

LEPROSY TRENDS IN NORTHERN THAILAND: 1951-1990

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Abstract. Data of new, previously untreated leprosy patients from 6 northern provinces of Thailand, diagnosed at McKean Rehabilitation Center, Chiang Mai and associated clinics between 1951 and 1990 were analysed.

The following trends were found: 1) Decreasing numbers 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 within the first year of symptoms. 5) Increasing percentage of paucibacillary cases. 6) Decreasing percentage of patients presenting with deformity.

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

INTRODUCTION

Evaluation of a leprosy control program involves an assessment of a variety of parameters to answer such questions as whether transmission is being interrupted, disabilities are being prevented, public awareness of leprosy is increasing and self-reporting is occurring at an earlier stage in the disease. In this report such an analysis is presented spanning a 40-year period.

McKean Rehabilitation Center has for more than 80 years been involved in leprosy work in Northern Thailand. It is a private institution and works in cooperation with the Thai Government Leprosy Control Program. It acts as the regional referral center for leprosy complications, reconstructive surgery and also has vocational training activities. However, new cases frequently present without being referred. Many new patients present themselves directly to the Center or are found through two associated general clinics (in Chiang Mai and Fang district) with expertise in dermatology. Besides this there is an active mobile team involved in case-finding and follow-up, contact tracing and village and school surveys.

Recently the Leprosy Division (1990) of the Thai Ministry of Public Health published a report titled Thailand Leprosy Profile 1990. The Kingdom of Thailand has had a National Leprosy

Control Program operating since 1955, integrated into the Ministry of Public Health since 1972. It was felt that comparison of data between the McKean Center and the Government statistics for the whole country might yield some insights helpful to an assessment of effectiveness of the Center's Leprosy Control activities over the years. An analysis of new registrations was therefore done covering the years 1951-1990. Special attention is given to the data of new, previously untreated patients from 6 northern provinces (the main population base for the Center) and trends in this group are presented.

MATERIALS AND METHODS

Data from records of patients registered at McKean Rehabilitation Center and associated clinics from 1951 to 1990 were entered into an IBM-compatible computer using a dBASE III program. The data relevant to this analysis included the following entries:

- * Name and chart number.
- * Age and sex.
- * Date of registration.
- * Address at registration.
- * Deformity of each limb at registration.
- * Duration of symptoms before registration.
- * Duration of therapy before registration.

- * Family history.
- * Smear result at registration.

A total of 8,370 records were processed. However, approximately 40 charts in the pre-1965 era could not be located. Some information was still available in other ledgers for these patients and this was entered into the program. The patient records since 1965 were complete. For clarity, patients were divided in 5-year groupings. This report focuses on patients from 6 northern provinces (Chiang Mai, Chiang Rai, Mae Hong Son, Phayao, Lampang and Lamphun) which form the main population base of the Center. These 6 provinces are referred to as "Zone 10" in the Thai Government Leprosy Control Program.

RESULTS

Annual registrations

The numbers of new registrations, together with the number of new, previously untreated cases are given in Table 1. Also the male: female ratio is shown. Approximately half of the new registrations had never received any therapy prior to being seen by McKean staff. The genuine new cases from Zone 10 showed an annual increase until 1979, with a noticeable fall in numbers since

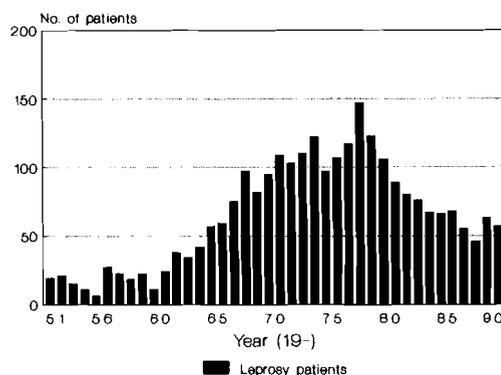


Fig 1—Annual number of new, previously untreated leprosy patients from Zone 10, registered at McKean Rehabilitation Center; 1951-1990.

(Fig 1). The male: female ratio decreased from 4.00 in the second part of the 1950s to 2.07 by the end of the 1980s.

Age, sex and onset of disease

Fig 2 shows the distribution by age and year of registration of new patients from Zone 10. Fig 3 gives the average age at onset and on presentation of these leprosy patients. A trend towards an older age at presentation and a decrease in duration of symptoms is apparent. Fig 4 shows the per-

Table 1

Total number of new registrations, including those with no previous therapy, at McKean Rehabilitation Center between 1951 and 1990.

Years	Total No.	No previous therapy			Male:Female ratio
		Total	Total Zone 10	Male Female	
1951-55	516	139	72	41 31	1.32
1956-60	736	236	100	80 20	4.00
1961-65	941	449	195	148 47	3.15
1966-70	1,535	728	408	307 101	3.04
1971-75	1,816	791	541	380 161	2.36
1976-80	1,386	774	600	417 183	2.28
1981-85	865	493	378	280 98	2.86
1986-90	575	339	289	195 94	2.07
Total	8,370	3,949	2,583	1,848 735	2.51

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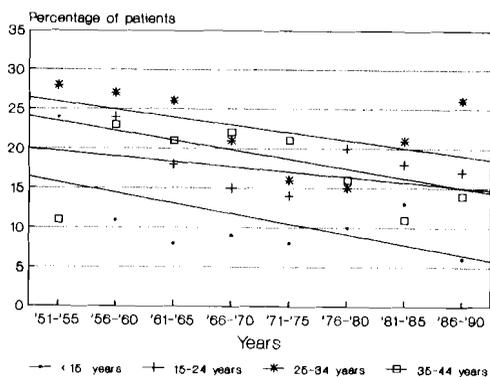


Fig 2a—Distribution by age and year of registration of new, previously untreated leprosy patients from Zone 10 at McKean Rehabilitation Center; 1951-1990. (0 to 44 years).

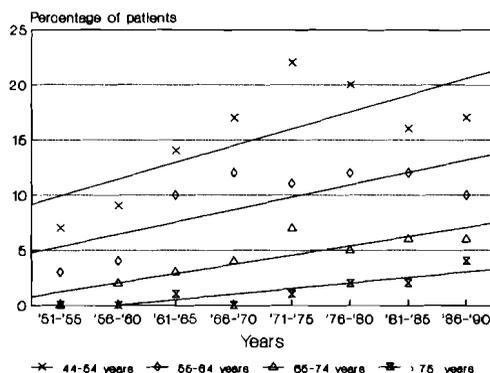


Fig 2b—Distribution by age and year of registration of new, previously untreated leprosy patients from Zone 10 at McKean Rehabilitation Center; 1951-1990. (45 to > 75 years).

centages of new, previously untreated patients presenting within 1 year after onset of symptoms. This increase in early presentation was found in all age groups. There was no significant difference ($p > 0.05$) between the sexes regarding age of onset, duration of symptoms and age at presentation, although in general the average ages of women were slightly less than those of men. The rising age of onset and the decreasing duration of symptoms before registration indicated a definite trend towards reduction in numbers of children and young adults with leprosy and a trend towards earlier presentation (95% voluntary self-reporting).

Leprosy classification

Table 2 lists the numbers and percentages of each classification, based on the Ridley-Jopling scale. Indeterminate leprosy has been regarded more as a suspicion of leprosy rather than a diagnosis and is rarely made. Patients with such lesions are re-examined 3 to 6 months later and a more definitive diagnosis is then made if the lesions have entered the true spectrum. The second visit is regarded as the date of registration. Primary neural leprosy has only been seen on a few occasions and was usually regarded as a variant of BT leprosy

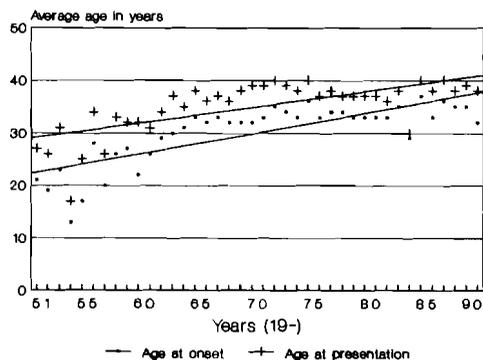


Fig 3—Average age at onset and presentation of new, previously untreated leprosy patients from Zone 10 at McKean Rehabilitation Center; 1951-1990.

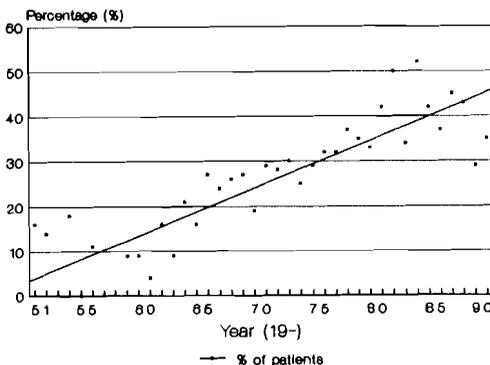


Fig 4—Percentage of new, previously untreated leprosy patients from Zone 10, presenting at McKean Rehabilitation Center within 1 year after onset of symptoms.

Table 2

Distribution of leprosy classification (Ridley-Jopling) in new, previously untreated patients from Zone 10 at McKean Rehabilitation Center between 1951 and 1990.

Years	I No. (%)	TT No. (%)	BT No. (%)	BB No. (%)	BL No. (%)	LL No. (%)	Unknown No. (%)	PB:MB ratio
1951-55	0 (0)	13 (19)	23 (33)	1 (1)	5 (7)	27 (39)	3 (4)	1.09
1956-60	0 (0)	13 (13)	22 (23)	4 (4)	12 (12)	46 (47)	3 (3)	0.57
1961-65	0 (0)	13 (16)	47 (24)	12 (6)	31 (16)	90 (47)	2 (1)	0.45
1966-70	1 (0)	86 (21)	85 (21)	12 (3)	64 (16)	154 (38)	6 (1)	0.75
1971-75	2 (0)	113 (21)	155 (29)	33 (6)	98 (18)	129 (24)	11 (2)	1.04
1976-80	5 (1)	214 (36)	136 (23)	29 (5)	93 (16)	122 (20)	1 (0)	1.46
1981-85	4 (1)	134 (35)	86 (23)	26 (7)	68 (18)	50 (13)	10 (3)	1.56
1986-90	4 (1)	78 (27)	82 (28)	18 (6)	47 (16)	60 (21)	0 (0)	1.32

I: Indeterminate; TT: tuberculoid; BT: borderline-tuberculoid; BB: midborderline; BL: borderline-lepromatous; LL: lepromatous; Unknown: not classified or not classifiable; PB:MB ratio: ratio of paucibacillary (I + TT + BT) to multibacillary (BB + BL + LL) forms.

(although opinion has changed now in this matter). A variety of doctors has been involved in making the diagnosis, thus making criteria for differentiating between subgroups of the classification less consistent. However, if the classifications are grouped into multibacillary (MB: BB, BL and LL) and paucibacillary (PB: I, TT and BT) groups, variations in diagnostic criteria are minimized. It is apparent that a shift is occurring in the tuberculoid: lepromatous ratio (PB: MB), with a greater proportion of patients now presenting with the paucibacillary forms of the disease. Those patients classified as "unknown" (not classified or not classifiable) were not included in the calculations. Skin biopsies were done occasionally, but not as a routine until 1980 when Chiang Mai University Medical School became involved in research projects. Agreement between clinical and histological diagnosis has been 90%.

Deformities

Each limb was recorded according to the current OMSLEP recommendation (WHO, 1988) from 0 to 2 (0 = normal; 1 = anesthesia only; 2 = wasting, ulceration, contracture or absorption). The percentages with "0" deformity and deformity grade 2 are shown in Fig 5. There was an increasing number of patients presenting with no deformity

with a corresponding decrease in numbers recording as "2". There were no changes in the number of patients presenting with deformity grade 1. The difference between right and left limbs was not significant. However, there was a definite trend for women to be less deformed than men - a higher percentage of those with no deformity at all and a lower rate of deformity scores of "2" in any limb. When analysing deformity rates by classification it is found that the number of patients with no deformity (grade 0) increases in all classification

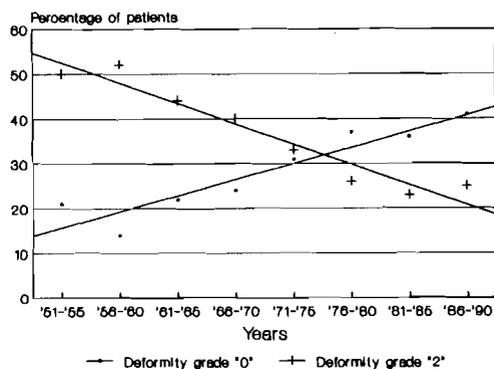


Fig 5—Deformity grade "0" and "2" of new, previously untreated leprosy patients from Zone 10, registered at McKean Rehabilitation Center, 1951-1990.

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Table 3

Percentage of new, previously untreated patients from Zone 10 with deformity grade "O" and "2" per classification category.

Years	Deformity grade "O" (%)					Deformity grade "2" (%)				
	TT	BT	BB	BL	LL	TT	BT	BB	BL	LL
1951-55	31	0	0	0	37	38	74	100	80	30
1956-60	23	18	0	8	11	46	68	75	67	39
1961-65	23	19	0	6	31	62	60	42	45	32
1966-70	28	14	42	23	24	45	58	17	36	31
1971-75	39	25	48	23	31	29	45	24	32	22
1976-80	40	33	34	39	35	27	32	17	25	19
1981-85	41	29	50	34	34	22	34	12	16	18
1986-90	45	30	39	51	38	22	39	22	17	18

categories (Table 3). No relationships were found between age groups and deformity grading.

Other factors

A positive family history was recorded in approximately 30% of new, previously untreated cases. Smear positivity at first appearance occurred on average of 50%. The same laboratory technicians have been responsible for skin smears for the past 20 years. Prior to 1970, smear taking was rather erratic and staining and counting of bacilli was unreliable. However, a positive smear probably meant that acid-fast bacilli were seen and the computer data entry simply recorded positive or negative irrespective of the value of the BI.

DISCUSSION

The above analysis of new patients from Zone 10, registered at McKean Rehabilitation Center between 1951 and 1990 shows the following trends:

1. Decreasing numbers of new, previously untreated patients.
2. Increasing average age of patients at onset of the disease and at presentation.
3. Decreasing duration between onset and registration.
4. Increasing percentage of patients presenting within the first year of symptoms.
5. Increasing percentage of paucibacillary cases.

6. Decreasing percentage of patients presenting with deformity.

At present, the number of new, previously untreated patients seen annually at McKean Rehabilitation Center represents about 3% of those found in the whole country and about 40% of those found in the northern Thailand area (Zone 10, population approximately 4.3 million). Before the establishment of government public health facilities (including leprosy) throughout the northern provinces in the early 1970s, patients detected by McKean Rehabilitation Center represented virtually all registered new leprosy cases in this area. The ratio of newly detected patients seen first by our Center has gradually decreased over the years with expansion of the government leprosy services in the field (Fig 7). The trends in detection rate compare with the trends found in government statistics collected from all areas of the country (Leprosy Division, 1990). In these statistics, fluctuations in detection rate are seen through the years of change from a specialized program to an integrated approach (1970s), but a steady decline is observed only after 1985 (Fig 7). This sharp decline was also observed in the McKean figures (89 new cases in 1981 to 57 new cases in 1990), although it started some 5 years earlier. A shift to the older age group of the peak age incidence was also seen. The decline started before the implementation of multidrug therapy (MDT), but seemed to be accelerated with higher MDT coverage over the later years.

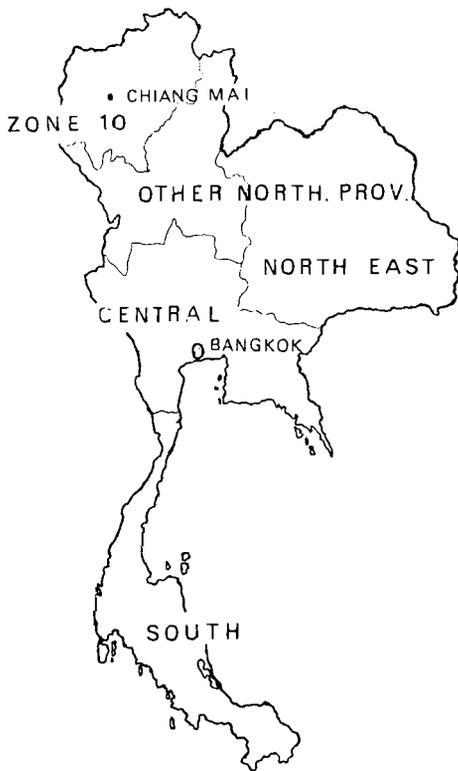


Fig 6—Map of Thailand, including main geographic areas and Zone 10 in Northern Thailand.

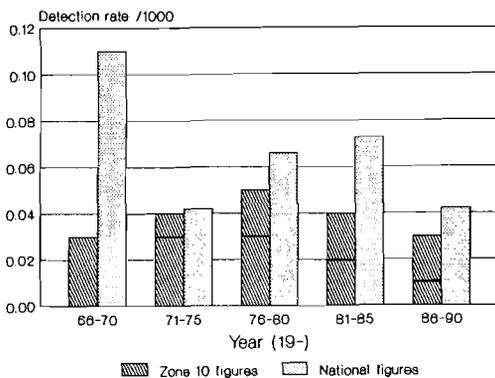


Fig 7—Leprosy detection rates in Zone 10 and in the whole of Thailand; 1966-1990. The area below the line in the Zone 10 bar indicates the contribution of the Center's patients to these figures.

Probable explanations for these trends are multi-factorial and include increased public awareness of leprosy by health education activities on

radio and television, poster displays at public places and festivals, leprosy education in schools etc. With this dissemination of leprosy information, the general public has become more aware of the early signs and symptoms and of the fact that early therapy is curative. Together with improved socio-economic conditions, improved availability of health services and a less fatalistic attitude towards disease, people tend to seek medical attention more rapidly. The decreasing average durations of symptoms and the increasing numbers of people who are presenting within the first year, as shown by the McKean figures, are the consequence of these factors.

By presenting earlier and receiving effective therapy, patients (especially the multibacillary ones) are infectious for much shorter times than before. This decreases the risk of transmitting their bacilli to others. Contact with susceptible people occurs less frequently so that those prone to develop the disease may live in safety for longer periods before being exposed. In some cases they may not be exposed at all. Hence there will be a delay in transmission and this would explain the increased average age of onset and presentation. Thailand is rapidly developing and health, housing and dietary standards have improved markedly in recent years. The effect of these factors on the immune competence are difficult to establish but are likely to play a part in reducing the negative factors (malnutrition, frequent viral infections, etc) that may enhance the susceptibility to contract leprosy. The increased average age of onset and presentation can also be explained by longer incubation periods. Thai people are healthier and living longer, but with aging the immune system deteriorates so that more older people than before are presenting, often with a short history but probably with long incubation periods. As in tuberculosis, this is likely to be due primarily to endogenous reactivation of infections acquired in childhood (Nordeen, 1992). Similar trends have been described in other countries towards the end of the leprosy epidemic (Irgens, 1985). General availability of BCG vaccination in Thailand could also be a possible explanation for the decreased transmission of leprosy. Although BCG has been available in some areas for 2 or 3 decades, programs providing vaccination to the population at large have only been in effect for a decade or so. At this time it is not possible to draw any conclusions about its effect on the leprosy situation in Thailand.

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Many patients in Southeast Asia appear to develop leprosy in the Borderline spectrum and "downgrade" from BT to BL if untreated. Earlier presentation would prevent or reverse this downgrading tendency. This could explain the increase in the paucibacillary proportion. Similar trends have been reported in India (Vanderverken *et al.*, 1985), Portugal (Irgens and Skjaerven, 1985), and Rwanda (Stes and Malatre, 1989), but opposite trends have been described in other countries (Li *et al.*, 1985; Saikawa, 1981). In addition, earlier presentation would catch more people before the immune mechanism started to cause nerve damage which would lead to deformity.

A factor which is probably relevant to the decline in detection rate after 1980 (before the MDT era) is the change in treatment policies at McKean which occurred in the mid-1970s. Prior to 1974 it was customary to commence dapsone (DDS) monotherapy with low dosage (10 mg twice a week) and slowly increase the dose over a period of 6 to 12 months. It was believed that this would cause less reaction. The dose was lowered or stopped whenever "reaction" was imminent so that effective killing of bacilli was delayed. With the emerging threat of DDS resistance the policy changed to continuous therapy with higher starting dose (50 mg twice a week, 1974) and later to starting with the full dose (50 to 100 mg daily, 1977) in combination with lamprene for all new cases with a positive smear. This more effective use of therapy would render patients non-infectious more rapidly. Allowing for an incubation period of about 3 years, one would therefore expect to see a fall in incidence of new cases after 1980. Multidrug therapy as recommended by WHO (1982), was introduced at McKean Rehabilitation Center by the end of 1982.

Comparing male : female ratio and percentage of deformity in new cases found in 1990, it was found that figures for McKean and national figures are roughly the same. However, in the same year there are significant differences in the PB : MB ratio (McKean, 1.54; National, 2.0) and percentages of smear positivity (McKean, 40%; National, 20%). The differences could be explained by the fact that the government program includes much more survey work which leads to finding many cases of hypopigmented patches being skin smear negative and labeled as TT or Indeterminate leprosy. This category of patients often does not actively seek

treatment and some might even possibly prove not to be leprosy when examined in a more sophisticated setting with expertise in dermatology and facilities for doing skin biopsies and detailed study of changes in skin sensation and peripheral nerve function.

In conclusion it can be stated that analyses of data from new patients from Zone 10, registered at McKean between 1951 and 1990 show encouraging trends. These trends are a reflection of the trends seen for the whole of Thailand. Similar trends have been seen in other countries (Irgens *et al.*, 1990; Davey, 1975; Irgens and Skjaerven, 1985) and indicate that leprosy control is being effective. Patients are presenting at an earlier stage than ever before, with consequent reduction in deformity and infectiousness. Better usage of chemotherapy since 1976 has helped to reduce the transmission of bacilli from person to person, combined with effective health education activities which have dispelled some of the wrong ideas about leprosy and encouraged patients to seek help early in the course of the disease. Additional factors related to public health and living standards have also contributed, stressing the fact that leprosy control and eradication is best achieved with co-operative effort from many health-related departments, both within the Government system and from the private sector. The leprosy epidemic in Thailand is coming to an end and it is not unreasonable to state that the disease might well become a rarity by the year 2000.

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