

UNIT COST AND COST RECOVERY ANALYSIS OF COMMUNITY HOSPITALS:
A CASE STUDY OF THONGSAENKHAN HOSPITAL

Mr. Kasame Tungkasamesamran

สถาบันวิทยบริการ

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By : Mr. Kasame Tungkasamesamran
Program in : Health Economics
Thesis Advisor : Assistant Professor Kaemthong Indaratna, Ph.D.

Accepted by the Faculty of Economics, Chulalongkorn University in Partial Fulfillment
of the Requirements for Master's Degree

.....Dean, Faculty of Economics
(Associate Professor Suthiphand Chirathivat, Ph.D.)

Thesis committee:

..... Chairman
(Assistant Professor Siripen Supakankunti, Ph.D.)

.....Thesis Advisor
(Assistant Professor Kaemthong Indaratna, Ph.D.)

.....Member
(Associate Professor Pongsa Pornchaiwiseskul, Ph D.)

.....Member
(Chairat Aemkulwat, Ph D.)



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This study intends to study the cost, revenue, unit cost, and cost recovery of
Thongsaenkhan community hospital in fiscal year 2000 from provider's perspective.

Total cost of Thongsaenkhan hospital was 28,892,655 baht. The proportion of capital,
labor and material cost was 38:37:25. The majority of hospital cost (67%) was paid by budget
revenue allocated from the government while 33% was paid by non-budget revenue. The
hospital spent about 87 % for curative care and 13 % for preventive care. Unit costs of OPD,
Dental clinic, Health promotion clinic and IPD were 266, 593, 1,138, and 4,215 baht per visit
consecutively. Total hospital revenue was 28,049,691 baht. Governmental budget was the
major source of hospital revenue (69%), while the non-budget source was only 31%. The
latter included payments from various health insurance/welfare schemes, user charges,
donation, and interest income. Total hospital cost recovery was 0.97 and non-budget cost
recovery was 0.30. The insurance scheme providing the maximum cost recovery was CSMBS
(1.37) while the minimum belonged to the underprivileged group (0.85).

With the universal coverage policy, Thongsaenkhan hospital cost recovery will be
lower than the situation in fiscal year 2000 (only 0.88). This means that the hospital may not
survive with the newly proposed capitation-based budget. Based on the break-even analysis
Thongsaenkhan hospital will survive with the capitation of 1,373.23 baht per head which is
higher than the proposed rate. Alternately, the size of registered population must be at least
37,857 people which is larger than that of Thongsaenkhan district.

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Contents

	Page
ABSTRACT.....	iv
ACKNOWLEDGEMENT.....	v
CONTENTS.....	vi
LIST OF TABLES.....	ix
LIST OF FIGURES.....	xii
ABBREVIATIONS.....	xiii
CHAPTER	
1. INTRODUCTION	1
1.1 Background and Rationale.....	1
1.2 Research Questions.....	7
1.3 Research Objectives.....	7
1.4 Scopes of the Study.....	7
1.5 Possible Benefit.....	8
2. LITERATURE REVIEW.....	9
2.1 Cost Allocation Method.....	9
2.2 Cost Recovery Analysis.....	12
2.3 Cost and Unit Cost Analysis.....	13
3. RESEARCH METHODOLOGY.....	19
3.1 Study Design.....	19
3.2 Study Population.....	19
3.3 Operational Definition.....	19

3.4 Conceptual Framework.....	20
3.5 Data Collection.....	22
3.6 Data Analysis.....	24
3.6.1 Unit Cost Analysis.....	24
3.6.2 Hospital Revenue Analysis.....	31
3.6.2 Cost Recovery Analysis.....	32
3.6.4 Sensitivity Analysis.....	36
4. RESULTS	37
4.1 Hospital Cost and Patient Utilization.....	37
4.1.1 Capital Cost.....	37
4.1.2 Labor Cost.....	40
4.1.3 Material Cost.....	42
4.1.4 Total Hospital Cost.....	44
4.1.5 Total Cost of Patient Service Cost Centers.....	47
4.1.6 Unit Cost and Patients Utilization.....	50
4.2 Hospital Revenue.....	51
4.3 Cost Recovery.....	54
4.4 Sensitivity Analysis.....	56
4.4.1 Unit Cost and Cost Recovery with Changing in Cost Component..	56
4.4.2 Hospital Cost Recovery with Various Changes in Hospital Revenues and Costs.....	57
4.4.3 Hospital Revenue and Cost Recovery with the Universal Coverage Policy.....	58
4.4.4 Break Even Analysis.....	62
5. DISCUSSION, CONCLUSION, AND RECOMMENDATIONS.....	64
5.1 Discussions and Conclusions.....	64
5.2 Policy Implications.....	73

5.3 Limitations.....	75
5.4 Further Studies.....	76
5.5 Recommendations.....	76
REFERENCES.....	78
APPENDICES.....	81
Appendix A: General Information of Thongsaenkhan Hospital and Uttaradit Provincial Health Office.....	81/1
Appendix B: Data of Cost, Unit Cost, Cost Recovery, and Other Health Economics.....	87
CURRICULUM VITAE.....	115



สถาบันวิทยบริการ
จุฬาลงกรณ์มหาวิทยาลัย

LIST OF TABLES

Tables	Page
1.1 Comparison of Revenue to Costs, 350 District Hospitals, Thailand, 1987-1988.....	2
1.2 Health Insurance Coverage of Uttaradit and Thongsaenkhan District In 1999	4
2.1 Summary of Unit Cost Analysis Study of Public Hospitals.....	17
3.1 Data Collection Methods.....	22
3.2 Allocation Criteria for Cost Allocation from NRPCC and RPCC.....	29
4.1 Capital Cost of Thongsaenkhan Hospital, Fiscal year 2000.....	37
4.2 Capital Cost of Each Cost Center, Thongsaenkhan Hospital, Fiscal year 2000.....	39
4.3 Component of Labor Cost.....	40
4.4 Labor Cost of Each Cost Center, Thongsaenkhan Hospital, Fiscal Year 2000.....	41
4.5 Sources of Funds Paid for Labor Cost, Thongsaenkhan Hospital, Fiscal year 2000.	39
4.6 Medical Materials of Thongsaenkhan Hospital, Fiscal year 2000.....	43
4.7 Top Five Non-medical Device Costs of Thongsaenkhan Hospital, Fiscal Year 2000.....	43
4.8 Components and sources of funds of Material Cost, Thongsaenkhan Hospital, Fiscal Year 2000.....	44
4.9 Material Cost of Thongsanekhan Hospital, Fiscal Year 2000.....	45
4.10 Total Direct Cost of Each Cost Center.....	46
4.11 Proportion of Sources of Resources (Budget and Non-budget revenue).....	46
4.12 Curative and Preventive Care Cost of Thongsaenkhan Hospital.	47
4.13 Direct and Indirect Cost of Each Cost Center.....	48
4.14 Direct and Indirect Cost of Each PS.....	49
4.15 Utilization and Unit Cost of Each PS and Total Hospital.....	48
4.16 Components of Unit Cost.....	51

4.17	Sources of Hospital Revenue, Fiscal Year 2000.....	51
4.18	Government Budget Support to Thongsaenkhan Hospital by Line Items, Fiscal Year 2000	52
4.19	Non-governmental Budget Revenue, and Governmental Budget Support.....	51
4.20	Hospital Cost Recoveries.....	54
4.21	Cost Recovery of Each Health Insurance Schemes, Fiscal Year 2000.....	55
4.22	Unit Cost and Cost Recovery of Total Hospital with Changing Scenario.....	57
4.23	Hospital Cost Recovery with Various Changes in Hospital Revenues and Costs....	57
4.24	Number of Responsible People for Preventive Care of Each Health Facility Level..	60
4.25	Utilization of the Underprivileged Groups in Each Health Facility Level.....	60
4.26	Estimated Revenue of Health Facilities under Universal Coverage Policy.....	61
5.1	Hospital Cost Studies of Three Community Hospitals	60
5.2	Cost Components of Capital Costs of Three Hospitals.....	67
5.3	Thongsaenkhan Hospital Capital Cost and Cost Recovery with Adjusted Capital Cost.....	67
5.4	Comparison of Workloads and Unit Costs of Three 30-bed Community Hospitals: Thoen, Maeai, and Thongsaenkhan Hospital.....	69
5.5	Sources of Funds, Insurance Payment Mechanism and Utilization of Service, Thailand, 1996.....	71
5.6	Comparison of Patients with Various Insurances between Two Hospitals.....	72
A.1	Workforce of Thongsaenkhan Hospital in Fiscal Year 2000.....	83
A.2	Workload of Thongsaenkhan Hospital during Fiscal Year 1997- 1999.....	83
A.3	DRGs Weight of each Group of Thongsaenkhan IPD, Fiscal Year 2000.....	84
A.4	Causes of Top Five OPD and IPD Cases of Uttaradit Province, Fiscal Year 1999...	85
A.5	Top Five Causes of Death (Uttaradit Province).....	85
A.6	Equipment and Building of Thongsaenkhan Hospital Acquired from Budget and Non-budget Revenue during 1998- 2000.....	86

B.1	Area and Building Cost of Each Cost Center in Thongsaenkhan Hospital, Fiscal Year 2000.....	88
B.2	Full Time Equivalent of Each Personnel.....	89
B.3	Type of Material and Sources of Funds for Payment, Fiscal Year 2000.....	93
B.4	Cost Allocation from Administration.....	94
B.5	Weight of Workload Done by Supply for Each Cost Center.....	95
B.6	Examples of Medical Treatment Set (Supply by A2), Clothes (Supply by A6), and Their Sizes.....	96
B.7	Criteria for Cost Allocation from Cleaning (A4).....	97
B.8	Criteria for Cost Allocation from Registration (A5).....	97
B.9	Weight of Workload Done by Laundry (A6) for Each Cost Center.....	98
B.10	Medical Charge to Patients of Each Outpatient Clinic (Supply by Pharmacy)...	99
B.11	Work of Laboratory Cost Center Done for Each Patient Service Cost Center: 1 Month (September 2000).....	100
B.12	Work of Laboratory Cost Center Done for Each Patient Service Cost Center: 1 Year (Fiscal Year 2000).....	102
B.13	Proportion of Work Done by X-ray for Patient Service Cost Centers.....	103
B.14	Cost Allocation with Step Down Allocation Method.....	104
B.15	Total 1 Month Charge of Each Clinic (September, 2000).....	105
B.16	Total 1 Month Charge of IPD (September, 2000).....	106
B.17	Financial Requirements for Implementing Universal Coverage.....	107
B.18	Capital Cost Record Form (for Equipment).....	109
B.19	Labor Record Form.....	110
B.20	Workload Collection Form.....	111
B.21	Summary of Working Hours for Each Cost Center.....	111
B.22	Health Expenditure (Current Price), 1986-1998.....	112
B.23	Comparison of Health Expenditure among Some Asian Countries.....	113
B.24	Growth of Real-term Expenditures of Drugs, Health and Gross Domestic Product, 1988- 1998	113
B.25	Allocation of Government Health Budget by Type of Service, 1993- 1999.....	114

LIST OF FIGURES

Figure	Page
1.1 Thongsaenkhan Hospital Structure.....	5
3.1 Conceptual Framework.....	21



สถาบันวิทยบริการ
จุฬาลงกรณ์มหาวิทยาลัย

ABBREVIATION

CC	Capital Cost
DC	Direct Cost
DRGs	Diagnostic Related Groups
FY	Fiscal Year
LC	Labor Cost
MC	Material Cost
TDC	Total Direct Cost
UPHO	Uttaradit Provincial Health Office
MoPH	Ministry of Public Health



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CHAPTER 1

INTRODUCTION

1.1 Background and Rationale

Health sectors in many countries today are facing with severe resource constraints and rising costs. The optimal use of resources requires clear and accurate information on resources flow, and on the impact of how resources affect on the quality and performance of health services. At the same time cost control is necessary and the responsibility of everyone who manages resources (WHO, 1992).

National health spending in Thailand had risen significantly during the past decade. The per capita health spending had risen nearly 9-fold (current price) from 545 baht (3.82% of GDP) to 4,663 baht (6.21% of GDP) during 1980-1998. The rate of increase is higher than the per capita GDP growth and higher than most developing countries and some developed countries in Asia.

Ministry of Public Health (MoPH) is the main provider of public health care services for Thai people by various levels of health facilities in every province of Thailand. During the economic crisis, the MoPH budget has declined from 66,544 million baht in fiscal year 1997 to 58,426 million baht in fiscal year 2000. The budget allocated to provincial level has also declined. While the limited resources are more, utilization of the patients has increased continuously. Hence, public health facilities are under greater pressure to control the cost and manage resources more efficiently. However, the public health sector must maintain its social objectives in providing affordable and good quality services to all. Therefore financial sustainability has become a major issue for hospital survival.

In the study in 350 district hospitals in Thailand during 1997- 1998, cost recovery on the extent of revenue generated in covering the operating cost of public hospital is about 50% (Pannarunothai et al, 1999) as shown in table 1.1. In general this value tends to be higher than other developing countries because the definition of cost recovery is including both out of pocket and revenue from existing insurance. In most developing countries where revenue component includes only out of pocket payment, therefore revenue over cost is much less than what is found in Thailand.

Table 1.1: Comparison of revenue to costs, 350 district hospitals, Thailand, 1987- 1988

	FY 1987	F Y 1988
Operating costs	1,781,362,000	2,050,304,000
Operating costs w/o labors	1,025,915,000	1,187,612,000
Net revenue	937,608,000	1,028,179,000
% of Operating costs	52.6%	50.2%
%of Operating Costs w/o labor	91.4%	86.6%
Accrual revenue	1,373,717,000	1,470,560,000
% of Operating costs	77.1%	71.7%
%of Operating cost w/0 labor	133.9%	123.8%

Source: Pannarunothat et al, 1999

The 50% cost recovery means that 50% have to be subsidized from other sources. Such low cost recovery can limit the population coverage and activities. With the current decentralization policy, the role of community hospitals is more important. Most community hospitals are encouraged to manage their own resources and to be more financially independent. With the new budget allocation criteria being based on the number of registered population, the hospital will need to compete for potentially registered population. Hence the hospital will have to improve health service quality in order to secure confidence of potential clients as a mean to increase the revenue. However to improve quality requires more resources for investments, and incentives for health personnel. It is essential for a community hospital to understand its current financial status in order to set policies and

strategies for hospital administration to respond to better prepare and respond for the changing environments.

Thongsaenkhan hospital, a community hospital in Uttaradit province, will experience similar phenomena. Hence it is necessary to assess the cost and revenue situation of the hospital in order to explore how the hospital may be affected by the new budget allocation approach within the decentralization policy.

Thongsaenkhan hospital:

Thongsaenkhan hospital is a 30-bed community hospital of Thongsaenkhan district which is a rather poor district. Most of the populations earn livings as agriculturiers. From Uttaradit Basic Needs census of year 1998, average yearly per capita income of Thongsaenkhan people was 7,435 baht, which was the fifth rank of the total 9 districts of Uttaradit province. There are six public health facilities in Thongsaenkhan district; one 30-bed community hospital, and five health centers. Infant mortality rates of Thongsaenkhan district in fiscal year 1998-2000 were 13.51, 24.69, and 0 per 1,000 live births. And maternal mortality rates were 0 per 100,000 live births for all three years. 83.24 percent of the populations were covered by various insurance schemes which 52 percent were the underprivileged groups as shown in table 1.2.

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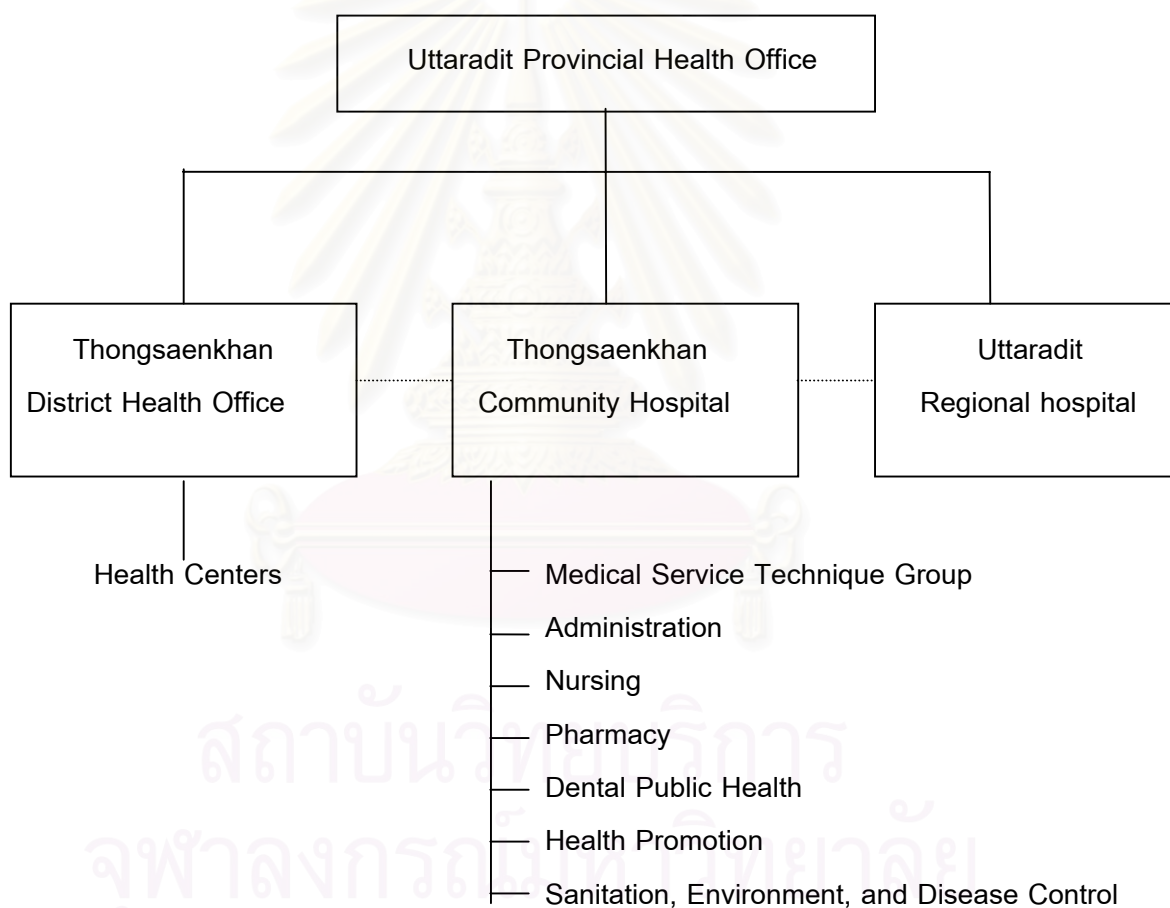
Table 1.2: Health insurance coverage of Uttaradit population, and Thongsaenkhan district in 1999

Type of health insurance	Uttaradit province (1999)		Thongsaenkhan district	
	Number	% of total	Number	% of total
		population		population
1. Underprivileged group				
- Poor card	75,312	15.54	7,959	27.76
- Elderly	46,500	9.59	2,771	9.67
- Children 0-12 years.	71,390	14.73	2,888	10.07
- Student gr.7-9	13,102	2.70	1,041	3.63
- Handicaps or cripples	1,968	0.41	170	0.59
- Veterans and families	1,127	0.23	112	0.39
- Buddhist monk and novices	1,066	0.22	62	0.22
Total	210,465	43.42	15,003	52.33
2. Voluntary Health Cards				
- General people	84,697	17.47		
- Community leaders	6,102	1.26		
- Voluntary health workers	27,518	5.68		
Total	118,317	24.41	7,947	27.72
3.CSMBS	45,147	9.31	745	2.60
4.Compulsory health insurance (SSS,WCF)	9,101	1.88	168	0.59
Total population under all schemes	383,030	79.02	23,863	83.24
Total population	484,737	100	28,666	100.00

Source: Uttaradit Provincial Health Office Annual Report, 1999
and Thongsaenkhan Hospital Annual Report, 1999

The responsibility of Thongsaenkhan hospital is to provide integrated public health care: health promotion, disease prevention and control, curative care and rehabilitation, and provide referral system for 28,774 people of the district (census data in year 1999), under Uttaradit Provincial Health Office administration and in collaboration with Thongsaenkhan District Health Office and Uttaradit regional hospital, as shown in figure 1.1.

Figure 1.1: Thongsaenkhan hospital structure



Note: Dense line is command line

Dotted line is collaboration line

Sources of Thongsaenkhan hospital revenue are governmental budget and non-governmental budget revenue. As a public hospital, the government has supported some budget for capital, labor and material. The hospital has also earned non-budget revenue from patients' direct payment by themselves or indirect payment by funds from various health insurance schemes, such as poor card, health card, underprivileged card, civil servant medical benefit (CSMBS), and social security schemes (SSS). Funds of these schemes are different in value per capita of registered people, range from 273 baht per head per year in the poor and underprivileged group to 2,230 baht per head per year in CSMBS group (Pannarunothai et al, 1999). The hospital can collect all non-budget revenues without reversion to central treasury.

From Thongsaenkhan Hospital Annual Report 2000, Thongsaenkhan has faced with the increasing number of patients' utilization, the number of OPD services has increased continuously from 40,927 in fiscal year 1998 to 47,527 in 1999 and 51,074 visits in 2000. On average the hospital occupancy rate is 80%. According to Declaration of Patients' Rights in 1998 and new constitution implementing, all Thai people have basic right to get health care services. So the hospital has a responsibility to provide health care services to all groups of patients with the same standard. For the patients who can not pay, the hospital has to bear the cost. With the trend of increasing patients' utilization under limited resources, the hospital has to evaluate how much and how well resources are allocated and used for providing services, in order to control the costs.

To manage efficiently, the hospital administrators have to analyze the cost, revenue and cost recovery of their hospital in multi-approaches and multi-dimensions in order to have data for decision making, budget allocation and planning for hospital activities and health care service quality improvement. Cost analysis data is also an important basic data used for setting appropriate hospital service charges, and potential study on cost effectiveness, cost benefit and cost utility analysis. Thongsaenkhan hospital has never done hospital cost recovery analysis before, and it is essential to analyze the cost, in order to have important

basic data as a stepping stone and a benchmark for hospital financial status assessment and sustainability improvement in the future.

1.2 Research Questions

Research question of this study is “What are the cost recovery and the unit cost of Thongsaenkhan hospital?”

1.3 Research Objectives

General Objective:

To analyze the cost, revenue, unit cost and cost recovery of Thongsaenkhan hospital.

Specific objectives:

1. To estimate direct, indirect, total cost of the hospital.
2. To measure the unit cost of each patient service cost center.
3. To identify cost structure of the hospital.
4. To assess the sources and levels of hospital revenue.
5. To analyze total hospital cost recovery and the cost recovery of each health insurance scheme.

1.4 Scopes of the Study

The scopes of this study focus on cost, revenue of Thongsaenkhan hospital in fiscal year 2000 (1st October 1999 – 30 September 2000) from the provider 's perspective, and the cost study is examined at the level of cost center rather than by specific services.

1.5 Possible Benefits

This study provides some data and some policy implications for hospital administrators in the followings:

1) The hospital administrators can understand hospital financial status in term of total costs, revenue, the amount and percentage of revenue supported by the government, and cost recovery. They can use these data to plan for cost containment, policy setting, new activity implementation and other decision-makings.

2) The hospital administrators can use unit cost information to improve efficiency of health service charge in different health insurance schemes.

3) The result of the study can identify the possible target groups of patients' scheme for marketing and equity purposes.

4) The hospital administrators can apply unit cost data of each activity as criteria to justify budget support from municipal or local administrative authorities.

5) The study can stimulate the need to improve hospital accounting system, which is essential for hospital planning, budgeting, and monitoring hospital performance improvement in relation to efficiency, equity, quality of services, and sustainability.

CHAPTER 2

LITERATURE REVIEW

In this study literature review is divided into three parts:

1. Cost allocation method
2. Cost recovery analysis
3. Unit cost analysis

2.1 Cost allocation method:

Cost allocation method is the method used for full cost determining and to show a process by which the expenses assigned to general service centers (patient service) are rearranged so as to determine the cost of providing direct patient care.

Broyles (1982) classified cost allocation methods into 3 methods.

1. Direct apportionment
2. Step down method
3. Double distribution method

Suver and Neumann (1981); Berman, Weeks and Kukla (1986) classified cost allocation methods from 3 to be 4 methods (adding Reciprocal methods for the forth method).
Summary of cost allocation methods is as followings.

1) Direct apportionment

The interdepartmental demands among the general service centers are ignored. Then the actual or expected costs assigned to the general service centers are proportioned directly to

the patient service centers. The major advantages of the direct apportionment method are its simplicity and the ease with which it is understood. The major disadvantage is that it fails to reflect interdepartmental exchanges among the general service centers.

2) Step down method

It provides for the allocation of the costs of general service centers to other general service units and in turn to the patient service or final cost centers. Under this method, the costs of the general service center serving the most departments (both general service and patient service) are allocated first. The costs of the general center serving the second largest number of departments are allocated next, and so on. If two departments serve an equal number of departments, another criterion such as relative costliness should be used to determine the order of apportionment.

The total cost of the first general service center is apportioned to each of other centers. Next, the total cost of the second general service center and the apportionment from the first to the second general service center are allocated to each of the remaining support centers and to the patient centers. The first general service center is closed and no allocation from other support centers to this unit is permitted under the step down method. Similarly, once the accumulated costs in the remaining centers are apportioned, these units are closed and no further allocations are made to them. This process continues until the total costs accumulated in the last general service center are apportioned directly to the patient service or final cost centers.

Although the step down method allows for a partial reflection of interdepartmental exchanges among general service centers, it can be criticized for failing to allow fully for all exchanges among the general centers. Thus, the step down method partially reflects interdepartmental demands among the general service units.

3) Double distribution technique

The double distribution method uses two rounds of allocations. This tends to overcome some of the weaknesses inherent in the step down method. In the first distribution, the costs assigned to the general service units are allocated to all the other departments (both general service and patient service) in accordance with measures of the relative demand exerted on the entity whose costs are apportioned. After the first distribution, the cost allocated to the general service units then are redistributed to the final cost centers using either the direct or the step down method.

Once the costs of a general service department have been apportioned, it is reopened and expenses from other general service units then are allocated to it. Each general service unit thus will have a positive balance at the end of the first distribution. These amounts reflect the interdepartmental exchanges among the general service centers. The residual costs remaining in general service department then may be allocated directly to the final cost centers using the direct method. The results under the double distribution method are more accurate than those of the direct or step down methods.

4) Simultaneous equation method (Reciprocal method)

This method uses infinite rounds of allocation until there is no cost left in that cost center. The calculation is done by computer program. The result under this method is the most accurate among the results of all methods. But the disadvantage is that it can not show how the cost of one cost center is allocated to other cost centers.

2.2 Cost recovery analysis:

There are some studies in cost recovery of medical equipment. Tangcharoensathien et al. (1994) studied the cost recovery of Extra Corporeal Shock Wave Lithotripter (ESWL) found that at Ramatibbodi Hospital was the highest total cost recovery ratio at 1.52, followed by the Veterans Hospital at 0.88. The average cost recovery ratio of other hospitals in Bangkok was about 0.14-0.38, the hospitals in the northeastern region was about 0.20- 0.31, and the lowest of total cost recovery ratio was in the Central Hospital in Bangkok at 0.14.

Harnvoravongchai et al. (1999) studied on cost recovery of Magnetic Resonance Imaging (MRI) and found that the average cost recovery in public hospital was 0.41, in private hospital 0.49, and private center 0.71. In the whole pictures, the hospitals could not recover the cost that they invested to provide the services.

Ngamsiriudom, Satiensakpong and Ngamsiriudom (1997) had prospectively studied unit cost and cost recovery of Chiangmai Maternal and Children Hospital. With integrated budgeting system made hospital account and finance rather complicated. Simultaneous equation method was applied for cost allocation.

They found that total hospital cost was 36,915,876 baht. The proportion of labor cost to material cost to capital cost was 6: 3: 1, which was the same as other studies such as the study of Wibulpolprasert et al in 1989 (proportion was 5: 4: 1), but different from the study of Wannawek in 1991 (proportion was 3: 6: 2), the study of Pongprasert et al in 1987 (proportion was 36: 59: 5), and the study of Public Health Planning Division in 1980 (proportion was 39: 49: 12).

They also compared unit cost among similar activity department such as among clinics

of OPD and among inpatient wards. The highest unit cost of OPD was adult clinic, and the lowest was ANC (antenatal care) clinic. The highest unit cost of inpatient wards was special post partum ward and the lowest was newborn ward. Although the characteristic of each clinic of OPD was rather similar, but resources used for setting up each clinic and details in health care cost such as medical cost were different. So in depth analysis should be applied for comparing efficiency among hospitals.

Cost recovery analysis was studied for cost recovery of each cost center in three dimensions; total cost recovery, recurrent or operating cost recovery and material or non-labor operating cost recovery. Revenue of each cost center was collected by investigate in each prescription and then compared to the cost. They found that among OPD clinics, the highest operating cost recovery was dental clinic (198.73 percent), and the lowest was well child clinic (55.33 percent). Total cost recoveries of OPD, IPD and total hospital were 36.57, 22.82, and 26.57 percent consecutively. Operating cost recoveries were 40.95, 25.26, and 29.52 percent, and material cost recoveries were 137.8, 82.13, 97.21 percent consecutively.

The results of this study were rather different to the real situation because government had supported some budgets for capital, labor and material cost. This study didn't include these budgets as hospital revenue. If they had added the budget supported from the government, the total hospital cost recovery would have been more than 97.21 percent.

2.3 Cost and unit cost analysis:

There are a number of cost analysis studies of many hospitals in Thailand. Public Health Planning Division, Ministry of Public Health (1980) had studied service cost of rural health facilities, they found that majorities of all hospitals costs were labor and material cost in the same proportion. The least part was capital cost. Labor cost was about 24-58%, material cost was about 27-53%, and capital cost was about 12.8-22.8%.

Kitteerawuttipong, Sribunroeng, and Thitirat (1998) had retrospectively studied operating cost of Maeai hospital, Chiangmai province. Only operating cost (labor and material cost) was collected and analyzed. They divided cost centers into NRPCC, RPCC, and PS. Step down method was applied for cost allocation. They found that cost center which had the highest total direct cost was administration, and the lowest was X-ray. Unit cost of OPD was 116.79 baht per OPD visit, of dental health was 500.05 baht per visit and of IPD was 286.45 per admission day or 1,330.13 per IPD case. The proportion of labor cost and material cost was 58.15: 41.85.

Pittayarungsarit et al (1998), had retrospectively studied fiscal year 1996 cost analysis of four community hospitals in Khonkaen province in fiscal (Health Care Reform Pilot Project in Field Model Development). Among four hospitals, two hospitals were 60 beds hospital (Nampong, and Pol hospital), and another two were 30 beds hospitals (Ubonrat and Poowiang).

Simultaneous method was used for cost allocation. Useful lives of building were 20 years, and of equipment were 5 years. For the resources, which were older, than the year specified, the cost was zero. Land was not included in capital cost. For this setting, it might make capital cost underestimated. Cost as a renting cost for these over-age capitals should be applied for cost calculation.

They found that the average unit cost of four hospitals for each patient service was as follows, 162 baht for OPD, 257 for ER, 206 baht for dental health, 123 baht for ANC clinic, 436 baht for family planning clinic, 96 baht per visit for well child clinic, and 769 baht per admission day or 1,767 baht per inpatient for IPD. The proportions of LC: MC: CC were 50: 41: 9, 56: 41:4, 37: 57: 7, and total cost of the hospitals were 35, 35, 28, 27 million baht for Nampong, Pol, Ubonrat and Poowiang hospital consecutively. Labor cost took the greatest part of hospital cost in 60-bed hospitals, and material cost took the greatest part in 30-bed hospitals. This was because of numbers and salaries of personnel were more in the bigger hospitals. With in detail analyses in labor cost, they found that 61-69 percent of the cost were civil servants' salary and permanent employees' wages (supported by the government), 9-11 percent were temporary

employees' wages (hospital budget), 17-22 percent were overtime incentives, and the rest was hospital welfare.

To compare among patient service groups, they found that 46-50 percent of hospital resources was used for IPD, 41-44 percent were used for OPD, dental health and ER, and only 7-10 percent was used for health promotion and community programs. The numbers here can provide hospital administrators to set budget for each activity of the hospital, which one should get more, depended on hospital policies.

They also analyzed for total district cost (combined both hospital and health centers cost). They found that 20 percent of resources were used for health promotion and community programs, 43 percent were used for OPD, and 37 percent were used for IPD. So, to increase productivity of the hospital is not the answer for increasing efficiency. Patient service distribution to health centers by referral system and health centers strengthening were the answer to increase efficiency of health care providers and also reduce the cost of the patients.

There are also many studies of the cost for each activity of the hospital, such as Silapat (1996) studied unit cost and cost recovery of traditional practice clinic in Payamengrai hospital, Chiangrai. She found that unit cost per visit was 92.46 baht. Total cost of this activity was 334,666.16 baht, and the proportion of LC; MC: CC was 7.39: 1: 1.01. Total program cost recovery was 33.19 percent. Material cost recovery was 312.15 percent. The result of the study could provide hospital administrators to compare between cost and benefit (both in money and other benefit term) and decide to promote this program or not.

Petchoo (1998) studied unit cost of patient referring (fiscal year 1996) in seven community hospitals in Phang-nga province. She found that patient referring unit cost were much different among hospitals, from 1,180 to 4,872 baht. Labor costs were about 30- 63 percent, and material costs were about 5-19 percent. The patient refer fee collected by most hospital, except Ko-yao hospital, was enough to pay for the material cost.

Unit cost of Ko-yao hospital was rather high because of the high capital cost; Refer Boat. Proportion of LC: MC: CC were 77:20:3 in year 1996 and 31:16:53 in year 1998; after Refer Boat was supplied by the government. To reduce the cost, she suggested that, by changing overtime payment system from whole month payment to be workload payment would reduce the cost 32 percent. And with refer Boat used for patient refer, to increase the fee to 1,000 baht was still not cover all operating cost. This study gave the administrator the ideal to manipulate the system and the effect of high cost equipment. But, to invest in health, only cost and cost recovery of the hospital is not the only essence to consider. The comparative summary of unit cost studies is shown in table 2.1.



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Table 2.1 : Summary of unit cost analysis study of public hospitals

unit: baht

Year	Researcher	Hospital	Allocation method	unit cost/visit	unit cost	LC:MC:CC
1987-1989	Jitchinakul	Loedsin	Stepdown method	OPD=90	IPD=26-391/day	36:59:05
1980	Karnchanakul et al	12 provincial hosp.	Double ditribution	OPD=37-86	IPD=193-248/day	36:49:12(medium size) 42:45:12(large) 35:53:12(extra large)
1986	Pongprasert et al	Lampang	Double ditribution	OPD=160	IPD=529/day	36:59:05
1986	Rungtanapirom et al	Suppasittiprasong	Double ditribution	OPD=39-180	IPD=212-1,602/day	43:55:02
1987	Tungcharoensatien et al	Trakarnpeutpol h. Srisaket h.	Double ditribution &Simultaneous eq.	OPD=72 OPD=85	IPD=550-1,216/case IPD=1,255/case	- -
1990	Wannawek	Chulalongkorn h.	Simultaneous eq.	OPD=242	-	26:55:19
1990	Chalapirom	Somdetchaopraya	Simultaneous eq. Operating cost only	OPD shychi=199 OPD neuro=567	IPD Psychi=123/day IPD Neuro=653/day	LC:MC=86:50
1991	Butsayapanpong	Chonburi	Double ditribution	OPD=110 ER=173	-	-
1995	Ngarmsiriudom et al	Chiangmai maternal and children h.	Simultaneous eq.	OPD- PED=148 -Adult=244 -OB GYN=127	IPD PED=1,992 IPD OB-GYN=5,170	6.2:2.7:1

Year	Researcher	Hospital	Allocation method	unit cost/visit	unit cost	LC:MC:CC
1996	Patcharanarumol	Khonkaen	Simultaneous eq.	OPD=236 Dental=553	IPD=1,242/day	48:45:07
1996	Pannarunothai	9provincial hospitals	Simultaneous eq.	OPD=380	IPD=987/day IPD=5,443/case	-
1996	Seelapat	Payamengrai	Direct allocation	Traditinal medicine OPD=91	-	7.4:1:1
1997	Kongsawat	16 community h. in 5 provinces	Simultaneous eq. ,only operating cost	OPD=119	IPD=696/day	52:38:10
1997	Kongsawat	7 provincial in 5 provinces	Simultaneous eq. ,only operating cost	OPD=236 dental=324	IPD=6,372/case	51:46:02
1998	Kitteerawuttipong	Maeai h.	Stepdown method	OPD=117	IPD=286/day	-
	et al			Dental=500		
1998	Sridaeng	Thoen	Simultaneous eq.	OPD=201 Dental=380	IPD=945/day	54:30:16
1999	Thantaristri	Bangpli	Simultaneous eq.	OPD=147 Dental=230 H.promotion=380	IPD gen.=1,173/day IPD pp=1,122	63:28:19

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Study Design

The research design of this study is a retrospective, descriptive study by analyzing cost and revenue in fiscal year 2000 of Thongsaenkhan Hospital.

3.2 Study Population

The population of this study is community hospitals in Uttaradit province. The sample in this study is Thongsaenkhan hospital, which is purposively selected.

3.3 Operational Definition

- **Cost recovery:** The ratio of the revenue to the cost.
- **Capital cost:** The costs of buildings, and equipment which have a life expectancy of 1 year or more which are used by the health services.
- **Labor cost:** The cost of wages and salaries including fringe benefits such as hospitalization fees, child school fees, child benefit allowance
- **Material cost:** The cost of resources that are purchased and used within one year including electricity, mailing and telephone charges.
- **Unit cost:** The cost per unit of health services
- **Hospital budget revenue:** The revenue supported from the government for capital, labor and material
- **Hospital non-budget revenue:** The revenue that the hospital earns from direct payment and from funds of various insurance schemes.

- **Break even point:** The point that hospital revenue equal to hospital cost or zero profit

3.4 Conceptual Framework

This study describes the components of hospital cost and sources of revenue and measure unit cost and cost recovery of the hospital as shown in figure 3.1.

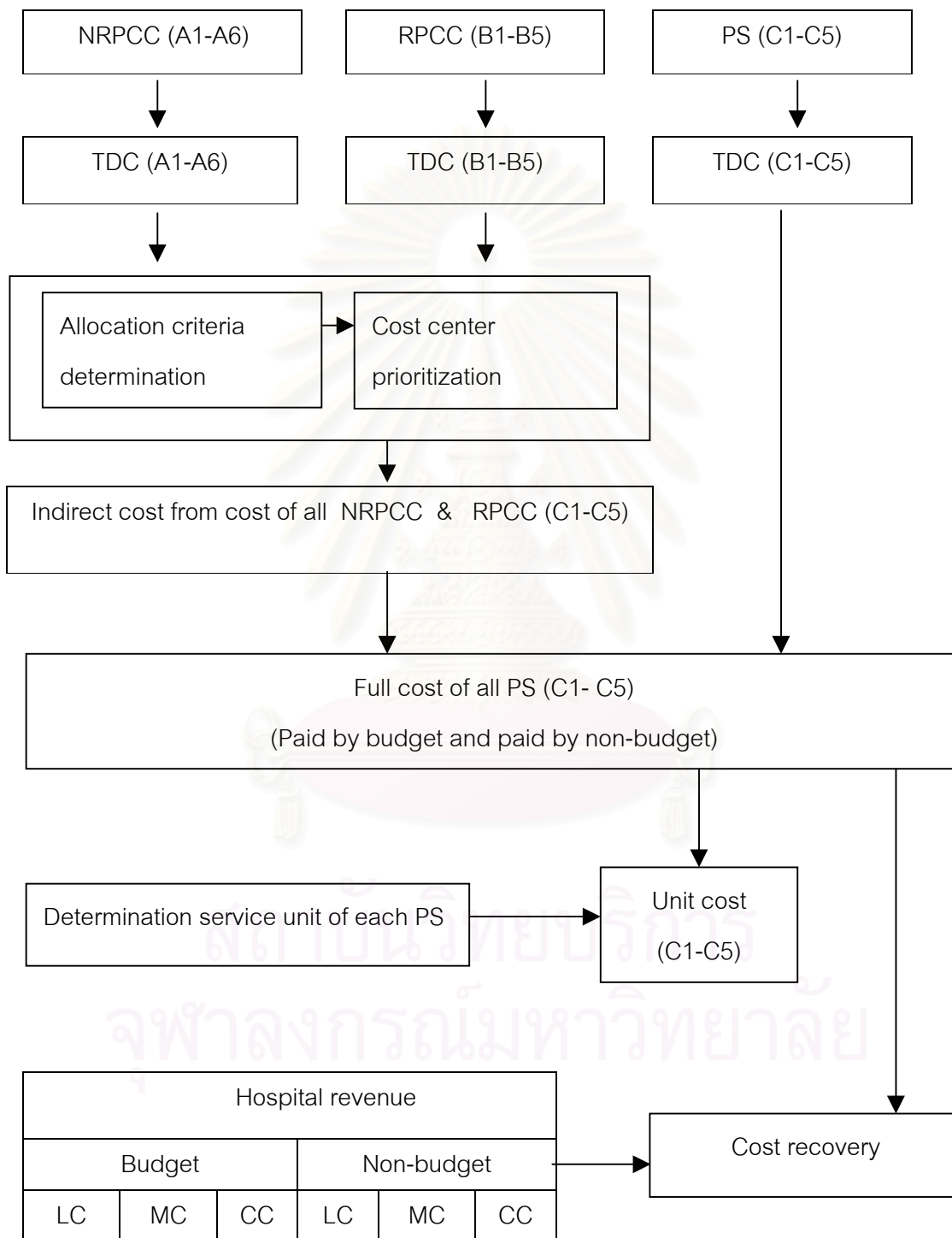
Total Cost and Unit Cost:

Costs of providing health care of each patient service center (total or full cost) are composing of direct and indirect costs. Direct cost is the cost of resources consumed by that patient service cost center (PS), and indirect cost is the cost, which derived by cost allocation from other non-patient service cost centers (NRPCC and RPCC). Cost components of each cost center are labor cost, material cost and capital costs. Unit cost of each patient service activity is derived by dividing full cost with number of unit of that specific patient service.

Hospital Revenue:

There are 2 sources of hospital revenue: governmental budget, and non-governmental budget (non-budget). Governmental budgets pay for some parts of labor, capital and material. The rests are paid by hospital non-budget revenue. Hospital non-budget revenue is derived from various mechanisms such as out of pocket or directly paid, and by other channels such as reimbursement from central treasury (IPD case of CSMBS), annual funds from insurance schemes, interests and donations from patients or communities. For directly paid non-budget revenue or out of pocket, it is from CSMBS (OPD case), and direct payment group.

Figure 3.1: Conceptual framework: Unit cost and cost recovery analysis of Thongsaenkhan Hospital with Step down allocation method



Cost Recovery:

Cost recovery is a comparison of revenue and cost. Cost recovery is identified in three forms of revenue: 1) total revenue sources, 2) non-budget only and 3) out of pocket revenue only. Cost recovery is also identified by three cost components: total costs, operating costs and non-labor operating costs. Lastly, cost recovery by insurance schemes is also determined in order to assess the capability to cover the cost.

3.5 Data Collection

3.5.1 Sources: The data were collected from two types of sources:

I. Primary data: Some labor cost and its allocation were collected from self record forms for job descriptions and health personnel's full time equivalent. The data calculation of fiscal year 2000. The data were based on a sample period of two weeks in February.

II. Secondary data: Material cost, capital cost, some labor cost, hospital charge, hospital revenue, and health services utilization were derived from hospital documentary review and database.

3.5.2 Methods of collection: The methods of collection are shown in table 3.1.

Table 3.1: Data collection methods

Objective	Variable	Unit/Scale	Data source	Instrument
Hospital cost	1 Labor cost -Salary &Fringe benefits	Baht /year	Primary data & Secondary data	-Interview -Self record form (diary) -Record form
	2 Material cost - Medical material - Non-medical material - Electricity - Telephone - Mailing	Baht /year	Secondary data	-Record form
	3 Capital cost -Equipment -Building -Long term training	Baht /year	Primary and secondary data	-Survey form -Record form
H o s p i t a l revenue	1 Budget revenue	Baht /year	Secondary data	-Record form
	2 Non-budget revenue	Baht / year	Secondary data	-Record form
Unit of services	1 Outpatient department	Visit / year	Secondary data	-Record form
	2 Dental clinic	Visit /year	Secondary data	-Record form
	3 Health promotion	Visit /year	Secondary data	-Record form
	4 Inpatient	-Case /year -Day / year -IPD severity unit	Secondary data	-Record form
P a t i e n t s characteristics	1 Payment mechanism or insurance scheme	- types	Secondary data	-Record form
	2 Number of patients with each insurance scheme	-Case / year -Day / year -IPD severity unit / year (Patients' severity level)	Secondary data	-Record form
Hospital charge	Charge to patients with each insurance scheme	Baht / month	Secondary data	-Record form

3.6 Data Analysis

3.6.1 Unit Cost Analysis

Unit cost analysis was following these steps:

1) Cost center identification and grouping

The cost centers were divided to non-revenue producing cost centers (NRPCC), and revenue producing cost centers (RPCC) and patient service cost center (PS) as followings.

I. *Non-revenue producing cost centers (NRPCC):*

These cost centers are the centers that support other cost centers to service patients. The outcomes of work are not directly related to patients. These cost centers don't produce revenue to the hospital. The lists of these cost centers are:

- 1) Administration (A1)
- 2) Central Supply (A2)
- 3) Catering (A3)
- 4) Cleaning (A4)
- 5) Registration (A5)
- 6) Laundry (A6)

III. *Revenue producing cost centers (RPCC):*

These cost centers provide services to the patients and can produce revenue from their services to the hospital. The lists of them are:

- 1) Pharmacy (B1)
- 2) Laboratory (B2)
- 3) X-ray (B3)

- 4) Labor room (B4)
- 5) Operating room (B5)

IV. *Patient service cost center (PS):*

These cost centers are the centers of providing patient services. The lists of them are:

- 1) Outpatient department or OPD(C1)
- 2) Dental clinic (C2)
- 3) Health promotion (C3)
- 4) Sanitation, environmental and diseases Control (C4)
- 5) Inpatient department or IPD (C5)

2) **Total Direct Cost Determination**

The total direct cost of each cost center comprises labor cost, material cost, and capital costs of each cost center. Sources of money paid for these costs were also determined as governmental budget (budget) and non-governmental budget (non-budget) hospital revenue.

I. *Capital cost:*

The capital cost is cost of resources that have a useful life of 1 year or more. Capital cost consists of two components. One is the opportunity to invest the sum in some venture yielding positive benefit. It is usually valued by applying an interest rate to the amount of capital invested. The other component of capital cost is the depreciation over the time of the asset itself. These include the cost of buildings, equipment, vehicles and long term training costs. The prices of land, fence and roads are not included in this study. Capital costs were collected by health personnel of each cost center and then were checked to the equipment register of administration cost center.

The prices of equipment and buildings were calculated from the purchased prices to be the prices in year 2000 or assessed from price list that could be purchased in year 2000. For the ones that were not included in the price list, the technician or purchasing personnel would assess their prices. The capital prices in year 2000 were calculated from the purchased price in year t by the following formula.

$$C_{2000} = C_t (1+r)^{2000-t}$$

Where; C_{2000} = the value of the capital in year 2000

C_t = the purchased value of making or buying the capital in year t

r = discount rate at the specific period

t = the year that the capital was bought or completed

Discount rate used to calculate the capital cost in this study was the World Bank discount rate of 10%, which is generally used to calculate the capital cost (Creese and Parker, 1994).

Depreciation value of capital or annual cost was then calculated by dividing value in year 2000 of the item by the annualization factor obtained from the table or by multiplying the value in year 2000 of the item to the factor obtained from the annualization formula as the following equations.

$$\text{Annual economic cost} = \text{Current value} / \text{Annualization factor.}$$

Annualization factor; the factor used to determine how much one received or paid annually for x year is worth today, was applied from standard table. Useful life and discount rate were defined first, and then annualization factor value from was defined (Creese and Parker, 1994). The same as many studies in Thailand such as Karnchanakul (1983), Tungcharoensatian (1998), Pittayarungsarit (1998) and Wibulpolprasert (1999), the useful lives used in this study were 20 years for buildings, and 5 years for equipment and vehicles.

The equipment with older age than their useful lives, in some studies, their values are zero. But in this study, their values were assessed as the cost to rent that equipment.

II. *Material cost:*

Material costs are the costs of resources that are purchased and used within 1 year. Material costs in this study are stationery, medicine, medical device, laboratory device and reagent, x-ray film and reagent, dental device, food, vehicle maintenance, electricity, fuel, mailing, telephone, short-term training, and wages for some jobs such as for gardening maintenance.

The data were collected from material disbursement records from all hospital inventories such as pharmacy, medical device, administration, dental material, x-ray and laboratory inventories.

The cost electricity was distributed to all cost centers by proportion of area of each cost center. The telephone cost was distributed by the number of personnel of each cost center. Mailing and fuel costs were distributed to A1.

III. *Labor cost:*

Labor costs in this study are costs of wages, salaries and various types of fringe benefits. Fringe benefits are per diem, overtime payment, incentives for non-private practice, allowance for evening and night shift personnel, social security contribution (for temporary employees), child school fees, child benefit allowance, and civil servant medical benefits (hospitalization fee). The data were collected from hospital account, hospital financial reports, hospital annual reports and others.

All sources of funds for purchasing or paying for material, capital and labor were collected as budget and non-budget sources in order to assess how much the proportion between budget and non-budget sources.

3) Allocation Criteria Determination

All total direct costs of non-revenue producing cost centers (NRPCC) and revenue producing cost centers (RPCC) are allocated to be indirect costs of patient service cost centers (PS). Costs are allocated by step down method. The allocation criteria used for cost allocation are shown in table 3.2.

4) Prioritization of cost centers (NRPCC and RPCC)

NRPCC and RPCC were prioritized according to the number of other cost centers served by a specific cost center. The cost center providing services to the highest number of cost centers is the first priority to be allocated. The one that provides services to the least number of cost centers is the last priority to be allocated. The priorities of all non-PS cost center to be allocated are as followings.

1. Cleaning: Thongsaenkhan hospital had contracted out a cleaning company for all office areas.
2. Administration
3. Laundry
4. Central supply
5. Registration
6. Pharmacy
7. Laboratory
8. X-ray
9. Catering
10. Labor room
11. Operating room

Table 3.2: Allocation criteria for cost allocation from NRPCC and RPCC

Cost Centers	Allocation criteria
<u>1. NRPCC</u>	
1.1 Administration	- 50% by proportion of full time equivalent (FTE) of each cost center - 50% by proportion of total direct cost of each cost center
1.2 Central supply	- Proportion of relative weight of material supplied to each cost center
1.3 Catering	- For IPD only
1.4 Cleaning	- Proportion of areas of each cost center
1.5 Registration	- Proportion of visits of each PS for OPD, number of IPD cases
1.6 Laundry	- Proportion of relative weight of clothes and gloves supplied to each cost center
<u>2. RPCC</u>	
1.1 Pharmacy	- Proportion of one month charges of medicine for patients of each PS
2.2 Laboratory	- Proportion of one year charges of laboratory service for patients of each PS
1.2 X-ray	- Proportion of one year charges of X-ray service for patients of each PS
2.4 Labor room	- For IPD only
2.5 Operating room	- For IPD only

5) Allocation of direct costs of NRPCC, RPCC to PS

Costs of NRPCC and RPCC were allocated one by one. After allocation of each cost center, that cost center was closed because all costs were allocated to other cost centers. Finally, all costs of NRPCC and RPCC were allocated to all PS.

6) Full Cost or Total Cost Determination

The full costs of each patient service cost center were calculated from the summation of direct cost and indirect cost.

7) Unit cost calculation.

Units of patient service cost centers were as followings.

1. Unit of Outpatient department (C1): Numbers of visits of outpatients in year 2000
2. Unit of Dental clinic (C2) : Numbers of visits of patients in year 2000
3. Unit of Health promotion (C3) : Numbers of visits of patients in year 2000
4. Unit of Inpatient (C5) : Number of inpatients,
Number of inpatients' days,
Estimated severity level of diseases (DRGs
units of total inpatients in year 2000)

According to MoPH guideline, severity level of diseases of total inpatients in year 2000 were estimated from DRGs unit per inpatient of year 1999 multiply with number of inpatient in year 2000. For example, DRGs relative weight of Appendectomy without complication and comorbidity is 1.29, while DRGs relative weight of Appendectomy with complication and comorbidity is 1.38 (Health insurance office, 1998).

5. Unit of hospital service : Number of patients serviced by the hospital

Unit of Sanitation and diseases control (C4) was not analyzed in this study. Because the activities of C4 were preventive health services in the community.

Unit costs by patient service cost centers were calculated from the following formula.

$$\text{Unit cost} = \text{Total cost at PS} / \text{Units at PS}$$

$$\text{Unit cost of total hospital} = \text{Total hospital cost} / \text{Number of patient visits}$$

3.6.2 Hospital revenue analysis: Sources and levels

Hospital revenues were collected by sources with different payment mechanisms.

Hospital revenue derives from the following sources:

1) Budgets: This source of revenue was supported from the government for capital cost, labor cost, and material cost. The budgets are supported for all hospital activities and for specific programs.

2) Non-budget revenue: This source of revenue was from various health insurance schemes and direct payment (out of pocket). Sources of non-budget revenue are as followings:

1. Health Card Scheme
2. Underprivileged Group Insurance Scheme (comprises the poor, the elderly, children <12 years, grade 7-9 students, war veterans, the disabled, Buddhist monks and novices)
3. Social Security Scheme and Workmen Compensation Fund
4. CSMBS (civil servant medical benefits scheme which for civil servants and state enterprise employees): Paid directly to the hospital for OPD cases and reimbursed from the government for IPD cases.
5. Road Traffic Accident Insurance scheme
6. Direct payment: from fees for service that patients pay for health care services.
7. Donation: Community and patients' contribution for health care services such as for IPD and OPD services, and for charitable purposes (raise hospital revenue to serve the poor or to run hospital activities).
8. Interest of hospital account.

Directly paid non-budget revenue or out of pockets are from CSMBS (OPD case), and direct payment group.

3.6.3 Cost recovery analysis

Steps for analysis were as following:

1) Cost determination:

Hospital cost was determined in two levels:

- 1) Total hospital cost:
- 2) Hospital cost by schemes:

1) **Total hospital cost:** It was mentioned already in total direct cost determination

2) Hospital cost by schemes:

Determination of hospital cost by schemes was under the assumptions that (1) the cost of each patient treatment was the same proportion to the charge of treatment and (2) the charges of all patients with various schemes were under the same standard. The whole year costs of services for each insurance scheme's patients were assumed from one-month service charges (collected from patients' prescriptions and inpatients' medical records of September 2000) as followings.

I. Calculation of average charge per patient with specific scheme:

Average charge of patient of each scheme

$$= \frac{\text{One month charges of total patients of the scheme}}{\text{No.of patients of the scheme in that month}}$$

No.of patients of the scheme in that month

II. Estimation of total charges per year of each scheme:

Total yearly charges of patients of a scheme

$$= \text{Average charge} \times \text{Total yearly number of patients of the scheme}$$

III. Total hospital charges identification:

All charges of patients' insurance schemes were calculated and summed as the total hospital charges.

IV. Yearly cost of each scheme estimation:

Based on the assumption 1 and 2, cost of each insurance scheme can be based on the total hospital cost over total hospital charge. Therefore cost of each scheme can be estimated from the following formula.

$$\begin{aligned} \text{Estimated yearly cost of each scheme} \\ = \frac{\text{Yearly charge of the scheme} \times \text{Total hospital cost}}{\text{Yearly total hospital charges}} \end{aligned}$$

2) Hospital revenue identification: As indicated in 3.6.2 hospital revenue analysis

3) Determination of revenue by scheme :

Revenue of each insurance scheme was from 1) budget and 2) non-budget (direct payment and funds from various health insurance/ welfare scheme)

As a public hospital, governmental budget supports health care services to all patients under all insurance/ welfare schemes. Since budget support can not be readily divided for each insurance scheme, the criteria to allocate budget to each scheme needed to be set. In this study, with the assumption that governmental budget was supported to patients equally with the same proportion to the charge of treatment. Hence, budget revenue was distributed to each insurance scheme by the relative weight of yearly total charges of patients' services of each scheme.

Budget for each scheme

$$= \frac{\text{Total hospital budget revenue} \times \text{Estimated yearly total charge of the scheme}}{\text{Estimated yearly total hospital charge}}$$

Total revenue of each scheme = Budget + Non-budget revenue

4) Cost recovery calculation:

Cost recoveries were calculated from the following formula.

$$\text{Cost recovery} = \text{Revenue} / \text{Cost}$$

Cost recovery is a comparison of revenue and cost. Cost recovery is identified in three forms.

- 1) The hospital revenue includes both budget and non-budget revenue.
- 2) The hospital revenue is from non-budget revenue only.
- 3) The revenue is from directly paid revenue only.

If the government can not support budget to the hospital and altogether with the collapses of all health insurance schemes. Then revenue from directly paid is the indicator for hospital financial sustainability, hence, survival.

In each form, cost recoveries are analyzed in 3 levels of costs. Cost recovery is also determined in term of total operating cost recovery, operating cost recovery and non-labor operating cost recovery in order to assess the capability of the hospital to earn revenue to cover three levels of hospital costs as followings:

1) Total cost recovery:

$$= \text{Revenue} / \text{Total hospital cost}$$

Total revenue is from all budgets and non-budget revenue.

2) Operating cost recovery:

$$= \text{Revenue} / \text{Hospital operating cost}$$

Operating cost is from labor and material cost.

3) Non-labor operating cost recovery or material cost recovery:

$$= \text{Revenue} / \text{Hospital material cost}$$

Non-labor operating cost is the operating cost excluding labor cost, which is material cost alone.

Lastly, cost recoveries of all insurance schemes are assessed in order to determine differences of cost recoveries among various schemes. Cost recovery of each insurance scheme was calculated from the following formula.

$$\text{Cost recovery} = \text{Total revenue of each scheme} / \text{Total cost of each scheme}$$

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3.6.4 Sensitivity analysis

Sensitivity analysis is performed in various scenario settings under the assumption that the others remain stable. Sensitivity is analyzed as followings.

I. Unit cost and cost recovery with changing in cost components

Unit costs of all PS, total hospital and hospital cost recovery were determined with various scenario settings: changing of material cost and labor cost.

II. Hospital cost recovery with various changes in hospital revenues and costs

Hospital cost recovery was analyzed when there were changes of hospital revenue components and hospital cost.

III. Hospital revenue and cost recovery with the universal coverage policy.

Hospital revenue and cost recovery with the universal coverage policy were analyzed in order to assess the effects of the policy to hospital financing.

IV. Break even analysis

Break even analysis is the analysis of break even point where hospital revenue is equal to hospital cost. Break even analysis was calculated in two aspects:

1. Budget per capitation that provides total hospital cost equal to total hospital revenue.
2. Number of population that provides total hospital cost equal to total hospital revenue (under 1,197 baht per capitation).

CHAPTER 4

RESULTS

This chapter provides the results as well as discussions. The results follows the conceptual framework of the study and are presented in four parts:

- (1) Hospital cost and patients utilization
- (2) Hospital revenue
- (3) Hospital cost recovery
- (4) Sensitivity analysis

4.1 Hospital cost and patients utilization

4.1.1 Capital cost

Total capital cost of Thongsaenkhan hospital in fiscal year 2000, was 10,965,209.63 baht. The components of capital costs were 37.87% from equipment, 59.09% from buildings, and 3.04% from long term training cost as shown in table 4.1

Table 4.1: Capital cost of Thongsaenkhan hospital, fiscal year 2000

Equipment cost	Buildings cost	Long term training	Total capital cost
4,152,858.15	6,479,631.48	332,720.00	10,965,409.63
37.87	59.09	3.04	100.00

As a public hospital, the government has supported some budgets for hospital cost. The sources of funds paid for capitals were 9,669,189.75 baht (88.18%) from budget revenue and 1,296,019.88 baht (11.82%) from non-budget revenue. Total equipment cost was

4,152,858.15 baht with 69.13% (2,870,674.12 baht) paid by budget and 31.21% (1,296,019.88 baht) paid by non-budget revenue. For all of the building costs (6,479,631.48 baht) and all long term training costs (332,720 baht) were paid by budget revenue as shown in table 4.2.

Administration (A1) was the cost center with the highest capital cost (5,844,097.65 baht or 53.3%) Most of A1 capital costs were from building cost (70.07% of total building cost) because it provided infrastructure of the hospital such as electricity, water supply, sewage treatment, personnel's' residence, and other recreation supports. Catering (A3) and Cleaning (A4) were the two with least capital costs (56,722.60 baht or 0.52%, and 61,595.85 baht or 0.56%, respectively), because the hospital had contracted out cleaning and catering to private companies, therefore the capital costs were quite low (no equipment cost of A4). The distribution of capital costs to each cost center is shown in table 4.2.



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Table 4.2: Capital cost of each cost center, Thongsaenkhan hospital , fiscal year 2000

Cost center	Equipment cost				Buildings cost		Long term training	Total Capital cost	Total Capital cost	Total	
	Non-budget	Budget	total equip.cost	%	Budget	%	Budget	Non-budget	Budget	Capital Cost	%
A1	181,697.46	789,265.94	970,963.40	23.38	4,540,414.25	70.07	332,720.00	181,697.46	5,662,493.64	5,844,191.10	53.30
A2	29,852.54	156,877.00	186,729.60	4.50	101,501.89	1.57		29,852.54	258,385.01	288,237.55	2.63
A3	12,619.36	4,197.20	16,816.56	0.40	39,906.04	0.62		12,619.36	44,104.26	56,723.62	0.52
A4	-	-	-	-	61,595.85	0.95		-	61,596.80	61,596.80	0.56
A5	50,810.37	6,530.36	57,340.73	1.38	23,107.25	0.36		50,810.37	29,639.35	80,449.72	0.73
A6	95,597.12	18,491.69	114,088.80	2.75	45,778.72	0.71		95,597.12	64,273.85	159,870.97	1.46
B1	76,338.61	6,361.98	82,750.59	1.99	240,953.68	3.72		76,338.61	247,371.37	323,709.98	2.95
B2	149,239.23	107,745.50	256,984.70	6.19	43,903.78	0.68		149,239.23	151,656.12	300,895.35	2.74
B3	1,859.64	317,128.39	318,988.03	7.68	57,768.13	0.89		1,859.64	374,905.09	376,764.73	3.44
B4	119,807.70	94,006.60	213,814.30	5.15	97,050.47	1.50		119,807.70	191,063.72	310,871.42	2.84
B5	8,011.33	241,694.70	249,706.10	6.01	41,593.06	0.64		8,011.33	283,294.48	291,305.81	2.66
C1	195,884.13	310,439.17	506,623.23	12.20	310,792.57	4.80		195,884.13	621,531.67	817,415.80	7.45
C2	62,224.95	429,329.40	491,554.40	11.84	89,941.90	1.39		62,224.95	519,284.57	581,509.52	5.30
C3	82,522.48	146,187.80	214,524.40	5.17	184,787.55	2.85		82,522.48	316,797.49	399,319.97	3.64
C4	31,702.72	753.69	32,456.41	0.78	75,283.82	1.16		31,702.72	76,039.45	107,742.17	0.98
C5	197,852.24	241,664.70	439,516.90	10.58	525,252.52	8.11		197,852.24	766,935.87	964,788.11	8.80
Total	1,296,019.88	2,870,674.12	4,152,858.15	100.00	6,479,631.48	100.00	332,720.00	1,296,019.88	9,669,389.75	10,965,409.63	100.00
(1)	31.21	69.13	100.00								
(2)			37.87		59.09		3.04			100.00	
(3)								11.82	88.18	100.00	

- (1) is %of equipment cost by budget and non-budget revenue, (2) is % of each component of capital cost, (3) is the % of total capital cost paid by budget and non-budget revenue.

4.1.2 Labor cost

Total labor cost of Thongsaenkhan hospital in year 2000 was 10,580,224.56 baht. The components of labor costs were 7,083,226.98 baht (66.95%) from salaries and wages, and 3,496,997.58 baht (33.05%) from fringe benefits as shown in table 4.3

Table 4.3: Component of labor cost of Thongsaenkhan hospital, fiscal year 2000

Salaries and wages		Fringe benefits		Total
Total	%	Total	%	
7,083,226.98	66.95	3,496,997.58	33.05	10,580,224.56

The two major fringe benefits were non-private practice incentive (10.25%) and overtime allowance (10.16%). The rests were social security contribution (0.34%), position benefit allowance (0.26%), per diem (5.26%), allowance for evening and night shift (2.85%), hospitalization fee or civil servant medical benefit (3.74%), child school fee (0.17%) and child benefit allowance (0.01%). The hospitalization fee (CSMBE) was lower than it should be, because the data collected could not be totally collected (especially for hospitalization fee of admission). Labor cost of each cost center is shown in table 4.4.

OPD (C1) was the cost center with the highest labor cost (26.19% or 2,770,544.71 baht), and Cleaning (A4) was the one with the least (0%). C1 contains high labor cost because it provided the highest workload of patient services and works for 24 hours a day. A4 contained zero labor cost because the hospital had contracted out hospital cleaning to a cleaning company.

The major source of funds paid for labor costs was budget revenue (7,806,672.8 baht or 73.79%), and the rests were paid by non-budget revenue (2,773,551.76 baht or 26.21%) of the total labor cost, as shown in table 4.5.

Table 4.4: Labor cost of each cost center, Thongsaeankhan hospital, fiscal year 2000

Cost	Salary and wage	SSS contribution	Position Benefit allowance	Non-private practice incentive	Perdiem (monthly) allowance	Perdiem (regular)	Overtime	Allowance for Evening, night shift	CSMBS (hospitalization fee)	Child school fee	Child benefit allowance	Total	%
enter	Total	Total	Total	Total	Total	Total	Total	Total	Total	Total	Total		
A1	1,492,461.80	13,578.00	16,800	156,633.81	31,723.40	88,610.01	52,850.00	-	97,230.11	16,452	600	1,966,939.13	18.59
A2	105,463.05	100.80	-	-	-	10,380.39	10,200.00	-	9,738.64	-	-	135,882.88	1.28
A3	6,672.00	-	-	-	-	95.25	-	-	127.25	-	-	6,894.50	0.07
A4	-	-	-	-	-	-	-	-	-	-	-	-	-
A5	405,840.00	1,644.30	-	-	-	11,126.20	59,888.75	-	38,583.40	-	600	517,682.65	4.89
A6	111,712.55	1,243.20	-	-	-	3,981.44	10,200.00	-	6,446.37	-	-	133,583.56	1.26
B1	456,141.60	-	-	144,666.67	38,320.00	28,400.85	47,050.00	-	35,834.05	136	-	750,549.17	7.09
B2	188,772.80	-	-	-	-	4,971.22	11,775.00	-	12,976.92	982	-	219,477.94	2.07
B3	140,542.08	-	-	-	-	10,485.95	14,375.00	-	1,666.17	112	-	167,181.20	1.58
B4	109,386.96	193.20	-	61.08	8.36	7,060.33	9,654.75	-	8,309.39	-	-	134,674.07	1.27
B5	44,537.49	128.80	-	4,899.38	670.56	6,170.88	-	-	3,352.31	-	-	59,759.42	0.56
C1	1,574,843.00	2,009.70	8,400	438,153.54	59,968.48	69,523.63	395,209.00	135,740.25	86,697.11	-	-	2,770,544.71	26.19
C2	403,026.72	2,538.00	-	272,543.96	35,396.60	28,188.08	-	-	6,362.03	-	-	748,055.39	7.07
C3	541,236.55	4,310.00	-	5,913.65	809.38	67,078.87	18,455.50	15,082.25	20,180.42	-	-	673,066.62	6.36
C4	244,903.08	-	-	-	-	11,361.66	3,500.00	-	3,206.88	-	-	262,971.62	2.49
C5	1,257,687.30	10,134.00	2,800	62,127.91	8,503.22	33,764.00	442,277.00	150,822.50	64,845.77	-	-	2,032,961.70	19.21
Total	7,083,226.98	35,880.00	28,000	1,085,000.00	175,400.00	381,198.76	1,075,435.00	301,645.00	395,556.82	17,682	1,200	10,580,224.56	100.0
%	66.95	0.34	0.26	10.25	1.66	3.60	10.16	2.85	3.74	0.17	0.01	100.00	

Table 4.5: Sources of funds paid for labor cost , Thongsaenkhan hospital, fiscal year 2000

Component of labor cost	Budget		Non-budget		Total	
	Amount	%	Amount	%	Amount	%
I. Salary	6,350,469.98	89.66	732,757.00	10.34	7,083,226.98	66.95
II. Fringe benefits						
-SSS contribution	17,940.00	50.00	17,940.00	50.00	35,880.00	0.34
-Position benefit	28,000.00	100.00	-	-	28,000.00	0.26
-Non-private practice incentive	675,000.00	62.21	410,000.00	37.79	1,085,000.00	10.25
-Perdiem, monthly	22,200.00	12.66	153,200.00	87.34	175,400.00	1.66
-Perdiem, regular	2,204.00	0.58	378,994.76	99.42	381,198.76	3.60
-Overtime allowance	-	-	1,075,435.00	100.0	1,075,435.00	10.16
-Even.night shift incentive	296,420.00	98.27	5,225.00	1.73	301,645.00	2.85
-CSMBS	395,556.82	100.00	-	-	395,556.82	3.74
-Child school fees	17,682.00	100.00	-	-	17,682.00	0.17
-Child benefit allowance	1,200.00	100.00	-	-	1,200.00	0.01
Total	7,806,672.80		2,773,551.76		10,580,224.56	100.0
%	73.79		26.21		100	

Remark*

Overtime allowance source:	-Poor card fund	577,375.00
	-Other non-budget	498,060.00
	Total	1,075,435.00

4.1.3 Material cost

Total material cost of Thongsaenkhan hospital in year 2000 was 7,347,220.78 baht. The components of material costs were medical material cost (55.69 %) which including medicine, medical device, laboratory material, x-ray film and reagents, and dental material, and another 44.31% from non-medical material costs (stationeries, construction material, electricity, etc).

The major component of medical material was medicine (2,925,906.04 baht or 71.5%), while medical device (including syringes, wool, swab, gauze and small medical tools) was 12.24%, laboratory material and dental material were the same percentage of 7.42% and x-ray material was 1.43%, as shown in table 4.6.

Table 4.6: Medical materials of Thongsaenkhan hospital, fiscal year 2000

Types of medical material	Cost	%
- Medicine	2,925,906.04	71.50
- Medical device	500,745.96	12.24
- Lab.material	303,425.00	7.42
- X-ray material	58,340.00	1.43
- Dental material	303,579.00	7.42
- Total medical material cost	4,091,996.00	100.00

The major components of non-medical material were construction materials (701,908.74 baht) and wages for certain jobs such as gardening and roads repairing (693,541.72 baht) as shown in table 4.7.

Table 4.7: Top five non-medical material costs of Thongsaenkhan hospital, fiscal year 2000

Types of materials	Cost (Baht)
1. Construction	701,908.74
2. Wages for specific works	693,541.72
3. Electricity	312,850.50
4. Cleaning	240,000.00
5. Stationeries	223,838.00

Total material costs paid by budget and non-budget revenue were 1,948,394.28 baht (73.48%) and 5,398,826.50 baht (26.52%) as shown in table 4.8.

Table 4.8: Components and sources of funds of material cost, Thongsaenkhan hospital, fiscal year 2000

Component of material cost	Paid by budget	Paid by non-budget	Total	%
Total medical material	371,228.70	3,684,767.31	4,055,996.01	55.69
Total non-medical material	1,541,165.58	1,714,059.19	3,255,224.77	44.31
Total material cost	1,948,394.28	5,398,826.50	7,347,220.78	100
%	26.52	73.48	100	

Pharmacy (B1) was the cost center with the highest material costs with 36.86% or 2,708,107.28 baht, and the one with the least was Operating room (B5) with 0.19% or 13,628.89 baht. Material cost of each cost center is shown in table 4.9.

4.1.4 Total hospital cost

Total cost of Thongsaenkhan hospital in year 2000 was 28,892,654.94 baht. The components of total costs were 37.95% for capital cost, 36.62% for labor cost, and 25.43% for material cost.

Administrarion (A1) was the cost center with the highest total cost (34.38% or 9,932,305.65 baht), and the one with the least was Catering (0.71% or 204,889.24 baht). Total material cost of each cost center is shown in table 4.10.

Most of the capitals and labors were paid by budget (83.3 and 73.79% respectively), while most of material costs were paid by non-budget revenue (73.48%). Sources of funds paid for total hospital cost were budget revenue (19,424,256.81 baht or 67.23%) and the rests were by non-budget revenue (9,468,398.13 baht or 32.77 %) as shown in table 4.11

Table 4.9 : Material cost of Thongsaeankhan hospital, fiscal year 2000

Cost center	1.Pharmacy (non-budget)	2.Pharmacy from (UPHO)*	3.Medical device	4.Specific med.mat of CC	5.Total medical mat. Cost (1+2+3+4)	6.Administration material	7.Electricity	8.Telephone	9.Other material	10.Total non-med. mat.cost (6+7+8+9)	Total material (5+10)	%
A1	-	-	-	-	-	2,021,045.36	76,765.90	14,881.61	8,576.00	2,121,268.87	2,121,268.87	28.87
A2	-	-	134,682.50	-	134,682.50	3,462.00	13,752.00	1,156.44	-	18,370.44	153,052.94	2.08
A3	-	-	-	-	-	134,179.00	7,055.10	38.04	-	141,272.14	141,272.14	1.92
A4	-	-	-	-	-	240,000.00	6,696.80	4,108.42	-	250,805.22	250,805.22	3.41
A5	-	-	-	-	-	34,592.10	2,755.90	3,651.93	-	40,999.93	40,999.93	0.56
A6	-	-	26,846.00	-	26,846.00	60,205.56	12,346.40	1,628.15	-	74,180.11	101,026.11	1.38
B1	2,361,064.83	-	135,542.00	83,734.50	2,580,341.33	15,640.31	28,261.80	129.34	-	127,765.95	2,708,107.28	36.86
B2	831.00	-	7,838.00	303,425.00	312,094.00	10,891.72	5,236.20	1,886.83	-	18,014.75	330,108.75	4.49
B3	-	-	-	58,340.00	58,340.00	1,088.34	6,889.73	791.25	-	8,769.32	67,109.32	0.91
B4	5,500.00	-	18,370.00	-	23,870.00	7,870.00	11,574.80	1,087.97	-	20,532.77	44,402.77	0.60
B5	1,727.80	-	4,593.00	-	6,320.80	1,967.00	4,960.68	380.41	-	7,308.09	13,628.89	0.19
C1	24,024.46	105,341.50	91,131.65	-	220,497.61	40,347.68	37,066.90	15,178.33	-	92,592.91	313,090.52	4.26
C2	18,800.56	-	26,736.85	303,579.00	349,116.41	10,718.19	10,582.70	4,435.57	76,550.41	102,286.87	451,403.28	6.14
C3	3,150.00	233,690.90	6,406.50	-	243,247.40	21,252.58	20,090.59	6,040.90	80,167.60	127,551.67	370,799.07	5.05
C4	-	68,196.29	-	-	68,196.29	16,377.80	8,185.00	2,457.44	22,960.00	49,980.24	118,176.53	1.61
C5	19,844.20	-	48,599.46	-	68,443.66	64,487.32	60,630.00	12,142.66	-	137,259.98	205,703.64	2.80
Total	2,434,942.85	407,228.69	500,745.96	749,078.50	4,091,996.00	2,684,124.96	312,850.50	69,995.31	188,254.01	3,255,224.78	7,347,220.78	100.0
%					55.69					44.31	100.00	

Table 4.10: Total direct cost of each cost center

Cost center	Material cost	Labor cost	Capital cost	Total direct cost	Percentage	MC:LC:CC
A1.	2,121,268.87	1,966,939.13	5,844,097.65	9,932,305.65	34.38	0.21:0.20:0.59
A2.	153,052.94	135,882.88	288,231.49	577,167.31	2.00	0.27:0.24:0.50
A3.	141,272.14	6,894.50	56,722.60	204,889.24	0.71	0.69:0.03:0.28
A4.	250,805.22	-	61,595.85	312,401.07	1.08	0.80:0:0.20
A5.	40,999.93	517,682.65	80,447.98	639,130.56	2.21	0.06:0.81:0.13
A6.	101,026.11	133,583.56	159,867.52	394,477.19	1.37	0.26:0.34:0.41
B1.	2,624,372.78	750,549.17	323,704.27	3,698,626.22	12.80	0.71:0.20:0.09
B2.	330,108.75	219,477.94	300,888.48	850,475.17	2.94	0.39:0.26:0.35
B3.	67,109.32	167,181.20	376,756.16	611,046.68	2.11	0.11:0.27:0.62
B4.	44,402.77	134,674.07	310,864.77	489,941.61	1.70	0.09:0.27:0.63
B5.	13,628.89	59,759.42	291,299.16	364,687.47	1.26	0.04:0.16:0.80
C1.	313,090.52	2,770,544.71	817,415.80	3,901,051.03	13.50	0.08:0.71:0.21
C2.	451,403.28	748,055.39	581,496.30	1,780,954.97	6.16	0.25:0.42:0.33
C3.	370,799.07	673,066.62	399,311.95	1,443,177.64	4.99	0.26:0.47:0.28
C4.	118,176.53	262,971.62	107,740.23	488,888.38	1.69	0.24:0.54:0.22
C5.	205,703.64	2,032,961.69	964,769.42	3,203,434.75	11.09	0.06:0.63:0.30
Total	7,347,220.76	10,580,224.55	10,965,209.63	28,892,654.94	100.00	0.25:0.37:0.38
%	25.43	36.62	37.95	100.00		

Table 4.11 : Proportion of sources of resources (budget and non-budget revenue) of each kind of cost

	Budget	Percentage	Non-budget	Percentage	Total	Percentage
Capital cost	9,669,189.75	83.30	1,296,019.88	11.82	10,965,209.63	37.95
Labor cost	7,806,672.80	73.79	2,773,551.75	26.21	10,580,224.55	36.62
Material cost	1,948,394.26	26.52	5,398,826.50	73.48	7,347,220.76	25.43
Total	19,424,256.81	67.23	9,468,398.13	32.77	28,892,654.94	100.00
Percentage	67.23		32.77		100.00	

4.1.5 Total costs of patient service cost centers

Total costs of PS compose of direct and indirect cost, which were allocated from NRPPC and RPCC by step down allocation method.

Most of the hospital costs were relevant to curative care (25,206,729 baht or 87.24%), only 3,685,926 baht or 12.76% was related to preventive care, as shown in table 4.12.

Table 4.12: Curative and preventive care costs of Thongsaenkan hospital

Cost center	Indirect cost	Direct cost	Total cost	%
C1 OPD	8,961,627	3,901,051	12862678	44.52
C2 Dental clinic	1,341,252	1,780,955	3122207	10.81
C5 IPD	6,018,409	3,203,435	9221844	31.92
Curative care cost (C1+C2+C5)	16,321,288	8,885,441	25206729	87.24
C3 H. promotion	1,390,547	1,443,178	2833725	9.81
C4 Sanitation and dis.control	363,313	488,888	852201	2.95
Preventive care cost (C3+C4)	1,753,860	1,932,066	3685926	12.76
Total	18,075,148	10,817,507	28,892,655	100.0

PS with the highest total cost was C1 (OPD), and the one with the lowest was sanitation and diseases control (C4).

The percentage of indirect cost from total hospital costs was 62.56%, and of direct cost is 37.44%. PS with the highest percentage of indirect cost was OPD (69.67%), when the percentages of indirect cost of C2, C3, C4 and C5 were 42.96, 49.07, 42.63, and 65.29% respectively as shown in table 4.13.

Table 4.13: Direct and indirect cost of each cost center

Cost center	Indirect cost	%	Direct cost	%	Total cost	%
C1 OPD	8,961,627	69.67	3,901,051	30.33	12,862,678	44.52
C2 Dental clinic	1,341,252	42.96	1,780,955	57.04	3,122,207	10.81
C3 H.promotion	1,390,547	49.07	1,443,178	50.93	2,833,725	9.81
C4 Sanitation	363,313	42.63	488,888	57.37	852,201	2.95
C5 IPD	6,018,409	65.26	3,203,435	34.74	9,221,844	31.92
Total	18,075,148	62.56	10,817,507	37.44	28,892,655	100.00

Administration was the cost center allocating maximum indirect cost to all PS, except OPD, it was the second highest. The maximum indirect costs allocated to C1, C2, C3, C4, and C5 were from B1 (29.45%), A1 (28.22%), A1 (33.03%), A1 (41.65%), A1 (21.69%). The second highest indirect costs allocated to C1, C2, C3, C4 and C5 were from A1 (18.85%), A2 (8.42%), B1 (7.03%), A4 (0.98%) and B1 (11.71%) respectively as shown in table 4.14.

Table 4.14 : Direct and indirect cost of each PS

Cost	C1	%	C2	%	C3	%	C4	%	C5	%	Total	%
Direct Cost	3901051	30.33	1,780,955	57.04	1443178	50.93	488,888	57.37	3203435	34.74	10817507	37.44
Indirect c.allocated from A1	2425050	18.85	880957	28.22	935948	33.03	354961	41.65	1963010	21.29	6560048	22.70
Indirect c.allocated from A2	217191	1.69	262790	8.42	31732	1.12	0	-	196348	2.13	708072	2.45
Indirect c.allocated from A3	0	-	0	-	0	-	0	-	270586	2.93	270586	0.94
Indirect c.allocated from A4	37823	0.29	10799	0.35	20501	0.72	8352	0.98	61867	0.67	139344	0.48
Indirect c.allocated from A5	949950	7.39	103425	3.31	48906	1.73	0	-	43065	0.47	1145358	3.96
Indirect c.allocated from A6	72998	0.57	52651	1.69	18960	0.67	0	-	451662	4.90	596274	2.06
Indirect c.allocated from B1	3787494	29.45	30631	0.98	206758	7.30	0	-	1080245	11.71	5105166	17.67
Indirect c.allocated from B2	827625	6.43	0	-	127742	4.51	0	-	300703	3.26	1256081	4.35
Indirect c.allocated from B3	643497	5.00	0	-	0	-	0	-	214499	2.33	858001	2.97
Indirect c.allocated from B4	0	-	0	-	0	-	0	-	881233	9.56	881233	3.05
Indirect c.allocated from B5	0	-	0	-	0	-	0	-	555190	6.02	555190	1.92
Total cost	12862679	100.0	3,122,208	100.0	2833725	100.0	852,201	100.0	9221843	100.0	28892655	100.0
%	44.52		10.81		9.81		2.95		31.92		100.00	

สถาบันวิทยบริการ
จุฬาลงกรณ์มหาวิทยาลัย

4.1.6 Unit cost and patients utilization

Units of OPD (C1), Dental clinic (C2), and Health promotion (C3) are numbers of cases serviced at that PS. The units of IPD (C5) are determined in 3 ways: number of cases, number of admission days and severity of diseases of IPD (DRGs units). Unit costs of each PS and total hospital are shown in table 4.15.

Table 4.15: Utilization and unit cost of each PS and total hospital

	C1	C2	C3	C4	C5	Total hospital
Total cost	12,862,679	3,122,208	2,833,725	852,201	9,221,843	28,892,655
No. of cases	48,346	5,265	2,491	N/A	2,188	51,074
Unit cost	266.05	593.01	1,137.59	N/A	4,214.74	565.70
Admission day	-	-	-	-	8,813	N/A
Unit cost	N/A	N/A	N/A	N/A	1,046.39	N/A
Severity of IPD unit(DRGs unit)	-	-	-	-	1,288.49	N/A
Unit cost	N/A	N/A	N/A	N/A	7,157.09	N/A

N/A = not analyzed

Proportions of unit cost components are different among cost centers. Capital costs take a greatest role in C2 (41%), C5 (42%) and total hospital (38%), while material costs take the greatest role in C3 (38%) and labor cost take the greatest role in C1 (41%) and C4 (39%) as shown in table 4.16.

Table 4.16: Components of unit cost

Cost component	Outpatient clinics			IPD			Total hospital
	OPD case	Dental case	H.pro.case	Case	Admit.Day	DRGs unit	Hospital visit
MC	85.14	142.32	432.28	927.24	230.21	1574.56	143.86
LC	109.08	207.55	398.15	1517.31	376.70	2576.55	207.16
CC	71.83	243.13	307.15	1770.19	439.48	3005.98	214.68
MC:LC :CC	0.32:0.41	0.24:0.35	0.38:0.35	0.23:0.39	0.23:0.39	0.23:0.39	0.25:0.37
	:0.27	:0.41	:0.27	:0.38	:0.38	:0.38	:0.38
Unit cost	266.05	593.00	1137.58	4214.74	1046.39	7157.09	565.70

4.2 Hospital revenue

Sources of hospital revenues were budget and non-budget. Total revenue in fiscal year 2000 was 28,049,690.97 baht. The major part of hospital revenue was from governmental budget (19,424,256.81 baht or 69.25%). Hence non-budget revenue was the minor part of the revenue (8,625,434.16 baht or 30.75%) as shown in table 4.17.

Table 4.17: Sources of Thongsaeankhan hospital revenue, fiscal year 2000

Sources of revenue	Amount	%from total revenue
Non-budget revenue	8,625,434	30.75
Governmental budget revenue	19,424,256.81	69.25
Total hospital revenue	28,049,690.97	100.00

The amounts of budget supported for capitals, labors and materials were 9,669,189.75 baht (49.75%), and 7,806,672.80 baht (40.19%), and 1,948,394.26 baht

(10.03%) consecutively as shown in table 4.18. While the rests were paid by non-budget revenue.

Table 4.18 Government budget support to Thongsenkhan hospital by line items, fiscal year 2000

Types of budget	Amount	%
1. Budget for materials	1,948,394.26	10.03
2. Budget for labor	7,806,672.80	40.19
3. Budget for capital	9,669,189.75	49.78
Total governmental budget	19,424,256.81	100.00

The highest revenue among various insurance schemes was from underprivileged group (3,452,231.40 baht), and the lowest was from social security scheme (179,225.85 baht). The directly paid revenue was 1,102,804 baht or 12.79% of non-budget revenue. Therefore the major part of non-budget revenue were from funds of insurance schemes. The details of budget and non-budget revenue are shown in table 4.19.

สถาบันวิทยบริการ
จุฬาลงกรณ์มหาวิทยาลัย

Table 4.19 : Non-governmental budget revenue, and governmental budget support

Sources of revenue	Amount	%from non-budget revenue
I. Non-budget revenue		
1. Underprivileged group	3,452,231.40	40.02
2. Road traffic accident	293,825.00	3.41
3. Health card 1	1,697,774.29	19.68
4. Health card 2,3	278,849.55	3.23
5. CSMBS (IPD only)	1,848,853.00	21.43
- Directly paid at OPD	556,328	6.45
- Reimbursed (IPD)	1,292,525	14.98
6. Social security scheme	179,225.85	2.08
7. Direct payment	546,476.00	6.34
8. Interest	44,545.59	0.52
9. Donation	241,378.00	2.80
10. Others	42,275.48	0.49
Total non-budget revenue (% from total revenue)	8,625,434.16 (30.75%)	100.00
II. Governmental budget support		
1. Budget for materials	1,948,394.26	10.03
2. Budget for labor	7,806,672.80	40.19
3. Budget for capital	9,669,189.75	49.78
Total government budget 1+2+3 (% from total revenue)	19,424,256.81 (69.25%)	100.00
Total hospital revenue	28,049,690.97 (100%)	

4.3 Cost recovery

Hospitals cost recoveries are shown in table 4.20. Total cost recovery of total revenue is nearly 1 (0.9708). Without budget support, total cost recovery was only 0.2985. Non-budget revenue could not cover even though operating cost (operating cost recovery was 0.4811). Nevertheless it could cover material costs.

Table 4.20: Hospital cost recoveries

Cost recovery	Total revenue (budget + non-budget)	Only non-budget revenue
Total cost recovery(MC+LC+CC)	0.9708	0.2985
Operating cost recovery(MC+LC)	1.5646	0.4811
Non-labor operating cost recovery(MC)	3.8177	1.1740

Total cost recovery was 0.97, which meant that the revenue could not cover the total cost. The operating cost recovery was 1.03, and non-labor operating cost recovery was 1.44, which meant that the revenue could cover operating cost, and material cost respectively.

Cost recoveries of insurance schemes from the highest to the lowest were as followings: CSMBS (1.37), social security scheme and workmen compensation fund (1.22), health card for general people or health card type 1 (1.03), direct payment and traffic accident insurance scheme (0.97), health card for community leaders and health volunteers or health card type 2 and 3 (0.90), and lastly, underprivileged group (0.87). There were some differences in cost recoveries because of the difference of budget per head. All cost recoveries of various insurance schemes are shown in table 4.21.

Table 4.21: Cost recovery of each health insurance scheme, fiscal year 2000

Health insurance scheme	Outpatient clinics			IPD			Overall	PP.	Estimated total hospital cost	Hospital non-budget revenue	*Budget revenue for hospital cost	Total hospital revenue	PP.of hosp. revenu	Cost reco-very
	Total case	Av.Chge./case	Total charge	Total case	Av.charge /case	Total charge	Hospital charge							
1.Poor	9,285	179.33	1,665,079	466	1,776.21	827,714	2,492,792.91	0.17	4,865,949.35		3,271,331.41			
2.Ch.0-12	8,557	128.29	1,097,778	311	1,129.29	351,209	1,448,986.72	0.10	2,828,432.30		1,901,528.10			
3.Elderly	8,102	171.72	1,391,275	480	2,385.80	1,145,184	2,536,459.44	0.17	4,951,186.72		3,328,635.69			
4.Monk	259	114.81	29,737	26	1,950.00	50,700	80,437.00	0.01	157,013.59		105,558.74			
5.Cripples	339	112.50	38,138	39	47,540.00	1,854,060	1,892,198.00	0.13	3,693,583.84		2,483,161.25			
6.Veterans	160	132.06	21,129	4	3,348.96	13,396	34,524.86	0.00	67,392.76		45,307.51			
7.Gr.7-9stu	476	155.00	73,780	6	3,348.96	20,094	93,873.78	0.01	183,242.29		123,192.05			
Total 1-7	27,178	158.84	4,316,916	1,332	3,348.96	4,460,815	8,777,730.74	0.59	17,134,192.32	3,452,231.40	11,519,154.35	14,971,385.75	0.52	0.874
8.H.card 1	9,145	161.46	1,476,552	400	2,332.67	933,067	2,409,618.50	0.16	4,703,592.31	697,774.29	3,162,180.32	4,859,954.61	0.17	1.033
9.H.card 2	711	216.73	154,093	23	1,810.00	41,630	195,723.00	0.01	382,052.68		256,850.38			
10.H.card3	2,247	149.68	336,327	53	2,011.67	106,618	442,945.35	0.03	864,632.45		581,284.16			
Total8+9	2,958	165.79	490,420	76	1,950.64	148,248	638,668.35	0.04	1,246,685.13	278,849.55	838,134.54	1,116,984.09	0.04	0.896
11.SSS	1,015	156.79	159,146	18	420.00	7,560	166,706.00	0.01	325,411.29	179,225.85	218,770.91	397,996.76	0.01	1.223
12.CSMBS	2,783	199.90	556,328	118	6,864.00	809,952	1,366,280.00	0.09	2,666,988.20	1,848,853.00	1,792,990.77	3,641,843.77	0.13	1.366
13.Dir+traffi	5,807	158.44	920,061	244	2,141.18	522,447	1,442,507.94	0.10	2,815,785.68	840,301.00	1,893,025.90	2,733,326.90	0.10	0.971
Other	-	-	-	-	-	-	-	1.00	2,882,654.94	328,199.07		328,199.07	0.01	
Total	48,886	159.95	7,919,423	2,188	3,145.38	6,882,089	14,801,511.54	1.00	28,892,654.94	8,625,434.16	19,424,256.81	28,049,690.97	0.98	0.971

4.4 Sensitivity analysis

Sensitivity analysis is performed in various scenario settings under assumption that the others remain stable.

4.4.1 Unit cost and cost recovery with changing in cost components:

Among changing of cost components, cost recovery was most sensitive to changing of capital cost because capital cost was the greatest component of total hospital cost. Unit costs of all PS, total hospital, and hospital cost recovery were determined with various scenario settings as following.

Scenario 1: Changing of material cost

If the hospital has implemented cost containment programs such as changing the method of buying medical material from direct negotiation to be a bidding system, or reducing construction materials because the hospital environment is well developed already. The material cost can be reduced to 10%, unit costs per total hospital visit will reduce to 550.31 baht. Hospital cost recovery will be 0.9962 as shown in table 4.22. So material cost containment can be one method to improve hospital cost recovery.

Scenario 2: Changing of labor cost

With regard to labor cost, the trend of labor cost has been increasing due to the yearly income and fringe benefit adjustment at community hospitals, labor cost has increased at the rate of 5%, or 10% within the duration of two years. If the labor cost is increasing 10%, unit costs total hospital visit will be increased to 7,157 baht. Hospital cost recovery will change from 0.97 to be 0.94 as shown in table 4.22.

4.4.3 Hospital revenue and cost recovery with the universal coverage policy:

The essence of universal coverage policy is to provide health care assurance for total Thai population. In current situation, Thai population are under coverage of various health insurance schemes such as poor card, health card, CSMBS, SSS and about 20% are not covered by any insurance schemes. So the government decided to set the universal coverage policy to take care the uncovered group. Moreover with different payment mechanism and different levels of budget paid for each insurance scheme (inequity in health care), the government has planned to merge all schemes to be only one scheme.

Under universal coverage policy, the budget allocated to hospitals is based on the number of registered people. At the beginning of policy implementation, hospitals where people can register are those in the communities or in the areas the people live. At district level, there is only one community hospital in each district. Therefore community hospitals are the main providers of health care to the people in communities.

Under the new policy, if we assume that all insurance schemes are merged to be only one scheme with payment mechanism designed by the recent universal coverage policy, Thongsankhan hospital revenue will be from two sources: budget per capitation (1197 baht / capitation), and contribution per visit (30 baht / visit). The budget per capitation is set at 1,197 baht per capitation, which covers labor cost, material cost and 10% of capital cost of the registered hospital. Since Thongsankhan hospital is the only community hospital in Thongsankhan district, people in the district will register with this hospital. Thongsankhan hospital can refer patients to Uttaradit hospital for tertiary care and the five health centers for primary care. Hence, budget allocation criteria have been set for allocating budget to each health facility. Uttaradit Provincial Health Office (UPHO) has set its own criteria for allocating budget of underprivileged group and voluntary health insurance (health cards). Uttaradit province will implement this criteria for the new budget allocation in the following ways.

Budget allocation criteria:

From the total budget, the allocation is as the following.

- 2.5 % is pooled at the central organization for expensive care (whole countries)
- 10 % is pooled at Uttaradit Provincial Health Office (UPHO) for
 - 1) accident or emergency treatment outside the province
 - 2) referring patients to other tertiary care hospitals outside the province
- 87.5 % is allocated to each community hospital as the hospital fund to be divided to health facilities (health centers, a community hospital and Uttaradit hospital) in the province who provide care to the people. This amount of budget will be divided as following
 - 1) 15% for administration and preventive cares
 - 2) 85% for curative cares (45% for OPD case , and 55% for IPD case)

Because of differences of levels of health facilities who provide different severity of diseases, so relative scores are applied for budget allocation as following.

- OPD case: Relative scores for health center is 40, for community hospital is 80 and for Uttaradit regional hospital is 120.
- IPD case: Relative scores for community hospital is 1,200 and for Uttaradit regional hospital is 2,000.

Patients will have to pay 30 baht when they go to the hospital or to the health centers at the first health facility. If the diseases beyond the facility, patients will be referred to the upper level health facility. Referring form Thongsaenkhan hospital is strictly implemented for the patients to get care from other health facilities outside the district. Referral system is not compulsory for services within the district, people in the district can come to Thongsaenkhan hospital directly without referring from health centers.

Assumptions:

Some assumptions set for sensitivity analysis are as followings.

1. Number of patient visits is the same as in fiscal year 2000 (51,074 visits)
2. Utilization pattern of the patients is the same as that of the underprivileged groups in fiscal year 2000 as shown in table 4.24.
3. The number of population in Thongsaenkhan district registered is the same total population in fiscal year 2000 (33,256 people) as shown in table 4.25.
4. Patients visit Thongsaenkhan hospital directly without referring from health center, but referral system is compulsory for patients needed to go to Uttaradit regional hospital.

Table 4.24: Number of responsible people for preventive care of each health facility level

Health facility	No. responsible people(preventive care)	%
Health centers	26,845	80.72
Thongsaenkhan hospital	6,411	19.28
Uttaradit regional hospital	0	0
Total population	33,256	100

Table 4.25: Utilizations of the underprivileged groups in each health facility level

Health facility	OPD visits	Relative score (OPD)	%OPD score	IPD visit	Relative score(IPD)	%IPD score
Health centers	11,717	468,680	18	0	0	0
Thongsaenkhan hospital	27,178	2,174,240	81	1,332	1,598,400	74
Uttaradit hospital	245	29,400	1	285	570,000	26
Total	33,256	2,672,320	100	1,617	2,168,400	100

Revenue of health facilities and budget allocation under universal coverage policy is shown in table 4.26.

Table 4.26: Estimated revenue of health facilities under universal coverage policy

Revenue	H.centers	Thong.hospital	Uttaradit hospital	Total
I. Government budget				
1.For preventive care(15%)				
-No. of people	26,845	6,411	0	33,256
-Budget	4,217,517	1,007,208	0	5,224,725
2.For curative care(85%)				
2.1 OPD (45%)				
-% of relative wt.	17.54	81.36	1.1	100
-Amount of budget	2,336,637	10,839,833	146,580	13,323,050
2.2 IPD (55%)				
-% of relative wt.	0	73.71	26.29	100
-Amount of budget	0	12,002,736	4,280,992	13,283,728
Total budget(1+2)	6,554,154	23,849,777	4,427,572	34,831,503
%	18.82	68.47	12.71	100
II. Patients' contribution				
- No. of visit	24,951	51,074	425	76,450
Amount of contribution	748,530	1,532,220	0	2,280,750
Total revenue (I+II)	7,302,684	25,381,997	4,427,572	37,112,253
Budget : Pt contribution	90:10	94:6	100:0	94:6

With the revenue from per capitation budget, Thongsaenkan hospital revenue is 68.47 % from total budget, while health centers revenue is 18.82% and Uttaradit hospital is 12.71%. With the revenue from both budget and patients' contribution, total revenue of Thongsaenkan hospital is 25,381,997 baht which can not cover hospital cost (28,892,655 baht). Hospital cost recovery with this policy is 0.88.

4.4.4 Break even analysis:

1. Budget per capitation that provides total hospital cost equal to total hospital revenue.

Under the same assumptions as analysis of universal coverage policy, the amount of budget per capitation, which provides the hospital financing to be at break even point (total hospital revenue is equal to total hospital cost), is calculated by the following formula.

At break even point : Total hospital revenue = Total hospital cost

$$\begin{aligned} \text{Budget revenue} &= \text{Total hospital revenue} - \text{revenue from patients' contribution} \\ &= 28,892,655 - 1,532,220 \\ &= 27,360,435 \end{aligned}$$

Calculation from data of the study:

$$\begin{aligned} \text{Hospital budget revenue} \\ &= 68.47\% \text{ of } 87.5\% \text{ of total budget for Thongsaenkhan people} \end{aligned}$$

$$\begin{aligned} \text{Total budget for Thongsaenkhan people} \\ &= \text{budget per capitation} * \text{number of Thongsaenkhan people} \end{aligned}$$

$$\begin{aligned} \text{Budget per capitation} &= \text{Hospital budget revenue} / 68.47\% \times 87.5\% \times \text{No. of people} \\ &= 1,373.23 \text{ baht} \end{aligned}$$

Under the assumptions, the amount of budget per capitation providing Thongsaenkhan hospital cost equal to Thongsaenkhan hospital revenue is 1,373.23 baht. Therefore, with the number of registered people as in fiscal year 2000, the budget per capitation should be at least 1,373.23 baht in order that the hospital will be able to survive.

2. Number of population that provides total hospital cost equal to total hospital revenue.

Under the same assumptions as analysis of universal coverage policy, the number of population which provides the hospital financing to be at break even point (total hospital revenue is equal to total hospital cost), is calculated by the following formula.

At break even point : Total hospital revenue = Total hospital cost

Total hospital revenue

= Hospital budget revenue + revenue from patients' contribution

Hospital budget revenue = 87.5% X 68.47% X 1,197 X No. of people

Revenue from patients' contribution = 30 X utilization rate X No. of people

= 30 X 1.5358 X No. of people

No. of people = 28,892,655 / (717.1377+46.074)

= 37,857 people

Under the assumptions, the number of people providing Thongsankhan hospital cost equal to Thongsankhan hospital revenue is 37,857 people. Therefore, with the amount of per capitalization budget for community hospitals that contain the same financial situation as Thongsankhan hospital in fiscal year 2000, the number of registered people should be at least 37,857 people in order that the community hospitals will be able to survive.

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CHAPTER 5

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

This chapter consists of conclusion, discussion, policy implications, limitations, further studies and recommendations of the study.

5.1 Conclusion and discussion

This study intends to study the cost recovery of community hospitals, which are the public health facilities providing primary and secondary care to people with various insurance schemes in district level. The objectives of the study are to estimate the total cost, unit cost, revenue, and cost recovery of community hospital in fiscal year 2000 at Thongsaenkhan hospital, Uttaradit province, which was purposively selected. This study is a retrospective study performed from provider's perspective. The cost centers were identified and grouped into 3 groups: NRPCC, RPCC and PS according to the character of their services. NRPCC composes of Administration, Central supply, Catering, Cleaning, Registration, and Laundry. RPCC composes of Pharmacy, Laboratory, X-ray, Labor room and Operating room. PS composes of Outpatient department (OPD), Dental clinic, Health promotion, Sanitation, environmental and diseases control, and Inpatient department (IPD). Total direct costs of each cost center were determined and classified into capital, labor and material costs. Total direct costs of NRPCC and RPCC were allocated to all PS, which were the main centers to care patients, by step down allocation method under allocation criteria. Therefore total costs of PS are composing of direct and indirect costs. The units of each PS were determined and applied for unit cost calculation. Later, hospital revenue from various sources were determined and then compared to the cost of the hospital in order to estimate cost recovery of the hospital and cost recovery of each insurance scheme. The findings of this study can be concluded as followings.

I. Hospital cost:

Total cost of Thongsaenkhan hospital is 28,892,654.94 baht. The proportion of capital cost, labor cost and material cost is 38: 37: 25. The capital and labor costs are rather the same amount and taking the biggest parts of the cost. Material is the smallest component of hospital cost.

To compare to other studies in Thailand, the range of percentages of capital cost is from 5 to 20 %, the range of labor cost is from 35 to 65 % and the range of material cost is about 27 to 60 %. For examples Kongsawat with study in 16 community hospitals in 5 provinces in 1997 found that CC: LC: MC was 10: 52: 38. Pittayarungsarit et al (1997) with study in community hospitals in Khonkaen province found that CC: LC: MC of Poowiang hospital was 12:35:53. Thantaristri (1999) with study in Bangpli hospital found that CC: LC: MC was 19: 63: 28.

This may be because, depreciation values of capital cost are assessed differently. In this study depreciation values are assessed from current value of capital and annualization factors, which provided higher value when compare to the studies which assessed from purchased price and straight line methods. Another point is that the values of capitals with older age than useful life of this study are assessed as the costs to rent that capital to provide services, while other studies the values are zero. For example Pittayarungsarit's study applied purchasing price with simple straight line depreciation; Sriboonreung's study in Maeai hospital applied current value of capitals with simple straight line depreciation and the values of capitals with older age than useful life were zero; and Sridaeng's study in Thoen hospital applied purchased value of capitals with annualization factor and zero values for the capital with older age than useful life as shown in table 5.1.

Table 5.1 Hospital cost studies of three community hospitals

	Tohen hospital	Mae ai hospital	Thongsaenkhan hospital
Year of study	1997	1998	2000
Size of hospital	30 beds	30 beds	30 beds
Capital cost	Purchased value	Current value	Current value
CCwith age>useful life	Zero value	Zero value	Assessed value not zero
Depreciation method	Annualization factors	Simple straight line method	Annualization factors
No.of hosp. personnel	No data	109	83
No. OPD case	43,303	84,942	48,346
No. IPD case	2,814	4,586	2,188
Admission days	8,750	21,295	8,813
Occupancy rate	79.91	194.5	80.48
Capital cost	3,494,015	3,116,977	10,965,209.63
Labor cost	11,836,574	11,519,089	10,580,224.55
Material cost	6,505,146	8,276,129	7,347,220.76
Total cost	21,835,735	22,912,195	28,892,654.94
CC:LC:MC	16:54:30	13:56:32	38:37:25

To compare to the studies of other two 30-bed hospitals: Thoen (study of Sridaeng for fiscal year 1997) and Maeai hospital (study of Sriboonreung for fiscal year 1998), because hospital size, hospital services, responsibilities, infrastructures and other hospital characteristics were rather the same. The proportion of cost components of Thoen hospital is 16: 54: 30, and the one of Mae-ai hospital is 14: 50: 36. There is a big difference among their capital costs. Capital costs of Thoen, Maeai and Thongsaenkhan hospital are 3,494,015 baht, 3,116,977 baht and 10,965,209.63 baht. Capital costs of Thoen and Maeai are rather the same, when the capital cost of Thongsaenkhan hospital is much higher (about 3 times to the others). Although the capital cost of Thongsaenkhan hospital are adjusted to be the same method of depreciation value assessment, the cost is still higher. Exploring to the capital cost components, the proportions of building to equipment cost of three hospitals are about 60: 40 as shown in table 5.2. For building cost of Thongsaenkhan hospital is more than Maeai's

because personnel residence, recreation and sewage treatment cost are higher (no data of Thoen hospital).

Table 5.2 :Cost components of capital costs of three hospitals

Hospital	year of study	Building	%	Equipment	%	Total
Thoen	1997	2,201,745	63.01	1,292,270	36.99	3,494,015
Maeai	1998	1,824,058	58.52	1,292,919	41.48	3,116,977
Thongsaenkhan	2000	6,479,631	60.94	4,152,858	39.06	10,632,489

To compare to other hospitals, the methodology of calculating cost should be the same, therefore the adjusted value of capital costs to be the same methodology to other studies was calculated as shown in table 5.3.

Table 5.3: Thongsaenkhan hospital capital cost and cost recovery with adjusted capital costs

	Capital cost	T o t a l hospital cost	MC: LC:CC	Cost recovery (non-budget revenue)
Thong.hospital (baseline)	10,965,410	28,892,655	25:37:38	0.30
Thong. Hospital with adjusted (1)	9,494,517	27,421,762	27:39:34	0.31
Thong. Hospital with adjusted (2)	5,124,565	23,051,810	32:46:22	0.37
Maeai hospital	3,116,977	22,912,195	36:50:14	0.69
Thong. Hospital with adjusted (3)	8,574,339	26,501,584	28:40:32	0.33
Thoen hospital	3,494,015	21,835,735	30:54:16	N/A

Note: (1) : The capitals with ages over than useful life are excluded

(2) : (1) + current value and straight line depreciation method are applied: the same method as the study of Maeai hospital

(3) : (1) + Purchased value and depreciation method with annualization factors are applied: the same method as the study of Thoen hospital

With adjusted values of capital costs, capital cost of Thongsaenkhan hospital was still higher than the other two hospitals. The ratio of capital costs to total hospital cost was still higher than 0.20 which was the highest of the range of other studies. As well as the cost recovery with different adjusted values of capital costs was less than cost recovery of Maeai hospital. This analysis proved that capital costs of Thongsaenkhan hospital were higher than that of the other two hospitals.

Compared to the other two hospitals, labor costs of Thongsaenkhan hospital is rather low. This may be because of Thongsaenkhan hospital is a rather new hospital (compared to the other two), and Thongsaenkhan district is a rather poor and low economic district, so the health personnel are rather young and the personnel turn over rate is high. Then the salaries and wages are lower (7,083,227 baht when 9,248,047 baht of Thoen and 8,529,178 baht of Maeai).

Material costs of three hospitals are rather the same. In year 2000, Thongsaenkhan hospital had a “hospital environment improving project”, so the wages and material for repairing and construction are higher than normal situation.

II. Unit cost:

The unit cost of Thongsaenkhan hospital for total hospital is 565.70 baht per visit, OPD is 266.05 baht per visit, for dental clinic is 593.01 baht per visit, for health promotion is 1,137.58 baht per visit, and for IPD is 4,214.74 baht per case or 1,046.39 baht per admission day or 7,143.62 baht per IPD severity unit (DRGs unit). The results are compared to other 30-bed hospitals (Thoen and Maeai hospital). The results are shown in table 5.4. The unit costs of Thoen and Maeai hospital should be more than shown, because the studies were done in 1997 and 1998 consecutively. However after adjusted with discount rate, the unit cost of Thongsaenkhan hospital is still higher than the other two.

Compared to Thoen, which had similar hospital and workloads pattern, unit cost of Thongsae Khan hospital was higher because the total cost was higher as mentioned before. Compared to Maeai hospital with higher workloads, the total cost of Thongsae Khan was still higher, and as well as the unit costs. With higher workload, the lower unit costs were relevant to “Economy of scale”. With about two times difference of workloads, the numbers of health personnel were not much different (83 and 109). Routine service costs (capital cost and labor cost) of Maeai and Thongsae Khan hospital were about 68 and 75%, while material costs were 32 and 25%, respectively. Hence to reduce unit costs, the hospital has to reduce the costs and another way is to increase units of patients service. Because the fixed cost which is the major part of cost is rather constant, while material cost varies with the workloads or units of services. Anyway, another point should be concerned for Maeai hospital, the occupancy rate was too high (194.5%), the hospital should be extended to be more than 30-bed hospital because in the year of study, hospital resources were overutilized, and this would reflect to lower quality of care. So unit costs of Maeai were too low for comparing to other community hospitals, more resources were needed to support Maeai hospital.

Table 5.4: Comparison of workloads and unit costs of three 30-bed community hospitals: Thoen, Maeai and Thongsae Khan hospital

Unit	Thoen hospital		Mae ai hospital		Thongsae Khan hospital	
	Workload	Unit cost	Workload	Unit cost	Workload	Unit cost
OPD (case)	43,303	207	84,942	131	48,346	266.05
Dental clinic(case)	4,933	380	6,366	267	5,265	593.01
H.promotion(case)	N/A	N/A	2,423	N/A	2,491	1,137.58
IPD						
- case	2,814	2,938	4,586	1,751	2,188	4,214.74
- admission day	8,750	945	21,295	377	8,813	1,046.39
- estimated DRGs wt.	N/A	N/A	N/A	N/A	1,290.92	7,143.62

III. Cost recovery:

Total hospital cost recovery of non-budget revenue is 0.30. Total hospital cost recovery of total hospital revenue is 0.97. This means non-budget revenue can not cover the cost and even with budget support, the revenue is still not able to cover the cost as well.

Cost recoveries of various insurance schemes are 1.37 for CSMBS, 1.22 for social security scheme, 1.03 for health card 1 (general people), 0.97 for direct payment and road traffic accident, 0.90 for health card 2,3 (community leaders and health volunteers) and the least is 0.87 for underprivileged group. This is because of different payment mechanisms or different budget per capita of each group. Another reason is the utilizations of each group, because of the difference in age, risks to be sick and economic status. For examples, the elderly and the children are higher risk to be sick than the working age groups, so the utilization rate should be higher. Sources of funds, insurance payment mechanism, and utilization of service among insurance schemes are shown in table 5.5.

Anyway with different cost recoveries of insurance schemes, the hospital has to provide services to all groups of people because of the hospital responsibility to serve the social. The costs of low cost recovery groups and the cost of health care improvements are subsidized by the revenue from the richer groups in order to improve equity for all people.

However the hospital has to improve cost recovery because with the cost recovery lower than 1, the hospital can not survive in the future because the costs are more than the revenue. To improve cost recovery or financial status, the hospital has to control the costs or to increase the revenue. The hospital can apply the results of the study to identify the target groups for marketing purpose. The groups with high cost recoveries are the groups to be focussed. The hospital should implement some projects to attract these groups to get health services in the hospital. The revenue from these groups can be applied for services quality improvement for all groups of patients in order to improve quality to all people in the district.

Table 5.5: Source of Funds, Insurance payment Mechanism, and Utilization of Service, Thailand, 1996

Insurance Program	payment Mechanism	copayment	ave exp/ cap/yr	op visits/ capita	admissn/ per 100	alos* (days)	source of care
CSMBS	Fee-for-Service	IP at Private Hospital	>1781	5.5	13.6	11.9	Public
						5.1	Private
SSS	Capitation	Maternity, Emergency	712	1.4	2.6	5.6	Public
							Private
WCS	Fee-for-Service	If over B30,000 ceiling	96	0.04	0.6	7	
VHCS	Capitation	None	~190	1.7	5.8	4.3	
LICS	Global Budget	None	<225	0.7	3	5.4	
PRIVATE	Fee-for-Service	Almost None	1667	n.a.	n.a.	n.a.	
OVERALL	Muliple		n.a.	2	5 to 6	n.a.	

*alos is average length of stay

Source: Supachutiul, A. Gilson, L., and Tangcharoensathien (no date), Supachutiul, A. (July 1996)

(*) from Songkhla, et.al. (June 28,1997)

Compared to the study in Maeai hospital as shown in table 5.6, cost recovery of Maeai hospital is 0.69 (non-budget revenue only). This may be because Maeai hospital was overutilized and the revenue in that study did not include hospital revenue from budget. Anyway it is not necessary always to expect a public hospital to have full cost recovery, or 100% cost recovery or higher because of the externalities and equity principle. Besides, efficiency is not the only and may not be an objective of public health sectors. However, the government has to subsidize public hospitals in order to be sustainable for health care providing because some health care services are public goods, and the importance of their externalities to health status of all Thai people and the responsibility to improve equity among all people.

Cost recovery of non-budget revenue only takes more important role because the

trend of governmental policy is to autonomize the hospitals and the hospitals have to generate the revenue and survive with their own revenue. Total cost recovery of Thongsaenkhan hospital from non-budget revenue only is about 0.30, which is much lower than of Maeai hospital. This was because the kinds of patient serviced in both hospitals are under different insurance schemes that provide different hospital cost recoveries. The major group of patients of Maeai hospital is CSMBS and direct payment group, while the major of Thongsaenkhan hospital is underprivileged group. This is because Thongsaenkhan is a rather poor district, as well as Uttaradit province, compared to northern region and country level. (From Thai people quality of life (1998), average yearly per capita income of Uttaradit, northern region and of Thailand were 11,301, 13, 271, and 16, 406 baht consecutively. Uttaradit was the twelfth rank of the northern region and the sixty-third rank of the country. Thongsaenkhan was the fifth rank of Uttaradit province with income 7,435 baht per year.)

Table 5.6: Comparison of patients with various insurance between two hospitals

	Mae ai hospital, FY 1998		Thongsaenkhan hospital, FY 2000	
	Number	%	Number	%
1. OPD				
Underprivileged	24,074	28.16	27,178	55.59
H.card1	17,005	18.62	9,145	18.71
H.card2,3	4,915	5.38	2,958	6.05
SSS	824	0.90	1,015	2.08
CSMBS & direct pay.	42,860	46.94	8,590	17.57
Total OPD	89,678	100.00	48,886	100.00
2. IPD				
Underprivileged	1,352	29.48	1,332	60.88
H.card1	796	17.36	400	18.28
H.card2,3	167	3.64	76	3.47
SSS	27	0.59	18	0.82
CSMBS & direct payment	2,244	48.93	362	16.54
Total IPD	4,586	100.00	2,188	100.00

5.2 Policy implication

To provide policy implications of hospital cost recovery analysis, the results of this study will be proposed to Thongsaenkhan hospital administrators and Uttaradit provincial health planning and evaluating committee. Some policies need to be considered.

5.2.1 Hospital cost containment

The hospital administrators should set up the policy to control the cost. The target of cost to be controlled should be the ones that take the big part of the cost.

1.Labor cost : The hospital should consider carefully about personnel recruitment. The hospital should recruit only the personnel which is really needed. Because with current numbers of personnel, some groups of personnel are enough for workload of hospital services. The hospital should contract out some tasks such as garden maintenance, security, car driver and some laboratory procedures because the cost (both labor and material cost) may be lower.

2.Material cost: Materials with the highest cost are medicine and other medical materials. The hospital can change the method of purchasing from gradually purchasing to a big lot purchasing contract or bidding of one or of every community hospital in the province. The price of material will be lower.

3.Capital cost: The hospital administrators or the powerful people with responsibility for capitals supply or budget allocation should consider the costs and cost recoveries of some equipment and buildings. Are there other channels to manage resource more efficiently? Such as to let health personnel to buy or to rent the houses and reimbursed from the government instead of house construction in the hospital. Another example is that instead of to invest expensive equipment in every provincial hospital, should we set the effective referral system and we can reduce the cost.

5.2.2 Policy of new health facility construction.

The policy of new health facility construction should be reconsidered. The cost should not be considered only construction cost, but the maintenance cost and other recurrent cost should be considered also. The decision for extending the overutilized health facility or construction new health facility should be made under economic backgrounds also. The advantages and disadvantages including maintenance cost in the future should be considered carefully. The new channels or new way to provide health services with lower cost should be created, such as nurse recruitment to work in health centers or hospital evening in the big community with long distance to the hospital.

5.2.3 Budget allocation criteria

Provincial budget allocation criteria should be reconsidered. Is it fair enough to allocate budget with the criteria of the number of people in that area? Because the costs of health facilities are not only material cost but also labor cost. For the health facilities with the small number of responsible population, the budget allocated by per capita will not cover the cost. It is relevant to "Economy of scale". Another reason is that health facilities are locating in different area with different economic status. So the abilities to earn revenue are different. Therefore the minimum guarantee of budget should be supported to the one in the poor area or with small number of responsible population in order to provide equity to all people in the country.

5.2.4 Universal coverage policy

To implement universal coverage policy needs more budget for health. The way to recruit resources for this policy may effect quality of life of the people such as if the government has to increase taxes in order to raise funds for this policy, the people has to pay more taxes. This policy should provide better quality of life in health term. Anyway not only health to be concerned, the impacts to other sectors should be concerned also. The

government has to carefully consider the advantages, disadvantages and the impact of the policy to quality of life of Thai people.

5.3 Limitation of the study

Limitation of the study are as followings:

1. This study is a retrospective study, therefore the data may be unrecorded or Misestimated because of unawareness. For examples; full time equivalent (FTE), were collected by recalling the activities daily done in year 2000. Therefore some activities were unrecognized and some activities were overestimated. Moreover for some personnel who has changed workplace, their work were determined by other personnel. Another example is that hospitalization fee (CSMBS) for the one admitted in the hospital was unable to obtain because the patients did not know how much to be charged by the hospital they admitted in. Prospective study provides better data, however it consumes more time and more resources. Hence to study prospectively or retrospectively should be considered carefully.

2. Discount rate applied in this study was 10 % which was the acceptable value for cost study. Nevertheless, it was not the discount rate of the real situation. Then the results should be interpreted carefully.

3. There are some assumption in this study such as the assumption that the average charges of patient with specific insurance schemes collected from September 1999 was the representative of the average of all the year 2000. Because epidemiology of diseases is different among seasons or months. The utilization of patients with different insurance scheme is not the same also. Then the average charge per patient with each scheme of September 1999 may not be the good value for the whole year.

5.4 Further studies

This study carried out for only one community hospital in Uttaradit. Then for information on population based, further studies should be conducted:

1. Unit cost and cost recoveries of all community hospitals in Uttaradit province.
2. Unit cost and cost recovery of all health facilities, which provide care to people in Thongsaenkhan district (health centers, Thongsaenkhan hospital, and Uttaradit) and what should be the per capitation budget for all people in Thongsaenkhan district.
3. The effect of the recent universal coverage policy to Thongsaenkhan hospital cost recovery.
4. Hospital cost and cost recovery after cost containment policy implementation.
5. Unit cost and the suitable charges of health care services of each cost center in Thongsaenkhan hospital.

5.5 Recommendations

1. Cost analysis should be done continuously to compare the performance of the hospital under specific hospital policy. It can be applied to assess how efficient the hospital administration.
2. Cost or unit cost among hospitals should be compared carefully. The details of

cost identification, cost allocation and unit cost determination should be considered, because it varies among studies. As well as hospital revenue, it should be clarified its meaning and defined the extent of revenue; only charge, non-budget revenue or cover budget revenue.

3. Governmental budget allocation criteria for all over the country should be assessed for their appropriateness. For example, fixed budget per capitation for all people in different area of the country, it should be more budget for the poor area or area with small number of registered people.

4. The hospital should set up information system for collecting essential data base on hospital accounting, resources consumption, workload of hospital services, and other important data. The system should be able to assess the financial situation, hospital costing and hospital performances.



สถาบันวิทยบริการ
จุฬาลงกรณ์มหาวิทยาลัย

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APPENDIX

สถาบันวิทยบริการ
จุฬาลงกรณ์มหาวิทยาลัย



APPENDIX A

General Information of
Thongsaenkhan hospital
and Uttaradit Provincial Health Office

สถาบันวิทยบริการ
จุฬาลงกรณ์มหาวิทยาลัย

Thongsaenkhan hospital

Thongsaenkhan hospital is a 30-bed community hospital. It was founded in 1987 as an extended OPD of Tron hospital. The hospital was supported to be 10-bed hospital in 1990 and 30-bed hospital in 1997. It is 35 kilometers from Uttaradit province. It has been providing primary and secondary health care for the people in Thongsaenkhan district and adjacent subdistricts of Nampad, Pichai and Chartrakarn district.

Thongsaenkhan hospital composes of 7 departments:

- 1) Administration
- 2) Nursing
- 3) Dental health
- 4) Pharmacy
- 5) Health promotion
- 6) Sanitation and disease control
- 7) Laboratory and x-ray

Health Personnel:

Health personnel working in Thongsaenkhan hospital in 2000 were divided into 3 types.

- 1) Civil servants: Total number of civil servants was 66 personnel (the maximum standard number of personnel of this group of 30-bed hospital is 88).
- 2) Permanent employees: Total number of permanent employees was 11(the maximum of the standard number of this group of 30-bed hospital is 18).
- 3) Temporary employees: Total number of temporary employees was 18 (no standard number of this group).

Table A.1: Workforce of Thongsaenkhan hospital in fiscal year 2000

Type of workforce	Number
1. Physician (include the hospital director)	4
2. Dentist	2
3. Pharmacy	3
4. Nurse	34
5. Other health personnel	11
6. Permanent employee	11
7. Temporary employee	18
Total	83

Table A.2: Workload of Thongsaenkhan hospital during fiscal year 1997- 1999

Type of service	1997	1998	1999
Out patients	35,505	40,927	47,527
Inpatient- Case	1,606	1,876	2,135
- Admission day	6,398	7,681	8,802
- Occupancy rate	175.3	70.15	80.38

Note: In 1997 Thongsaenkhan hospital was a 10-bed hospital

สถาบันวิทยบริการ
จุฬาลงกรณ์มหาวิทยาลัย

Table A.3: DRGs weight of each group of Thongsaenkhan IPD, fiscal year 2000

Health insurance scheme	Number of IPD	Average DRG Weight	Total DRGs Weight
1. Underprivileged group			
- Poor card	302	0.59	178.18
- Elderly	372	0.86	319.92
- Children 0-12 years	234	0.33	77.22
- Student gr.1-12	14	1.20	16.8
- Cripples or handicaps	15	1.08	16.2
- Buddhist monk and novices	9	0.72	6.48
Total of underprivileged group	946	0.65	614.8
2. Health card			0
- Health card for general people	347	0.65	225.55
- Voluntary health workers	7	0.58	4.06
3.CSMBS	107	0.64	68.48
4.Compulsory health insurance (SSS,WCF)	26	0.65	16.9
5. Road traffic accidents protection	6	0.61	3.66
6. Self paid	350	0.49	171.5
7. Others	399	0.46	183.54
Total	2188	0.59	1288.49

Source: Thongsaenkhan DRGs report, 2000

สถาบันวิทยบริการ
จุฬาลงกรณ์มหาวิทยาลัย

Table A.4: Causes of top five OPD and IPD cases of Uttaradit Province

(unit :per 100,000 population)

Rank	Causes of Outpatients	Rate
1	Respiratory tract diseases	51399.41
2	Digestive system include oral cavity diseases	28585.19
3	Diseases of the musculoskeletal system	28077.49
4	Circulatory system diseases	19034.44
5	Symptoms, signs, and abnormal clinical and lab. finding	15322.32
Rank	Causes of Inpatients	Rate
1	Symptoms, signs, and abnormal clinical and lab. Finding	680.78
2	Intestinal infectious diseases	483.97
3	Acute upper respiratory tract infection	473.65
4	Hypertension	458.18
5	Digestive system diseases	409.29

Table A.5 Top five causes of Death (Uttaradit Province) (unit: per 100,000 population)

Rank	Causes of Death	Rate
1	Cardiac disease	122.95
2	All types of tumors	55.97
3	Respiratory tract diseases (except URI)	40.23
4	Hypertension and cerebrovascular diseases	37.34
5	Toxemia	25.37

Table A.6 : Equipments and building of Thongsaenkhan hospital acquired from budget and non-budget revenue during 1998-2000

Capital	1998		1999		2000		1998-2000		total
	Budget	Non-budget	Budget	Non-budget	Budget	Non-budget	Budget	Non-budget	
Car	-	-	805,000	-	-	-	805,000	-	805,000
U/S	-	-	650,000	-	-	-	650,000	-	650,000
Defibrillator	-	-	315,000	-	-	-	315,000	-	315,000
Refer bed	-	-	22,140	-	-	-	22,140	-	22,140
Total equipment	-	1,685,306	1,792,140	450,300	-	271,395	1,792,140	2,407,001	4,199,141
Buildings	-	-	-	-	-	-	-	-	-
percentage	-	100	80	20	-	100	43	57	100

สถาบันวิทยบริการ
จุฬาลงกรณ์มหาวิทยาลัย



APPENDIX B

Data of cost, unit cost, cost recovery,
and other health economics

สถาบันวิทยบริการ
จุฬาลงกรณ์มหาวิทยาลัย

Table B.1 : Area, and building cost of each cost center in Thongsaeankhan hospital 's buildings, fiscal year 2000

Cost center	OPD building		B1		B2		B3		B4		Laundry building		Supply building		Extension laundry		Other building	Total cost	Total area
A1	318.75	294,617.49			94.50	95,815.77	91.13	92,393	-	-	96.00	59,859	-	-	96.00	11,745	3,985,982	4,540,414	696.38
A2							60.75	61,595.85					64.00	39,906				101,501.89	124.75
A3													64.00	39,906				39,906.04	64.00
A4									60.75	61,595.85								61,595.85	60.75
A5	25.00	23,107.25																23,107.25	25.00
A6											64.00	39,906.0			48.00	5,872.68		45,778.72	112.00
B1	72.50	67,011.04					30.38	30,797.93	121.50	123,191.7			32.00	19,953				240,953.68	256.38
B2	47.50	43,903.78																43,903.78	47.50
B3	62.50	57,768.13																57,768.13	62.50
B4	105.00	97,050.47																97,050.47	105.00
B5	45.00	41,593.06																41,593.06	45.00
C1	336.25	310,792.57																310,792.57	336.25
C2	82.50	76,253.94			13.50	13,687.97												89,941.90	96.00
C3			121.50	123,191.7	60.75	61,595.85												184,787.55	182.25
C4			60.75	61,595.85	13.50	13,687.97												75,283.82	74.25
C5																	525,252.52	525,252.52	550.00
Total	1,095	1,012,097.7	182.25	184,787	182.25	184,787	182.25	184,787	182.25	184,787	160.00	99,765	160	99,765	144	17,618	4,511,235	6,479,631	2,838.00

Note: useful life 20 years

Table B.2: Full time equivalent of each personnel

Name	a1	a2	a3	a4	a5	a6	b1	b2	b3	b4	b5	c1	c2	c3	c4	c5	Total
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	
Wong	0.198														0.802		1
Somjit	0.276														0.724		1
Boonying	0.150														0.850		1
Nuttapol	0.142														0.859		1
Narong	0.097			-					0.903							-	1
Kanitta	0.100		0.050													0.850	1
Chaleao																1.000	1
Yaowaret																1.000	1
Malee																1.000	1
Buakhong																1.000	1
Sumitra	0.150	0.150								0.100	0.100	0.350				0.150	1
Patcharin	0.234														0.766		1
Karpicha															1.000		1
Supattra															1.000		1
Payom					0.800						0.100	0.100					1
Issariya					0.9000							0.1000					1
Somkid					1.0000												1

Table B.2: continued

Name	a1	a2	a3	a4	a5	a6	b1	b2	b3	b4	b5	c1	c2	c3	c4	c5	total
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	
Leka	0.1140													0.8860			1.00
Amporn	0.0000													1.0000			1.00
Nidda	0.0000													1.0000			1.00
Kullaya	0.0000													1.0000			1.00
Piyanat	0.0000													1.0000			1.00
Petrung	0.0000													1.0000			1.00
Jiraporn	0.0000													1.0000			1.00
Sukanya	0.0000													1.0000			1.00
Omsin	0.1200	0.1275				0.1275										0.6250	1.00
Farung		0.8875				0.1125											1.00
Junbang		0.0750				0.9250											1.00
Kafeerat		0.0750				0.9250											1.00
Kulpob	0.0405												0.9595				1.00
Nuttapong	0.0540												0.9460				1.00
Chokchai	0.0715											0.9285					1.00
Anong												1.0000					1.00
Prapaporn												1.0000					1.00

Table B.2: continued

Name	a1	a2	a3	a4	a5	a6	b1	b2	b3	b4	b5	c1	c2	c3	c4	c5	total
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	
Arom													1.0000				1.00
Kasame	0.6000									0.0000		0.3000				0.1000	1.00
Chaiyakit	0.2000									0.0250		0.7000				0.0750	1.00
Suntree									0.0002			0.8500		0.0283		0.1213	1.00
Wannisa									0.0002			0.8500		0.0283		0.1213	1.00
Boonyarat									0.0002	0.0008		0.9140				0.0847	1.00
Worarit									0.0002	0.0008		0.9140				0.0847	1.00
Admin employees	16.0000			0.0000													16.00
Round nurse										0.9000		8.1000				9.0000	18.00
Total FTE	19.5558	1.5150	0.0500	0.0000	4.8000	2.1400	5.5700	2.4800	1.0438	1.4266	0.5000	19.9450	5.8340	7.9426	3.2352	15.9620	92.00
Supply OT		0.5000				0.5000											
Doctor OT										0.0100		0.4950				0.4950	1.00
Nurse OT										0.050		0.450				0.500	1

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จุฬาลงกรณ์มหาวิทยาลัย

Table B.3: Types of materials and sources of funds for payment

Types of material	Paid by budget revenue		Paid by non-budget revenue		Total
	Hospital budget	Other org. (UPHO,MoPH,etc)	All, except Poor card	Poor card	
I. Medical material					
1. Material for health promotion services	-	233,690.91	-	-	233,690.91
2. Pharmacy	-	137,537.79	-	2,518,677.35	2,656,215.14
3. Medical device	-	-	-	500,745.96	500,745.96
4. Lab. material	-	-	-	303,425.00	303,425.00
5. X-ray	-	-	-	58,340.00	58,340.00
6. Dent. material	-	-	-	303,579.00	303,579.00
Total	-	371,228.70	-	3,684,767.31	4,055,996.01
II. Non-medical material					
1. Admin. material					
Stationery	174,690.00	-	49,148.00	-	223,838.00
Housework	76,563.12	-	45,324.80	41,220.00	163,107.92
Electric	82,516.00	-	9,776.00	-	92,292.00
Construction	360,798.45	-	341,110.29	-	701,908.74
Fuel	141,092.00	-	33,164.00	-	174,256.00
Wage for work	122,418.00	-	571,123.72	-	693,541.72
Other	87,165.41	-	158,666.18	-	245,831.59
AIDS project	-	1,670.00	-	-	1,670.00
100 years project	-	1,000.00	-	-	1,000.00
Municipal project	-	12,500.00	-	-	12,500.00
Electricity	127,390.00	-	185,460.50	-	312,850.50
Telephone	10,235.02	-	59,760.29	-	69,995.31
Mail	-	-	6,776.00	-	6,776.00
Garbage treat.	-	-	1,800.00	-	1,800.00
2. cleaning	240,000.00	-	-	-	240,000.00
3. Patients' food	-	-	134,179.00	-	134,179.00
4. Sanitational. material	-	22,960.00	-	-	22,960.00
5. Milk for malnourished child	-	80,167.58	-	-	80,167.58
6. Dental equipment repairing	-	-	-	76,550.41	76,550.41
Total non-medical material	1,422,868.00	118,297.58	1,596,288.78	117,770.41	3,255,224.77
Total material cost	1,422,868.00	489,526.28	1,596,288.78	3,802,537.72	7,347,220.78

Table B.4 : Cost allocation from A1 (Administration)

Cost center (CC)	FTE	Adj. FTE proportion	Total cost of A1	50% allocate by FTE proportion	Total direct cost of each CC	Proportion of CC cost	50% allocated by CC cost proportion	Total allocated cost	Proportion for allocation
A1	19.5558	-	-	-	-	-	-	-	-
A2	1.5150	0.0209	209,222.33	104,611.17	577,167.31	0.0310	154,918.20	259,529.36	0.0259
A3	0.0500	0.0007	7,007.45	3,503.72	204,889.24	0.0110	54,994.58	58,498.30	0.0058
A4	-	-	-	-	-	-	-	-	0
A5	4.8000	0.0663	663,705.29	331,852.65	639,130.56	0.0343	171,549.83	503,402.48	0.0503
A6	2.1400	0.0295	295,313.82	147,656.91	394,477.19	0.0212	105,882.11	253,539.02	0.0253
B1	5.5700	0.0769	769,818.06	384,909.03	3,698,626.22	0.1983	992,752.86	1,377,661.89	0.1376
B2	2.4800	0.0342	342,363.82	171,181.91	850,475.17	0.0456	228,277.10	399,459.01	0.0399
B3	1.0438	0.0144	144,153.19	72,076.59	611,046.68	0.0328	164,011.80	236,088.39	0.0236
B4	1.4266	0.0197	197,209.57	98,604.78	489,941.61	0.0263	131,505.84	230,110.62	0.023
B5	0.5000	0.0069	69,073.40	34,536.70	364,687.47	0.0196	97,886.22	132,422.92	0.0132
C1	19.9450	0.2753	2,755,928.62	1,377,964.31	3,901,051.03	0.2092	1,047,085.96	2,425,050.27	0.2422
C2	5.8340	0.0805	805,856.35	402,928.18	1,780,954.97	0.0955	478,028.34	880,956.51	0.088
C3	7.9426	0.1096	1,097,165.92	548,582.96	1,443,177.64	0.0774	387,365.10	935,948.06	0.0935
C4	3.2352	0.0447	447,475.52	223,737.76	488,888.38	0.0262	131,223.14	354,960.90	0.0355
C5	15.9620	0.2204	2,206,344.60	1,103,172.30	3,203,434.75	0.1718	859,837.90	1,963,010.20	0.1962
Total	92.0000	1.0000	10,010,637.92	5,005,318.96	18,647,948.22	1.0000	5,005,318.96	10,010,637.92	1.0000

Table B.5 : Weight of workload done by supply (A2) for each cost center

Cost center	Super small		Small		Medium)		Large		NSS		Distilled water		Flush solution		Total weight	Proportion
	number	weight 0.5	number	weight 1.5	number	weight 3	number	weight 7	number	weight 3	number	weight 5.5	number	weight 5.5		
B1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
B2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
B3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
B4	593	296.5	972	1,458.0	2,223	6,669	1,069	7,483	-	-	-	-	451	2,480.5	18,387	0.1345
B5	-	-	718	1,077.0	434	1,302	308	2,156	-	-	-	-	-	-	4,535	0.0332
C1	12,148	6,074.0	5,635	8,452.5	4,119	12,357	475	3,325	1,255	3,765	71	390.5	98	539.0	34,903	0.2553
C2	40	20.0	890	1,335.0	13,393	40,179	-	-	196	588	20	110.0	-	-	42,232	0.3089
C3	-	-	594	891.0	1,309	3,927	-	-	-	-	-	-	50	275.0	5,093	0.0373
C4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C5	12,012	6,006.0	4,767	7,150.5	3,402	10,206	300	2,100	1,145	3,435	75	412.5	410	2,255.0	31,565	0.2309
Total	24,793	12,396.5	13,576	20,364.0	24,880	74,640	2,152	15,064	2,596	7,788	166	913.0	1,009	5,549.5	136,715	1.0000

Table B.6: Examples of medical treatment set(supply by A2), clothes(supply by A6) and their sizes

Examples of medical treatment set and their sizes				Examples of clothes and their sizes		
Super small(weight 0.5)	Small(weight =1.5)	Medium(weight =3)	Large(weight=7)	Small (weight = 0.5)	Medium (weight=1.5)	Large(weight= 3)
1. Syringe set 2 ml)	1.Syringe 50 ml.	1.Suture,Scrub set	1. Labor set	1.Pillow case	1. Shirt	1.Bed sheet
2. Syringe set 5 ml.	2.Syringe irrigate	2.PV set	2.Gown	2.Rectangular cloth	2.Trousers	2.Operating set
3. Syringe set 10 ml	3.Wound dressing	3.Flush set	3.TR set	3.Dental cloth	3.Plastic sheet	3.Towel (large)
4. Syringe set 20 ml.	4.Needle box	4.Catheterization	4.Vacuum retraction	4.Cap	4.Gown	4.Blanket
5. Syringe Insulin	5.Mask, cap	5.Gauze box	5.Curettage set	5.Syringe case	5.Towel(medium)	
6. Set Iowa Trumpet	6.Drain gauze pack	6.Medical tray	6.Appendectomy set	6.Towel(small)	6. Labor set	
7. Nasal speculum	7.Cotton box	7.Chest drain set	7.Forceps extraction	7.Mask		
	8.Speculum	8.Cut down set	8.Cervical dilatation			
	9.Operating glove	9.Spinal block set	9.OR Supporting set			
	10.Proctoscope	10.Dental set	10.Retraction			

Table B.7 : Criteria for cost allocation from cleaning (A4)

Cost center	Total area	Adjusted area for allocation	Adjusted Proportion	Cleaning cost allocated to each CC
A1	696.38	696.38	0.2507	78,332.27
A2	124.75	124.75	0.0449	14,032.60
A3	64.00	64.00	0.0230	7,199.09
A4	60.75	-	-	-
A5	25.00	25.00	0.0090	2,812.14
A6	112.00	112.00	0.0403	12,598.40
b1	256.38	256.38	0.0923	28,838.54
B2	47.50	47.50	0.0171	5,343.07
B3	62.50	62.50	0.0225	7,030.36
B4	105.00	105.00	0.0378	11,811.00
B5	45.00	45.00	0.0162	5,061.86
C1	336.25	336.25	0.1211	37,823.34
C2	96.00	96.00	0.0346	10,798.63
C3	182.25	182.25	0.0656	20,500.53
C4	74.25	74.25	0.0267	8,352.07
C5	550.00	550.00	0.1980	61,867.17
Total	2,838.00	2,777.25	1.0000	312,401.0740

Table B.8: Criteria for cost allocation from Registration (A5)

PS center	Number of case per month	Proportion	Number of case per year	Proportion to allocate by year
OPD	3390	0.8091	48346	0.8294
Dent	401	0.0957	5265	0.0903
H.promotion	218	0.0520	2491	0.0427
IPD	181	0.0432	2188	0.0375
Total	4190	1.0000	58290	1.0000

Table B.9: Weight of workload done by laundry (A6) for each cost center

Cost center	Small size		Medium size		Large size		Total	Estimated direct cost of clothes	Sterile gloves		Disposable gloves		Total	Estimated cost device cost	Total direct cost of A6	Proportion
	number	weight 0.50	number	weight 1.5	number	weight 3			number	weight 0	number	weight 0.9				
B1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
B2	-	-	95	142.5	-	-	142.5	155.83	-	-	-	-	-	-	155.83	0.0012
B3	-	-	460	690.0	-	-	690.0	754.53	-	-	-	-	-	-	754.53	0.0058
B4	3,303	1,651.50	1,997	2,995.5	313	939	5,586.0	6,108.38	6,570	657	-	-	657.0	815.05	6,923.43	0.0529
B5	1,111	555.50	48	72.0	1,171	3,513	4,140.5	4,527.70	3,000	300	-	-	300.0	372.17	4,899.87	0.0375
C1	8,334	4,167.00	670	1,005.0	1,458	4,374	9,546.0	10,438.70	13,000	1,300	2,160	1,944.0	3,244.0	4,024.39	14,463.10	0.1106
C2	13,133	6,566.50	1,304	1,956.0	-	-	8,522.5	9,319.49	8,900	890	-	-	890.0	1,104.10	10,423.59	0.0797
C3	1,999	999.50	280	420.0	482	1,446	2,865.5	3,133.47	5,000	500	-	-	500.0	620.28	3,753.75	0.0287
C4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C5	10,697	5,348.50	23,720	35,580.0	6,655	19,965	60,893.5	66,588.01	9,000	900	19,474	17,526.6	18,426.6	22,859.40	89,447.42	0.6837
Total	38,577	19,288.50	28,574	42,861.0	10,079	30,237	92,386.5	101,026.11	45,470	4,547	21,634	19,470.6	24,017.6	29,795.40	130,821.51	1.0000

Table B.10: Medical charge to patients of each outpatient clinic(supply by Pharmacy cost center)

Health insurance scheme	OPD Medical charge	Health promotion Medical charge	Dental clinic Medical charge	IPD Medical charge	Total Medical charge
Poor	82,180	1,945	1,370	18,750	104,245
Child0-12	28,140	15,950	360	9,940	54,390
Elderly	100,560	-	260	33,150	133,970
Monk	2,440	-	10	960	3,410
Cripples	3,660	-	10	7,535	11,205
Veterans	1,210	45	20	-	1,275
Gr.7-9students	1,180	-	-	-	1,180
H.card 1	88,555	1,320	490	16,600	106,965
H.card 2	7,120	-	80	740	7,940
H.card 3	18,835	700	240	1,610	21,385
SSS	14,170	160	20	170	14,520
CSMBS	28,040	-	200	10,080	38,320
Direct+traffic	14,130	1,160	110	11,760	27,160
Total	390,220	21,280	3,170	111,295	525,965
Proportion	0.7419	0.0405	0.0060	0.2116	1.0000

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จุฬาลงกรณ์มหาวิทยาลัย

Table B.11: Work of laboratory cost center done for each patient service center ;
1 month(September 2000)

Types of laboratory	Price/ case	OPD case (1mth)	OPD Charge (1mth)	H.prom. case (1mth)	H.prom. Charge (1mth)	IPD case (1mth)	IPD Charge (1mth)	Total Charge (1mth)	OPD+ IPDcase (1mth)	Total case (1mth)
<u>1.Clinical chemistry</u>										
FBS/Blood sugar	70	233	16,310	-	-	24	1,680	17,990	257	257
LFT	450	6	2,700	-	-	10	4,500	7,200	16	16
BUN/ Creatinine	140	9	1,260	-	-	17	2,380	3,640	26	26
Uric acid	70	9	630	-	-	-	-	630	9	9
Choles/ Triglyceride	190	16	3,040	-	-	2	380	3,420	18	18
<u>2.Microscopic and parasite</u>										
Urine Albumin, sugar	30	-	-	44	1,320	-	-	1,320	-	44
U/A	50	54	2,700	-	-	46	2,300	5,000	100	100
Stool exam	50	9	450	-	-	6	300	750	15	15
Sputum exam	70	-	-	-	-	1	70	70	1	1
<u>3.Hematology</u>										
CBC	60	13	780	8	480	27	1,620	2,880	40	48
CBC+Platelet+Malaria P	100	7	700	-	-	13	1,300	2,000	20	20
Hematocrit	30	40	1,200	11	330	30	900	2,430	70	81
<u>4.Immunology</u>										
UPT	100	13	1,300	-	-	-	-	1,300	13	13
Widal/ Weil-felix	170	1	170	-	-	2	340	510	3	3
Anti-HIV	150	10	1,500	9	1,350	2	300	3,150	12	21
Hepatitis B profile	260	5	1,300	-	-	3	780	2,080	8	8
Urine amphetamine	150	3	450	-	-	-	-	450	3	3
Rheumatoid factor	100	1	100	-	-	-	-	100	1	1
VDRL	50	-	-	9	450	-	-	450	-	9
<u>5.BI.bank</u>										
Blood group ABO	40	7	280	6	240	-	-	520	7	13
<u>6.Microbiology</u>										
KOH	60	3	180	-	-	-	-	180	3	3
Wet smear	60	2	120	-	-	-	-	120	2	2
AFB 3 days	210	10	2,100	-	-	10	2,100	4,200	20	20

Table B.11: Work of laboratory cost center done for each patient service center ;
1 month(September 2000) : (continued)

Types of laboratory	Price/ case	OPD case (1mth)	OPD Charge (1mth)	H.prom. case (1mth)	H.prom. Charge (1mth)	IPD case (1mth)	IPD Charge (1mth)	Total Charge (1mth)	OPD+ IPDcase (1mth)	Total case (1mth)
7.Referral system										
Microbilirubin	70	-	-	-	-	1	70	70	1	1
Stool c/s	240	10	2,400	-	-	5	1,200	3,600	15	15
Sputum c/s	240	-	-	-	-	1	240	240	1	1
Urine c/s	240	-	-	-	-	4	960	960	4	4
TFT	550	26	14,300	-	-	2	1,100	15,400	28	28
Alfa-fetoprotien	100	1	100	-	-	2	200	300	3	3
Hemoglobin typing	150	1	150	-	-	-	-	150	1	1
Electrolyte	240	4	960	-	-	5	1,200	2,160	9	9
Calcium	70	1	70	-	-	-	-	70	1	1
Urine protein 24 hrs	70	-	-	-	-	1	70	70	1	1
Leptospirosis titer	60	-	-	-	-	1	60	60	1	1
Cryptococcal antigen	120	-	-	-	-	1	120	120	1	1
Thalassemia screen.test	150	-	-	8	1,200	-	-	1,200	-	8
Total		494	55,250	95	5,370	216	24,170	84,790		
Proportion			0.6516		0.0633		0.2851	1		

สถาบันวิทยบริการ
จุฬาลงกรณ์มหาวิทยาลัย

Table B.12: Work of laboratory cost center done for each patient service center ; 1year (2000)

Types of laboratory	Total case 1 year	H.prom. case 1 year	H.prom. charge 1 year	Total IPD&OPD 1 year	OPD case 1 year	OPD charge 1 year	IPD case 1 year	IPD charge 1 year	Total Charge 1 year
<u>1.Clinical chemistry</u>									
FBS/Blood sugar	2,750	-	-	2750	2,493	174,510	257	17,990	192,500
LFT	18	-	-	18	7	3,150	11	4,950	8,100
BUN/ Creatinine	104	-	-	104	36	5,040	68	9,520	14,560
Uric acid	91	-	-	91	91	6,370	-	-	6,370
Choles/ Triglyceride	111	-	-	111	99	18,810	12	2,280	21,090
<u>2.Microscopic and parasite</u>									
Urine Albumin., sugar	720	720	21,600	-	-	-	-	-	21,600
U/A	100	-	-	100	54	2,700	46	2,300	5,000
Stool exam	238	-	-	238	143	7,150	95	4,750	11,900
Sputum exam	5	-	-	5	-	-	5	350	350
<u>3.Hematology</u>									
CBC	871	85	5,100	786	255	15,300	531	31,860	52,260
CBC+Platelet+Malarial P	524	-	-	524	183	18,300	341	34,100	52,400
Hematocrit	1,236	179	5,370	1057	604	18,120	453	13,590	37,080
<u>4.Immunology</u>									
UPT	197	-	-	197	197	19,700	-	-	19,700
Widal/ Weil-felix	18	-	-	18	6	1,020	12	2,040	3,060
Anti-HIV	509	165	24,750	344	287	43,050	57	8,550	76,350
Hepatitis B profile	53	-	-	53	33	8,580	20	5,200	13,780
Urine amphetamine	39	-	-	39	39	5,850	-	-	5,850
Rheumatoid factor	9	-	-	9	9	900	-	-	900
VDRL	165	165	8,250	-	-	-	-	-	8,250
<u>5.BI.bank</u>									
Blood group ABO	299	85	3,400	214	214	8,560	-	-	11,960
<u>6.Microbiology</u>									
KOH	77	-	-	77	77	4,620	-	-	4,620
Wet smear	26	-	-	26	26	1,560	-	-	1,560
AFB 3 days	137	-	-	137	69	14,490	68	14,280	28,770

Table B.12: Work of laboratory cost center done for each patient service center; 1year (continued)

Types of laboratory	Total case 1 year	H.prom. case 1 year	H.prom. charge 1 year	Total IPD&OPD 1 year	OPD case 1 year	OPD charge 1 year	IPD case 1 year	IPD charge 1 year	Total Charge 1 year
7. Referral system									
Microbilirubin	7	-	-	7	-	-	7	490	490
Stool c/s	187	-	-	187	125	30,000	62	14,880	44,880
Sputum c/s	3	-	-	3	-	-	3	720	720
Urine c/s	11	-	-	11	-	-	11	2,640	2,640
TFT	212	-	-	212	197	108,350	15	8,250	116,600
Alfa-fetoprotien	3	-	-	3	1	100	2	200	300
Hemoglobin typing	16	-	-	16	16	2,400	-	-	2,400
Electrolyte	88	-	-	88	39	9,360	49	11,760	21,120
Calcium	18	-	-	18	18	1,260	-	-	1,260
Urine protein 24 hrs	3	-	-	3	-	-	3	210	210
Leptospirosis titer	7	-	-	7	-	-	7	420	420
Cryptococcal antigen	8	-	-	8	-	-	8	960	960
Thalassemia screen.test	88	88	13,200	0	-	-	-	-	13,200
Total	8,948	1,487	81,670	7461	5,318	529,250	2,143	192,290	803,210
Proportion			0.1017			0.6589		0.2394	1

Table B.13: Proportion of work done by X-ray for patient service centers

Procedure of x-ray	Price	OPD: C1		Ward: C6		Total	
		Yearly number of cases	Yearly Charge	Yearly number of cases	Yearly Charge	Yearly number of cases	Yearly Charge
CXR	200	482	96,400	179	35,800	661	132,200
KUB	200	85	17,000	27	5,400	112	22,400
Abdomen	200	20	4,000	19	3,800	39	7,800
Bone	150	237	35,550	49	7,350	286	42,900
Skull	300	20	6,000	4	1,200	24	7,200
Total		844	158,950	278	53,550	1,122	212,500
Proportion			0.75		0.25		1.00

Table B.14 : Cost allocation with Step down allocation method

Cost center	Total direct cost	A4	A1	A2	A3	A5	A6	B1	B2	B3	B4	B5	C1	C2	C4	C5	C6			
A4. Cleaning	312,401	-	0.2507	0.0449	0.0230	0.0090	0.0403	0.0923	0.0171	0.0225	0.0378	0.0162	0.1211	0.0346	0.0656	0.0267	0.1982	1.0000		
			78,332	14,033	7,199	2,812	12,598	28,839	5,343	7,030	11,811	5,062	37,823	10,799	20,501	8,352	61,867	312,401		
A1. Admin.	9,932,306	-	-	0.0259	0.0058	0.0503	0.0253	0.1376	0.0399	0.0236	0.0230	0.0132	0.2422	0.0880	0.0935	0.0355	0.1962	1.0000		
		-	-	259,529	58,498	503,403	253,539	1,377,662	399,459	236,088	230,111	132,423	2,425,050	880,957	935,948	354,961	1,963,010	10,010,638		
A2. Supply	577,167	-	-	-	-	-	-	-	-	-	0.1345	0.0332	0.2553	0.3089	0.0373	-	0.2308	1.0000		
		-	-	-	-	-	-	-	-	-	114,423	28,244	217,191	262,790	31,732	-	196,348	850,729		
A6. Laundry	394,477	-	-	-	-	-	-	-	0.0012	0.0058	0.0529	0.0375	0.1105	0.0797	0.0287	-	0.6837	1.0000		
		-	-	-	-	-	-	-	793	3,832	34,947	24,773	72,998	52,651	18,960	-	451,662	660,615		
A5.registrat	639,131	-	-	-	-	-	-	-	-	-	-	-	0.8294	0.0903	0.0427	-	0.0376	1.0000		
		-	-	-	-	-	-	-	-	-	-	-	949,950	103,425	48,906	-	43,065	1,145,346		
A3. Catering	204,889	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0000	1.0000		
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	270,586	270,586		
B1. Pharm.	3,698,626	-	-	-	-	-	-	-	-	-	-	-	0.7419	0.0060	0.0405	-	0.2116	1.0000		
		-	-	-	-	-	-	-	-	-	-	-	3,787,494	30,631	206,758	-	1,080,245	5,105,127		
B2. Lab.	850,475	-	-	-	-	-	-	-	-	-	-	-	0.6589	-	0.1017	-	0.2394	1.0000		
		-	-	-	-	-	-	-	-	-	-	-	827,625	-	127,742	-	300,703	1,256,070		
B3. X-ray	611,047	-	-	-	-	-	-	-	-	-	-	-	0.7500	-	-	-	0.2500	1.0000		
		-	-	-	-	-	-	-	-	-	-	-	643,497	-	-	-	214,499	857,997		
B4. Labor	489,942	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0000	1.0000		
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	881,233	881,233		
B5. OR	364,687	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0000	1.0000		
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	555,190	555,190		
													indirect cost	8,961,627	1,341,252	1,390,547	363,313	6,018,409	18,075,148	
													direct cost	3,901,051.0	1,780,955	1,443,178	488,888	3,203,435	10,817,507	
													Total cost	12,862,678	3,122,207	2,833,724	852,201	9,221,844	28,892,655	

Table B.15: Total 1 month charge of each clinic (September, 2000)

Health insurance scheme	OPD					Health promotion						Dental clinic					Total case	Total all clinics charge
	Medical charge	Service charge	Total charge	Total case	Average charge / case	Medical charge	Other medical charge	Service charge	Total case	Total charge	Average charge / case	Medical charge	Service charge	Total case	Total charge	Average charge / case		
Poor	82,180	16,180	98,360	602	163.39	-	1,945	5,290	37	7,235	195.54	1,370	7,270	42	8,640	206	637	114,235
Child0-12	28,140	12,210	40,350	521	77.45	890	15,060	1,440	113	17,390	153.89	360	49,660	182	50,020	275	840	107,760
Elderly	100,560	18,570	119,130	696	171.16	-	-	-	-	-	-	260	2,530	18	2,790	155	710	121,920
Monk	2,440	320	2,760	24	115.00	-	-	-	-	-	-	10	330	3	340	113	27	3,100
Cripples	3,660	650	4,310	38	113.42	-	-	-	-	-	-	10	180	2	190	95	40	4,500
Veterans	1,210	610	1,820	11	165.45	45	-	-	1	45	45.00	20	360	5	380	76	17	2,245
Gr.7-9student	1,180	1,760	2,940	25	117.60	-	-	-	-	-	-	-	1,400	3	1,400	467	28	4,340
H.card 1	88,555	22,050	110,605	701	157.78	-	1,320	3,520	31	4,840	156.13	490	12,100	68	12,590	185	793	128,035
H.card 2	7,120	3,220	10,340	48	215.42	-	-	-	-	-	-	80	1,500	9	1,580	176	55	11,920
H.card 3	18,835	6,700	25,535	173	147.60	-	700	460	6	1,160	193.33	240	3,300	23	3,540	154	202	30,235
SSS	14,170	5,040	19,210	126	152.46	-	160	770	2	930	465.00	20	380	4	400	100	131	20,540
CSMBS	28,040	8,240	36,280	182	199.34	-	-	-	-	-	-	200	4,500	25	4,700	188	205	40,980
Dir+traffic	14,130	19,510	33,640	201	167.36	-	1,160	2,440	28	3,600	128.57	110	2,260	17	2,370	139	250	39,610
Total	390,220	115,060	505,280	3,348	150.92	935	20,345	13,920	218	35,200	161.47	3,170	85,770	401	88,940	222	3,935	629,420

Table B.16 : Total 1 month charge of inpatient (September, 2000)

Health insurance scheme	IPD							Total all clinics charge	Average all clinics charge/case	Total hospital charge
	case	Medical charge	Service charge	Av.medical charge/ case	Av.service charge/case	Total IPD charge	Average IPD charge/case			
Poor	29	18,750	51,510	646.55	1,776.21	70,260	2,422.7586	114,235	179.33	184,495
Child0-12	28	9,940	31,620	355.00	1,129.29	41,560	1,484.2857	107,760	128.29	149,320
Elderly	50	33,150	119,290	663.00	2,385.80	152,440	3,048.8000	121,920	171.72	274,360
Monk	2	960	3,900	480.00	1,950.00	4,860	2,430.0000	3,100	114.81	7,960
Cripples	2	7,535	95,080	3,767.50	47,540.00	102,615	51,307.5000	4,500	112.50	107,115
Veterans	-	-	-	-	-	-	-	2,245	132.06	2,245
Gr.7-9student	-	-	-	-	-	-	-	4,340	155.00	4,340
H.card 1	30	16,600	53,380	553.33	1,779.33	69,980	2,332.6667	128,035	161.46	198,015
H.card 2	1	740	1,070	740.00	1,070.00	1,810	1,810.0000	11,920	216.73	13,730
H.card 3	6	1,610	10,460	268.33	1,743.33	12,070	2,011.6667	30,235	149.68	42,305
SSS	1	170	250	170.00	250.00	420	420.0000	20,540	156.79	20,960
CSMBS	15	10,080	92,880	672.00	6,192.00	102,960	6,864.0000	40,980	199.90	143,940
Dir+traffic	17	11,760	24,640	691.76	1,449.41	36,400	2,141.1765	39,610	158.44	76,010
Total	181	111,295	484,080	614.89	2,674.48	595,375	3,289.3646	629,420	159.95	1,224,795

Table B.17: Financial requirements for implementing universal coverage

Forecast for fiscal year 2545

Row	Elements of core packages	Unit	National average	Technical notes
1	Reported illness last 2 weeks	per capita per 2 weeks	0.166	
2	Reported illness in a year	per capita per year	4.340	row1*26
3	Use at institutional care	Ratio	0.661	sum row 5 to 9
4	Number of institutional visit	visit per capita per year	2.876	row 2* row3
5	Use at health centers	Ratio	0.151	
6	Use at district hospitals	Ratio	0.129	
7	Use at provincial and other public hospitals	Ratio	0.155	
8	Use at Private clinics	Ratio	0.195	
9	Use at Private hospitals	Ratio	0.031	
10	Cost incurred at Health Center	Baht per capita per year	39.40	row2* row5* 60B/visit
11	Cost incurred at District Hospital	Baht per capita per year	123.8	row2* row6* 221B/visit
12	Cost incurred at provincial Hosp	Baht per capita per year	186.9	row2* row7* 278B/visit
13	Cost incurred at private clinic	Baht per capita per year	187.2	row2* row8* 221B/visit
14	Cost incurred at Private hospital	Baht per capita per year	37	row2* row9* 278B/visit
15	Total OP cost incurred	Baht per capita per year	574	sum row 10 to 14
16	Admission	Admission per capita per year	0.066	
17	Use at district hospitals	Ratio	0.332	
18	Use at provincial and other public hospital	Ratio	0.488	
19	Use at Private hospital	Ratio	0.18	
20	Cost incurred at District Hospitals	Baht per capita per year	62.7	row16* row17* 2857 B/adm
21	Cost incurred at Provincial Hosp	Baht per capita per year	175.2	row16* row18* 5424 B/adm
22	Cost incurred at private clinic	Baht per capita per year	64.7	row16* row19* 5424 B/adm
23	Total IP cost incurred	Baht per capita per year	302.6	sum row 20 to 22

Table B.17: continued

Row	Element of core package	Unit	National average	Technical notes
24	Total cost for curative care per capita per year	Baht per capita per year	877	sum row 15 to 23
25	Preventive and promotive packages	Baht per capita per year	175	row24* 20%
26	Capital cost, 10% of curative package	Baht per capita per year	88	Row24* 10%
27	Total package including capital	Baht per capita per year	1140	sum row 24 to 26
28	High cost care, adjusted from Social Security Scheme	Baht per capita per year	32*	reference social security scheme
29	Accident and emergency outside contract primary care	Baht per capita per year	25*	reference social security scheme
30	Total capitation (operating expenditure only, exclude capital investment)	Baht per capita per year	1197	sum row 27 to 29

Source: Senior Research Scholar program in Health Economics and Financing, Thailand Research Fund and Health Systems Research Institute, computed from various sources, notably, NSO-Health and Welfare Surey 2539 and synthesis from unit cost studies

Notes

* pooled and managed centrally, not include in the capitation.

สถาบันวิจัยบริการ
จุฬาลงกรณ์มหาวิทยาลัย

Table B.20: Workload collection form

Name.....

Cost center.....

Day	8-9am.	9-10am.	10-11am.	11-12 am.	0-1am.	1-2am.	2-3am.	3-4am.
Monday								
Tuesday								
Wednesday								
Thursday								
Friday								
Saturday								
Sunday								

Table B.21: Summary of working hour for each cost center

Cost center	Name of cost center	Number of hours	%
A1	Administration		
A2	Central supply		
A3	Catering		
A4	Cleaning		
A5	Registration		
A6	Laundry		
B1	Pharmacy		
B2	Laboratory		
B3	X-ray		
B4	LR		
B5	OR		
C1	OPD		
C2	Dental clinic		
C3	Health Promotion		
C4	Sanitation and disease control		
C5	IPD		

Table B.22: Health Expenditure (Current Price), 1986-1998

Year	Public sector								Private sector				Foreign aid		Total health Expend.	Per capita health Expend.	% of GDP
	MoPH	Other ministries	Civil servant welfare	State enterprise welfare	Workmen's Compens. fund	Social security	Total	%	Private health insurance	Household	total	%	Amount	%			
1986	9,275	3,965	2,594	435	221	-	16,490	24.96	630	48,432	49,062	74.27	508	0.77	66,066	1,254.78	5.83
1987	9,525	4,082	2,828	474	274	-	17,183	22.7	756	51,258	58,014	76.63	507	0.67	75,704	1,439.10	5.82
1988	10,373	4,338	3,156	529	347	-	18,743	20.83	951	69,955	70,906	78.81	319	0.35	89,968	1,649.70	5.77
1989	11,733	4,448	3,521	590	397	-	20,689	19.69	1,162	82,988	84,150	80.07	252	0.24	105,091	1,895.31	5.66
1990	16,225	4,558	4,316	723	443	-	26,265	20.96	1,403	97,450	98,853	78.89	184	0.15	125,302	2,224.04	5.74
1991	20,569	4,699	5,127	859	624	778	32,656	23.52	1,544	104,348	105,892	76.28	270	0.19	138,818	2,449.93	5.54
1992	24,604	484	5,854	981	753	2,057	39,089	24.75	1,755	116,745	118,520	75.03	356	0.23	157,965	2,753.20	5.58
1993	32,898	4,928	7,906	1,291	927	2,473	50,423	27.39	2,061	131,297	133,358	72.45	281	0.15	184,062	3,141.85	5.81
1994	39,319	5,016	9,954	1,668	1,169	3,773	60,899	29.63	2,309	142,097	144,406	70.27	206	0.1	205,511	3,500.10	5.66
1995	45,833	5,106	11,156	1,869	1,370	3,991	69,325	30.08	2,586	158,371	160,957	69.85	151	0.07	230,433	3,887.33	5.5
1996	55,861	5,198	13,587	2,277	1,610	6,239	84,772	32.59	2,896	172,360	175,256	67.37	111	0.04	260,139	4,350.85	5.66
1997	68,934	5,292	15,503	2,598	1,987	10,245	104,559	37.86	3,245	168,211	171,456	62.09	122	0.04	276,136	4,540.52	5.91
1998	65,065	4,996	16,440	2,755	1,630	7,637	98,523	34.74	3,633	181,237	184,870	65.19	183	0.06	283,576	4,662.83	6.21

Source: 1. National Economic and social Development Board, Thailand National Income, 1995-1998.

2. Viroj Tangcharoensathien. Sufferings and Causes in the Health System, 1996

3. Charles Myers. Financing Health Service and Medical Care in Thailand, 1985

Table B.23: Comparison of Health Expenditure among Some Asian Countries

Country	Per capita health exp. (US\$)	Percentage in relation to GDP	Proportion govt. : household
Indonesia	76	1.8	39 : 61
The Philippines	60	2.3	56.5 : 43.5
Sri Lanka	61	1.8	77.8 : 22.2
Malaysia	220	2.4	58.3 : 41.7
Thailand (1998)	126	6.21	34.8 : 65.2
Singapore	845	3.6	36.1 : 63.9
South Korea	518	5.4	33.3 : 66.7

Source : World Development Indicators, The World Bank, 1998 (data for 1990-1995).

Note : For 1119, the exchange rate of 37 baht to a US\$ is used.

Table B.24: Growth of real-term expenditures of drugs, health and gross domestic product, 1988-1998 (1988 price=100)

Year	GDP	Health Expenditure	Drug Expenditure
1988	100	100	100
1989	112.19	110.08	133.43
1990	124.72	124.08	118.13
1991	135.39	130	124.65
1992	146.34	141.57	129.29
1993	158.61	159.65	123.95
1994	172.78	169.56	146.99
1995	188.05	179.31	179.65
1996	198.42	194.54	205.5
1997	190.13	194.39	220.58
1998	171.86	184.53	183.7
Average annual growth (10 year period)	5.55%	6.32%	6.27%
Average annual growth (last 5-year period)	1.61%	2.76%	8.20%

Source: Thailand Health Profile 19978-1998, MoPH

Table B.25: Allocation of government health budget by type of service, 1993-1999

Health budget	1995		1996		1997		1998		1999	
	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
1. Hospital services	31,006.1	62.7	37,443.0	62.6	44,881.2	65.9	39,181.2	63.7	37,795.1	62.8
2. Outpatient care (at h. centers)	11,173.2	22.6	13,630.4	22.8	13,898.3	20.4	13,239.6	21.5	14,044.5	23.3
3. Health services	2,033.1	4.1	2,571.3	4.3	2,335.7	3.4	2,395.2	3.9	2,187.2	3.6
4. Health research	476	0.9	537.6	0.9	1,022.3	1.5	975.9	1.6	809.3	1.3
5. Other health activities	4,758.7	9.7	5,628.1	9.4	5,987.3	8.8	5,716.3	9.3	5,343.6	9
Total	49,447.1	100	59,810.4	100	68,124.8	100	61,508.2	100	60,179.7	100

CURRICULUM VITAE

Name: Kasame Tungkasamesamran

Sex: Male

Date of Birth: 25 September, 1968

Office Address: Thongsaenkhan Hospital, Tambol Bothong, Thongsaenkhan District, Uttaradit, 53230, Thailand
Tel.6655-418040 Fax. 6655-418041

Home Address: 120/1 Samarnmit Road, Tambol Thait, Muang District, Uttaradit, 53000, Thailand
Tel. 6655-414538

E-mail Address: tkasame@hotmail.com

Nationality: Thai

Place of Birth: Uttaradit, Thailand

Marital Status: Single

Education: M.D., Chiangmai University, Thailand. (1985-1991)
Diploma, Preventive Medicine (Clinical Preventive Medicine). (1996)

Past Experience: 1. Physician, Tron Hospital, Uttaradit, Thailand. (1991-1992)
2. Director, Faktha Hospital, Uttaradit, Thailand. (1992-1994)
3. Director, Thongsaenkhan Hospital, Uttaradit, Thailand. (1994- Up to now)

สภามหาวิทยาลัย
จุฬาลงกรณ์มหาวิทยาลัย