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EPIDEMIOLOGICAL ANALYSIS OF SCHISTOSOMIASIS IN THE MUNICIPALITY OF EUNÁPOLIS (BA): A DESCRIPTIVE STUDY BASED ON SURVEILLANCE DATA FROM 2017 TO 2022

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Abstract: Schistosomiasis is a parasitic endemic disease caused by the helminth Schistosoma mansoni, whose transmission cycle involves humans as the definitive host and snails of the Biomphalaria genus as intermediate hosts. In Brazil, its persistence is directly linked to poor sanitation and frequent exposure to contaminated freshwater bodies, especially in socioeconomically vulnerable regions. This study aimed to characterize the epidemiological profile of schistosomiasis in the municipality of Eunápolis, Bahia, from 2017 to 2021, in order to support targeted surveillance and control strategies. This is a descriptive, quantitative, and cross-sectional research based on secondary data from the Notifiable Diseases Information System (SINAN) and the Schistosomiasis Control Program (PCE). Data were analyzed using Microsoft Excel spreadsheets, with calculations of prevalence, incidence, and relative frequency. A total of 113 confirmed cases of schistosomiasis were recorded during the study period, predominantly among males (54.9%) aged between 30 and 59 years. The years 2017 and 2018 showed the highest number of cases, followed by a declining trend in subsequent years.

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The neighborhoods with the highest relative frequencies were Pequi, Juca Rosa, and Alecrim II. The findings highlight the continued active transmission of schistosomiasis in the municipality, associated with structural factors such as lack of basic sanitation and occupational or recreational exposure to contaminated aquatic environments, emphasizing the need for active surveillance, health education, and intersectoral vector control actions.

Keywords: Schistosomiasis. Epidemiological Surveillance. Public Health. Eunápolis-BA.

Introduction

Schistosomiasis, also known as bilharziasis, is an infectious and parasitic waterborne disease caused by the trematode Schistosoma mansoni, whose occurrence still poses an important challenge to public health in Brazil. Its evolutionary cycle requires the presence of humans as the definitive host and mollusks of the genus Biomphalaria as intermediate hosts. Infection occurs through the active penetration of cercariae through human skin during contact with contaminated water collections, such as dams, rivers and streams (Luz Neto, 2003).

According to data from the Ministry of Health (Brasil, 2019), Brazil remains one of the main endemic areas in the world, concentrating most cases in the North and Northeast regions. Structural factors such as the precariousness of basic sanitation, direct contact with natural waters in the daily lives of vulnerable communities and the absence of health education contribute decisively to the maintenance of the disease cycle (Silva and Domingues, 2011 apud Jordão et al., 2014). According to Neves (2005), the spread of schistosomiasis in the Brazilian territory is also related to disordered internal migratory flows and the wide dispersion of mollusk vectors. Under these conditions, the simple coexistence between infected snails and contaminated human waste in aquatic environments becomes sufficient for the sustained spread of the disease.

The scientific literature demonstrates that schistosomiasis is profoundly determined by social, cultural, and occupational factors. According to Coura-Filho et al. (1994), activities such as fishing,

agriculture, washing clothes and bathing in rivers are directly associated with greater exposure to the infectious agent, especially in low-income areas. In addition, classic studies by Barbosa (1968) and the World Health Organization (1985), cited by Coura-Filho et al. (1995), already pointed out that the epidemiological profile of schistosomiasis is not restricted to biological aspects, but is part of a network of social influences related to the organization of the territory, leisure, culture and work. Although old, these authors are considered a founding reference in studies on the disease and remain current for elucidating the structuring elements of the transmission chain.

The absence of adequate sanitary infrastructure, the dependence on water bodies for consumption and hygiene, and the discontinuity of public policies to control schistosomiasis are still persistent realities in many Brazilian municipalities, including Bahia. Recent studies reinforce that, even with the expansion of control programs, the disease remains active in inland areas, revealing failures in surveillance and coverage of sanitation services (Chiles et al., 2020). In the state of Bahia, the endemic presence of schistosomiasis is historically documented, especially in municipalities in the extreme southern region, such as Eunápolis, which is part of the so-called Discovery Coast. Despite this, local data on the prevalence, incidence, and sociodemographic profile of the disease remain limited.

In Eunápolis, a municipality with an estimated population of more than 115 thousand inhabitants and still deficient sanitary sewage coverage, the socio-environmental conditions favor the maintenance of schistosomiasis transmission. The scarcity of local studies prevents accurate mapping of critical areas, hindering territorialized interventions and limiting intersectoral planning. In this context, it is urgent to produce updated epidemiological evidence that supports effective surveillance, prevention, and control actions.

In view of this scenario, the present study aims to analyze the epidemiological profile of schistosomiasis in the municipality of Eunápolis (BA), from 2017 to 2022, based on secondary data from official health information systems. By describing the temporal, spatial and sociodemographic distribution of reported cases, this research seeks to contribute to the strengthening of local

epidemiological surveillance, supporting the formulation of public policies oriented to the reality of the territory.

Methodology

This is a descriptive epidemiological study, with a cross-sectional design and quantitative approach, based on the analysis of secondary data from official health surveillance systems. The objective was to describe the behavior of schistosomiasis in the municipality of Eunápolis (BA), based on the occurrence, distribution, and frequency of cases reported between 2017 and 2022.

The study was carried out in the municipality of Eunápolis, located in the southern region of the state of Bahia, belonging to the Southern Bahia Mesoregion and the Porto Seguro Microregion. The municipality has a territorial extension of 1,179.126 km², with an average altitude of 189 meters and approximate geographic coordinates of 16°22'23'' south latitude and 39°34'30'' west longitude (IBGE, 2010; Amaral et al., 2018). It is characterized as an urban regional center with high socioeconomic heterogeneity and areas with insufficient health coverage, factors known to be associated with the maintenance of the schistosomiasis cycle.

The data sources used were the records of the Notifiable Diseases Information System (SINAN) and the Schistosomiasis Control Program (PCE), accessed from the Municipal Health Department of Eunápolis. These databases provided information on the number of confirmed cases, year of notification, gender, age group, neighborhood of residence, and location of individuals diagnosed with schistosomiasis. Population data for calculating the rates were obtained from the Brazilian Institute of Geography and Statistics (IBGE), based on annual estimates of the municipality's population.

The study population corresponded to the total number of confirmed cases of schistosomiasis in the municipality in the period between January 1, 2017 and December 31, 2022. Only cases with confirmed laboratory diagnosis and complete registration as to the location of occurrence were considered. Imported cases or records with inconsistent or incomplete information were not included.

The variables analyzed were: absolute number of cases per year, distribution by sex and age group, frequency by neighborhood/locality, and annual prevalence and incidence of the disease. To calculate the prevalence, the ratio between the number of existing cases in a given year and the estimated population for the same period, multiplied by 100,000 inhabitants, was used. The incidence was calculated by the ratio between the number of new cases diagnosed and the exposed population, also multiplied by 100,000 inhabitants (Wagner, 1998). All indicators were organized by year of notification.

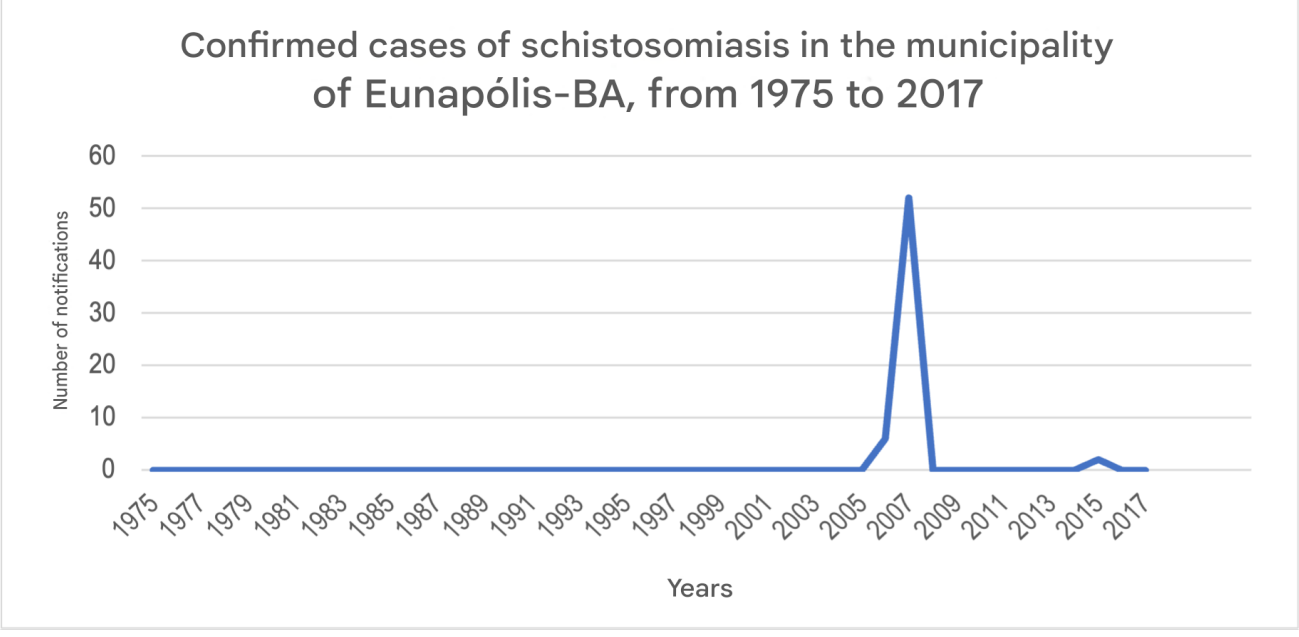
The organization and descriptive analysis of the data was carried out using Microsoft Excel spreadsheets, using simple tabulation and graph construction resources. The results were presented in absolute and relative frequencies and rates per 100,000 inhabitants. The interpretation of the findings was complemented based on a narrative review of the scientific literature, in order to contextualize the local data to the regional and national trends already documented on schistosomiasis.

As this is a study based exclusively on secondary data, in the public domain and without individual identification of the subjects, it was not necessary to submit the project to the ethics committee, according to Resolution No. 510/2016 of the National Health Council.

Analysis and Discussion of Results

The epidemiological analysis of schistosomiasis in the municipality of Eunápolis (BA), between 2017 and 2022, revealed a total of 113 confirmed cases, evidencing the persistence of the disease as a public health problem in the region. The data indicate a higher concentration of cases in 2017 and 2018, with a downward trend in subsequent years, which may be related to both control actions and possible underreporting.

Graph 1. Confirmed cases of schistosomiasis in the Municipality of Eunápolis-BA, from 1975 to 2017



Source: Study Data, 2024.

In 2017, 43 cases were reported, a number that was repeated in 2018, representing, together, 76% of all records in the period. From 2019 onwards, there was a significant reduction: 17 cases in 2019, 5 in 2020, 9 in 2021 and only 1 case in 2022. This oscillation may reflect the variability in the effectiveness of surveillance and vector control actions, as well as fluctuations in the notification processes, as also observed by Pereira (2019) in a study conducted in the state of Pará.

The peak of notifications between 2017 and 2018 coincides with periods in which the Health Surveillance of Eunápolis intensified field actions, which suggests that the increase in numbers may be partially linked to greater detection capacity and not necessarily to an outbreak. This hypothesis is compatible with the findings of Oliveira et al. (2024), who point to the discontinuity of notifications as one of the main challenges to accurately measure the real burden of schistosomiasis in Brazil.

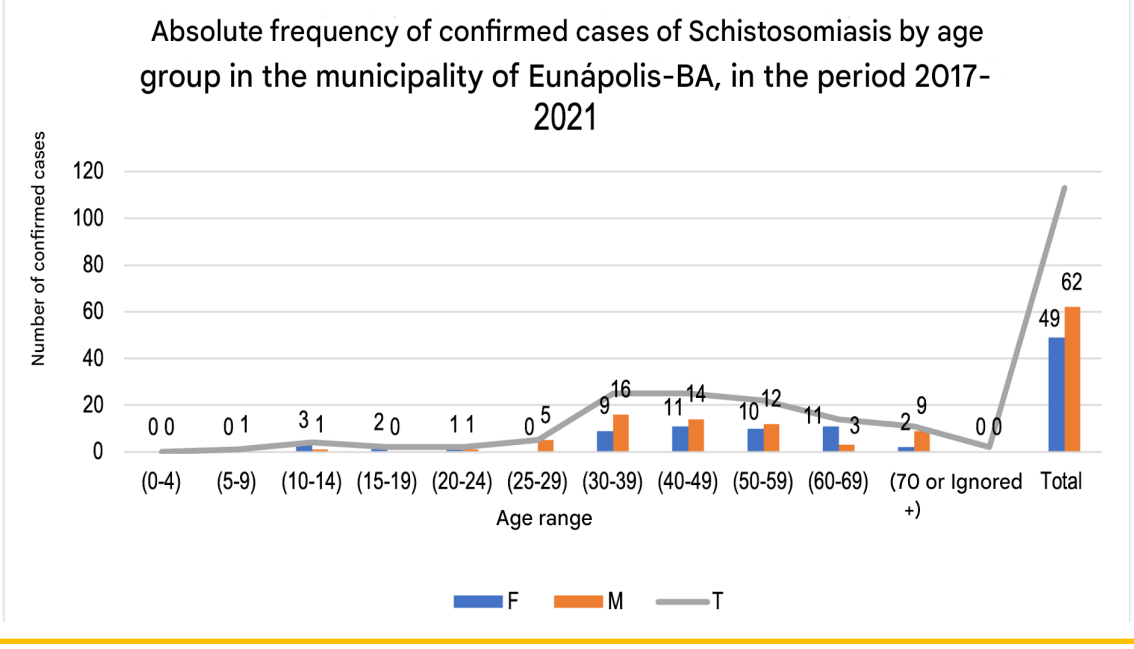
The distribution of cases according to sex showed a predominance of men, with 62 records (54.9%) among men and 51 (45.1%) among women. This proportion contrasts with the regional

panorama described by Chiles et al. (2020), who identified a higher prevalence of the disease in women with low education in the Discovery Coast region, to which Eunápolis belongs. Such divergence points to possible territorial and occupational singularities specific to the municipality.

The national literature presents different findings in relation to the most affected sex. While Jordão et al. (2014) observed a male predominance between 2001 and 2011 in the state of Alagoas, attributed to the greater occupational exposure of men in activities such as fishing and agriculture, Chiles et al. (2020) indicate that, in certain urban contexts, the greater vulnerability of women may be related to the overload of domestic tasks performed in unhealthy environments. Both patterns illustrate how social determinants shape local disease dynamics.

The distribution by age group revealed a concentration of cases among adults aged 30 to 59 years, both in males and females. In the case of men, the highest frequency was observed between 30 and 39 years old (25.81%), while among women, the cases were concentrated in the 40 to 49 years and 60 to 69 years old groups (both with 22.45%).

Graph 2. Absolute frequency of confirmed cases of schistosomiasis by age group in the municipality of Eunápolis-BA, in the period 2017-2021

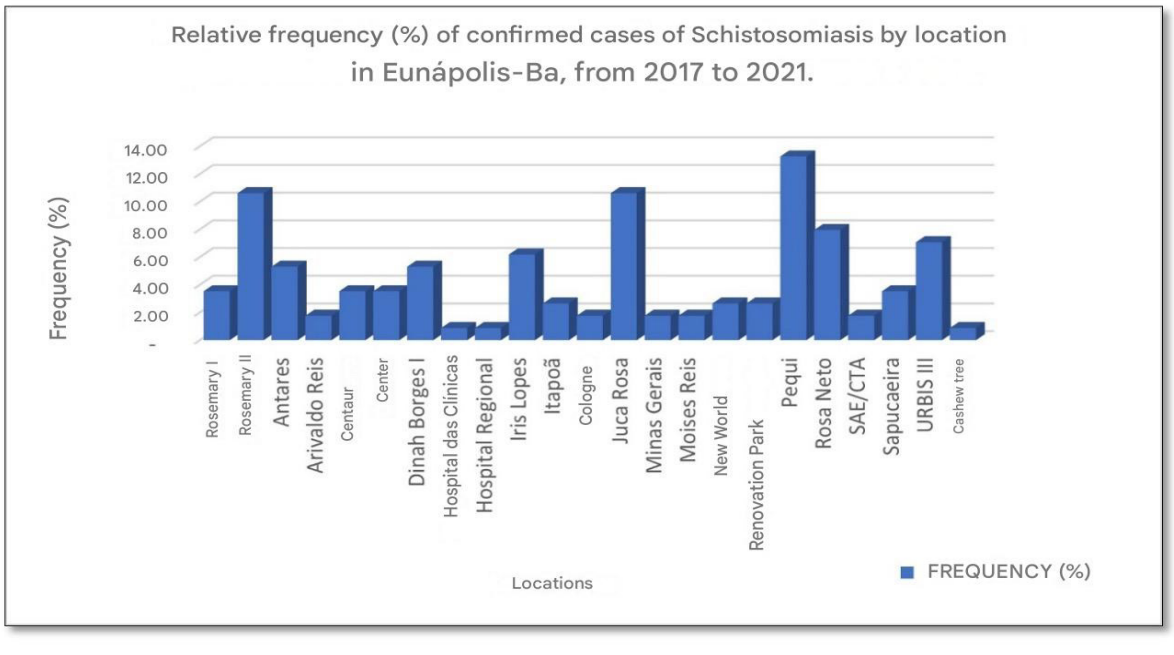


Source: Study Data, 2024.

This age concentration is compatible with the occupational exposure profile pointed out by Coura-Filho et al. (1994), who identified as the main risk factors the involvement with agricultural, fishing and leisure activities in rivers, common practices among adults of economically active age. The frequency of cases in more advanced age groups, such as 60 to 69 years of age, may also be associated with accumulated chronic exposure and recurrence of infections in populations with a history of prolonged contact with contaminated environments.

Regarding the spatial distribution of cases, the neighborhoods with the highest relative frequencies were Pequi (13.27%), Juca Rosa (10.62%) and Alecrim II (10.62%), followed by Rosa Neto, Urbis III and Iris Lopes, all with percentages above 6%.

Graph 3: Relative frequency (%) by neighborhood/locality – 2017 to 2022



Source: Study Data, 2024.

These locations concentrate populations with lower urban development rates, high population density and precarious coverage of sanitary infrastructure.

Gonçalves et al. (2016), when studying the urban expansion of Eunápolis, identified that only 20.4% of the families in the municipality are served by a sanitary sewage network, which forces most of the population to resort to rudimentary cesspools or the direct disposal of waste in open areas. This reality directly contributes to the contamination of water collections and the perpetuation of the schistosomiasis cycle, as also observed by Souza et al. (2011) in an analysis of the health determinants of the disease.

The persistence of cases in specific neighborhoods, even with the general reduction in notifications, indicates the existence of local foci of active transmission. This pattern reinforces the importance of territorializing surveillance and control strategies, with actions directed to areas with greater health and socio-environmental vulnerability. This approach is in line with the recommendations of Paiva et al. (2025), who advocate the adoption of measures focused on regions with a higher burden of hospitalizations and less access to structuring policies.

When evaluating the annual distribution of incidence rates, a decreasing pattern was observed in the municipality of Eunápolis over the period analyzed. In 2017, the rate was approximately 37.29 cases per 100,000 population; in 2018, 38.29; in 2019, 14.99; in 2020, 4.37; and in 2021, 7.8. In 2022, there was no information on the number of cases for calculation.

Table 1: Schistosomiasis incidence rates by year – 2017 to 2021

Year	Estimated population	Confirmed cases	Incidence rate (per 100,000 inhabitants)
2017	115.290	43	37,29
2018	112.318	43	38,29
2019	113.380	17	14,99
2020	114.396	5	4,37
2021	115.360	9	7,80

Source: Study Data, 2024.

The downward trend, although positive, should be interpreted with caution, considering the limitations of coverage of notification systems, as highlighted by Oliveira et al. (2024) and Dutra et al. (2024), who point to underreporting as a recurrent obstacle in the monitoring of schistosomiasis.

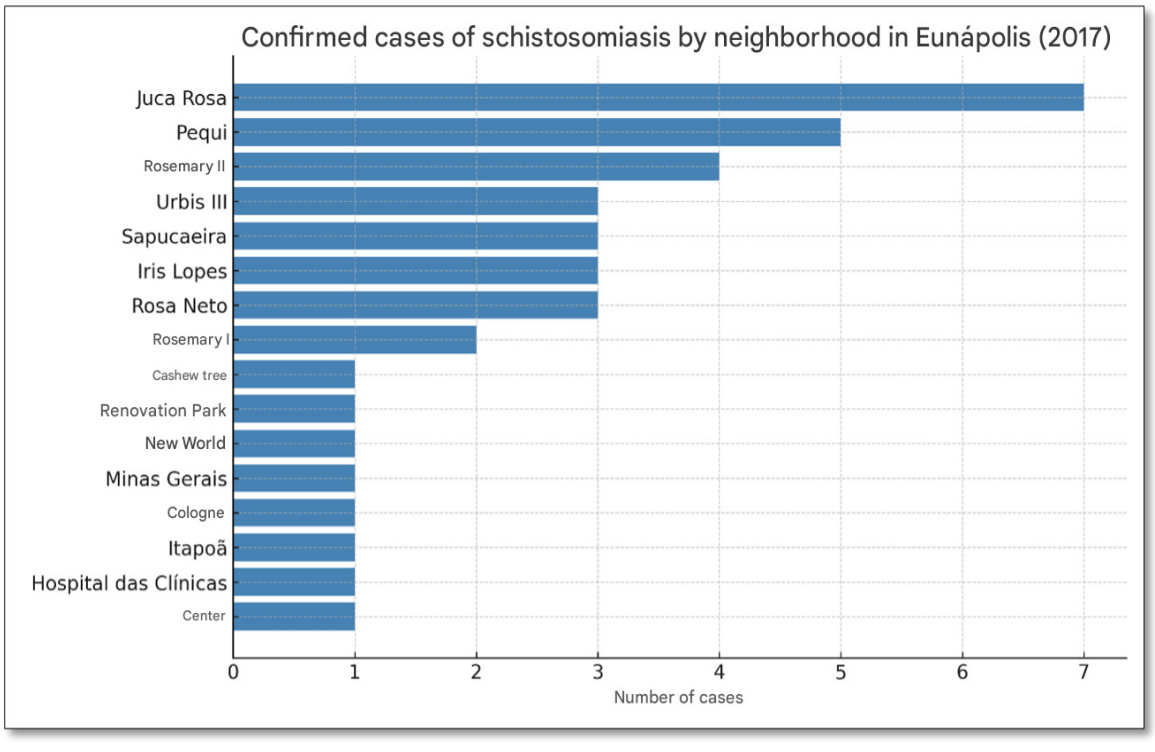
The abrupt drop in cases after 2018 may reflect not only the impact of control actions, but also the possible interruption of sustained epidemiological surveillance and health education strategies. Vira Júnior et al. (2024) showed that the discontinuation of the Schistosomiasis Control Program is directly associated with the subsequent increase in the incidence of the disease in municipalities that previously showed a downward trend. Such a relationship signals that the maintenance of low indicators requires continuity of actions and not just punctual responses.

The spatial heterogeneity of the cases in Eunápolis reveals important patterns. The neighborhoods with the highest number of confirmed cases, such as Pequi, Juca Rosa, Alecrim II and Rosa Neto, coincide with areas with higher population density and less sanitary sewage infrastructure, as described by Gonçalves et al. (2016). This association reinforces the socio-spatial character of schistosomiasis and the need for territorialized interventions.

The literature indicates that the absence of adequate basic sanitation is one of the main determining factors for the persistence of the schistosomiasis transmission cycle. Souza et al. (2011) point out that the lack of sewage collection and treatment allows the contamination of surface water with parasite eggs, which favors the infection of snails of the genus Biomphalaria and, later, of humans. This dynamic is aggravated in contexts of disorderly urbanization, as occurs in several peripheral regions of Eunápolis.

In 2017, it was possible to observe a wide dispersion of cases among different neighborhoods, with emphasis on Juca Rosa (7 cases), Pequi (5 cases) and Urbis III (3 cases).

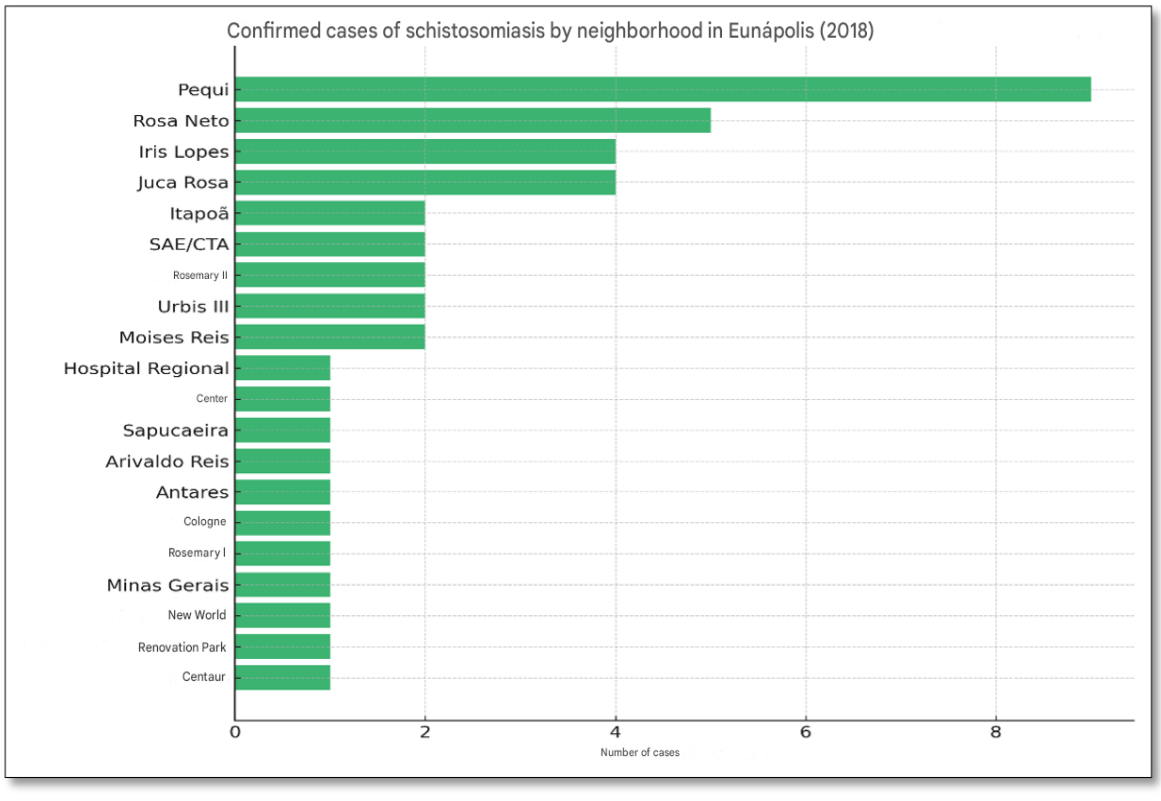
Graph 4: Confirmed cases by neighborhood – 2017



Source: Study Data, 2024.

This dispersion suggests the existence of multiple sources of transmission, possibly related to the use of different water bodies by the population, whether for leisure, hygiene or work. In 2018, the spatial distribution remained wide, with the Pequi neighborhood registering 9 cases, followed by Rosa Neto (5 cases), Iris Lopes (4 cases), Juca Rosa (4 cases) and SAE/CTA (2 cases).

Graph 5: Confirmed cases by neighborhood – 2018

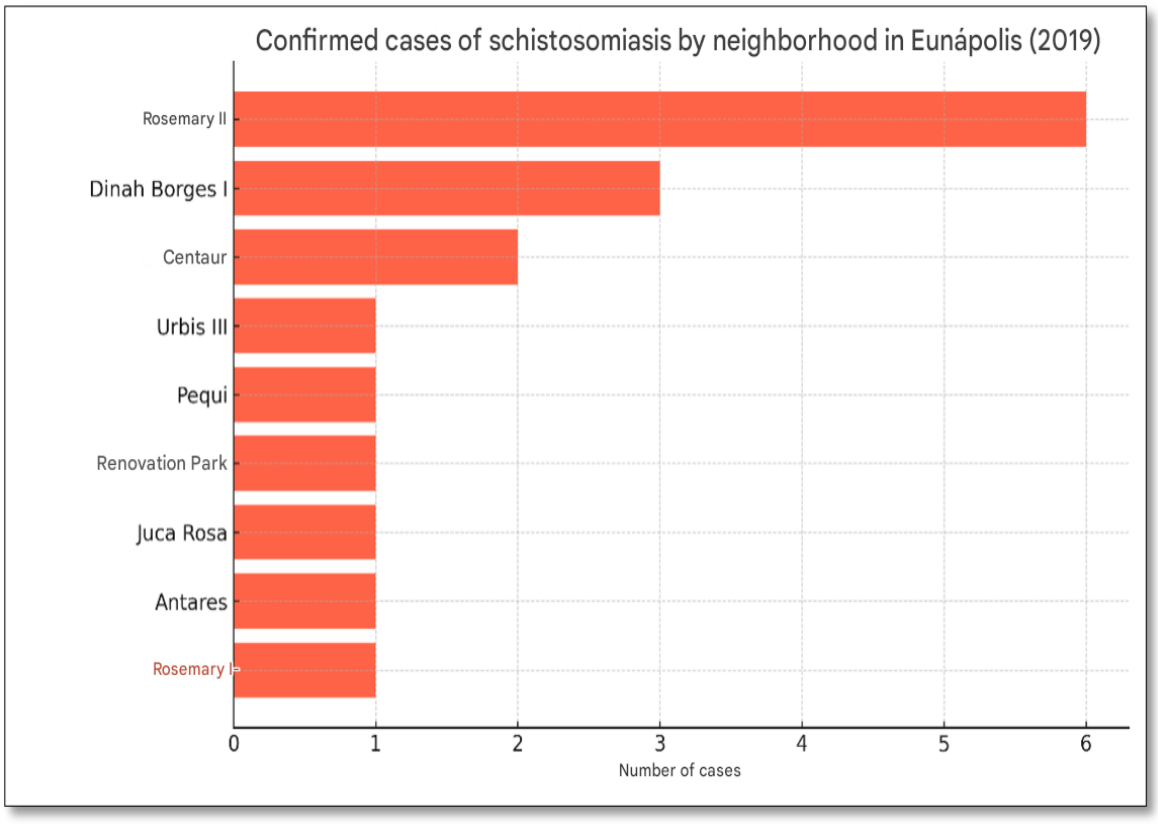


Source: Study Data, 2024.

The presence of cases in different urban neighborhoods, including health units, points to the need for environmental investigations and updated mapping of the presence of Biomphalaria sp. in the municipality.

In 2019, the total number of cases dropped to 17, but even so, the concentration in neighborhoods such as Alecrim II (6 cases) and Dinah Borges I (3 cases) demonstrates that transmission persisted in specific areas.

Graph 6: Confirmed cases by neighborhood – 2019

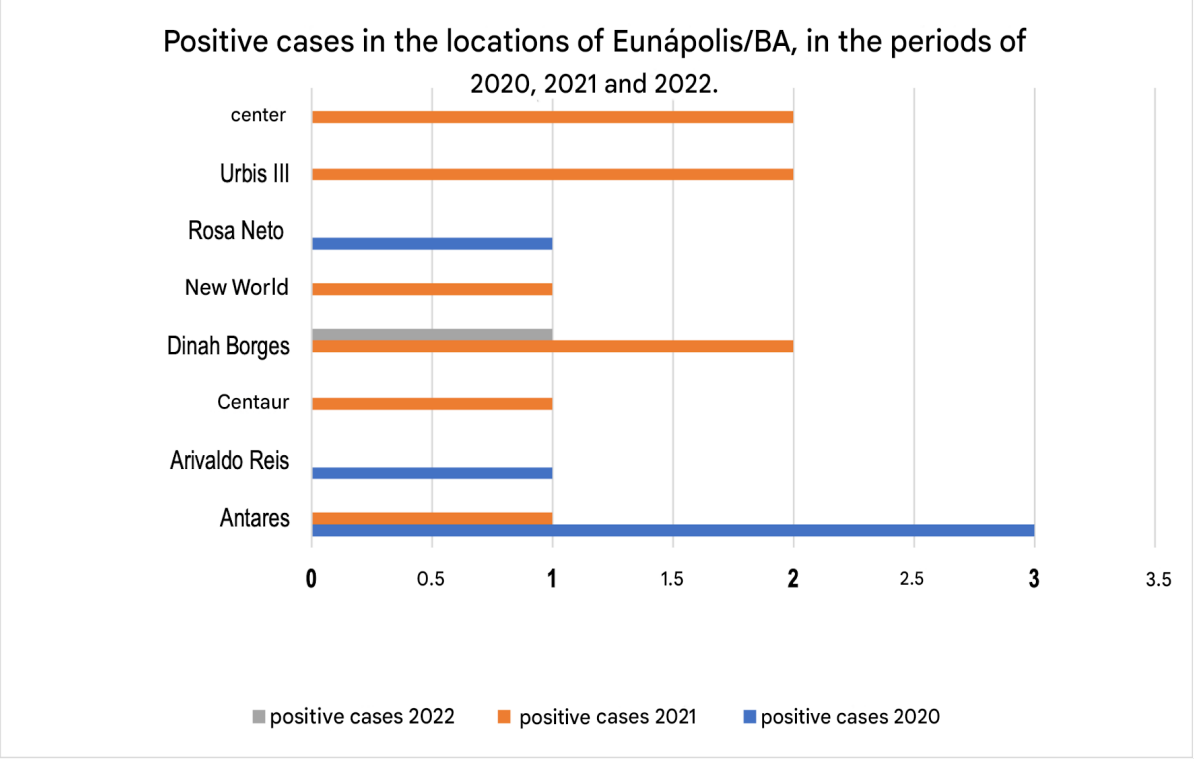


Source: Study Data, 2024.

Persistence in certain territories may indicate failures in vector control processes and in the articulation between epidemiological surveillance and environmental surveillance.

In the years 2020, 2021 and 2022, the records were less expressive, but reveal continuity of the territorial pattern. In 2020, for example, 3 of the 5 cases occurred in the Antares neighborhood. In 2021, there were notifications in the Center, Dinah Borges I and Urbis III, and in 2022 1 case was registered in Dinah Borges I.

Graph 7: Confirmed cases by neighborhood – 2020 to 2022

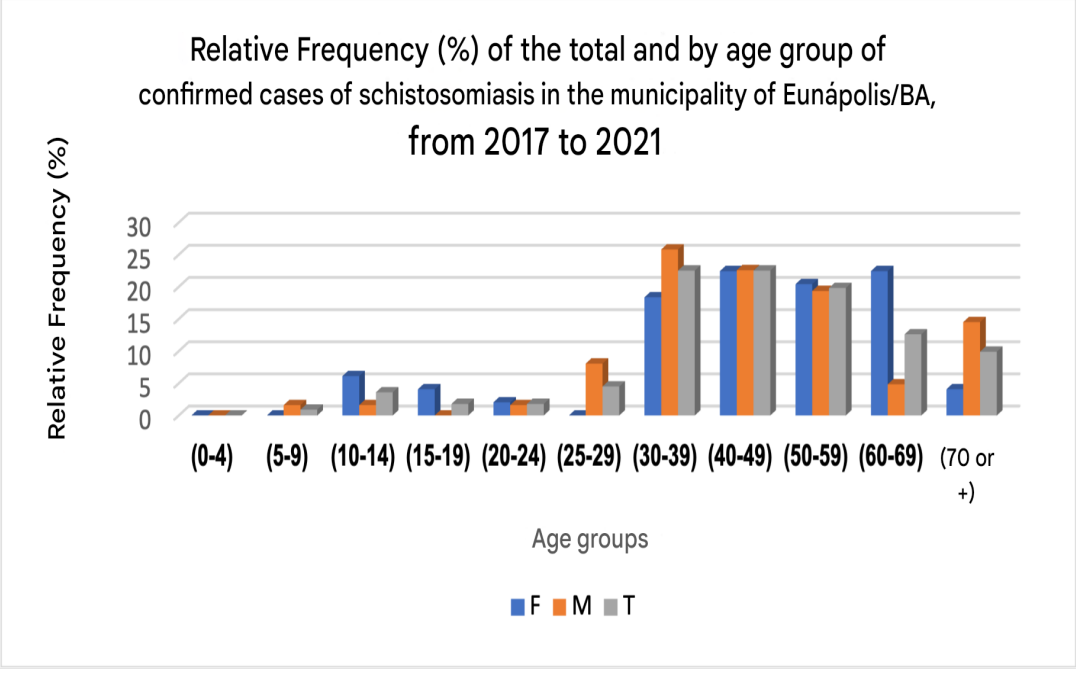


Source: Study Data, 2024.

The repetition of these locations suggests that the foci have not been completely eliminated, but rather reduced, which requires permanent active surveillance actions.

Analysis by relative frequency between men and women also revealed relevant distinctions. While men concentrated cases between 30 and 39 years old (25.81%), women had higher relative frequencies in the 40 to 49 and 60 to 69 age groups (both 22.45%).

Graph 8: Relative frequency by sex and age group



Source: Study Data, 2024.

These differences may be associated with the type of exposure in each group, with men more exposed to external economic activities and women to domestic tasks that involve contact with water, such as washing clothes and utensils in unhealthy places.

The predominance of cases in the middle-aged adult population reinforces the understanding that schistosomiasis is a disease strongly linked to lifestyle and working conditions. As pointed out by Coura-Filho et al. (1994), work activities developed in rural and riverine areas, such as fishing and agriculture, significantly increase exposure to Biomphalaria breeding sites, configuring important risk factors. This pattern of occupational exposure seems to be maintained over time and in different regions of the country.

However, local data also indicate that older age groups, such as 60 to 69 years old, continue to have cases in considerable numbers. Such a finding may reflect not only continued exposure but also the absence of regular access to diagnosis, which contributes to chronic untreated infections.

This situation was also observed by Jordão et al. (2014) when analyzing the epidemiological profile of schistosomiasis in Alagoas, reinforcing the relevance of active screening even among older populations.

The frequency of cases among women over 60 years of age may also be related to the domestic use of untreated water, since in communities without formal supply, contact with rivers, wells and streams to carry out daily activities remains frequent. As observed by Silva and Domingues (2011) apud Jordão et al. (2014), sanitary precariousness, added to structural poverty, imposes risks of infection even within the home environment.

The Eunápolis scenario confirms the classic notes of Neves (2005), for whom schistosomiasis represents not only a parasitic endemic, but a socially determined phenomenon. The author points out that the distribution of the disease follows internal migratory trajectories, absence of public infrastructure and low health coverage, all elements present in the regions with the highest incidence in the municipality studied.

The presence of cases in health units, such as the Regional Hospital and the SAE/CTA, as recorded in 2018, may be associated with active search or late notification of cases diagnosed during hospitalizations or routine laboratory tests. This data draws attention to the importance of sensitizing health care professionals regarding mandatory notification and the inclusion of schistosomiasis in the differential diagnosis of nonspecific symptoms.

In studies conducted by Oliveira et al. (2024) and Dutra et al. (2024), underreporting is pointed out as one of the main obstacles to effective surveillance of schistosomiasis, aggravated by the disarticulation between municipalities and the discontinuity of field actions. This reality seems to be reflected in Eunápolis, where the years with the lowest number of cases coincide with periods without records of joint efforts, educational campaigns or intersectoral mobilizations documented in the article.

The data also allow us to infer that the intermittent records may be the result of structural failures in the surveillance system. According to Paiva et al. (2025), many Brazilian municipalities

lack teams trained for the early detection and interruption of outbreaks, which compromises local control of the endemic. The finding of only one case in 2022, for example, requires interpretative caution, as it does not necessarily indicate eradication, but may signal the absence of active search and investigation.

The analysis of the data allows us to affirm that schistosomiasis persists as a neglected problem in the municipality of Eunápolis, especially in the urban peripheries and areas with low sanitation coverage. As demonstrated by Souza (2024), the disease remains active in several municipalities in the interior of Brazil, where high rates of poverty, absence of treated water, and discontinuity of preventive actions are concentrated.

The results obtained in this study reinforce the need for epidemiological surveillance strategies articulated with intersectoral actions, which involve not only the health sector, but also public policies for sanitation, housing, education, and the environment. This approach is compatible with what Santos Pereira et al. (2018) propose, when they argue that environmental health education should be integrated into territorial planning as a tool to cope with schistosomiasis.

Another critical point identified is the absence of updated studies on the presence and geographic distribution of vector snails in the municipality of Eunápolis. Although the risk of transmission is directly associated with the presence of Biomphalaria sp., no recent surveys were found in the material analyzed that indicate the active foci. This gap compromises the development of effective control actions aimed at risk environments, requiring the resumption of malacological investigations.

The absence of updated georeferenced data on the foci of Biomphalaria sp. It compromises not only the control of transmission, but also the construction of risk maps that guide health surveillance in a territorialized way. Chiles et al. (2020), when studying the Discovery Coast, pointed out the importance of the spatialization of cases and the integration between entomological surveillance and community actions. In Eunápolis, this absence is configured as a point of institutional vulnerability, especially in neighborhoods with recurrence of cases over the years analyzed.

In summary, the results demonstrate that, despite the general trend of reduction in schistosomiasis notifications in Eunápolis (BA) between 2017 and 2022, foci of active transmission persist in specific areas, with a sociodemographic pattern characterized by young and middle-aged adults, predominantly male. The permanence of these cases in neighborhoods marked by health vulnerability and the absence of structural interventions confirms the multifactorial nature of the disease, requiring that coping be based on integrated, continuous strategies adapted to local realities, as guided by the reference studies included in this study.

Final Thoughts

The municipality of Eunápolis (BA) remains an area of epidemiological relevance for schistosomiasis, as evidenced by records documented since 1971 and by the occurrence of significant peaks, such as that of 2007. In the most recent cut, corresponding to the period from 2017 to 2022, 113 cases of the disease were confirmed, including one death in 2020. In 2022, although only one new case was officially reported, the data cannot be interpreted as eradication of the disease, but rather as a possible reflection of underreporting or reduced active surveillance. The set of evidence reinforces the permanence of schistosomiasis as a public health problem that is still active and worrying in the territory.

The findings of the study indicated an epidemiological profile markedly associated with the male gender, predominantly in the age groups between 30 and 59 years, which is in line with the occupational risk identified in previous studies. The higher incidence in economically active adults suggests that work practices and daily activities related to contact with contaminated water are still determining factors in the transmission chain. The temporal analysis showed a trend towards a reduction in the absolute number of cases from 2019 onwards; however, this drop cannot be interpreted as an interruption of the cycle, in view of the continuity of notifications in historically vulnerable neighborhoods and the absence of a recent survey on the outbreaks of Biomphalaria sp. in

the municipality.

The geographical distribution of cases reinforces the need for territorialization of coping actions. Neighborhoods such as Pequi, Juca Rosa, Alecrim II, Rosa Neto, and Dinah Borges I concentrated recurrent notifications over the years studied, indicating the maintenance of active foci of transmission. The lack of georeferenced data on vector mollusks constitutes a critical gap that prevents the formulation of more precise and effective malacological strategies, compromising the local control of the endemic.

In addition to the issues directly related to surveillance, the study evidenced the contribution of structural and social factors to the maintenance of schistosomiasis in Eunápolis. Precarious conditions of basic sanitation, low level of education of the affected population, absence of continuous health education actions and discontinuity of vector control campaigns make up a scenario that favors the permanence of the disease. The frequent use of water bodies for bathing, recreation, and domestic activities intensifies the risks of infection, especially in underserved communities.

Given this scenario, it is essential to strengthen the articulation between epidemiological surveillance, the environmental health sector, and other structuring public policies, such as housing, education, and sanitary infrastructure. The intersectoral approach should be prioritized, with permanent investments in educational actions, vector control, early diagnosis, and active monitoring. Only with integrated and territorialized strategies will it be possible to interrupt the cycle of schistosomiasis transmission and ensure better health conditions for the population of Eunápolis, respecting local specificities and the social determinants that sustain the permanence of this neglected endemic.

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