



CHAPTER 1

INTRODUCTION

1.1 Natural History of Disease

Leprosy is a chronic infectious disease caused by *Mycobacterium leprae*, an acid-fast, rod-shaped bacillus. The disease mainly affects the skin, the peripheral nerves, mucosa of the upper respiratory tract, the eyes and some other structures. Leprosy has afflicted humanity since time immemorial. It once affected every continent and it has left behind a terrifying image in history and human memory - of mutilation, rejection and exclusion from society (World Health Organization, 1996).

The modes of transmission of *Mycobacterium leprae* remain uncertain, but most authorities consider the naso-respiratory tract the major route of entrance via aerosols (Rees and McDougall, 1977, quoted in Meyers and Marty, 1991). Skin-to-skin transmission is also likely, but may require broken skin. There is no evidence that ingested food or water transmits leprosy (Meyers and Marty, 1991).

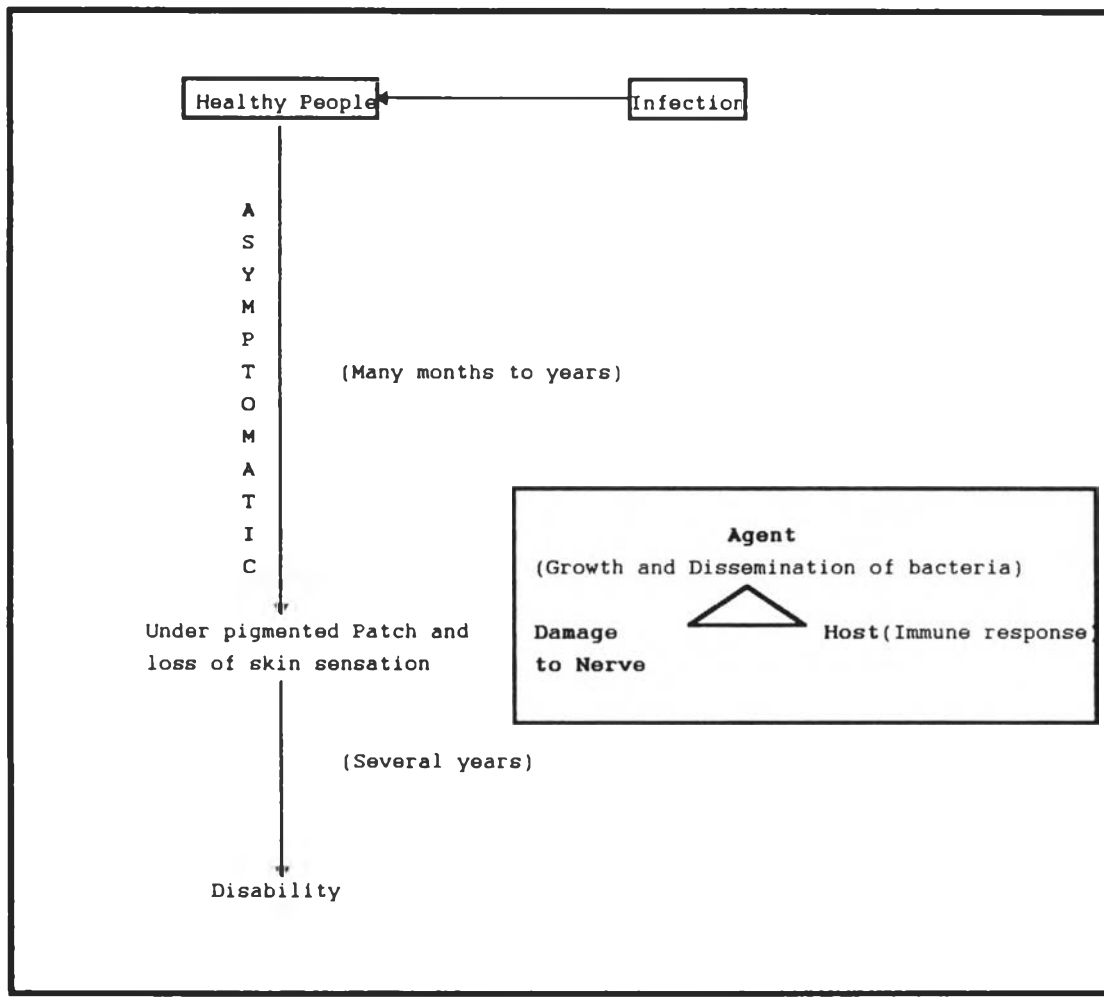
The route of infection is thought to be via coughing and sneezing, but transmission is very inefficient. Of those infected with the slow-growing leprosy bacillus, few develop the disease (WHO, 1995).

The bacterium infiltrates skin and nerves and, subject to the nature of the immune response, can cause irreversible damage which may lead to paralysis, mutilation, damaged eyes and limbs.

Individuals exposed to *Mycobacterium leprae* who remain healthy either recognize a clinically important antigens which susceptible individuals do not, or they eliminate phagocytised bacteria more effectively, or both. In susceptible infected patients the disease develops insidiously with an incubation period of 2-5 years although shorter and longer times have been recorded. The signs and symptoms of the disease result from three interrelated processes: growth and dissemination of

Mycobacterium leprae, host immune response and damage to nerves (Mayers and Marty, 1991).

Figure 1.1: Nature of Leprosy



The above figure shows that, when healthy person is exposed to *Mycobacterium leprae*, he or she will be asymptomatic for many months to year. After that period, signs and symptoms appear as under pigmented patch and loss of skin sensation which are the result of three factors: agent, host and damage to the nerve. And disability from the disease will appear after the several years later.

The clinical course of disease varies from asymptomatic infection to severe disfigurement of many parts of the body. Onset of leprosy is usually gradual, and the first signs may not be apparent for many months or years after infection. As the

disease progresses, usually over several years, skin lesions range from under-pigmented patches which are usually accompanied by loss of skin sensitivity, to multiple nodules with extensive skin thickening and folding. The disabilities caused by leprosy are mainly damaged limbs and eyes, which affect functioning of these organs; there is also the loss of sensation. Disfigurement associated with advanced stages of the disease leads to serious psychological, economic and social problems for the patients and their families(WHO, 1996).

Leprosy is notable for its propensity to produce disability and stigma which makes rehabilitation. There are three-tier model of the disability process:

Disease → Impairment → Disability → Handicap

Impairment may be defined as any loss of psychological, physiological or anatomical structure or function. when an impairment falls within the range considered normal for a human being, it constitutes a disability, but when fulfillment of a 'normal' role is prevented, the term handicap is used. Related terms include deformity which is deviation from the normal size or shape of a part of the body.

Disability affects the economic status of patients principally as a result of unemployment(vocational displacement), which may arise either directly through a reduced ability to work(patient factors) or indirectly as a result of adverse social customs, attitudes, or restrictive laws(society factors). In a wider sense, the socioeconomic development of some endemic countries may have been hampered by a loss of manpower due to leprosy(Gilbody, 1992).

1.2. Global Situation

Leprosy is an insidious, slowly-developing disease which flourishes mainly in the 'poverty belt' of the globe. Leprosy has always and everywhere been regarded as a special diseases (WHO, 1996).

In 1995, there were an estimated 2 million cases in the world, most of them concentrated in South Asia, Africa and Latin America. Among them 1.3 million are registered for treatment of

whom 1 million are treated with Multi Drug Therapy(MDT). The number of new cases detected worldwide each year is about half a million. During 1995, about 530,000 new cases were detected. India, Indonesia and Myanmar account for 70 % of all the cases in the world (WHO, 1996).

The global leprosy situation by WHO regions is shown in Table 1.1. The South-East Asia region is the highest one among WHO regions because India, Indonesia, Bangladesh, Myanmar and Nepal are the most endemic countries in the world(WHO, 1996).

Table 1.1: Leprosy Situation by WHO Regions 1996

WHO Region	Estimated cases	Registered cases	New cases	MDT coverage (%)
Africa	170,000	95,901	46,516	91.5
Americas	170,000	123,537	36,842	75.3
South East Asia	830,000	651,562	428,652	93.7
Eastern Mediterranean	40,000	23,005	5,231	83.0
Western Pacific	50,000	32,254	12,135	99.0
Total	1 260,000	926,259	529,376	91.0

Source: WHO Weekly Epidemiological Record 17 May 1996
No. 71.20 (World Wide Web)

Leprosy is one of the diseases that causes public health problems whenever it occurs. The most endemic countries in the world are shown in Table 1.2. Myanmar is situated in the fifth position(WHO, 1996). Myanmar is one of the tropical countries and leprosy is a one of the tropical diseases. Because of the peoples' believes, they do not give attention so much on the disease and because of the social stigma, the disease can spread easily.

There are many countries in Asia, Africa and Latin America with a significant number of leprosy cases. As of 1995 around 2.400 million people live in countries where the prevalence of leprosy is more than one case per 10,000 population. It is estimated that in 1995 there are between one and two million people visibly and irreversibly disabled due to past and present

leprosy who require to be cared for by the communities in which they live (WHO, 1996).

Six of the 79 countries in which leprosy is a public health problem - India, Bangladesh, Brazil, Indonesia, Myanmar and Nigeria - account for 85% of the estimated cases. It is also estimated that globally 2-3 million individuals are disabled because of leprosy and some 600,000 new cases detected annually (WHO, 1994 quoted in Kaewsonthi and others, 1995).

Table 1.2: The Most Endemic Countries in the World
(Leprosy Situation 1995)

Country	Estimated cases	Registered cases	New cases	MDT coverage(%)
India	680,000	542,511	416,685	93.0
Brazil	130,000	137,806	35,906	69.0
Indonesia	60,000	40,232	13,492	98.0
Bangladesh	30,000	12,434	8,782	100.0
Myanmar	30,000	21,071	6,577	100.0
Nigeria	26,000	17,371	7,147	100.0
Nepal	20,000	12,764	4,783	93.0

Source: WHO Weekly Epidemiological Record 17 May 1996
No. 71.20 (World Wide Web)

In 1988 WHO stated "It is difficult to estimate accurately the number of cases of leprosy in the world. Diagnostic criteria and definitions are not always clear or consistent, and the enumeration of cases in many parts of the world is incomplete. Nevertheless, estimates are extrapolated from the available data from time to time: the WHO estimates of prevalence for 1966 and 1976 were 10.8 and 10.6 million cases respectively, and prevalence is currently estimated at 10-12 million cases. The total number of registered cases in 1987 was about 5.1 million of cases" (WHO, 1988).

1.3 Problem and Rationale

Leprosy is the major health problem in Myanmar and throughout the centuries many social problems were created as a result of local communities' attitudes and actions in dealing with this disease.

There are many problems in the Leprosy Control Program such as low coverage of registered cases, lack of treatment compliance in urban areas, lack of supervision at the peripheral level and inadequate measures for rehabilitation. The problem of low coverage registered cases is most important for the LCP because many undetected cases are present in the country. The low coverage registered cases mean that "registered number of cases are roughly estimated to be about 50% of total estimated cases in the country and this still below the level of 75% coverage which is considered to be the minimum for effective control program(LCP, Annual Report, 1992).

Of the estimated 2.4 million sufferers world wide, 1.7 million are known and are receiving treatment. Use of the combination of three different drugs in MDT is very effective, because the likelihood of a bacterium being resistant to all the three at the same time is practically nil(WHO, 1995).

In 1988 WHO stated that "case detection is an integral component of the leprosy control program. Where MDT has been adequately implemented, it has been found that self-reporting by patient increases significantly. This is welcome as many of these cases present early, which helps to prevent deformities".

Therefore, how to improve case finding activities especially for early case detection within a limited budget is a great problem for the LCP because of low coverage of registered cases and inadequate measures for rehabilitation. Since only 50 % of the estimated cases are currently under MDT, there still remain undetected cases in the community which act as a source of infection. It is also observed that about 20 % of the newly detected leprosy cases are already suffering from grade II disability (visible deformity in hands or feet with or without severe visual impairment) which means that they are already quite advanced in the disease process(LCP, Annual Report, 1992).

There is thus a need for intensification of the case finding activities, especially early case detection, because the cases are detected in early stage, there will be much cost saving from the provider side as well as the patient side.

The sources of budget for LCP are mainly from the Government and World Health Organization(WHO). The budget for Leprosy Control Program for 1984-85 to 1991-92 is shown in Table 1.3.

Table 1.3: Source of Finance for the Leprosy Control Program of Myanmar (Kyats in Thousands) (1984-85 to 1991-92)

Year	Recurrent Costs		Capital Costs		Total Costs	
	Govt	WHO	Govt	WHO	Govt	WHO
1984-85	4,477	469	-	81	4,477	550
1985-86	4,664	178	-	252	4,664	430
1986-87	4,765	2,794	-	67	4,765	2,861
1987-88	5,065	1,764	-	96	5,065	1,860
1988-89	5,434	594	-	134	5,434	728
1989-90	11,410	2,168	-	-	11,410	2,168
1990-91	11,026	264	-	24	11,026	288
1991-92	10,670	1,846	-	120	10,670	1,966

Note: Recurrent Costs contains

- (a) Salaries
- (b) Traveling Allowance
- (c) Training & Fellowship
- (d) Supplies & Equipment
- (e) Drugs
- (f) Others

Capital Costs contains

- (a) Buildings
- (b) Equipment
- (c) Vehicles
- (d) Others

Source: LCP, Annual Report, Department of Health, Myanmar
1985 to 1992

From that table, it is evident that government expenditure for LCP was increasing year by year from 1984-85 to 1988-89. The government expenditure was abruptly increased during 1988-89 and 1989-90 because of MDT initiation phase was started in 1989. After the increase in that period, the government expenditure decreased from 1989-90 to 1991-92.

In Myanmar, there are (14) States and Divisions. These are roughly divided into (3) groups according to the leprosy registered prevalence rate per 10,000 population. State and Division wise LCP's Budget with the registered prevalence for the year 1992-93 is shown in Table 1.4.

Table 1.4: State and Division-wise Leprosy Control Program Expenditures for the Year 1992-93

No.	State/Division	Govt. Expend. (in Kyats)	%	R.Prevalence (per 10,000)
1.	Ayeyarwady	1,029,826.7	9.63	11.0
2.	Bago	1,068,711.2	9.99	9.7
3.	Chin	227,015.3	2.13	16.2
4.	Kachin	49,828.0	0.47	3.9
5.	Kayin	156,500.0	1.46	20.1
6.	Kayah	36,980.0	0.35	13.6
7.	Magway	1,792,708.2	16.77	23.4
8.	Mandalay	2,429,900.6	22.73	11.8
9.	Mon	206,633.7	1.93	24.2
10.	Rakhine	129,406.0	1.21	4.7
11.	Sagaing	1,265,174.8	11.83	16.5
12.	Shan	712,396.3	6.66	17.4
13.	Tanintharyi	145,696.4	1.36	20.8
14.	Yangon	1,440,922.4	13.48	6.0
Total		10,691,700.2	100.00	13.54

Note: Govt. Expend. = Government Expenditure
R.Prevalence = Registered Prevalence

Source: Leprosy Control Program, Annual Report,
Department of Health, Myanmar, 1992

In Myanmar, as in other developing countries, the scarce resources have to be shared among various sectors including health. Within the health sector, several control programs for communicable diseases, non-communicable diseases and other relevant health related problems have to share the limited

resources. It is an undeniable fact that sufficient amount of money cannot be expected to cover all and rational use of resources is essential.

To achieve the objective of the Leprosy Control Program, the case finding activity is very important among other activities because many hidden cases are present in the country. The current situation in Case finding activities are shown in Table 1.5.

Table 1.5: Mode of New Case Detection

Year	ACD			ACD	ACD %	PCD	PCD %	Total
	CE	SE	MS					
1984	715	188	725	1628	20.86	6175	79.14	7803
1985	543	156	342	1041	15.77	5559	84.23	6600
1986	478	188	490	1156	18.67	5035	81.88	6191
1987	669	120	687	1476	25.78	4249	74.22	5725
1988	373	35	219	627	14.02	3845	85.98	4472
1989	443	121	602	1166	17.95	5330	82.05	6496
1990	483	110	614	1207	19.50	4997	80.50	6204
1991	834	190	1426	2450	25.40	7182	74.60	9632
1992	829	313	2970	4112	36.30	7202	63.70	11314

Note: CE = Contact Examination, SE = School Examination
MS = Mass Survey

Source: Annual Report, Leprosy Control Program, Myanmar,
1984-1992

According to the above table, PCD detects more new cases than ACD, both early and late cases. Although the percentage of passive case detection is decreasing year by year except for some years, it is still higher than those of active case detection. In general, active case detection can pick up more early cases than passive case detection. From an economic point of view, more emphasis on early case detection is desirable because, if the cases are detected at an early stage before stigmatizing disability sets in, there will be a reduction in economic burden which has a long term effect on the patients, program and the nation. From provider point of view, economic burden means expenditure necessary to take care of the cases disabled by leprosy. At the same time they are not fully productive. By preventing disability, productivity can be ensure and expenditure for taking care of the disabled avoided. Therefore, by doing economic evaluation of the program, we can

assess which method of case finding activity has more cost benefit in terms of cost savings from early case detection.

In principle, the justification for trying to achieve earlier case detection, minimizing the time between onset of symptoms and diagnosis, could be to reduce transmission, to prevent disability and to reduce the rate of relapse. Improvements in one or more of these outcomes would reduce the cost to individuals, the control program and the community (Kaewsonthi, 1995).

Although multidrug therapy has reduced the occurrence of disability, the proportion of treated patients who are disabled remains high in some areas because many patients are diagnosed after irreversible nerve damage has occurred. Early diagnosis and treatment are thus important in reducing the proportion of disabled patients (Htoon, 1993).

Therefore, it is necessary to examine components of cost in each case finding activity and to determine which type of activity is better in the sense that more early cases are detected, that is before the deformity sets in. The government expenditure for LCP is decreasing year by year and thus it is necessary to allocate resources efficiently, activity wise and region wise according to endemicity of the disease.

1.4 Research Objectives

1.4.1 General Objective

- To determine the costs, the benefits and the benefit cost ratio of case finding activities by comparing between Active Case Detection and Passive Case Detection in terms of early case detection in three different endemic areas, i.e. low, median and high endemic area of Myanmar

1.4.2 Specific Objectives

- (1) To determine the total cost of each case finding activity (ACD and PCD) from provider as well as consumer point of view

- (2) To identify the number of early cases according to grading of disability by different methods of case finding activity
- (3) To estimate cost savings for early case detection by different methods of case finding activity
- (4) To analyze the cost and benefit of case finding activities between ACD and PCD according to endemicity of leprosy by three different scenarios namely: Baseline scenario, ACD alone scenario and PCD alone scenario

1.5 Scope of the Study

This study is an economic evaluation of case finding activities on leprosy control program focusing on the methodological approach expected to be carried out as empirical study when the data collection is possible.

The study evaluates the leprosy control program especially on case finding activities by analyzing costs and benefits of different methods from provider as well as patient perspectives. From the provider perspective, the total costs of different methods of case finding activities are classified as capital costs and recurrent costs. From the patient perspective, the total costs are classified as direct and indirect costs. In this study, the benefits are determined as cost savings for early case detection. For the provider perspective cost savings for rehabilitation and for the patient perspective cost savings for productivity loss due to disability of the disease are calculated. The study is aimed to show which method of case finding activities: ACD or PCD is better in different endemic areas of the countries. By doing economic evaluation of the program, the policy maker can decide most efficient way of resource allocation for case finding activities.