Epidemiological Report

Hanseniasis

Historic Series 2010 – 2021

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INTRODUCTION

Hanseniasis (or leprosy) is an infectious disease of chronic evolution that affects nerves and skin. It is caused by *Mycobacterium leprae (M. leprae)*, bacillus identified as causing the disease in 1873 by the Norwegian physician Gerhard Armauer Hansen.[1,2]

Hanseniasis seems to be one of the oldest diseases to affect man. It is believed to have originated in Asia,[3] but some authors also point to Africa as its birthplace.[4] According to Opromolla,[5] it is admitted that hanseniasis was unknown in Europe at the time of Hippocrates (467 BC). It is accepted that the troops of Alexander the Great, when they returned to the European continent after the conquest of the hitherto unknown world, brought individuals infected with the disease from travels to India (300 BC). During the Middle Ages, hanseniasis was highly prevalent in Europe and the Middle East. The council held in Lyon, in the year 583, established rules of the Catholic Church for the prophylaxis of the disease.[3] These rules consisted of isolating the sick from the healthy population, so that they reside in places specially reserved for this purpose (leprosariums or lazarettos).[4]

Its magnitude in the Old World can be estimated from the existence of almost 20,000 leprosariums on that continent in the 13th century. In the same way, one can follow the decline of the European endemic, from the 17th century, through the gradual deactivation of the same asylums, which continued throughout the 18th century and the first half of the 19th century.[6]

By 1870, the disease had practically disappeared in almost all European countries and, even in Norway, where it could still be considered endemic, its incidence was already in decline. While on the European continent leprosy tended to disappear, endemic foci remained in Asia and Africa and the disease was introduced in the New World, from the Spanish and Portuguese conquests and the importation of enslaved Africans. In the Americas there was no hanseniasis among native peoples. During the colonization period, Latin America gradually became a new world endemic area.[7]

The disease entered Brazil from several points along the coast with the first Portuguese settlers, mainly from the Azores, but other European peoples also collaborated in its dissemination later on.[8, 9] The first cases of the disease were reported in the country in 1600, in the city of Rio de Janeiro, where, years later, the first lazaretto would be created.[10] Later, other foci of the disease were identified, mainly in Bahia and Pará.[10] There are case reports in the state of São Paulo (SSP) in 1765 and 1768.

After the introduction of the disease through several points of the Brazilian coast, the infection would have accompanied the route of colonization. From Pernambuco, one of the oldest centers of sugarcane agriculture, the disease would have spread to Paraíba and Alagoas, due to the agricultural development of these regions. And it arrived in Ceará, Maranhão, Pará and Amazonas through the

occupation of these states. From São Paulo, the infection would have accompanied the pioneers to Minas Gerais, Mato Grosso and Goiás. And São Paulo would also be the focus of leprosy for the southern states.[11]

With the introduction of sulfone in the treatment of leprosy in the 1940s, the control of the disease was no longer done through isolation and segregation of the infected individual.[12,13] Since the 1950s, the norm of compulsorily isolating the leprosy patient in hospital-colonies no longer exists and the therapy is carried out on an outpatient basis.[14] In São Paulo, the Leprosy Prophylaxis Dispensary (LPD) continued to hospitalize patients until 1967. In Brazil, in 1976, new policies for the control of leprosy determined health education actions, monitoring of contacts with the application of BCG, active search for new cases, treatment of patients and prevention and treatment of physical disabilities.[14]

In 1991, at the 44th World Health Assembly of the World Health Organization (WHO), member countries committed to promoting the use of all control measures to eliminate the disease as a public health problem in the world by the year 2000. All endemic nations were expected to reach a prevalence rate of less than 1 patient per 10,000 population.[15] The goal was reached at the global level, however, despite all efforts, Brazil did not reach the goal of eliminating leprosy, and its main bottlenecks are: high case detection, high prevalence in many municipalities, diagnostic complexity and coverage of diagnostic and treatment services. The deadline was then extended to 2005 at the federal and state levels, while at the municipal level the proposal for elimination was extended to 2015.

ETIOLOGICAL AGENT

M. leprae is an obligate intracellular parasite that has an affinity for peripheral nerve cells and skin cells. The bacillus has slow reproduction, which may take 12 to 13 days to complete. This biological slowness explains why leprosy is so chronic in its evolution and its incubation period is so long – on average from three to five years. There are reports in the literature of periods longer or shorter than this.[16]

Despite being the first microorganism to which a disease was attributed (Hansen, 1873), so far the multiplication of the bacillus in artificial culture media has not been proven. It can remain viable for up to nine days outside the human body. Under adequate conditions of humidity and temperature, this period can reach 46 days.

The sick man of clinical bacilliferous form (multibacillary-MB) without treatment is considered as the main source of infection, which keeps transmission active in the community. The infective potential of the paucibacillary-BP forms and its subclinical phases is not yet known.

TRANSMISSION MODE

Hanseniasis is considered a disease of high infectivity and low pathogenicity. The most important routes of elimination seem to be the upper airways and breakage of the skin (ulcers, wounds, etc.). It is estimated that Virchowian patients eliminate around 2.4 x 10^8 bacilli daily through the respiratory tract.

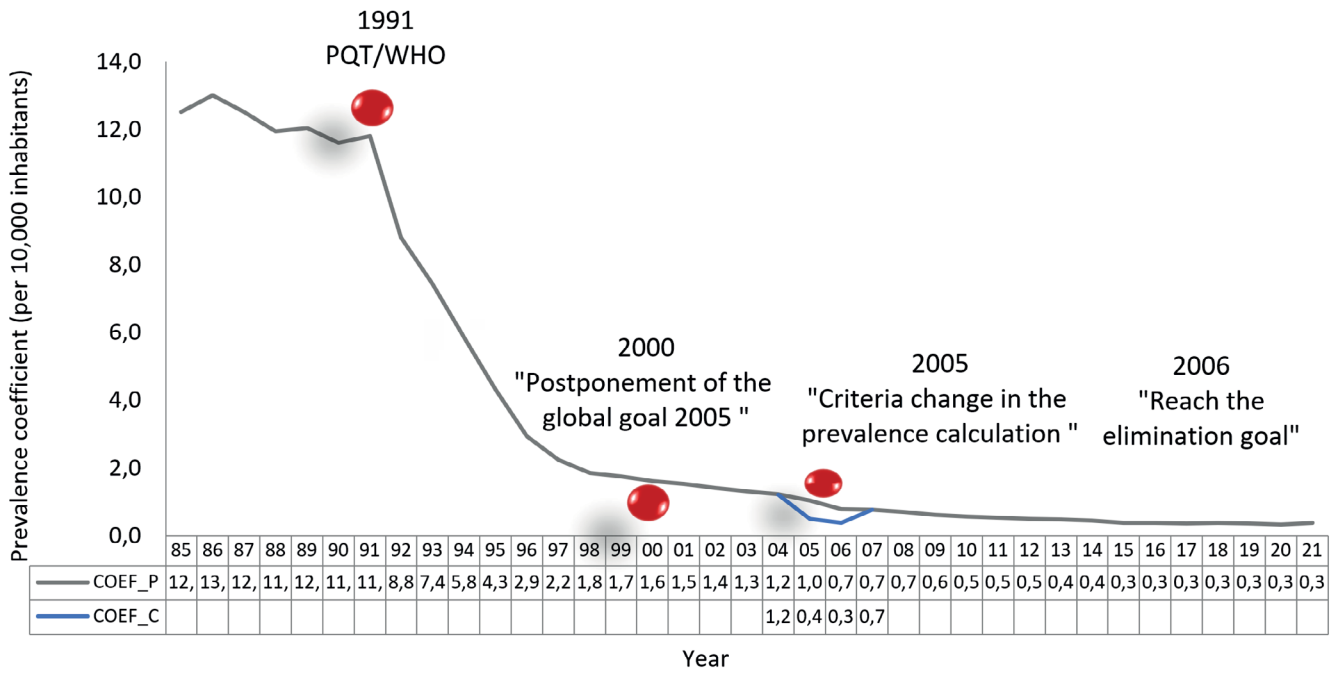
Although mycobacteria are found in the milk of Virchowian mothers, breastfeeding does not seem to be an important route of transmission. Comparative studies of children breastfed by Virchowian mothers did not demonstrate a greater risk of acquiring leprosy than children in the same situations who were artificially breastfed.

Direct contact and inhalation appear to be the most important entry routes for Hansen's bacillus. Ingestion or vectors may also be remembered, although none of these possibilities have been consistently proven. Factors linked to the host, such as malnutrition, and those linked to the environment, such as poor sanitation and low socioeconomic status, seem to be associated with the occurrence of leprosy.[16,17]

EPIDEMIOLOGICAL SITUATION

The SSP reached the elimination target proposed by the WHO of less than 1 case of leprosy registered per 10,000 inhabitants in 2006, with 3,196 cases and a prevalence coefficient of 0.78 (a parameter considered low). Graph 1 shows the coefficient resulting from the impact of therapy (polychemotherapy – MDT), adopted in 1991 at the SSP. In 2000, the target established by the WHO was extended to 2005, and the Ministry of Health adopted a new criterion for calculating the prevalence coefficient (Ordinance No. 31, of July 8 of the same year), which was resumed a posteriori. Although the SSP reached the elimination goal in 2006, 11 epidemiological surveillance groups (ESG) and 264 municipalities remain with a coefficient greater than or equal to 1 in that year.

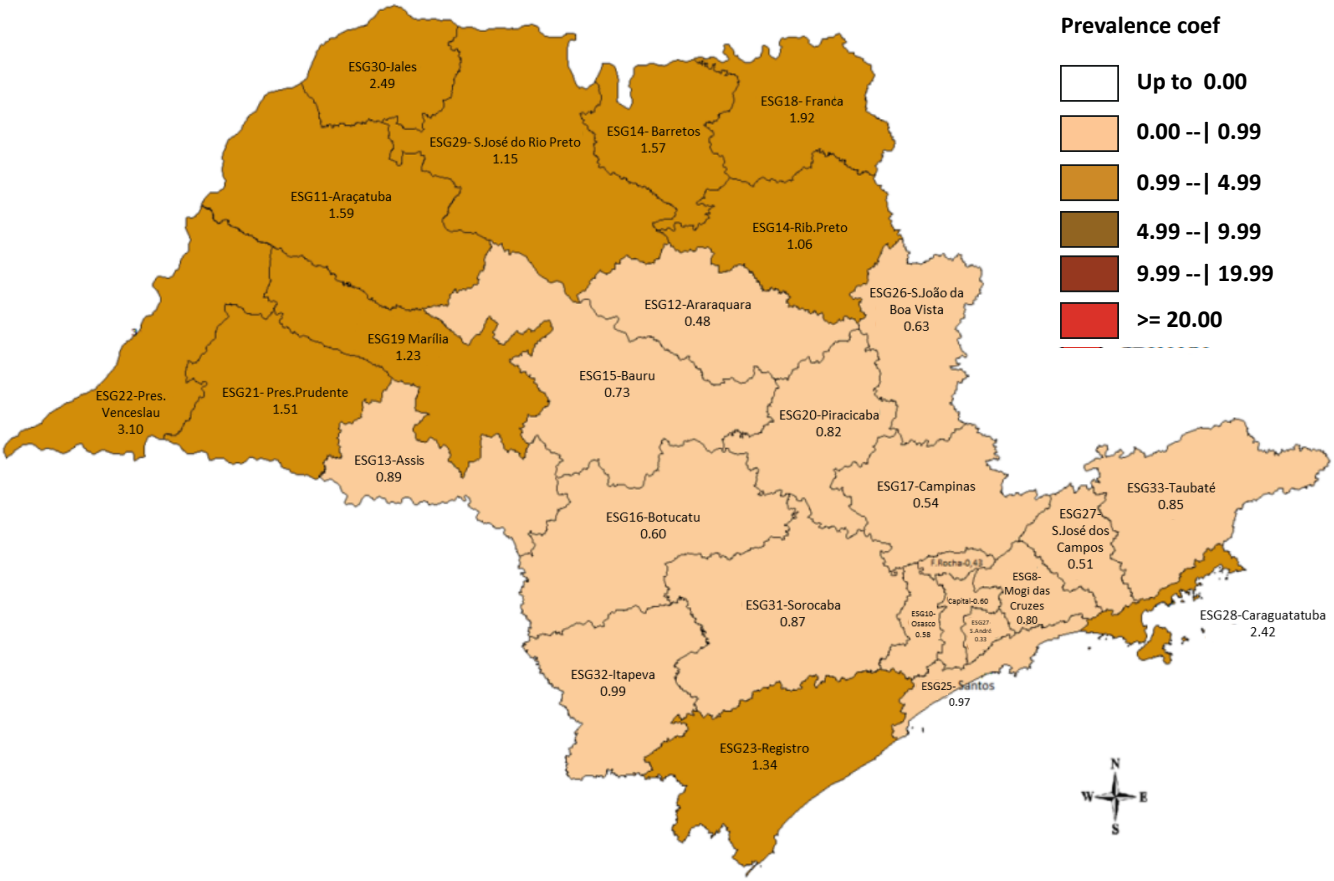
Graph 1. Prevalence coefficient of leprosy cases in the SSP, 1985-2021.



Source: TDHES/ESC/DCC/SHD-SP. Note: Coef_Corrected -> Prevalence coefficient corrected by the new calculation method established in 2005.
Prevalence – parameter: Low <1.00; Medium 1.00 to 4.99; High 5.0 to 9.99, Very High 10.0 to 19.99; Hyperendemic ≥ 20.00 for 10,000 inhab

In Figure 1, the cases are distributed by ESG, with most of the border regions with states that have many cases: Mato Grosso do Sul, Minas Gerais and Paraná.

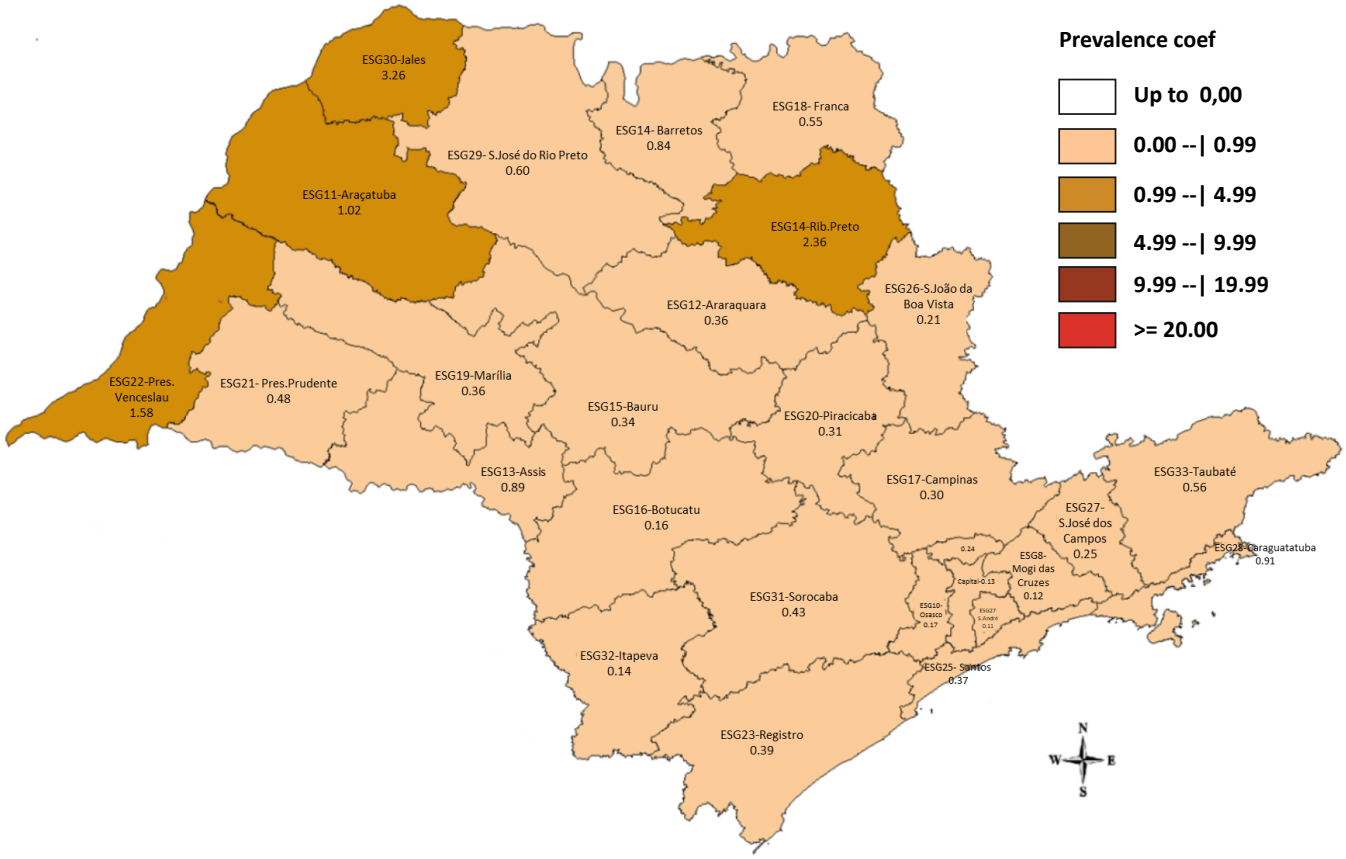
Figure 1. Distribution of the prevalence of leprosy cases by ESG of residence in the SSP, 2006.



Source: TDHES/ESC/DCC/SHD-SP.

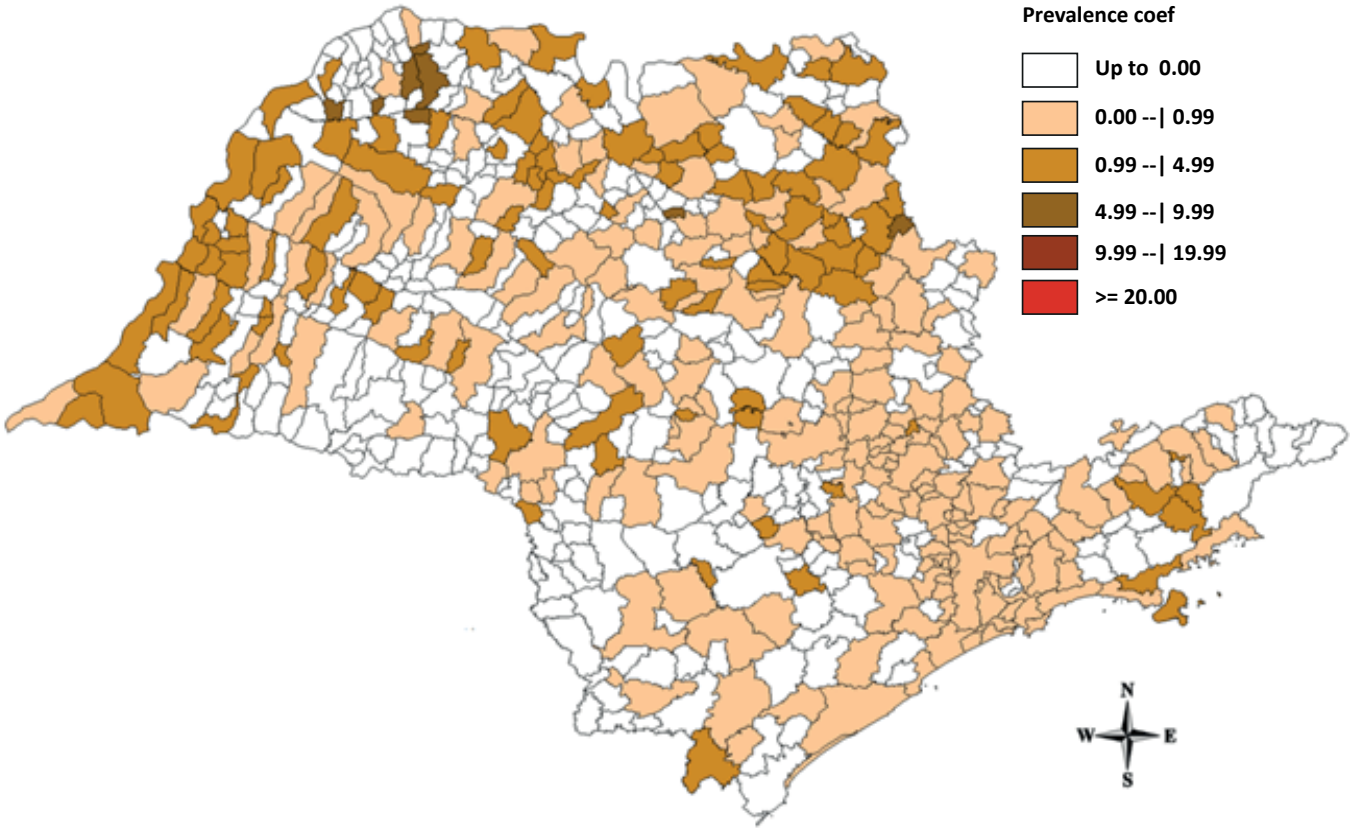
In 2021, 1,696 cases were recorded (0.37/10,000 inhabitants), with four ESGs presenting levels of the endemic considered average: ESG 30 - Jales (3.26), ESG 24 - Ribeirão Preto (2.36), ESG 22 - Presidente Venceslau (1.58) and ESG-11 – Araçatuba (1.02). In addition, 106 municipalities had an average coefficient and eight had a high parameter (Figures 2 and 3).

Figure 2. Distribution of the prevalence of leprosy cases by ESG of residence, SSP, 2021.



Source: TDHES/ESC/DCC/SHD-SP.

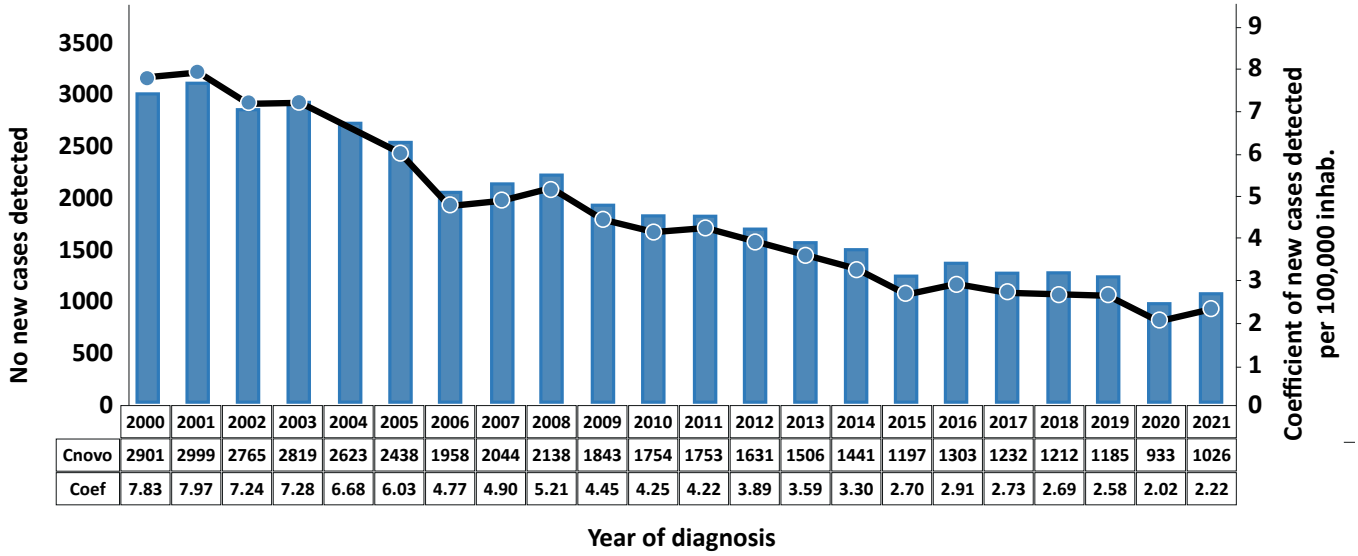
Figure 3. Distribution of the prevalence of leprosy cases by municipality of residence in the SSP, 2021.



Source: TDHES/ESC/DCC/SHD-SP.

The detection of new cases showed a statistically significant decreasing trend over time, being considered of medium intensity according to official parameters (Graph 2). In 2021, the SSP detected 1.026 new cases (2.22/100,000 inhabitants), 93 more than in 2020, when the covid-19 pandemic impacted these numbers. In 2020, 933 cases were diagnosed (2.00/100,000 inhabitants), a decrease of 20% compared to 2019, the year in which 1,185 cases were diagnosed (2.58/100,000 inhabitants).

Graph 2. Overall detection of new leprosy cases in the SSP, 2010 to 2021.

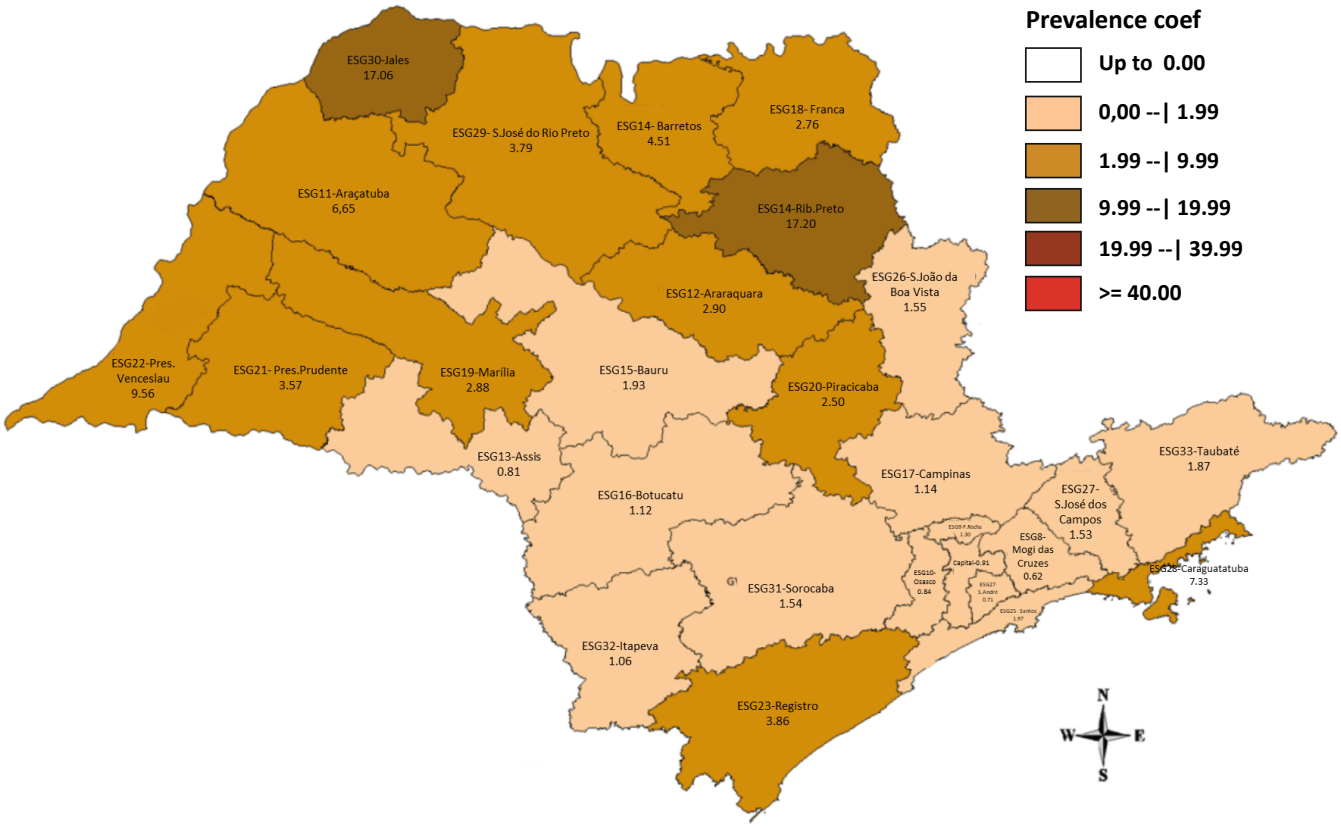


	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Cnovo	2901	2999	2765	2819	2623	2438	1958	2044	2138	1843	1754	1753	1631	1506	1441	1197	1303	1232	1212	1185	933	1026
Coef	7.83	7.97	7.24	7.28	6.68	6.03	4.77	4.90	5.21	4.45	4.25	4.22	3.89	3.59	3.30	2.70	2.91	2.73	2.69	2.58	2.02	2.22

Source: TDHES/ESC/DCC/SHD-SP.

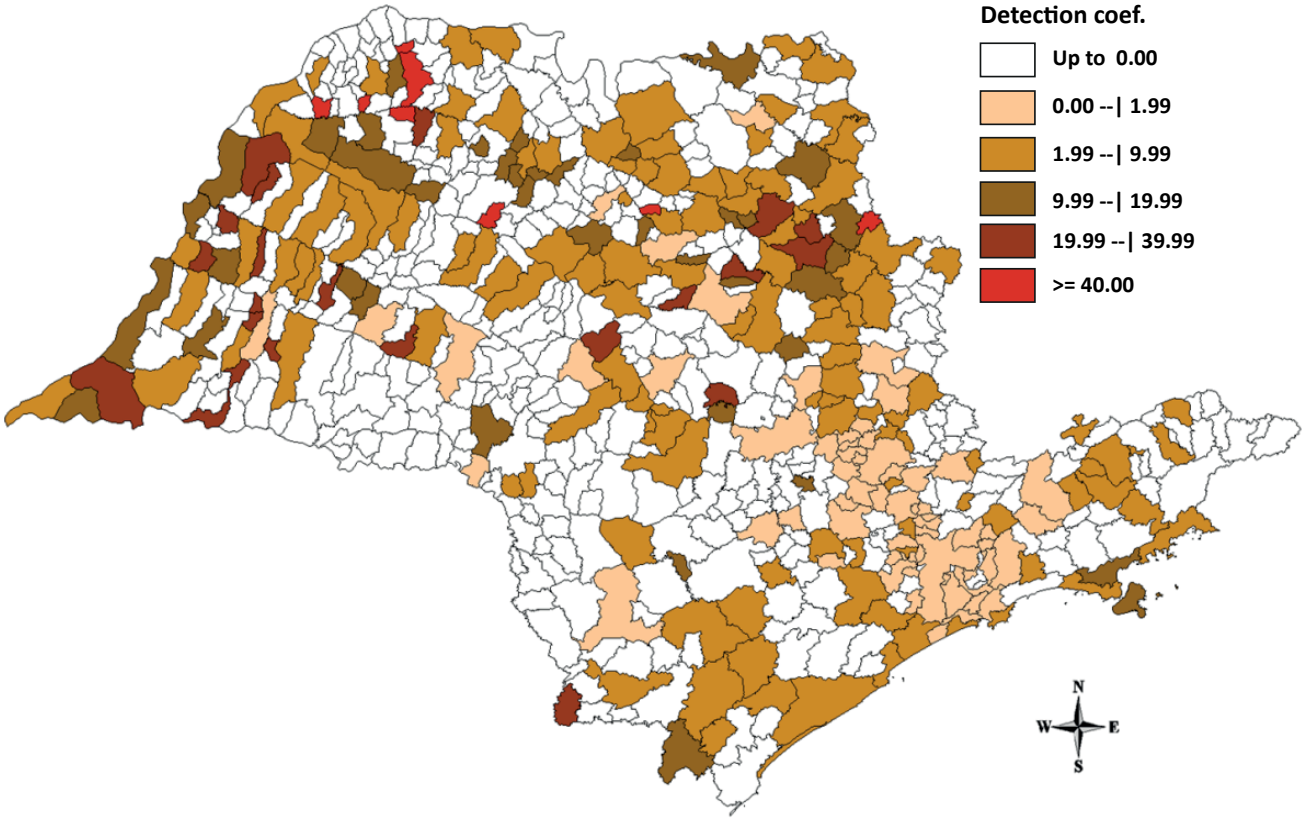
Two ESGs stand out in the state, Ribeirão Preto (17.20/100,000 inhabitants) and Jales (17.06/100,000 inhabitants), presenting a new case detection coefficient with a parameter considered high (Figure 4). No cases were detected in 388 municipalities in São Paulo (60%), but in 21 a high coefficient was observed (above 10.00 and less than 19.99/100,000 inhabitants) and in 8 it was above 40.00/100,000 inhabitants, considered hyperendemic by the official parameters of the CGDE/MS (Figures 4 and 5).

Figure 4. Distribution of newly detected cases of leprosy by ESG of residence in the SSP, 2021.



Source: TDHES/ESC/DCC/SHD-SP. Note: Detection of new cases – parameter: low < 2.00; medium 2.0 to 9.99; high 10.00 to 19.99; very high 20.00 to 39.9; hyperendemic ≥40.00 p/100,000 inhabitants.

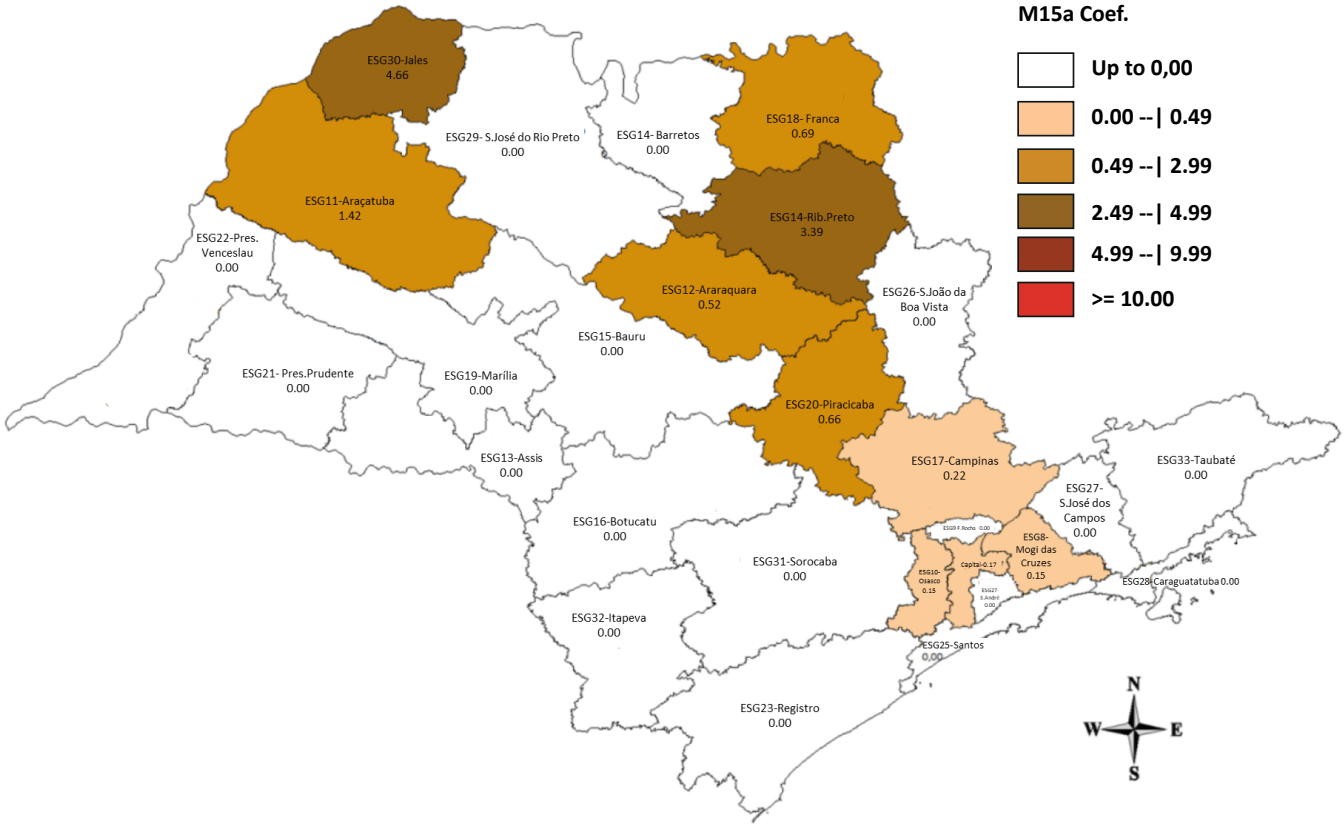
Figure 5. Distribution of new leprosy cases detected by municipality of residence in the SSP, 2021.



Source: TDHES/ESC/DCC/SHD-SP.

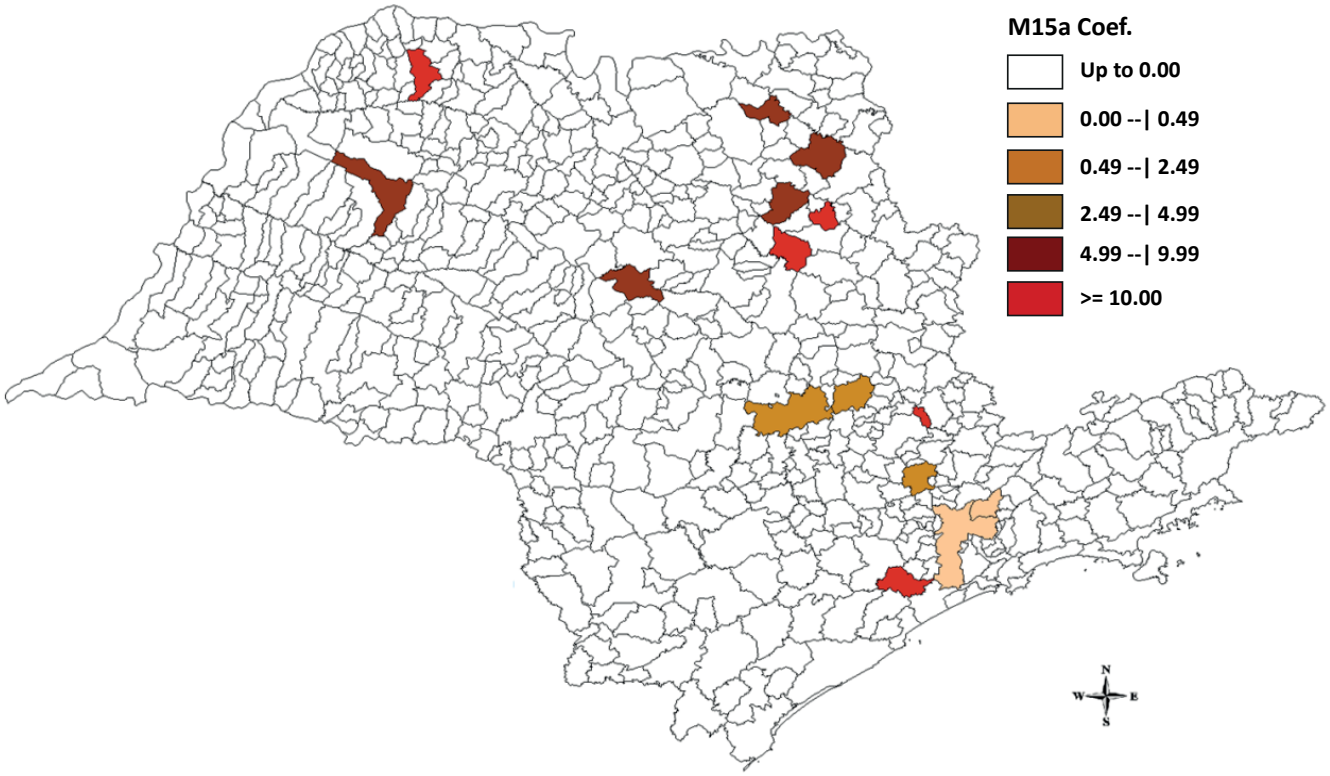
As for detection in children under 15 years of age, 26 cases were diagnosed (0.29/100,000 inhabitants) in 15 municipalities in 10 regions of the SSP. Cases in children show active foci of the disease and recent transmission and that they are in close contact with a source of infection, that is, a sick adult without treatment (Figures 6 and 7).

Figure 6. New detected cases of leprosy in children under 15 years old distributed by ESG of residence in the SSP, 2021.



Source: TDHES/ESC/DCC/SHD-SP. Note: Detection of new cases in children under 15 years old – parameter: low <0.50; medium 0.50 to 2.49; high 2.50 to 4.99; very high 5.00 to 9.99; hyperendemic ≥10.00 p/100,000 inhabitants.[18]

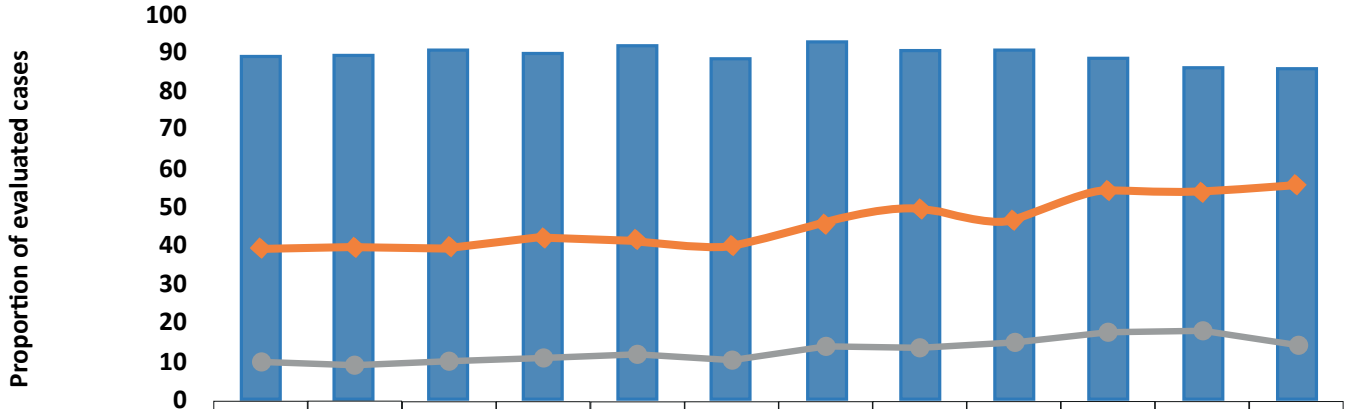
Figure 7. New detected cases of leprosy in children under 15 years old distributed by ESG of residence in the SSP, 2021.



Source: TDHES/ESC/DCC/SHD-SP.

The proportion of new cases with grade II disability shows late diagnosis. In grade I, there is loss of protective sensitivity and muscle strength, which can be installed in the hands, feet or eyes. In cases with grade II, the deformity is visible in these same segments. Since 2012, the SSP has shown a high parameter (≥ 10%) in the proportion of grade II disability at the time of diagnosis (Graph 3).

Graph 3. Proportion of physical disabilities (grade I + II) in new leprosy cases detected and evaluated in the SSP, 2010 to 2021.



	10	11	12	13	14	15	16	17	18	19	20	21
Evaluated	89.62	89.39	90.92	90.17	91.51	88.30	92.79	89.94	90.51	89.03	85.63	86.06
Inc I+II	39.19	39.48	39.22	41.90	41.26	39.83	45.57	49,46	46.76	54.03	53.63	55.93
Grade II	9.86	8.93	10.24	10.90	12.07	10.50	14.23	13.36	14.95	17.54	18.30	14.40

Source: TDHES/ESC/DCC/SHD-SP.

In Table 1 the cases are distributed by ESG of residence, with the result of the assessed percentage of new ones at the time of diagnosis and how many of them had grade II.

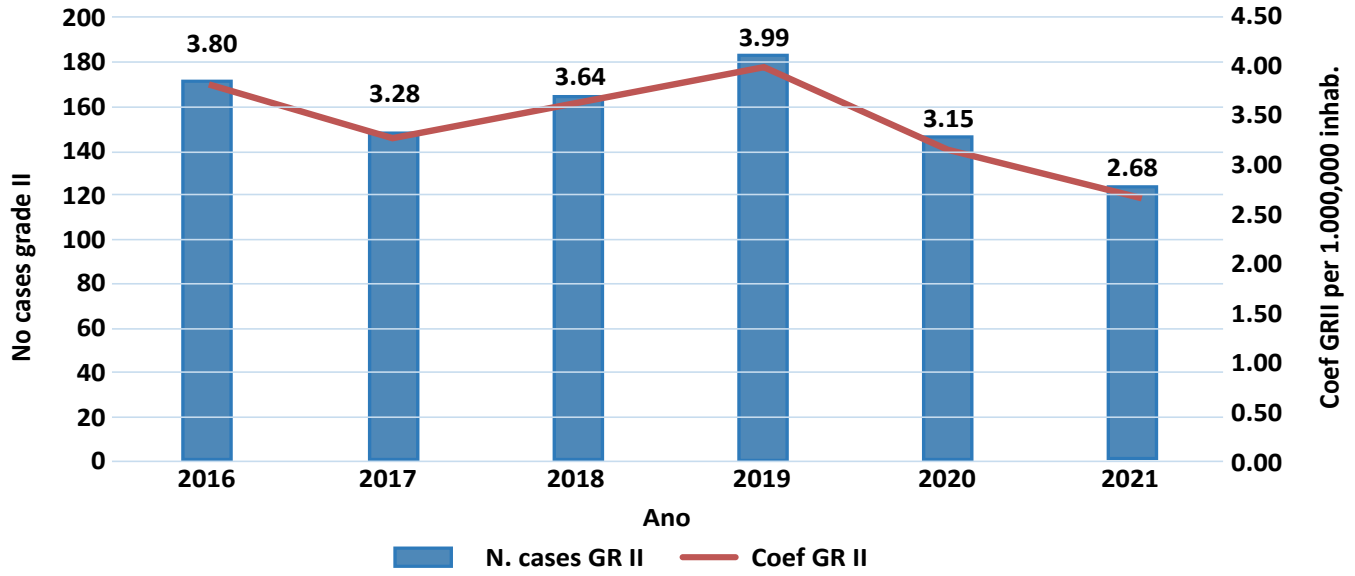
Table 1. New detected cases of leprosy distributed according to disability assessment and ESG of residence at the SSP, 2021.

ESG of residence	DIAGNOSIS DISABILITY ASSESSMENT								
	GRADE 0	GRADE I	GRADE II	Total assessed	Not assessed	Ignored/blank	Total	% assessed	% GRADE II
1331 ESG 1 CAPITAL	50	47	13	110	0	2	112	98.21	11.82
1332 ESG 7 SANTO ANDRÉ	9	10	0	19	0	1	20	95.00	0.00
1333 ESG 8 MOGI DAS CRUZES	13	3	2	18	1	0	19	94.74	11.11
1334 ESG 9 FRANCO DA ROCHA	1	2	3	6	0	2	8	75.00	50.00
1335 ESG 10 OSASCO	10	9	3	22	4	0	26	84.62	13.64
1336 ESG 11 ARAÇATUBA	31	16	3	50	1	2	53	94.34	6.00
1337 ESG 12 ARARAQUARA	10	14	2	26	2	2	30	86.67	7.69
1338 ESG 13 ASSIS	3	1	0	4	0	0	4	100.00	0.00
1339 ESG 14 BARRETOS	8	7	2	17	2	1	20	85.00	11.76
1340 ESG 15 BAURU	15	5	0	20	1	2	23	86.96	0.00
1341 ESG 16 BOTUCATU	4	1	2	7	0	0	7	100.00	28.57
1342 ESG 17 CAMPINAS	28	11	5	44	5	5	54	81.48	11.36
1343 ESG 18 FRANCA	7	7	0	14	2	4	20	70.00	0.00
1344 ESG 19 MARÍLIA	14	3	2	19	0	0	19	100.00	10.53
1345 ESG 20 PIRACICABA	15	12	10	37	2	1	40	92.50	27.03
1346 ESG 21 PRESIDENTE PRUDENTE	9	5	0	14	2	1	17	82.35	0.00
1573 ESG 22 PRESIDENTE VENCESLAU	12	3	2	17	2	10	29	58.62	11.76
1347 ESG 23 REGISTRO	3	3	1	7	2	2	11	63.64	14.29
1348 ESG 24 RIBEIRÃO PRETO	83	121	30	234	18	13	265	88.30	12.82
1349 ESG 25 SANTOS	6	5	5	16	14	7	37	43.24	31.25
1350 ESG 26 SÃO JOÃO DA BOA VISTA	3	3	3	9	2	2	13	69.23	33.33
1351 ESG 27 SÃO JOSÉ DOS CAMPOS	5	8	3	16	1	0	17	94.12	18.75
1576 ESG 28 CARAGUATATUBA	7	13	2	22	1	2	25	88.00	9.09
1354 ESG 29 SÃO JOSÉ DO RIO PRETO	17	19	8	44	0	8	52	84.62	18.18
1574 ESG 30 JALES	13	17	12	42	3	1	46	91.30	28.57
1353 ESG 31 SOROCABA	9	10	11	30	4	1	35	85.71	36.67
1575 ESG 32 ITAPEVA	0	1	0	1	1	1	3	33.33	0.00
1352 ESG 33 TAUBATÉ	8	10	0	18	0	3	21	85.71	0.00
Total	**393**	**366**	**124**	**883**	**70**	**73**	**1.026**	**86.06**	**14.04**

Source: DTVEH/CVE/CCD/SES. Note: Data closed on April 8, 2022. Disability Assessment – Parameter: good > =90.00%; regular 75.00 to 89.99%; precarious < 75.00%.18 Disability grade II – Parameter: high->=10.00%; medium 5 to 9.99% and low < 5.00%.[18]

Graph 4 shows a series of disability grade II coefficient of new leprosy cases. It is an impact indicator that reflects the delay in diagnosis, applicable at the global, federal and state levels, as well as in municipalities with more than 1 million inhabitants. The SSP has been presenting a rate of around 3.00/1.00.0000 inhabitants.

Graph 4. Grade II disability coefficient of new leprosy cases detected in the SSP, 2016 to 2021.



Source: TDHES/ESC/DCC/SHD-SP.

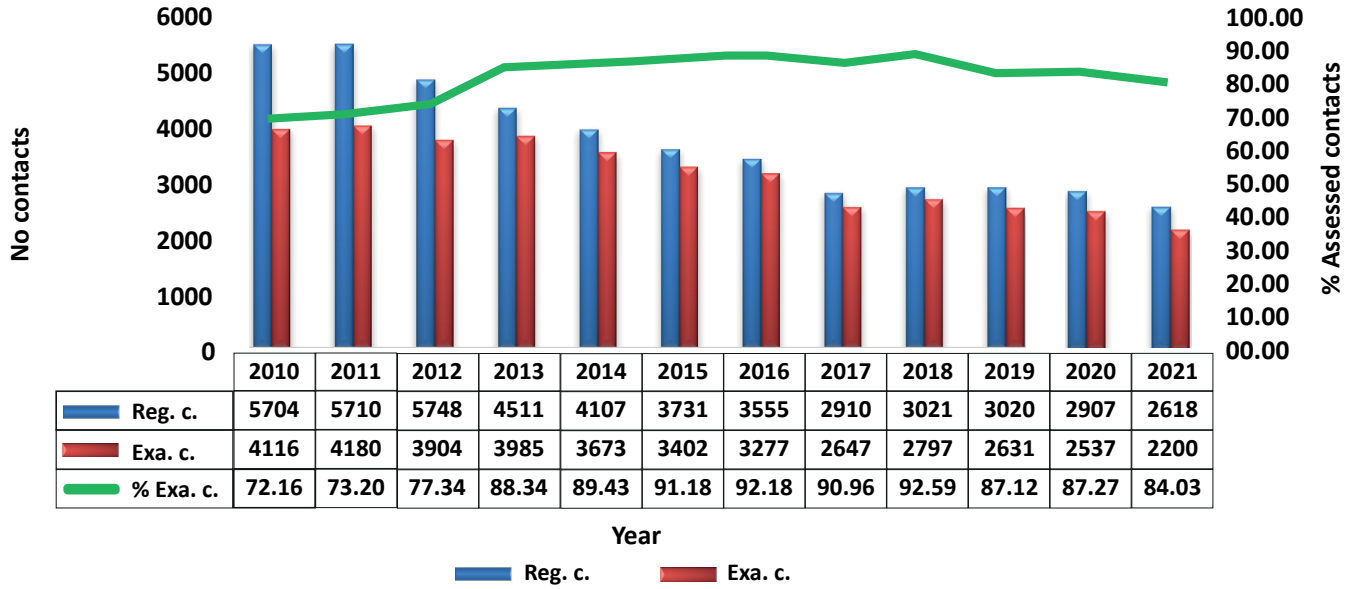
The Global Leprosy Strategy 2016-2020 – Accelerating towards a leprosy-free world is based on three pillars covering governance, medical and social aspects of the disease[1,9] The ultimate vision of the strategy is to have a leprosy-free world, but its immediate objective is to further reduce the global and local burden of disease. The goals are:

1- Elimination of disability among new cases in children.
2- Reduction of Grade II disability among new cases to less than 1 per million.
3- No country with laws that allow leprosy discrimination.

The indicator of the proportion of contacts examined is part of the list of indicators of the Qualification Program for Health Surveillance Actions (QPHSA).[a] The calculation of the indicator until 2012 was constructed by selecting the new cases diagnosed in the year. As of 2013, the selection criterion was changed by the General Coordination of Leprosy and Diseases in Elimination (GCLDE) of the Ministry of Health, and it started to be evaluated among the new cases in the years of the PBMB cohorts. In the series shown in Graph 5, there was an improvement in the rates since 2012, however, from 2019 onwards there was a reduction in the evaluation percentage.

[a]Created by Ordinance nº 1.378/GM/MS, of July 8, 2013, the Qualification Program for Health Surveillance Actions (PQA-VS) seeks to improve health surveillance actions and services, as an initiative to improve the Health Unic System.[20]

Graph 5. Proportion of examined contacts of new leprosy cases in the SSP, 2010-2021.



	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Reg. c.	5704	5710	5748	4511	4107	3731	3555	2910	3021	3020	2907	2618
Exa. c.	4116	4180	3904	3985	3673	3402	3277	2647	2797	2631	2537	2200
% Exa. c.	72.16	73.20	77.34	88.34	89.43	91.18	92.18	90.96	92.59	87.12	87.27	84.03

Source: TDHES/ESC/DCC/SHD-SP.

In Table 2, the cases are distributed by ESG of residence and classified according to the parameter of the percentage of contacts examined. Contacts who live with untreated hanseniasis patients are at greater risk of becoming ill, so it is extremely important to carry out surveillance of contacts. The indicator measures the capacity of services to carry out this surveillance of new cases, thus increasing the timely detection of hanseniasis and recommending the application of the BCG vaccine to healthy contacts. This BCG vaccine is not specific for the disease, but some studies have shown that it promotes protection against the manifestation of multibacillary leprosy.

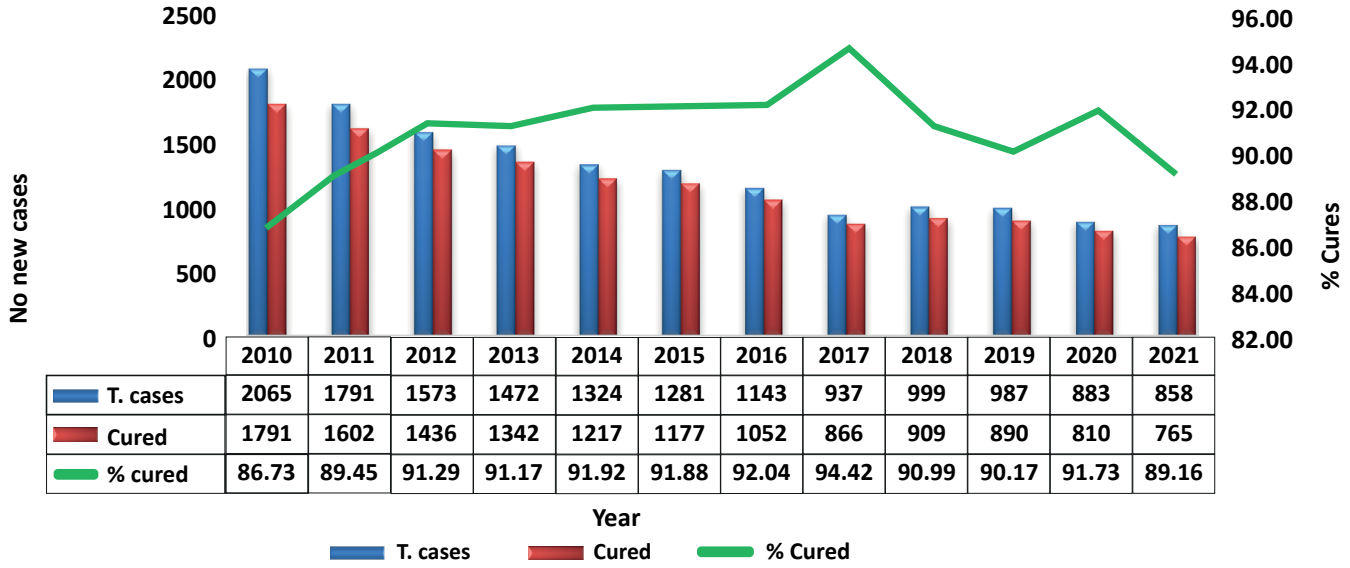
Table 2. Percentage of examined contacts of newly detected leprosy cases in PBMB cohorts distributed by ESG of current residence in the SSP, 2021

ESG of current residence	PBMB COHORT				Parameter % Examined cases
	Nº cases	Registered case	Examined case	% Examined cases PBMB	
1334 FRANCO DA ROCHA	3	8	8	100.00	Good
1338 ASSIS	2	5	5	100.00	
1341 BOTUCATU	3	12	12	100.00	
1344 MARÍLIA	29	68	68	100.00	
1346 PRESIDENTE PRUDENTE	16	38	38	100.00	
1575 ITAPEVA	5	9	9	100.00	
1351 SÃO JOSÉ DOS CAMPOS	8	27	26	96.30	
1574 JALES	81	216	208	96.30	
1352 TAUBATÉ	19	76	71	93.42	
1340 BAURU	9	26	24	92.31	
1335 OSASCO	27	121	111	91.74	
1332 SANTO ANDRÉ	16	64	58	90.63	
1573 PRESIDENTE VENCESLAU	24	59	53	89.83	Regular
1354 SÃO JOSÉ DO RIO PRETO	41	124	111	89.52	
1350 SÃO JOÃO DA BOA VISTA	3	9	8	88.89	
1345 PIRACICABA	43	169	148	87.57	
1336 ARAÇATUBA	31	90	78	86.67	
1576 CARAGUATATUBA	22	82	68	82.93	
1333 MOGI DAS CRUZES	33	92	76	82.61	
1343 FRANCA	32	69	57	82.61	
1353 SOROCABA	119	326	269	82.52	
1342 CAMPINAS	47	127	104	81.89	
1347 REGISTRO	10	23	18	78.26	
1339 BARRETOS	14	42	32	76.19	
1331 SÃO PAULO – CAPITAL	77	260	195	75.00	
1348 RIBEIRÃO PRETO	113	396	290	73.23	Precarious
1349 SANTOS	19	50	36	72.00	
1337 ARARAQUARA	12	30	19	63.33	
Total	**858**	**2618**	**2200**	**84.03**	**Regular**

Source: TDHES/ESC/DCC/SHD-SP. Note: Data ended April 8, 2022. % of Contacts examined – Parameter: good ≥ 90.00%; Regular 75.00 to 89.99%; Precarious < 75.00%.[18]

The proportion of cured cases in PBMB cohorts is an indicator of interfederative agreement assessment[b] that assesses the quality of care in the follow-up of cases until the conclusion of treatment. To standardize the calculation method since 2012, the General Coordination of Leprosy and Diseases in Elimination, through technical note No. 3/2012/CGDHE/DEVIT/SVS/MS, guides the calculation of the indicator in the period of these cohorts. Since 2012, the SSP has also reached the target, with values equal to or greater than 90.0%. In 2021, it was not achieved (89.16%), with an increase in the proportion of dropouts compared to the previous year, which contributed to the reduction of the goal (7.81%), probably due to the covid-19 pandemic (Graph 6).

Graph 6. Proportion of cured cases among newly detected leprosy cases in the SSP, 2010-2021.



	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
T. cases	2065	1791	1573	1472	1324	1281	1143	937	999	987	883	858
Cured	1791	1602	1436	1342	1217	1177	1052	866	909	890	810	765
% cured	86.73	89.45	91.29	91.17	91.92	91.88	92.04	94.42	90.99	90.17	91.73	89.16

Source: TDHES/ESC/DCC/SHD-SP.

Table 3 presents the distribution of the indicator by ESG, an indicator whose result is in percentage and, therefore, its evaluation needs to be careful. This is because the increase in the number of deaths or abandonment in the cohort interferes with the result of the indicator.

[b]The inter-federative agreement is the negotiation process between the federated entities (municipalities, states and the Distrito Federal) that involves a list of indicators related to national health priorities, with the federated entities being responsible for discussing and agreeing on such indicators according to regional interests.[21]

Table 3. Cure percentage of newly detected leprosy cases in PBMB cohorts distributed by ESG of current residence and type of discharge in the SSP, 2021.

ESF of current residence	PBMB COHORT – TYPE OF DISCHARGE						
	RA	Cure	Death	Abandonment	Total	% cure	% abandonment
1331 São Paulo – Capital	0	74	2	1	77	96.10	1.30
1332 Santo André	0	14	2	0	16	87.50	0.00
1333 Mogi das Cruzes	0	29	0	4	33	87.88	12.12
1334 Franco da Rocha	0	2	1	0	3	66.67	0.00
1335 Osasco	0	24	1	2	27	88.89	7.41
1336 Araçatuba	0	29	2	0	31	93.55	0.00
1337 Araraquara	0	11	0	1	12	91.67	8.33
1338 Assis	0	2	0	0	2	100.00	0.00
1339 Barretos	0	12	0	2	14	85.71	14.29
1340 Bauru	0	8	0	1	9	88.89	11.11
1341 Botucatu	0	3	0	0	3	100.00	0.00
1342 Campinas	0	41	3	3	47	87.23	6.38
1343 Franca	0	24	0	8	32	75.00	25.00
1344 Marília	0	27	1	1	29	93.10	3.45
1345 Piracicaba	0	41	1	1	43	95.35	2.33
1346 Presidente Prudente	0	15	1	0	16	93.75	0.00
1348 Ribeirão Preto	0	97	1	15	113	85.84	13.27
1349 Santos	0	18	0	1	19	94.74	5.26
1350 São João da Boa Vista	0	3	0	0	3	100.00	0.00
1351 São José dos Campos	0	6	1	1	8	75.00	12.50
1352 Taubaté	1	17	1	0	19	89.47	0.00
1353 Sorocaba	0	98	4	17	119	82.35	14.29
1354 São José do Rio Preto	0	41	0	0	41	100.00	0.00
1573 Presidente Venceslau	0	22	2	0	24	91.67	0.00
1574 Jales	0	73	1	7	81	90.12	8.64
1575 Itapeva	0	4	1	0	5	80.00	0.00
1576 Caraguatatuba	0	22	0	0	22	100.00	0.00
Total	**1**	**765**	**25**	**67**	**858**	**89.16**	**7.81**

Source: TDHES/ESC/DCC/SHD-SP. Note: % Cure – Parameter: Good =90%, Regular 75 to 89.9 and Precarious <75%.

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