CHAPTER 4

RESULT AND DISCUSSION

The collected data were divided into the following parts for analysis.

- Demographic information of patients
- Behavior of the patients
- Performance of patients prior to the formal care
- Costs to the patients prior to the formal care
- Relation between performance and cost, prior to the formal care

4.1 Demographic information

Gender - about 79% patients (77 out of 96) were males and other (19) are females. The male female ratio was 1:0.2.

Weight - The mean weight (± Std deviation) of male patients was 53± 7.09 Kg and the mean weight of female patients was 47.21 ± 8.56 Kg.

Marital status - Examination of marital status of the patients showed that about 63 % were married.

Age - The minimum age of the patients was 15 and maximum age was 70 years. The mean (± Std deviation) age of patients was 38.7 ± 14.7. If compared the age distribution of the all newly detected DS+ve TB patients in Bangkok showed 25% in aged 25-34 (Division of Epidemiology, MOPH 1992). There were more or less same frequencies of patients' age groups. Though it did not show the prevalence of infection. The frequency distribution of patients by age have shown that most of the patients are in their productive period. When the disease affected the persons in their productive ages, they could not work due to tuberculosis. In this situation, the patients loss their wage as a result there will be a personal loss. In national level, a country may loss production. The age frequencies of patients have shown in Table 4.1.

Table 4.1 Distribution of patients by age group

Age group	Number	%
15 - 24	20	21
25 - 34	27	28
35 - 44	20	21
45 - 54	19	20
55 - 64	8	8
65 and above	2	2
Total	96	100

Table 4.2 Educational status of the patients

Educational status	Total	%
1.No formal education	1	1
2. Primary	66	69
3. Secondary	25	26
4. Higher	4	4
Total	96	100

Educational level - The data of education status showed that over 68% of the patients had up to primary education but only 26% had secondary education. The educational status of the patients affects the occupation and income. If educational level of the patients compared with national figure,in national level the mean years of schooling was 3.8 (Human Development Report 1993), sampled patients' years of schooling was more or less same. The frequencies of educational status have shown in Table 4.2

The information on the occupation of the patients revealed that majority of the patients (53%) were casual laborer. While the unemployed patients were 28%. Businessmen and employed constituted 6% and 8 % respectively. Only a few patients were engaged in agriculture. Detailed frequencies of patients by occupation have shown in Table 4.3.

Table 4.3 Occupation of the patients

Occupation	Total	%
1. Farmer	1	1
2. Casual laborer	51	53
3. Unemployed	27	28
4. Business man	6	6
5. Govt. employee	7	8
6. Vender	3	3
7. Others	1	1
Total	96	100

Income of the patients - about 33 % of the total patients reported that they had no earning. About 30 % of patients have income ranging from Baht. 2000-3999. 5% of the had monthly income ranging from Baht 6000 to 7999 per month and another 5% percent had income Baht 8000 and above. The mean (± Std deviation) income was Baht 2840. ± 3382 per month and median income per month was Baht 3000. In occupation, 28 patients were unemployed but in income reporting 31 patients had no income because few of the casual laborers seldom get work and they reported they had no income for several months. The range of income was wider (0-20000 Baht.). Median income was used in valuing the income foregone instead of mean income. The median income represented right value, if the income range was wider. The reported income of the patients was much lower than the minimum wage rate. The opportunity (time) cost of patients and care taker person was valued in monetary term using median income of the patients because their income assumed same. The real GDP per capita of Thailand was $ 3,986 (Human development report 1993). When compared TB patients' average income with real GDP per capita of national level, majority of the patients had income much lower than the real GDP per capita of Thailand. Distribution of patients by income groups have shown in Table 4.4.

Table 4.4 Monthly income level of the patients

Monthly income group Baht.	Total number	%
1. No income	31	33
2. 1 - 1999	4	4
3. 2000 - 3999	29	30
4. 4000 - 5999	22	23
5. 6000 - 7999	5	5
6. 8000 and above	5	5
Total	96	100

Range= 0 -20,000, mean = 2840, median 3000,sd +_ 3382.89

Findings from the above figure and fact:

- TB patients were both socially and economically from lower and disadvantage class.
- 25-34 age group population was more vulnerable to developing the disease.

4.2 Results of patients' behavior

The behavior of the sampled population had analyzed in term of the following items.

Initial choice of service point for consultation following the perceived symptom. About 32% of patients initially approached the drugs stores, about 28% of patients went to private clinics for care and BMA Clinics was visited by 23% of the patients, while only 11% patients initially visited to the TB clinics (Table 4.5). Drug store was a preferable service points prior to the formal care. No one approached the traditional healers.

Accessibility to the service points - Drug store was the nearest point (D = 0.95 KM). The average distance to the private clinic was relatively longer (D = 11.10 KM), distance to the BMA clinic (D = 6.5 KM). TB clinic of course was located at the longest distance an initially 11% patients visited to TB clinic.

Table 4.5 Initial choice of service points

Choice of Services at service point	Initially attended	%
Drug store	31	32
BMA clinic	23	24
Private clinic	27	28
TB clinic	10	11
Health center	5	5
Traditional healer	0	0
Total	96	100

The average travelling time taken for the patients to reach the drug store was 18 minutes, to reach BMA clinic and health center it was reported to take 44, 28 minutes respectively. Private clinics were situated on an average distance of 11.1 KM and to reach it took as long as 46.1 minutes. Time spent to reach the Chest clinic was longest (79.09 minutes).

Table 4.6 Mode of travel and average distance to the service point

Service points	Mode of travel					Average dist. KM ±STD
	Bus	Car	Taxi	Walk	other	
Drug store	5	3	0	23	0	$\bar{X}$ 0.95 ± 1.53
BMA Clinic	11	7	1	0	1	$\bar{X}$ 6.50 ± 6.77
Health center	4	0	1	0	0	$\bar{X}$ 4.40 ± 5.58
Private clinic	13	7	1	5	1	$\bar{X}$ 11.10 ± 4.33
TB clinic*	66	11	12	1	6	$\bar{X}$ 23.06 ± 22.71

* Attended all sampled patients.

The mode of travel was depended on the community and condition of the patients. About 35% of the patients reported to walk to the service points. Only 16% used bus to visit drug store. About 50%

patients used bus and 32 % used car to visit BMA Clinic. About 80% patients used bus to visit the health center, 48% patients used bus and 26% patients used car to visit private clinic. Among poor patients bus was popular and rich patients used car to travel to the service points (Table 4.6).

Reason for seeking care - Almost all patients (about 92%) complained to the TB clinic that they have chest pain and cough. Few patients have fever and lethargy.

Findings:

- Most of the TB patients like to visit the nearest service points.
- Most of the patients travelled to the service points by bus.
- Distance was not only the key factor in choosing service points, income of the patients and behavior of the provider (quality of care) are equally important factors.
- TB diagnosis and treatment service was not accessible to the grass level.

4.3 Result of patients' performance

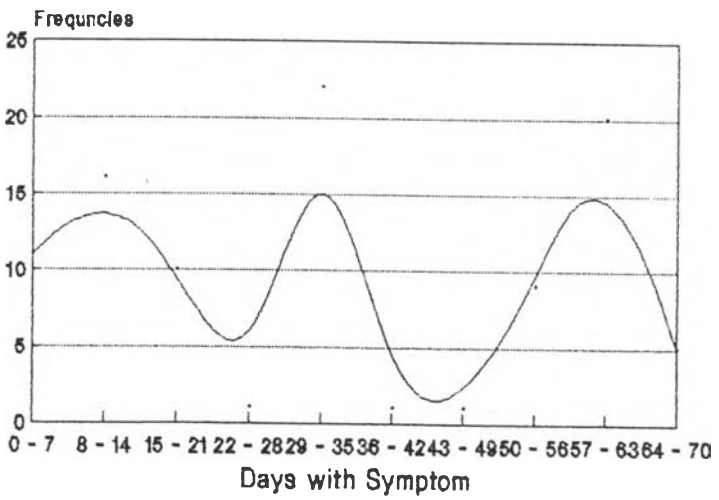
About 30 % patients reported to the TB clinic within 14 days of their perceived symptom(s) with 63% reporting within 5 weeks. The mean of patients' performance of all sampled population was 34 days (Sd± 21.53). The patients' performance is shown in Table 4.7.

Table 4.7 Patients' performance prior to the formal care.

Class intervals in days with symptoms	Total number	%
0 - 7	11	12
8 - 14	16	17
15 - 21	10	10
22 - 28	1	1
29 - 35	22	23
36 - 42	1	1
43 - 49	1	1
50 - 56	9	9
57 - 63	20	21
64 - 70	5	5
Total	96	100
Range = 0 - 70; mean = 33.96; sd± 21.53		

Assumed that the days with perceived symptom were normally distributed. The frequencies of the patients and days with perceived symptom were plotted in Figure 4.1 to see the shape of distribution.

Figure 4.1 Frequencies of days with symptom



The above Figure 4.1 showed that it was not under normal distribution. Which showed that there might be some reasons behind it. The possible reasons were: seasonality of disease, long public holidays, out reach clinic, subjectivity recall error. The reporting cases in Bangkok showed that there was no seasonality, there was no long public holidays and there was no out reach clinic in Bangkok. The another possible reason was subjectivity recall error. Data were checked and found that the frequencies of patients were 22 and 20 on 30th days and 60th days of their perceived symptom respectively. It showed that patients reporting was bias. They did not remember the exact days of perceived symptom. They reported their symptom in monthly unit. Therefore the rising and falling trend have seen in Figure 4.1.

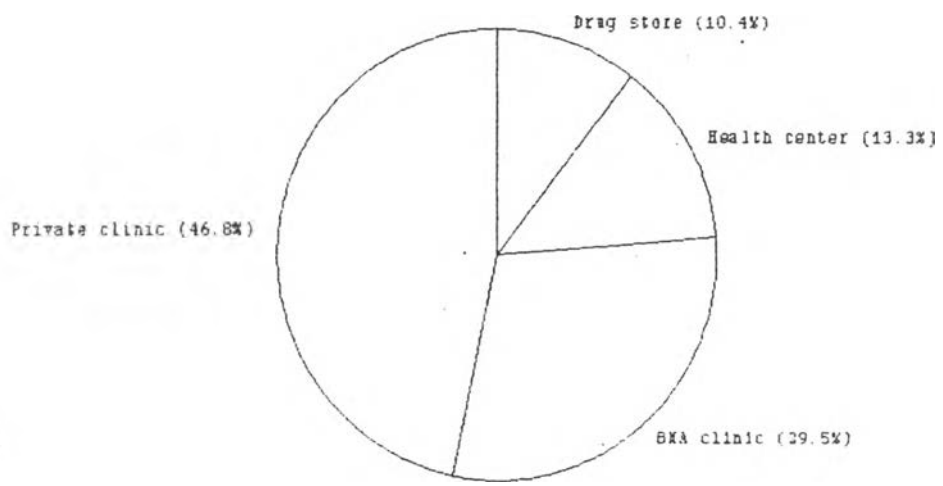
4.4 Result of cost analysis:

Patients' costs is an important component of aggregate costs. Patients' cost prior to the formal care is a part of total costs to the patients. Patients' cost is a major part of total community costs (Kamolratanakul 1989). Components wise cost analysis is helpful to minimize the cost because it identifies the costs which can be reduced or minimized. The average cost per patients of all services (mean) was Baht 1729 and median was Baht 129. The wide difference showed in the days of work lost because 59 % of the patients have no work lost due to illness or no sick leave before seeking care. Then the median days of work lost was 0. Similarly the patients who had no work lost, they can

care themselves therefore 59% patients need not have a person to take care of them. In this situation median value of care taker showed 0. The mode cost of these components were also 0. In the situation, where probability of incurring some cost components were about 0.41 (based on Table 4.8) The median and mode unable to show the real average though there was wide variation of costs. Mean was the only way to show the average cost.

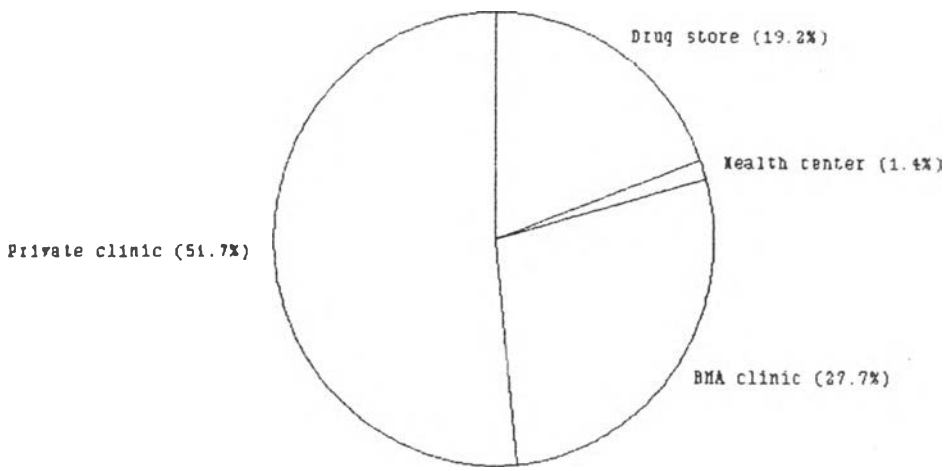
Travel fare - The average travel fare for all services was Baht 41. Travel fare comprised 10%, 30%,13% and 47% to forward and return journeys for drug store, BMA clinic, health center and private clinic respectively. A higher rate of travel fare reported by the patients seeking care from BMA clinic and private clinics might be due to the use of cars and taxi meters (Figure 4.2).

Figure 4.2 Distribution of travel fare by service points



Consultation and drug cost - The average consultation and drug costs of all service was B. 406.20. This accounts about 18% of total costs. When costs distributed for different service points and compared, the drug costs was as high as 51% in private clinics followed by BMA clinic (27%) and drug store (19%) of total drug costs. The distribution of consultation and drug costs has shown in Figure 4.3.

Figure 4.3 Distribution of consultation and drugs cost by service points



Travel time cost to the patients - The average travel time to all service points was 133.23 minutes (2.22 hrs). The average time costs of all service points was valued in average income foregone of the sampled population. The travel time cost on an average (mean) was Baht 32, and median cost is only Baht 19. The difference occurred due to the wide range of travel time, which comprised only 2.26% of total costs.

Days of work lost before seeking care and consequent economic cost determined based on the assumption that the days of work lost was not substituted and showed that an average of 7.19 days and Baht 829 respectively. The time cost of days of work lost comprised 48 % of the total cost. The mean cost of days lost was taken because median value of days of work lost was 0. Only 42 % patients have work lost before seeking care. The distribution of days of work lost have shown in Table 4.8.

Table 4.8 Distribution of patients by days of work lost

Days of work lost	Total	%
0	57	59
1 - 15	15	16
16 -30	11	11
31 and above	13	14
Total	96	100

It was an implicit phenomenon that the cost incurred for travelling to the service point by the patients remained to be the same for the accompanying person. Though the cost of household work was intangible for valuation, its value did not determine in this study.

Analysis of time cost in relation to the total cost showed that about 70% of the total cost constituted by the time cost. Thus the time cost ranks to be the major cost component for the patients.

Travel time cost for accompanying person travelling to the service point were as low as Baht 8, this low cost compared to that of patients was due to the fact that most of the persons accompanying the patients had no earning.

Time cost of taker person at home was about 22 % of total patients' costs. About 41% were in need of care taker particularly when they were ill. It was assumed that there was not surplus laborer to substitute their work. The detail components of costs have shown in Table 4.9.

In Table 4.9, major cost component was time cost. It comprised about 70% of the total patients perspective cost prior to the formal care. It identified the area where costs can be minimized. Time cost can be minimized by reducing the time (away from work due to illness and in accompanying with patients prior to the formal care).

Table 4.9 Patients perspective average costs by components

Cost components	Mean (Baht)	Sd. (Baht)	% of total cost
Direct costs to patients			
- Consultation & Drug cost (Explicit)	406	1142	23
- Travel fare (explicit)	41	76	2
Time costs			
- Waiting & service time costs (implicit)	--	--	
- Travel time cost (implicit)	32	44	2
- Days of work lost before seeking care (implicit)	829	1487	48
Sub total	1308		75
Indirect costs to patients			
- Travel fare (implicit)	47	132	3
Time costs			
- Travel time cost (implicit)	8	27	1
- Care taker time cost (implicit)	365	654	21
Sub total	420		24
Total	1729	± 2324	100

4.5 The relationship between performance of the patients and Costs to the patients prior to the formal care.

Costs can be reduced by earlier presentation at the TB Center. If there is a positive relationship between patients' performance (the days with symptom(s)) and patients' economic costs. A simple regression analysis had done to identify the relationship between patients' performance and cost to the patients prior to the formal care.

The objective of regression analysis was to identify the relationship between patients performance and cost to the patients by using the following formula.

$$y = a + bx$$

y = Cost to the patients

x = Patients performance (days with symptom)

Dependent variable = patients' perspective total cost in Baht.
Independent variable = patients' performance in days.

The result of the regression was as following (Table 4.10)

Table 4.10 Result of regression analysis 1

No of observation = 96

Variable	Coefficient	Std. error	T- test	2 - tail sig.
C	896.43	428.88	2.09	0.040
Patients performance	24.6	10.7	2.29	0.02

R squared 0.05,	mean of dependent var. 1729.67
Adjusted R squared 0.04,	s.d. of dependent var. 2324.44
	F- statistic 5. 27

Interpretation of result: - 2 tail significance showed that there was statistically significant relationship between patients' performance (days with symptom) and cost to the patients prior to the formal care. The F statistic valued 5.27 exceeded the tabulated value therefore it allowed the result.

R squared was the coefficient of co-relation and the another measure of how well y can explained by x. Here R squared was positive so there was positive relationship between patients' performance and costs to the patients. The R squared was 0.05, which was not significant thus only 5 % of the total variation of y (cost to the patients prior to the formal care) can be explained by x (patients performance prior to the formal care). Which was very low in proportion. The strength of regression is R squared, which was very low. There might be some other factors which affect costs other than days with symptom (patients performance).

A multiple regression analysis had done to identify the relationship between cost to the patients and other possible variable using the following formula.

$y = a + b_1x_1 + b_2x_2 + b_3x_3$

y = Cost to the patients prior to the formal care.

x_1 = Days with symptom.

x_2 = average number of visits of all services prior to the formal care.

x_3 = Monthly income of the patients.

Dependent variable = Costs to the patients prior to the formal care.

Independent variable = Days with symptom, no of visits, income of the patients.

The result of regression analysis was as follow (Table 4.11)

Table 4.11 Result of regression analysis 2

Number of observation = 96

VARIABLE	COEFFICIENT	STD	T- STAT.	2 TAIL SIG.
C	54.42	539.20	0.01	0.920
Days with symptom	30.53	11.01	2.77	0.007
No. of visit	113.00	101.49	1.11	0.269
Income of patients	0.13	0.07	1.97	0.051

R squared	0.11	Mean of dependent var.	1729.67
Adjusted R squared	0.08	SD of dependent var.	2324.44
		F Statistic	3.89

The 2 tail significance showed that there were positive relationship between costs to the patients and days with symptom (at 0.05 sign. level), within statistical limit there was also positive relationship between costs to the patients and income of the patients. F statistic tabulated value is 3.09 and it was significant. There was no significant (sig.0.269) relationship between cost to the patients prior to the formal care and number of visit before seeking formal care.

The R squared was 0.11 therefore only 11% of the variation of y can be explained by x_1, x_2, X_3,. R squared was positive therefore there was positive relationship between cost to the patients and monthly income of the patients. If income of the patients increased seek better care then the cost would be increased. If days with symptom increased the cost to the patients also increased. But the strength of R squared was low.

The cost to the patients might be affected by many variables which were not included in this study. The possible reasons were convenience of service point, better service. Assumed that TB patients and Malaria patients in Thailand in same income group and health care seeking behavior of both patients were same. Then better service, convenience of the service point affect choice of service points and costs (Kaewsonthi and Harding 1989).

Consultation and drug cost was a major explicit cost. The following regression analysis showed that within statistical limit there was significant relationship between consultation an drug cost, and number of visits. The drugs cost increase if number of visits increased. R squared was.03 therefore only 3% of the variation of consultation and drug cost can be explain by no. of visits.

Dependent variable = Consultation and drug costs
Independent variable = No. of visit

Result of regression analysis is shown in Table 4.12

Table 4.12 Regression analysis 3

No of observation 96

VARIABLE	COEFFICIENT	STD	T - STAT.	2 TAIL SIGN.
C	190.34	158.15	1.20	0.232
No.of visit	99.39	50.60	1.96	0.053

R squared 0.03	Mean of dependent variable	406.20
Adjusted R squared 0.02	SD of dependent variable	111.48
	F statistic	3.85

Findings:

- More than 70% of patient's perspective costs (prior to the formal care) was time costs.
- Patients have borne higher costs in compare to the income.
- Consultation and drugs costs was not a major component of total costs prior to the formal care.
- There was statistically significant relationship between patients' performance (days with symptom) and costs. But only 5% variation of costs to the patients prior to the formal care can explain by patients performance (days with symptom) because R squared was 0.05. There was subjectivity recall error in days with symptom then the relationship between patients' performance and costs might be affected by that error and there might be some other variables which affected patients costs prior to the formal care.

4.6 Discussion

Tuberculosis is a disease which affects to low socio-economic class. TB has high negative externalities and TB Control Service is a public goods. The best utilization of the available resources can be

achieved if total costs to the community is minimized. Patients costs comprised remarkable proportion of aggregate cost, therefore it is important to assess the patients costs. Patients' perspective cost especially prior to the formal care is burden to the patients without substantial benefit.

The result of this study showed that 64 % of TB patients have primary education. In the earlier result of the study (Kamolratanakul 1989) had shown that about 60 % patients had primary education. The result of this study supported the previous result.

The result of previous study (Jittinandana, 1985) had shown that 4/5 of the TB patients were from low income or without income. The present study supports the previous results.

This study result showed that majority of the TB patients like to visit to the nearest service points. But initial choice of service point was also affected by the quality of care. The patients who had higher income preferred to visit to further service points (Private clinic), Distance is not only the key factor to choose the service points.

This study showed that average patient's performance prior to the formal care was 33.9 days about 12 %, 16 %, 10 % and 1% of the patients attended at the TB clinic in 0-7, 8-14,15-21 and 22-28 days respectively. But 21 % of patients attended at the TB clinic ranged 57-60 days of their having symptom. While patients performance (days with symptom) and frequencies of patients plotted to see the shape of distribution of days with symptom. The figure showed that it was not under the normal distribution. There might be many reasons; seasonality, out reach clinic, long public holiday and subjectivity recall error. The reported cases showed that there was no seasonality, There was no out reach clinic in Bangkok and no long public holiday within that period. The researcher checked the all observations and found that there were 22 patients on 30th days of their perceived symptom and 20 patients were attended at TB Clinic on 60th days of their perceived symptom. It might be due to inexact remember of onset of symptom. They might be expressed the period at month instead of days.The patients performance in previous similar study (Kornkeo 1988) had shown that only 22% of patients come to the TB clinic within 5-12 weeks period. However this study result showed that patients' performance have improved in compare to the earlier study.

When compared the direct cost with indirect cost to the patients, direct cost to the patients was very high (75 %) and compared the explicit cost with implicit cost, explicit cost was only 30%.

The cost analysis of patients prior to the formal care showed that on an average patients' cost was Baht 1729. There were 28427 new TB patients in 1992 (Anual Report of Tuberculosis Division 1992), if the number remained same in 1995, in nation-wide patients incurred Baht 49,150,283 prior to the formal care. The following assumptions were

made in calculating the cost in nation-wide

Assumption:

- The income level of TB patients was same over the country.
- The incidence and prevalence of the direct smear positive (DS+ve) was same over the country.
- The health seeking behavior of the patients was same over the country.
- The distance to the particular service points was same over the country.

The result of the analysis showed that about 70% of the total costs to the patients was time costs. When the 70% of the total cost to the patients was time costs, cost can be minimized by reducing the time cost (away from work). The costs profile showed that major time costs was days of work lost due to illness before seeking care. Days of work lost comprised about 48% of the total costs.If we reduced the days of work lost, time cost can be reduced and subsequently the cost to the patients can be minimized.

The questions arise that how the days of work lost can be reduced? Days of work lost can be reduced by early case detection and treatment. Early case detection and treatment can be achieved if the TB services are accessible to the bottom level or knowledge of the people about TB increased.

TB case finding and treatment service can be accessible, if these services are decentralized and integrated into the health centers' activities. But if TB case finding and treatment services are decentralized, cost to the provider will be increased. It is imperative to know the proportion between provider's and patients' costs. According to the earlier study (Kamolratanakul 1989) showed that patients' costs during the diagnosis and treatment was 70% higher than provider costs in chemotherapy scenario. If both costs (prior to the formal care and during formal care) considered patients' costs will be much higher than providers' costs. In this situation, aggregate cost to the community can be minimized by reducing the patients' costs. If pool of infection cost and transmission cost considered, aggregate cost to the community can be reduced at lower level.

Another option is to intensify the health education, information and communication (IEC) it helps to increase the patients' performance. They will come to the clinic earlier for diagnosis and treatment. The probability of days of work lost will be lower. Thus the costs to the patients can be minimized. It also increases the providers' costs. By this option, it is expected that provider's costs will be increased at lower rate than decentralization. But the effectiveness of the health education should be evaluated.

The third option is semi-active case finding programme. Health volunteers are mobilized to collect the sputum specimens. Thorough this

means the time gap between perceived symptom and seeking care will be narrowed and days of work lost expected to be reduced. It will also increase the provider's costs because the opportunity costs of the volunteers' increase the economic cost to the programme.

The relationship between economic cost to the patients prior to the formal care and patients performance showed that there was statistically significant relationship between patients performance and economic cost at 0.05 significance level. Only 5% of the variation of the costs could explained by patients performance because the R squared was 0.05. Collected possible variables were put into the regression analysis and tested. There was significant relationship between patients' costs and monthly income of the patients. But income of the patients explained only 3% of the variation of the total costs because R squared was 0.03.

Then tried to explore the possible variables which were not included in the study. Assumed that TB patients and Malaria patients had the same income. The health seeking behavior of the both patients were same. Then from the earlier study (Kaewsonthi and Harding 1989) on the Malaria patients showed that convenience of the service, better service and previous perceived service can affect the choice of service points and the costs to the patients.