

**MANUEL JACINTO ABREU NETO**

*Acadêmico do Curso de Medicina do Centro  
Universitário Lusíada - UNILUS.*

**LUIZ HENRIQUE GAGLIANI**

*Mestre em Ciências da Saúde pelo Centro  
Universitário Lusíada - UNILUS. Doutor em  
Infectologia pela Universidade Federal de  
São Paulo - UNIFESP. Responsável pelo Núcleo  
Acadêmico de Estudos e Pesquisas em Ciências  
Biomédicas e Saúde Pública do Centro  
Universitário Lusíada - UNILUS. Professor do  
Curso de Pós-Graduação - Mestrado em Clínica  
Médica do Centro Universitário Lusíada -  
UNILUS.*

**ROSA MARIA FERREIRO PINTO**

*Doutora em Serviço Social - PUC - São Paulo.  
Professora do Curso de Pós-Graduação -  
Mestrado em Clínica Médica do Centro  
Universitário Lusíada - UNILUS.*

**MARCOS MONTANI CASEIRO**

*Doutor em Infectologia pela Universidade  
Federal de São Paulo - UNIFESP. Professor do  
Curso de Pós-Graduação - Mestrado em Clínica  
Médica do Centro Universitário Lusíada -  
UNILUS.*

*Recebido em março de 2017.  
Aprovado em abril de 2017.*

## THE EPIDEMIOLOGY OF LEPTOSPIROSIS IN BAIXADA SANTISTA FROM 2007 TO 2014

### ABSTRACT

**Introduction:** This study aims to describe the epidemiology of leptospirosis in Baixada Santista from 2007 to 2014. **Methods:** This study approaches the incidence of leptospirosis and the lethality of this disease in the regions of the State of São Paulo and, in a second moment, analyzes the data referring to nine municipalities of Baixada Santista. The data is from the Center for Epidemiological Surveillance of the state of São Paulo (Centro de Vigilância Epidemiológica do Estado de São Paulo - CVE-SP) and Santos Regional Health Board (Diretoria Regional de Saúde de Santos - DIR XIX). **Results:** The results indicate that Baixada Santista has a higher incidence coefficient of all the metropolitan regions of the state of São Paulo, as well as a high lethality. **Conclusions:** It is believed that educational measures for the population, together with training for doctors in emergency care units and emergency services, can decrease those numbers in a significant way.

**Keywords:** Leptospirosis. Epidemiology. Baixada Santista.

## EPIDEMIOLOGIA DA LEPTOSPIROSE NA BAIXADA SANTISTA DE 2007 A 2014

### RESUMO

**Introdução:** Este estudo tem como objetivo descrever a epidemiologia da leptospirose na Baixada Santista de 2007 a 2014. **Métodos:** Este estudo aborda a incidência de leptospirose e a letalidade desta doença nas regiões do Estado de São Paulo e, em um segundo momento, analisa. Os dados referentes a nove municípios da Baixada Santista. Os dados são do Centro de Vigilância Epidemiológica do Estado de São Paulo (CVE-SP) e da Direção Regional de Saúde de Santos - DIR XIX. **Resultados:** Os resultados indicam que a Baixada Santista apresenta maior coeficiente de incidência de todas as regiões metropolitanas do estado de São Paulo, bem como alta letalidade. **Conclusões:** Acredita-se que medidas educacionais para a população, junto com a formação de médicos em unidades de atendimento de emergência e serviços de emergência, possam diminuir esses números de forma significativa.

**Palavras-Chave:** Leptospirose. Epidemiologia. Baixada Santista.

## INTRODUCTION

Described in the last decades as a major infectious disease worldwide, leptospirosis is a zoonosis disease that affects mainly the tropical regions and it is caused by a bacterium of the genus *Leptospira*. This zoonosis is transmitted through animals of different species (rodents, mainly) to humans [1]. The maintenance of the disease is guaranteed by the elimination of the microorganism in the urine of the infected animals. Human infection can occur through direct contact with the urine of an infected animal or indirect contact by exposure to water and soil contaminated by *Leptospira*. Leptospirosis is characterized by generalized vasculitis, which may present as an asymptomatic infection or initially manifest with nonspecific clinical symptoms, characterized by fever, chills, headache and myalgia. Jaundice, hemorrhages, renal complications, torpor and coma are signs of the severe form of the disease, also known as Weil Syndrome [2].

According to the Ministry of Health, from 2007 to 2014, 31,851 cases of leptospirosis were confirmed in Brazil, with an annual average of 3,981 cases. The southeastern region stands out in the period, with an annual average of 1,503 cases. During the same period, Baixada Santista presented one of the highest incidences in the state of São Paulo. Based on these data, the present study aims to describe and analyze the values of the leptospirosis incidence coefficients and the lethality of this disease in the nine municipalities of Baixada Santista in the same period.

## METHODS

The study was based on data from the Epidemiological Surveillance Center of the state of São Paulo and the Regional Directorate of Health of Santos for the period from 2007 to 2014.

Initially, data were analyzed for each Epidemiological Surveillance Group (Grupo de Vigilância Epidemiológica GVE) in the state of São Paulo. Each group is formed by a determined number of cities and characterizes different regions of the state.

After that, the data for each municipality of Baixada Santista were analyzed, based on the incidence coefficients and lethality of each year.

The calculation of the incidence coefficients of leptospirosis was done together with data provided by IBGE and the Santos Regional Health Board, based on the resident population of each municipality and the number of reported cases of leptospirosis. The following equation was performed:

$(\text{Number of reported cases} / \text{Resident population}) \times 100,000 \text{ inhabitants}$

The lethality was calculated as follows:

$(\text{Number of deaths in local given and period} / \text{Number of confirmed cases in the same place and period}) \times 100.$

The calculated coefficients were arranged in tables, from which graphs were developed, in order to comparatively analyze the regions of the State of São Paulo and the municipalities of Baixada Santista.

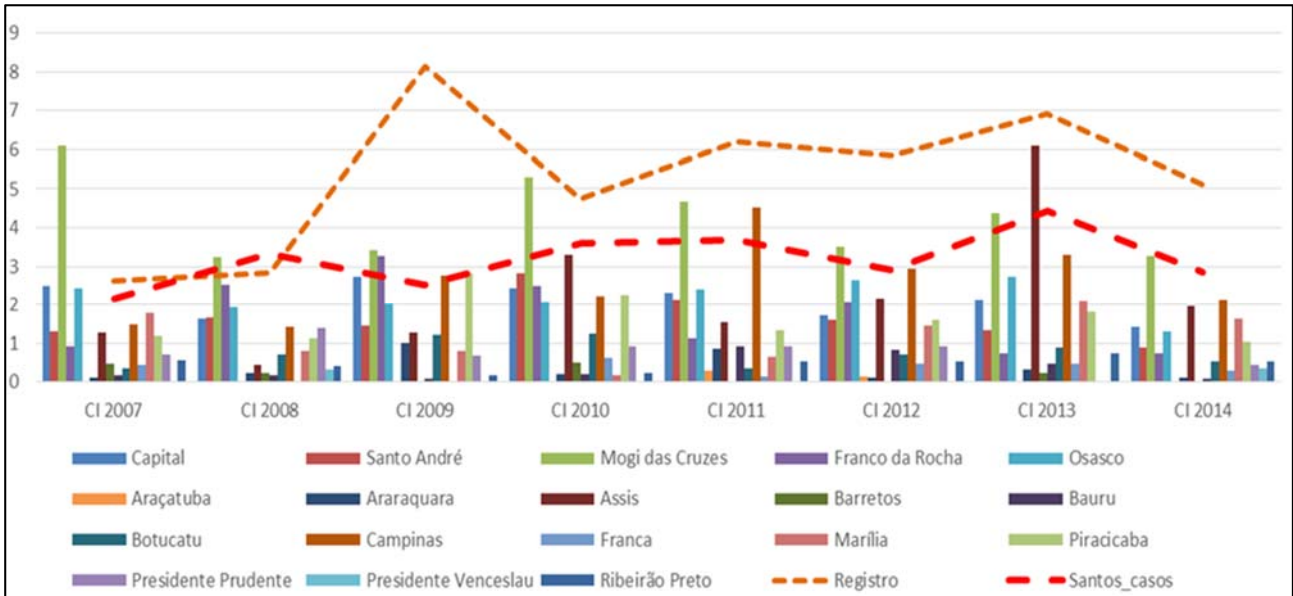
To illustrate, partial data from 2015 were presented in the charts referring to the municipalities of Baixada Santista.

## RESULTS

According to the Ministry of Health, the Southeast region has one of the highest numbers of confirmed cases of leptospirosis in the country, especially in the state of São Paulo. Of the 31,851 cases confirmed throughout the country in the period from 2007 to 2014, 12,024 cases are in the Southeast region, with 6,555 cases belonging to the state of São Paulo.

According to data from the Epidemiological Surveillance Center of the State of São Paulo, the incidence coefficients of the epidemiological surveillance groups of the state (SP - SP) vary widely. The region of Registro city has one of the highest coefficients, ranging from 2.63 in 2007 to 5.11 in 2014. The highest registry incidence coefficient was in the year of 2009, in the amount of 8.14, according to the chart below.

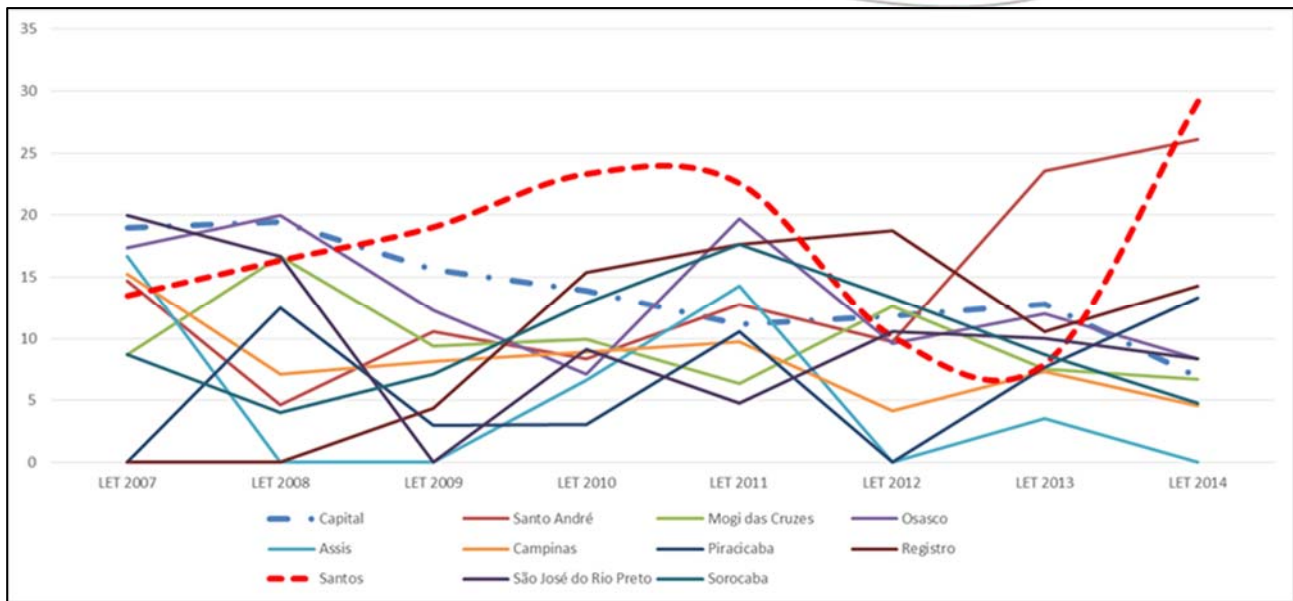
Chart 1 - Incidence coefficient by leptospirosis in different regions of the state of São Paulo (GVE-SP), from 2007 to 2014.



During this same period, the region of Santos also stood out. Also according to the previous chart, the incidence coefficients of this region were relatively high comparing to the other regions. The highest incidence coefficient of Santos was in the year of 2013, in the amount of 4.43.

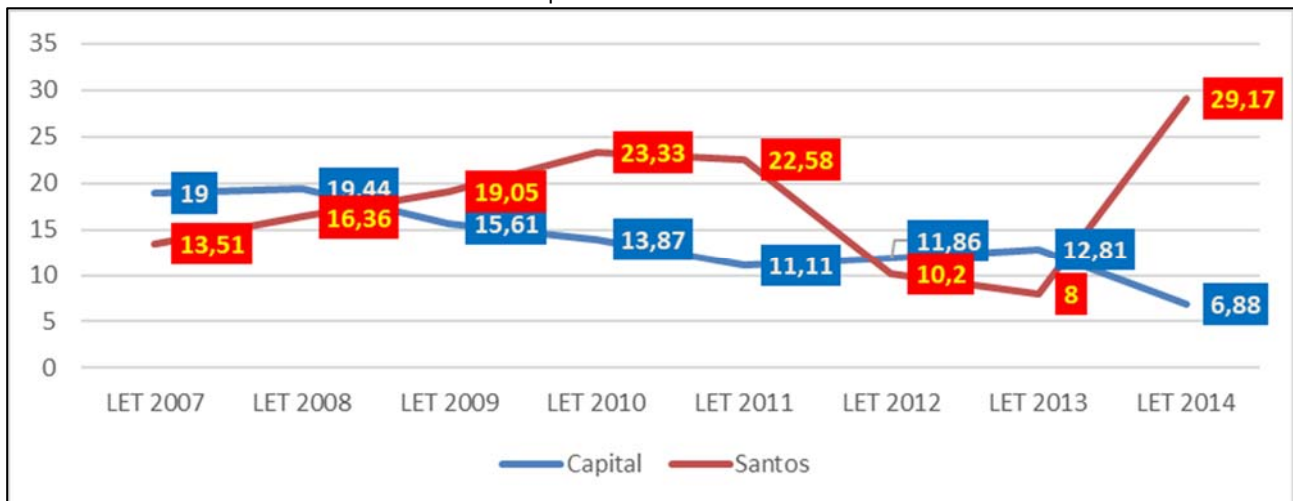
Leptospirosis lethality also varies according to the regions of the state and the analyzed years. According to the chart below, it is noted that the lethality is high in regions such as Santos, Santo André, Registro and Osasco, for example. It is worth mentioning that in the period from 2011 to 2013 there was a decrease in lethality in the region of Santos, reaching the value of 8. However, this value increased again after the year of 2013, reaching 29.17 in 2014.

Chart 2 - Lethality by leptospirosis in different regions of the state of São Paulo (GVE-SP), from 2007 to 2014.



In contrast to the region of Santos, the lethality of the region related to the state capital has decreased in the period between 2007 and 2014, which can be seen in the chart below. In 2007, the capital had a lethality of 19. In 2014, this value reduced even more: 6.88.

Chart 3 - Lethality by leptospirosis, in the period from 2007 to 2014, referring to the regions: Capital and Santos.

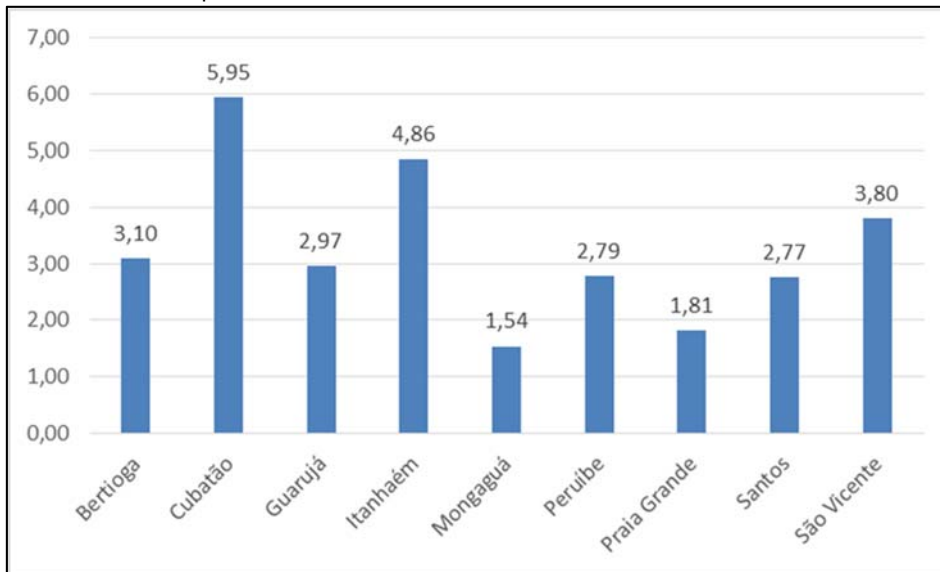


The region of Santos, known as Baixada Santista, is made up of nine municipalities: Bertioga, Cubatão, Guarujá, Itanhaém, Mongaguá, Peruíbe, Praia Grande, Santos and São Vicente. As seen previously, it is noted that this region has one of the highest incidence coefficients of leptospirosis in the state. According to data provided by the Santos Regional Health Board, it was possible to analyze each municipality in this region separately.

In the analysis of the graph below, it is noted that the city of Cubatão has one of the highest average incidence coefficients of the region, the amount of 5.95, followed by Itanhaém, whose value is 4.86. Mongaguá has the lowest average coefficient, equivalent to 1.54. These figures refer to the average incidence coefficients in the period from 2007 to 2015.

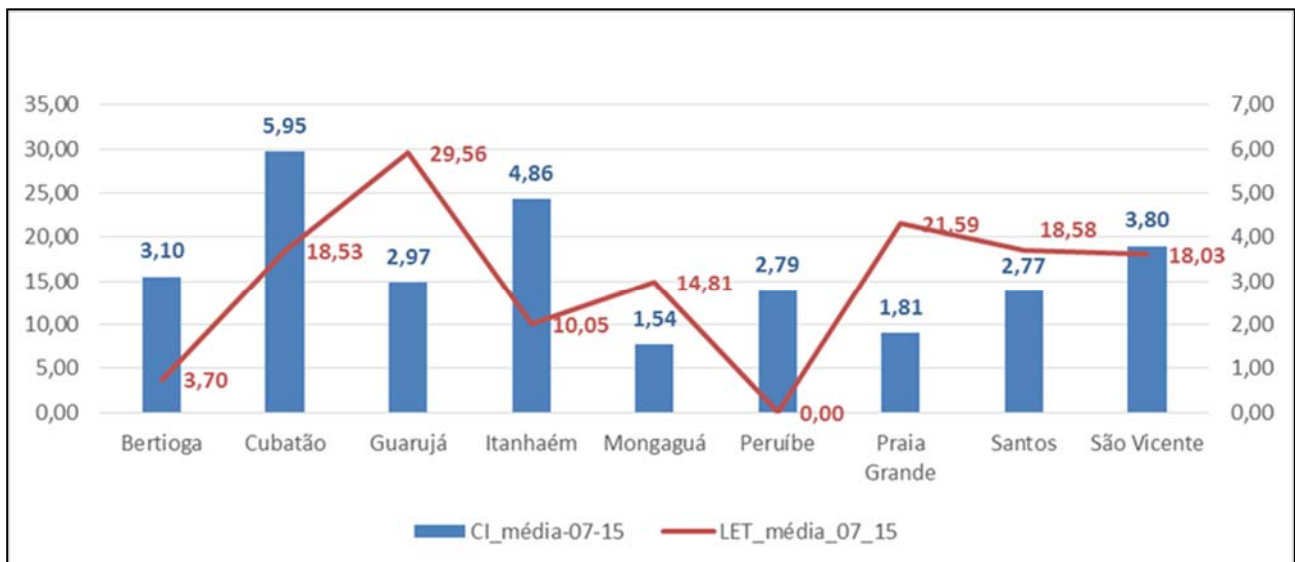


Chart 4 - Average incidence coefficient for leptospirosis in the municipalities of Baixada Santista, from 2007 to 2015.



In this study, it is also noted that the leptospirosis lethality in Baixada Santista is significant. According to the chart below, cities such as Guarujá and Praia Grande presented values higher than 20 in the period from 2007 to 2015. Santos, São Vicente and Cubatão also presented high lethality, with values close to 18 in the same period.

Chart 5 - Lethality by leptospirosis, from 2007 to 2015, in the municipalities of Baixada Santista.



## DISCUSSION

According to the results, it has been verified the high incidence of leptospirosis in the state of São Paulo and the high rates of this disease in the region

of Baixada Santista. It is also noted that in some regions, the indexes tend to decrease, while in other regions the values remain high.

It is known that leptospirosis usually presents with nonspecific clinical symptoms, which are very similar to the symptoms of illness such as influenza and viral infections. In addition, it has an incidence of seasonal variation. Thus, it is believed that more attention should be paid to the symptoms and the correct diagnostic means to confirm the suspicion of this disease, especially in the periods in which it presents more incidence. This can be done through educational measures for the population, especially for groups of professionals who are most exposed to contagion. In addition, providing training for doctors and health professionals of emergency care units and emergency services, prioritizing regions where leptospirosis rates are high. These actions together would enable a significant reduction of these indices.

## CONCLUSION

According to the data and graphs analyzed, it is concluded that the region of Baixada Santista presents one of the highest coefficients of incidence in the state of São Paulo and high lethality. Thus, it is believed that educational measures for the population, as well as training for the physicians of the emergency care units and the emergency services, can bring significant improvement of these indices.

## REFERÊNCIAS

1. Bharti, A.R., et al., Leptospirosis: a zoonotic disease of global importance. *Lancet Infect Dis*, 2003. 3(12): p. 757-71.
2. Senior, K., Leptospirosis and Weil's syndrome: cause for concern? *Lancet Infect Dis*, 2010. 10(12): p. 823-4.
3. Bohlmann, B.J., Clinical problem-solving: leptospirosis. *N Engl J Med*, 1993. 329(27): p. 2041.
4. Hasnain, S.E. and N. Ahmed, Leptospirosis. *Lancet Infect Dis*, 2004. 4(9): p. 543; discussion 544.
5. Ren, S.X., et al., Unique physiological and pathogenic features of *Leptospira interrogans* revealed by whole-genome sequencing. *Nature*, 2003. 422(6934): p. 888-93.
6. Malmstrom, J., et al., Proteome-wide cellular protein concentrations of the human pathogen *Leptospira interrogans*. *Nature*, 2009. 460(7256): p. 762-5.
7. Vinetz, J.M., et al., Sporadic urban leptospirosis. *Ann Intern Med*, 1996. 125(10): p. 794-8.
8. Abdulkader, R.C., Acute renal failure in leptospirosis. *Ren Fail*, 1997. 19(2): p. 191-8.
9. Cetin, B.D., et al., Acute renal failure: a common manifestation of leptospirosis. *Ren Fail*, 2004. 26(6): p. 655-61.
10. Im, J.G., et al., Leptospirosis of the lung: radiographic findings in 58 patients. *AJR Am J Roentgenol*, 1989. 152(5): p. 955-9.
11. Ferguson, I.R., Leptospirosis update. *BMJ*, 1991. 302(6769): p. 128-9.
12. Rock, C., et al., Leptospirosis: a globally increasing zoonotic disease. *BMJ Case Rep*, 2010. 2010.
13. Desakorn, V., et al., Accuracy of a commercial IgM ELISA for the diagnosis of human leptospirosis in Thailand. *Am J Trop Med Hyg*, 2012. 86(3): p. 524-7.

14. da Silva, M.V., et al., Immunodiagnosis of human leptospirosis by dot-ELISA for the detection of IgM, IgG, and IgA antibodies. *Am J Trop Med Hyg*, 1997. 56(6): p. 650-5.
15. Edwards, C.N., et al., Thrombocytopenia in leptospirosis: the absence of evidence for disseminated intravascular coagulation. *Am J Trop Med Hyg*, 1986. 35(2): p. 352-4.
16. Clement, J., et al., Urban leptospirosis versus urban hantavirus infection in Brazil. *Lancet*, 1999. 354(9194): p. 2003-4.