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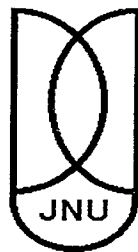
**SOCIO-ECONOMIC DIMENSIONS AND HEALTH
SEEKING BEHAVIOUR FOR LEPTOSPIROSIS**

A Case Study of Kumarakom Panchayat, Kerala

*Dissertation submitted to the Jawaharlal Nehru University in partial
fulfilment of the requirements for the award of the degree of*

MASTER OF PHILOSOPHY

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Date : 24/07/02

Certificate

This is to certify that the dissertation entitled "Socio-economic Dimensions and Health Seeking Behaviour for Leptospirosis, A case study of Kumarakom Panchayat, Kerala", submitted by Mathew George in partial fulfilment of the requirements for the award of the degree of Master of Philosophy of this university has not been submitted for any other degree of this university or any other university and is my own work.

Mathew George

We recommend that this dissertation be placed before the examiners for evaluation.

Dr. Rama V Baru
(Chairperson)

Dr. Alpana D Sagar
(Supervisor)

**DEDICATED TO THOSE AFFECTED
WITH LEPTOSPIROSIS**

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Mathew George

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INTRODUCTION

Leptospirosis is a disease found in humans, which if not treated can become fatal. It is known by different names viz. Weil's disease, mud fever, trench fever, rice-field fever, cane cutter's fever, swineherd's disease etc¹. The different names reveal the fact that the disease was initially associated with occupational groups.

Leptospirosis is caused by a bacterium (*Leptospira*) and is transmitted to humans by domestic animals and also wild animals of which rats are found to be the major carriers². The infected animals excrete the bacteria through their urine. This will contaminate the environment viz. water, soil, vegetation³. Humans contract the infection through contact with the contaminated environment. Penicillin and Doxycycline are the drugs of choice for the treatment of Leptospirosis.

In India, the disease has been reported from many parts of the country including Tamil-Nadu, Karnataka, Andhra Pradesh, Maharashtra, Gujarat, Orissa, Rajasthan, Bihar, West Bengal and Andaman Islands⁴. Gujarat and Andaman have been showing epidemic proportions during the last couple of years. In the state of Kerala also, the cases reported have increased from 11 in 1982 to more than 2500 by the year 2001⁵.

Communicable diseases have been prevalent since the beginning of group life in both human and animal societies. Shah⁶ comments that as the knowledge and scientific development is advancing recurrence of epidemics can be reduced and infectious diseases can be controlled if not eradicated- so that they do not become endemic. However, when one looks at the allocation of resources for scientific research and control of communicable diseases it is seen that political processes play

¹ Sehgal S C et. al.(1991): *Leptospirosis-current status and general aspects*, National Institute of Communicable Disease, Directorate General of Health Services, New Delhi.

² Solly Faine (1996): "Leptospirosis" In *Bacterial infections of humans – epidemiology and control*, Alfred Evans & Philip S Brochman (ed.), Plenum, Medical Book Company, 3rd ed., London.

³ Ibid.

⁴ "Leptospirosis as an emerging public health problem in India", CD Alert 2000, 4(6), July 2000, National Institute of Communicable Disease, Directorate General of Health Services, Government of India.

⁵ Data from the DHS, Thiruvananthapuram and Kottayam Medical College Records Section.

⁶ Ghanshyam Shah (1997): *Public health and urban development*, Sage, New Delhi, chap. 1.

an extremely important part in their distribution. In fact the history of public health and the methods of dealing with diseases over time is a clear illustration of the linkages between Public health and politics.

LEPTOSPIROSIS WITHIN THE PUBLIC HEALTH CONTEXT

The debates on the theories of disease causation⁷ occupy a central stage in the history of disease. Despite the understanding of the role of environment that existed at the times of Hippocrates, intense attention and deeper understanding was seen only by the 19th century. In England, the *new poor law act* of 1834 that removed the earlier benefits given to the poor created a 'surplus labour force' and thereby gave rise to a new class of industrial workers in the cities⁸. This resulted in poor living and working environment of the workers, which led to several health problems of which cholera and typhus epidemic are well documented. The better off saw disease and death among the poor as the result of overcrowding, destitution, crime, alcoholism, prostitution, and illegitimacy. During the same period, Chadwick in his report⁹ on the sanitary conditions of the labouring population of Britain drew linkages between living conditions of the poor and their ill health by saying that 'disease causes poverty' and 'health creates wealth'. He attributed diseases to have stemmed from filthy environment conditions, polluted water supplies and decaying garbage and wastes clogging the streets. The fear about the survival of the better-off in those conditions resulted in enactment of laws related to public health viz. Public Health Act (1848), Nuisance and Disease Prevention Act (1855), Arsenic Act (1842)¹⁰.

Interestingly, at the same time radicals like Engels and Virchow in England and Germany used Public Health as a focal point for demonstrating exploitation and unhealthy social conditions thereby demanding more democratic solutions¹¹. Statistical studies of health and disease during these periods brought out the role of political and economic reforms as the solution to the epidemics and also strengthened

⁷ Elizabeth Fee (1993): "Public health- past and present; A shared social vision" In *History of Public health*, George Rosen, expanded edition, Johns Hopkins University, Baltimore chap. IX-LXVI.

⁸ Ibid.

⁹ Edwin Chadwick (1969): *The Report on the Sanitary conditions of the Labouring Population of Britain*, Edinburg university press, Edinburg.

¹⁰ George Rosen (1971): "Historical trends and future prospects of Public Health", In *Medical History and Medical Care: A Symposium of Perspectives*, Nuffield Provincial Hospital Trusts, London.

¹¹ Elizabeth Fee, op. cit.

the argument of radicals'¹². This understanding resulted in a set of health and sanitary movements in Europe, England and America and resulted in setting up of several health departments that take care of sanitation and social legislation.

During this period (19th century), the role of medicine was secondary in England and United States for preventing communicable diseases. Rosen¹³ considers the success of Europe and North America in lowering infectious disease in this period due to their ability to invest accumulated wealth in the improvement of community health. It was the sanitary movement that played a leading role in decreasing the incidence of diseases like Diarrhoea, Pneumonia, Tuberculosis, Pertussis etc.

Many of the important communicable diseases had already begun to wane before the full effects of the bacteriological discoveries were felt¹⁴. Specifically in US, Cholera and Yellow Fever disappeared fully before the discovery of the specific causes and the knowledge of transmission was known¹⁵. Despite this, the work of Louis Pasteur and Robert Koch marked the beginning of a new approach (the germ theory) in the control of communicable diseases¹⁶. After Koch and others demonstrated bacterial agents as the cause of diseases like TB, Typhoid, Leprosy, Malaria, Cholera and Tetanus, the earlier knowledge of *miasma* creating infectious disease was replaced by the germ theory approach of infection being caused by specific microscopic creatures. This led to the replacement of local health department that was part of the sanitary reform movement by the diagnostic laboratory during the bacteriological revolution. Elizabeth Fee¹⁷ calls this “scientific arm of health department”. This germ theory dominated the medical and public health fields from the last quarter of the 19th century to mid 20th century. Public Health responses at this time were to limit transmission by vaccines, to isolate those affected, and ultimately to cure with chemotherapy and antibiotics¹⁸. However, the germ theory is often found to be inadequate to explain disease causation. For example, Joseph Goldberger (in his

¹² Ibid.

¹³ Ibid.

¹⁴ Walsh Mac Dermott (1969): “Demography, Culture and Economics and the Evolutionary stages of Medicine”, In *Human Ecology and Public health*, E DKilbourneand W G Smillie, Mc millan, London, 4th ed., pp.7-16.

¹⁵ Ibid.

¹⁶ George Rosen (1951): *History of Public Health*, MD publications New York, chap.4.

¹⁷ Elizabeth Fee, op.cit,

¹⁸ Ibid.

study on pellagra) established nutritional deficiency and not an organism as the cause of Pellagra and showed its distribution among the poor share-croppers and other workers in the cotton fields¹⁹.

By the mid-twentieth century the morbidity pattern and the age structure had changed in developed countries. This led to new problems for which solutions as such do not exist. Several factors like changing working environments, eating habits and stress, all of which are parts of the changing life style, were possible reasons for the increase in the non-communicable diseases. However, in case of developing countries, both communicable and non-communicable diseases still prevailed and there was the threat of both. The occurrence of non-communicable disease, where the germ theory was inadequate to explain this ill health led to the coming up of *chronic diseases* or '*risk factor epidemiology*'. In fact presently from the germ theory we have moved to what is termed '*risk factor epidemiology*'. This mainly looks at individual behaviour and its outcome (ill health). Its aim is to change individual behaviour by creating awareness. This approach give less importance to the germ *per se* than in germ theory but tends to 'blame' the victim for his/her behaviour.

PROBLEMS OF BIOMEDICAL MODEL

It can thus be seen that different forms of knowledge on disease causation have dominated during history. The considerations of political, social and economic factors as the reasons for ill health during the miasmatic (sanitary) era were suppressed by the entry of the germ theory. This happened despite the knowledge that medical science has contributed less to the control of communicable diseases than the change of the external environment and standard of living²⁰. According to Illich²¹ the upper hand approach of medicine towards disease many a time become inadequate in solving health problems. This could be probably due to the mechanistic approach of the biomedical model with germ theory as the basic guiding knowledge. Apart from this, biomedical model expects the state of health as an outcome of the balance between agent-host-environment (physical) interaction. It fails to look at the

¹⁹ Ibid.

²⁰ Thomas Mckeown (1976): "Sociological Approach to the history of Medicine" In *Medical History and Medical Care*, op.cit. pp. 1-21.

²¹ Ivan Illich (1976): *Limits to Medicine, (Medical Nemesis- the expropriation of health)*, Marion Boyars, London.

relationship of human beings both within and without that has greater influence on being healthy viz. possibility of getting the infection, articulation of pain, behaviour at the time of illness and so on.

PUBLIC HEALTH IN INDIAN CONTEXT

While examining the Indian history of public health during the colonial period one can find several developments like building of sewage lines, piped water and medical facilities to control cholera, plague and other epidemics. However, these facilities were not given to the whole country. They were restricted to only some parts of Calcutta and other major cities²². It was clear that the intention was primarily to cater to the needs of Europeans and the military²³. During this period there were famines and drought along with epidemics that took a great toll of lives. However, the coming up of railways, canals and roadways made transportation of goods easier and deaths due to famines were reduced. At the same time this transportation helped increase the onset of diseases like Malaria, Plague and respiratory diseases²⁴.

Due to persistence of communicable diseases, Indians were blamed for their resistance to sanitary programmes. However, while leaders like Bal Gangadhar Tilak were at the forefront to appeal for the sanitary system in urban areas, health services to the common man were provided only when there were massive outbreaks of epidemic diseases. An important feature of health policies, plans and programmes in India is that they originated during the national movement against colonial rule where health had been recognised as a part of the larger development paradigm²⁵. The need to integrate curative and preventive functions in a single stage agency was urged and it was stressed that the maintenance of health of the people was the responsibility of the state.

John Grant²⁶ had asserted that health services must be organised as an integrated whole, which should be accessible to all persons irrespective of difference

²² Roger Jeffery (1988) : *The politics of health in India*, California University Press, California.

²³ D. Banerji,(1985): *Health and family planning services in India : An Epidemiological, Socio-cultural and Political Analysis and a Perspective*, Lok Paksh, ND. Chap. 1.

²⁴ Roger Jeffery, op.cit.

²⁵ Government of India (1946): Report of the Health Survey and Development Committee (Bhore Committee), Vol, manager of publications, Delhi

²⁶ Cited in Banerji D (1988): *Trends in Public Health Practice in India –A Plea for a new Public health*, Thirty-second Annual conference of the Indian Public health Association, Hyderabad, India.

in income, race, creed or political beliefs. Additionally, every village with an average of one thousand inhabitants ought to support a community health worker chosen from among themselves who can assume responsibility for all phases of community reconstruction including health. These ideas were reiterated, reinforced and extended by the reports of the Sokhey committee (1940), Bhore committee (1946), Alma Ata declaration (1978) and even in the National Health Policy (1982).

Thus Public Health practice in India had situated the health of population in its social, economic and ecological setting²⁷. Actions in social and economic fields in their turn are considered as parts of a political process. Socio-cultural aspirations of the people emerge from the existing modes of production and production relations. Going further still, socio-cultural aspirations have their roots in the history and in the dynamics of human ecology. This way of viewing health in a broad framework helps to identify ill health as the imbalance between any of these forces.

Along with the use of epidemiological tools to understand community health problems in terms of dynamics of interaction among the agent-host-environment, concepts of different social science disciplines such as Sociology, Cultural Anthropology, Social Psychology, Demography, Political Science etc. are needed to provide social dimension to quantitative data. Health services are only one of the means for improving health status of a community. Health status is an outcome of complex intersectoral activities with its roots in ecological setting and its culture.

SCOPE OF THE PRESENT STUDY

There is an old saying that "A problem well defined is half solved". This is applicable in case of health problems also. The failure of an effective monitoring and surveillance system for Leptospirosis in India prevents an understanding of the total problem. There have been neither standard diagnostic tests nor reporting systems for Leptospirosis nation-wide till now²⁸. This might be due to the "breakdown of the existing health services system"²⁹ or the huge cost required for maintaining lab

²⁷ Ibid.

²⁸ S C Sehgal (1998): "Emergence of Leptospirosis as a Public Health Problem", In *Leptospirosis*, Ranbaxy Science Foundation, Round table conference series no. 3, Feb. 98, New Delhi, India., chap. 4.

²⁹ D Banerji (1984): "Breakdown of public health system", *Economic and Political Weekly*, 19(22): 881-882.

facilities nation-wide capable of detecting the disease. The case is same with other diseases also, as there are lacunae in reporting morbidity³⁰.

However, despite poor reporting there has been an upsurge of disease since 1980s. This might be due to the large-scale expansion of agriculture in the country as it has been found that agricultural manual labourers are those more vulnerable to Leptospirosis. Thus the poorly planned irrigation projects, rapid urbanisation etc. which are parts of Indian development paradigm lead to ecological imbalance which may be responsible for creating factors for spread of Leptospirosis.

It is also important to look at the way in which the health service system deals with the outbreak of Leptospirosis. Purendra Prasad³¹ has brought this out in his study on the epidemic in Gujarat. He identifies the failure of the state in ensuring access to health care services to the marginalised. He also points out the inability of the health services to save lives of people in spite of temporary increases in allocation of supply of drugs, and other equipment at the time of epidemic.

Majority of the studies on Leptospirosis either look at the clinical or the microbiological aspects and. this could probably a reflection of the dominant biomedical paradigm where the germ is all-important in disease causation. Leptospirosis has been identified as a major public health problem in India after the recent outbreaks of Gujarat, Orissa, Kerala and Mysore. The burden of Leptospirosis to the health care system is significant as in many cases complicated treatment procedures and prolonged hospital stay is required. The threat of a new epidemic in the midst of the other diseases viz. TB, Japanese Encephalitis, Cholera, Kala-azar, Malaria, which have not yet been controlled is daunting. However, studies that look at the social context of Leptospirosis are lacking.

In the present study an attempt is made to understand the epidemic of Leptospirosis in Kerala in its socio-economic and ecological context. Since agricultural workers are the major occupational groups that are affected by Leptospirosis, this study was conducted in a rural village (Panchayat) of Kerala. The study examines the perceptions of the people regarding the disease and the health

³⁰ D Banerji (1985), op. cit., chap.7, p.151.

³¹ Purendra Prasad (2000); "Health care access and marginalised social spaces- Leptospirosis in Gujarat", *Economic and political Weekly*, Oct.7, pp. 3688-94.

services in order to understand their health-seeking behaviour. This was done by looking at the people's conditions of life, their access to civic amenities and infrastructure, their perception about the causes of the disease, and their actions after getting Leptospirosis in the context of the health institutions existing in the village. In short, the study is an approach to understand Leptospirosis epidemic in its totality.

CHAPTERISATION

This study is divided into seven chapters. The introductory chapter considers the history of theories of disease causation within the context of public health. It also introduces the problem of Leptospirosis and shows why the disease cannot be understood in isolation from people's lives. Chapter II reviews literature in order to gain an understanding of Leptospirosis in general and its social dimension in particular. Studies on Leptospirosis were also reviewed to understand the way the existing dominant paradigm has looked at the issue. Then the role of health services in control of epidemics was dealt with. Also the concept of health seeking behaviour used in the study was based on the review of relevant literature.

Chapter III deals with conceptualisation and the methodology of the study and discusses the procedure as well as the tools used for data collection. Chapter IV portrays the study area (village), its history, demographic profile, ecological conditions and other specific characteristics. Chapter V deals with the thirty-seven households selected for the study. The socio-economic conditions, environmental conditions, religious distribution of the households are analysed in this section. This helps in developing an understanding of the characteristics of those households with cases of Leptospirosis.

Chapter VI looks at the disease characteristics, the villagers' perception of the disease and its transmission and also deals with the seasonal, regional, age and sex distribution of the people affected. It also brings out the various perceptions about Leptospirosis among the health personnel. Finally, the health seeking behaviour of the thirty-seven patients with Leptospirosis is dealt in detail. This helps in understanding the role of health services in control of the epidemic and the burden the disease has created to the society. The seventh and final chapter summarises and discusses the findings of the study and concludes by identifying further research areas and possible policy implications.

CHAPTER II

REVIEW OF LITERATURE

INTRODUCTION

Well-planned studies of disease come out with inferences leading to feasible and people oriented control strategies. This is obvious from the historical studies of John Snow (1849)¹ on cholera, William Farr (1852)² on miner's health, James Lind (1748)³ on Scurvy and Joseph Goldberger (1914)⁴ on pellagra. Similarly any initiative to understand Leptospirosis has to consider its socio-economic, political, ecological and cultural dimensions in addition to its bacteriologic dimension. It has been observed⁵ that Leptospirosis is caused by a *Leptospira* (a bacterium) whose transmission follows direct contact with urine, blood or tissue from an infected animal or exposure to a contaminated environment. It has been found that those having wounds or broken skin are in greater chance of getting the infection. Human to human transmission is rare. Animals as carriers are important for the propagation of the epidemic. In most cases rodents⁶ are considered as the major reservoir of infection for they remain as carriers throughout their life. The questions that arise for a person who has Leptospirosis can be, What will the disease do to me? How did I contract the illness? Where and whom to consult? When to take treatment? How long will the treatment take? How much will be the cost of treatment? Will I be able to get well? A Review of literature that deals with such issues can help to widen an understanding of the disease. To understand Leptospirosis in its totality one would therefore probably need to know not only about the aetiology of the disease, its distribution, the frequency and determinants in a population including risk factors but also the patients

¹ John Snow (1849): "On the mode of communication of cholera" In "*Challenges of epidemiology – Issues and related readings*", PAHO (1988), Scientific publication no: 505, WHO, USA, pp 42-45.

² Mortality of miners: "A selection from the reports and writings of William Farr", In *Ibid.*, pp. 67-71.

³ James Lind (1748): "An inquiry into the nature, causes and cure of the scurvy" In *Ibid.*, pp. 20-23.

⁴ Joseph Goldberger (1914): "Considerations on pellagra", In *Ibid.*, pp. 99-102.

⁵ E Braunwald (1994)(ed): *Harrison's Principles of internal medicine*, International edition, Mc-Graw hill, Vol. I, chap. 135, pp. 740-743, 13th ed.

⁶ J Singh & J Sokhey (1998): "Epidemiology, prevention and control of Leptospirosis", In *Leptospirosis*, Ranbaxy Science Foundation, Round table conference series no: 3, Feb '98, ND, India, chap. 5.

response to the illness and the implications of all of the above factors for the spread of the disease.

LEPTOSPIROSIS – THE DISEASE

Leptospirosis is an anthroponoses⁷ (transmitted from animal to animal and man) caused by spirochete (bacteria) *Leptospira interrogans*. The organism is around 5-20µm in length and 0.1µm thick. Both ends are hook shaped. The bacteria can be seen using a dark field microscope. The ideal condition for the existence and multiplication of the bacteria are places where temperature is in the range of 28-32°C with P_H in the range of 6.2-8⁸. The bacterium has more than 200 *serovars*⁹ (based on difference in the behaviour in the host's body) distributed into 23 groups (*serogroups*). Animal reservoirs¹⁰ of the bacteria for humans can be rodents and insectivores constituting one group, whereas domestic (swine, cattle, dogs etc) and caged game animals (foxes, jackals etc) together form the other. The first group generally becomes renal carriers and urinary excretors of the bacteria if they survive an acute initial infection.

Mode of Transmission: Infection is acquired through contact with the environment contaminated with urine, blood tissue or faeces of an infected animal that is a carrier or is suffering from disease caused by *Leptospira*. It is said that excretions or sheddings of carrier animals contain bacteria in small numbers to as many as 10⁹/ ml of urine. Human to human transmission and congenital infection is found to be rare. The bacteria can enter the human body through breaks in the skin, including even small scratches and through the lining of the mouth, nose and eyes¹¹. It is said that the bacteria can also penetrate skin, which has been immersed in water for a long time. The bacteria after entering the bloodstream multiply rapidly and are distributed in various tissues within two hours of entry. In most cases the bacteria may be removed by *Phagocytosis* (self-defence mechanism of the cell) except in the kidney¹².

⁷ Ibid.

⁸ Harrison's, op.cit

⁹ Harrison's, op. cit. pp. 740

¹⁰ S C Sehgal et. al. (1991): *Leptospirosis - current status and general aspects*, NICD, DGHS, ND, India, chap. 2.

¹¹ Solly Faine (1982): *Guidelines for the control of Leptospirosis*, WHO offset publication no: 67, pp. 21-22.

¹² L H. Turner (1967): "Leptospirosis I", *Transactional Royal Society of Tropical Medicine and Hygiene*, 61(6), pp. 842-855.

In the kidney, the bacteria form colonies and will be shed into the urine. This stage of shedding bacteria through the urine can extend from the eighth day to four to five weeks from the time of infection¹³. The bacteria cannot survive in the acidic human urine.

Pattern of Occurrence: Persons of all ages and both sexes¹⁴ are susceptible to infection. Adult men however are more frequently infected and the reason assigned is that they tend to work in high-risk jobs such as agriculture, slaughterhouse, sewers etc. Though cases can occur in any seasons, their frequency is more in warm months in temperate climates, whereas in subtropical and tropical regions, association has been found with periods of heavy rainfall and crop-raising cycles.

Symptoms: It is recorded that, within six to eight days after the entry of the microorganism in the body, symptoms are seen¹⁵. The whole period of illness can be divided into two stages. The initial stage is manifested by severe headache and muscle pain (calf and abdominal), fever, irritation in the eyes and so on. Later during the fifth day onwards, fever with vomiting, nausea, coloured urine will occur. Symptoms seem to subside by eight to nine days as if the disease has been cured. However, by the ninth or tenth day, second stage begins to be exhibited. In this stage the symptoms of the first stage will be shown with more severity together with haemorrhages in the internal organs. Death usually happens in this stage.

Laboratory tests: Several laboratory tests¹⁶ are available for detection of the bacteria though many are not used widely. A brief description of some of them is given below.

Dark field microscopy

Blood: As the bacteria are found in the blood, direct observation is possible using a dark field microscope. This is possible only in the first stage of the disease, as the period of presence in the blood will be limited. **Urine:** Here the same technique of looking the bacteria in the urine is carried out. Technically, this is effective only from

¹³ Solly Faine (1996): "Leptospirosis" In *Bacterial Infection of Humans – Epidemiology and control*, Alfred Evans & Philip S Brochman (ed.), III (ed), Plenum Medical Book Company, NY, London, pp. 395-420.

¹⁴ Ibid.

¹⁵ Punnen Kurien et. al (2001): *Elippani (Malayalam), (Rat fever – Leptospirosis)*, Field information bulletin-6, Kerala Rodent Research Centre and Leptospirosis Institute of Kerala, Kottayam, Kerala.

¹⁶ Solly Faine (1996), op. cit.

the second week after entry of microbe. However, it is not safe to wait till second stage to diagnose the illness.

Serum test: This test looks for the presence of *antibodies* (chemical produced by the body against microorganisms) in the *serum* (blood plasma from which protein is removed). This helps to detect the presence of microbe in the body. ELISA (*Enzyme Linked Immuno Sorbent Assay*) and *Macroscopic Slide Agglutination Test* are examples. A still more advanced test exists to identify the *serovar* to which the *Leptospire*s belongs. They include *Microscopic Slide Agglutination Test* (MAT), *Polymerase Chain Reaction* etc. It is claimed that if adequate facilities are maintained, both the test results can be made available within a day. However this is expensive.

In addition, the following set of tests¹⁷ are usually done among patients in the hospitals and other laboratories for detection and thereby treatment. They include: (1) In urine, albumin and bile pigment is looked for (2) In blood, Erythrocyte Sedimentation Rate (ESR), White Blood Cell (WBC) count [Total and differential count (TLC, DLC)], Platelet Count, Urea level, Serum Bilirubin, Serum Amylase, and *Creatinine Phospho Kinase* (CPK). It is found¹⁸ that the urine of person with Leptospirosis patients will be having bile-pigmented casts, with rise in values for ESR, WBC count and blood urea and lowered platelet count.

Treatment¹⁹: Antibiotics are found to be effective. The commonly used antibiotics are derivatives of tetracycline like *Doxycycline* at the initial stages whereas in later stages, Penicillin injection along with fluid supplementation is the widely accepted procedure.

Leptospirosis is known as the zoonosis with the widest geographical distribution²⁰. It occurs in all the five inhabited continents. As mentioned earlier different names have been given to the disease in different places according to the occupational groups involved and the nature of the disease situation²¹. These are

¹⁷ Ibid., p. 16.

¹⁸ Ibid.

¹⁹ Harrison's, op. cit. p. 743.

²⁰ S C Sehgal et. al. (1991), op. cit. chap. 2.

²¹ S C Sehgal (1998): "Emergence of Leptospirosis as a public health problem", In *Leptospirosis*, Ranbaxy Science Foundation, op. cit., chap. 4.

“seven-day fever” found commonly in Japan, “cane-cutter’s fever” in Australia, “rice-field Leptospirosis” in Indonesia and “rag –fever” which appeared as an outbreak in the U.S. Weil’s disease, which is one of the severe forms of the disease, occurs in many countries including India and parts of Southeast Asian countries, China, Continental Europe and England.

Jacob John²² highlights the complexity of Leptospirosis from a bacteriologist’s point of view. He says “It is very common to assign a plausible clinical diagnosis to patients with disease patterns like Leptospirosis, without establishing or excluding any specific aetiology and to treat them with more than one anti-microbial. Therefore, Leptospirosis is a hidden problem in India. It is only found by those who seek it”. This may be the reason why many of the cases are reported from developed countries where there are better medical and laboratory facilities. However recently, developing countries have also started collecting information on the disease to generate sufficient data to understand the magnitude of the problem. It has been observed²³ that a change in the distribution and incidence rate of Leptospirosis has occurred proportionally to the alterations in the ecosystem. Thus the disease can be seen as one which is found in different parts of the world and whose onset is influenced by changing ecological conditions. A brief discussion on the history of the disease will not be out of context at this point.

HISTORY OF THE DISEASE

The early history of the disease is found to be vague as it was not possible to differentiate the different forms of “malignant” Jaundice, which included Yellow Fever, Leptospirosis and Malaria until the pathologic knowledge had progressed in the 1880s²⁴. The clinical disease was identified in 1886, by Adolf Weil and was therefore known as Weil’s disease²⁵. The clinical features include fever, mental confusion, jaundice, myalgia (muscle pain), haemorrhages and nephritis. The causative agent was isolated for the first time in 1914 by Japanese workers Inada and Ido²⁶ who named their organism as *Spirochete ictera haemorrhagica*. During the

²² Jacob T John (1996): “Emerging and re-emerging bacterial pathogens in India”, *Indian Journal of Medical Research*, Jan. 103: 4 -18.

²³ S C Sehgal et. al.(1991), op. cit.

²⁴ Solly Faine (1996), op. cit.

²⁵ Ibid.

²⁶ S C Sehgal (1998), op.cit.

same period, Wolbach and Binger also isolated similar organisms and assigned the species the name of *Spirochete biflexa*. Later, in 1918 Noguchi created a new genus- *Leptospira* that differed in some characteristics from those of the spirochete. The genus *Leptospira* encompasses the isolates of Inada and Ido as well as those of Wolbach and Binger. Leptospirosis among animals was identified and considered as a problem in the field of Veterinary science, when it was found that an outcome of this infection was increased abortions and miscarriages among farm animals²⁷. Subsequently, in 1939, vaccines were introduced for control of Leptospirosis in dogs and soon after for pigs and cattle²⁸. With the developing knowledge of microbiology and pathology, works on antigenic differentiation was the major interest in successive years. By 1950s, this resulted in identification²⁹ of 45 *serovars* (based on difference in behaviour of bacteria in the host body) significant for human Leptospirosis and their reservoirs. Dasgupta (1937) published his work on the laboratory experiments done to identify and isolate the serovars for the first time from Indian cases of both Weil's disease³⁰ and Leptospirosis³¹. The discovery of livestock as possible carriers and the understanding of the cycle of transmission are considered as the major³² achievement in the field. Genetic³³ typing of Leptospire done in 1960s has helped later in 1994 for recognizing genetic species of *Leptospire*s.

In spite of WHO's recommendation that Leptospirosis be a notifiable disease, the data available is not reliable³⁴. Several studies have been undertaken in various countries in order to understand the prevalence and incidence of the disease. From an international survey³⁵ conducted by International Leptospirosis society in 1999 based on serologically positive cases it has been induced that there could be more than 100,000 cases requiring hospitalisation annually worldwide. The survey may be only the tip of the iceberg as it fails to get participation from large parts of India, many

²⁷ S S. Khera (1968): "Zoonoses in India", *Indian Veterinary Journal*, Oct. 45 (10), pp.: 811-5.

²⁸ Solly Faine (1996), op. cit.

²⁹ Ibid.

³⁰ B M Das Gupta (1937): "The occurrence of Weil's disease in India", *Indian Medical Gazette*, 72; pp. 610-12.

³¹ B M Das Gupta (1938): "Leptospirosis in India", *Indian Medical Gazette*, 73; pp. 449-53.

³² Solly Faine (1996), op. cit.

³³ Ibid.

³⁴ Ibid.

³⁵ Ibid.

countries from South-east Asia, Latin America and the Caribbean as well as whole of Africa.

In Australia³⁶, in the state of Victoria it was found that there was 25% prevalence among the dairy farmers and almost nil for the rest of the community. The survey was done using specific antibody test. The authors state that this rate is comparable with that of countries with environments as diverse as that of Netherlands and Congo. In the US³⁷ fewer than 100 cases of Leptospirosis are reported each year representing an incidence of about 0.05 cases per 100,000 populations. These cases have an average case fatality rate of 5.7%. In contrast to other countries slightly fewer than half of US cases are occupation associated. Cases are most common in South Atlantic, Gulf and Pacific coastal states. Hawaii³⁸ reported the highest annual incidence of 10-12 cases per 100,000 during 1971-1990. Major epidemic outbreaks with pulmonary haemorrhage have been reported from Korea in 1984³⁹. These have been associated with rice harvesting following a heavy storm. Epidemics following floods and earthquakes are well documented⁴⁰ in China, Brazil and elsewhere. In October 1995 following extreme rainfall, an epidemic of Leptospirosis was reported in Nicaragua⁴¹ with 2200 cases in an affected population of 37,000. Of these 200 were hospitalised with case fatality rate of 0.7%. Contrary to other experience, in Nicaragua the highest age specific incidence (80 per 1000) occurred in the one to fourteen year old age groups.

While discussing the situation of Leptospirosis at the global level, it is important to note the context in which one is looking for the disease. Many developing and underdeveloped countries are struggling⁴² with other epidemics like TB, Malaria, and Diarrhoeal diseases. Here not only would the priority given to Leptospirosis be meagre, also its investigation and reporting can be poor. However in Thailand⁴³, an outbreak of the disease in 1996 turned the attention of health workers

³⁶ Ibid.

³⁷ Ibid.

³⁸ Ibid.

³⁹ Ibid

⁴⁰ Ibid

⁴¹ Ibid.

⁴² The World Health Report (1996): *Fighting disease and Fostering development*, WHO, Geneva.

⁴³ "Leptospirosis, India – Report of the investigation of a post-cyclone outbreak in Orissa, Nov 1999", *Weekly epidemiological record* 2000, 7 July, 75 (27), pp. 217-224.

towards the identification of Leptospirosis. As a result the cases reported have increased from less than a few hundreds in 1996 to several thousands in 1999.

LEPTOSPIROSIS IN INDIA

In India, Leptospirosis was first isolated from 24 out of 64 cases by Taylor and Goyle in Andaman Islands in the year 1929⁴⁴. After the initial isolation of the bacteria, several human cases have been reported from Calcutta in 1938, from Bombay in 1941, and in 1964 from Madras. The reports other than that in Andaman Islands were sporadic and information on the number of cases was lacking, as the primary concern was to serologically identify and isolate the bacterium. A point source outbreak⁴⁵ of Leptospirosis was reported from Howrah, West Bengal in 1972, where 63 of 120 inmates of a hostel were affected. Of those two died. The bacteria were identified⁴⁶ in Nepal in 1977 in a soldier who died with pyrexia of unknown origin.

Additionally the Indian Veterinary Research Institute, Izatnagar, Uttaranchal, where the national reference centre for Leptospirosis is located demonstrated a range of *serovars* from the patients. Researchers were interested to identify the *serovars*, as there are more than 200. This interest seemed to subside by 1980's. However, a severe outbreak⁴⁷ of Leptospirosis in Madras City during 1986 resulted in significant morbidity and mortality. This outbreak again stimulated the workers in the field but the focus changed from mere *serovar* identification to that of screening of patients with pyrexia of unknown origin and hepatitis. This change in the focus can be the reason for getting an increasing number of cases from many parts of the country.

Cases have been reported from different parts of the country since 1930s but most of the available information pertained to the work based upon the serological studies in healthy as well as in suspected cases. These include Tamil Nadu, Kerala, Karnataka, Andhra Pradesh, Maharashtra, Gujarat, Rajasthan, Bihar, West Bengal, and Andaman Islands. The extended coastal belt of the country could probably have

⁴⁴ S C Sehgal (1998), op.cit.

⁴⁵ "Leptospirosis as an emerging Public health problem in India", *CD Alert*, July 2000, 4 (6), National Institute of Communicable Disease, Directorate General of Health Services, New Delhi.

⁴⁶ S C Sehgal et. al.(1991) op. cit., chap. 1.

⁴⁷ Ibid.

an impact on disease occurrence as is reflected in the reports from Andaman, Kerala, Tamil Nadu, Maharashtra, Orissa, Gujarat, and Bengal.

In 1993⁴⁸, 39 persons having febrile illness were admitted to Community Health Centre Dighilpur, North Andaman during Oct-Nov of whom six died (Case Fatality Rate-15%). Seventy-eight percent of those admitted were diagnosed to have Leptospirosis. As in Nicaragua, most of the cases were children and belonged to families engaged in agricultural activities. Seasonal outbreaks of similar pattern⁴⁹ of occurrence have been reported repeatedly in North and South Andaman since 1988 with high case fatality rate (10.15%).

Gujarat has reported several outbreaks since 1994 (Table 2.1), every year till 2000⁵⁰. During 1994, the epidemic started reported from Valsad districts which later spread to Surat in 1997. The outbreaks are always confined to periods between July and October, which are warm and wet months, and widespread following heavy rains. Almost all the cases were reported from adult males, and nearly all were involved in agriculture and diary farming.

Table 2.1. Reported cases and deaths due to Leptospirosis in Gujarat for the year 1994 to 2000.

Year	Cases	Deaths	Case Fatality Rate
1994	158	12	7.6
1995	14	2	14.3
1996	40	9	22.5
1997	657	76	11.6
1998	537	42	7.8
1999	365	31	8.5
2000*	112	12	10.7

* Up to August,

Source: CD Alert, 4(6), 2000

Another outbreak of Leptospirosis occurred in medical college, Mysore⁵¹ in the year 1997, where 78 residents of a post graduate hostel were admitted to the hospital

⁴⁸ Ibid.

⁴⁹ SC Sehgal et. al. (1996): "Outbreak of Leptospirosis in north Andaman Islands", *Indian Journal of Medical Research*, 102, pp. 9-12.

⁵⁰ Ibid., Purendra Prasad (2000), op. cit.

⁵¹ *CD Alert*, 2000, op. cit.

and treated for Leptospirosis. Seventy percent were positive for Leptospirosis. The source of infection was hypothesised to be a water tank contaminated with urine of rodents that were in plenty around a nearby garbage dump.

In Orissa⁵², post cyclone outbreak of Leptospirosis was reported in 1999. Investigation was carried out in four villages where many of the villages were under water for four to five days. The four villages have a combined population of 1,25,000. A sample of 142 was taken for the study. Of these 142, 84 (59.2%) reported history of fever. Nine of these 84 cases died in the hospital due to respiratory distress and pulmonary haemorrhage.

In the year 2000, following heavy rains in the first and second week of July; an outbreak was reported in areas of Mumbai and Thane⁵³. A large number of people either remained in flooded houses or walked through waterlogged areas while going to their workplaces. A total of 505 suspected cases and 32 deaths (suspected) were reported up to 16 August. The health authorities had confirmed about 31% of cases and 38% of deaths as due to Leptospirosis.

In Kerala, from 1982 when 11 cases were diagnosed and treated, the number has increased to almost two thousand five hundred by the year 2001. Though the causative agent was identified⁵⁴ first time in 1987, using laboratory tests doctors states that they have treated cases of Leptospirosis since 1982. It was in early 1990s⁵⁵ that the epidemic struck hard in Kerala. But, the government started notifying the disease especially from medical college only from 1998.

During the year 2000, a point source outbreak was reported in Kottayam district of Kerala where 31 of 64 persons engaged in cleaning a canal filled with stagnant water was admitted to the hospital and diagnosed as Leptospirosis. In the state, the epidemic is widely distributed among paddy field workers in Alappuzha and Kottayam districts. In the district of Kochi, cases are more among pineapple field workers. Majority of them takes treatment at the private hospital Kolencherry.

⁵² Leptospirosis, India, *Weekly epidemiologic record*, 2000, *op. cit.*

⁵³ *CD Alert*, 2000, *op. cit.*

⁵⁴ M Kuriakose et. al. (1997): "Leptospirosis in Kolencherry, Kerala, India: Epidemiology, prevalent local serogroups and serovar and a new serovar", *European Journal of epidemiology*, Sep 13 (6), pp. 691-97.

⁵⁵ Punnen Kurien et.al (2001), *op. cit.*, chap. 1.

Unofficially it is estimated that there can be more than 250 deaths occurring per year due to Leptospirosis in Kerala.

STUDIES ON RISK FACTORS FOR LEPTOSPIROSIS

Several studies on the disease were reviewed. While the majority of them deal with either the identification of the *serovar* or the clinical symptoms of each *serovar* some deal with the risk factors of the disease. A brief description of some of the latter will be made here.

In 1965, Heath⁵⁶ carried out a historical analysis of the epidemic in United States. For this 483 cases reported during the period 1949-61 were taken. The clinical symptoms and the organs affected were dealt in the study. In addition the risk factors were identified based on the *serotype*. Of the total cases studied, it was found that 32% of *L.icterohaemorrhagica* was due to immersion in water whereas 54 % of *L.canicola* was found due to exposure to horse or veterinary work and 44 % of those with *L.Pomona* got the disease from agricultural farms and 41.2 % from slaughter house.

In 1998 in India, Murhekhar M.V, Sugunan et.al⁵⁷ did an unmatched case control study to understand the various risk factors for acquiring Leptospiral infection in Dighilpur district of North Andaman. For this study 1014 *sera* were collected randomly and tested for antibodies using MAT for four *serotypes*. The 54.2% found positive were considered as cases and the rest were taken as controls. The researchers could not find any association for *L.icterrahaemorrhagica* with rat infestation but found associations for *L.Grippotyphosa* with use of well or stream water and presence of dogs in the house, *L.Australis* with farming families and presence of cattle in houses, *L.canicola* with habit of bathing in ponds. The study concludes by inferring behavioural and environmental factors like exposure to stagnant water bodies while walking, use of stream water for domestic purposes, working in fields, bathing in ponds, playing in the fields, and presence of cattle or dogs in house or handling of domestic animals as possible risk factors of the disease.

⁵⁶ C W Heath Jr. et. al. (1965): "Leptospirosis in the US – analysis of 483 cases in man (1949-61)", *New England Journal of Medicine*, 273, pp. 915-22.

⁵⁷ M V Murhekhar et. al. (1998): "Risk factors in the transmission of Leptospiral infection", *Indian Journal of Medical Research*, May, 107, pp. 218-223.

Another study by Singh et.al⁵⁸ in Andaman dealt with eighty hospitalised, clinically suspected cases who were tested for Leptospirosis using ELISA. Of these, fifty-eight (58) patients were diagnosed to have Leptospirosis of which fourteen died (Case Fatality Rate-24.1%). The age distribution showed that more than 70 percent of patients and 86% of deaths were in the age group 13-30 years. The seasonal trend of these cases showed two peaks, one during the start of monsoon (May-July) and the second during the end of monsoon (Oct-Dec). They also add that "Seasonal trends seems to have some coincidence with paddy cultivation and the cases were found more among young adult males".

Many studies have also looked at the causes of transmission of Leptospirosis, and more emphatically in cases of new outbreak at different places. Krishnamurthi⁵⁹ discusses the case of a flutist in Madras who got the disease from whom the bacteria was identified. He extends the possibility of the flutist getting the disease because of flood wherein the case's house was under water during flood period. Bhatnagar⁶⁰ has identified the bacteria in water ponds of Bombay, which he assigns as a chance for the disease becoming prevalent. Yet another study identifies the first case⁶¹ in Rajasthan, where a nurse of Bikaner got the disease and the *serovar* was identified as *L.ictorrahaemorrhagica*. Here, it was suspected that the infection might have occurred due to infected rats living in sewage nearby the nurse's residence.

In another study done in Nepal⁶² it was found that a military officer who reported having Pyrexia of unknown origin (PUO) was found to be positive for Leptospirosis. He was also the first case identified from the state. The officer was examined for prevalence of antibody. Blood *sera* were collected from 188 normal blood donors and army recruits belonging to different parts of eastern Nepal to check the presence of infection in apparently uninfected persons. Twelve-percent

⁵⁸ S S Singh et. al. (1999): "Clinico-epidemiological study of hospitalised cases of severe Leptospirosis", *Journal of Communicable Diseases*, Sep.31 (3), pp. 201-202.

⁵⁹ M V Krishnamurthi et. al. (1965): "Leptospirosis in Madras", *Journal of Association of Physicians in India*, Sep. 13 (9), pp. 737-40.

⁶⁰ R K Bhatnagar et. al. (1967): "Prevalence of Leptospirosis in Bombay, Studies in man and animals", *Indian Journal of Pathology and Bacteriology*, Oct. 10(4), pp. 324-31.

⁶¹ R G Agarwal et. al. (1971): "Leptospirosis in Bikaner, (Rajasthan). A case report", *Journal of Association of Physicians in India*, Jan. 19 (1), pp. 53-4.

⁶² G W Brown et. al. (1981): "Leptospirosis in Nepal", *Tran. Roy. Soc. Trop. Med. & Hyg.*, 75 (4), pp.572-3.

seropositivity (having disease or had earlier exposure) was found which shows that the possibility of Leptospirosis infection in Nepal cannot be ruled out

Ratnam S et.al.⁶³ have looked at the role of *bandicoots* (type of rats) in human Leptospirosis in Madras city by conducting a follow up of five proven human Leptospirosis cases whose possible transmission was attributed to rats. Twenty *bandicoots* were collected from the locality near the huts of those cases. Water samples were collected from stagnant water and a well near the huts of the cases. On laboratory examination *Leptospire*s (bacteria) were found in one of the water samples and three of the rats were found to be carriers of the bacteria. This study tries to establish the role of bandicoots (rats) in the spread of Leptospirosis in Madras City.

During 1987, an outbreak was reported in a small town of Italy. This was studied by Cacciapicotti et.al.⁶⁴ who found that the cases (33) had contracted the infection by drinking water from a fountain contaminated by a hedgehog. The diagnosis was based on serology tests (MAT). The fatality rate was found to be 8.6%.

Everard⁶⁵ in his study in the Caribbean points out "*Where Leptospire*s are widespread in the environment and where the disease is endemic, infection will be related to a way of life as well as to specific occupation". Sehgal et.al.⁶⁶ conducted a study among tribes of Andaman and Nicobar Islands and collected a serum sample of 1557 people belonging to four tribes. These were tested for anti-Leptospiral antibodies using MAT employing 10 serogroups. It was found that, of the four groups one group showed a greater prevalence (53.5%). They assigned this to the environment in which these tribes lived such as hillocks, valleys and marshy plains. The rest of them whose major settlement is near seashore have prevalence ranging from 15% - 23%. Sehgal also identifies the former as needing to trek long distances every day through forests for their subsistence. Infection was probably due to the exposure to marshy areas in the forest. As mentioned earlier, in the study by Sehgal

⁶³ S Ratnam et.al (1986): "Role of bandicoots in human Leptospirosis in Madras city – An epidemiologic perspective", *Indian Journal of Public Health*, 30 (3), pp. 167-69.

⁶⁴ B Cacciapicotti et. al. (1987): "A water borne outbreak of Leptospirosis", *American Journal of Epidemiology*, 126, pp. 535-545.

⁶⁵ J D Everard and C O R Everard (1993): "Leptospirosis in the Caribbean", *Reviews in medical microbiology*, 4, pp. 114 – 122.

⁶⁶ S C Sehgal et. al. (1999): "Leptospiral infection among primitive tribes of Andaman and Nicobar Islands", *Epidemiology and Infection*, 122, pp. 423-428.

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et.al⁶⁷ after the 1999 cyclone in Jajpur district of Orissa, 84 persons in a sample of 142 had suffered febrile illness after cyclone. It was found that 46 (54.8%) of the 84 were serologically positive for Leptospirosis. Based on this study, outbreak of Leptospirosis was confirmed in post cyclone Orissa. The authors assigned the sudden change in environment and human behaviour during disasters as creating a situation conducive to the rapid transmission of Leptospirosis. It is worth noticing that epidemics mentioned before from Brazil, China and Nicaragua following floods and earthquakes strengthens the possibility of natural calamities as risk factor for Leptospirosis.

NEED FOR A PUBLIC HEALTH PERSPECTIVE ON LEPTOSPIROSIS

In 1989, Muthusethupathi et.al⁶⁸ announced the need for an urgent action against Leptospirosis. He considers the disease as a public health problem of great importance because of the following reasons: “(i) It has a predilection for people following certain occupations (e.g.: workers in rice or cane fields, veterinarians, sewage workers) causing loss of considerable man hours in vital section of our economy. (ii) It affects domestic farm animals causing abortion and (iii) it can be prevented by taking appropriate public health measures.” The article then focuses on the urgent need to solve the problem by (i) making available laboratory facilities (MAT) in all medical college microbiology laboratories, (ii) setting up a central Leptospirosis reference laboratory (iii) considering Leptospirosis as a notifiable disease and (iv) active participation of public health officials in control programmes. This report needs to be appreciated as it attempts to put forth the problem of Leptospirosis from an occupational hazard point of view. But, the control strategy seems to be another “Technocentric Programme” for Leptospirosis, which cannot ensure effective outcome not only because the country is burdened with other communicable diseases but also of the failure of the existing health service system in ensuring basic health services.

⁶⁷ S C Sehgal et. al. (2002) : “Outbreak of Leptospirosis after the cyclone in Orissa”, *National Medical Journal of India*, 15(1), pp. 22&23.

⁶⁸ M A Muthusethupathi et. al. (1989): “Leptospirosis- need for urgent action”, *Journal of Association of Physicians in India*, Jul. 37 (7), p. 477.

Jayaraman⁶⁹ call for a need to launch a surveillance program, for which he cited recent epidemics of Gujarat (1994-96) and Mysore medical college as cautionary. He added that for the year 1997, a total of 90 deaths were reported due to different outbreaks in the country. Sehgal⁷⁰ analyses the history of Leptospirosis since its discovery and subsequent outbreaks in India. He points out the limited knowledge persisting about the disease despite its discovery a century ago.

From a public health point of view, control of an epidemic is not possible merely by preventing the occurrence of disease but also by effectively taking care of those affected so as to control the transmission and also to avoid any disability out of the disease⁷¹. Additionally, an in-depth understanding of the socio-economic, cultural and ecological context in which the disease occurs is required based on the general understanding of health in a social context. This is made possible by understanding the socio-economic conditions of those affected as reflected in their living conditions, and their dynamics of ecological relations. This way of looking of Leptospirosis helps to understand the causes of occurrence and the complexities involved in it. The behaviour of those affected with Leptospirosis helps to reveal the burden (social, economic and physical) the disease has created for the family as well as for the society. Besides, the contribution of health services system to the problem of Leptospirosis has to be examined in order to explain the behaviour of those affected.

In fact the review of literature does show that there is a certain amount of knowledge about the disease. The age distribution though showing variation gives an understanding that it is more among the young adults who get the infection. Likewise, the seasonal distribution and also the association of this with harvesting seasons gives scope for further research on how the disease is transmitted. The importance of the physical environment (either due to geographical reasons, or due to natural calamities) as well as occupational hazard gives an idea of the real complexity involved in the causation of the disease. However instead of adding knowledge about the distribution and determinants of disease in order to improve prevention, setting up

⁶⁹ S Jayaraman (1998): "India urged to act against Leptospirosis", *National Medical Journal of India*, Mar. 5, p.392.

⁷⁰ S C Sehgal (2000): "Leptospirosis in the horizon", *National Medical Journal of India*, Sept- Oct, 13 (5), pp. 1228-30.

⁷¹ Banerji D (1981): "Public health perspectives in the formulation of the National tuberculosis Programme of India", *National tuberculosis Institute Bulletin*, Nov. 14, Special issue.

of reference laboratories and introducing MAT facilities cannot be proposed as the main control strategies. For a public health perspective the studies above need to look at the characteristics of the people who are at risk i.e. the socio-economic strata to which they belong, their living conditions, the way they perceive the disease and its causes. They also need to understand the health services existing and their role in solving the problem. None of the studies approach the problem from a people oriented public health perspective. For this, a general understanding of the social context of health and the role of health services system in control of the epidemic is necessary.

SOCIAL CONTEXT OF HEALTH

Historically, the role of social environment in explaining disease occurrence has been raised even in the 19th century. Engels⁷² and Chadwick⁷³ were the notable proponents of this idea even though their approach did have basic difference. Engels considered ill health as one among the several deprivations of the working class whereas Chadwick focused on improving the working and living conditions of the poor in Britain. Later, Virchow - a pathologist supported Engels view, that “economic insecurity and political disenfranchisement were, through a complex chain of causality, social problems that generated disease, disability and early death”⁷⁴. This way of looking at disease in the context of working environment, living conditions and so on, was sidelined by the development of germ theory of diseases which popularised the agent-host-environment triad for explaining disease causation during the 1900’s. The argument of Rene Dubos (1950)⁷⁵ and T. Mckeown (1976)⁷⁶, that the reduction of mortality and morbidity by infectious diseases was due to social changes rather than medical interventions restated the earlier view of disease - as a social problem. Medical sociologists⁷⁷ have dealt with social conditions as those, which increase susceptibility or exacerbate disease, but they also fail to consider these as

⁷² Howard Waitzkin (1981): “The social origin of illness - A neglected history”, *International Journal of Health Services*, 11(1), p. 77

⁷³ Edwin Chadwick (1842): *Report on the sanitary conditions of the labouring population of Great Britain*, Edinburgh university press, Edinburgh, chap. 1.

⁷⁴ Howard Waitzkin, op. cit., p. 84.

⁷⁵ Rene Dubos (1959): *The mirage of health – utopias, progress and biological change*, Harper and Row, NY.

⁷⁶ Thomas Mckeown (1976): “Sociological Approach to the history of Medicine” In *Medical History and Medical Care*, op.cit. pp. 1-21.

⁷⁷ David Tuckett (1976): “Doctors and society”, In *Readings in Medical sociology*, David Tuckett (ed), Tavstock publications, London.

primary causes of ill health. Their focus many a times confine only to the doctor patient relationship within health care settings alone. Besides, there were arguments that environment was more important in disease causation and by environment the physical environment was of major concern.

The term 'social environment' used to explain disease causation by Sagar⁷⁸ incorporates not only the social and economic status of the person and the larger social structures but also the social determinants of the adoption of particular norms and values that determine well-being.

In further linking ecology and disease, Susser adds, "In *the ecological perspective, culture and nature are not antagonists external and alien to one another, but joint participants in the evolution of living systems*"⁷⁹. He considers ecology as biological, behavioural and social science. With these set of standpoints, any approach to look at the disease in it's totality should address the socio-economic conditions of the people under study, the forces that interacts from within and without along with the ecological linkages of the disease.

Disease among population needs to be looked in its socio-economic context to explain the distribution pattern and its occurrence. This was of concern for the early writers but has been brought out in detail in the Black Report⁸⁰ in which analysis of distribution of morbidity and mortality based on the Registrar General's data during 1979 was done. This brought out those inequalities with respect to socio-economic differences like income, work (or lack of it), environment, education, housing and transport that adversely affect health of the poor and favours the better-off. Rodney has also addressed the same issue in a different way. According to him "*Disease is a universal phenomena and therefore affects all people everywhere despite understanding and control of diseases but not always to the same degree or in the same way*"⁸¹. Though there exist dilemmas in measuring health using mortality and

⁷⁸ Alpana D Sagar (1994): "Health and social environment", *Environment Impact Assessment Review*, 14, pp. 359-75, Elsevier, Boston.

⁷⁹ Mervyn Susser et.al (1985 ed): *Sociology in medicine*, OUP, NY, chap. 1 pp. 11-12.

⁸⁰ Peter Townsend and Nick Davidson (1982): "The Black report" In "*Inequalities and health*", Peter Townsend et.al (ed), Penguin Books.

⁸¹ Rodney M Coe (1970): *Sociology of medicine*, Mc-Graw hill company, NY, chap. 4, p. 61.

morbidity and the way disease has to be defined, several scholars like Lerner⁸² and Blackburn⁸³ have shown that differences in health are seen with respect to social classes, with poorer health status among lower class. They also found that racial and ethnic differences exist in specific disease distribution. Blackburn also draws linkages by considering income as a health resource, as it determines the families' choice of food, living place, work, leisure and access to civic amenities including health services.

The difference in health status in Indian context is well documented by Srivastava et.al⁸⁴ and Minocha⁸⁵ who argue that the health of a person is rooted in his social milieu. They have found that exposure of an individual to various diseases and the strata to which one belongs condition one's attitudes. It has been found that the poor sections are the worst affected by epidemics and contagious diseases. The latter explains how the poor become more vulnerable to illness as poor nutrition lowers individual resistance to diseases and poverty also lowers standard of living and creates unhygienic surroundings. Doyal attributes this condition of poverty as a result of capitalist mode of production by pointing "*The principal causes of the difference in disease kinds in different classes must be sought in three sources- exercise in the ordinary occupation of life, the adequate or inadequate supply of warmth and food, and the differential degree of exposure to poisonous effluvia and to destructive agents*"⁸⁶. Zurbrigg⁸⁷ elaborates how the existing social structures makes the poor vulnerable to ill health and the inability of the existing system to cope with the needs of the poor in the context of rural India. She also gives a clear picture of the burden created for a poor family by disease and how the alternatives becomes few in those situations. Blackburn further explains the behaviour of a family affected by disease as "*In the area of food choices and other areas of behaviour, poverty also affects health*

⁸² Monroe Lerner (1969): "Social differences in Physical health", In "*Poverty and health - a sociological analysis*", Kosa et. Al (eds), Harvard university press, London,

⁸³ Clare Blackburn (1991): *Poverty and health - working with families*, Open University press, Philadelphia, chap. 2.

⁸⁴ Srivastava A L et.al(1991): "Socio-cultural contours of health and disease" In "*Sociology of health in India*", T M Dak (ed), Rawat publishers, ND, India,

⁸⁵ Aneeta A Minocha(1991): "Socio-economic equity and health - examination of a few key concepts" in "*Sociology of health in India*", T M Dak (ed.) Rawat publishers, ND, India.

⁸⁶ Leslie Doyal (1979): *The political economy of health*, Pluto press, NY, chap. 2, p. 51.

⁸⁷ Sheila Zurbrigg (1984): *Rakku's Story, Structure of ill health and source of change*, Sadma offset press, Madras, India.

by not only reducing a family's access to health resources but by placing them in a situation where they have to make health choices that serve to protect one aspect of health, or the health of another family member, whilst undermining another aspect of health or the health of another person. These health choices are often classified as reckless or irresponsible behaviour but appear to act as mechanism for coping with some of the stress and hardships of poverty"⁸⁸. Illich gives a description of the increasing professionalism and mystification of medicine, which is a major limitation in satisfying people's needs. He considers "health as the ability to cope with the experience of pain"⁸⁹ and states that primary importance has to be given to equity in access of health services and the social cost.

HEALTH SEEKING BEHAVIOUR

After considering the role of social environment in disease occurrence and distribution, an attempt is made to understand the behaviour of those affected with any disease. The concept of disease and illness has to be the starting point. The terms 'disease' and 'illness' seem to be synonymous but the former is used to explain "a state of altered functions of the body as a biological organism", Whereas the latter can be explained as "a subjective phenomena in which individuals perceive themselves as not feeling well and therefore may tend to modify their normal behaviour". These definitions suggested by Rodney⁹⁰ can be accepted at this juncture. The problem here in explaining disease in physician's terms is that, many a times they will not accept the perceptions of those affected. This mismatch exists in all the stages of behaviour right from the unwellness to the perception of cure.

This problem becomes clearer while looking at the stages of health related behaviour. It is to be noted that the behaviours related to health right from the daily behaviours that contribute directly or indirectly to stay healthy to that of behaviours at the time of ill health to become healthy comprises a wide spectrum which is difficult to view separately. In order to understand these complexity distinctions has been made between each. Health behaviour as defined by Kasl and Cobb is "an activity undertaken by a person believing himself to be healthy for the purpose of preventing

⁸⁸ Clare Blackburn, op. cit., chap. 2 p. 46.

⁸⁹ Ivan Illich (1976): *Limits to Medicine, (Medical Nemesis – The expropriation of health)*, Pluto press, chap. 4.

⁹⁰ Rodney M Coe, op. cit. chap. 4, p. 92.

disease or detecting it in an asymptomatic stage"⁹¹. Within this definition, it is advisory to include day-to-day hygiene behaviours, preventive health behaviours⁹² like periodic health check up, vaccination, avoiding risk behaviours etc. as well as 'illness behaviour' which Mechanic defines "as the ways in which given symptoms are perceived, evaluated and acted (or not acted) upon by different people"⁹³. Treatment seeking behaviour can be defined as that part of illness behaviour extending to that of seeking treatment, i.e. *an activity undertaken by individuals who perceive themselves to have a health problem or being ill with a view to get rid of the illness*. To further make clear the distinction between 'illness behaviour' and treatment seeking behaviour, Suchman's⁹⁴ elaboration on the stages of illness experience will be helpful. He explains five stages in terms of social and cultural as well as psychological factors viz. (i) symptom experience (ii) assumption of the sick role (iii) medical care contact (iv) dependent patient role and (v) recovery or rehabilitation. Here, stage (iii) onwards can be included under treatment seeking behaviour. Division of these ranges of behaviours into different stages and naming each provides a useful framework for description. However this does not mean that it occurs uniformly and always in the prescribed order.

These set of behaviour to a great extent can be explained using the concept of 'Health Culture' developed by Banerji. He defines "*Health culture as a sub cultural complex that gives cultural meaning of the health problems of the community, its perception of these problems and the means it adopts for dealing with them, both in terms of formations of various health institutions and the health behaviour of individuals or groups*"⁹⁵. This furthers the understanding of health culture - a subculture of the existing culture, which changes with time as the latter itself is dynamic and is dependent on the environment within which it interacts. Banerji has

⁹¹ Kasl and Cobb (1966): "Health behaviour, Illness behaviour, and Sick role behaviour", *Archives of Environmental Health*, Feb., 12, p. 246.

⁹² L J Steele & H W MC Broom (1972): "Conceptual and empirical dimensions of health behaviour", *Journal of Health and Social behaviour*, 13 Dec. pp. 382-92.

⁹³ David Mechanic: "Illness and cure" in Kosa et. al. (ed), op. cit., p.191.

⁹⁴ Edward A Suchman (1963): *Sociology and the field of public health*, Russell Sage foundation, NY chap. 4.

⁹⁵ Banerji D (1987): *A long-term study of nineteen villages, Vol. I – Cultural, social, economic and political background of health culture*, CSMCH, SSS, JNU, chap. 1 pp. 2, 3 & 5.

also identified five distinct health institutions and health practices that can be used for encountering health problems of a community.

- (a) *Cultural institutions that are handed down to the community as a social heritage.*
- (b) *Specific cultural innovations within the community to deal with some health problems.*
- (c) *Diffusion of cultural innovations and health institutions from outside the community.*
- (d) *Health practices within the community to seek services located outside the community.*
- (e) *Active introduction and promotion of health practices from outside as an effect to make a purposive intervention in the pre-existing health culture within a view to bring about "desired change".*

The above framework of health culture can be used to study the health-related behaviour of groups or individuals in a community and how the complex forces influence their behaviour. It also helps in an understanding of how the community perceives health problems and their solutions to tackle it. It is difficult to demarcate the effect of health culture on complex forces and vice versa, as the relationship is reciprocal. With this understanding, the health related behaviours mentioned before could be understood. They are influenced by the set of beliefs and knowledge regarding health and ill health ascribed or achieved which is further influenced by the structures existing, past experiences, and the social environment with which society interacts.

Preventive health behaviours include those innovations of the society to deal with health problems influenced by their attitude and may be framed out of their day-to-day experience and exposure to it. There can also be innovations from outside given to the community with an intention to make "desired change".

Treatment seeking behaviour is influenced by the characteristics of those affected like age, sex, social class to which one belongs, and the extent to which one has perceived the severity of the illness, his past experience about illness in general

and so on. The above behaviour is also influenced by the factors of health services like access (physical, socio-economic, cultural), procedure involved in taking treatment, and the diagnosis and treatment made in terms of people's need etc. The factors dealt above are a part of the greater concept of health institutions and health practices discussed earlier.

From a public health point of view, the division of illness behaviour and treatment seeking behaviour has two dimensions. First, as focus need to be towards those who are not acting even after perceiving and assuming sick role, i.e. those who are not seeking treatment, and if at all sought treatment, how the choices become few because of the socio-economic conditions of those affected. Second is that the mismatch between disease and illness can be solved to some extent by developing illness behaviour (first two stages) as a people oriented tool to diagnose any health problem or ill health as similar to symptoms of diseases.

SUMMARY

This chapter attempts to set the premise for conceptualising the social context of Leptospirosis. This was based on surveying literature on Leptospirosis on its history at the global level, and Indian level. Historical analysis reveals that it is prevalent in all the five continents and is the Zoonoses with the widest geographical distribution. However, while details of the pattern and occurrence are found to be available for many of the developed countries in case of developing and underdeveloped countries the exact details of occurrence and distribution are scanty. This could possibly due to the health service system prevalent in the latter where there is inadequacy of basic laboratory and health care services.

In India, Leptospirosis is emerging as a public health problem not only out of the greater chances of getting infection but also because of the failure of the existing health services system to satisfy the needs of the poor. In the state of Kerala, known for its better health status than any other states in India, the rise in the number of cases from 11 in 1982 to more than 2500 by the year 2001 shows the severity of the epidemic. Within this estimate of the problem, studies on Leptospirosis were examined which helped to understand different dimensions of disease explored as well as the dominant approach with which the disease Leptospirosis is looked at.

However, this information on Leptospirosis found to be inadequate for the study. In order to understand Leptospirosis in its totality, literature on the social context of health that depicts the linkages between health and social environment, inequalities existing in health status and access to health services were reviewed. This makes clear that there exists a difference in distribution of diseases with respect to their class, ethnicity and race. This difference is such that the poorer and the downtrodden are the worst affected. Then, the role of health institutions with respect to people's needs and the burden disease creates to poor families were looked at. This brought out the fact that the choices of poor at the time of illness are decided by their social conditions and further by their purchasing power. Finally, the concept of health seeking behaviour is developed which helps in better understanding of the complexities involved in the access and utilisation of health care institutions. This has showed that how the choices of people can get influenced by different factors like access (physical, socio-economic, cultural), procedure involved in taking treatment, and the diagnosis and treatment made in terms of people's need etc. Based on the review of literature, the study was conceptualised and adequate methodology was designed which will be discussed in next chapter.

CHAPTER III

CONCEPTUALISATION AND METHODOLOGY

CONCEPTUALISATION OF THE STUDY

Based on the literature review information was collected on the development of knowledge about Leptospirosis over time, the causes of transmission as well as seasonal and geographical factors that could have an impact on disease occurrence. Additionally, the lacunae in the studies on Leptospirosis call for a need to understand the disease in its totality. This study attempts to look at the socio-economic dimensions of Leptospirosis as well as people's health seeking behaviour within their socio-cultural context. The focus of the study is a people centred approach wherein an understanding is developed of the relationship between the circumstances of peoples' lives and their health. Additionally the need exists to understand the linkages between these within the larger social structures and political process. The health of people is the outcome of the balance between socio-economic, political, cultural and ecological processes prevailing in society. Imbalance in any one of this will create a vulnerability to disease, which will result in ill health.

The living conditions of the people are related to the working conditions as well as the larger social structures existing in society. The social environment in which people live has to be seen as that shaped by their social positions. The ecological relations are influenced by the development programmes of the area and affect the health of the people. The larger social structures determined by the political processes have an impact on peoples' access to civic amenities and infrastructures that also have implications on their health status. The kind of health service system present in the society is the reflection of the policies and the paradigm of development with which health planning is carried out. The attitude towards health services and thereby the health seeking behaviour is the outcome of the mutual interaction between health services system existing and peoples' needs. Within this context the study attempts to understand the reasons for increased transmission of Leptospirosis in Kerala and to know how various groups deal with the disease. For this, the public health perspective has to go beyond the agent- host- environment (physical), and need to

look for the reasons for vulnerabilities of certain population. Also, the attitude and perception of the people towards the health service system and the role in the epidemic need to be examined. The behaviour of those affected, the burden created due to Leptospirosis was also examined with a view to understand how one can deal with the problem.

Leptospirosis in its totality

Leptospirosis epidemic is viewed as a disease transmitted by rats and has been found more commonly among agricultural workers. Those working in stagnant water are found to have greater chances of getting the infection. Seasonal trends have shown association between cropping period and epidemic peaks. With this understanding individuals who had been diagnosed as having Leptospirosis were looked within their socio-economic conditions. These included their occupation, housing quality and the physical environment prevailing. At the household level, the land ownership, monthly wages, household possessions are indicators of the socio-economic condition of the household. Peoples' socio-economic condition has to be viewed in the larger context of the study area, which includes their access (physical, social and economic) to civic amenities, the infrastructure existing in the area, the major economic activity and other developmental activities.

The government health service system in the village has to be looked at as it is supposed to play a major role in taking care of epidemics. The different health care services existing, their functioning and the providers' approaches to this disease need to be understood. This helped to explain the reasons for the health seeking behaviour of those affected. Besides, the burden the disease- Leptospirosis can create for the family needs to be understood. With the above understanding of the disease, following methodology was used to study the epidemic.

METHODOLOGY

The broad objective of the study is to look at the socio-economic conditions of those affected with Leptospirosis and whether their conditions of life make them vulnerable to the infection. It also explores their health seeking behaviour with an attempt to understand its pattern and the place of the health service system in tackling the epidemic. **Specific objectives** set for the study are:

- To review Leptospirosis over time in Kerala.
- To examine the demographic and seasonal distribution of Leptospirosis in Kumarakom Panchayat.
- To inquire into the socio-economic conditions of those affected with Leptospirosis and whether their conditions made them vulnerable to the disease.
- To identify the health care services available in the study area and how far they are beneficial to those affected.
- To explore and understand the health seeking behaviour of those affected with Leptospirosis.

PROCEDURE FOR SAMPLING

Kerala was selected as the area of study as the literature review seemed to indicate that the state has greater number of reported cases over the past few years. A case of Leptospirosis is that reported in health care institutions and confirmed clinically by a physician with or without the help of laboratory tests.

Data collection was a long-term task. Initially, the Institute of Virology and Infectious diseases Alappuzha, (also known as research centre for Weil's disease) was visited hoping that time-series data would be available. But it was found that the centre had been established a few years ago and work had only been carried out on bacteriological aspects of the disease. Data on disease occurrence was scanty, as their priority was laboratory investigations. Then the researcher went to Alappuzha Medical College as it was near to the institute, from where it was found that information on the cases of Leptospirosis was not available, as there was no proper recording system. Then data was sought at the Directorate of Health Services (DHS), Thiruvananthapuram – a state level health information centre. Here, the researcher met the zonal officer for Malaria who is also in charge of Leptospirosis. From the demographer at DHS, crude data on Leptospirosis (district wise from 1998 onwards) was collected. The district level data showing the year wise number of cases and deaths reported in the state from 1998 is shown in the table (Table 3.1). The DHS directed the researcher to Prevention of Epidemic and Infectious Diseases (PEID) cell

where data on cases of medical college was available. This data is sent to the PEID cell by the community medicine department of all medical colleges. From both these places it was found that reporting of Leptospirosis cases had begun only from 1998. This led to the difficulty in tracing out the historical trends of the state.

Table 3.1 District-wise distribution of cases in the state of Kerala for the year 1998-2001.

YEAR	1998		1999		2000		2001	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Thiruvananthapuram	16	5	52	13	37	1	104	12
Kollam	10	5	56	10	28	15	49	14
Pathanamthitta	12	7	4	1	6	1	26	5
Alappuzha	92	24	136	8	171	9	159	19
Kottayam	62	5	249	11	288	13	998	26
Idukki	1	1	61	5	145	8	122	6
Kochi	59	3	98	3	174	2	579	10
Thrissur	4	4	45	14	64	10	135	17
Palakkad	-	-	-	-	5	-	13	1
Malappuram	43	2	21	-	14	-	27	6
Kozhikode	-	-	17	-	173	17	73	2
Wayanad	-	-	5	-	17	2	124	-
Kannur	43	8	16	-	44	9	148	11
Kasargode	-	-	3	-	8	-	25	-
Total	342	64	763	65	1174	87	2582	129

* Source: Directorate of Health Services (DHS), Thiruvananthapuram, 2001.

The cases and deaths reported from five medical colleges of Kerala from 1998 (Table 3.2) shows that Thiruvananthapuram medical college has the maximum number of cases. This could be probably due to the wider coverage of the medical college (it covers Thiruvananthapuram, Kollam and also part of Pathanamthitta district). Kottayam coming next, covers districts of Kottayam, parts of Idukki, Kochi and some cases of Alappuzha district. Majority of the cases of Ernakulam and Idukki districts are diagnosed and treated at the Private hospital in Kolencherry, well known for Leptospirosis treatment.

Table 3.2 Cases reported in five medical colleges in Kerala during the year 1998-2001.

Years	Medical colleges	Cases			Deaths		
		Males	Female	Total	Males	Female	Total
1998	Kottayam	470	102	572	29	9	38
	Alappuzha	41	17	58	3	1	4
	Thiruvananthapuram	467	143	610	51	15	66
	Thrissur	71	20	91	4	4	8
	Kozhikode	50	14	64	10	4	14
	Total	1099	296	1395	97	33	130
1999	Kottayam	400	136	536	37	16	53
	Alappuzha	81	30	111	1	1	2
	Thiruvananthapuram	569	152	721	42	10	52
	Thrissur	51	22	73	0	0	0
	Kozhikode	285	109	394	2	2	4
	Total	1386	479	1865	82	29	111
2000	Kottayam	507	144	651	52	10	62
	Alappuzha	132	43	175	6	2	8
	Thiruvananthapuram	649	207	856	41	17	58
	Thrissur	43	13	56	2	2	4
	Kozhikode	149	47	196	2	1	3
	Total	1480	454	1934	103	32	135
2001	Kottayam (Sep. 30)	414	129	543	23	10	33
	Alappuzha (Nov. 15)	124	52	176	2	1	3
	Thiru'puram (Sep. 15)	477	117	594	29	5	34
	Thrissur (Oct. 30)	86	37	123	2	2	4
	Kozhikode (July 8)	74	15	89	1	1	2
	Total	1175	350	1525	57	19	76
* Source PEID cell, 2001.							

District level data from DHS was used to identify the district with more number of cases as the cases reported in each medical college can be from different districts. Based on the DHS data, Kottayam district was identified as the district of study. The medical college hospital, Kottayam was found to be the place where majority of the patients were going for diagnosis and treatment. Leptospirosis needs

prolonged hospital stay and the past experiences of better care in medical college in general and for this disease in particular could have been the reason why preference for medical college was greater than local PHCs or private hospitals in the district.

The Kottayam medical college in-patient register was analysed to identify the most endemic Panchayat because of following reasons (i) this is the major treatment centre for Leptospirosis in the district, (ii) it has a catchment area of all municipalities and Panchayats of Kottayam district, and (iii) it is the practice that whoever comes to medical college hospital suspected of Leptospirosis gets admitted. Initially, it was thought that from the case records of each patient social factors like occupation, family status, causes of transmission and like could be analysed. But the medical records section permitted only to go through the in-patient register maintained, from which age, sex, address and duration of treatment were available. Based on the address available, Panchayat-wise categorisation was made of those cases reported in the year 2000 and 2001 (up to Sept.) Kumarakom Panchayat was identified as the one with maximum number of cases (24). To increase the sample size, cases for the year 1998 and 1999 were also taken, which all together were 60 cases.

Table 3.3 Table showing the distribution of households in the wards of Kumarakom.

Ward No.	Number of Households
I	552
II	582
III	534
IV	283
V	475
VI	800
VII	476
VIII	480
IX	426
X	611
XI	481
XII	505
Total	6205

Map 1

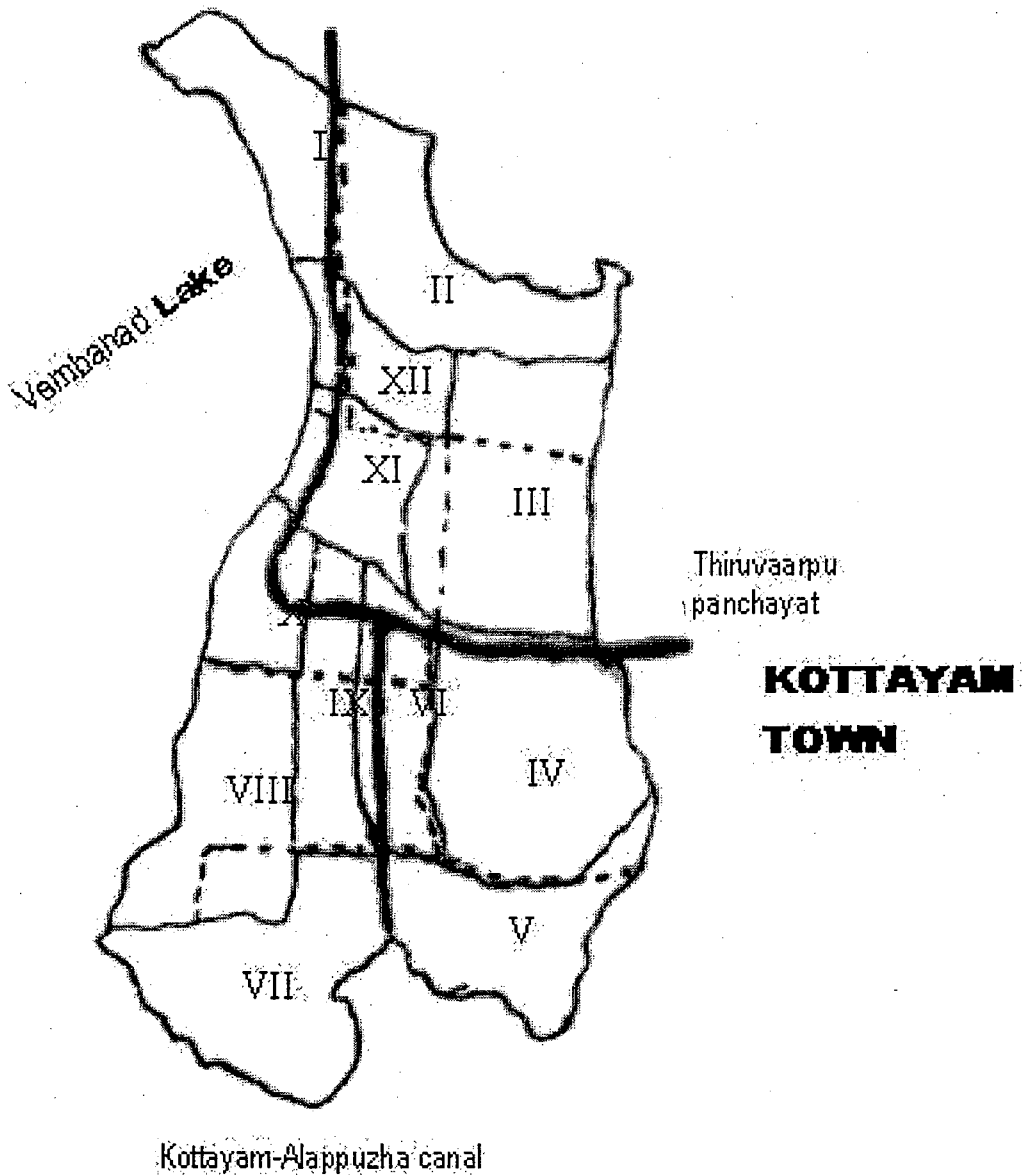
MAP OF KUMARAKOM SHOWING ITS BOUNDARIES AND THE WARDS

----- Rivulets and streams

———— Main road

———— Ward boundary

Aymanam panchayat



After identifying Kumarakom panchayat as the study area, sanction was sought from the panchayat president who offered extensive help. Panchayat level data on the number of wards, distribution of households in each wards (Table 3.3), civic amenities and infrastructure available in the village and other socio-cultural history of the village along with details of developmental programs were collected from panchayat documents.

Kumarakom panchayat consists of more than 6000 households spread over 52 Sq. Km to cover the whole panchayat. The whole panchayat is divided into 12 wards. In Kerala, wards comprising of 200 to 1000 households are the smallest unit of a panchayat. The map (Map I) showing Kumarakom Panchayat with its wards is given. The number of households in each ward is also shown in the table. Since the whole area could not be covered due to time and cost constraints it was decided to randomly select 50% of the total wards (six wards from twelve). For this, the wards were grouped based on certain characteristics.

Group I (wards 1, 2,3 and 4): Those wards having greater area of agricultural land with houses scattered more than the others.

Group II (wards 8,10, 11 and 12): Those wards situated on the immediate banks of Vembanad Lake.

Group III (wards 6 and 9): Those wards that are in the central area of the panchayat with greater access to civic amenities and infrastructure especially health institutions.

Group IV (wards 5 and 7): Those wards situated on the banks of Alappuzha–Kottayam canal, where the only mode of transport is ferry or by walking.

From these groups, half of the wards were selected randomly. Thus wards 3 and 4 from group I, 11 & 12 from group II, 6 from group III and 5 from group IV were selected for the study. Based on the medical college records, 35 cases were identified from these wards. Complete coverage of all diagnosed cases, from the selected wards was made possible through the Neighbourhood Association* convenors' of each ward. By talking to these persons, in addition to thirty-five patients diagnosed and treated in medical college two more cases were identified. Thus a total of 37 cases were selected for the study. Of these thirty-seven cases three had died.

Then, the local PHC was visited where it was found that the number of cases recorded by the health inspector was only one third of the numbers identified at the medical college. Since records were incomplete at the PHC, with the help of the postman of the village, houses of the thirty-seven patients were spotted. The houses were visited and interviews were carried out based on the schedule. Travelling through the village helped in getting information on local perceptions, beliefs about the disease and health institutions. Apart from that, the researcher was able to create a rapport with the villagers, which made the fieldwork enjoyable. An understanding of the living conditions problems of transport and all other life experiences of people were understood through interaction at several junctures.

AREA OF STUDY

Kumarakom Panchayat of Kottayam district, Kerala was the area selected for the study (Map 2). Kumarakom panchayat is situated on the western end of Kottayam district on the banks of Vembanad Lake. The Panchayat is spread over an area of 52 Sq. Km.. Vembanad Lake included in this Panchayat is 24 Sq. Km.. The Lake forms an estuarine with Arabian Sea. Vembanad Lake, which is important for fishing and for agriculture influences the occupation of the villagers. Waste is also disposed of in this lake. A barrier (Thanneermukkam barrage) was constructed in the narrow area of the lake to prevent salt water entering into it. The demographic profile of the area and the administration of the panchayat will give a general understanding of the people of the village.

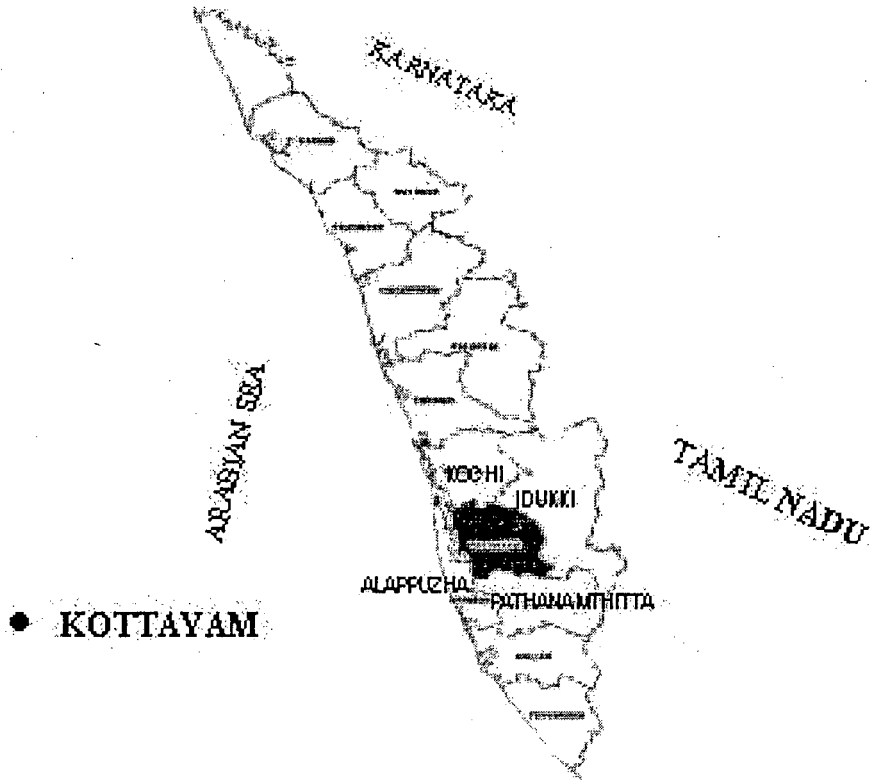
DEMOGRAPHIC PROFILE

The characteristics of Kumarakom Panchayat population help to place the characteristics of the study population within the village. The village level information is based on the 1991 census and also based on the socio-economic survey of Kumarakom Panchayat conducted in a sample of 3940 households comprising a population of 18,311 by Centre for Earth Science Studies (CESS) during April 1994. Kumarakom Panchayat is included in the revenue village of Kumarakom itself belongs to Pallom block of Kottayam district. The whole Panchayat area is 51.67 Sq. Km. This includes part of Vembanad Lake (24.13 Sq. Km)¹. As per 1991 census the

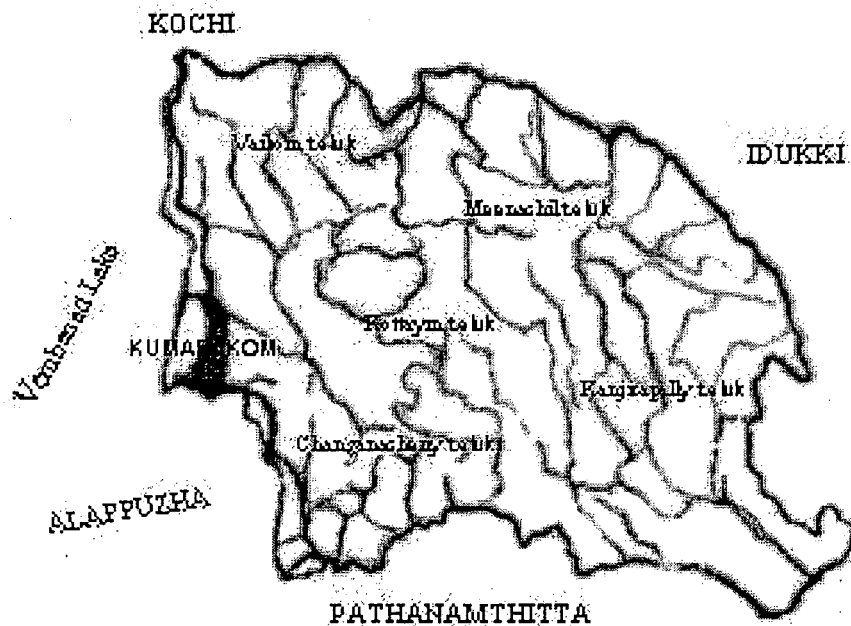
¹ Ibid., p.12

Map 2

MAP OF KERALA SHOWING KOTTAYAM



MAP OF KOTTAYM SHOWING KUMARAKOM



total population of the Panchayat is 22,232 distributed in 4510 households located in ten wards. This has increased to 6205 households distributed in twelve wards covering a population of 29779 by 1996². The distribution of households in each ward is given in table (Table 3.3). As per the 1991 census, the sex wise distribution is 11022 males to 11210 females leading to a sex ratio of 1000 males to 1017 females. Children below the age of six years were 2411, with 1252 boys and 1159 girls leaving a sex ratio of 1080 males to 1000 females. The average family size is 4.9, as compared to 5.6 for Kerala State. The scheduled caste population was 1020 (4.5%) with 525 (51.5%) females and 495 (48.5%) males, whereas the scheduled tribe population was 90 (0.4%), with 45 females and 45 males. The death rate calculated for the village were 2.5 per 1000 population during the year 1994 and life expectancy was seen to be greater among women.

The literacy rate as per the socio-economic survey conducted by CESS is 96.5%. Of the population surveyed (18,311), 12,816 persons (69.9%) have studied up to X standard, with 3,027 persons (16.5%) completed their X standard. In the village there were 372 (2.03%) graduates and 80 (0.44%) postgraduates. Those with technical qualification were 204 (1.1%). There were 4729 (25.81%) students at the time of survey.

As mentioned above significant portion of the village area is Vembanad Lake along with the paddy fields and agricultural land. This leaves aside only a small area (761 ha) of dry land. This for a population of 22,232 results in a density of 2,922 persons per sq. Km, which when compared to Kerala (729) or India (289) is extremely high.

ADMINISTRATION OF THE PANCHAYAT

The administration of the study area is similar to other Panchayats in Kerala. It is divided into wards. Based on the new divisions in 1996 the number of wards that were ten have been increased to twelve and have been re-numbered. Each ward is a separate constituency. "Wards"³ are geographical divisions of a Panchayat. These are the smallest unit geographically distributed with number of households varying

² Panchayat document on household distribution of each wards, 1996.

³ M P Parameshwaran & P G Padmanabhan (1984): "Panchayat raj", (Malayalam) Panchayat Raj, Current Books, Kerala, chap.9, p.47.

from 200 to 1000. This division is done to carry out administrative functions easily along with ensuring better representation from all areas. Elections take place for each ward when the residents elect⁴ one member called the Panchayat member. In Kumarakom Panchayat since there are twelve wards, twelve members form the Panchayat committee. Among these are the president and a vice president. At present, the president and vice-president of the panchayat belong to wards XII and IV respectively. They along with two or three members' form the standing committee that helps the Panchayat president in taking decisions and also in implementing various development initiatives.

Apart from this, there is a ward committee for each ward. The members of these are from the respective wards, and include *Ayalkootam* (neighbourhood associations) convenors. As mentioned earlier, *Ayalkootams* are informal groups (one for fifty households within a ward) that discuss local issues and developmental programmes and other relevant issues. The ward committees⁵ carry out the developmental programs in the Panchayat. The Panchayat secretary, who is a full time government officer assisted by two to three clerical staff helps in implementation of these programmes.

TYPE AND KIND OF DATA COLLECTED

Data was collected to obtain information regarding the village, the people and their perceptions about the disease, the health services available and care sought. It is obvious from the conceptualisation that those affected with Leptospirosis are the central focus of the study. As mentioned earlier, a case of Leptospirosis is taken as that reported in health care institutions and confirmed clinically by a physician with or without the help of laboratory tests

The socio-economic conditions of households were assessed by collecting data on Caste, religion and educational status along with data on Land ownership and monthly income of the household. This is based on the fact that in rural area of Kerala, where agriculture is the major economic activity, land ownership can explain the socio-economic conditions of the household to a great extent. This information

⁴ Ibid., chap:

⁵ Ibid., chap:

was supplemented with information on the monthly income of the household, where the income of the family for the month of October 2001 was taken. This month was the preceding month of the survey, hence income for this month was taken. However it needs to be kept in mind that this is one of the better earning months in case of irregular workers. The personal income of each member of the household was calculated based on the type of work engaged and the income from other sources. The sum of these will give the total household income of the households for the month of October 2001.

Additionally, housing quality is taken as an indicator of socio-economic status. Housing quality is reflected in the type of roof and floor area. This is important in Kerala where the type of house in itself is considered as a status symbol. Taking into account Kerala's heavy rainfall that calls for seasonal maintenance of thatched roof, those who can afford tiled houses prefer it.

Information on household possessions such as Radio, TV, Newspapers, Telephone and vehicles was collected with two presumptions. First, usually only those who can afford these possessions will go for it, and others won't. This is determined by the income the family earns. Similar is the case with the type of cooking fuel used. Secondly these communication facilities and transportation facilities increase access to the information at different parts of the country, which helps in social development.

Apart from these, the expenses of the family on health were taken. This gives an idea about the economic burden of ill health. In addition, information on loans taken, their purposes and amount remaining as debt, were also collected as debts limits the choices of health care by limiting the ability to pay. Looking at the above details will help to understand the socio-economic condition of the household in its totality. Ecological relations were looked at based on the major modes of production and the production relations. In this area, agriculture being the major economic activity, the lives of people were examined by collecting information on the day-to-day activities of people the type of occupation engaged in and work involved in it along with their working conditions.

The information regarding village profile such as civic amenities and their functioning, people's access to these amenities, history of development patterns that

affected the ecology and thus the health of the villagers and specific factors in the village that influence people's lives were collected. Additionally, village level data on demographic and administrative matters were also collected.

Coming to Leptospirosis epidemic, the demographic and seasonal variations were looked at in the village. The month and year of onset, symptoms, presence of wound and details of complications were looked at with a view to understand disease characteristics. As literature raises the possibility of rats and cattle in transmission of Leptospirosis, prevalence of rats and cattle rearing practices were focussed in the study. Data on waste disposal methods and chances of exposure to contaminated water helped in drawing linkages of these with disease causation.

People's perceptions and attitudes about the disease and its causes were sought. Information was also collected on the available health institutions and the way they functioned. In addition to this, to understand the health-seeking behaviour of those affected details on the actions undertaken after getting the disease and their reasons for their actions were focused. While collecting data on seeking treatment the difficulties faced by the people at the health institutions, social and economic cost incurred were also given due concern.

TOOLS OF DATA COLLECTION

Primary and secondary methods were used for collecting adequate data for the study. The primary sources used for data collection are (1) Semistructured personal interview (2) Observation method (3) Interview Schedule (4) Informal discussion (5) In-depth Interview (6) Case study

Semistructured personal interview: In the initial stages of data collection the understanding about Leptospirosis was based on Literature review. In Kerala, several institutions were visited to get the background information of the epidemic. These included the *Institute of Virology and Infectious Diseases, Alappuzha, Leptospirosis Institute of Kerala, Kottayam, the Directorate of Health Services, Thiruvnanathapuram* and Medical College hospital Thiruvananthapuram. Personal interviews were carried out with the microbiologist in the Institute of Virology and Infectious Diseases, which helped to identify other persons, engaged in this field. In the DHS, an interview with the project officer for Leptospirosis control facilitated the

understanding of government level initiatives and also the approach towards disease control.

Talking to the doctors and paramedical staff in the medical colleges helped in understanding the procedures involved in the hospital regarding treatment of Leptospirosis. From the information collected semistructured questionnaires (Appendix I) was constructed and administered, for one doctor each from a medical college hospital, a private hospital and the local PHC. Apart from this, a politician, a bank employee and a schoolteacher were also requested to fill the questionnaire (Appendix II) to know their perception about the disease. This was because unlike fishermen and agricultural workers, sanction has to sought earlier from the bank employee, teacher or politician to get the information

Observation method: Observation has been an important method of data collection mainly at the Panchayat level. Conditions of the village, the environmental conditions in which people live their lives were better understood by observation. Understanding people's life their day-to-day behaviour and the type of work involved in agriculture and the village structure like type of roads and other infrastructure of the village were all the result of observation.

Interview Schedule: A Schedule (Appendix III) was prepared with the intention to get relevant information for the study. The unit to which schedule is administered is those households identified with cases of Leptospirosis. The schedule consists of five parts. The first part deals with general information of District, Panchayat, ward, religion and caste details. Second part is on the details of all household members such as their age, sex, occupation education and income. Third part covers those informations regarding land ownership, housing quality, source of drinking water, cooking fuel waste disposal methods, rat breeding places and household possessions. This section also examines the various sources of income for the household and also the household expenditure on health and their loan details.

Then the personal details of the patients such as their age, sex and working conditions along with the type of work were included in the fourth section of the schedule. The information on persons' day-to-day activities was covered in this section. Disease specific details like time of onset, symptoms, and actions taken after perception along with information of available health care institutions for treatment

were looked at in the final section. Patients' opinions regarding the best centre available for Leptospirosis treatment was taken. This section also highlights the difficulties faced due to the disease in general and financial burden in particular. Questions on health seeking behaviour and their reasons along with the difficulties faced out of the disease were also included.

Questions were framed in such a way that it should ensure logical sequence and avoid 'leading' questions. Open-ended and close-ended questions were used as required to get adequate data. Pilot study was done in five cases, and necessary changes were made to increase the efficiency of the schedule.

Informal discussions: At the village level, discussions held with various sections of people at different instances helped to understand the way people perceived the disease and its causes. This included the neighbourhood association convenors, Panchayat members and Panchayat office staffs. Apart from these, talking to village people at different points of fieldwork helped in understanding about the people's choices and their view of the health care institutions. The perception of people about the environmental condition, their understanding about Panchayat officials were all reflected in discussion with people of the village. Discussions were also carried out with health inspectors, health supervisor of the PHC, doctors and paramedical staff of private hospitals. These helped to understand their perception of the problem of Leptospirosis and their attitude to those affected.

In-depth interview: Apart from the schedule, in-depth interviews were carried out with many of the respondents to get more information of specific situations. Of these, some of the cases were taken later on as case studies for understanding the real life situations.

Case study: In order to understand the day-to-day activities of the patient and the family members, in-depth interviews were necessary. The type of difficulties people happen to face due to the disease can be well documented using this method. The unit of study was the family of those affected with the disease. Cases were selected and the focus was to understand 'how' and 'why' the disease caused. Also, how the debt and the income situation affect the choices at the time of illness was looked at using case studies. The difficulties faced out of the disease reflected in the behaviour at the time

of illness and the reasons were crosschecked with relevant cases. Case study also helped to understand other linkages within the study.

Secondary sources of data collection include review of literature from different libraries, data from office settings and those reports and documents collected from Panchayat office. Relevant literature collected from different libraries were reviewed to understand social context of diseases in general and Leptospirosis in particular. It also helped to know the disease characteristics and also to conceptualise the study. Data on Kerala's current situation of the disease was collected from DHS, Thiruvananthapuram. This was collected month and sex wise. Details of the cases from in-patient registers of medical college Kottayam help to locate the patients and also to identify the most endemic Panchayat. From the Panchayat office documents, the village profile including civic amenities and the available health institution details were calculated. The development report of the village was used to explain the history of the area and the existing environmental conditions.

DATA ANALYSIS

Data analysis was carried out at different stages of the study. As quantitative and qualitative data comprise the set of data collected, analysis also was of different types. The quantitative data included the case details collected from medical college in-patient register. Through the schedule, quantitative as well as qualitative data was collected. In the schedule, each question was taken separately and answers were coded separately. Later on, the frequency for each code was examined using percentages and inferences were made.

For qualitative data like those out of observation, personal interview, informal discussion and case study, a field diary was maintained in which the whole experiences was recorded and later on consolidated in such a way as to generate adequate information. Government documents and other institutional documents were reviewed for more information.

Quantitative data helped in developing a profile of the cases to understand the distribution of the problem, whereas qualitative data helped in gaining an understanding to explain the reasons for distribution. Qualitative data also helped to

understand the burden of the disease and the complex linkages existing in the lives of people in the village.

LIMITATIONS

This study on the socio-economic dimensions and health seeking behaviour of Leptospirosis is an exploratory case study of Kumarakom village. As there was a constraint of time and cost, the study confines only to the specific village, whose results cannot be generalised to elsewhere.

In the study, 'a case of Leptospirosis' is taken based on physician's diagnosis, which could be with, or without laboratory diagnosis. The laboratory tests done at Kottayam Medical College did not include any specific tests confirmatory for Leptospirosis. So the possibility of false positives cannot be ruled out.

SUMMARY

This chapter is an attempt to conceptualise the present study. This was made possible based on the understanding of the literature reviewed. The conceptualisation is based on the people-centric approach. Leptospirosis as an epidemic is seen in the context of the study area's (village) mode of production and production relations, the ecological conditions, socio-cultural processes prevalent along with the political process involved. Additionally the role of health services in controlling such epidemics is looked at based on the concept of health seeking behaviour.

In order to study Leptospirosis in its totality as conceptualised, a methodology is required that can achieve the specific objectives based on its broad objective. These include the procedures involved in selection of the study population and collecting adequate data. The type and kind of data collected and a brief profile of the study area is explained including its demographic characteristics and administration gives an overall picture of the village and the people. Additionally, the tools used for collecting data, the techniques used for analysis and the limitations of the study are dealt in this chapter. Within this understanding of the conceptualisation and methodology of the study, the next chapter gives the detailed profile of the study area.

* Neighbourhood Associations are informal groups in the Panchayat and municipalities of Kerala. In the study area there are one Associations present for every 50 households.

CHAPTER IV

AREA DESCRIPTION

GEOGRAPHIC LOCATION

The area of the study is Kumarakom Panchayat located at the western end of Kottayam district separated from the Arabian sea by Vembanad lake lying in the west of the Panchayat. On the north of Kottayam district lies Kochi district and to the south lies Pathanamthita and Alappuzha district, wherein part of Alappuzha also extends to the western side (Map 2). Like the rest of Kerala, this area is also richly endowed with sunlight throughout the year, warm temperature and high rainfall, all congenial for intense biological activity, which is manifested in the rich bio-diversity.

On the eastern side of Kumarakom Panchayat is the Thiruvapur Panchayat. Kottayam town located 12 km. away is beyond Thiruvapur Panchayat. In the north of Kumarakom Panchayat is the Aymanam Panchayat with the Kottayam-Alappuzha canal flowing through the south (Map 2). The only river flowing through the area is the Meenachil River with its rivulets flowing through the Panchayat to the Vembanad Lake. The climate of Kumarakom Panchayat is humid tropical, with a temperature of 25⁰ C to 30⁰ C and humidity of 87%¹. The bimodal rainfalls, which have fashioned the rice culture of the state, are the south-west monsoon (Kaalavarsham) during the months of June-September, and the north-east monsoon (Thulaavarsham) during the months of October-December. These together generate a rainfall of 2469² mm per annum. Sixty percent of the rains are during the months of June and July.

Vembanad Lake extends from Azheekodu in north to Alappuzha in the south. It is 96.5 km long with total area of 256 Sq. Km. It forms an estuarine with Arabian Sea in the west. It is known under different regional names, wherein Kumarakom kaayal (the part of Vembanad Lake belonging to the Kumarakom Panchayat) is one among them³. After the construction of the Thannermukkam barrage the area

¹ Kumarakom Grama Panchayat(1996):*Vikasenarekha (Malayalam),(Development report)*,chap. 4, p.11

² Ibid.

³ Ibid.,chap. 1, pp. 15,16.

extending from the barrage to Alappuzha is called as Vembanad Lake. The largest width of this Lake is reported to be 8 km, with a depth ranging from 5-10 ft. There are altogether seven rivers flowing to the lake from different parts of the state. The lake is well known for its fish resources like prawn, shellfish etc.

The land area of Kumarakom is a low-lying area one meter above the mean sea level. The fields are generally classified into *Kara paadoms*, *Kaayal Niloms*, and *Kari Niloms*⁴ wherein cultivation is possible only after draining of water from the fields. Here, the terms itself explains the type of fields. *Kara* means dry land and *paadom* means shallow fields. These are lands seen near dry land used for cultivation. However, they are near to the dry lands, they too need drainage of water. These are located little above the rest of the other two. *Kaayal* means lake and *Nilom* means deep fields. Those deep fields that have been reclaimed from the Lake and are used for cultivation are included in this category. This land lies 1.5 to 2.0 Mts. below the mean sea level and is affected by the salinity of water and flood havoc. *Kari Niloms* are the lands with black (*Kari*) peat soil, with more acidity. The land lies below the mean sea level and its water table is about one meter below the surface of the soil. In Kumarakom Panchayat, *Kara paadoms* and *Kaayal Niloms* are the major type. In all the above-mentioned fields water has to be flushed out in huge amounts before sowing and the water around the fields is contained with temporary bunds built around the fields with soil and leaves, at a height of 1.0 to 2.5 feet. This water is pumped to the nearby streamlets and rivulets and eventually flows to the Vembanad Lake.

HISTORY OF THE AREA

The land lying to the east of Vembanad Lake was once part of the sea. Gradually the sea receded and an estuarine lake came into being. The land uncovered was called 'Kumarakom'. The place was mentioned during 2nd century AD, as among the ports. Later on, after the formation of land and lake in the western region the port was shifted further to the Northwest. The data on Kumarakom was first entered in the 1891 census. In this there were 1729 houses with a population of 8332⁵.

⁴. M P Parameswaran (1992), Kuttanad (Malayalam), (Kuttanad – facts and Fallacy), KSSP, P. 28.

⁵ *Vikasena rekha* (1996), op. cit., chap. pp. 8 & 9.

As per 1941 census, there were 2185 houses, of which 206 were vacant, and the population was 13027. There were 7960 (61 per cent) literates. There were 15 educational institutions with 1215 (9.5%) boys and 1034 (7.9%) girls enrolled. There was one library and four hospitals and dispensaries as per the 1941 census. The present infrastructure will be discussed later on. During this period, lime burning, fish curing and canoe making were the major industries. During the First and Second World Wars, there were famines reported and the reason was that the usual supply of rice to the place was stopped. To overcome this, the ruling king encouraged those who were interested in land reclamation. Besides, as the famine was severe, many labourers were ready to work for lower wages. The local landlords utilised this⁶. Reclamation is still being carried out in the Panchayat, where half of the Panchayat area is Vembanad Lake (24.13 Sq. Km of the total 51.67 Sq. Km). The place also is famous for the social reformer Sri Narayana Guru's visit and his efforts to fight casteism, prevalent at that time. The respect towards the guru and his teachings can be found even now among the people, which is reflected in the presence of guru's portrait in majority of the houses in the area irrespective of the religion or caste to which one belong. There was considerable growth of communism among the agricultural labourers in the area, which was clear from the victory of the communist party in the first Panchayat election. This also helped some of the landless to acquire land at the time of land reforms in 1970. Therefore today some families have 10 cents as land ownership⁷. After receiving 10 cents of land, the age-old type of small huts got replaced by houses made of bricks. Later, in 1990 the Panchayat gained 100% literacy.

VILLAGE PROFILE

The profile of the village on the ecological conditions, the infrastructures existing, and the type of economic activity is dealt in detail to understand the life situation of the people in general. The major crop cultivated is rice. The type of work involved and the seasons of cultivation are dealt later on. The village is known to the world as a tourist centre for its rich bio-diversity. The Mangrove forests seen in the banks of Vembanad Lake and the wide varieties of birds (resident and migrant) along

⁶ Ibid., chap. 3, p. 8.

⁷ Ibid., p.10

with different type of fishes contribute to the natural beauty. The major transportation facility available to the village is private buses whose frequency is one in fifteen minutes. However they traverse only the main road of the village, which which passes only some part of the wards. The access to interior of the village is either by walking or by small ferries.

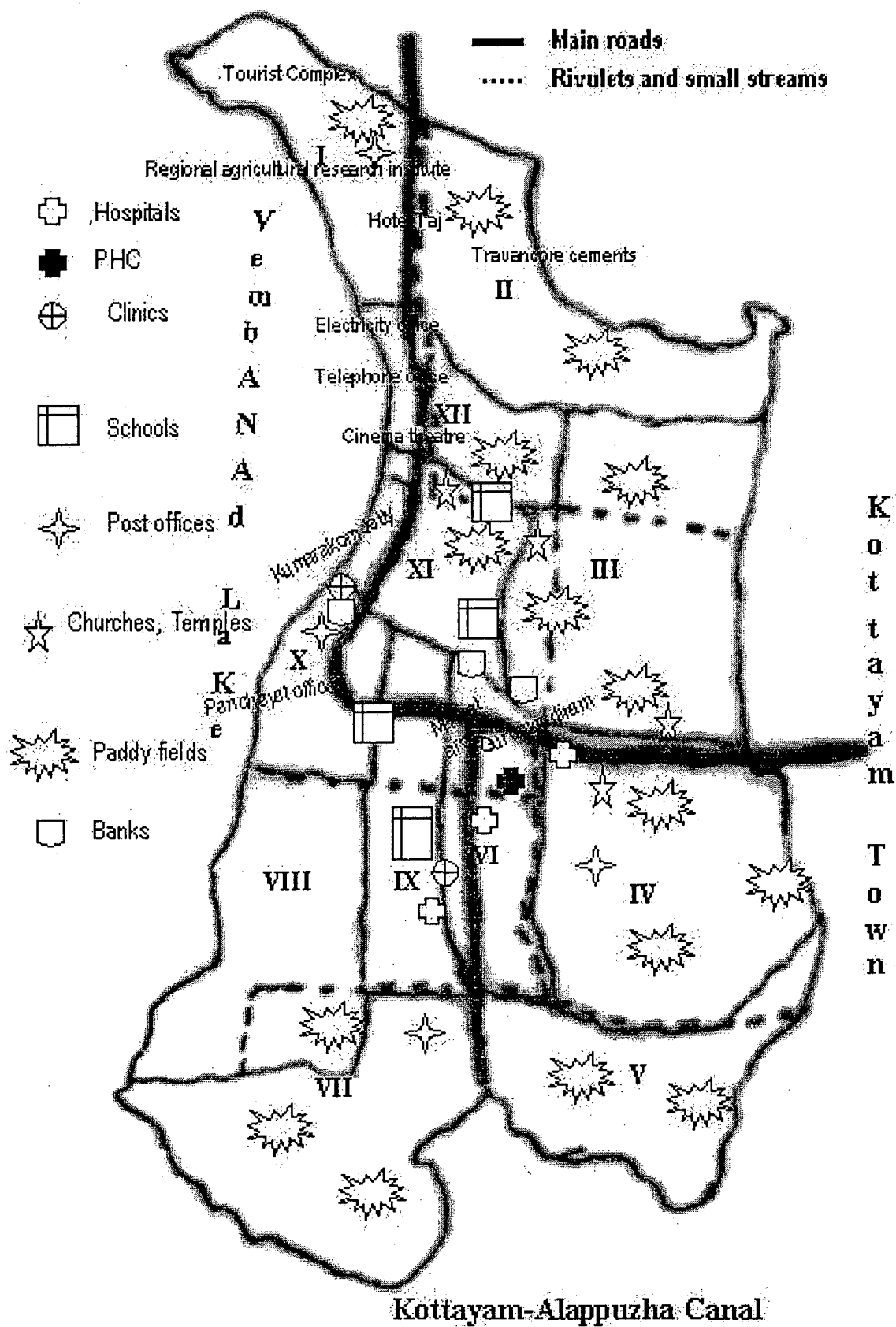
In the village, there are both public and private health institutions. The PHC as well as the panchayat clinics for Homoeopathy and Ayurveda are the public health institutions. The Private health institutions are the Santhi hospital (19 beds), Church hospital (15 beds) and Karuna hospital (10 beds). Apart from these, there are two to three private clinics (only outpatient services) and an anti-venom centre. The health institutions outside the Panchayat used by the people are government taluk hospital (15 Kms away) and Kottayam Medical College hospital (25 Kms from the Panchayat). Additionally, there are six Banks and fourteen schools ranging from Lower primary to higher secondary. The Regional Agricultural Research Institute and the lime-shell processing unit of Travancore Cements Ltd., are the two important institutes functioning in this Panchayat. Several small industries like coconut oil mill, grinding mill etc. are there in the Panchayt.

A ward-wise distribution of infrastructures and civic amenities will give an idea of the state of development of the Panchayat (Map 3). The road entering the Panchayat passes through with paddy fields on either side. This is a beautiful sight at the time before harvest. These fields extend for a kilometre. Beyond the fields are small houses scattered in the area. Between the fields are paths made of clay and leaves called '*Varambu*' which are one to two feet wide. The main road, which is tarred, passes through the centre of the Panchayat, a bus route that links the area to the outer world. The road enters the village through wards III and IV and after reaching ward VI divides into two. One road continues till the Kottayam-Alappuzha canal and other finds its way to Aymanam Panchayat through wards IX, XI, XII and I. Certain points on the bus route near wards VI and IX look like a well-developed town.

After travelling some distance through the main road, a big church is seen. On its opposite side are two to three shops with boards showing "boats for hire". This is part of the tourism promotion. Near the church there is a hospital, which people call

Map 3

MAP OF KUMARAKOM PANCHAYAT SHOWING THE INFRASTRUCTURE



the 'Church hospital' as the church management runs it. Further, the road leads to a bridge crossing one of the rivulets of the Meenachil River flowing to the Kottayam-Alappuzha canal. The bridge is the entry to ward VI. There is a bus stop here with a statue of Sri Narayana Guru and known as *Gurumandiram* stop. On the right side of the road one can see a branch of the river flowing to the west and eventually reaching the Vembanad Lake. The area of the ward VI is dense with several buildings. The PHC is in ward VI near the *Gurumandiram* bus stop. Close to the PHC are two to three laboratories, an optical centre and four to five medical stores. Then is the marketplace where one can find a wide range of shops for jewellery, furniture, etc.. There are also textile shops from where latest models of dress, both ready made and cloth piece are available. There are shoe stores of companies like Bata, Sandak and other leading brands. Along with these, there are bakeries, teashops - big and small and hotels of medium type. A range of chocolates and biscuits of new varieties are sold in the bakeries. Besides, one can find age old *Vaidyashaala* (Ayurvedic medicine shop) with an old person sitting in the midst of several coloured bottles, some of them arranged and a few covered with dust. There is a typical marketplace where all sorts of groceries, fish, meat and other stationers are sold. There are at least three shops for each kind.

The road divides at this point where the one that goes left proceeds to the interior of sixth ward. Further down this road there is a police station and a private hospital - 'Santhi hospital', which as per the people is the best private hospital of the area. After some distance is a government higher secondary school. There are several medium-type houses concentrated in this area and a *Krishi bhavan* (Agricultural office). The Kumarakom *Kummaya Vyavasaya Sahakarana Sangham* (lime shell society) and the Housing Board Sahakarana Sangham are situated in this area. Karuna hospital (a ten-bedded private hospital), Mookambika homoeo clinic and a massage centre are other centres rendering health care and close to this branch of the road.

The main road that goes straight from the market area passes through wards IX, X, XI, XII, and I leads to the Aymanam Panchayat. On its sides there is a small tailoring shop, an Internet café and also some electric goods repairing shop. Then there is the Young Men's Club Association (YMCA), wherein the members of the

club come and spend their evenings. Adjacent to the YMCA is the Panchayat office and village extension office, which is a newly constructed building. On the back side of the panchayat building, there is the government Ayurvedic clinic and government Homoeo dispensary with one doctor each. These two institutions are run by the Panchayat and are situated close to each other. In front of the Panchayat office there is a playground for the government lower primary school. The school itself is located at the side of the Panchayat office. During rainy season, the ground is filled with water. The whole area of the Panchayat and the school is a low-lying area.

The road continues right to the Kumarakom jetty area. It passes by the State Bank of Travancore and the main post office, after which there are several big concrete houses with car porches and lawns similar to those found in cities. There is one Aishwarya clinic further on. The road then reaches a big bridge over the Meenachil River, which is flowing, to the Vembanad Lake. On the left hand side of the bridge is the boat jetty, where boat services go till Alappuzha, Vaikkom and other places. Many people of Kumarakom use this service. There is a cinema hall and small teashops at the entry of ward XII, after which is an electric shop, the telephone exchange office and the Kerala State Electricity Board office. Before entering wards II & I several boards showing “rooms available for rent” and “boat services available” can be seen. The brand new “Hotel Taj”, one of the biggest hotels of the district with all modern facilities and the place of choice for VIP tourists to spend holidays is also present in the study Panchayat. Then the road enters ward I, where the region is having plenty of paddy fields with rivulets flowing around.

Apart from the institutions described above there are several others, which are away from the main road, i.e. in the interior of the Panchayat. They include The Travancore Cements Ltd. in ward II, a big industrial unit engaged in lime shell processing with more than 75 staff. There is Regional Agricultural Research station situated in ward I carrying out research on agriculture in field settings with around 100 staff. In addition there are altogether four post offices with the main post office situated in the X ward and the other three in wards IV, VII and I. Besides there are six banks in the Panchayat where three are under a co-operative society, one bank is a private one, one a national bank and one is an associated bank. There are fourteen schools in the village, of which eight are lower primary four are upper primary, one

higher secondary and a vocational higher secondary school. Several small-scale industries like sawmills, flourmills, coconut mills and other similar organisations do function in the Panchayat. Among the fishermen, agricultural labourers and lime shell collectors, several co-operative societies are formed with the welfare of its members as their primary concern.

The major transportation facility is private buses whose frequency of services is one in fifteen minutes. But it covers only the road area described earlier, which is a small part of the Panchayat. For people residing in interior areas they have to rely on ferry of their own if they have or by walking long distance (around 2-3 km.) through *Varambu*, which will be damaged during monsoon seasons. There are also good tarred roads passing through the interior area but largely concentrated in the central parts. Based on the infrastructures existing and the access to civic amenities, it is obvious that wards VI and IX are better developed and densely populated with VIII, X, XI and XII coming next. Wards I, II, III and IV have greater area of paddy fields than the rest resulting in severe water logging. Ward V and VII being in the interior parts of the Panchayat are deprived of transportation facilities.

HEALTH CARE INSTITUTIONS

It has been attributed that health care institutions in Kerala have a major role in maintaining the health status of the people⁸. This strengthens the need to look at the health care institutions existing in the village. The institutions of the village for health care are the Primary health centre- where outpatient and inpatient services are available and one Homoeo and Ayurvedic clinic run by the Panchayat. Three private hospitals with inpatient service, one private allopathic clinic and one Homoeo clinic together are the private health care centres.

JBMM is a 15-bedded hospital known to the people of the village as the 'Church hospital' as it is run by the church trust. Santhi hospital with bed strength of 19, as per the people is 'the best in the private sector though expensive' and Karuna hospital with 10 beds (started a few years back) are the major private hospitals. Apart

⁸ PGK Panicker & CR Soman (1987) : Health Status of Kerala, the paradox of economic development and better health status,

from these, there is a Mookambika Homoeo clinic with a massage centre attached and an Aishwarya clinic, where both homoeopathic and allopathic services are given as out-patient services. There is also a Homoeo medical store and an anti-venom centre. Besides, the Panchayat run government Ayurvedic dispensary and government homoeopathic dispensary are functioning in the Panchayat office building. Above and all, there are PHC doctors who do private practice in their home during evenings. The distributions of these institutions in the Panchayat are such that except the church hospital situated in the boundary of IV and VI wards and Aishwarya clinic in ward IX, all others are distributed in the VI and IX wards.

The PHC of Kumarakom is a century old institution, which before conversion to a PHC was a clinic run by missionaries. During 1990s it has upgraded its bed strength from 30 to 50 along with increasing the number of doctors and other staff. Now the health centre has specialities in general medicine and antenatal care and some laboratory facilities. However, the latter are usually unused. While on fieldwork, it was found that of the four doctors recruited in the health centre only two were present. This is because, as per the hospital staff one of the doctors is on leave for last four months and the other has gone for higher studies for a year.

The major service given by the PHC is the outpatient service for which on an average there are 120 patients coming for treatment everyday. They are seen by two doctors from 9 am to 1 p.m. This means, on an average a doctor gets four to six minutes for making diagnosis and to treat a patient coming to the PHC.

Generally, cases of Leptospirosis if suspected (clinically) will be referred to the Kottayam Medical College, that is 20-25 km. away from the Panchayat. As per the records of PHC there are only 4-5 cases of Leptospirosis per year in the Panchayat and those too are 'imported'. Thus according to the PHC records there is no chance of the locals being infected, as humans do not transmit Leptospirosis. Here the only solution proposed by the health professionals of the PHC is to educate workers to avoid contaminated environment".

The other important hospital is the Santhi hospital. This is a private hospital. This hospital has a doctor who is in fact the person in charge of 'everything'. The

building is double storied one with an office, laboratory facilities and a pharmacy. Both out-patient and in-patient services are offered. There were three nurses and two attendees at the time of visit but the doctor was reluctant to give the details of the staffing pattern and other information of the hospital. From the people's point of view, they consider the doctor as efficient and a good clinician. But as the expenses are high, people do not prefer this hospital in cases like Leptospirosis that need prolonged hospital stay. For outpatient services and minor ailments the expense they have to bear at this hospital is compensated by the travelling expense if they have to go out of the village. This perception of the people seems to be rational when the researcher found that the room rent in this hospital is in the range of 100-150 per day for inpatients apart from diagnostic and treatment expenses at Santhi hospital.

The health institutions outside the village used by the people of the village are the government taluk hospital (situated in Kottayam town, 15 Km. from the village) and the Kottayam Medical College. The people do not prefer the former because, (1) They have to travel 15 km. to reach there (2) a big hospital where lot of patients come and according to them, "only if one has a contact in the hospital one can ensure good services". (3) The facilities they find is almost same as that in PHC, where the familiarity to doctor in case of PHC, is important. (4) The difference in the distance to government hospital and medical college from the village is 10 Km., which for the villagers makes no difference as in either case they have to take a taxi and somebody has to stay with the patient. Additionally on comparing the efficiency of the services, the people find medical college far better than the taluk hospital.

Kottayam Medical college is situated 25 Kms away from the village and is considered as the best centre available. The faith people have towards this public institution is reflected from their words, "If we have any chance of life, the medical college will help getting it". The system of diagnosis and treatment is that, whoever goes to the medical college has to take appointment of the speciality required, and the doctor will ask for certain laboratory diagnosis to get done, based on which treatment will be carried out. This is in the case of outpatients, and in-patients who are not so serious. For emergency cases, the patient will be admitted to the emergency room, and basic care like giving intravenous fluids and injections if required will be given. The patient still needs to have laboratory tests done outside. Based on the disease

diagnosed the patient will be transferred to the specific wards. In case of Leptospirosis, even if the patient comes with fever and Leptospirosis is suspected, the patient will be admitted. They will be asked to get tests done from outside after admission.

LIVES OF THE PEOPLE

The whole Panchayat comprises areas with tarred roads, small pavements and also 'Varambu', which is found between fields and leads to huts in the midst of fields or to the nearby paths. The area also has rivulets and streamlets flowing through, over which are seen bridges ranging from mere coconut bridges to concrete bridges over which buses and other vehicles pass. There are also well built wooden bridges with steps constructed by the Panchayat. Within the Panchayat area (5167 ha), half is covered with Vembanad lake (2413 ha), and of the remaining 2754 ha, 1470 ha are paddy fields, and 853 ha are coconut lagoons⁹. 431 ha (4.31 Sq. Km.) are for houses along with other cultivation like Mango, Rubber, Plantain, cocoa and so. Thus 4.31 Sq. Km for 6025 houses which is on an average 17 cents per household. Here it is to be noted that these houses are scattered in the 51.67 Sq. Km area. This description is given just to understand that there are houses seen together as well as that situated in a distance of one km between two adjacent households. The houses are generally considered of the tiled type, that too many of them newly built, in an area of 10 cents or less. There are also houses situated in the banks of the river, which at the time of flooding will be water logged. Houses looking like sheds can also be found in the midst of paddy fields from which it is impossible to get out without touching water. There are also multi-storied houses of rich families who are generally businessmen or service personnel with gardens, porch and big gates similar to those seen in towns. These houses are concentrated in areas where the access to transportation and other services are greater.

There is a range of water plants found in waterlogged areas. They include *Kulavaazha* (water hyacinth), *African paayal* (*Salvinia molusta*), *Kula Paayal* (*Nymphaea Stella*), *Mullan paayal*, *Aambal*, *Thamara* (*Lotus*)¹⁰. Of the above,

⁹ *Vikasana rekha*, op. cit., chap. 5, pp. 16, 17.

¹⁰ *Ibid.*, chap. 4, p. 13.

Kulavaazha and *African paayal* is found more in water-logged fields, where *Kulavaazha* grows thickly above the water level to a height of one to one and half feet. The water plants along with the wastes dumped by the villagers serve an ideal place for rat's burrows and also for mosquito breeding. The *Varambu* is the only route for people staying in the interior to go for their work. These paths become water-logged either during monsoon or at the time of draining of fields, and the people cannot avoid coming in contact with the contaminated water. A brief description of the Thanneermukkam barrage at this point will help to understand factors other than geographical leading to the above environmental conditions.

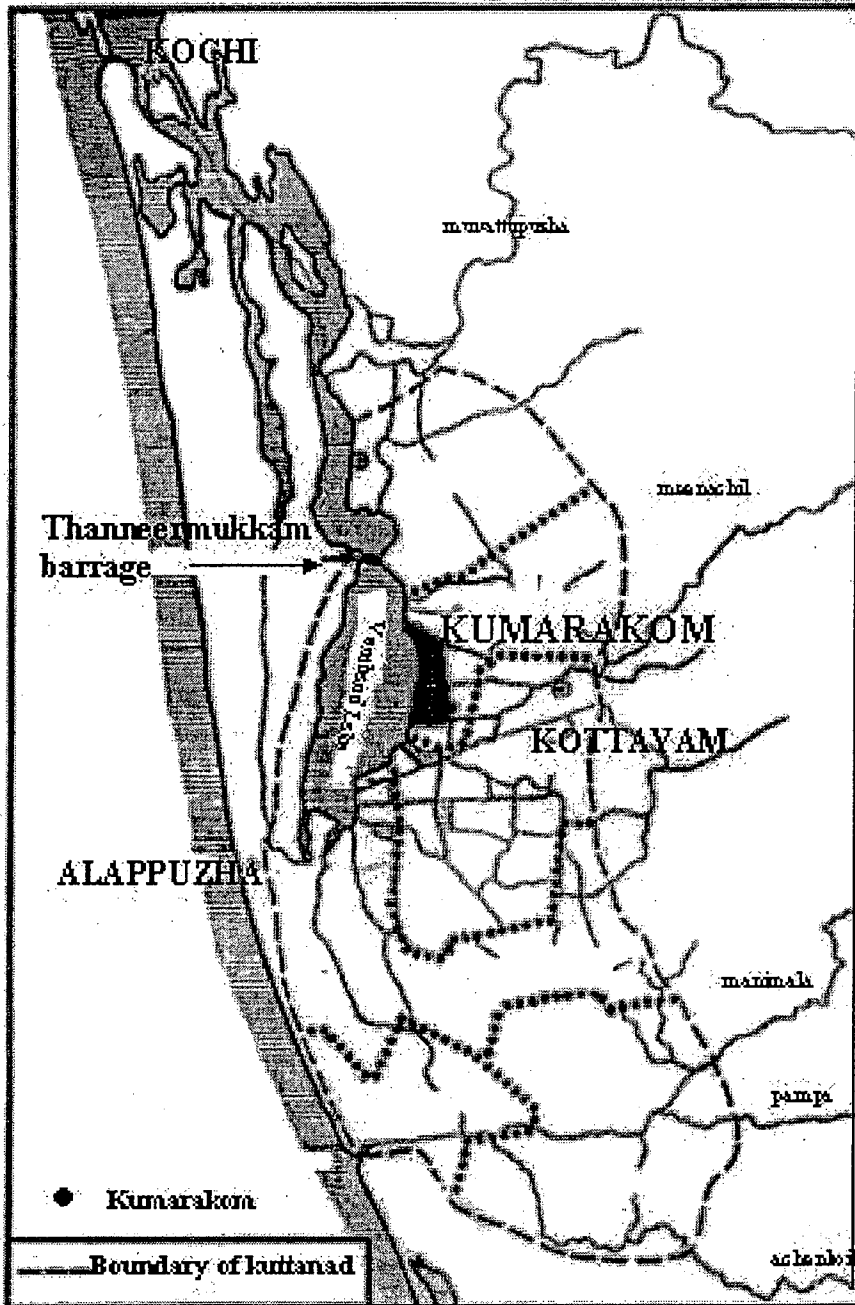
THANNEERMUKKAM BARRAGE

The whole rice cultivation of Kuttanad region is affected by the salinity of Vembanad Lake due to intrusion of seawater during December. To solve this, the government had planned to block the seawater during December to June and started constructing Thanneermukkam barrage at the narrow area of Vembanad Lake in 1955 (Map 4). The project was completed in 1974 and was allowed to function. The system¹¹ is that shutters were made in the lake that can be opened and closed as and when required, so that it will obstruct the seawater from flowing into the lake. At the time of installation, the agreement was that the shutters will be closed from December to June of every year and by June it will be opened which allows offspring of fishes and prawns to enter into the lake along with the seawater. However, the barrage remained closed forever with an aim to promote agriculture and the shutters have become dysfunctional. This has raised several issues affecting the whole region of Kuttanad. Several inquiry committee reports and study reports have come out, which have brought out several issues related to this project. Converting the Vembanad Lake that was a salt-water lake for the major part of the year into a fresh water lake by constructing the Thanneermukkam barrage has led to an ecological imbalance in Kuttanad region. Several issues have identified by different committees out of which that which were found relevant¹² are mentioned here.

¹¹ M P Parameswaran et.al. (1992), op. cit., chap. 1.

¹² K R Nayar (1983) : "Environment and well being - A socio psychologic approach", Ph.D thesis, CSMCH, JNU chap. 5, pp. 144-151.

Map 4
**MAP OF KUTTANAD REGION
 SHOWING
 THANNEERMUKKAM BARRAGE**



(1) Before the construction of the barrier, the problem of water plants especially *African paayal* was not very severe as salt water used to destroy the plants. This luxuriant growth of water plants started creating hazards to transport and cultivation by choking canals and waterways and also leading to pollution of water and growth of mosquitoes.

(2) The water plants enter the paddy fields when fields are left submerged in water after cultivation. During drainage operations for the next season, removal of plants from the fields by manual labour as well as the exposure to contaminated water and wastes deposited for long time has resulted in the raising cost of cultivation.

(3) The people of the area especially who live in the interior areas with ferry as their only mode of transport, have to struggle through the thick growth of water plants while working for their daily bread. Fishermen and lime shell collectors also complain that not only transport but also their fishing nets get easily damaged due to these plants.

(4) One of the serious impacts of the barrier is the pollution of drinking water. This along with the people's behaviour in terms of disposal of wastes become more complex, where people used to deposit all their wastes in the water. As the tidal water carries all the wastes it was not a problem earlier, but after the blockage of lake, the waste deposited in stagnant water has raised threat on the water purity.

(5) The outbreak of diseases such as diarrhoea, dysentery, typhoid, jaundice etc is a cumulative impact of the environmental conditions, intensive use of pesticides and practices of depositing the wastes into the water.

(6) Studies have shown that the fishermen in Kuttanad complain that several varieties of prawns and other fish population in the lake have deteriorated as their life is adjusted to saline conditions, which was shattered because of the barrage. This is same with the case of shell varieties also affecting the lime shell collectors.

(7) The agricultural labourers consider the saline water deposits during lean season in the fields have pesticide quality to destroy weeds and water plants. However

after the barrage there are no more saline water deposits. As a result there have been increased problem with weeds and water plants.

ECONOMIC ACTIVITY

Table 4.1 Occupational pattern of the people of the village.

Type of Occupation	Number of members		
	Males	Females	Total
<i>Total regular workers</i>	5218	2379	7597
Agriculture labourer and Agriculturists	1677	1799	4476
Cattle rearing, fishing, Lime shell collecting etc.	1395	55	1450
Production and processing jobs related to cottage industry	60	21	81 (0.96)
Production and processing jobs not related to cottage industry	341	26	367 (4.4)
Construction work	128	6	134 (1.6)
Trade	725	132	857 (10.2)
Transport and communication	268	10	278 (3.3)
Other services	624	330	954 (11.4)
<i>Total irregular workers</i>	316	474	790 (9.42)
Total workforce	5534	2853	8387 (100)

The major economic activity of the area is agriculture. The agricultural labourers and agriculturists together constitute 53.4% of the total workforce (8387)¹³. Agriculturists and agricultural labourers are taken together as the chances of exposure to contaminate water are there for both and looked together in the analysis. It is the case with cattle rearing, fishing and lime shell collecting groups.

Then come the fishermen, lime shell collectors, cattle rearing group (17.2%), service sector (11.4%) and trade (10.2%). The male female breaks up for each sector and other works engaged by the villagers are shown in the table. As the table shows, in all other sectors except agriculture greater numbers of workers are men. The types of work involved in agriculture have a gender differential. As more than half of the work force is engaged in agriculture, which is also the occupational group more vulnerable to the disease, the type of work involved in it calls for elaboration.

¹³ *Vikasanarekha*, op. cit., chap. 4, pp. 14.

WORK INVOLVED IN AGRICULTURE

Out of the total paddy fields (1470 ha), only half (750 ha) is cultivated twice in a year wherein waterlogging will be only for a maximum of three months. Around 200 ha of paddy fields are not cultivated and remain waterlogged for the whole year whereas the rest remains water logged for six months in a year¹⁴. As mentioned before, all the Paddy fields remain water logged when there is no cultivation.

Traditionally in Kerala, the major crop, rice is grown in consonance with the incidence of the monsoons. Generally *Virippu* (April-Sept.), *Mundakan* (Sept.-Jan.) and *Puncha* (Jan.-April)¹⁵ are the three seasons of cropping of rice*.

Kuttanad region (1100 sq. km) also known as the rice bowl of Kerala is situated in the southern part of Kochi of central Kerala. It is divided into six zones based on the agro-ecology¹⁶. The study area belongs to one of them, viz. the northern Kuttanad region. Over the centuries, peasants of Kerala have evolved a rice culture that is in sympathy with the rigid but heterogeneous environmental conditions especially with respect to the control of water (deficiency as well as excess). One among it is the Kuttanad agro-eco system, a unique system of rice production practised in Alappuzha Thrissur and Kottayam. The study area being in Kottayam follows the same pattern. Being low-lying estuarine lands, these areas are subjected to floods during the two monsoons and salinity incursion during post monsoon periods.

For both single cropping and double cropping the work involved are the same. Before cultivation, the land around the fields has to be repaired with mud and leaves. Water is drained from the fields carried out using specially designed electric motors. Pump contractors, who charge based on the quantity of water to be pumped out, do this. For this subsidies are given with an aim to promote rice cultivation in these areas. Then wet ploughing, is carried out, followed by '*pallikkadi*' (raking of soil by passing a harrow), which sets the field. This is men's work. Large numbers of female

¹⁴ Ibid., p16.

¹⁵ Working paper on *Rice Production and Food security concerns in Kerala*, Centre for Development Studies, Thiruvananthapuram, 1999.

¹⁶ M P Parameshwaran & M K Prasad (1992), op.cit., chap. 1, p. 12.

labourers carry out the first weeding operation called '*kalaparickal*'. However water plants are largely removed by males during draining of water. Females remove plants that remain at the time of first weeding.

Sowing is done after first weeding. Seeds are first packed in bags and soaked to induce sprouting. This will be sown in knee-deep water, usually carried out by both male and female labourers. The first manuring done after ten days is the work of male labourers, after which operation of gap filling. Then second weeding starts for which female labourers are engaged. Fertilisers are applied a second time after 45 days. Harvesting and threshing (removal of grains from the plant) is done once the rice is ready. These operations are open to all. For most of the agricultural work except in the stages of drainage and '*pallikadi*', female labourers are preferred, as their wage rate is less than male labourers. The current wage rate is rupees sixty for females and rupees one hundred and ten for male labourers.

In the study area both single cropping and double cropping are practised. In areas where single cropping is done, *Puncha* (summer) is practised, where *bund* repairing and de-watering is carried out during September-October, and harvesting done during February as irrigation need to be minimum. In case of double cropping, along with *Puncha*, *Virippu* is the combination where *bund* repair is carried out during February- March and harvested in July – August.

OTHER OCCUPATIONS EXPOSED TO RISK OF INFECTION

The possible occupation groups at risk for Leptospirosis can be agricultural labourers and agriculturists, fishing community and lime shell collectors and sand collectors. In the study area there are no families having cattle rearing alone as their major occupation. For most of them it is an additional source of income along with agriculture, fishing or other regular jobs.

The mode of work of fishermen, lime shell collectors and sand collectors show some similarity as all of them go to the lake in ferries for their work. On their way they have to face difficulties due to excessive growth of water plants in the rivers. Also chances of exposure to contaminated water are similar. Two or three fishermen go to the lake with fishing net and other stuff during evenings in a small ferry. They

return to their home sometime in the morning. The lime shell collectors on the other hand go to the lake early morning by six or seven, then collect the lime shell from the lake manually, which is tiresome and risky, as they have to be under water for long time. They return home by noon. Sand collectors also do similar work as that of lime shell collectors. The chances of exposure to contaminated water for those engaged in any of the work mentioned above are greater than the rest.

SUMMARY

The chapter tries to present a picture of the area of study, by discussing the geographical and climatic conditions of the area, which has considerable rainfall and a rich bio-diversity. The area is well equipped for rice cultivation with several rivulets and streams flowing across resulting in greater water supply. Historically, the area is land reclaimed from the lake where low lands and *Kaayal Niloms* are common.

The administration is similar to that of other Panchayats in Kerala. The infrastructure and civic amenities seems to be distributed in such a way that those residing in wards I, II, III, IV, V & VII seems to be less benefited than those living in wards VI, VIII, IX, X, XI and XII. As far as health care institutions are concerned, both public and private hospitals exist in the village with both of them used by the people at the time of ill health. The taluk hospital and medical college serve a larger population of which the study villagers are a part, and the faith of the people towards the medical college and the rationale behind preferring the latter to the former seems to be of relevance in the current context.

After setting the scene of the village, the transportation facilities and residential pattern within the context of physical environment of the area is looked at. The major transportation facility is private buses along the main roads. For those residing in the interiors, walking or using a ferry to reach main roads is 'normal' way of life. The residential pattern is a range from few huts; many a times in midst of water logged fields, to big multistoried houses with medium and small tiled roof houses in between. The problem of heavy water logging and water plants during monsoon makes it impossible for those residing near streamlets and fields, to avoid exposure to contaminated water in their daily life.

The physical environment is seen not as a geographical outcome but as an outcome of "development"- with Thanneermukkam barrage as one of them. Several

hazards like growth of water plants and pollution of water collections with wastes resulting as seasonal seawater entry was prevented due to the construction of the barrage have been identified. Within this setting of the villages, the type of work involved in the major economic activity viz. agriculture, were explained to understand the lives of people in the village. The understanding is that the behaviour of the people engaged in agriculture, fishing, lime shell collectors etc. is in a way due to the narrowing of their choices, which force them to undertake behaviours, which are 'risky' or which make them vulnerable to the disease-Leptospirosis. In fact, this chapter sets the context for the analysis in the next chapter

** After the summer or pre monsoon showers have prepared the land for sowing. The growing period coincides with the incidence of southwest monsoon and harvesting is during the intermonsoon break in August –September. Typically, the Virippu season commences with sowing often by broadcasting and very few places by dibbling (raking of soil using harrow) in mid Maetom month (April).*

Mundakan season commences during the two inter monsoon lulls in September. The sowing of sprouted seeds on wet lands or transplanting in September- October carried through the Northeast monsoon (Oct-Nov) and harvesting in Dec- Jan.

In Puncha season crop is grown during relatively rainless (but for the occasional uncertain summer showers) period under irrigation. The crop starts off with sowing sprouted seeds on wetland or transplanting in Jan-Feb and harvesting in April-May. Rice cultivated during Puncha season is essentially an irrigated crop. Physiologically Puncha (summer) is the best time for rice growth in Kerala on account of the bright sunshine received and water control that can be exercised during this period.

Taking the midlands as a model in the state, Virippu season is long lasting for five months, Mundakan lasts for four months and Puncha the shortest, last for only three months. The growing period can be adjusted according to availability of water by the number of cropping done in a year viz. single cropped, double cropped or triple cropped.

CHAPTER V

PROFILE OF THE PEOPLE UNDER STUDY

As mentioned in the methodology, data was collected from the identified cases of Leptospirosis residing in Kumarakom Panchayat. Thus a total of 37 cases identified from six wards of the Panchayat were interviewed both at the individual and the family level for data on their socio-economic and environmental conditions. Socio-economic status of an household as mentioned in the methodology chapter has been understood by considering the sum total of the monthly income of the households as well as the social status determined by the occupation engaged by the members, the caste they belong and educational status. Household possessions are also linked to the income and status.

RELIGION AND CASTE

Out of the total number of cases from six wards, 31 (83.8%) were Hindus, and the rest belong to the Christian community (16.2%). All the Hindu families were from the other backward castes (OBC), whereas among Christians out of the total six families, five belong to the general community and one belongs to the backward community.

EDUCATIONAL STATUS

Based on the educational status of the household members, it was found that of the total 184 members, 46 (25%) are less than 15 years. Of the remaining 138 members, twenty-six (14.13%) have education above X standard, 69 (37.5%) have studied till X, with 19 (10.33%) gone till VII standard. Nine (4.9%) studied up to IV standard and fifteen (8.2%) have never gone to school.

The educational status of members within each household was also examined. It was found that of the total 37 households, thirty-three (91.9%) have at least one member who has completed eight standard. Of these thirty-three, fifteen (40.5%) have qualification of more than X standard. As there is not much difference in the basic educational standards (almost all the households have at least one person who has studied till VII standard). within households, it is not possible to look whether there is any

influence of education on perception of Leptospirosis, its causes or its treatment practices.

SOCIO-ECONOMIC CONDITIONS OF THE HOUSEHOLDS

Data on the socio-economic conditions of those households with cases of Leptospirosis were looked at based on their monthly income, land ownership, housing quality reflected in the type of roof and floor area, household possessions and sources of cooking fuel. Also those factors affecting the socio-economic conditions such as loan details and monthly health expenditure were analysed to understand this.

MONTHLY HOUSEHOLD INCOME

The total monthly income for the household was calculated based on personal income of the members and other sources of household income viz. domestic animals, agriculture, cottage industry, trade etc for the month of October 2001 as this was the month preceding the month of survey. The personal income of each member was calculated based on the type of work engaged in and the incomes from other sources were calculated considering the sources' productivity. The sum of the personal income of all household members along with other income will give the total household income for the month of October 2001.

Among the members (personal) there are regular workers— where the person has fixed income in every month of a year and irregular workers— where the person earns money only for a few months in a year, or in other words income of 'casual workers'. Out of the total members (184) of all (37) households, 57(30.94%) are less than 20 yr. Another 57 (30.94%) in the less than 20 yr. age do not have any specific job and includes housewives. Among the remaining 70 (38%), which is the working population, 36 (51.4%) are engaged in irregular jobs like agriculture, fishing, sand or lime shell collectors, painters, carpenters etc. Ten per cent (7) are engaged in government service sector and another 10% (7) in business. In addition to this, five (7.1%) are private company employees, three (4.3%) each are working as contractors and in toddy society. The remaining nine (12.9%) include teachers, sales person, shop managers and so on.

Thus the major occupation among households are agriculture, fishing or lime shell collection, etc. where work will be available for a maximum of six months for agriculture and eight months in the case of lime shell collectors, fishing etc. The total income of all the households is as follows.

Table 5.1 Monthly household income

Monthly income of the HH (Oct 2001)	TYPE OF INCOME			Total
	Regular income	Irregular income	Both regular & Irregular	
< Rs. 2000	1	5	-	6
Rs. 2000-Rs. 4000	4	8	2	14
Rs. 4000-Rs. 6000	4	2	3	9
Rs. 6000<	8	-	-	8
Total	16	15	5	37

Based on number of months (6-9) irregular workers can work in a year, the annual incomes for each household were calculated hypothetically based on the monthly income of October 2001 which incidentally is an over estimation of incomes as October is a well paying month. Families with hypothetical annual income less than Rs. 36,000/ p.a. were taken as the lower income group, those in the range of Rs. 36,000 to Rs. 72,000 p.a. were the middle income group and those getting an annual income greater than Rs. 72,000/ p.a. were the better off. Thus, those families with regular workers earning less than Rs. 2000/ p.m., or with irregular worker/s earning a total household income of less than Rs. 4000/ p.m. together were taken as the lower income families. There are 16 (43.24%) families in this group with lower income status. Those families with regular income in the range of Rs. 2000-6000/ p.m., or irregular worker with income in the range of a total of Rs. 4000-6000/ p.m. are considered as middle-income group. Thirteen (35.13%) families were identified in this group. Those with all the earning members of regular income category and having total household income of more than Rs. 6000/ p.m. were treated as the better off. Therefore, out of the total families (37), 16 (43.24%) belong to the lower income group, 13 (35.13%) belong to the middle income group, and eight (21.6%) belong to the better off or the upper income group.

LAND OWNERSHIP

The distribution of land in each household will help to understand their economic status as land can be seen not only as an income source but also as a possession. Out of the 37 households, 19 (51.4%) families have less than ten cents (1 acre = 100 cents) of land, whereas 10 (27%) have land between ten and fifty cents and 8 (21.6%) families have land equal to or greater than fifty cents. Within this there are also families with 2.5 cents of land with their houses situated in less than 150 sq. ft. Additionally, among the eight families there are those having 2-10 acres of farmland, which is the major source of income.

Table 5.2 Land ownership among the three income groups

Income groups	Land ownership in cents			Total
	< 10	10 -50	50+	
Lower income	11 (57.8)	4 (40)	1 (12.5)	16
Middle income	7 (36.8)	5 (50)	1 (12.5)	13
Better off	1 (5.3)	1(10)	6 (75)	8
Total	19	10	8	37

The land ownership for the three income group is as shown above. This will give a better picture of the household status. From the table it has to be noted that, of the nineteen families having less than 10 cents of land, 57.8% are from the lower income group, with 36.8% belonging to the middle-income group. Only 5.3% in of those having less than 10 cents belong to the better off. In addition to this, the distribution of the income groups in the 50+ cents' category is such that 75% of those having 50+ cents of land are from the better off, with 12.5% each from the lower and middle-income group. This confirms the fact that majority of those having less than 10 cents are those families with lower monthly income and those with greater land are the better earning group.

HOUSING QUALITY AND POSSESSIONS

After looking the distribution of families based on socio-economic conditions, analysis of housing quality (type of roof and floor area), possession of each households

and the source of cooking fuel used will help to broaden the picture. The data showing the housing quality is given below.

Table 5.3 Housing quality.

Type of roof	Floor area in sq. feet			Total
	<200	200-500	500-1000	
Thatched	3	-	-	3
Tiled	9	17	1	27
Concrete	-	2	4	6
Concrete & tiled	-	-	1	1
Total	12	19	6	37

From the table, it is clear that 27 families, out of 37 have tiled house and only three families have thatched roof. The qualitative data reveals that six concrete houses and the one concrete and tiled are those of the better off. It was found that owners of twelve houses among the 27 having tiled roof have taken loans for building houses and are still on debts in the range of Rs. 10,000/-. This leads to the inference that many of the huts might have been converted to tiled ones, because of the preference of tiled roof over huts in Kerala due to the state's heavy rainfall. This rainfall calls for seasonal maintenance of thatched roof, which is expensive. So people prefer tiled houses even if they have to take loans. This could be the reason why the number of huts has become less than expected as per the monthly income and land ownership, thanks to the housing schemes

The three houses with the thatched huts have also the smallest floor area. These are indisputably the poorest household. Of the nine houses with tiles and floor area less than 200 Sq. ft. four have taken housing loans. Among the seventeen with tiled roof and having floor area in the range of 200-500, eight of them have taken housing loan.

Of the total 37 households, 12 (32%) have less than 200 sq. ft., which is less than the housing standards¹ (100 sq. ft per person.). Here, five being the average household size, 500 sq. ft becomes the minimum required area. Here, 19 families (51.4%) have floor area in the range of 200-500 sq. ft, with only one family having exactly 500 sq. ft. There are total seven (18.9%) families with concrete houses of which five have sufficient floor area i.e. between 501-1000 sq. ft.

Questions about the possessions of household articles like telephone, television, radio, newspaper and vehicles were asked. None of the surveyed households has car, whereas one of them owned both scooter and a bicycle. Eight families have telephones. Of these, six have television and newspaper together with telephone and, of these six, three have television, telephone, radio, and newspaper. Considering the access to media, there may not be much disparity as there were altogether eighteen families having television.

However, in the Kerala context it is to be noted that telephone can be used only those who can afford at least Rs. 750/- per month (as per the current rates for maintaining a telephone in Kerala), which is a significant amount. Those having telephone are the one's with better access to social networks in the society. There was only eight (21.6%) having telephone and could be the well off.

Cooking fuel is another variable that helps to give an idea of the family's economic status. Twenty (54.1%) of the total thirty-seven use firewood as their source of cooking fuel. Nine families' (16.2%) use both wood and kerosene. Two (5.4%) have both wood and LPG and the remaining three (8.1%) use both LPG and kerosene. Maintaining a LPG stove is the more expensive and cannot be affordable for the poor. Here eight families of the 37 households use LPG for cooking purposes of which three use LPG alone.

When considering the household possessions as a measure of the socio-economic status of the households, it becomes clear that eight families have telephone, and use LPG

¹ Park & Park (1994): "*Park's Text book of preventive and social medicine*", Bhanot publishers, Jabalpur, chap.10, p.421.

for cooking. This, when linked to the household income and the housing quality give similar distribution (eight families) of the better off families.

FACTORS AFFECTING THE SOCIOECONOMIC CONDITIONS OF THE HOUSEHOLDS

Income is the major determinant that affects the household expenditure. Health expenditure is an important expenditure and is affected by the family income. The debts of households also influence the socio-economic conditions.

HEALTH EXPENDITURE

Table 5.4 Patterns of health expenditure among different income groups.

Income Group	Monthly expenditure on health				Total
	Nil	<400	400-800	800<	
Lower Income	-	11(68.75)	2 (12.5)	3 (18.75)	16
Middle Income	4 (30.8)	4 (30.8)	3 (23.1)	2 (15.4)	13
Better off	1 (12.5)	2 (25)	1(12.5)	4 (50)	8
Total	5	17	6	9	37

From the table, it is clear that only five families of the total 37 households surveyed had no expenditure on health during last one year. It is to be noted that none of these five families is from the lower income group implies that all the 16 families from the lower income group fell ill during the last one year. The inference is that there is greater ill health among the lower income group. This has also brought out by Kannan et. al. in the KSSP study².

The table also shows that 69% of households from the lower income group spent 13.3 percent of their monthly income for health related expenditure. Of the remaining 31 per cent, 12% spent 26.6 per cent of their monthly income on health and 18% spent 40 per cent of their monthly income.

² Kannan KP et.al (1987): *Health Status in Rural Kerala, A study of linkages between Socio-Economic Status and Health Status*, KSSP.

Among the middle-income group, 15% households spent 20 percent of their monthly income on health, 23.1% spent 13.3 percent of their monthly income on health, with 31% spending 6.6 per cent. Of the remaining, 31% did not have any health expenditure and. For the better off, 50% spent 13.3 percent of their monthly income for health related expenses, whereas 25% spent 4.4 percent of their monthly income.

These shows that, while the monthly expenditure on health is more for better off than the lower income, the greater proportion of the lower income group shows greater burden.

OTHER DEBTS

In addition to medical expenditures, households often are in debt due to other expenditures. The impact of debts on the household condition can be analysed by examining the data on the loans taken other than that for treating Leptospirosis. It was found that greater number of families [14(37.8%)] has taken housing loans. Of these fourteen, two also have taken loan to buy household articles, viz. ferry and TV. Of seventeen families remaining, seven (18.9%) have taken agricultural loan, four (10.8%) to buy household articles such as TV, ferry etc. and three (8.1%) for taking treatment for other diseases. Two (5.4%) have taken loan for cottage industries and one (2.7%) to give bribe for getting a government job. Six (16.2%) families of those surveyed have not taken any loan for last five years.

Table 5.5 General debts among three income groups.

Debt due to loans	Income groups			Total
	Lower	Middle	Better off	
< 5000	3 (18.8)	1 (7.6)	-	4
5000-20,000	5 (31.4)	2 (15.4)	1 (12.5)	8
20,000 <	2 (12.5)	7 (53.8)	4 (50)	13
Not taken	2 (12.5)	3 (23.1)	1(12.5)	6
Debt paid	1 (6.3)	-	2 (25)	3
Don't Know	3 (18.8)	-	-	3
Total	16	13	8	37

The details of debts of each household when looked for three income groups. These will help to understand the purpose and priority and the reasons for debts. The table above (Table 5.5) shows the distribution of debts in three income groups.

From the table it is clear that the amount families have to repay is significant. Of the thirty-one households taken loans, thirteen families (35.1%) have debt of more than Rs. 20,000/-. Of these thirteen households, eleven have taken loan for nothing other than housing or agriculture. The debts of eight families (21.6%) are in the range of Rs. 5,000-20,000/- and four (10.8%) having debt less than Rs. 5,000/-. The remaining three families (8.1%) are free of any debts, whereas the remaining three (8.1%) don't even know how much amount remains. Among the three income groups, 53.8% of the middle-income group and 50% of the better off have more than Rs. 20,000, whereas among the lower income group, majority (31.3%) have debts in the range of Rs. 5,000 to Rs. 20,000.

The purpose for which loan has taken by each group reveals the priorities. Of the five (31.4 %) in the lower income group having debts in the range of Rs. 5000 to Rs. 20000, two have taken loan for treatment of diseases, two for building houses and the other to buy a ferry. Three of the lower income group has debts less than Rs. 5000/ as part of the loan taken for building their house. The remaining two having debts more than Rs. 20,000/ is due to the loan taken for agriculture and housing. Another three belonging to the lower income group do not even know of the amount remaining.

Among the seven (53.8 %) of the middle-income group, with debts more than Rs. 20,000/ five have taken for housing and two for agricultural purposes. Among the two from the middle income group with debts in the range of Rs. 5,000 –Rs. 20,000, it is the result of loans taken for building a house for both and to buy a cattle for one and a T.V for the other. The remaining one fell on debt due to housing loan.

For the better off the purpose of loan for the four (50%) having debts above Rs. 20,000 are for agriculture, to start a furniture shop and also to get a government job. The remaining one took loan for treatment leading to a debt of around Rs. 20,000/-. This analysis makes clear that the reason for debt for the lower income group is part of

acquiring basic needs, especially to build a house. For the middle income group lower amounts are taken for acquiring basic needs whereas larger amounts for buying household possessions and also for agriculture purposes. The same is the case for the better off also as their loans were to start new business or to get a job. From this analysis, it is clear that many a times the outcome of the struggle of the lower income to acquire their basic needs end up in debts.

The case of Pappachan and Janakiamma will give a real life situation of how loans have become a burden in their life. Pappachan, a 35 yr. old fisherman his wife Anitha his mother aged 60 yr. and his two children together form the family. Anitha is an agricultural labourer, willing to work every month but gets work only for three to four months a year. Unfortunately, Pappachan met with an accident a year before which resulted in kidney dysfunction for which he is taking treatment. Not only were the family's major earnings stopped with his accident but also their monthly health expenditure went up (around Rs. 1200/- per month). The whole responsibility of earning money for the family's livelihood then lay with Anitha for which she had to work hard. The income she managed to get during the month of October 2001 was Rs. 1200/-. She can earn Rs. 1200/ for a maximum of four months in a year, which is about Rs. 4500/- per year, which is not sufficient for the family for the whole year. Besides due to the recurrent ill health of Pappachan she has to take off her several work days, as she has to look after him. The family already had a debt of more than Rs. 6000/- when Anitha got Leptospirosis. This again has led to another loan of Rs. 3000/-. The former loan was taken @ 5% interest per month and the latter were managed from friends and relatives. Is it that the loan which make their life difficult, or is that the lack of employment that led the family to debt?

Janakiamma, a 51-yr. old widow is an agricultural labourer with two children, a son 25 yr. of age working in a company, who earns Rs. 1800 per month, and her daughter who got married in the year 2000, was working as a sales girl before marriage. Their house is situated in the wetland that is flooded during monsoon season. The house is a thatched one, with no electricity. Her husband was a fisherman and had taken a loan of Rs. 6000/- at an interest rate of 18% per year from fisheries department to buy a ferry. He

died two years before. After his death, the ferry was sold and part of the money was used for death ceremony. In this situation the daughter contracted Leptospirosis. This added a debt of Rs 2500/-. Though Janakiamma is still working as an agricultural labourer in the field she suffers from recurrent illness like backache, headache for which they have to spend an average of Rs. 200/- per month while she earns an average of Rs. 500/- per month. The amount to be repaid was not known to the rest of the family members. The reason for not inquiring was that “ If at all we come to know the amount, we are not in a position to repay it. So, whatever happens let it happen”. Here, the impact loans had on the family have further intensified by the burden created by disease – Leptospirosis.

ENVIRONMENTAL CONDITIONS OF HOUSEHOLDS WITH CASE OF LEPTOSPIROSIS

The environmental condition of the village has already been discussed. The fields and paths logged with water plants and the threats rising out of it have been looked at in sufficient detail. In order to look at the environmental conditions of the households with cases of Leptospirosis, indicators like source of drinking water, waste disposal methods, presence and type of cattle shed and lastly the proximity to rat breeding places were chosen. Drinking water was never a problem in the area till a few decades ago, as there were several fresh water ponds in the village. Later the sources became polluted due³ to excessive use of pesticides for agriculture and excessive growth of water plants due to the barrage that stopped natural cleansing. Thus a dependency was created towards drinking water. This is now supplied by the water authority, where the major source of drinking water is the Panchayat pipe, which is installed within a distance of <50 feet for every household. This system when faced with any breakdown creates water problem.

The dependency on this Panchayat system is clear from the data on the source of drinking water. Thirty-three (89.2%) out of the total houses have only Panchayat tap for drinking water and three families have pipe connections from the panchayat tap extended to their houses and also use Panchayat tap for drinking water. However, these Panchayat taps fail to give water during summer, which creates the additional burden of collecting water from far away pipes for which travelling in ferries through the water logged fields

³ *Vikasanarekha*, op. cit.

is unavoidable. At the time of field work in the Panchayat, there was protest against the Panchayat officials by the people living in Wards IV and V, as there was failure in the water supply system for a week because of leakage in the pipes.

Information on the waste disposal method was collected. Twenty-six (70.3%) families stated that they dispose waste by burning during summer months, whereas during the rest of the year, they throw the wastes in the nearby fields. Four families (10.8%) cover the waste with earth and the rest (seven) of them cover the waste with earth as well as throw to nearby fields. *As mentioned before, the tidal water used to carry all the wastes deposited in the waterlogged fields before the construction of Thanneermukkam barrage. But after the barrage was closed the wastes along with the water plants became an ideal place for the breeding of mosquitoes and rats leading to many health problems.*

Cattle were present in ten households of the total surveyed. Out of this, only nine have cattle shed, of which four attached to the house and five were detached. Attached shed means those having a shade of the house with a pole fixed nearby in which the animal is usually tied, with two to three stone slabs put together, so that the cattle can stand on it.

The proximity of rat breeding places and the perception of the problem of rats was asked for. Thirty-one families (83.8%) complained of having problem with rats. Six families (18.9%) told that there is no problem of rats as they use some of the rat control measures like rat killing. Regarding presence and proximity of rat breeding places, eight families complained of rat breeding on the roof of their houses seven families have identified both roofs of their house and fields at a distance of 20 to 60 feet as breeding place of rats. Six families complained of rat breeding in nearby fields. Eight families identified within a distance of 20 ft, and six did not know the distance. Two said they don't know about the breeding place of rats. From the people it was clear that the rats were not of the smaller type found inside the houses but "big ones which are the size of a cat". The information on rat and its prevalence shows that the area has a large population of rats, and adds to the possibility of the rats being that of the Bandicoots type which is

identified as a permanent carrier of the bacteria causing Leptospirosis. The environmental condition of the area, along with that of the household helps to give a vivid picture of the conditions of life and vulnerability of the residents to health problems.

SUMMARY

The socio-economic conditions of the households with Leptospirosis patients were looked at based on the caste to which the family belongs, the educational status of its members and also the monthly income the family earns. It was found that about 85% of the total households belong to the backward class group. Additionally, there was no significant difference in the educational status among the households. It was found that 43.24% of the total belong to poor category with an annual income less than Rs. 36,000/ per annum. 35.23% are from middle income category earning an annual income in the range of Rs. 36,000 to Rs. 72,000 p.a. and 21.6% are the better off who earns more than Rs. 72,000/ per year. This almost coincide with the distribution of land ownership, where 51.4% have land less than 10 cents, 27% with land in the range of 10 – 50 cents and 21.6% have land greater than 50 cents. The quality of housing of these households and the articles each household possess supports the argument that nearly half of those who got the disease are from the lower socio-economic group, one third in the middle class, with only one sixth belonging to the better off.

This chapter also furthers the understanding of how the existing socio-economic condition gets affected by the expenditure of household of which health expenditure is one, It was found that the poor spend greater share of their total income for health related expenses than the better off. The data showing loans taken by different groups found that of the total households surveyed greater number of people have taken housing loans. Also one third (35.1%) of the households have a debt of more than Rs. 20,000/, of which 84.6% have taken loan for agriculture or housing. Even around 54% of the middle class has debts greater than Rs. 20,000/. This shows the economic insecurity with which people live their lives. Additionally, the purpose of loans for lower income group is to satisfy their basic needs whereas for better off is to further enrich the existing situation.

CHAPTER VI

DISEASE CHARACTERISTICS AND PEOPLE'S PERCEPTIONS AND HEALTH SEEKING BEHAVIOUR

INTRODUCTION

The preceding chapter highlights the socio-economic condition of those affected with the disease. It also explains how the existing environment affects people's conditions of life. The present chapter highlights the disease characteristics such as regional distribution within the village, seasonal characteristics and also the age-sex distribution. The chapter also attempts to explore the perceived causes of transmission of Leptospirosis with a view to understand how, according to the people risk factors create vulnerability to the disease. This along with the perception of the disease by different categories viz. doctors, health institutional staff, local people of the village as well as those affected help us to understand the reasons behind different perspectives about the disease. In addition, the present chapter examines the health seeking behaviour of those affected, and the reasons underlying this behaviour. Additionally, analysis was carried out on the burden created by the disease for the family and thereby how the problem affects society.

REGIONAL DISTRIBUTION

Table 6.1 Number of households and the number of cases of Leptospirosis in the selected wards.

Wards	No: of houses	No: of cases
III	534	3 (8.1)
IV	283	13 (35)
V	475	7 (18.9)
VI	800	3 (8.1)
XI	481	6 (16.2)
XII	505	5 (13.6)
TOTAL	3078	37

In the study village, the disease was distributed in different wards differently. Table below shows the distribution of cases in the six wards. 35% of the total numbers of cases were reported from ward no IV that has least number of households (283), whereas least (8%) were from ward VI, with greater number of households (800). Ward V has got seven (18.9%) cases out of the total 37. In the village, it was found earlier that wards VI and IX are those, which are more 'urbanised' unlike wards III, IV and V, which have more of agricultural land and lack roads and even shortage of drinking water during summer months. Thus, those wards that have more agricultural land and with no good roads constitute 62.2% (23) of the total number of cases.

SEASONAL CHARACTERISTICS

From the data collected, month of onset of the disease in a patients was looked at. The monthly distribution was as follows.

Table 6.2 Month wise distribution of the cases.

Mo	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Tot
No:	1	3	4	1	3	2	6	2	7	4	2	2	37

Here the greatest number of cases (18.9%) is in the month of September, with July (16.2%) next. March and October have four (10.8%) cases each. This when looked with the seasons of agriculture will help to understand the distribution i.e. September-October and February –March are the two periods when agriculture work like *bund* replenishing and drainage together with cleaning of fields happen. Eleven (29.7%) and seven (18.9%) cases occurred respectively during these periods. It has been found that chances of contracting Leptospirosis infection are greater when there is contact with rat's urine or faeces. The possibility for this is greater during cleaning of fields, since this involves manual removal of water plants and cleaning of rat burrows and other wastes. The cases during July could probably due to the flooding during the south west monsoon when contaminated water of low lying fields mixes with water collections in streams, small ponds and pavements that people regularly come in contact with.

AGE AND SEX CHARACTERISTICS

Table 6.3 Age and sex wise distribution of the disease.

SEX	AGE				TOTAL
	15-30	30-45	45-60	60<	
MALE	6	12	5	2	25
FEMALE	1	7	2	2	12
TOTAL	7	19	7	4	37

From the table males are almost twice that of females. This was also observed in the district and medical college data. When looking at the age distribution, it can be found that 30 to 45 age groups are affected more both among the males and females. Together, 51.3% of the total numbers of cases belong to this age group. There was no case in the 0 to 15 age groups and, 60+ age groups shows the fewest number of cases (10.8%). This concentration of cases in the younger working population affects the productivity, as they are the ones that earn more for the family.

To explain the sex distribution, the cause of transmission - sex wise is looked at along with the occupation with which cases are engaged. It is said that agriculture workers are more prone to get the disease than any other group. This is same with the total case (37), out of which 18 are engaged in agriculture work. The major occupation in the study area is agriculture and among the agricultural workers, it is female workers who are more in number (Table 4.1). If so, it is a paradox that more males get the disease. To understand this paradox, understanding the causes of transmission according to the people and the sex wise distribution of the work profiles among agriculture labourers will help.

'PERCEIVED' CAUSES OF TRANSMISSION OF LEPTOSPIROSIS

Regional, seasonal, and demographic characteristics of Leptospirosis are already discussed. Microbiologists have identified the bacterium that causes the diseases and the rodents that is the carrier vector, and research has raised the possibility of its transmission

to humans through exposure to contaminated water collections. In this study data was collected in an attempt to understand people's perceptions of disease causation and its links with their daily lives. For this, data on the source of bathing water, presence of wound and open-ended question on cause of transmission were used for survey. As dealt in chapter II, presence of wound can increase the possibility of getting infected. Here, eighteen (48.6%) of the total cases have said they had a wound immediately before getting the infection, whereas fifteen (40.5%) told they don't know whether there was any wound or not. Only four (10.8%) told that there was not any wound at the time of infections. As stated in other studies, wound seems to be a risk factor for the diseased as 48.6% complained of its presence. Whereas chances of getting the infection simply through bathing in contaminated water seems to be less as the cases would have been much larger as majority of the villagers take bath in the flowing stream.

Table 6.4 Distribution of the perceived causes of transmission within those affected with Leptospirosis.

Perceived Causes	Cases
Cleaning of Agricultural fields before sowing	10 (27)
Other Agriculture works in the fields (planting, sowing, weeding, etc.)	7 (18.9)
Fishing, lime shell and sand collection	4 (10.8)
Walk through contaminated water	4 (10.8)
Bathing in stream	2 (5.4)
Drank unclean water	1 (2.7)
Collection of grass	3 (8.1)
Don't know	6 (16.2)
Total	37

From the table it was found that, according to the respondents, ten (27%) of thirty seven believed they had been infected while cleaning of fields before sowing and seven (18.9%) believed they had been infected through agriculture work other than cleaning of fields. Four (10.8%) people said that they got the disease while fishing, lime shell and

sand collection and another four (10.8%) believed that they had got the disease as they happened to walk through the water logged fields which were near their houses while travelling or when engaged in household activities. Two cases (5.4%) stated that they got the disease because of bathing in the stream and one person said that he happened to drink unclean water, which might have been the cause of infection. Three (8.1%) women said that they got the disease as they went to collect grass from the place where it was water logged and rat's burrows were present. Six (16.2%) of the total cases did not know how they got the disease. The above causes of transmission based on the people's perception open a wide range of possibilities. It is worth noticing that the villagers seem to know the importance of rats' burrows and water logging as risk factors for transmission.

This when considered with the context of the area seems to show linkages. The association between cattle and the disease transmission identified in literature could be also possibly occur due to collecting grass for cattle in water logged area. It is the practice of cutting grass submerged in water. This is due to the fact that the grass will be clean under water. Also it is easy to cut grass that are soaked in water. These grass-collecting sites are usually seen near water logged fields. Here, the chances of contamination and of getting wound are greater. However, in an environment that is water logged and contaminated with rat's burrows, to have exposure to contaminated environment is unavoidable, as it is part of the day to day household activities. The chances of exposure is found to be greater for those who have poor housing conditions and have to travel long way by walking through small pavements or damaged paths, as part of their daily 'struggle for life'.

The table given below (Table 6.5) helps to understand the sex wise distribution of Leptospirosis based on the perceived causes. Out of the total ten men engaged in agriculture, seven (70%) got the infection while removing water plants from the field, whereas only one (10%) got while doing works like sowing, weeding, planting etc. In the case of women four (50%) got infected while planting of seeds and also weeding, whereas one (12.5%) got infected at the time of removing water plants during first weeding. In the type of agriculture work it is the men who clean the fields and setting

them till first weeding. While women work in the fields only after the fields had been cleaned out. Therefore the chance of exposure to contaminated (with rat's burrows and faeces) water is greater among men than women at the time of agricultural work. However, while chances of infection are highest for those who clean the fields for the first time, for others who work in the fields also the risk of infection is quite high. It is therefore possible that this work distribution could be one reason why males outnumbered females in the number of cases reported.

Table 6.5 Sex wise distribution and perceived causes of transmission of those engaged in agriculture.

Perceived causes of transmission	Sex		
	Male	Female	Total
Collection of grass	-	1	1
Cleaning of fields	7	1	8
Work in the fields other than cleaning	1	4	5
Got down in water logged fields	1	1	2
Taking bath in stream	-	1	1
Don't know	1	-	1
Total	10	8	18

The perceptions of the medical care providers and the villagers about the disease and its causation were examined in detail.

PERCEPTIONS OF MEDICAL CARE PROVIDERS

Discussion with the Zonal officer for malaria in the DHS, who also the project officer of Leptospirosis about the disease helps to understand his outlook. He considers ecological and seasonal conditions, temperature and p_H of the soil, type of land, occupational factors contributing to the greater incidence in Kerala. He complained of the unplanned development reflected in poor and damaged sewerage system as the possible reason for increased incidence.

According to him, since diagnosis of Leptospirosis is extremely difficult it is extremely important to create awareness about the disease among the doctors, so that they can suspect fevers as that due to Leptospirosis. He also believes that educating people about the possibility of getting infection can control the disease transmission. He felt early diagnosis and prompt treatment was an effective way of controlling the disease. He also added “ Doctors are reluctant to prescribe penicillin – the effective drug for Leptospirosis as there is fear of side effects. Besides, in medical education the disease is not given necessary importance”. He also calls for intersectoral action – that which involve the veterinary departments and Agricultural sector to join hands in surveillance and control of rodents which he consider the major strategy for any control program for the disease.

Additionally, three doctors who have treated Leptospirosis cases were interviewed. Two were from the Panchayat itself, one from the PHC and the other from ‘Santhi’ hospital and one from the Kottayam medical college. The general symptoms they identified were fever, muscle pain, conjunctiva suffusion, jaundice, and severe headache. They also consider manual labourers as the group who are more prone to infection especially the agricultural workers and those who are engaged in cow rearing and duck farming. As far as diagnosis is concerned, based on the clinical symptoms, treatment was started in PHC and other private hospitals and later on confirmed with laboratory tests, whereas in medical college hospital they insist for laboratory test, and only then do they start treatment. All the doctors consider crystalline penicillin given intravenous every sixth hour as the effective treatment for the disease. Based on the cases examined they suspect that the route of transmission was contaminated water. As for the expenditure by the patients, the doctors consider medicine cost and cost of laboratory test as the major cost. According to them, on an average this comes to Rs. 1500/. The doctors consider health education to avoid exposure to contaminated water, public health measures like clean environment and eradication of rats as the ways to control epidemic. Diagnosis of the disease is identified as the major difficulty as the symptoms mimic other different diseases.

However, the local health authority's (Health inspector and Health supervisors in PHC) perception about the disease was surprising as it was expected that they would have a good understanding of the disease. At the first meeting the response was that "There is not much case of Leptospirosis in the village and those few cases are imported". By "imported" they mean those who got the disease from the working place outside the village. The caseload based on the primary health centre record was around 10-15 cases for four years, while according to medical college records the number was actually 60. Thus, it is to be noted that the number of cases, which reach DHS, (10-15) are only one fourth of the real number (60). While the local health authorities considered the improper waste disposal leading to rise in rat population as a cause of the epidemic they also believed that another reason was the agricultural workers' ignorance.

PERCEPTION OF VILLAGERS'

In order to get the perception of the villager's, talking to people of different groups were helpful. These include the politicians, bank employer, teacher, agriculturist, agricultural labour etc. The villagers are aware that the disease is transmitted through rats and generally through contaminated water. Some of them believe that rat biting can cause the disease, which could be the reason that there is a stigma for some who got the disease. The villagers are also aware of the deaths due to the disease, and this lead to fear towards the disease. They are therefore aware if any of their neighbours get the diseases and are vigilant about the fatality of the disease. From the experience of those affected with Leptospirosis they have identified Kottayam medical college as the best health institution that takes care of the disease despite the problems at the Kottayam medical college hospital, viz. insufficient beds, medicine to be brought from outside, laboratory tests to be done outside. An agricultural labour, says, "We know that we are vulnerable to being infected while cleaning of fields especially removal of water plants with rat's burrows, but how can we stay away from our work as it is our bread". This clearly brings out the fact that the people of the village (esp. the agricultural workers who are the major group who get the disease) are aware enough about disease causation. Going beyond, the people in the village themselves attributes the increased pollution of water collections as due to the construction of Thanneermukkam barrage and increased use of pesticides. In

the words of an old fisherman whose wife had died of Leptospirosis the problem is viewed as *“Drinking water was never a problem for us as there were several fresh water ponds in this village during my young days. Many of this have turned to stagnant water collections with lot of water plants and are the breeding place of rats and mosquitoes. Nowadays fishing has become a hopeless job, as the money we get out of it will not be sufficient to pay back the rent of ferry. This is all because of the Thanneermukkam barrage that prevents seawater, which cleans the water collection while entering into the lake once in every year”*. This along with the politician’s explanation of environmental conditions prevailing, which he assigns as the result of Thanneermukkam barrage and increased growth of water plants in farmlands, strengthened the argument of the villager. The villagers’ said that *“the government has done nothing to solve the problem, they have enough funds, but is spent for preserving vested interests”*.

The perception about the disease from two different dimensions, one from the health professionals and the other from those affected has helped to give a clear picture of the diversities. For the former, the major problem is the diagnosis of the disease and increased rat population for which awareness creation and eradication of rats is considered the best solutions. The terms used by the health professionals viz. “early diagnosis and prompt treatment”, “imported cases” and “eradication of rats” has to be noted as it could be due to the over emphasis given to malaria program, leading to identifying the vector and eliminating it as common control program for all vector-borne diseases. The ecological imbalances that can happen by eradicating a species (rats) need to be studied in detail before going for such an initiative.

Interestingly the Zonal officer did at least understand the need for intersectoral action for Leptospirosis control. For the people, it is neither “ignorance” nor “lack of awareness” that make them exposed to Leptospirosis, but the condition with which they live is such that they are repeatedly susceptible to the infection. Here, the problem is well identified and understood by the people of the village, whereas it was found that the only programme initiated in the village was health education campaign against Leptospirosis and distribution of some Homoeo medicine as it will prevent the disease. However the broader action leading to sustainable environmental sanitation (not one time removal of

water plants) measures and also better health care services at the primary health centre level itself need to be initiated at the village level. It is a paradox that the conflict between the programmes implemented and people's needs is occurring in a state which claims much on decentralisation of power and thereby "people's health in people's hands".

PERCEPTION ABOUT HEALTH CARE INSTITUTIONS

After understanding people's perception of the disease, their perception of the health care institutions seems to be relevant. Earlier, while looking at the health care institutions of the village, the villager's perceptions in general had been dealt with. The perception about health care institutions with respect to Leptospirosis by those who got the disease as well as their knowledge on preventive measures was looked at. Of the health care institutions mentioned before viz. primary health centre, medical college, government hospital and other private institutions, it was found that twenty-one (56.8%) people identified Kottayam Medical College Hospital as the only treatment centre for the disease. Six (16.2%) of them said that treatment is available from both Kottayam medical college and Santhi hospital (one of the private hospital) whereas four (10.8%) stated that both Kottayam medical college and Kottayam government taluk hospital render treatment for the disease. Two (5.4%) of them said that all the above centres deliver treatment for the disease. Four (10.8%) responded that they 'don't know'. The opinion regarding the best centre for treatment for Leptospirosis was taken, where it was found that thirty-two (86.5%) out of thirty seven patients said that medical college hospital was the best centre. One (2.7%) said that Santhi hospital was the best one as it is near to their home. Another four (10.8%) responded that they 'don't know'.

Quick diagnosis and immediate treatment, regular presence of doctor, adequate facilities and last but not the least, free cost of treatment are the reasons identified by the people for considering medical college as the best centre for treatment for Leptospirosis.

In addition, people's opinion about preventive measures taken by government or any health related institutions were sought. Four patients' (10.8%) said that "some health education class was organised near panchayat office but we couldn't attend as we had to

go for work". However, majority of them knew nothing about government programs to prevent the disease. Later on, after inquiring at the panchayat office it was found that one health education class was organised in the school near to the panchayat office which only a few villagers attended. They were given 'preventive medicines', a set of Homoeo medicine that claims to have preventive effect against Leptospirosis.

HEALTH SEEKING BEHAVIOUR OF THOSE AFFECTED

In order to understand health-seeking behaviour the concept developed through literature review is used. Thus preventive health behaviour, illness behaviour, and treatment seeking behaviour are dealt with separately.

PREVENTIVE HEALTH BEHAVIOUR

By preventive health behaviour, both hygiene behaviour and actions taken by the government health services to control the disease has to be looked at. Hygiene behaviour can be seen only in the context of the patients' social position. For example, for an agricultural labour, working in water logged fields leading to exposure to contaminated environment, has nothing to do with his personal behaviour, but is an occupational hazard whose ill effects need to be taken care of by the employer. It is the employer's responsibility to ensure safe working environment to his employees. Similarly, little can be done by an individual to avoid the disease while living in a contaminated environment where susceptibility to the disease is greater. Here, the responsibility lies with the state to ensure a safe environment for its citizens by identifying and rectifying the causes of pollution. In the study village it was found that the pollution of water collections is mainly due to the 'development' – here the construction of Thanneermukkam barrage without an understanding of the possible outcomes.

ILLNESS BEHAVIOUR

Illness behaviour is the way given symptoms are perceived and expressed. In the study, questions were asked in order to classify the symptoms felt at the time of Leptospirosis in the order of severity. Based on the severity, symptoms were classified where the most severe was termed the first and the least severe – the seventh. The

commonest symptoms reported were severe headache, fever with chills, redness in eyes, body pain and backache, coloured urine, vomiting, pain in limbs and joints. Less common symptoms like low urine output, unconsciousness, lack of hunger and nausea, swelling in the body, loose motion and cold together were grouped as others. The above sets of symptoms are shown in the table below.

Table 6.6 Different symptoms complained by Leptospirosis patients.

Symptoms in the order of severity	First	Second	Third	Fourth	Fifth	Sixth	Seventh	Total
Pain in limbs and joints	3	2	3	1	2	1	-	12
Severe headache	15	7	8	1	-	-	-	31
Vomiting	2	1	4	7	6	2	-	22
Redness in eyes	-	-	9	14	4	-	-	27
Coloured urine	-	-	2	7	7	4	2	22
Fever with chills	12	12	2	3	3	-	-	32
Body pain with backache	3	9	7	1	2	1	-	23
Low urine output	-	-	-	2	2	2	2	8
Unconscious	-	1	1	-	1	-	-	3
Others	2	3	3	1	2	1	1	13
Total	37	37	37	37	29	11	5	193

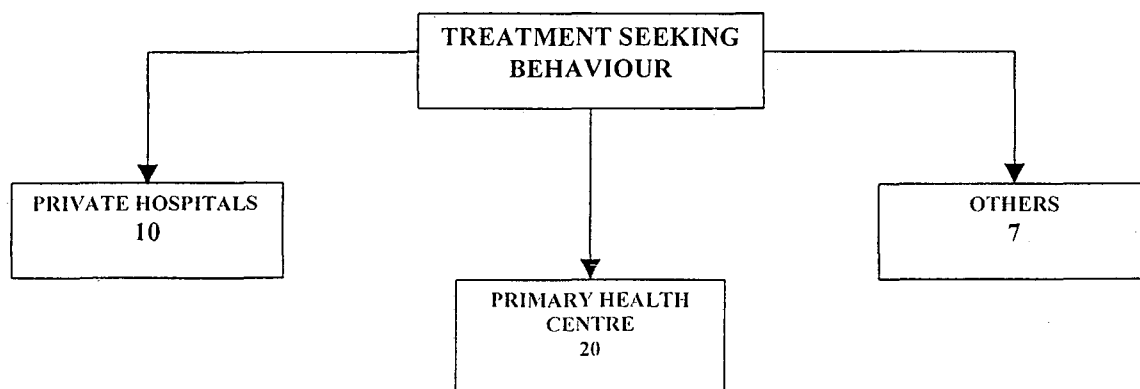
When all categories are taken together it was found that fever with chills is the one complained by majority i.e. 32 (16.6%), with severe headache [31(16.1%)] coming next, with redness in eyes, body pain with backache, vomiting and coloured urine following respectively. Interestingly no patient has complained of jaundice though the colour of urine and vomiting were identified as the symptoms. The understanding of these illness behaviours could help to develop a people oriented diagnostic tool for Leptospirosis in spite of its character of mimicking symptoms.

TREATMENT SEEKING BEHAVIOUR

As explained earlier, treatment-seeking behaviours are actions taken by patients when they perceive themselves as being ill in order to get rid of their illness. The action

taken by people and the reasons for each was inquired using open-ended questions. It was found that *all* the thirty-seven interviewed had been admitted either in the Primary Health Centre (PHC) or in the medical college hospital. The majority had been admitted in both. Some of them had initially taken outpatient treatment either from private health institutions or from PHC and had gone back home thinking the disease was cured. Besides, self-medication, taking medicine from pharmacist are other initial activities carried out by those affected. To get rid of the disease several stages of behaviour were undertaken. This, of course varied for different people ranging from one stage to four or five stages. A detailed explanation of the stages and the corresponding reasons for each behaviour will help to understand the way people behave at the time of illness in general and for Leptospirosis in particular. This is because in many cases only after first or second stage of treatment sought, did the patient get to know that the illness they are suffering could be Leptospirosis. For explanatory purposes, the behaviour of those thirty-seven patients were placed into three categories based on the first actions taken after perceiving the illness.

The flowchart showing the first actions of those affected with Leptospirosis is given below.

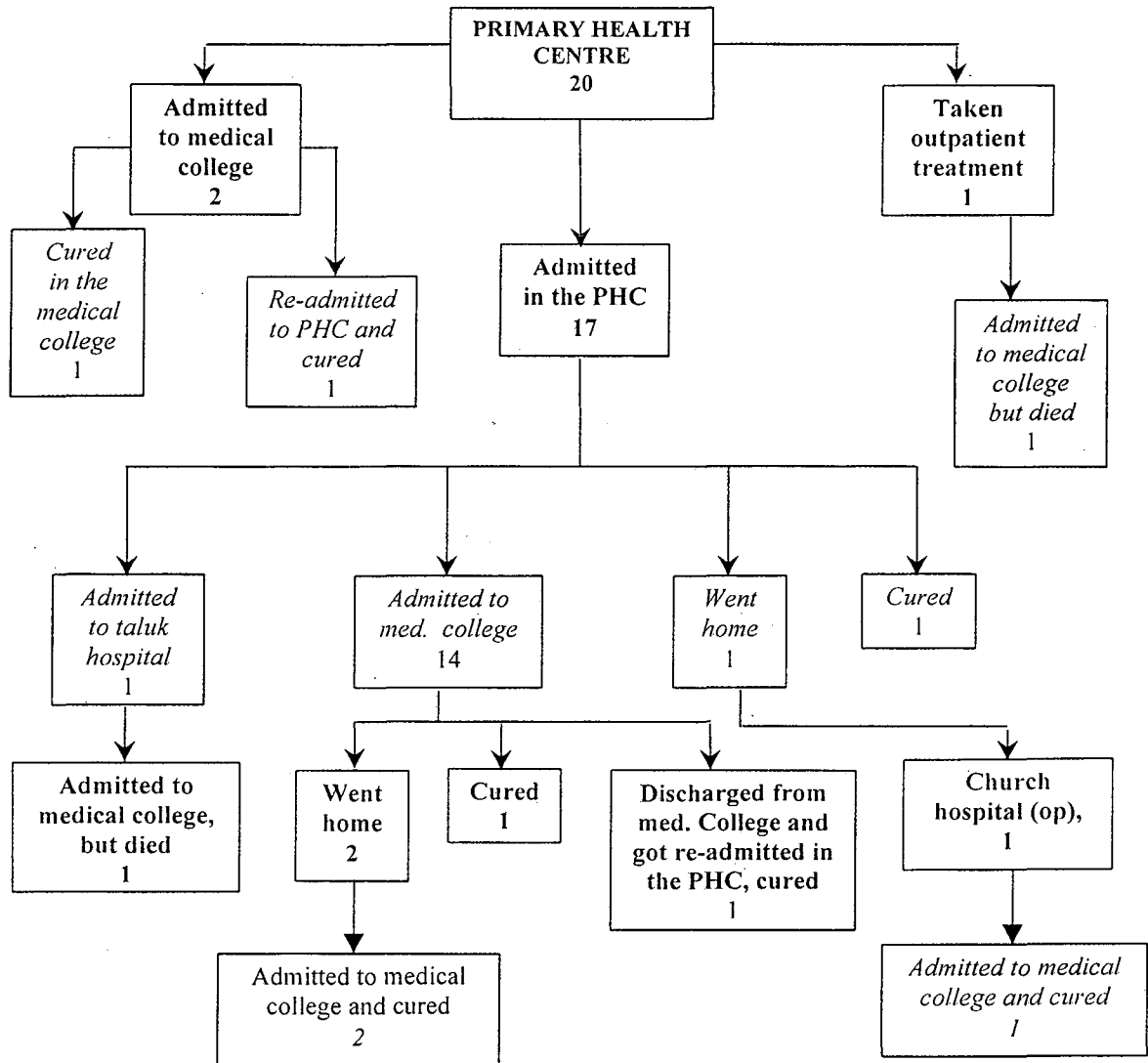


First category is that of twenty (54.1%) patients who initially gone to the primary health centre. Second group is of the ten (27%) patients who sought treatment in various private hospitals initially. Third category includes seven (18.9%) patients whose actions were varied.

First category

Flowchart showing the treatment seeking behaviour of first category is given below for better understanding. This category deals with the twenty patients who first sought primary health centre for their treatment.

Flowchart of first category.



For those twenty gone to the PHC first, eight gave proximity and less experience as the reason, five gave proximity alone, four of them stated proximity and past experience as the reasons for the above behaviours. Of the remaining three, two gave past

experience alone and the other told it was because the PHC was near and the disease has become serious make them took treatment in the PHC. Thus from the above it is to be noted that except two all the eighteen gave proximity as the reasons for taking treatment in PHC for the first time.

Of the twenty patients who went to the PHC, seventeen were admitted there and two were admitted in medical college and the one took outpatient (OP) treatment from PHC thinking that the disease will subside. All of those (seventeen) who got admitted in PHC had stated proximity as the reason for going to PHC. Of these, eight of them added that they sought treatment at the PHC since it is less expensive. Four of the seventeen linked with their past experience in PHC that was good in the treatment of fever.

Of the two went to medical college out of the seventeen, one said that as the PHC doctor suspected his fever as Leptospirosis and as medical college render better services he opted for that. The other patient stated that as his illness became serious he sought help of medical college hospital for better services. Of these two, one got cured in the medical college whereas the other shifted back to the PHC where he got well. The one who stayed home went directly to medical college as the disease became worse but later on died in the medical college hospital.

Among the seventeen who were admitted in PHC, fourteen went to medical college and took admission there. Of these fourteen, ten stated that as doctor in the PHC suspected Leptospirosis, they themselves went to the medical college seeking better services. Two patients said that they were referred by the PHC doctor as he suspected the fever could be due to Leptospirosis. The remaining two of the fourteen sought treatment in medical college as the disease had become serious.

Of the remaining three of those seventeen, one was cured in the PHC itself whereas another needed to be admitted in the taluk hospital, as the PHC doctor couldn't diagnose the disease. After spending five to six days there, as the disease became serious she was taken to medical college where she died after two to three days in medical college. The third patient was discharged as the illness subsided. He later on went to the

'church hospital' (one of the private hospitals) as the disease became severe. He was eventually taken to medical college where he got cured.

Eleven of the fourteen admitted in the medical college got cured. Of the remaining three, two went stayed back home when the disease had subsided but later on some complications were reported and both got re-admitted in medical college and got well. The remaining one got discharged from the medical college hospital as illness subsided and gets admitted in PHC as it is less expensive and near to their home. He was cured.

From the above description it can be inferred that proximity (given by all those who went there first) and lesser cost as stated by eight of those admitted are the factors which patients identify as advantages in the primary health centre. Additionally, past experience also found to have influenced the choices of patients. It is to be noted that people went to PHC before knowing that the disease was Leptospirosis. After the PHC doctors suspected Leptospirosis, the tendency was to shift to medical college on their own. This brings out the fact that people are well aware about the Leptospirosis treatment available in medical college. This could be out of their past experiences with other villagers. Also medical college hospital was sought at times when the illness had not subsided and when they needed prolonged hospital stay. The discussion above clearly reveals the villagers' rationality in taking decisions.

Second category

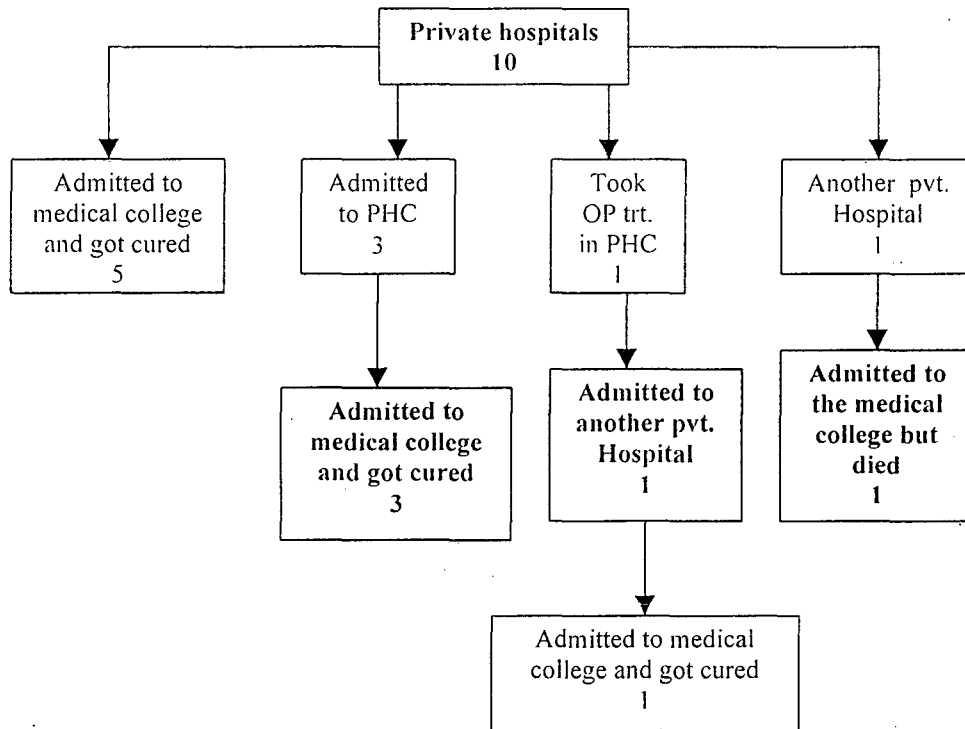
The flowchart showing the treatment seeking behaviour of second category is given below.

This category is about the ten (27 %) patients of the total thirty-seven who went to various private hospitals in the village immediately after getting the disease.

Among the ten patients who went to various private hospitals four gave proximity as the only reason, while two said it was because private health services render better services. One stated past experience as the reason. Another two cited both proximity and

past experience as the reason and the remaining one gave proximity and better services as the reasons for going to a private hospital.

Flowchart showing second category



Of the ten who went to the private hospital, five went to medical college on their own when the doctors of the respective hospitals suspected Leptospirosis. They added that treatment of Leptospirosis required hospital stay, for which medical college was the less expensive. They also felt the medical college offered better services.

Three of those ten who went to private hospitals went to the PHC and got admitted. They belonged to the four who gave proximity alone as the reason for going to private hospitals. For them the reasons to go to PHC was that it was less expensive. They all later on got admitted to the medical college where all of them got cured.

Of the remaining two among the ten, one took outpatient treatment from the PHC. Later as the disease became serious he went directly to medical college hospital and got

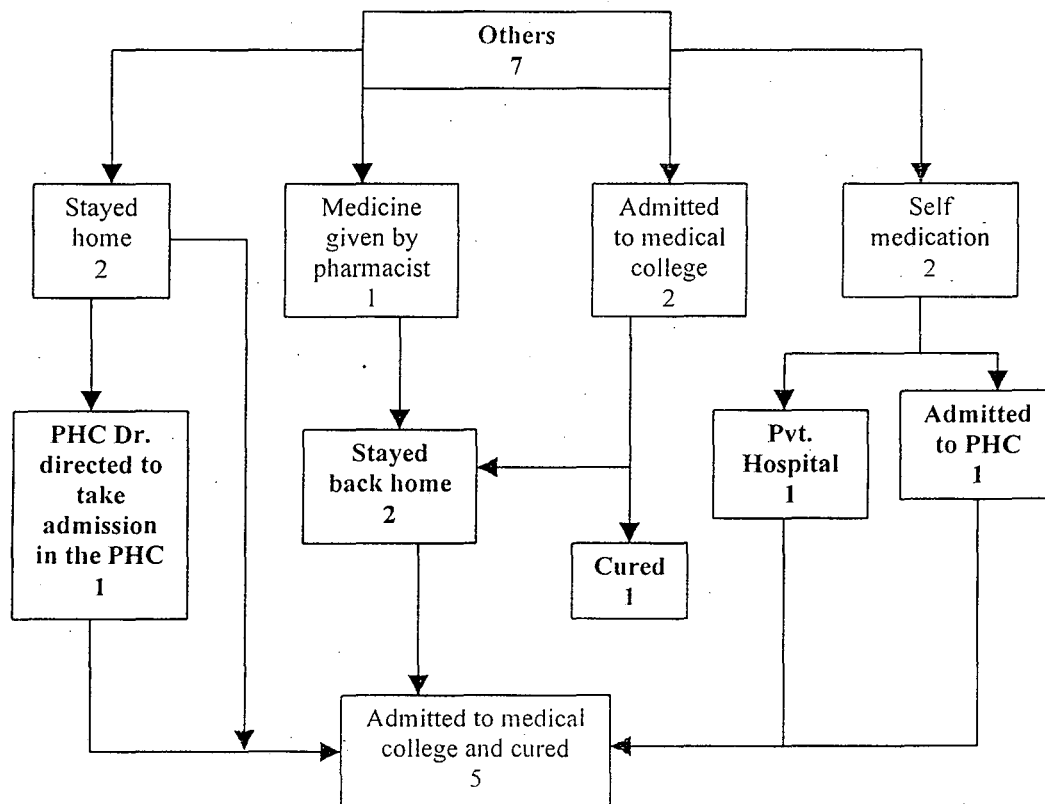
cured. The other one took out patient treatment from private hospital and later got admitted to medical college as the disease became more serious but died.

The major reason identified for taking treatment in private hospitals was proximity. Additionally, it can be seen that private hospitals are preferred for outpatient services. This could be due to the preference of better environment with more attention and less waiting time as compared to PHC where the patients attended per day are greater. It is obvious from the behaviours that those patients needing hospital stay considered the cost of treatment and sought care at the PHC or the medical college.

Third category

This comprises of seven patients whose actions were varied, hence their behaviour will be explained separately. The flowchart showing their behaviours is as shown below.

Flowchart showing third category



Two patients took medicine for fever from pharmacists by themselves, as it is their practice when affected with fever. Of these one took admission in the PHC as the situation worsened and was directed to medical college where he got cured. The other had gone to private hospital when the disease worsened and was asked to take admission in the private hospital but went to medical college and got admitted and got cured of the disease.

Two of the initial seven, thought that the fever would subside by itself. Of these one directly sought treatment in medical college as the disease became worse and got cured. As the disease became worse the other sought the help of PHC doctor. He was admitted in the PHC from where he was referred to medical college and got cured there.

Another two of those seven gone directly to medical college, one got cured. The other gone back home from the medical college, when illness seemed to subside. However when his condition worsened, again he got admitted to medical college and was cured.

The remaining one of the seven had taken medicine on pharmacist's advice and stayed home. He later on got admitted to the medical college hospital as the disease become more severe and was cured.

Here it was out of their past experience with other diseases that two had directly gone to medical college. For self-medication too, past experience was cited as the reason.

Thus examining the behaviour of those affected with Leptospirosis along with the reasons for that behaviour gives an insight of people's rationale behind their choices of behaviour. Here, of the thirty-seven patients twenty have gone to PHC for treatment of 'fever' without knowing that it was Leptospirosis. The majority gave proximity and cost of treatment as the reason for such behaviours whereas for some past experience with the PHC made them go there. This need to be looked at in the context of the facilities of the PHC, a fifty-bedded hospital (recently upgraded) with two to three doctors. The PHC of

the study area was noted for its better performance as compared to other PHCs of the districts.

Those who preferred private hospitals identified proximity as the major reason and a clear shift from private hospital to medical college or PHC can be seen when they are asked for admission. Here the important factor could be the cost of treatment in private hospital. Another important factor one could see is that whoever suspected as Leptospirosis by the doctor shows the tendency to go to medical college for further treatment. This could possibly due to (1) the level of awareness out of the past experience that medical college renders effective treatment for the disease. (2) The fear of Leptospirosis as a fatal disease that needs immediate attention where their final resort is the medical college.

Above all, it is to be noted that majority got cured in the medical college. This when looked at the type of services given by the medical college help in an understanding of the rationale behind choosing the medical college for treatment of Leptospirosis. The majority spent their whole treatment period in general wards. It has to be noted that the medical college hospital did not have enough beds, adequate laboratory facilities and sufficient drugs as reflected from patients' complaint of having to share beds with other patients and also to go to the private labs and medical stores outside the hospital for blood testing and medicines.

This also bring out the fact that the need for 'super-speciality' and 'high-tech' facilities are not mandatory for effective treatment but even timely and efficient service which if given at the local level can ensure more coverage. That is, 'basic health services' comprising of a 30-bedded hospital with basic laboratory facilities and having essential drugs with full time staff to support the whole facility can take care of such epidemics. This will be more convenient for those affected than the medical college hospital as it will be nearer to their village. In addition if the medicines are also rendered free of cost, the economic burden out of this epidemic can be reduced. In short, strengthening of primary health centres existing in the state can take care of those affected with Leptospirosis at the grassroots level.

DURATION OF TREATMENT

The duration of hospital stay for each patient was considered, as longer the duration greater will be the financial burden out of the disease. The duration (in no: of days) of hospital stay were as follows:

Table 6.7 Duration of hospital stay due to Leptospirosis.

Duration in days	Number of patients
0-5	3
5-10	15
10-20	16
20-40	2
40-60	1
Total	37

From the table, it is clear that there is a range of hospital stay lasting from less than five days to two months for patients being treated for the disease. Sixteen (43.2%) stayed for an average of ten to twenty days, and fifteen (40.5%) patients spent five to ten days in the hospital for diagnosis and treatment of the disease. However this table only considers the number of days spent in hospitals while the workdays lost are several more as there were cases that have needed more than six months rest.

BURDEN DUE TO LEPTOSPIROSIS

Burden of the disease can be explained as those difficulties for the patient and the family arising out of the disease. This can be an individual's ill health that not only hinders his/her normal life but also reduces the workdays, which affects the family. As the person affected fails to perform his/her role as a family member, other members have to take up the role of the ill person. The family's income not only is affected by spending money for treatment but also by the workdays lost. This burden increases when considered along with the loss of workdays of the ones who take care of the infected.

Within this purview, economic cost of treatment for Leptospirosis within the different income groups was looked at. The table below shows the economic cost of treatment for different income group.

Table 6.8 Cost of treatment among the three income groups

Income group	Cost of treatment			Total
	<4000	4000-8000	8000<	
Lower	10 (62.5)	4 (25)	2 (12.5)	16
Middle	6 (46)	4 (30.8)	3 (23.1)	13
Better off	3 (37.5)	3 (37.5)	2 (25)	8
Total	19 (51.4)	11 (29.7)	7 (18.9)	37

From the table it is seen that nineteen (51.4%) of the total cases spent around Rs. 4000 and less for treatment and other expenses and eleven (29.7%) spent Rs. 4000-8000 for treatment and seven (18.9%) of them spent more than Rs. 8000/-. Here in the three income groups, majority spent less than Rs. 4000. However, it is to be noted that Rs. 4000/- for lower income is 11.1 % of their annual income, whereas for the middle income is 5.5 % and for the better off it is only 3.7 %, i.e. the proportionate of expenditure and thus the economic burden for the poor out of Leptospirosis is thrice that of better off. This becomes clearer when looked at the loans taken for treatment by the three groups.

Table 6.9 Debt due to Leptospirosis for the three income groups.

Income group	Loan taken for treatment of Leptospirosis					Total
	Nil	<2000	2000-4000	4000-6000	6000<	
Lower	5(31.25)	6 (37.5)	5 (31.25)	-	-	16
Middle	5 (38.5)	1 (7.7)	3 (23.1)	3 (23.1)	1(7.7)	13
Better off	5 (62.5)	-	-	2 (25)	1(12.5)	8
Total	15 (40.5)	7 (18.9)	8 (21.6)	5 (13.5)	2 (5.4)	37

From the table, it can be seen that those who have not taken loan are only 31.25% for lower income group. However, 62.5 percent of better off did not need a loan. This shows least economic burden among the better off. The number of households (61.5%) who have taken loan in the middle-income group is also significant. Also for the lower income group all the loans are of less than Rs. 4000/, which is 11.1% of their annual income. On the other hand for the better off, loans greater than Rs. 4000/ are 7.4% of

their annual income. Only 38% have taken these loans. Here again the burden was greater among the lower income category. For the middle-income category, almost equal numbers (24%) have taken loans less than Rs. 4000/ (5.5% of their annual income) and greater than Rs. 4000/ (11.1% of their annual income)

This argument is strengthened when linked to the debt situation prior to the disease onset (Table 5.5). There, it is found that those already having larger debts are from the lower income groups. The difficulties created by the disease such as loss of workdays of the patient, as well as those taking care of the patient and difficulties faced in health care institutions can be better understood by studying some of the case histories of households affected with Leptospirosis.

Peethambaran a 34-year-old fisherman and his wife Vanaja a 30 yr. have two children studying in class seventh and fifth. The family also includes Peethambaran's mentally handicapped sister. They belong to the Ezhava (OBC) community, and live in a tiled house situated in a two-cent plot, their only asset. They both work hard to run the family. Vanaja leaves early morning by 5.30, collects fish from the market and sells them from house to house. She usually returns home by six in the evening and earns Rs. 50-75 per day. Peethambaran goes for fishing in a rented boat in the mornings and also during evenings. Generally he can fish only for five to six months a year. The rest of the months he goes for coolie work for construction. By fishing he earns an average of Rs. 50-100 per day whereas for coolie work it is Rs. 150 per day. He used to go for coolie work as and when he is called for. Their children and the mentally handicapped sister during daytime are taken care off by nearby household. Vanaja suffers from back pain several times a year.

Peethambaran fell ill with fever and severe headache for which he consulted the primary health centre out patient department. He was given medicine for fever. As the situation became worse, he was taken to the medical college hospital where he was found to be positive for Leptospirosis. His wife accompanied him to the medical college where they were asked to get the test done from outside. These cost Rs. 750/-. On the way to the medical college, they took Rs. 3000/- from a private moneylender for an interest of

15% at the time of return. In the hospital general ward, the patient had to share a bed with two others. Vanaja also complained that the sanitation facilities for the attenders were very poor and there was no space even to stand in the wards. Treatment started after the second day of admission. This was six injections per day costing Rs. 90 per day for injections alone. They were asked to buy some of the medicines from outside.

The disease was controlled within five days. They stayed in the medical college hospital for another twelve days. During initial stages vomiting were frequent and swelling in the knees occurred. After seventeen days they decided to leave medical college as they found it expensive to stay there. With doctor's permission they left on the condition that they would take the remaining course of treatment in the primary health centre. He got admitted in the PHC for another two months. In addition to the loan from the moneylender, they have also taken Rs. 2000/- each from two co-operative banks. Two years after the illness Rs. 2000/ still remains of the loans taken from moneylenders, friends and relatives at the time of treatment.

Altogether Peethambaran couldn't work for three months, whereas his wife lost work for two months. They said that they spent not less than Rs. 15,000/- for the whole treatment and diagnosis. Of this, a major part of the money was spent for recurrent laboratory tests. These tests needed to be done in a private laboratory in the hospital premises. Peethambaran believes he was infected because he exposed a wound in his leg (sustained during work) to water while fishing.

Monachan a 50 yr. old fisherman, his wife Mariamma (38 yr.) with two sons Salim and Salish aged 20 and 19 years respectively with the elder also a fisherman constitute a family. Monachan is an Asthma patient, which makes him irregular in his fishing. He explains the job as "hopeless nowadays as the income is not even sufficient to pay the cost of hiring the boat". His wife was an agricultural labour, but she earns more income by weaving chairs. The chair weaving had turned to be the major source of income for the family. In Sept. 1999, Mariamma got severe fever and was taken to the primary health centre and got admitted. After treatment, the fever did not subside. So she was taken to the government taluk hospital, where she was admitted for five days, but the

doctors couldn't diagnose the disease. The fever became more severe and the patient became unconscious with severe vomiting. Then she was directed to the medical college where she was directly admitted to the intensive care unit, but to no avail. The doctors in the medical college identified the disease as Leptospirosis, but they said that it was too late to help as the patient had developed severe hepatitis and encephelopathy. She died in the medical college.

Monachan said that she had gone to work in the agriculture field with a wound in her leg. The fever began two to three days after this. The delay occurred (more than 5 days) to diagnose the disease could be the reason for the death. Monachan considers excessive growth of water plants as the major factor contributing to the disease, which he assigns as the outcome of Thannermukkam barrage. He also says that this has also blocked fish eggs to enter the lakes, which has affected the fish population. He also showed a pond near their house that was a fresh water pond during his young age whose water is now a breeding place of mosquitoes.

The first case helps to understand the situation of a fisherman and his family and of how they cope with the disease situation, which include the economic burden and the difficulties one has to face in the medical college though it is accepted as the best centre. The second one portrays the difficulties of a household due to the disease, where the source of income for the family has stopped. But, the cost of the life is more than money.

SUMMARY

To summarise the chapter the findings of each section will be discussed in brief. The chapter looks at the disease characteristics such as regional, seasonal, and age-sex characteristics. Within this context, the perceived causes of transmission of Leptospirosis are examined. Regional distribution reveals that greater numbers of cases were reported from regions (wards) with greater agricultural land and with inadequate roads and waterlogging. Also more cases were reported from regions with less number of households and more paddy fields. The seasonal distribution of the disease showed peaks in Sept-Oct, Feb-Mar and July. The first two peaks could be due to type of work in agriculture and the latter due to the increased rainfall leading to floods resulting in

contamination of water collections. The sex distribution was explained based on the difference in the nature of work carried out by both men and women in agriculture. The maximum number of cases were reported from agricultural labourers of which majority got the infection while cleaning of paddy fields (removal of water plants manually) before sowing. It was also felt that the association between cattle found in many other studies could possibly be due to those getting the diseases while collecting grass where exposure to rat's faeces are greater.

The perceptions of the villagers especially those affected and that of health officials and doctors gave a clear picture of the existing situation. The focus of health professionals and doctors is on the need to create awareness to promote healthy behaviour in a population. While the people themselves have a broader understanding of the problem. The general symptoms of the disease though mimicking that of other diseases have shown some similarity viz. severe headache, fever, redness in eyes and so on.

The treatment seeking behaviour of patients with Leptospirosis brings out some important understanding of general health seeking behaviour of 'fever'. The PHC was chosen by the majority as it is nearest, less expensive, and in their past experience treatment at the PHC was quite effective for simple health problems. It was seen that severity of the disease also has an important role in deciding people's behaviour. A reason for going to medical college was mainly that the treating doctor suspected Leptospirosis. This brings out two factors. First, the level of awareness of the people regarding the fatality of the disease, and the health institution, better for their ill health, reveals that people are rational in their decisions in choosing health institutions. Secondly, the role of referral services in proper guidance and diagnosis so as to control any epidemic cannot be underestimated.

Subsequently, the burden the disease has created for the families' is well portrayed by the case studies. It is clear that it is not the cost of treatment alone that is a burden, but the loss of workdays. There arises an unexpected requirement of huge amounts of money and that too in the midst of debts. This is often not considered in

understanding the burden of illness. It needs to be appreciated that the major source by which loan was taken at the time of illness was from friends and relatives wherein the social support systems play an important role. The health care institutions which people consider 'best' in spite of all its setbacks reveal the type of health care institution, needed by people.

From the treatment seeking behaviour of those affected with Leptospirosis, the role of public and private health care institutions can be analysed. Treatment seeking behaviour helps to understand the type (public/ private) of institutions sought at different stages of Leptospirosis. In the earlier stages of behaviour, it was found that twenty-two (59.5%) of the thirty-seven patients went to public health care institution of which twenty went to PHC. This shows that, even in this age of privatisation, there is a significant population that is in need of public health services. Additionally the reasons given by the majority being proximity and low cost clearly brings out the need to retain free public health services at the lower (village) level with reference facilities.

Thus on analysing the treatment seeking behaviour of those affected with Leptospirosis brings out the possibility that ensuring primary secondary and tertiary health services at the village level can help in curing disease, which in turn will reduce the burden of those affected.

CHAPTER VII

DISCUSSION AND CONCLUSION

The major objective of the present study was to explore the social context of the disease Leptospirosis in the state of Kerala. For this the socio-economic conditions of those affected, their health seeking behaviour and the role of health institutions in treating the disease were examined. This was done since Leptospirosis needs to be viewed in its totality that comprises the socio-economic, political, cultural and ecological conditions operating in the study area. For the study, the district with the greatest number of cases over the past two years was chosen. This was Kottayam district. In this, the most endemic (with greater number of cases in the state) Panchayat (Kumarakom) was selected. Primary and secondary data was collected regarding the socio-economic and ecological conditions of those households with Leptospirosis patients. Additionally, data on the perceived causes of transmission of Leptospirosis and health seeking behaviour of those affected were collected. This was analysed in the socio-cultural and ecological context. Since this was an exploratory case study of Kumarakom Panchayat, it will be incorrect to generalise the findings to the entire state of Kerala. However, through this study an attempt has also been made to identify areas that need further research.

The study is carried out on thirty-seven patients of Kumarakom panchayat who got Leptospirosis during 1998 Jan to 2001 September. It was found that majority (43.2%) of those who got the disease were from the lower income group. On further analysis it was seen that the environmental conditions of the village are such that the chances of getting Leptospirosis are high. This is based on the fact that the area being low lying, several of the wards possess waterlogged fields. Many of these are not cultivated and remain waterlogged with a range of water plants that facilitate rat breeding. In addition to this there are areas in the village where the people have to rely on 1-2 ft. wide path made of leaves and mud, as the only way to reach outside the village for work and other day-to-day purposes. When the lives of the people were examined it was found that it is impossible for the villagers to avoid coming in contact with contaminated water in their daily life. But it was also clear that the

chances are greater among the agricultural labourers, fishermen, lime shell collectors, grass cutters etc. whose working conditions raises threat of infection. Also they are the ones with least access to civic amenities and also in greater debt than the better off, which would affect their overall health.

The risk factors for Leptospirosis were also examined and it was found that agricultural workers were the major (48.6%) occupational group that got the infection. This was supported by the analysis of routes of transmission, where 45.9% perceived that they got the disease while working in the fields. Among agricultural workers, on close examination it was found that majority presumably get the disease in the act of cleaning the fields before cultivation. This also is supported by the seasonal distribution of the cases that showed peaks during agricultural seasons. The sex distribution of the disease was possibly influenced by the difference in the type of work carried out by both sexes. The other activities increasing exposure were while fishing, lime shell collection and travelling through waterlogged areas. Another finding was that the association between cattle and Leptospirosis could be possibly due to greater chances of exposure to rat's faeces or urine while coming in contact with cattle feed such as grass or hay.

The distribution of the disease within the village reveals the fact that there is a clear regional disparity in the disease distribution. Those regions (wards) with better access to civic amenities, especially roads and other developments with less agricultural land are the ones with greater population and minimum number of cases. Those regions with extended agricultural land and devoid of roads are the ones with greater number of cases. This brings out the inequality existing at the village level that was also a factor in the disease distribution.

After examining the social context of the disease causation and its distribution, the focus of the study was to identify the perceptions prevalent about the disease at different levels of the society. Also an attempt has been made to understand the treatment seeking behaviour of those affected in the context of existing health infrastructure of the area. The study identifies that there is difference in the perception of the disease between the health professionals and the people who got affected. The villagers consider the disease as that due to the environmental

degradation occurring as a result of 'development' (construction of Thanneermukkam barrage) thereby promoting growth of water plants which serve as an ideal place for rat breeding. For the health officials, the disease is due to the lack of awareness among people regarding its causes of transmission.

The health seeking behaviour of those affected with Leptospirosis were looked at. It was found that symptoms showed a commonality with severe headache and fever with chills complained by majority as the most severe symptoms. Treatment seeking behaviour involves actions taken by the patients after getting the illness. From the actions taken by Leptospirosis patients the role of private health institutions Vs public health institutions become relevant. *In spite of greater utilisation of private health services in Kerala for various diseases in general it was found that all the Leptospirosis patients got cured in a public health institution viz. medical college hospital Kottayam. The same institution was considered by almost all as the best health care institution for treatment of Leptospirosis.* It has to be noted that this is despite minimal services rendered. These were however considered important by the patient as these included diagnosis of the disease, attention given to the patient, free accommodation and nursing care given by the medical college hospital. The private hospital services might be better than at the PHC but the consideration of cost seems to be a priority for patients seeking treatment. Indeed, the fact that all patients went to medical college Kottayam throws a question on whether private sector offers better services than government hospital.

Taking into consideration the first health centre sought for treatment, majority went to PHC for treatment of fever due to Leptospirosis. This also shows that in spite of the claim that public health services are less utilised, those who are in need could be those who cannot afford private health care services. The difficulties patients have to face viz. getting laboratory tests done from outside, buying medicine from private medical stores, travel a distance of nearly 25 Kms to reach the health centre and the making of arrangements for the attendants to stay was carefully examined to understand a part of the burden created by the disease. The burden created by Leptospirosis in families are not only the difficulties regarding access in health care services but also the economic and social cost of the illness. The debts patients have due to the disease were an additional burden for families already having other debts.

Also the workdays lost due to the illness has affected to many families badly when the major income source was stopped.

The findings of the study call for some implications at policy level. At the primary levels of prevention, the ecological condition is found to contribute to the transmission of Leptospirosis. Based on this, it was found that government level initiatives like removing of water plants from waterlogged areas, control of rodents by rodent killing are the interventions pushed forward. As public health measures that need to be sustainable, both these measures even if carried out would be insufficient and could cause further problems. The underlying causes of growth of water plants could be the blockage of seawater that prevent natural cleansing. This has to be studied properly before planning any intervention. Also studies on rodent population characteristics have revealed that mere killing of rats cannot control rodent population. It has been seen that unless and until the food and shelter of rodents are not attacked (environmental sanitation) the population remains stable¹. Before going to interventions like rat killing, an in-depth understanding of rodents at the population level and also its role in maintaining the equilibrium of the ecosystem has to be understood.

Regarding the health services system, the study reveals that it is necessary to retain the public health system. It is necessary to note that the scenario of the district is that there are lot many private health care institutions ranging from small clinics, 10 to 30 bedded hospitals, to super speciality hospitals. Here, the data shows that the only institution that took care (cured) of those affected with Leptospirosis was the Kottayam medical college hospital, again a public health institution. This is despite other private health care institutions that provide treatment in the district. Here, the reason was that, as Leptospirosis needs prolonged hospital stay and past experience made them identify medical college hospital as good in treating Leptospirosis. In both the above cases, cost of treatment was cited as the reason for the preference to public health institutions. This could probably due to those who got Leptospirosis being from the lower socio-economic conditions. Also, past experience has found to

¹ Harry D Pratt and Robert Z Brown (1983): "Rodent Biology" In Home study Course on Vector Borne Disease Control, Centre for Professional Development and Training, US Dept. of health and Human Services, Public Health Services Centre for Disease control, Lesson 10. pp.20.

influence people's decision making while seeking treatment. It is to be noted that, in the village the access to medical college (25 Km.) is an advantage and is not the case with many of the villages in the state. However, the fact that the medical college hospital played a significant role puts to the need of primary health care with free primary, secondary and tertiary institutions.

This has to be seen in the context of utilisation pattern of health services in Kerala, where it has found² that during 1997 only 28% of acute illnesses get reported to government hospitals for treatment. Of the rest, 63% seeks health care services from the private institutions. The reasons cited for not using public health institutions were low quality of services reflected in the non-availability of drugs, no doctors, less proximity, and so on. Therefore investment in public health services was considered wastage. This study reveals that even in Kerala, where private health services are used more by the people, and are claimed to be the reason for better health status, the role of public health services in taking care of those affected (many a times those belonging to the lower socio-economic group) in epidemics like Leptospirosis cannot be undermined.

Instead of investing in 'super speciality' or 'high-tech' hospitals the need of the hour is to strengthen the primary health care making it capable of dealing with epidemics like Leptospirosis by ensuring basic laboratory services and other basic facilities. However, the role of secondary and tertiary health services also cannot be ignored. In cases of epidemics like Leptospirosis that struck the state of Kerala, the major contribution was by the public health services. If this might be the case with other epidemics also, then the role of public health services has to be viewed as that which reduce the burden of the poor who are many a times the major victims of epidemics.

² Kunjthikannan and K P Aravindan (2000): Changing health status in Kerala during 1987-1997, KRPLLD, CDS, Thiruvananthapuram, chap. 5, pp. 14.

Appendix I

DOCTORS' WAY OF LOOKING AT LEPTOSPIROSIS

- 1) What are the general symptoms seen in patients coming with Leptospirosis? Is there any specific one?
 - 1
 - 2
 - 3
 - 4
 - 5
- 2) From your observation, who are the persons who get the disease? (occupation and class)
- 3) On what basis are the cases generally diagnosed? Clinical / laboratory / others
- 4) What is the effective treatment available?
- 5) What is the approximate expenditure of a patient to take treatment?
- 6) From the number of cases you have looked at, how are the patients getting infected?
- 7) Out of the total number of cases, what percentage of cases are diagnosed using laboratory investigations?
- 8) From the onset of illness, what is the average duration the patient can survive if not treated?
- 9) What you think are the ways to control the epidemic?
- 10) Is there any difficulty in taking care of the patients? Y /N
- 11) If yes, what are they?

Appendix II

PUBLIC OPINION ON LEPTOSPIROSIS

- 1) Have you heard of rat's fever (Leptospirosis)? Y /N
If yes, what is it?
- 2) Do you know anyone who got the disease? Y/ N
If yes, who
- 3) What you think are the type of people who gets the disease? (occupation, class)
- 4) Do you know how it is transmitted? Y / N
If yes how?
- 5) Which are the places where treatment for this disease is available?
- 6) What is your opinion about the health care institutions available for treatment?
- 7) Is there any government /institutional level measures taken to prevent its spread? Y/ N
If yes, what are they?
- 8) Do you find it as a problem in your village? Y /N if yes, why?
- 9) Have you come across any difficulty because of the disease? Y/ N

Appendix III

SOCIO ECONOMIC AND BEHAVIOURAL SURVEY OF THOSE AFFECTED WITH LEPTOSIROSIOSIS

SL. No.

1. General information

District:

Panchayat:

Ward no:

Religion:

Caste:

House no:

Sl. no.	Name of family members	Relationship with head of the family	Age	Sex	Marital status	Edn. Status	Occupation	Personal Income
1								
2								
3								
4								
5								

2. Household based

- (1) Area of land owned: dry: _____ wet: _____ nil: _____
- (2) Type of house: *Thatched / Tiled / Concrete / Others*, (3) Electrified: Y /N
- (4) Plinth area: _____ sq. ft (5) Cattle shed: *attached / detached / nil*
- (6) Type of cooking fuel: *wood/ kerosene/ gober gas/ LPG / others*
- (7) Source of drinking water: *well (own/ Panchayat)/ pipe (own/ Panchayat)/ borewell/ pond/ others* (a) Specify any source of contamination: details, _____
- (8) Methods of waste disposal: *compost/ burning/ panchayat system/ throw away.*
- (9) Any place identified of rat breeding: Y /N, if yes Place: _____
- (10) Possessions: *vehicle, _____ / TV / Radio / Newspaper / Telephone/ others*
- (11) Sources of household income (Other than personal income, per month):
 poultry: _____ cattle: _____ Agriculture: _____
 cottage industry: _____ trade: _____ Others, _____
- In case of sub occupation, income details _____

3. Household expenditure

(1) Did any of the family members have any disease during the last one-year? Y/N,

(a) If yes, details:

(b) If no, average family expenditure per month on health care services:

(2) Have you or your family taken any loan during the last five years? Y /N, if yes details

Loan purpose: Amount taken: Amount remaining:

Interest: place:

PATIENT SPECIFIC

Name of the person who got Leptospirosis:

Age:

Sex:

What happened:

4. Occupation details

Type of work	Period of Work			Name of the organisation	Number of employees	Type of work
	Hrs / day	Days /mnth	Mnth / year			
Main						
Sub						

(1) In your daily life, is there any possibility of contact with stagnant water? Y/N

(a) If yes, how many hrs per day:

(b) Type of water:

(2) Source of bathing water:

5. Disease based

(1) When was the disease first begun? Day: Month: year: (2)

(2) What were the symptoms faced by you during the disease in the order of severity and the duration of each?

Symptoms	Durations
1	
2	
3	
4	
5	
6	

(3) What were the actions taken by you after perceiving the illness in the order and the reasons for each?

Actions	Reasons
1	
2	
3	
4	
5	

(4) Which are the health care institutions available for treatment?

1
2
3

(a) Which do you find the best? Why?

(b) If the patient has not gone to that institution first, why?

(5) Was there any difficulty in accessing the health care services: Y /N

(a) If yes what are they in the order of importance?

1
2
3
4

(6) What you think is the cause of the disease and how was it transmitted?

(a) Were you aware about this before the illness, if not from where you get this knowledge?

(7) What you know about the treatment of the disease?

(a) From where you got this information? When?

(8) Have you taken any precaution to prevent the disease? Y /N

If yes, what?

If no, why?

(9) Has the doctor or any health professional told about any preventive measures?

Y/N/dk,

(a) if yes, what?

(10) Have the district health authorities taken any measures to combat the health problem?

(11) What were the financial difficulties that you faced due to the illness?

Explain

(12) Have you taken any loans at the time of illness for its treatment? Y/ N

If yes,how much:

from where:

interest:

balance:

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