Epidemiological Report

# Schistosoma mansoni
## Historic Series 2010 – 2021

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## BRIEF HISTORY

Schistosomiasis mansoni (SM) has its most remote traces in the Nile River basins in Africa and Yangtze in Asia. *Schistosoma mansoni* eggs were found in the viscera of Egyptian mummies, whose origin dates to 1250 BC. The Caribbean region in Central America and Venezuela and Brazil in South America are the focus.[1]

In Brazil, SM occurred through the trafficking of enslaved people from Africa. They entered the country mainly through the ports of Recife and Salvador to work in sugarcane crops.[1,2] In the state of São Paulo (SSP), the first cases of schistosomiasis occurred in the municipality of Santos in the early 1920s. After the description of numerous cases in the valleys of the Paraíba do Sul and Ribeira do Iguape rivers and the middle stretch of Paranapanema, SM began to have recognition in the context of public health.[3,4]

Between 1968 and 1969, the Campaign to Combat Schistosomiasis (CACESQ) was created, responsible for the elaboration of the first disease control program in São Paulo. In 1976, this campaign was incorporated into the Superintendence of Endemic Control (Sucen), which provided some changes in the dynamics of disease control, such as the development of efforts to include the basic health network in this process and the recognition of three major endemic areas in the state: Baixada Santista and the Ribeira and Paraíba valleys.

In 2003, due to a restructuring of the State Department of Health, the epidemiological surveillance of the SM of São Paulo moved from Sucen to the Division of Water and Food Transmission Diseases of the Epidemiological Surveillance Center "Prof. Alexandre Vranjac" (DDTHA/CVE). In this new articulation, the proposal was the integration with institutions that shared responsibilities for controlling/eliminating the disease, that is, with those related to sanitation and the environment. Sucen, however, maintained the actions of control and research of the intermediate host (malacology).

Since 2004, the epidemiological surveillance of SM was decentralized to the municipalities, with the supervision of DDTHA and state health regions (epidemiological surveillance groups - ESG). In this process, the importance of the Notifiable Diseases Information System (Sinan) was emphasized, as well as reorganized the municipal reference laboratory network for coproscopic examinations. The Adolfo Lutz Institute (IAL) has been awarded a specialized laboratory reference for epidemiological surveys, outbreak investigations and other more complex situations.

In 2016, DDTHA transferred to the Zoonosis Division of the CVE the task of epidemiological surveillance of Schistosomiasis, which was responsible for continuing the articulation and integration with institutions that share responsibilities of control/elimination of the disease in SSP.

## ETIOLOGICAL AGENT

SM is a parasitic disease of water dissemination whose etiological agent is *S. mansoni*, a helminth belonging to the genus *Schistosoma*, the *family Schstossomatidae* and the class Trematoda. They are digenetic, slender, white-colored, and separate sexes. The adult female, more elongated, is lodged in a cleft of the male's body, called the gyncophore canal.[5]

## TRANSMISSION MODE

The transmission of schistosomiasis depends on the presence of the infected man (definitive host) excreting viable eggs of *S. mansoni* and snails (intermediate hosts) releasing worm infecting larvae in freshwater water collections (rivers, ponds, streams, and dams, etc.), used by humans. The eggs of *S. mansoni* turn into a larva called miracidia when it encountered the snail of the genus *Biomphalaria* (*glabrata, straminea tenagophila*).[6,7]

Miracidia evolve into the form of sporocysts that produce the fences. The fences abandon the snail looking again for water and penetrate the skin or mucous membranes of people, when they encounter the infected water (bathing, fishing, washing clothes, etc.), transforming in schistosomulum (phase after the cercaria lose the syrup and penetrate the human body). After this cycle, the larvae are carried by the blood and encounter some organs of the human body, such as lung, liver, and intestinal veins.

SM occurs mainly in localities without or with precarious basic sanitation conditions, which favors the contamination of aquatic environments with human waste. Susceptibility to the disease is general, which means that anyone, regardless of age, gender, or ethnic group, encountering the fences can contract the disease. The presence of the intermediate host in the environment is a necessary and indispensable condition for the development of the parasite cycle.

## EPIDEMIOLOGICAL SITUATION

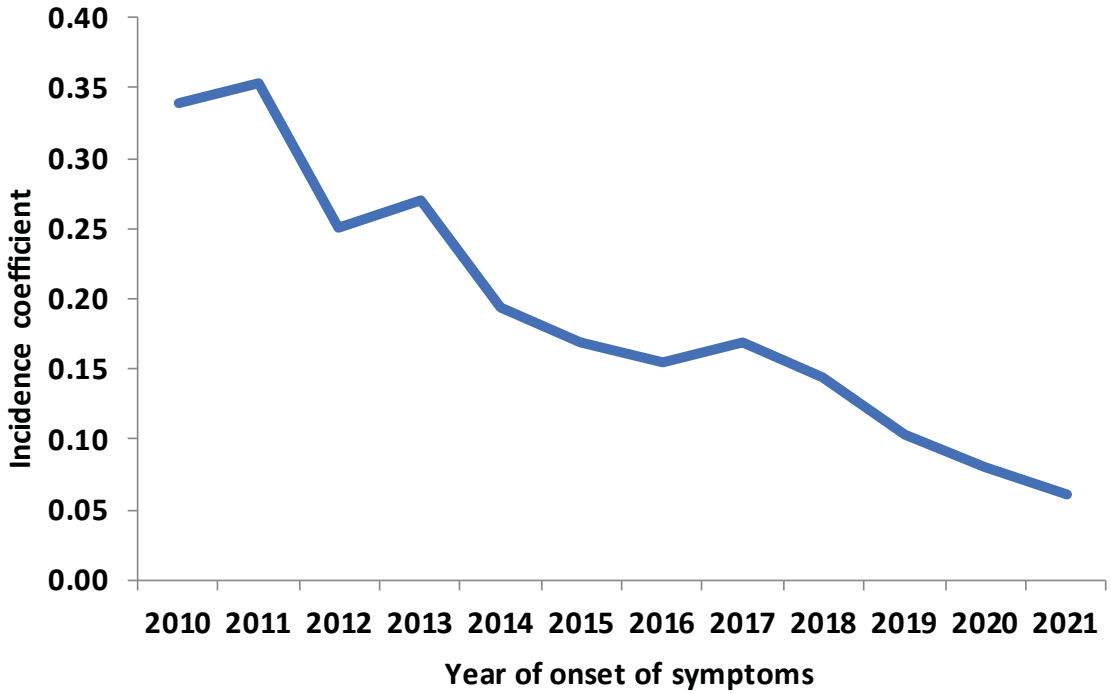
Schistosomiasis is one of the most widespread parasitasis in the world. It is considered one of the most prevalent diseases among those transmitted by water.[4,5]

In SSP, the disease is influenced by the migration of people from endemic areas, including *S. mansoni*, in search of better living conditions. This has contributed to the spread of SM in São Paulo. These people are concentrated in small population centers in which sanitary conditions are precarious

or non-existent, favoring the contamination of aquatic environments with human waste and, thus, enabling the counting of human feces parasitized with susceptible intermediate hosts. Thus, the cycle of contamination and transmission of this disease is maintained, which points to the need for its constant epidemiological surveillance in the context of public health.

The incidence of SM in the SSP has been decreasing over the years. This is observed in the period studied, 2010 to 2021 (Graph 1).

**Graph 1**. Incidence coefficient of schistosomiasis second year of onset of symptoms. SSP, 2010 to 2021.*




Data from June 20, 2022. Source: SINAN NET - Zoonosis Division (CVE/SES-SP).

The proportion of cases from other states has shown relative stability. It is interesting to note that in 2020 and 2021, years of greater mobility restriction measures, there was a proportional reduction in the number of cases coming from the Northeast and in the total reported (Table 1).

**Table 1**. Frequency of cases of schistosomiasis according to UF source of infection and year of onset of symptoms. SSP, 2010 to 2021.*

| Federal unit source of infection | Year of onset of symptoms | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | Total |
| Bahia | 276 | 275 | 235 | 222 | 167 | 121 | 118 | 135 | 121 | 82 | 37 | 36 | **1,825** |
| Minas Gerais | 176 | 190 | 246 | 156 | 129 | 86 | 100 | 89 | 113 | 43 | 28 | 30 | **1,386** |
| Pernambuco | 154 | 184 | 124 | 110 | 77 | 67 | 74 | 66 | 70 | 38 | 20 | 15 | **999** |
| São Paulo | 147 | 145 | 103 | 117 | 82 | 74 | 66 | 75 | 62 | 45 | 33 | 30 | **979** |
| Alagoas | 131 | 120 | 124 | 100 | 85 | 46 | 61 | 59 | 47 | 32 | 12 | 12 | **829** |
| Sergipe | 51 | 38 | 44 | 36 | 30 | 18 | 22 | 22 | 22 | 14 | 6 | 3 | 306 |
| Paraíba | 11 | 11 | 7 | 7 | 11 | 5 | 3 | 5 | 3 | 5 | 1 | 3 | **72** |
| Ceará | 8 | 7 | 8 | 8 | 9 | 2 | 4 | 7 | 4 | 3 | 2 | 2 | **64** |
| Paraná | 12 | 12 | 7 | 7 | 5 | 4 | 7 | 4 | 0 | 5 | 1 | 0 | **64** |
| Maranhão | 2 | 4 | 6 | 4 | 2 | 4 | 3 | 3 | 2 | 1 | 0 | 1 | **32** |
| Piauí | 3 | 3 | 2 | 1 | 4 | 1 | 1 | 3 | 1 | 1 | 0 | 1 | **21** |
| Rio Grande do Norte | 1 | 0 | 2 | 1 | 4 | 1 | 0 | 0 | 3 | 1 | 0 | 0 | **13** |
| Espírito Santo | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | **13** |
| Mato Grosso do Sul | 5 | 0 | 2 | 1 | 0 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | **12** |
| Goiás | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 0 | 0 | 0 | 1 | **11** |
| Rio de Janeiro | 2 | 0 | 0 | 1 | 3 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 9 |
| Pará | 0 | 1 | 0 | 4 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | **8** |
| Amazonas | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | **2** |
| Mato Grosso | 1 | 0 | 0 | 3 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | **6** |
| Santa Catarina | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | **3** |
| Amazonas | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | **2** |
| Tocantins | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **2** |
| Rondônia | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | **1** |
| Acre | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **1** |
| Rio Grande do Sul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | **1** |
| Distrito Federal | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Ignored/blank | 124 | 131 | 148 | 111 | 110 | 91 | 91 | 88 | 99 | 87 | 48 | 63 | **1,191** |
| **Total** | **1,108** | **1,126** | **1,062** | **893** | **722** | **525** | **559** | **560** | **549** | **360** | **188** | **199** | **7,851** |

*Data for June 20, 2022. Source: SINAN NET - Zoonosis Division (CVE/SES-SP).

Table 2 shows that the disease occurs in greater numbers in males. It is worth mentioning that in the age group above 80 years this proportion is reversed and the occurrence in females is highlighted. The likely reason for this is that such infections arise from domestic activities performed in ponds and rivers.

**Table 2**. Frequency of SM cases according to age group and gender, SSP, 2010 to 2021.*

| Age group | Gender | | |
|---|---|---|---|
| | Male | Female | Total |
| <1 Year | 3 | 6 | **9** |
| 1-4 | 25 | 18 | **43** |
| 5-9 | 110 | 81 | **191** |
| 10-14 | 200 | 130 | **330** |
| 15-19 | 209 | 241 | **450** |
| 20-34 | 1,481 | 1,279 | **2,760** |
| 35-49 | 1,474 | 985 | **2,459** |
| 50-64 | 636 | 556 | **1,192** |
| 65-79 | 201 | 178 | **379** |
| 80 e+ | 14 | 24 | **38** |
| **Total** | **4,353** | **3,498** | **7,851** |

*Data from June 20, 2022. Source: SINAN NET - Zoonosis Division (CVE/SES-SP).

Table 3 shows the differences in expected outcomes for intestinal and hepatic clinical forms (hepatointestinal and hepatosplenic). The first form has a probability of cure more than 17.5% higher than the second, while the latter has a death rate due to schistosomiasis 36 times higher than the intestinal form of the disease.

**Table 3**. Frequency of SM cases according to clinical form and evolution, SSP, 2010 to 2021.*

| Clinical form | Evolution | | | | | |
|---|---|---|---|---|---|---|
| | Cure | Non cure | Death by schistosomiasis | Death by other causes | Ignored/blank | Total |
| Intestinal | 3.137 | 55 | 7 | 18 | 1,989 | **5,206** |
| Hepatointestinal | 222 | 8 | 15 | 10 | 136 | **391** |
| Hepatosplenic | 185 | 20 | 24 | 22 | 152 | **403** |
| Acute | 49 | 4 | 1 | 0 | 45 | **99** |
| Other | 170 | 11 | 5 | 7 | 125 | **318** |
| Ignored/blank | 496 | 12 | 13 | 23 | 890 | **1,434** |
| **Total** | **4,259** | **110** | **65** | **80** | **3,337** | **7,851** |

*Data from June 20, 2022. Source: SINAN NET - Zoonosis Division (CVE/SES-SP).

Table 4 shows that praziquantel is the most usual form of treatment. Today, the only drug available for the treatment of the disease is distributed free of charge by the Unified Health System (SUS) to states and municipalities. It is indicated for all clinical forms, unless contraindicated.

**Table 4**. Frequency of SM cases according to treatment performed and year of onset of symptoms, SSP, 2010 to 2021.*

| Treatment | Symptom Start Year | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **2010** | **2011** | **2012** | **2013** | **2014** | **2015** | **2016** | **2017** | **2018** | **2019** | **2020** | **2021** | **Total** |
| Praziquantel | 943 | 983 | 961 | 760 | 625 | 431 | 464 | 464 | 451 | 290 | 144 | 154 | **6,670** |
| Oxaminiquine | 54 | 43 | 18 | 15 | 5 | 3 | 5 | 7 | 3 | 1 | 1 | 0 | **155** |
| Non treatment | 71 | 78 | 71 | 79 | 62 | 66 | 47 | 52 | 61 | 40 | 29 | 33 | **689** |
| Ignored/blank | 40 | 22 | 12 | 39 | 30 | 25 | 43 | 37 | 34 | 29 | 14 | 12 | **337** |
| **Total** | **1,108** | **1,126** | **1,062** | **893** | **722** | **525** | **559** | **560** | **549** | **360** | **188** | **199** | **7,851** |

*Data for June 20, 2022. Source: SINAN NET – Zoonosis Division (CVE/SES-SP).

Deaths from schistosomiasis in São Paulo follow the same spatial pattern as the population distribution of the state. Thus, most of them are concentrated in the capital of São Paulo or its surroundings.

**Table 5**. Frequency of deaths according to ESG and municipality of residence, SSP, 2010 to 2021.*

| ESG\Municipality of residence | Deaths |
|---|---|
| **:: ESG I PRINCIPAL CITY ::** | **31** |
| São Paulo | 31 |
| **:: ESG VII SANTO ANDRÉ ::** | **3** |
| Diadema | 1 |
| São Bernardo do Campo | 2 |
| **:: ESG VIII MOGI DAS CRUZES ::** | **14** |
| Guarulhos | 6 |
| Itaquaquecetuba | 2 |
| Mogi das Cruzes | 4 |
| Suzano | 2 |

| ESG\Municipality of residence | Deaths |
|---|---|
| **:: ESG IX FRANCO DA ROCHA ::** | **1** |
| Francisco Morato | 1 |
| **:: ESG X OSASCO ::** | **6** |
| Carapicuíba | 2 |
| Itapecerica da Serra | 1 |
| Osasco | 1 |
| Taboão da Serra | 2 |
| **:: ESG XII ARARAQUARA ::** | **1** |
| Araraquara | 1 |
| **:: ESG XXIV RIBEIRÃO PRETO ::** | **2** |
| Pitangueiras | 1 |
| Pontal | 1 |
| **:: ESG XXV SANTOS ::** | **4** |
| Santos | 2 |
| São Vicente | 2 |
| **:: ESG XXIX SÃO JOSÉ DO RIO PRETO ::** | **1** |
| José Bonifácio | 1 |
| **:: ESG XXXI SOROCABA ::** | **1** |
| Sorocaba | 1 |
| **:: ESG XXXIII TAUBATÉ ::** | **1** |
| Areias | 1 |
| **Total** | **65** |

*Data for June 20, 2022. Source: SINAN NET – Zoonosis Division (CVE/SES- SP).

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