

## EPIDEMIOLOGICAL ANALYSIS OF EXOGENOUS POISONING CASES IN THE STATE OF PIAUÍ FROM 2017 TO 2022

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*Stephanie Damasceno Araujo Matos*

Graduated in Medicine UESPI, Teresina, PI

*Adhonias Carvalho Moura*

Medical Student UESPI, Teresina, PI

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**Abstract:** Exogenous poisoning (IE) represents a set of clinical and symptomatic manifestations resulting from exposure to harmful chemical substances, being a global public health problem that causes morbidity and mortality. This study aimed to analyze the epidemiological profile of IE in the state of Piauí, classifying cases by sex, age group, toxic agent, circumstance and evolution. An epidemiological, documentary, observational, applied, descriptive and quantitative study was used, based on data from the Notifiable Diseases Information System (SINAN) accessed via DATASUS. The collected data was organized and analyzed with basic statistics, being presented in tables and graphs. The results showed a total of 10,788 cases of IE in Piauí between 2017 and 2022, with an annual average of 1,798 cases. The highest number of cases occurred in 2019 (22.58%), and the lowest in 2020 (12.48%), possibly due to underreporting during the COVID-19 pandemic. Women were most affected (64.01%) and the most common age group was 20 to 39 years old (40.45%). The main circumstance of EI was attempted suicide (47.70%), with medications being the most common toxic agents (58.95%). The majority of cases were confirmed by clinical criteria (64.18%) and the most common outcome was cure without sequelae (62.90%). Data analysis revealed that young women are more prone to EI, mainly due to suicide attempts using medication. These findings corroborate previous studies that show a tropism towards the female gender and the use of medication for self-extinction. Furthermore, the results highlight the importance of rapid clinical diagnosis for effective treatment. Final considerations indicate that the majority of EI cases are associated with mental disorders, suggesting the need to optimize mental health programs in primary care to prevent suicide attempts. Although the study showed the

reality of EI in Piauí, the analysis was hampered by incomplete data. It is hoped that this study will contribute to the literature and encourage the structuring of effective public policies for the prevention and treatment of EI.

**Keywords:** Exogenous poisonings; public health; epidemiology; biostatistics; suicide.

## INTRODUCTION

Exogenous intoxications (IE) can be described as a set of clinical and symptomatic manifestations that arise due to exposure to harmful chemical substances. These manifestations can be easily observed during the physical examination and medical interview, or can be identified only through laboratory tests. These EIs have harmful effects on the human body. Among the agents that most contribute to exogenous poisonings, we can mention pesticides, food, drinks, illegal drugs, rat poisons, cleaning products and medicines (Alvim et al., 2020).

Exogenous poisonings are considered a public health problem across the globe, as they cause morbidity and mortality and represent 5 to 10% of visits to emergency services. However, there is little reliable information about these events, which makes it difficult to accurately assess their impact on the population. There are more than 12 million chemicals catalogued, however, less than 25% of them are responsible for clinically relevant poisonings, whether accidental or intentional. The main categories of chemicals involved in clinical poisonings include legal and illegal drugs, cleaning products, agricultural products and pesticides, plants, industrial chemicals, and food substances. The correct identification of the toxic product and the precise assessment of potential damage are essential to establish an appropriate and effective therapeutic approach (Bonfim et al.203).

Poisoning can be divided into acute and chronic, according to the time between exposure to the toxic agent and the onset of clinical symptoms. Those clinical manifestations that occur less than 24 hours after exposure are considered acute, while chronic poisonings are those in which clinical symptoms manifest after this period of time. Approximately 70% of all clinical poisonings are acute, and the main form of exposure/contamination is oral, corresponding to almost 90% of all cases. In Brazil, around 60% of suicide attempts are caused by excessive medication intake and 20% by pesticides and pesticides, with the other causes being responsible for only 20% of cases. Excessive medication intake is also the main cause of suicide attempts in developed countries (Nery et al., 2020).

In this context, IE can be classified according to the clinical condition they trigger, such as mild acute intoxication (IAL), moderate acute intoxication (IAM), severe acute intoxication (IAG) or chronic intoxication (CI). AI is defined by the presence of headache, skin and mucous irritation, irritant contact dermatitis or hypersensitization, and there may also be nausea and dizziness. In the context of AMI, the patient may experience intense headache, nausea, vomiting, abdominal cramps, more intense dizziness, generalized weakness, dyspnea paresthesia, increased salivation and sweating (Bonfim et al., 2023).

In the case of severe acute poisoning, the most common manifestations are miosis, hypotension, cardiac arrhythmias, respiratory failure, acute lung edema, chemical pneumonitis, convulsions, changes in consciousness, shock, coma, which can lead to death. Chronic poisoning can affect various organs and systems, such as immunological, hematological, hepatic, neurological problems, congenital malformations and tumors (Bonfim et al., 2023; Sene et al., 2021).

According to a study by Alvim et al., (2020) from 2007 to 2017 in Brazil, 833,282 cases of exogenous poisoning were reported in female individuals (54.25%) and in those aged 15 to 39 years (54, 47%). The injuries were recorded mainly in the urban area (86.3%) of the Southeast region (47.65%). The main toxic agent was related to the use of medication (336,143) and attempted suicide (292,930) as the main circumstance. Of the total, 76.39% were cured without sequelae (Costa; Alonzo, 2019).

Given this, the general objective of the study was to analyze the epidemiological profile of cases of exogenous poisoning in the state of Piauí and the specific objectives: classify cases of IE according to sex, age group; catalog IE cases according to toxic agent, circumstance and evolution.

## METHODOLOGY

This study, as it used public data from the Notifiable Diseases Information System (SINAN), did not require approval from the Research Ethics Committee, but followed resolutions, number: 266/12 and number: 510/16 on research with human beings. This is an epidemiological, documentary, observational, applied, descriptive and quantitative study, based on data from SINAN, accessed via the DATASUS System.

The study covered reported cases of exogenous poisoning in the state of Piauí from 2017 to 2022. Data were collected digitally from SINAN-DATASUS, including variables such as sex, age group, circumstance, evolution, toxic agent.

The data was organized in Excel 2020 spreadsheets and analyzed using basic statistics and calculations of incidence, prevalence and mortality, being presented in tables and graphs. All cases reported during the period were included, excluding only patients who were not residents of the state.

The risks of the study were minimal, without direct interventions or collection of sensitive information, minimizing the possibility of identifying the subjects. However, the risks related to research lie in possible data fluctuations or incompleteness on the government platform. The benefits include understanding the reality of exogenous poisonings in Piauí and the potential contribution to the formulation and/or optimization of appropriate public health policies that contain this problem and minimize associated morbidity and mortality.

## RESULTS AND DISCUSSION

The study presented a total of  $n=10,788$  confirmed cases of exogenous poisoning in the state of Piauí, representing an annual average of 1,798 cases. Graph 1 shows the confirmed cases of exogenous poisoning, according to the year of occurrence, in the state of Piauí during the years 2012-2022.



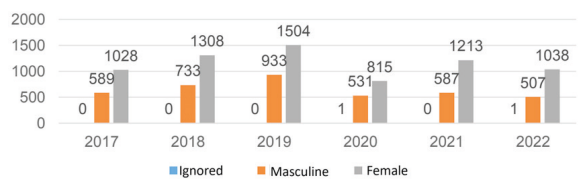
Graph 1: Confirmed cases of exogenous poisoning, according to the year of occurrence. Piauí. 2017-2022 ( $n= 10,788$ ).

Source: Adapted Ministry of Health/SVS-Notifiable Diseases Information System - Sinan Net.

When analyzing the data presented in graph 1, it was possible to observe that the year with the highest number of IE cases was 2019, with  $n=2,437$  (22.58%) confirmed cases in the state of Piauí, followed by the year 2018 with  $n=2,041$  (18.90%) confirmed cases. The year with the lowest number of registered cases was the year 2020 with only 1,347 confirmed cases (12.48%), followed by the year 2022 with 1,546 (14.46%) confirmed cases.

The data from the present study are in line with the literature. Dias et al. (2022), shows their epidemiological study on exogenous poisonings in the state of Rondônia, that the drop in IE notifications during 2020 was not a real drop, but rather a reflection of the underreporting of cases that occurred during the pandemic period. Antsy; Brito; Neto (2022) in his study on the underreporting of illnesses during the pandemic, showed that there was a reduction in notifications of practically all types of compulsory notification diseases, in the pandemic years, since all the efforts of health professionals were focused on containing COVID-19.

Graph 2 presents the confirmed cases of exogenous poisoning, according to the year of occurrence and sex in the state of Piauí during the years 2012 to 2022.



Graph 2: Confirmed cases of exogenous poisoning, according to year of occurrence and sex. Piauí. 2017-2022 ( $n= 10,788$ ).

Source: Adapted Ministry of Health/SVS-Notifiable Diseases Information System - Sinan Net.

When analyzing graph 2, it is possible to observe that the sex with the highest number of cases was female with  $n= 6,906$  (64.01%). Males presented  $n= 3,880$  cases (35.96%).

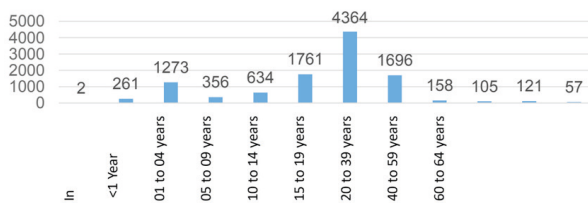
Regarding the analysis of the graph, the data in question corroborate the studies by Soares *et al.*, (2021) and Silva *et al.*, (2020). In their analysis of exogenous poisonings that occurred in Brasília, Soares *et al.*, (2021), observed that the average proportion of cases was 2.07 women (M) poisoned for each man (H), and this rate reached its maximum peak in 2017, with a ratio of 2.54 (M/H), Silva *et al.*, (2020), whose study took place in the state of

Piauí showed that females are four times more likely to attempt suicide than males. male and that these attempts at self-extermination are common through the use of medication, which configures the EI situation, therefore, women are ahead compared to male individuals.

Still according to Silva's study *et al.*, (2020), men, when attacking their own lives use violent means, while women use medications, therefore, the majority of cases of exogenous poisoning will occur in females. This reality also corroborates Guimarães' study; Lopes (2019) in which it was shown that in the state of Tocantins, in 2016, 70.13% of cases of exogenous poisoning occurred in females. These data corroborate the fact that most cases of IE occur in females, in addition, these cases, for the most part, are linked to attempts at self-extermination.

Parallel to this, the historical series of reported cases shows that annually the number of female cases is higher than the number of male cases, once again proving Silva's studies *et al.*, (2020) and Guimarães; Lopes (2019), who also found that annually, the number of cases in females is higher than in males, therefore, a tropism in relation to gender was noted annually.

Graph 3 analyzes the number of confirmed cases of exogenous poisoning from 2012 to 2022 in the state of Piauí, according to age group.



Graph 3: Confirmed cases of exogenous poisoning, according to age group. Piauí. 2012-2022 (n= 10,788).

Source: Adapted Ministry of Health/SVS-Notifiable Diseases Information System - Sinan Net.

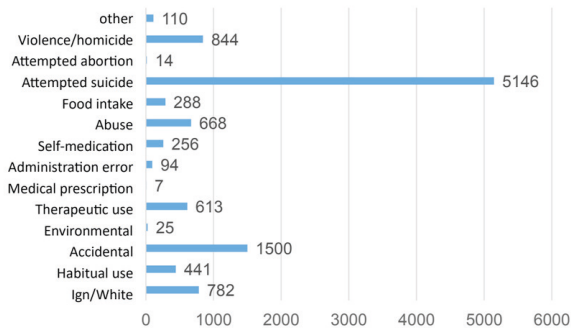
Graph 3 shows the reported cases of Exogenous Poisonings, according to age group, Piauí, 2017 to 2022. When observing the data in the graph, it is possible to infer that the age group with the highest number of cases was that of 20 to 39 years old with n= 4,364 cases (40.45%), and in second place was the age group of 15 to 19 years old with n=1,761 (16.32%).

Guimarães; Lopes (2019) in his study showed that the largest number of cases occurred in the age group of 20 to 39 years, as in the present study, however, such data differed from the research by Alvim et al. (2020) and Aguiar et al. (2020) in which the age group from 01 to 04 years old had the highest number of cases. However, the literature reports that the most affected age groups are children aged 0 to 4 years, and young adults, however, each group has distinct particularities, as young children generally suffer from accidental poisoning due to the ingestion of sanitizers or other products unsuitable for consumption, adult individuals intentionally become intoxicated through the use of medication in suicide attempts.

Silva et al., (2020) show this reality, in which the majority of cases observed in their study are linked to medication abuse, especially committed by women in the middle age group. 20 to 39 years old, As observed and corroborated by Melo, et al. (2020), which highlight the high number of EI in women and their propensity to commit these types of suicidal acts, especially through drug intoxication, since the age group from 20 to 39 years old represents individuals in young adulthood and who suffer greater social and work pressures, in addition to playing different roles that require demands and many of these individuals do not They have sufficient resilience and end up becoming mentally ill, which justifies the use of medication.



Graph 4 shows the cases of exogenous poisoning in the state of Piauí according to the circumstances of the poisoning, in the period of 2012 to 2022.



Graph 4: Confirmed cases of exogenous poisoning, depending on the circumstance. Piauí. 2017-2022 (n= 10,788).

Source: Adapted Ministry of Health/SVS-Notifiable Diseases Information System - Sinan Net.

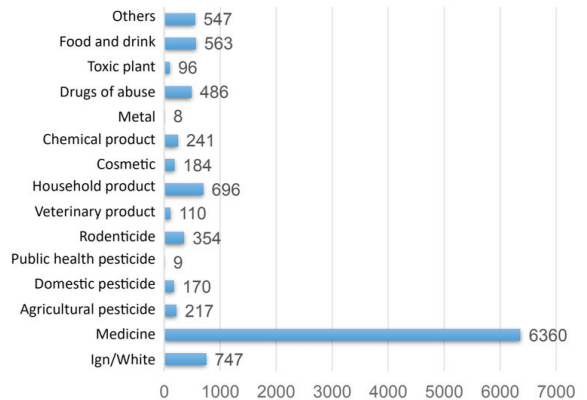
When analyzing the graph4 it was possible to observe that the largest number of exogenous poisonings occurred due to attempted suicide with n=5,146 cases (47.70%) of cases, followed by accidental poisonings with n=1,500 (13.90%). The lowest number of IE occurred due to medical prescription with n=7 cases (0.06%).

This reality can be confirmed by the study of Guimarães; Lopes (2019) in which 51.58% of the observed cases of IE occurred in suicide attempts, in addition, this fact is corroborated by the studies of Teixeira et al., (2020), is that 70% of the analyzed cases of IE were of suicide attempts. Just like the studies by Gomes et al. (2020), Coslop; Quinte; Antunes, (2019) and Miranda et al., (2020), which showed that most cases of EI occurred in suicide attempts, especially due to medication abuse.

Miranda et al., (2020) showed that 3,400 (2015 to 2020) cases of attempted suicide using toxic agents were detected in the state of Piauí; and, through this total, it was found that 76.18% were female, 53.35%, this corroborates the literature that the majority

of EI occurs in women, especially in attempts at self-extinction and through abusive use of medications, especially the use of benzodiazepines.

The graph5 presents cases of exogenous poisoning in the state of Piauí according to the toxic agent, referring to the period from 2017 to 2022.



Graph 5: Confirmed cases of exogenous poisoning, according to the evolution of cases. Piauí. 2017-2022 (n= 10,788).

Source: Adapted Ministry of Health/SVS-Notifiable Diseases Information System - Sinan Net.

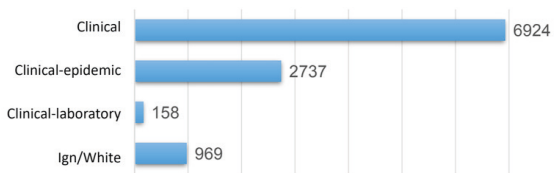
By observing graph 5, it is possible to identify that the most common toxic agent was medicines with n= 6,360 (58.95%). This toxic agent accounts for more than half of IE cases, which represents a high number of cases related to a single intoxicating agent, especially when compared to the second most common toxic agent, which were products for home use with n=696 (6.45%).

The analysis of the table corroborates the studies by Melo et al. (2020) and Alvim et al. (2020) who showed that the highest number of EI is related to the use of medications, which is also in line with other studies that show that females are the ones with the highest numbers of EI and that these EI are caused, in the majority, through medication ingestion, either accidentally (self-medication with high dosages) or intentional, such as attempts at

self-extirpation as proposed by Miranda et al. (2020) in their study on female suicides through EI, in the state of Piauí.

These data also corroborate the study of Teixeira et al., (2020), where 70% of the EI cases analyzed were suicide attempts, and the studies by Gomes et al. (2020), Coslop; Quinte; Antunes, (2019) in which the main toxic agent was also medications and that these are related to suicide attempts.

Graph 6 shows the confirmed cases of exogenous poisoning in the state of Piauí during the years 2017 to 2022, according to confirmatory criteria.



Graph 6: Confirmed cases of exogenous poisoning, according to confirmatory criteria. Piauí. 2017-2022 (n= 10,788).

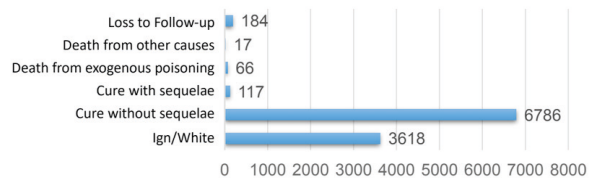
Source: Adapted Ministry of Health/SVS-Notifiable Diseases Information System - Sinan Net.

When analyzing what was evidenced by graph 7, it was possible to verify that the most common type of confirmatory criterion was the clinical criterion with n=6,924 cases (64.18%), followed by clinical-epidemiological criteria with n=2,735 cases (25.35%). The least used criterion was the clinical-laboratory one with n=158 cases (1.46%).

This data corroborates the study by Teixeira et al., (2020) in which there were n=2,484 cases of IE confirmed by the clinical method, which was equivalent to 96% of the cases found in their study. This reality configures the fact that the clinical practice of exogenous intoxications is exuberant, in addition to that, the clinical associated with epidemiology (second most used criterion) shows that the majority of IE cases occur through suicide attempts due to the use of medication and that detoxification

and assistance actions must be emergency, as the time available is reduced, therefore, clinical criteria are essential for rapid therapy, while waiting for laboratory confirmation is incompatible with the emergency situation.

Graph 7 shows the confirmed cases of exogenous poisoning in the state of Piauí during the years 2017 to 2022, according to the evolution of the case.



Graph 7: Confirmed cases of exogenous poisoning, according to evolution. Piauí. 2017-2022 (n= 10,788).

Source: Adapted Ministry of Health/SVS-Notifiable Diseases Information System - Sinan Net.

When analyzing the graph, it is observed that the most common evolution was cure without sequelae with n=6,786 cases (62.90%). This represents more than half of the number of poisoning cases. The smallest number of cases were deaths from another cause with n= 17 cases (0.15%).

According to the study by Almeida et al., (2020), healing without sequelae is the most observed evolution in cases of exogenous poisoning, as current medicine is capable of reversing most cases of these poisonings, especially due to epidemiology and clinical. In these cases, we can quickly suggest appropriate therapy. Furthermore, therapy occurs satisfactorily, either through the administration of antidotes or through detoxification techniques such as gastric lavage with activated charcoal and other procedures carried out with the aim of detoxifying the body.

According to Miranda et al., (202) deaths resulting from exogenous poisoning are commonly associated with delays in medical

access or consequences of diseases associated with this. These generally occur in children who accidentally ingest cleaning products or women who ingest medication in an attempt to exterminate themselves due to depression and other mental disorders. These patients are the most likely to die from exogenous poisoning.

## FINAL CONSIDERATIONS

The epidemiological profile of individuals who presented exogenous poisoning in the state of Piauí from 2017 to 2022 was composed of female individuals of 20 to 39 years old, most of which occurred due to attempted suicide; the most common intoxicating agent were medicines; the most used criterion for diagnosing cases was the clinical criterion. The most common evolution was cure without sequelae.

As the majority of reported cases occur in circumstances of attempted suicides, it was noted that the root of the problem is not only found in the consumption of medication, but in a more serious problem associated with mental disorders, therefore, to intervene in the prevention of grievance, it is up to health authorities to optimize programs within the scope of primary care to locate, treat, or refer cases of mood disorders that may result in attempts at self-extermination.

The study showed the reality of cases of exogenous poisoning in the state of Piauí, however, during the preparation of the research, poorly recorded data with a blank number or that did not apply acted as obstacles to data analysis and, consequently, to inference. The picture of exogenous poisonings in Piauí. Furthermore, the study is expected to contribute to the literature in a broader way and encourage the optimization and structuring of public policies aimed at containing the problem.

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