

**The Analysis of Spatial Distribution and
Geographical Determinants of Leprosy
Patients in Colombo and Suburbs**

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Patients in Colombo and Suburbs**

By

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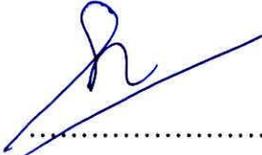
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DECLARATION OF THE CANDIDATE

I do hereby declare that the work described in this thesis was carried out by me under the supervision of Dr. (Ven.) Pinnawala Sangasumana Thero and Dr Dilantha Darmagoonawardena and a report on this has not been submitted in whole or in part to any university or any other institution for another Degree/Diploma.

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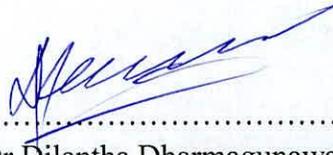
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LIST OF ABBREVIATIONS

Abbreviation

WHO	World Health Organization
GIS	Geographic Information System
GND	Grama Niladari Division
DSD	Divisional Secretarial Division
MS	Microsoft
GPS	Global Positioning System
IDW	Inverse Distance Weighted
HIV	Human Immune virus
PCR	Polymerase Reaction Test
NDVI	Normalized Difference Vegetation Index
AVHRR	Advanced Very High Resolution Radiometer
MCA	Multi-Criteria Analysis

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A GIS-based Analysis on Spatial Distribution of Leprosy Patients in Colombo and Suburbs

By

Thathsarani Hennayake

ABSTRACT

Leprosy is one of the most neglected tropical disease and epidemic outbreaks often occurred in the world. World Health Organization has estimated that about three million people reported as permanently disabled due to leprosy at present. Considering the global situation, it is obvious factor to be understand that leprosy detection rate has increased in hidden way. Sri Lanka is one of the few countries in the world detecting average of 1800-2000 new cases yearly. Colombo district has become the region where highest leprosy incidents reported at present. Therefore, the research problem focuses to identify the distribution pattern of leprosy patients in Colombo and suburbs and then analyze the hotspots using ArcGIs, SPSS and Excell. Hot spots identified by choropleth mapping on the study area show the spatial pattern of leprosy patients while Inverse Distance Weighted (IDW) map shows most critical hot spots in and around the lower part. Hot spot analysis revealed that *Koralawella* Grama Niladari Division is the most severe area (statistically significant (>2.58) spatial clustering) of spreading *Micobacterium leprosy* compare with other Grama Niladari Divisions. The reasons for spatial clustering of disease rates are not known, but might be related to an heterogeneous distribution of other factors such as crowding, poverty, and environmental characteristics may be influenced the transmission of *mycobacterium leprae*.

Key words – leprosy patients, Colombo, Hot pots, GIS, spatial analysis

CHAPTER ONE

INTRODUCTION

1.1 INTRODUCTION

Leprosy, Hansen's disease, is a chronic infectious disease caused by the bacteria *Mycobacterium leprae* and *Mycobacterium lepromatosis*. Leprosy, if left untreated, attacks the skin, nerves, limbs, eyes and mucous membranes and it results in developing sores on human skin and in losing their nerve sensations. Thought to be transmitted from one human to another is from direct contact with the patient for a longer duration. Nevertheless, there is growing and increasing evidence that there is a possibility of transmission through the nose and mouth. So therefore it is possible to get the bacterium from armadillo and other non-human primates.

This is an ancient disease to have been carried with a substantial degree of social stigma even now. For centuries, it was thought to be a hereditary disease, a curse or punishment from the god. Having affected humanity for over 4000 years, it was recognized in the civilizations of ancient China, Egypt, Israel and India. Evidence of leprosy dates back to ancient Egypt in 4000 B.C and it was discussed by Hippocrates in 460 B.C. *Mycobacterium leprae* was discovered by G.H. Armauer Hansen in Norway in 1873 making it the first bacterium to be identified as causing disease in humans. Leprosy was divided into two categories based on clinical manifestations and skin smear results: the patients namely paucibacillary leprosy and multibacillary leprosy.

Globally, between two and three hundred thousand people have leprosy-related disabilities. It is most common in places where people's immune systems are not strong due to poverty, poor nutrition and low standards of living. So it can be seen mainly in countries where there are high levels of poverty. Below map indicated that an overview of the number of new cases of leprosy detected around the world in 2010. According to official reports received from the World Health Organization, 228,474 new cases of leprosy were detected in 2010.

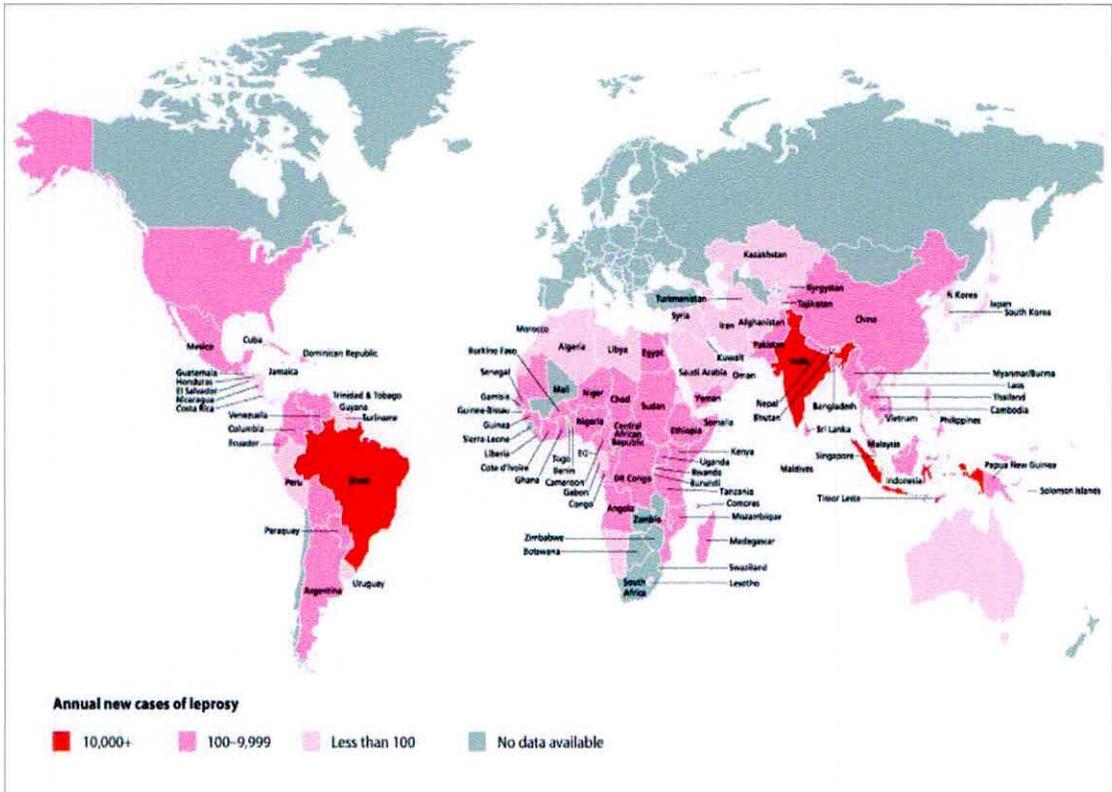


Figure 1:1 annual new cases of leprosy in 2010

source: <http://www.leprosymission.org/what-is-leprosy.html>

Turning to global leprosy situation in 2011, table 1.1 shows that the number of new cases detected during 2011 in 18 countries that have contributed 94% of new cases globally. Of these countries, 7 are in the African region and 3 countries Ethiopia, Nigeria and United Republic Of Tanzania. It is obvious fact to understand that the leprosy have detected in economically undeveloped countries that population's access to basic services, amenities and expendable income. Regarding current situation, even though most countries that were previously highly endemic for leprosy have achieved elimination at the national level, the global registered prevalence of leprosy at the end of 2013 has stood at 189018 cases while the number of new cases detected during 2012 was 232 857.