Epidemiological Report

Spotted fever
Historic Series 2010 – 2021

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BRIEF HISTORY

The first record of rickettsiosis in Brazil was recorded at necropsy at the Bacteriological Institute of Sao Paulo, by Adolpho Lutz, in 1900.[1] From then on, sporadic cases were registered in the state until 1929, with a diagnosis of exanthematic typhus. Between 1929 and 1931, Toledo Piza, at the São Paulo Isolation Hospital (now the Emilio Ribas Institute of Infectious Diseases), Meyer, at the Biological Institute, and Salles Gomes, at the Bacteriological Institute (now the Adolfo Lutz Institute), demonstrated that the disease actually was another type of rickettsiosis, which was named exanthematic typhus of São Paulo. It was not until 1937 that it became known as Brazilian spotted fever (SF).

The cases occurred in the capital of São Paulo and in the municipalities of Santo André, Cotia, Guarulhos, Osasco, Caieiras, Jandira, São Bernardo do Campo, São Caetano, Itapecerica da Serra and Mauá, which are now part of the Metropolitan Region of São Paulo (MRSP). From 1950 onwards, SF was considered unimportant in this region. On the other hand, interest reappeared from the 1980s onwards in the interior of the state, where since then SF has been identified in an increasing number of municipalities, with an always very high lethality.

The monitoring of SF cases in the state of São Paulo (SSP), consequently, the study of their demographic and epidemiological characteristics, led to the discovery of marked regional differences, studied jointly by the Zoonoses division of the Epidemiological Surveillance Center "Professor Alexandre Vranjac" (CVE), Superintendence for Endemic Disease Control (Sucen) and School of Veterinary Medicine and Animal Science at the University of São Paulo (FMVZ-USP). At the beginning of the 21st century, it was possible to conclude that the demographic differences between the disease that occurred in the interior (cerrado area) and in the MRSP were due to the presence of different species of vector ticks, but that the etiological agent was the same. In both locations, the bacterium *Rickettsia rickettsii* is the causal agent, but the vector tick is *Amblyomma sculptum* in the interior and *A. aureolatum* in the MRSP. This determines that SF transmission in cerrado areas occurs in rural or wild environments, where there are many capybaras, affecting mainly men of working age, in work or leisure activities. In the MRSP, on the other hand, transmission occurs basically intra or peridomicile, reaching both sexes of all ages, including small children, without the participation of capybaras in the cycle and without marked seasonality.

In 2018, it was discovered that the non-fatal cases reported on the coast of São Paulo were of a different disease, another rickettsiosis of the spotted fever group, whose causal agent is *R. parkeri*, as well as the vector, the *A. ovale*. The clinical picture and evolution are also different. Therefore, from the report published in BEPA 213,[2] we also started to record cases separately according to the vector found in each region.

ETIOLOGICAL AGENT

The etiologic agent of SF is the same as that found in Rocky Mountain spotted fever (from the United States of America), *R. rickettsii*. The responsible for the spotted fever of the coast is the *R. parkeri*.

TRANSMISSION MODE

The two rickettsiae (*R. rickettsii* and *R. parkeri*) have ticks as a vector. In fact, they are the only pathogens transmitted by ticks to humans in SSP of clinical and epidemiological importance. Although there are other microorganisms in Brazilian territory with transmission through ticks (*Babesia* and *Rangelia*, *Ehrlichia* and *Anaplasma*), their occurrence until today is restricted to domestic animals and birds. The borrelia (including *Borrelia burgdorferi*, the agent of Lyme disease) has never been identified or cultivated in humans or tick vectors.[2] Rickettsiae are transmitted to humans by the bite of vector ticks.

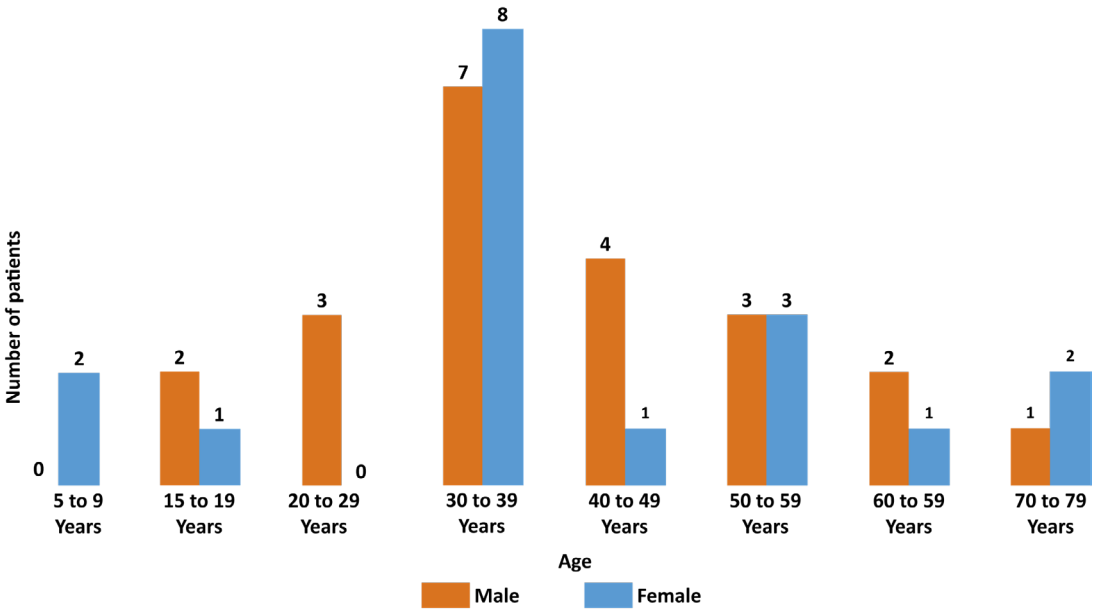
EPIDEMIOLOGICAL SITUATION

Data from 1985 to 2006 were grouped together, as there was no recognition of differences between areas and the registration of cases was much lower. In this period, the total number of cases was 258, with the year 2005 presenting the highest number of records (57), while in 2004 and 2005 there were cases that came from Minas Gerais, Rio de Janeiro and Portugal. In relation to the total number of deaths, 94 deaths were recorded, and 2005 was the year with the highest number of deaths from SF (16).

The analysis of the epidemiological situation of rickettsiosis in the SSP reveals important differences, both in relation to the two rickettsiosis, *R. rickettsii* and *R. parkeri*, as well as the different epidemiological profiles in the areas of *A. ovale, A. aureolatum* and *A. sculptum*.

As for the distribution by sex and age, it is noted that the predominance of males of working age is much more evident in the area of *A. sculptum*, where the absence of young children is also notable. In the area of *A. aureolatum* the male predominance is much less evident and cases appear in younger children. The number of records in the *A. ovale* area is too small (perhaps due to underreporting, as it is a much less serious disease) and it is difficult to assess differences in demographic distribution. On the other hand, lethality is very high in areas of *A. sculptum* (57.0%) and *A. aureolatum* (63.0%), that is, of *R. rickettsii*, and there are no fatal cases in areas of *A. ovale, R. parkeri.* Graph 1 shows the distribution of SF cases in *A. ovale area*, by sex and age group.

Grap 1. Distribution by age and sex of SF cases in *A. ovale* area in the SSP from 2007 to 2021*.



Source: Sinan Net/CVE/DVZOO. *Provisional data until May 4, 2022.

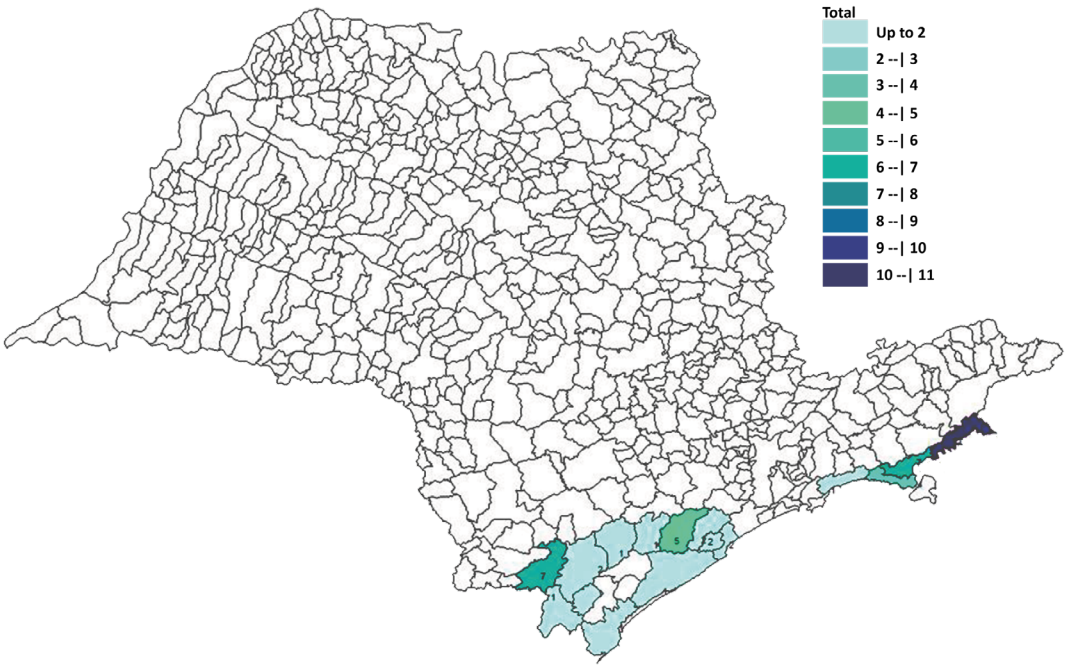
Table 1 and Figure 1 show the number of SF cases with probable site of infection (PSI) in each of the municipalities in the *A. ovale* area, by year of onset of symptoms (OS).

Table 1. Confirmed cases of SF in the SSP area of *A. ovale* from 2010 to 2021* by PSI.

PSI-MUNICIPALITY	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Total
BARRA DO TURVO	0	0	0	0	0	0	0	0	0	0	1	1
BERTIOGA	0	0	0	0	0	0	0	1	0	0	0	1
CANANÉIA	0	0	0	0	1	0	0	0	0	0	0	1
CARAGUATATUBA	3	0	0	0	2	1	0	0	0	0	0	6
ELDORADO	0	0	0	0	0	0	0	1	0	1	0	2
IGUAPE	0	0	0	0	0	0	0	0	1	0	0	1
IPORANGA	0	0	1	0	0	0	0	0	0	1	5	7
ITARIRI	0	1	0	0	0	0	0	0	0	0	0	1
JUQUIÁ	1	0	0	0	0	0	0	0	0	0	0	1
MIRACATU	0	0	1	1	0	0	0	0	2	0	1	5
PEDRO DE TOLEDO	1	0	0	0	0	0	0	0	0	0	0	1
SÃO SEBASTIÃO	2	0	0	0	0	0	0	1	0	0	0	3
SETE BARRAS	0	0	0	0	0	0	0	0	0	1	0	1
UBATUBA	1	0	0	0	1	0	2	3	0	1	1	9
Total	**8**	**1**	**2**	**1**	**4**	**1**	**2**	**6**	**3**	**4**	**8**	**40**

Source: Sinan Net/CVE/DVZOO. *Provisional data until May 4, 2022.

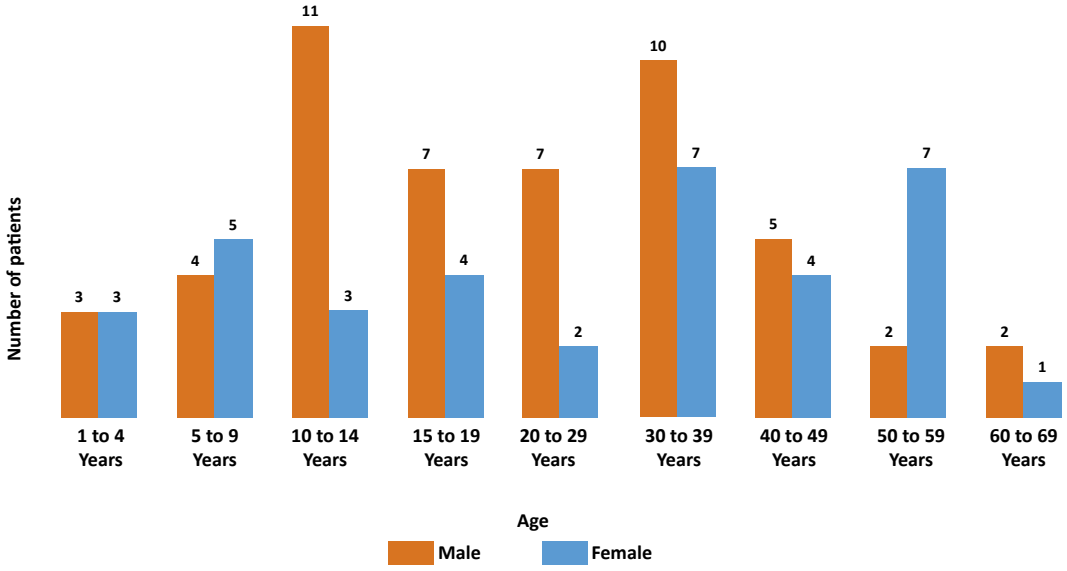
Figure 1. Spatial distribution of spotted fever cases caused by in *A. ovale* area in the SSP from 2010 to 2021*.



Source: Sinan Net/CVE/DVZOO. *Provisional data until May 4, 2022.

Graph 2 shows the distribution of SF cases in the *A. aureolatum* area, from 2010 to 2021, by sex and age group.

Graph 2. Spatial distribution of spotted fever cases caused by *R. parkeri* in *A. ovale* area in the SSP from 2010 to 2021*.



Source: Sinan Net/CVE/DVZOO. *Provisional data until May 4, 2022.

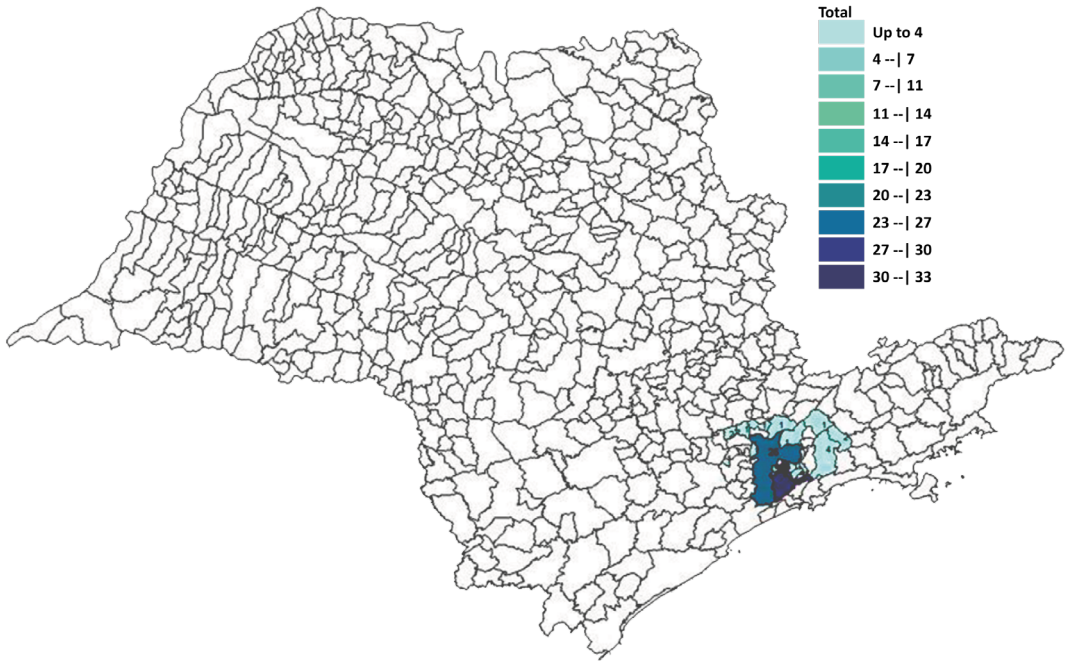
Table 2 and Figure 2 show the spatial distribution of confirmed SF cases in the *A. aureolatum* area of the SSP from 2010 to 2021, by probable municipality of infection (PSI) and year of OS.

Table 2. Confirmed SF cases in *A. aureolatum* area of the SSP, from 2010 to 2021*, by PSI and OS.

PSI-MUNICIPALITY	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Total
CAJAMAR	0	0	0	0	0	0	0	0	0	0	1	0	1
DIADEMA	0	1	1	0	1	0	0	0	0	0	0	0	3
FRANCO DA ROCHA	0	0	0	0	0	0	0	0	0	1	0	0	1
GUARAREMA	0	0	0	0	0	0	0	0	1	0	0	1	2
GUARULHOS	0	1	0	0	0	0	0	0	0	0	0	0	1
MAIRIPORÃ	0	1	0	0	0	0	0	0	0	0	0	0	1
MAUÁ	0	0	0	0	0	0	0	0	1	0	0	0	1
MOJI DAS CRUZES	0	0	0	0	0	1	0	1	0	0	1	0	3
PIRAPORA DO BOM JESUS	0	0	0	0	0	2	0	0	0	0	0	0	2
RIBEIRÃO PIRES	0	0	2	0	0	0	0	0	0	0	0	0	2
RIO GRANDE DA SERRA	0	0	1	0	0	0	0	0	0	0	0	0	1
SANTA ISABEL	0	0	0	0	0	0	0	0	0	0	1	0	1
SANTO ANDRÉ	4	0	7	1	4	3	2	4	1	0	0	0	26
SÃO BERNARDO DO CAMPO	3	4	0	2	3	2	2	0	1	1	3	0	21
SÃO PAULO	3	3	2	2	1	1	0	2	1	2	3	0	20
VARGEM GRANDE PAULISTA	1	0	0	0	0	0	0	0	0	0	0	0	1
Total	**11**	**10**	**13**	**5**	**9**	**9**	**4**	**7**	**5**	**4**	**9**	**1**	**87**

Source: Sinan Net/CVE/DVZOO. *Provisional data until May 4, 2022.

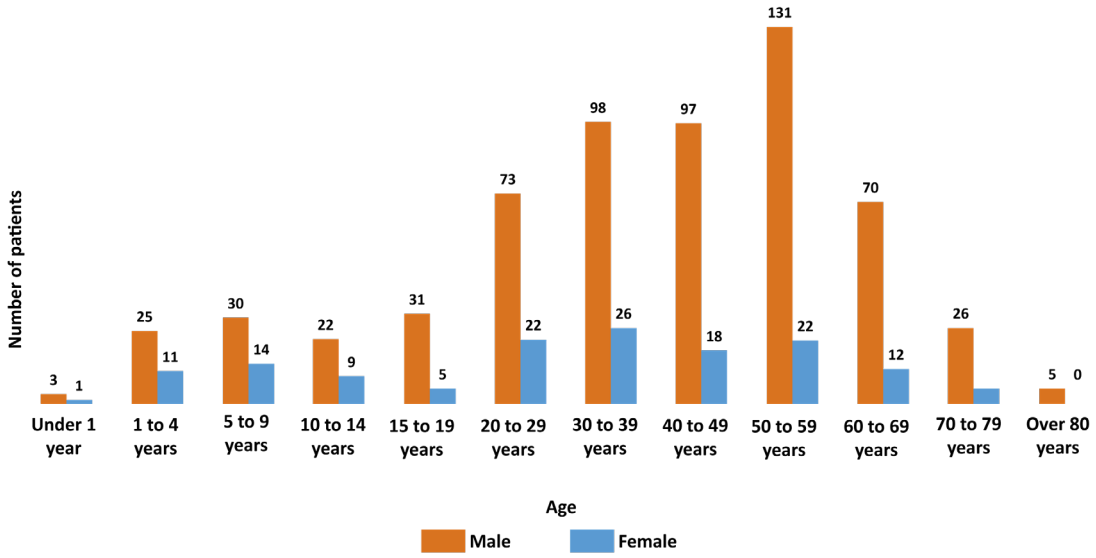
Figure 2. Distribution of confirmed SF cases in *A. aureolatum* area of the SSP from 2010 to 2021* by PSI.



Source: Sinan Net/CVE/DVZOO. *Provisional data until May 4, 2022.

Graph 3 and Table 3 show the distribution of SF cases in the *A. sculptum* area of the SSP from 2010 to 2021, by sex and age group.

Graph 3. Distribution by age and sex of SF cases in the *A. sculptum* area of the SSP from 2007 to 2021*.



Source: Sinan Net/CVE/DVZOO. *Provisional data until May 4, 2022.

Table 3. Confirmed cases of SF in *A. sculptum* area of the SSP from 2010 to 2021* by PSI and OS.

PSI-MUNICIPALITY	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Total
ÁGUAS DE LINDÓIA	0	1	0	0	0	0	1	1	0	0	0	0	3
ÁGUAS DE SÃO PEDRO	0	0	0	0	0	1	0	0	0	0	0	0	1
ALTINÓPOLIS	0	0	0	0	0	0	0	0	0	0	0	1	1
AMERICANA	4	0	1	0	2	3	0	2	16	2	2	4	36
AMPARO	1	1	0	2	1	0	3	1	1	2	0	0	12
ANGATUBA	0	0	0	0	0	0	0	1	0	0	0	0	1
ANHEMBI	0	1	0	0	0	0	0	0	0	0	0	0	1
ARARAS	0	4	0	2	4	1	0	1	2	1	3	1	19
ARTUR NOGUEIRA	0	0	0	0	1	1	0	0	0	0	0	0	2
ASSIS	0	0	2	2	3	1	0	1	0	0	0	0	9
ATIBAIA	2	0	0	0	0	0	0	0	0	1	0	0	3
AVARÉ	0	0	0	0	0	1	0	0	0	0	0	0	1
BOITUVA	0	0	0	0	0	0	1	1	0	1	0	0	3
BRAGANÇA PAULISTA	0	0	0	0	0	0	1	0	0	0	0	0	1
CABREÚVA	0	0	0	0	0	0	0	0	0	0	1	0	1
CAJURU	0	0	0	0	0	0	0	0	1	0	0	0	1
CAMPINAS	12	7	6	5	4	5	4	2	7	14	7	10	83
CÂNDIDO MOTA	0	0	0	1	0	0	0	1	0	0	0	1	3
CAPIVARI	0	0	0	0	0	1	1	0	0	0	1	1	4
CHAVANTES	1	0	1	0	0	0	0	0	1	0	1	0	4
CONCHAL	0	0	0	0	2	1	0	0	0	0	1	0	4

PSI-MUNICIPALITY	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Total
CORDEIRÓPOLIS	0	1	0	1	1	3	0	0	1	0	0	0	7
COSMÓPOLIS	2	1	3	5	3	2	5	1	3	0	0	1	26
CRAVINHOS	0	0	0	0	0	1	0	0	0	0	0	0	1
CRUZÁLIA	0	0	0	0	0	0	1	0	0	0	0	0	1
CRUZEIRO	0	0	1	0	0	0	0	0	0	0	0	0	1
DOIS CÓRREGOS	0	0	0	0	0	0	0	0	0	0	1	0	1
ECHAPORÃ	0	0	0	0	0	1	0	0	0	0	0	0	1
ELIAS FAUSTO	0	0	0	0	0	2	0	1	0	0	0	0	3
ENGENHEIRO COELHO	0	0	0	0	0	2	1	0	0	0	0	0	3
ESPÍRITO SANTO DO PINHAL	0	0	0	0	0	1	0	0	0	0	0	0	1
FARTURA	0	0	0	0	0	0	1	0	0	0	0	0	1
FERNANDÓPOLIS	0	0	0	0	1	0	0	0	0	0	0	0	1
FLORA RICA	0	1	0	0	0	0	0	0	0	0	0	0	1
FLORINIA	0	0	0	0	0	0	0	2	0	1	0	0	3
HOLAMBRA	0	0	0	0	0	0	0	0	0	1	0	0	1
HORTOLÂNDIA	0	0	0	0	0	0	0	0	0	0	1	0	1
IACANGA	0	0	0	0	0	0	0	0	0	0	1	0	1
IBIÚNA	0	0	0	0	0	0	0	0	0	2	0	0	2
IEPÊ	0	0	0	1	0	0	0	0	0	0	0	0	1
INDAIATUBA	0	0	0	0	0	1	0	0	0	1	0	2	4
IPAUSSU	0	0	0	0	0	1	0	0	0	3	2	0	6
IRACEMÁPOLIS	0	0	0	0	0	2	0	0	1	2	0	1	6
ITABERA	0	0	0	0	0	0	0	0	1	0	0	0	1
ITAJOBI	0	1	0	0	0	0	0	0	0	0	0	0	1
ITAPIRA	0	0	1	0	0	0	0	2	1	0	0	2	6
ITÁPOLIS	0	0	0	0	0	0	1	0	0	0	0	0	1
ITATIBA	0	0	3	0	0	0	0	1	1	0	2	0	7
ITU	0	1	5	0	5	3	0	0	3	0	2	2	21
ITUPEVA	0	0	0	1	0	0	0	0	0	0	0	0	1
JABORANDI	0	0	0	0	0	1	0	0	0	0	0	0	1
JACAREÍ	0	0	0	0	1	0	0	1	0	0	2	1	5
JAGUARIÚNA	1	1	0	0	2	1	1	4	2	0	0	3	15
JARINU	0	0	0	0	0	0	1	0	0	0	0	0	1
JAÚ	0	0	0	1	0	0	0	0	0	0	0	0	1
JUMIRIM	0	0	0	0	0	0	0	0	3	0	0	0	3
JUNDIAÍ	0	1	0	0	2	1	7	1	3	2	2	1	20
LARANJAL PAULISTA	0	0	0	0	0	0	0	1	2	0	2	1	6
LEME	0	0	0	0	0	0	0	1	0	0	0	0	1
LIMEIRA	1	0	2	1	2	3	1	4	6	2	1	1	24
LINDÓIA	0	0	0	0	0	0	3	3	2	0	2	0	10
LOUVEIRA	0	1	1	1	0	0	1	0	2	3	0	0	9
MAIRINQUE	0	0	0	0	0	0	0	1	0	0	0	0	1
MANDURI	1	0	0	0	0	0	0	0	0	0	1	0	2
MARACAÍ	1	0	1	0	0	0	0	1	5	2	3	0	13
MOCOCA	1	0	0	0	0	1	0	0	0	0	0	0	2

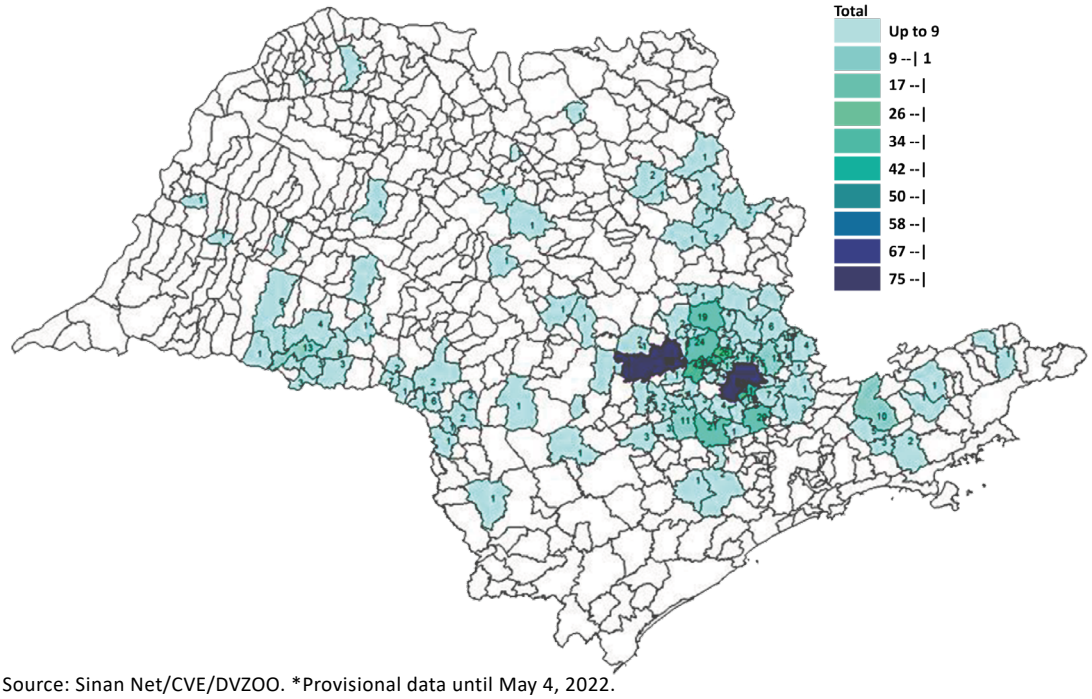
PSI-MUNICIPALITY	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Total
MOGI-GUAÇI	0	0	0	0	0	0	0	0	1	0	0	0	1
MOGI MIRIM	0	0	0	0	0	0	1	0	1	0	0	5	7
MONTE ALEGRE DO SUL	0	0	0	0	0	1	0	2	1	0	0	0	4
MORUNGABA	0	0	0	0	0	0	0	0	1	0	0	0	1
NOVA ODESSA	0	3	1	0	2	0	1	0	0	1	0	1	9
NOVAIS	0	0	0	0	0	1	0	0	0	0	0	0	1
OSVALDO CRUZ	0	0	0	1	0	0	0	0	0	0	0	0	1
OURINHOS	0	0	1	0	0	0	0	0	0	0	0	0	1
PARAGUAÇU PAULISTA	0	0	0	0	0	1	2	0	0	1	0	0	4
PARAIBUNA	0	0	0	0	0	1	0	0	0	1	0	0	2
PARDINHO	0	0	0	0	0	0	1	0	0	0	0	0	1
PAULÍNIA	4	0	4	0	1	0	1	0	0	0	2	1	13
PEDREIRA	0	0	0	0	1	4	1	0	7	0	1	1	15
PENÁPOLIS	0	0	0	0	0	0	0	0	0	0	0	1	1
PIEDADE	0	0	0	0	0	0	0	0	1	0	0	0	1
PINDAMONHANGABA	0	0	0	0	0	0	0	0	1	0	0	0	1
PINHALZINHO	0	0	0	0	0	0	1	0	0	0	0	0	1
PIRACICABA	3	3	10	12	6	4	3	8	4	10	6	7	76
PIRAJU	0	0	1	0	0	0	0	0	0	0	0	1	2
POMPEIA	0	0	1	0	0	0	0	0	0	0	0	0	1
PORTO FELIZ	0	0	2	1	0	1	1	1	1	0	0	4	11
RAFARD	0	0	0	0	0	0	1	0	0	1	0	0	2
RANCHARIA	0	0	2	0	1	2	0	0	0	0	1	0	6
RIBEIRÃO DO SUL	0	0	0	0	0	0	0	0	0	1	0	1	2
RIBEIRÃO PRETO	0	2	0	0	0	0	0	0	0	0	0	0	2
RIO CLARO	0	0	0	0	1	0	0	0	0	0	0	1	2
RIO DAS PEDRAS	1	0	0	0	0	0	0	0	0	0	0	0	1
SALTO	0	0	0	0	1	0	2	1	1	1	1	1	8
SALTO GRANDE	0	0	0	0	1	3	0	0	0	1	1	1	7
SANTA BARBARA D'OESTE	6	3	2	0	5	5	7	0	3	3	6	2	42
SANTA BRANCA	0	0	0	0	0	0	0	0	0	0	1	2	3
SANTA CRUZ DA CONCEIÇÃO	0	0	0	0	0	1	0	0	0	0	0	0	1
SANTA CRUZ DO RIO PARDO	0	0	0	0	0	0	0	0	0	2	0	0	2
SANTA GERTRUDES	0	0	0	1	0	1	0	1	0	2	0	0	5
SANTA RITA DO PASSA QUATRO	1	0	0	0	0	0	0	0	0	0	0	0	1
SANTA ROSA DE VITERBO	0	0	0	0	0	0	0	0	0	0	1	0	1
SANTO ANTÔNIO DE POSSE	0	0	0	1	0	2	0	0	0	0	0	0	3
SÃO FRANCISCO	0	0	0	0	0	0	0	0	0	0	0	1	1
SÃO JOSÉDOS CAMPOS	0	0	0	2	0	0	0	0	6	0	2	0	10
SÃO PEDRO	0	0	0	0	0	1	0	0	1	0	0	0	2

PSI-MUNICIPALITY	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Total
SARUTAIA	0	0	0	0	0	0	0	0	0	0	0	1	1
SERRA NEGRA	0	1	0	0	0	0	0	0	0	0	0	0	1
SILVEIRAS	1	0	0	0	0	0	0	0	0	0	0	0	1
SOCORRO	0	1	1	0	0	0	0	0	0	0	1	1	4
SUMARÉ	1	1	0	1	3	2	0	1	0	0	0	0	9
TAMBAU	0	0	0	1	0	0	0	0	0	0	1	0	2
TARUMA	0	0	1	1	0	0	0	0	0	0	0	1	3
TATUÍ	0	0	1	0	0	0	2	0	0	0	0	0	3
TAUBATÉ	0	0	0	0	0	0	0	1	0	0	0	0	1
TIETÊ	0	0	1	0	1	0	0	0	0	0	0	0	2
TUPI PAULISTA	0	0	0	0	1	0	0	0	0	0	0	0	1
VALINHOS	3	13	3	6	4	7	0	1	2	1	1	0	41
VINHEDO	3	4	2	0	2	0	2	1	0	0	0	0	14
Total	**50**	**53**	**60**	**50**	**64**	**78**	**60**	**52**	**95**	**65**	**63**	**66**	

*Provisional data until May 4, 2022. **Source**: Sinan Net/CVE/DVZOO.

Figure 3 shows the spatial distribution of SF cases in *A. sculptum* area in the SSP from 2010 to 2021.

Figure 3. Spatial distribution of SF cases in *A. sculptum* area of the SSP by PSI.



Source: Sinan Net/CVE/DVZOO. *Provisional data until May 4, 2022.

From the data presented, it is possible to conclude that SF is a disease of low incidence throughout the SSP, but with a very high lethality. Despite the measures adopted and the warnings in places where there is transmission, it is not possible to reduce the annual number of cases, which shows fluctuations, but not a consistent downward trend. However, despite the dissemination of places where transmission occurs and clarification of health services and the population to encourage early diagnosis, there is also no reduction in lethality.

Lethality by *R. rickettsii* is very high. The factors that contribute to this are: late diagnosis and consequent late introduction of specific medication, lack of a rapid confirmatory test and the fact that first-choice medication is not available in Brazil, which makes the clinical management of patients even more difficult. These factors are very difficult to reverse, despite the many efforts that have been made to do so. To increase surveillance of suspected cases of spotted fever, meetings, training sessions, the Spotted Fever Week (in September), seminars and work with schools and residents of the most affected areas are held. In addition, interactive maps are also produced so that one can quickly search if the place frequented by the patient is in a transmission area. And efforts have been made to ensure that the medication needed for severe cases is acquired through the São Paulo State Health Department and the Ministry of Health, since the drug became part of the National Medicines List (Rename), without success.

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