CHAPTER 2

LITERATURE REVIEW

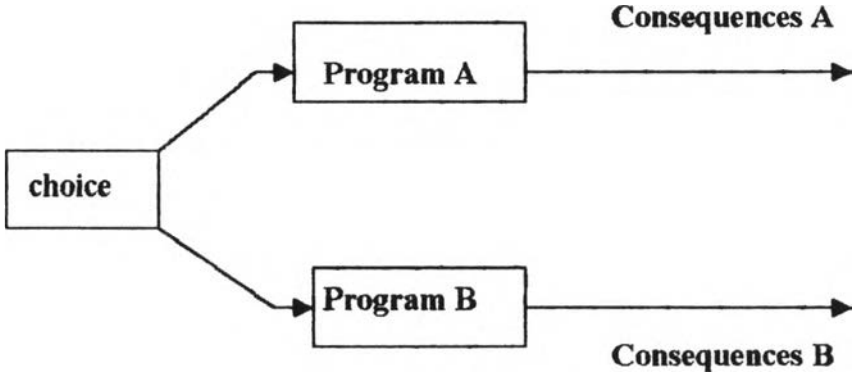
2.1 Economic evaluation.

Economic evaluation is based of scarcity of resource. So it is necessary to make choice or making decisions on how to allocate resources. Economic evaluation will come into play when such decision are made. In economics there are two types of choice to be made; technical efficiency or allocative efficiency (Jefferson, T. et.al, 1996). At the end of seventeenth century, Sir William Petty estimated the value of a human life to be between 60 and 90. William Farr (1807-1883) developed the theme of relationship between economic growth and worker's health.

In 1950 famous American economists, Kenneth Arrow and Milton Friedman, started analyzing the application of classic economic theory to health care. In 1970, economists began trying to adapt evaluation techniques of classic economics such as cost-benefit analysis (CBA) to health care. After that developed cost-effectiveness analysis (CEA). A single measure of outcome combining quantity and quality of life (the quality adjusted life year- QALY led to the birth of cost-utility analysis (CUA).

All methods of economic evaluation have one principle in common: they examine one (or more) possible interventions and compare the inputs or resources necessary to carry out such interventions with their consequences or effects. In cost-effectiveness analysis (CEA) the consequences of different interventions may vary but can be measured in identical natural units, then inputs are costed. Competing interventions are compared in term of cost per unit of consequences.

Figure 2.1 Economic evaluation always involves a comparative analysis of alternative courses of action.



Source: Drummond, M. F. method of economic evaluation of health care programme.

The basic tasks of any economic evaluation are to identify, measure, value and compare the costs and consequences of the alternatives being considered.

Table 2.1 Distinguishing characteristic (outputs) of health care evaluation.

Are both costs (inputs) and consequences (outputs) of the alternative examined?			
	NO		YES
NO	Examines only consequences	Examines only costs	
	Partial Evaluation Outcome Description	Partial Evaluation Cost description	Partial evaluation Cost-outcome description
YES	Partial Evaluation Efficacy or Effectiveness Evaluation	Partial Evaluation Cost Analysis	Full Economic Evaluation cost-minimization analysis cost-effectiveness analysis cost-utility analysis cost-benefit analysis

Source: Method for the economic evaluation of health care programmes, Micheal Drummond et.al. 2nd edition, 1997.

2.2 Cost-Effectiveness Analysis (CEA)

Cost-effectiveness analysis carried out only in order to identify the most efficient way of achieving objectives. For this reason, economists say that cost-effectiveness analysis is used to assess technical efficiency. Cost-effectiveness analysis should be regarded as a specific type of study design used to answer questions such as " what is the most efficient input to achieve a natural unit of outcome? (T. Jefferson et.al, 1996)

Cost-effectiveness analysis includes costs both to health care provider users which are used in cases when it is necessary to evaluate a wider impact of the intervention being assessed. In CEA the relationship between inputs and consequences is expressed in terms costs per natural unit such as case(s) avoided, hospital admissions avoided , sickness absence avoided, life years gained, death avoided or cases identified. Cost-effectiveness analysis (CEA) is one form of full economic evaluation where both the costs and consequences of health programmes or treatments are examined.

Comparisons can be made across a broad range of disparate programmes (e.g. treatment of chronic renal disease or seatbelt legislation) if there is a common effect of interest (e.g. live saved).

Table 2.2 Examples of effectiveness measures used in cost-effectiveness analysis.

Study reference	Clinical field	Effectiveness measured
Logan et.al (1981)	Treatment of hypertension	mm Hg blood pressure reduction
Schulman et.al (1990)	Treatmentof hypercholesterolaemia	% serum cholesterol reduction
Hull et.al. (1981)	Diagnosis of deep vein thrombosis	cases DVT detected
Sculpher and Buxton (1993)	Asthma	episode free days
Mark et.al. (1995)	Thrombosis	years of life gained No. of cases cured
Honrado et.al. (1999)	Treatment of uncomplicated falciparum malaria	No. of cases detected No. of cases cured
Miglori et.al. (1998)	Tuberculosis control policies	No. of cases averted No. of death averted.
Varley et.al. (1998)	Water supply and sanitation intervention	Disability adjusted life years saved

The effectiveness of health services relate to a final health output such as life-years gained, sometimes intermediate output, such as cases founded or patients appropriate treated, are used as effectiveness. Although intermediate outcomes may themselves have some value (or clinical meaning), the economist analyst should choose an effectiveness measure relating to a final outcome.

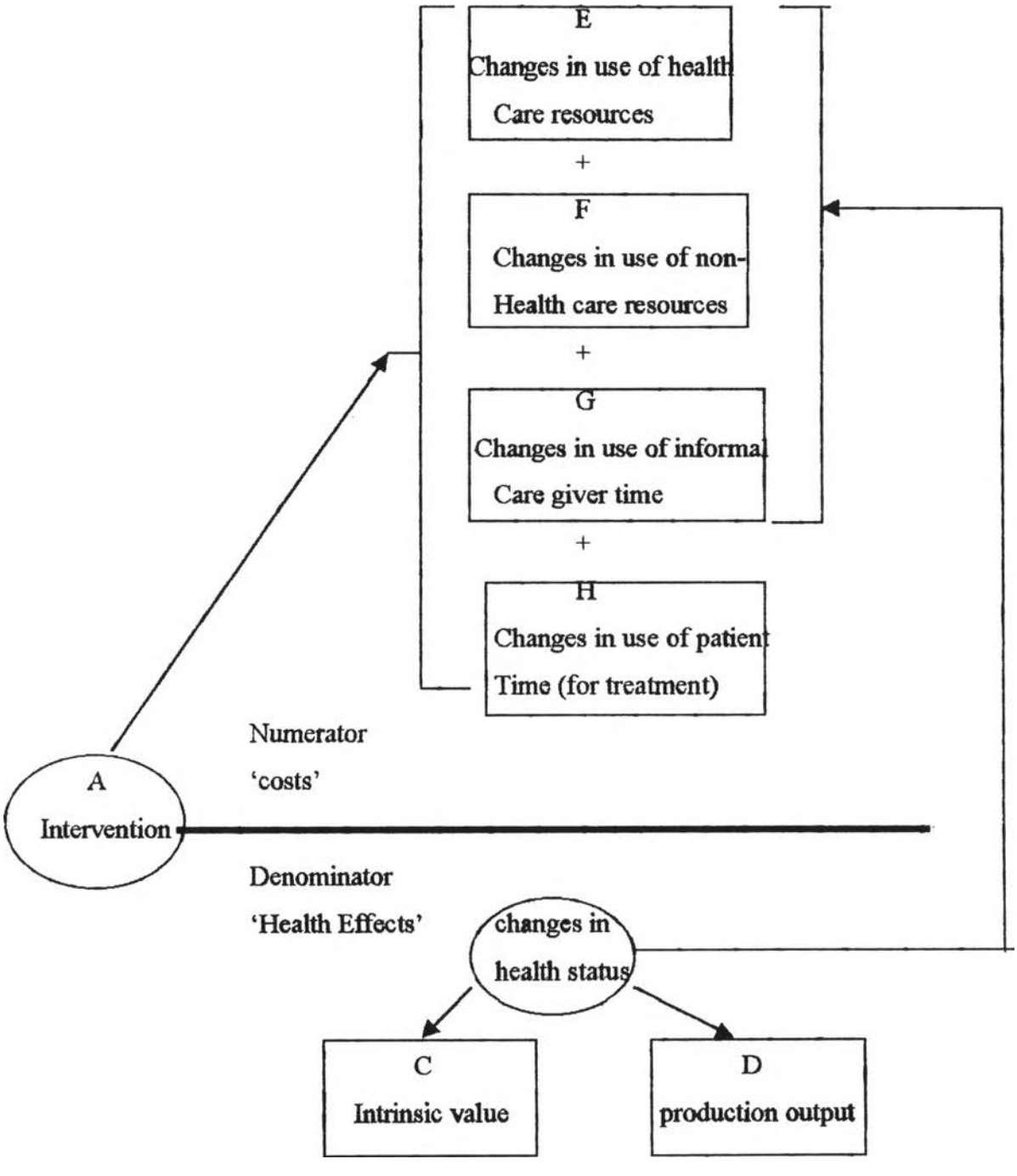
In the context of productivity losses, Koopmanschap (1995) have proposed that these should be estimated by the friction cost method. The basic idea is that the amount of production lost due to disease depends on the time – span organization need to restore initial production level. This friction period is likely to differ by location, industry, firm and category of worker.

The second concern relates to double – counting, especially in relation to productivity gains. The third concern relates to the issue of objectives and perspective in the use of economic evaluation. Economic evaluations in health care should consider the societal viewpoint. The fourth concern is equity implication (Drummond, 1997).

2.3 Estimating Costs in Cost-effectiveness Analysis.

A primary objective of cost-effectiveness analysis is to incorporate a consideration of resource consumption into decision about health care.

Figure 2.2 Economic consequences of health intervention: the cost-effectiveness ratio.



Source: cost-effectiveness analysis in Health and Medicine. Gold et.al. (1996).

Figure 2.2 illustrate these effects, beginning with the intervention (Box A), for example, a screening procedure. The intervention itself requires health care resources such as lab test and pathologist's time (Box E), and may require other type of resource such as transportation (Box F) or informal care giver time (Box G). Usually intervention will require 'time' input from the individual receiving the intervention (Box H).

Health effects can be measured such as morbidity and mortality or improved life expectancy and quality of life (Box B). Changes in health status have three potential economic aspects. First, there is inherent value of health itself, that may be measured in economic terms, such as maximum money amount that a patient would be willing to pay for certain health states (Box C). Second, changes in health status can affect the amount or type of work done and the way an individual uses leisure time. The changes are referred to as a change in productivity (Box D). Third, the changes in health status often result in a change in the subsequent use of resources.

Resources uses and their costs have been traditionally divided into direct and indirect. Direct cost refers to changes in resources use attributable to the intervention or treatment regimen. Indirect cost is used in economics to refer to productivity gains or losses related to illness or death (Gold, 1996). Direct health care costs include the costs of tests, drugs, supplies, health care personnel, and medical facilities. Direct non-health care costs include, for example, child care costs, for a patient attending a smoking cessation program, and the costs of transportation to and from the clinic. The relevant patient time costs include travel and waiting time as well as time receiving treatment (Luce ,1996).

Productivity costs are associated with lost or impaired to work or to engaged in leisure activities due to morbidity and lost economic productivity due to death. Friction costs are direct, non-health care cost, transaction costs – associated with replacement of a worker. For example if substitute labor is never as quite as productive as the labor it replace and the difference in productivity is a cost. Similarly if there are training costs

for new or temporary employees, friction costs accure to the employer, and there are real societal costs.

2.4 Sensitivity Analysis.

Sensitivity analysis has been the main method by which analysts have allowed for uncertainty in economic evaluation. There are a number of sources of uncertainty in economic evaluation. First, no data may be available and informed guesses are required. Secondly, estimates may be available but may be known to be imprecise. Thirdly, there may be methodological controversy, or value judgement may be incorporated in the study. Finally, the analysts may use sensitivity analysis to explore the generalizability of study results to other settings (Drummond , 97).

In general, sensitivity involves three steps:

(1) identify the uncertain parameters for which sensitivity analysis is required;

(2) specify the plausible range over which uncertain factors are thought to vary;

(3) calculate the study results based on combination of the best guess.

A plausible range could be determined by:

- reviewing the literature;
- consulting expert opinion;
- using a specified confidence interval around the mean.

The simplest form of sensitivity analysis is to undertake a one – way analysis. A more sophisticated approach is to undertake a multi-way analysis. Another approach is to use scenario analysis. Here a series of scenarios is constructed representing a subset of the potential multi-way analysis. Typically, the scenarios will include a base case (best guess) scenario and the most optimistic and most pessimistic scenarios. Finally another approach is to undertake a threshold analysis.

2.5 Review of Previous works on Leprosy Elimination Programme for other countries and Myanmar.

Smlth and Richardus (1993) reviewed the leprosy trends in Northern Thailand : 1951-19190. The authors explained that the following trends were found. (1) Decreasing number of new, previously untreated patient. (2) Increasing average age of patients at onset and presentation of disease. (3) Decreasing duration between onset and presentation. (4) Increasing percentage of patients presenting with in the first year of symptoms. (5) Increasing percentages of paucibacillary cases. (6) Decreasing percentages of patients presenting with deformity.

These trends are a reflection of the whole of Thailand, and indicated that leprosy control was being effective. Patients were presenting at an earlier stage than before, with consequent reduction in disability and infectivity. Better usage of chemotherapy since 1976 had helped to reduce the transmission of bacilli from person to person, combined with effective health education activities which had dispelled some wrong ideas about leprosy an encouraged patients to seek help early in the course of the disease. Additional factors related to public health and living standard had also contributed.

Schafer (1998) studied leprosy and disability central in the Guera Prefacture of Chad, Africa: do women have access to leprosy control services? In a retrospective study, data from the Gu'era Leprosy and Disability Control Project in Chad, covering the years from 1992 to 1996, were analyzed in order to determine whether there was any indication that the quality of care provided to female leprosy sufferers was inferior to the case provided for male patients. Data from a total of 741 patients registered for MDT, of whom 351 were newly diagnosed cases. The data indicated that women had access to diagnosis and treatment and health education. The women did not present for treatment later than men, disability rates are lower and they had higher treatment completion rates.

Kobina Atta Bainson et,al. (1998) studied dimensions and process of stigmatization in leprosy. They mentioned that leprosy is a disease which had struck fear into human beings for thousand of years. In 1991, the 44thWorld Health Assembly adopted a resolution to eliminate the disease as a public health problem by the year 2000. One of the major obstacles to achieving this objective is the stigma associated with the disease. Stigma against leprosy patients affects all aspects of leprosy control. This paper described a model of the stigmatization process in leprosy. The process of stigmatization can be divided into two stages. The first stage described how certain cognitive dimension of leprosy lead to a variety of affective response towards the disease. The second stage involves how there affective response contribute to social devaluation of the leprosy patients and consequently, the adoption of negative behaviors toward them.

Richardus et.al. (1999) studied case detection, gender, and disability in leprosy in Bangladesh: a trend analysis. In this paper they mentioned that a trend analysis was presented of all newly detected leprosy cases over an 18 years period (1979-1996) in a highly leprosy endemic area of Bangladesh. A total of 23,687 new cases were registered. with an average of 860 new cases per year in the first 12 years and increasing to around 3000 in 1996. The male: female (M: F) ratio decreased from 2.3 to 1.4. The proportion of newly detected cases with MB leprosy and of newly detected cases with any disability decreased over time.

Their reductions were more marked in the higher age groups of both sexes. The reduction in disability was primarily attributable to a decline in grade 2 disability. New case detection rates (NCDR) of all leprosy patients per 10,000 general population increased for males from 3 to 6; and for female from 1 to 4, while the NCDR of MB leprosy decreased from 1.4 to 0.6, and in females fluctuated around 0.45. The NCDR of females in the ages between 15 and 30 were low by comparison with the male NCDR at the same time. This may be due to socio-cultural characteristic of the Bangladesh society, with gender difference in exposure, health seeking behavior and opportunities for case detection. In the Bangladesh socio-cultural context, it is not appropriate for women to be examined by men, and particularly for young women.

Barua ,1999 studied leprosy elimination through integrated basic health services in Myanmar : the role of midwives. They mentioned that Myanmar was one of the top 16 countries identified by WHO as being hyper-endemic for leprosy. Multi-Drug-Therapy (MDT) was introduced in 1988 as a vertical program and gradually integrated into the basic health services (BHS), achieving 100% coverage over the registered cases by 1995. To achieve maximum coverage of and benefit for patients, both vertical staffs and BHS staffs were trained to implement MDT while performing routine BHS activities. This included a total of 8615 trained midwives who were mobilized for the nationwide leprosy elimination program. They worked at village level in various parts of the country and were willing and able to carry out basic tasks in leprosy management, such as the implementation of MDT using blister-calendar packs carrying a month supply of drugs. This study was performed to assess the workload of midwives and their attitude towards LEP.

The authors conclude that midwives in Myanmar show a high level of commitment and reliability which are essential contributing factors to achieve the current goal of leprosy elimination by the year 2000. Because of its long incubation period, new leprosy patients may arise even after elimination target is achieved. A community based sustainable approach for the post elimination phase, after the year 2000, will be considerable importance.

2.6 Review of previous works dealing with Economic Evaluation on Leprosy and other communicable diseases.

Sharma (1994), studied potential cost saving for leprosy patients in seeking local leprosy care in Nepal. He explained that the major aim of this research is to develop the method for determining the costs incurred by patients and accompanying relatives when the former consume leprosy care at outstation, that is at a service point outside their districts of residence. The second purpose is to actually determined the costs incurred by

patients and accompanying relatives and saving which could be achieved if they were to consume care at a local clinic..

The principle of decision tree are used to explore the alternative action patients in receiving the services at various level of leprosy clinics. The model is used to estimate cost incurred by patients and relatives attending local and outstation clinics based upon the parameters determined for 30 patients at each of the 3 sampled clinics.

The study showed that the costs incurred by the patients receiving service at local and outstation clinics are 489 Ru/ patient /year and 54 Ru / person / visit for patients at local clinic and 3166 Ru / patient / year and 352 Ru / person / visit at outstation clinics. The costs incurred by relatives accompanying patients to local and outstation clinics are 17.4 Ru / person /visit and 193 Ru / person / visit respectively. The average total costs in attending outstation clinics are 7.6 times that for attending the local clinics.

Kaesonthi, et. al. (1995) studied the economics of early leprosy case detection in Thailand. In that study, they explained that there are three potential impacts of early case detection namely : effect of early detection on transmission, effect of early detection on the number of disabled cases, and effect of early case detection on relapse. The authors also identified the six possible actions which could affect earlier case detection: strengthen health education, rapid village survey, contact survey, school survey, improved referral practice through training of staff and paying the travel expenses of referral patients to attend specialized diagnostic services. They found that rapid village survey and contact survey are viable action, economically.

They also studied the aggregate annual costs incurred due to the disease in Thailand in 1992 was US $ 14.8 million, with 59% incurred in contact activities, 41% in support & maintenance of the leprosy disabled.

San San Aye (1996), M.Sc. studied cost-benefit analysis of case finding activities: A case of leprosy control program in Myanmar. She mentioned that to assess the cost and benefits of different methods of case finding activities: Active case detection and

Passive case detection, from the provider as well as patient's perspectives. In this study benefits in term of cost savings for early case detection were used to find out which method of case finding activity was better in the sense that more early cases are detected. The study concluded that ACD activities are more emphasized than PCD activities especially in high endemic areas.

2.7 Success Story of Thailand in Eliminating Leprosy as A Public Health Problem.

Leprosy control in Thailand started at the 1908, when King Chulalongkorn granted a large piece of land in Chiang Mai upon which the leprosarium for patients was built. As in many other countries, the isolation of leprosy patients in Thailand lasted from 1908 to 1951. There were two leprosaria and 13 colonies covering almost every region of Thailand.

From 1950, the drug dapsone was used. In 1953, with WHO support, UNICEF and Ministry of Public Health conducted national randomized survey to estimate the number of leprosy sufferers in Thailand. There was about 140,000 and the estimated prevalence was 50 per 10,000 population. Almost 60% of patients lived in the northeastern region. With the initial financial support from the king, the Leprosy Division developed two years training courses and set up teams of leprosy staff to carry out the Specialized Control Program.

By 1970, the program had expanded to reach 40 provinces, in which leprosy was as a public health problem. Up to 1970 a total of 111722 leprosy cases had been detected and treated and 33653 patients had been successfully treated and discharged. Under the country Third Health Development Plan (1972-1976) the national leprosy control strategy was integrated into local public health services.

From 1982, community participation was promoted and accelerated. Leprosy training workshops promoted the dissemination of related information and techniques of self-care to peripheral health staff, primary health care workers and the affected communities. In 1984, multi drug therapy (MDT) was introduced to medical staff at all provincial and district level. It greatly improved the efficiency of the control program, increasing the confidence of health staff and compliance of patients.

By 1989, all leprosy patients were covered by MDT. In 1996 there were only 3015 registered cases; about 1300 new cases were detected each year, and the national prevalence rate of cases was 0.51 per 10,000 population. Thailand had been converted from one of the endemic countries in 1953 to one of the foremost countries in eliminating the leprosy problem (WHO, World Health, 1996).

During 1951-1990, the following leprosy trends were found.

(1) Decreasing number of new, previously untreated patients.
(2) Increasing average age of patients at onset and presentation of disease.
(3) Decreasing duration between onset and presentation.
(4) Increasing percentage of patients presenting with in the first year of symptom.
(5) Increasing percentage of paucibacillary cases.
(6) Decreasing percentages of patients presenting with deformity.

These trends indicated that leprosy control was being effective. Patients were presenting at an earlier stage than before, with consequent reduction in disability and deformity. Better usage of MDT since 1976 had helped to reduce the disease transmission of bacilli from person to person, combined with effective health education activities, which encouraged patients to seek help early in the course of the disease. Living standard had also contributed (Smith et.al., 1993).

2.8 How to measure effectiveness of Leprosy Elimination Programme?

The 7th WHO Expert Committee on Leprosy which met in Geneva in June 1997 stated that there was an important need to detect and treat the remaining undetected cases, for which special approaches, along with the extension of MDT services to all general health facilities are required.

There are six indicators to measure the effectiveness of the leprosy elimination programme. These indicators are the following:

(1) Registered Prevalence rate per 10,000 population.

(2) New case detection rate (NCDR) per 100,000 population.

(3) MDT coverage percentage (%)

(4) Cure rate percentage (%)

(5) Disability Grade 2 among new cases percentage (%).

(6) Relapse.

So new cases detection is very important indicator for leprosy elimination programme. Case finding together with multidrug therapy (MDT) form the key component of the global strategy. Case detection largely reflects detection of backlog (hidden) cases. Once the backlog is cleared, the detection of leprosy must decline and reach a minimum level. If the detection of backlog cases has not yet reached the optimal level, there was no reduction in case detection.

Case detection rate is defined by the number of newly detected cases, previously untreated, during a year among the population in which case has been detected. This includes patients with onset of disease in the year (incidence cases) and those with onset in previous years (backlog prevalence). There are three indicators which indicated that, there are many backlog cases and high transmission in that area.

These are percentage of childhood leprosy, proportion of MB leprosy and grade 2 disability among the newly detected cases. Increase in childhood leprosy and MB leprosy indicate that a high transmission of disease in that area. The high proportion of

MB patients indicate that a sloe expansion of leprosy services to previously uncovered areas. If the LEC or case detection had done very well, most the backlog cases will be detected, this lead to a steep increase in case detection followed by a significant decline during subsequent years.

This will happen if LEC is properly carried out and routine elimination activities are strengthened and maintained. The long-term impact of LECs can be measured only in term of a significant reduction in both prevalence and detection rates. The increase in case detection seen in areas where LECs were conducted clearly suggest that, in the past leprosy elimination were carried out poorly or only in limited geographical areas or population.