

EPIDEMIOLOGY AND VULNERABILITIES OF TRADITIONAL POPULATIONS OF THE AMAZON RELATED TO SCORPION ACCIDENTS



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ABSTRACT

Epidemiology is an instrument for identifying relevant health problems, evaluating their determinants and conditioning factors. The vulnerabilities of the traditional populations of the Amazon in the face of scorpion accidents need attention from the public authorities. The objective of this study was to investigate the epidemiological aspects and vulnerabilities of traditional populations in the Amazon related to scorpion accidents. This is a descriptive, multi-method, cross-sectional study carried out in the municipality of Santarém-Pa. The first quantitative stage was carried out by the SINAN database, from 2019 to 2023, in the second stage, qualitative, interviews were carried out with victims of scorpionism, with descriptive and content statistical analysis carried out, respectively, for the different stages. The study was approved by the CEP of the State University of Pará under CAAE No.: 72294123.6.0000.5168. From 2019 to 2023, there were 926 cases of scorpion accidents in Santarém PA. 64.80% were male, aged between 18 and 64 years (70.73%), 65.77% were from the rural area and 23.76% from the urban area. Aspects of vulnerabilities: individual and social and programmatic susceptibilities emerged specific to these traditional populations. Epidemiology revealed that in Santarém, scorpion accidents can cause neuromuscular manifestations, such as myoclonus, fasciculation and a sensation of electric shock through the body. In view of the vulnerabilities, scorpionism is a socially determined phenomenon, since it mainly affects people who live in conditions of greater vulnerability and the possibilities to face it are also different, including access to health services. The study brought an in-depth view of scorpion accidents in Santarém-PA, focusing on the epidemiological aspects and vulnerabilities that affect traditional populations in the Amazon. The limitation of access to immediate care with anti-scorpion serum in health services reinforces the need to improve the response to scorpionism, especially in remote areas.

Keywords: Scorpio, Scorpion accidents, Vulnerabilities.

INTRODUCTION

Epidemiology is an essential instrument for the identification of relevant health problems, evaluating their determinants and conditioning factors. Epidemiological studies play an important role in the sciences and public health, allowing us to understand how diseases move, are distributed, and what factors influence their occurrence. In addition, they provide indispensable technical information to support decision-making and the formulation of public policies at different levels of government (BARATA, 2013).

From this perspective, the vulnerabilities of traditional populations in the Amazon in relation to accidents by venomous animals, especially accidents by scorpions, need greater attention. Assessing these vulnerabilities is crucial to develop effective strategies that can address health problems and minimize the increase in these accidents among these populations (OLIVEIRA, 2018; CARDOSO, 2020).

In recent years, Brazil has seen a significant increase in notifications of accidents by scorpions. According to data from the Ministry of Health, there has been a 149.3% increase in notifications in the last 10 years, making scorpions the main responsible for envenomations registered in the Notifiable Diseases Information System (SINAN) since 2004 (BRASIL, 2022; BRAZIL, 2010). This increase reflects not only the higher incidence, but also the need for a more effective response from health authorities.

The municipality of Santarém, in the state of Pará, serves as an example of this reality. In 2019, 121 scorpion accidents were recorded in the municipality, with emphasis on rural communities, which are more exposed to these diseases due to conditions of social and economic vulnerability (XAVIER, 2021). This study seeks to investigate the scorpion accidents that occurred in Santarém, integrating epidemiological aspects, vulnerabilities, environmental and social elements that affect the traditional populations of the Amazon. In addition, it proposes strategies to improve the development of public policies aimed at these communities.

Traditional populations in the Amazon often live in precarious conditions, which makes them more susceptible to scorpion accidents. Lack of access to adequate health services, insufficient basic sanitation infrastructure, and limited opportunities for economic development are factors that aggravate this situation. Low education and misinformation about the risks associated with scorpions also contribute to the vulnerability of these populations. Often, victims seek medical attention only after symptoms worsen, increasing the risk of serious complications, such as myoclonus and fasciculations (OLIVEIRA, 2018).

The relationship between the environment and health is an essential aspect to be considered. Climate change, such as rising temperatures and changes in precipitation patterns, has a direct impact on the distribution and proliferation of scorpion species. In addition, disorderly urbanization and demographic expansion lead human populations to invade habitats previously occupied by these animals, increasing the risks of accidents (CARDOSO, 2020).

Given this scenario, it is essential that public policies are developed with a holistic view. The promotion of health education programs, the expansion of access to medical services, the improvement of basic sanitation infrastructure and the encouragement of socioeconomic development are priority actions. These measures not only mitigate the risks associated with scorpion accidents, but also promote improvements in the quality of life of affected populations (CAVALCANTI; MELO, 2021).

This study seeks not only to understand the magnitude of the problem of scorpion accidents in Santarém, but also to contribute to the formulation of effective and sustainable strategies. The analysis of the information collected will allow the identification of patterns and risk factors, providing subsidies for interventions that meet the needs of the traditional populations of the Amazon.

In this context, scorpion accidents in traditional populations of the Amazon represent a complex problem, which requires an integrated and intersectoral approach. The articulation between health, environment and social development is fundamental to face the challenges faced by these communities. This study aims to contribute to a deeper understanding of the vulnerabilities faced and to the creation of public policies that effectively protect and promote the health and well-being of these populations.

METHODOLOGY

This is a descriptive study, with a multimethod approach, since the quantitative method is the one characterized by the use of quantification, both in the collection and in the treatment of information, using statistical techniques, aiming at results that avoid possible distortions of analysis and interpretation, allowing a greater margin of safety. The qualitative method, in turn, describes the complexity of a given problem, and it is necessary to understand and classify the dynamic processes experienced in the groups, contributing to the process of change, enabling the understanding of the most varied particularities of individuals, not using statistical technique (MINAYO, 2010).

The first stage of the study was therefore carried out with data made available through the Notifiable Diseases Information System (SINAN) and in the local records of the Health Surveillance Division (DIVISA) of Santarém, Pará, which is responsible for archiving and organizing the notifications in the researched region. The period was from 2019 to 2023. Variables of interest that are included in the investigation form made available by SINAN to health sites were used. This notification form includes sociodemographic, clinical and classificatory variables in order to generate pertinent and reliable data about the objective proposed by the study, namely: variables of demographic and epidemiological importance such as origin, age, gender, work activity and education of the patient, place of occurrence of the accident (work, leisure, home), time (hours) between the accident and care, and month in which the accident occurred.

Variables of clinical importance were also captured: bite site, local and systemic symptoms and signs, accident classification, neurological and/or muscular clinical manifestations: myoclonus, dizziness, cerebellar ataxia, dysdiadochokinesia, nystagmus, vomiting; treatment instituted and evolution of the case.

For the analysis of vulnerabilities, the study was developed in the Fluvial FHS linked to the Municipal Health Department, and in the FHS Jucileide Ferreira de Oliveira, located in the Aldeia neighborhood, a reference for the care of traditional populations of the Amazon in the urban area of the municipality of Santarém, with authorization from the Municipal Health Department. To this end, a research protocol was used to carry out the interviews.

The analysis of quantitative data used descriptive statistics, while the analysis of qualitative data was based on Bardin's content analysis (MINAYO, 2010).

The study was approved by the Ethics Committee of the State University of Pará Campus XII Santarém and approved under opinion number 6.298.313 CAAE: 72294123.6.0000.5168.

RESULTS

FIRST STAGE: QUANTITATIVE STUDY

Table 01: Sociodemographic profile of patients injured by scorpions in the municipality of Santarém-PA, from 2019 to 2023.

Variables	Quantity (N)	Percentage (%)
SEX		
FEMALE	326	35,20%
MALE	600	64,80%
AGE GROUP		
0 TO 5 YEARS	70	7,56%
6 TO 12 YEARS	70	7,56%

13 TO 17 YEARS OLD	53	5,72%
18 TO 64 YEARS OLD	655	70,73%
65 YEARS +	78	8,43%
ZONE		
URBAN	220	23,76%
RURAL	609	65,77%
URBAN/RURAL	52	5,61%
IGNORED	45	4,86%

Source: Prepared by the authors, 2024.

Table 02: Epidemiological history of patients injured by scorpions in the municipality of Santarém-PA, from 2019 to 2023.

Variables	Quantity (N)	Percentage (%)
ELAPSED TIME STING/ATTENDANCE		
0 TO 1 HOURS	77	8,32%
1 TO 3 HOURS	374	40,39%
3 TO 6 HOURS	235	25,38%
6 TO 12 HOURS	72	7,77%
+ 12 HOURS	41	4,43%
IGNORED	94	13,71%
LOCAL CHOPPED		
HEAD	35	3,78%
ARM	25	2,70%
FOREARM	17	1,84%
HAND	224	24,20%
FINGERFINGER	155	16,74%
TRUNK	24	2,59%
THIGH	16	1,73%
LEG	53	5,72%
FOOT	219	23,65%
TOE	96	10,36%
IGNORED	62	6,69%
ACCIDENT CLASSIFICATION		
LIGHTWEIGHT	404	43,63%
MODERATE	393	42,44%
GRAVE	107	11,55%
IGNORED	22	2,38%

Source: Prepared by the authors, 2024.

Table 03: Clinical data of patients injured by scorpions in the municipality of Santarém-PA, from 2019 to 2023.

Variables	Quantity (N)	Percentage (%)
LOCAL SYMPTOMS		
YES	876	94,60%
NO	24	2,59%
IGNORED	16	1,73%
UNANSWERED	10	1,08%
SYSTEMIC SYMPTOMS		
YES	193	20,84%
NO	707	76,35%
IGNORED	26	2,8%

Source: Prepared by the authors, 2024.

Table 04: Clinical data on Local symptoms of patients injured by scorpions in the municipality of Santarém-PA, from 2019 to 2023.

Variables	Quantity(N)	Percentage (%)
LOCAL SYMPTOMS		
DOR	864	98,63%
EDEMA	305	34,82%
MYOCLONUS	241	27,51%
PARAESTHESIA	180	20,55%
BRUISE	14	1,59%
DORMANCY	9	1,03%
NECROSIS	5	0,58%
BLAZING	1	0,11%
PUPULENT SECRETION	1	0,11%

Source: Prepared by the authors, 2024.

Table 05: Clinical data on Systemic symptoms of patients injured by scorpions in the municipality of Santarém-PA, from 2019 to 2023.

Variables	Quantity(N)	Percentage (%)
NEUROLOGICAL	56	29,01%
WANDERING	48	24,87%
MYOTOXIC	19	9,84%
KIDNEY	9	4,66%
AGITATION	9	4,66%
DYSARTHRIA	9	4,66%
CHANGE OF FC/FR/PA	7	3,62%
MENTAL DISORIENTATION	6	3,11%
ELECTRIC SHOCK	4	2,07%
HEADACHE	1	0,52%
ATAXIC MARCH	1	0,52%

Source: Prepared by the authors, 2024.

Table 06: Therapeutic data of patients injured by scorpions in the municipality of Santarém-PA, from 2019 to 2023.

Variables	Quantity (N)	Percentage (%)
TREATMENT		
SORO	529	57,13%
WITHOUT SERUM	385	41,57%
IGNORED	12	1,30%

Source: Prepared by the authors, 2024.

Table 07: Evolution of patients injured by scorpions in the municipality of Santarém-PA, from 2019 to 2023. N=926.

Variables	Quantity (N)	Percentage (%)
EVOLUTION		
HEALING	769	83,04%
CURE WITH SEQUELAE	1	0,11%
DEATH	1	0,11%
IGNORED	155	16,74%

Source: Prepared by the authors, 2024.

SECOND STAGE: QUALITATIVE STUDY

Four (04) patients who were victims of scorpionism in the region of Santarém-Pa participated in the interview. The interview revealed different aspects of vulnerabilities as found in the following table:

Chart 1: Elements of Vulnerability of Patients Victims of Scorpionism, second quarter of 2023, Santarém-Pará, Amazonia, Brazil

Programmatic Vulnerability	Individual Vulnerability	Social Vulnerability
<ul style="list-style-type: none"> - Anti-scorpion serum only at the Municipal Hospital of Santarém-Pará - 50% reported having been instructed about scorpion accidents by health professionals, the vast majority of whom were nursing professionals and community health agents. - Deficit of information from the health team focused on scorpion accidents, especially about clinical manifestations and signs of severity. 	<ul style="list-style-type: none"> - Men living in the rural area mostly (Planalto and floodplain region), elementary school, farmers, brown, age group over 60 years old, income of up to one minimum wage; - 50% know and know how to prevent and what to do when being a victim of a scorpion accident. 	<ul style="list-style-type: none"> - All participants in the sample declared that they had their home, without sewage and although most of them had garbage collection, there are still patients who do not have this collection, throwing it into the environment and burning. - Women who live with their partners, being the provider of the family with elementary education; - Reside with 6 or more family members - They do not participate in the activity of the traditional people or community; - Most victims practice complementary therapies such as the use of medicinal plants combined with assistance to scorpion accidents.

Source: Prepared by the authors, 2024.

The thematic categories that emerged from the interviews were related to care practices and the experiences of caring action at the time of the scorpion accident, as described below:

Care practices performed by victims of scorpion accidents in the Amazonian context

Victims of scorpion accidents reported seeking different strategies for care, as mentioned in the following grafts:

"I killed the scorpion" (E 01)

"I looked for the health unit in my community and I looked for the Municipal Hospital of Santarém, despite the distance and I asked for help from my son, because it is the place where the serum is available" (E02)

"I took medication, which I had at home and teas that relieved the pain" (E03)

"I didn't seek help, the pain passed, my accident was mild" (E04)

Experiences of the caring action of traditional populations of the Amazon in the face of scorpionism

Through reports from the victims of scorpion accidents, we noticed that, in some cases possibly classified as mild accidents, the patients performed any care or took measures at home, or guided by a family member. In other cases, which can be considered moderate or severe, which cause expressive neuromuscular symptoms such as the sensation of electric shock, myoclonus, pain, typical of accidents caused by *T. strandi* and *T. obscurus* (Silva de Oliveira et al., 2020), lead victims to seek the basic health unit in their territory or nearby and the Municipal Hospital of Santarém, as reported below:

"Only the pain at the site, there was no reaction, no reaction. I didn't do anything"
(E 01)

"Yes, I had low blood pressure, many tremors"... "Against the poison I took coal with charcoal. "... "I took medicine against the poison bought at the pharmacy, I took it for 3 days"

(E 02)

"I had a sensation of electric shock, almost immediately and it only disappeared after 1 year of the accident, for me" (E03)

"Treatment with scorpion serum was done immediately upon arrival at the Hospital"... Bad experience, I immediately went to the hospital for help, I had intense shocks." Terrible feeling of this accident.. I thought I was going to die..." (E04)

DISCUSSION

In the period of the quantitative study carried out between 2019 and 2023, 926 cases of scorpion accidents were recorded in the municipality of Santarém-PA. When analyzing the regions of occurrence, a significant occurrence is noted in the rural area (65.77%), however, there is adaptation of these animals to the urban environment, with 23.76% of the cases registered in this zone. With regard to gender, men showed a higher frequency with (64.80%), with a considerable discrepancy with women (35.20%), indicating the influence of the most prevalent work modalities by each sex and their area of activity, as discussed by Lourenço (2002). With regard to the age group, ages under 5 years represent 7.56% of the registered cases, with the highest prevalence being adults between 18 and 64 years old and, consequently, the elderly with 8.43%. Thus, men, workers and/or residents of rural areas characterize a population more prone to the occurrence of accidents with scorpions, due to their advance in the areas of incidence of these animals (TAKEHARA, et al., 2023).

Regarding the time of care after the scorpion accident, it is recorded that it is done in 40.39% of the cases between 1 and 3 hours and in 25.38% between 3 and 6 hours. And when observing the most prevalent places on the body for such accidents, there is a

predominance of the hand (24.20%), and fingers (16.74%), followed by standing (23.65%) and toes (10.36%). Thus, for Cardoso (2020), since the habitat of scorpions is dark and hidden places, especially in the northern region, this is related to the probable sites of sting, since the body extremities are the first to reach objects and are generally unprotected in contact with the external environment, both in daily and work activities (CARDOSO, 2020).

Clinically, local symptoms have a prevalence of 94.60% in the cases analyzed in this study, as already described by Torrez et al. (2015), with a discrepancy regarding systemic symptoms (20.84%). Locally, pain is mainly observed (98.63%); edema (34.82%); myoclonus (27.51%) and paresthesia (20.55%).

The severity of the cases is related to the composition of the venom, the synthetic effects of the species and the age group of the victim, as children under five years of age and the elderly are more severely affected. Therefore, the cases in the age group between 0 and 5 years analyzed in this study had a mild classification (57.14%), however, the severe cases (10%) had symptoms such as agitation, disorientation and generalized myoclonus, in addition to presenting one death in this age group. As for the elderly – over 65 years old – 47.44% had mild cases, 39.74% moderate cases and 11.54% severe cases; in this group, the evolution of systemic symptoms involved agitation, disorientation, dysarthria, heart rate changes (tachypnea and hypertensive crisis) and breathing (tachypnea), headache and gait changes. GOYFFON, 2008)

Thus, mild cases tend to be self-limited clinical conditions, with cure progressing only with the use of symptomatic patients and hydration; moderate and severe cases, when managed early and with an antidote, also have a good prognosis and, finally, severe cases, although they have several risk factors, have a good response to serum therapy, if there is immediate care to neutralize the amount of venom received (OLIVEIRA, 2018).

Vulnerability is considered the chance of exposing people to illness as a result of a set of aspects that are not only individual, but collective, contextual, which lead to greater susceptibility to infection and illness (AYRES et al., 2003).

The predominance of scorpion accidents among males is due to the fact that they are active in the work involving the use of materials that can accumulate the scorpions or are in the field work, another conditioning factor that can contribute is climate change, as well as the influence of demographic expansion, due to the population is entering more places that are shelters for these animals (CORDEIRO, 2021; LUCION, 2022).

In this perspective, it is notable that most people exposed to accidents are with low education, low income who need to work in the field for subsistence, another factor is age, as 50% of the participants in this study are elderly people over 60 years old, which makes them more vulnerable to various accidents (TORREZ, et al., 2020).

Other factors, which can also increase the susceptibility to accidents with scorpions, involve poor basic sanitation conditions, irregular garbage collection or lack thereof, lack of adequate protection at work, leisure environments, the attempt to kill the scorpion after the accident can expose people. Such factors are directly linked to individual vulnerability, as well as difficult access to health units, difficulty in accessing specific serum at the health unit closest to the victims, especially in rural communities, and the delay in waiting for medical care and lack of knowledge about the importance and purpose of antivenom (CARDOSO, 2020; TORREZ, et al., 2020).

Individual and social vulnerability is evidenced in several aspects: little knowledge about scorpion behavior and preventive measures, low education (including illiteracy), low professional qualification, informal work, precarious living conditions (lack of running water, electricity and sewage). The material conditions of life and work can bring out or deepen vulnerabilities, which allows us to understand the behaviors and actions that are related to the exposure of individuals to scorpion accidents. Thus, access to information, and the possibilities of understanding such factors and the power to incorporate them into changes in attitudes, do not depend only on people, but also on the assistance of the public authorities (TORREZ, 2016).

In some regions of the Amazon, scorpionism can cause neuromuscular manifestations, such as myoclonus, fasciculation, and a sensation of electric shock through the body, which are not observed in other parts of the country. Patients who have a shock or systemic sensation could be considered moderate and patients who have acute brain dysfunction, with or without muscle and kidney manifestations considered severe (TORREZ, et al., 2020).

The sensation of electric shock can begin immediately after the bite, or later: from 30 minutes to 100 hours after the accident. In view of the vulnerabilities, scorpionism is a socially determined phenomenon, since it mainly affects people who live in conditions of greater vulnerability and the possibilities to face it are also different, including access to health services (OLIVEIRA, 2018).

In relation to traditional populations, low education (illiteracy), few professional skills, precarious housing conditions, difficulty in accessing health units, absence or little information regarding rescue measures after scorpion accidents stand out. Corroborating these highlights about the riverside populations, most of the care provided at the local Hospital came from the rural area, due to the working conditions performed by these people, the work in the fields (OLIVEIRA, 2018).

In this way, riverside communities face several challenges in their daily lives due to the lack of access to public policies, especially in health and education. Primary care services are limited, and even when riverside dwellers have access to the urban area of the municipality, the length of stay is short to provide the necessary care (SALAZAR et al., 2022).

The lack of records for care, professionals and community health agents aggravates the situation. In addition, the low education of riverside dwellers directly implies the management of their health, limiting economic development and access to essential consumer goods, such as food and medicines (GUIMARÃES; COLLABORATORS, 2020). Another factor highlighted by Salazar et al. (2022) is the absence of basic sanitation and infrastructure in the treatment of drinking water and deficient housing conditions, leaving them vulnerable. The riverside dwellers suffer from the silting up of the rivers, making it difficult to transport and work with fishing, the main means of family income (SALAZAR; COLLABORATORS, 2022)

These interconnected challenges affect the quality of life of riverside communities, a holistic view of these vulnerabilities presented related to riverside populations must be sought, starting from a deep understanding of the problems created and maintained public policies aimed at improving access to health and education services, expanding basic sanitation infrastructure, promoting economic and social development, as well as protecting the environment and natural resources so that it can meet the basic needs of these riverside communities (CAVALCANTI; MELO, 2021).

It is also noteworthy that the highest occurrence of accidents is during the working period. Regarding adequate treatment, greater attention to areas of susceptibility is highlighted, so it is important to have decentralization in the supply of serum, and training of professionals to care for accidents, and the ease of offering health services, with regard to help in the time between the accident and adequate care, for better results in the evolution of health recovery (OLIVEIRA, 2018).

CONCLUSION

This study addressed the epidemiological, environmental, cultural and programmatic aspects related to scorpion accidents in Santarém-PA, evidencing the vulnerability of traditional populations in the Amazon. It was found that these accidents are more common among rural workers and in areas affected by deforestation and improper garbage disposal. In addition, cultural practices, such as the use of home remedies, and resistance to formal medical care highlight the need for more integrated public health strategies.

The study also identified social vulnerabilities, such as low education and precarious socioeconomic conditions, and limitations in health services, such as the lack of anti-scorpion serum and inadequate infrastructure. To mitigate the impacts of scorpionism, it is essential to implement intersectoral public policies, focusing on the decentralization of care and training of health professionals.

Continuous epidemiological surveillance and the integration of new scientific knowledge with community practices are key to an effective response to scorpionism. In summary, educational, inter-institutional and infrastructure improvement actions can significantly reduce accidents and protect the most vulnerable populations in the region.

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