ต้นทุนและต้นทุนต่อหน่วยบริการของโรงพยาบาลกาฟู ดาลู

ประเทศมัลดีฟส์ ประจำปี 2550

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วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาวิทยาศาสตรมหาบัณฑิต

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ปีการศึกษา 2550

COST AND UNIT COST OF GAAFU DHAALU REGIONAL HOSPITAL/ MALDIVES, IN THE YEAR 2007

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A Thesis Submitted in Partial Fulfilment of the Requirements
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มาเรียม ชาฟีค : ต้นทุนและต้นทุนต่อหน่วยบริการของโรงพยาบาลกาฟู ดาลู ประเทศมัลดีฟส์ ประจำปี 2550. (COST AND UNIT COST OF GAAFU DHAALU REGIONAL HOSPITAL/ MALDIVES, IN THE YEAR 2007) อ. ที่ปรึกษาวิทยานิพนธ์หลัก : รศ. ดร. ศิริเพ็ญ ศุภกาญจนกันติ, 108 หน้า.

การศึกษานี้มีวัตถุประสงค์เพื่อวิเคราะห์ต้นทุนและต้นทุนต่อหน่วยบริการของโรงพยาบาลกาฟู ดาลู ประเทศมัลดีฟส์ ประจำปี 2550 การศึกษานี้เป็นการศึกษาแบบย้อนหลังในมุมมองของผู้ให้บริการ ได้แบ่งหน่วยบริการของโรงพยาบาลออกเป็น 18 หน่วย โดยจัดกลุ่มเป็น 4 กลุ่ม คือ หน่วยต้นทุนที่ไม่มีรายได้ (NRPCC) หน่วยต้นทุนที่มีรายได้ (RPCC) หน่วยบริการคนไข้ (PS) และหน่วยที่ไม่ได้ให้บริการคนไข้โดยตรง (NPS) ใช้แบบฟอร์มเพื่อรวบรวมข้อมูลของปี 2550 โดยแบ่งเป็นค่าแรง ค่าวัสดุและค่าลงทุน และใช้การจัดสรรต้นทุนแบบ Step Down Technique

ผลการศึกษาพบว่า ต้นทุนรวม คิดเป็น 18,596,887.81 Rf ต้นทุนการให้บริการเท่ากับ 16,068,752.84 Rf โดยต้นทุนรวม ประกอบด้วย ค่าแรง Rf 10,638,243.10, ค่าวัสดุ Rf 5,278,083.75 และค่าลงทุน Rf 5,430,509.75 ตามลำดับ ต้นทุนต่อหน่วยของงานผู้ป่วยนอก ห้องสังเกตอาการ ห้องทำแผล และทันตกรรม เท่ากับ Rf 232, Rf 821, Rf 178, Rf 514 ตามลำดับ ต้นทุนต่อหน่วยของงานผู้ป่วยใน ตึกชาย ตึกหญิง ตึกศัลยกรรม ตึกกุมารเวชกรรม และ ICU เท่ากับ Rf 7,687, Rf 4,097, Rf 6,910, Rf 2,312 และ Rf 10,558 ตามลำดับ ต้นทุนต่อหน่วยของวันนอนผู้ป่วยในต่อตึกเท่ากับ Rf 3,106, Rf 1,280, Rf 2,158, Rf 907 และ Rf 3,508 ตามลำดับ

ต้นทุนต่อหน่วยที่สูงและตัวชี้วัดสมรรถนะของโรงพยาบาล ชี้ให้เห็นถึงอัตราการใช้บริการการรักษาพยาบาลที่โรงพยาบาลมีอัตราการใช้ที่ต่ำ นอกจากนี้ผลการศึกษายังแสดงให้เห็นถึงความสิ้นเปลืองและความไม่มีประสิทธิภาพในด้านบริหารโรงพยาบาล และผลกระทบจากปัญหาระบบการส่งต่อและการบริหารทรัพยากรมนุษย์ของระบบบริการสุขภาพของประเทศ และได้เสนอให้มีการปรับปรุงระบบการส่งต่อผู้ป่วย พัฒนาระบบให้มีประสิทธิภาพ และการลดความสิ้นเปลืองในการใช้ทรัพยากรเพื่อโรงพยาบาลจะได้ให้บริการการรักษาพยาบาลที่มีคุณภาพและเป็นไปตามมาตรฐานต่อไป

สาขาวิชา เศรษฐศาสตร์สาธารณสุข ลายมือชื่อนิสิต.....

ปีการศึกษา 2550 ลายมือชื่ออาจารย์ที่ปรึกษาวิทยานิพนธ์หลัก.....

508 57030 29: MAJOR HEALTH ECONOMICS
KEY WORDS: COST / UNIT COST / REGIONAL HOSPITAL/ MALDIVES
MARIYAM SHAFEEQ: COST AND UNIT COST OF GAAFU DHAALU REGIONAL HOSPITAL/ MALDIVES, IN THE YEAR 2007. THESIS PRINCIPAL ADVISOR: ASSOC. PROF.SIRIPEN SUPAKANKUNTI, Ph.D., 108 pp.

The objective of this study was to analyze the cost profile and unit cost of health services of Gaafu Dhaalu Regional Hospital/ Maldives, for the year 2007.The study was a retrospective study conducted in provider's perspective. The hospital sections are divided into 18 cost centres and clustered into four groups of cost centres, namely non revenue producing cost centre (NRPCC), revenue producing cost centre (RPCC), patient services (PS) and non-patient services (NPS). Data recording forms are used to collect data for the period of 2007 and data information was compiled as three groups, labour cost, material cost and capital cost. The total costs were allocated using step-down technique of allocation with in-cooperated allocation criteria's, defined according to the activities of the cost centres.

Study results show that the total direct cost of the Hospital in 2007 is Rf 18, 596, 887.81with a total operating cost of Rf 16,068,752.84. The total direct cost comprise of Labour cost Rf 10,638,243.10, material cost Rf 5,278,083.75, and capital depreciated cost as Rf 5,430,509.75, respectively. The unit cost of Outpatient department, Observation room, Dressing room and Dental department are, Rf 232, Rf 821, Rf 178, Rf 514, respectively. The unit cost of an inpatient admission for Male Ward, Female Ward, Surgical Ward Paediatric Ward and Intensive care unit are, Rf7, 687, Rf4, 097, Rf 6, 910, Rf2312 and Rf10, 558 respectively. The unit cost of per inpatient days of ward, were, Rf 3,106, Rf 1,280, Rf2, 158, Rf 907 and Rf 3,508 respectively.

The high unit costs and low hospital performance indicators suggest low utilization of health services in GDH Regional Hospital in the year 2007. Moreover study result implies the presence of inefficiency in resource allocation and wastage in the hospital, which may be due to problems in the referral system as well as human resource management of the health care system in Maldives. The study presents recommendations to the policymakers and hospital administrators on improving these areas to work towards achieving quality and standard provision of health care.

Field of Study HEALTH ECONOMICS Student's Signature.....

Academic Year 2007 Principal Advisor's Signature .....

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LIST OF ABBREVIATIONS

CC	Capital Cost
CVD	Cardio Vascular Diseases
DMS	Department of Medical Services (in MOH/Maldives)
CSMBS	Civil Servants Medical Benefit Scheme
DRG	Diagnosis Related Group
GDH	Gaafu Dhaalu
GA	Gaafu Alifu
GDP	Gross Domestic Product
GGE	General Government Expenditure
HIV	Human Immuno-deficiency Virus
IP	Inpatient
IPD	Inpatient Department
LC	Labour Cost
MC	Material Cost
MOH	Ministry of Health (Maldives)
NPS	Non-patient Services
NRPCC	Non-revenue Producing Cost Centre
OPD	Out Patient Department
OP	Out Patient
PS	Patient Services
Rf	Rufiyaa (Maldivian Currency)
RPCC	Revenue Producing Cost Centre
SSS	Social Security Scheme
THE	Total Health Expenditure
TDC	Total Direct Cost
TOP	Total Operating Cost
UC	Universal Coverage
USA	Unites States of America
USD	United States Dollar
WHO	World Health Organization

CHAPTER I

INTRODUCTION

Health care financing is one of the biggest challenges in the developing countries. Especially low-and middle-income countries, throughout the world face many difficulties in meeting the health needs of their citizens, mobilizing sufficient financing in an equitable and affordable manner, and securing the value for scarce resources spent on preventive and curative health services. Maldives being a developing country has a goal to sustain its resources and mobilize health financing in an equitable manner (Nitayarumpong and Mills, 2005). As a part of health care reform efforts Maldivian government is aiming to develop a health insurance system in the country to sustain its resources and mobilize health care financing. This study provides a necessary component in developing insurance scheme through a cost analysis study of a regional hospital of Maldives, in an attempt to assist in scaling up the development of the development of health insurance system policy in the Maldives.

1.1 Rationale

The government of Maldives considers that the enjoyment of highest attainable level of health as a basic right of every Maldivian citizen. One of the important policy goals of this target is to ensure that the health system is financed by a sustainable and fair mechanism (MOH/Maldives, 2006). Maldives is in need of health care reforms step by step.

In Maldives, the burden of health expenditure solely depends on out of pocket payments and Social Welfare Scheme (in which expenditure is based on fee for service). The importance of out-of-pocket spending both private and total health spending is a key factor leading to lack of risk pooling and potential inequities in health financing, given poor people's ability to pay (Gottret and Schieber, 2006). In many de-

veloping countries the household out of pocket payments for health services represents the major source of health financing (Tangcharoensathein, Wilbulpholprasert and Nitayaramphong, 2004). These conditions are leading to extreme catastrophic consequences in health care. Countries have taken integration of health insurance schemes as one of the most challenging goals in their health care reforms (Nitayarumpong and Mills, 2005). During this era the government of Maldives has also decided to go for achieving Universal coverage of Health Care by the year 2010 and the first step is to establish a policy and develop a framework for health insurance scheme for the government employees and their dependants.

An increasing recognition on the importance of evidence- based decision making at health policy level, which highlights the fact that unit cost data for key activities are often not available, particularly in developing countries (Adam & Evans, 2006). Likewise Maldives lack reliable estimated cost of medical services such as unit cost of outpatient and inpatient care services. Cost associated with curative care is vital for policy makers and hospital administrators and Hospital unit cost is extremely vital for scaling up the development of health Insurance coverage such as Social Health Insurances and Community based health insurance schemes (Tisayaticom, Tangcharoensathien and Patcharanarumol, 2007)

Another major problem is the ongoing health transitions in many developing countries. These changes encompasses demographic changes, such as lower fertility and longer life expectancy and epidemiological changes, such as shifting the burden of disease towards non- communicable diseases and injuries will have profound effects on the quantity and type of health care services needed. This trend increases the cost pressure on the health care systems in developing countries. (Gottret and Schieber, 2006). Similarly, Maldives is struggling with a large burden of communicable disease while confronting with many non-communicable diseases, accidents and injuries and an additional burden to the increasing health expenditure in health facilities. The cost of Hospital services are increasing day by day due to the need for high cost equipments and qualified personnel to meet the growing demands of people. Hospitals are in a greater need for information on how to contain their cost and efficient alloca-

tion of resources within hospitals. The ignorance of cost, rising health expenditure, and concerns regarding quality have been addressed aggressively by OECD countries. Better information on cost has allowed improved health services, more effective use of public resources and better rationing of care, in turn has changed the face of health care. (Lewis, Forgia and Sulvetta, 2003). Hospital cost provides very useful information for hospital managers, to contain necessary resources and to allocate the limited resources in a more efficient manner (Tisayaticom et al, 2007)

This study focus on G.DH Regional Hospital, since it is one of the leading secondary care hospital as well as cost patterns of this hospital can be similar to the rest of the regional hospitals in Maldives. Furthermore, Maldives is in need of cost patterns of hospital for scaling up of a universal coverage, of health care services in the country.

1.2 Country Background: Maldives

Maldives is a group of islands scattered just below Srilanka in the Indian Ocean. Maldives is chain of 1192 islands which is grouped into 26 atolls (cluster of islands) out of that 200 islands are inhabited with local communities. A map of Maldives is included as appendix A. According to census of 2006 total population is 298,968 (Ministry of Planning/Maldives, 2006) and another estimation of July 2006 is about 300,000s (Website Wikipedia, 2007)

1.3 Health System in the Maldives

In the Maldives, Ministry of Health (MOH) has authority and mandate for formulating health policies and health development plans; it is also responsible for monitoring and evaluation of the health situation in the country. The Department of Public Health (DPH) is responsible for developing and implementing health preven-

tion programme and control of communicable diseases. DPH is also responsible to deliver basic health care services at the island and atoll levels.

The health care system of Maldives is organized into a five-tier referral system, compromising the referral hospital (in Capital Island, Male'), regional hospitals, atoll hospitals, atoll health centers and island health posts. There are two tertiary care hospitals in Maldives, a government hospital (Indira Gandhi Memorial Hospital) and a private hospital (ADK Hospital). Altogether there are 6 regional hospitals, 6 atoll hospitals, 53 health centers and 43 island health posts. The tertiary care hospital (Indhira Gandhi Memorial Hospital) serves as the central referral hospital for the whole country. The regional hospital provides care at the regional levels including supervision of atoll hospitals. (Website Ministry of Health/Maldives, and WHO, 2007)

1.3.1 Current Health Status of Maldives

According to Ministry of Health (2006) the health status of the people of Maldives has improved significantly in the last decade. Some key health indicators have shown improvement (as indicated in Table-1.1). Communicable diseases such as malaria and vaccine preventable childhood diseases are eliminated. Leprosy and filaria have reached elimination target and tuberculosis and HIV prevalence are low. However, diarrhea and acute respiratory infections still continue to be significant morbidity to both children and adults. At present dengue and scrub typhus are major communicable diseases which have emerged and still continues to prevail in the country. With the control of communicable diseases and changes in lifestyles chronic non communicable diseases have emerged as the main cause of mortality in the country. (WHO/Maldives, 2006). Furthermore the establishments of operation theatres at the regional level and focused capacity building in obstetrics have saved lives of mothers and babies. In addition to that the availability of laboratory investigations, X rays, and other diagnostic facilities have contributed to early diagnosis and more successful treatment of life threatening diseases.

Table-1.1 Basic Health Indicators of Maldives, from 2002-2006

Population Indicators	2002	2003	2004	2005	2006
Population Under 15 years (%)	38	36	34	33	_
Population 15 – 59 years (%)	56	58	59	61	_
Population over 60 years & above (%)	6	6	6	5.1	_
Annual Population growth Rate (%)	_	_	_	1.69	
Urban Population (%)	_	_	_	_	35
Health Indicators					
Infant Mortality Rate per 1000 live births	18	14	15	12	16
Child Mortality Rate per 1000, live births	23	18	22	16	19
Crude Birth Rate per 1000 population	18	18	18	19	20
Crude Death Rate per 1000 population	4	4	4	3	4
Maternal Mortality Rate per 100,000 of live births	97.28	96.26	96	72	69
Life Expectancy at Birth			M-71	M-72	M-72
			F-72	F-73	F-73
Primary Prevalence Indicators					
TB prevalence rate /1000 pop	0.1	0.14	0.26	0.26	_
Leprosy Prevalence rate/1000 pop	0.07	0.02	0.20	0.04	_
Incidence rate of Diarrheal disease/ 1000	65.23	51.00	49.67	79.06	_

Source: MOH- Maldives

1.3.2 Health Expenditure patterns

In 2005 the health expenditure patterns of Maldives (given in Table-1.2 in page 7) are such that, the total health expenditure as a percentage of GDP is 12.4% and general government expenditure on health is 21.5%. Out of the total health expenditure 88.3 % is from General Government General Expenditure, where as the private sector expenditure on health is 11.7%. Fifty percent of the General Government expenditure on health goes for social security services (fund) provided to the public

(Website WHO, 2006). Welfare assistance is the only mechanism whereby most needy can obtain financial assistance for health care. It covers all the medical charges of patient who are unable to pay for health services, when admitted in tertiary care hospital (IGMH). About 100% of private expenditures are of out of pocket payments of households. The out of pocket spending accounts a major bulk of total health spending (Gottret and Schieber, 2006)

1.4 General Information on Gaafu Dhaalu (G.DH.) Regional Hospital

G.DH. Regional Hospital is situated in G.DH. Thinadhoo, at the southern part of Maldives; it is 50 bed hospital where curative and preventive care is provided to the populations of two adjacent two atolls. G.DH. and Gaafu Alifu atoll with a population of 19, 275. The Department of Medical Services (DMS) / Ministry of Health have the immediate authority over to G.DH.Regional hospital. The organization of the hospital is divided into three main departments. They are administration and support services, the medical, nursing services and Health Promotion, and Finance and procument department.

There were approximately 170 employees working in the Hospital including locals and expatriates. There are qualified doctors, nurses and paramedical and other administrative staffs. The medical specialties available includes general medicine, general surgery, pediatrics, dentistry, orthopedics, obstetric, and gynecology. The diagnostic services available in the hospital are general blood and urine investigation, radiology, ECG and scanning services. The other services available in the hospital are physical therapy and rehabilitation service, immunization and health promotion services.

Table: 1.2 Health Related Expenditures of Maldives, from 1996-2005

A. SELECTED RATIO INDICATORS* FOR EXPENDITURES ON HEALTH	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
I. Expenditure ratios										
Total expenditure on health (THE) as % of GDP	5.8	6.0	6.1	6.1	6.8	6.8	6.6	7.2	7.7	12.4
Financing Agents measurement										
General government expenditure on health (GGHE) as % of THE	77.3	77.7	76.7	77.6	75.8	77.0	76.3	79.3	81.4	88.3
Private sector expenditure on health (PvtHE) as % of THE	22.7	22.3	23.3	22.4	24.2	23.0	23.7	20.7	18.6	11.7
General government expenditure on health as % of GGE	14.1	14.4	14.0	13.2	13.7	13.8	13.3	14.2	16.0	21.5
Social security funds as % of GGHE	20.1	24.0	24.1	21.3	20.5	24.9	23.8	27.9	29.2	50.1
Private households' out-of-pocket payment as % of PvtHE	100	100	100	100	100	100	100	100	100	100
Prepaid and risk-pooling plans as % of PvtHE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Financing Sources measurement										
External resources on health as % of THE	7.3	3.0	11.4	7.0	2.8	1.6	3.0	1.4	1.6	n/a
Resource Costs measurement										
Compensation of government health employees as % of GGHE	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Total expenditure on pharmaceuticals as % of THE	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Private expenditure on pharmaceuticals as % of PvtHE	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Provider measurement										
Total expenditure on hospitals as % of THE	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Functions measurement										
Total expenditure on inpatient care as % of THE	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Prevention and public health services as % of THE	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
II. Selected per capita indicators for expenditures on health										
Total expenditure on health / capita at exchange rate	101	114	119	128	145	143	139	159	180	274
Total expenditure on health / capita at international dollar rate	222	252	273	293	336	349	358	422	494	787
General government expenditure on health / cap x-rate	78	89	91	99	110	110	106	126	147	242
General government expenditure on health / cap int. $ rate	171	196	209	228	255	269	274	335	403	695

Source, WHO

1.5 Research Question

1. What is the unit cost for, inpatient and outpatient service of G.DH Regional Hospital?
2. What are the proportions of labour cost and material cost incurred for the unit cost?

1.6 Research Objectives

1.6.1 General Objective

- To analyze the cost and unit cost for inpatient and outpatient, services of G.DH. Regional Hospital in the year 2007.

1.6.2 Specific Objectives

- To analyze the total cost and cost profile of G.DH Regional Hospital
- To analyze the unit cost in terms of one inpatient day, an admission and one outpatient visit.
- To analyze the total labour cost, material cost, capital cost and operating cost incurred in the unit cost of inpatient and outpatient services of G.DH. Regional Hospital

1.7 Scope of the Study

The scope of this study is to provide analysis of the total cost profile of inpatient and outpatient services of G.DH Regional Hospital in the year 2007. The study analyzes unit cost based on average cost of all diagnoses of the departments in the hospital. The cost information includes only the costs borne with in the hospital budget. The study is account based rather than economical, as implicit costs such as opportunity costs was not included.

CHAPTER II

LITERATURE REVIEW

2.1 Cost Definitions

According to Lucy (2002) cited in Mogyorosy and Smith (2005, p-190) Cost can be defined as the amount of expenditure (actual or nominal) incurred on or attributable to a particular good or activity. In other words it can be defined as resources (cash or other assets) that must be surrendered in order to achieve particular objective. The cost always relates to past activities (Mogyorosy and Smith 2005).

Another definition refer cost as the cost of goods and services as the value of resources spent for acquisition of those good or services that may be expressed in monetary or non monetary values (Mogyorosy and Smith, 2005). As economist always distinguish between accounting cost and opportunity cost or social cost (Carrin and Evlo, 1995).

2.1.1 Accounting Cost and Opportunity Cost

Accounting cost are costs that are incurred to acquire resources (Mogyorosy and Smith, 2005). It can also be referred as the monetary values of actual expenditure for acquisition of goods and services (Carrin and Evlo, 1995). It is concern with measuring cost for financial planning, assessing decisions and reporting purposes from a particular organizational perspective (Mogyorosy and Smith, 2005).

Opportunity cost is the total value of benefit foregone because of alternative use of resources (including money) or the sacrifice of best alternative use of resources. Therefore measurement of opportunity cost or true cost could be difficult as it includes implicit cost such as cost of time and capital. It should not be taken as a

special type of cost accounting or costing system, but rather as a particular approach to decision making under resource scarcity. (Mogyorosy and Smith, 2005).

Economic and financial or accounting costs can be used in the same manner. In economic costing cost can be calculated as annualizing cost, it encourages thinking about cost per unit as a service indicator of efficiency, cost per beneficiary, per head, per house hold in measuring equity and priority values. When it comes to concepts of affordability and comparison with the budget allocation it is inappropriate to use economic cost rather than financial cost. (Creese & Parker, 1994).

2.1.2 Joint costs

In many situations costs are jointly shares by in more than one activity, especially in places like hospitals. For example a mobile immunization team may use rural clinics as their bases for vaccination, so the cost of maintaining the building need to allocated to both programs. Such cost has to be apportioned among all the programs. The breakdown of hospital into different activities can be complex but necessary in developing cost structures of the hospital. (Green, 2007)

2.1.3 Unit cost or Average cost

Unit cost is the cost of one unit of service and total cost is sum of all the cost associated with particular cost object. The unit cost is calculated by dividing the full cost of particular cost object by number of units of services provided. Unit cost is also considered as the average cost per unit of services (Mogyorosy and Smith, 2005)

2.2 Classifications of Costs

2.2.1 Direct and Indirect Cost

The cost of hospital services can be classified into “direct cost” and “indirect cost”. Direct cost are directly linked to the use of particular resources or cost objects (Mogyorosy and Smith, 2005).Carrin and Evlo (1995) declares that direct cost can be defined in relation to a given activity, a medical service or a department of Hospital. They also defined indirect cost as cost of goods and services used jointly by several activities or several departments; as such the totality of the cost cannot be attributed to one particular department, service or activity

2.2.2 Fixed and variable cost

The total cost of activivity can also be divided as fixed cost and variable cost. The fixed costs are those costs that remain constant within a range of activity, while variable costs will change with the level of activities (Green, 2007).

2.2.3 Prime cost, overheads and total costs

The sum of the direct materials, direct labours and direct expenses are called prime cost. While the total of indirect material, labours and indirect expenses are known as overhead costs. The total of both prime cost and overhead cost is called total cost (Mogyorosy and Smith, 2005).

Cost can also be categorized as by the way it provides inputs namely capital costs and recurrent cost (Creese and Parker, 1994). According to Tisayaticom et al, (2007) it can also be divided into three main classifications such as labour cost, material and Capital Cost.

2.2.4 Labour Costs

Labour cost: is defined as the salary, overtime payment of all the personnel in all the departments of the hospital. The labour cost must include all the, bonuses allowances and fringe benefits received to the personnel as a part of their remuneration package. In estimating labour cost, the working hours personnel spend on different department must be considered. For this full time equivalent could be used to reflect number of full time staff contribute to each cost centres.

2.2.5 Material Costs

Material cost: is the cost of all the medical goods and supplies and other related non – medical supplies incurred in the operation of activity or department. It consists of office supply, housekeeping, maintenance expenses, public utilities (such as electricity, postal services, and telecommunication services), gasoline, laboratory chemicals etc. (Tisayaticom et al, 2007)

2.2.6 Capital Costs

Capital Cost: are inputs that last for more than one year (Creese and Parker, 1994). This includes the cost of depreciation of all major equipments, machineries, buildings and other fixed assets(Tisayaticom et al,2007). Assets that have an economic useful life exceeding one year and is not acquired primarily for resale. Such capital items are being worn down by daily activities of the hospital has an expense in their depreciation. To calculate depreciation cost the purchasing price of equipment and useful life of equipment is very important. (Shepard, Hodgkin's and Anthony, 1998).

Estimation of capital cost employs the number of useful life –years of the particular equipment, building or assets. Usually its 5 years for the major equipments and

20 years for buildings. However if a building or equipment is fully depreciated the financing account could be zero, but the opportunity cost could be substantial (Brower 2001 cited in Mogyorosy and Smith, 2005). These years are usually determined by hospital or the concerned ministries of the country. According to another useful life and disposal value table the useful life years for hospital equipments and furniture can be 10 years. Capital costs can be estimated using the following formula (Tisayaticom et al,2007).

$$\text{Capital Cost (Depreciation cost)} = \frac{\text{Purchasing Price of the equipment}}{\text{Number of useful life years.}}$$

2.3 Utilization of Hospital Unit Cost

In order to avoid continuous 'reinventing the wheel' its necessary to develop series of hospital unit costs. Such cost reflects to the cost of outpatient, a vaccination, 100 ambulance-kilometers, as an inpatient day or training a hospital staff.(Green, 2007) Tisayaticom et al, (2007) view cost of health services as one of the key foundation for the study of health economics and health care financing. The cost of inpatient days are frequently the main drivers of total treatment cost and the hospital unit cost can markedly affect the outcomes of economic evaluations. As in many countries the unit cost calculation is an established method for valuation of resource used in economic evaluations. Often the estimation hospital unit cost is necessary as there are no other available cost prices to evaluate economical decisions in health care settings (Oostenbrink, Woude, Agthoven, Koopmanschap and Rutten, 2003)

The unit cost of inpatient and outpatient care is an essential element for costing, budgeting and economic evaluation exercises. (Adam, Evans and Murray, 2003). According to Adam et al (2003) information on hospital unit cost is also valuable to health decision –makers and researchers for the assessment of hospital efficiency by means of either cost-benefit analysis or cost effective analysis and to assess the efficiency of different health care interventions. They also concludes that as a result of

reform and changes in developing countries requires more and more relevant information on the level and structure of health care cost, the relative efficiency of current delivery modes and how to measure and ensure a basic level of quality.

Cost is an essential ingredient to guide policy as well as mange hospitals; it also plays an important role in allocation of effective resources across hospitals. It is an input for assessing various type of relative efficiency of various types of treatment and treatment compared to prevention. Cost also identify the resources necessary to undertake or sustain or scale up intervention efforts (Adam and Evans, 2006) and Health Insurance Coverage (Tisayaticom et al, 2007).Unit cost can be used in formulating and developing an appropriate rate of payment. Measuring unit cost allows distinguishing direct cost of hospital services (to be paid by the responsible insurer) from overhead cost (to be prorated across insurers. Treating patient in least complex and least costly type of health facility is one of the principles of health planning. Unit cost analysis allows the economic rationale behind the policy to ensure the patients are treated more conveniently at a lesser cost to the family. (Shepard et al, 1998).

Mogyorosy and Smith, (2005, page 33) identifies the purposes of costing of services as the following

- Pricing new services for an internal market
- Pricing new services for cost border care
- Pricing services for non-insured (private) patients
- Cost comparison between different providers
- Cost comparison between different providers in different regions
- Cost comparison between different countries
- Cost comparison with other mutually exclusive services
- Benchmarking for services/providers
- Identify areas of cost reduction / cost containment
- Assessing whether a particular service is good value for money

- Making formal coverage policy decisions/ reimbursement decision
- Fine- tuning (upgrading) incentives/ payment policies
- Developing local cost conscious clinical guidelines
- Other decisions
-

2.4 Basic Principles of Costing Methodologies

According to Mogyorosy and Smith (2005) there is no universally accepted appropriate methodology for costing. In spite of that there are several appropriate methods to estimate the unit costs of services. The methodology will depend on the purpose of cost data to be used, so different concepts methodologies can be used. According to both accounting and economical literature basic principles of costing are as follows (Mogyorosy and Smith, 2005):

- formation of well defined decision problem that includes objectives, the perspective and time horizon for costing
- the description of particular service (cost object) after defining the service for costing in detail, the costing methodology follow three distinctive steps
- the identification of resources used to deliver the services
- the measurement of resource utilization in natural units
- attaching monetary value to resource use
- sensitivity analysis and statistical tests

2.5 Standard Costing Methodology

Tisayaticom et al (2007) describes the four main steps involved in the standard costing methodology

2.5.1 Cost Centre Identification

In this step it's necessary to understand the organogram of the hospital, organization structure and functions of all departments. Each department of the hospital can be classified into a cost centre in accordance with the activity or function of it. There are four different types of cost Centers

(i) Non revenue producing cost centre (NRPCC):

NRPCCs are responsible for managing and providing support for the operation of other departments in the hospital. These services do not generate tangible revenue to the hospital.

(ii) Revenue producing cost Centres (RPCC):

RPCC provide medical and ancillary services to patients. They generate revenue to the hospital by charging a fee from the patient. For example: radiology department, operating room, pharmacy, laboratory or clinical pathology department.

(iii) Patient Service cost center (PS):

PS centres provides direct patient care, such as inpatient and outpatient departments, which includes outpatient consultation department, Dental, Emergency room etc.

(iv) Non Patient Service cost center (NPS):

NPSCs are responsible for providing other related activities like conducting health education programme, health promotion, disease prevention and control, mobile and outreach services, school base health services, teaching of medical and nursing students.

2.5.2 Compiling Total Direct Cost

The total direct cost of each cost centre comprise of three components, they are labour cost, material cost and capital cost

Total Direct cost = Labour cost+ Material Cost +Capital Cost

Total Operating Cost = Labour cost + Material Cost

2.5.3 Defining Allocation Criteria

In defining allocation criteria the allocation factors have to be collected to allocate either total direct cost or operating cost from non- revenue producing cost centers and revenue producing cost centers to patient and non patient services. The allocation criteria are generally based on service statistics or activity statistics of which the NRPCC and RPCC provide to PS and NPS (Tisayaticom et al, 2007). The cost allocated to PS and NPS by the other cost centers are known as indirect cost. It reflects to whatever factors that determines each department's use of indirect cost Centres. A person's knowledge of hospital functions may direct to formulate allocation criteria's, that predicts cost accurately (Shepard, Hodgkin and Anthony, 1998).

2.5.4 Full Cost and Unit Cost Estimation

To determine the unit cost of PS and NPS cost Centres, NRPCC and RPCC will allocate their total direct cost to this centre according to the allocation criteria and ratio. NRPCC and RPCC is also called transient cost Centres because all operating cost to will be allocated to its recipient centers PS and NPS which are also referred as Absorbing cost centers. To allocate overhead cost from the higher centre to lower centers, four common allocation techniques are used. After cost is fully allocated to patient service and non patient services, the unit cost is obtained. The unit cost is the division of the full cost of patient service by the total outputs of each cost center. The output can be defined as number of outpatient visits, number of admissions or discharges and hospitalization days. (Tisayaticom et al, 2007)

2.6 Overhead Cost Allocation Techniques

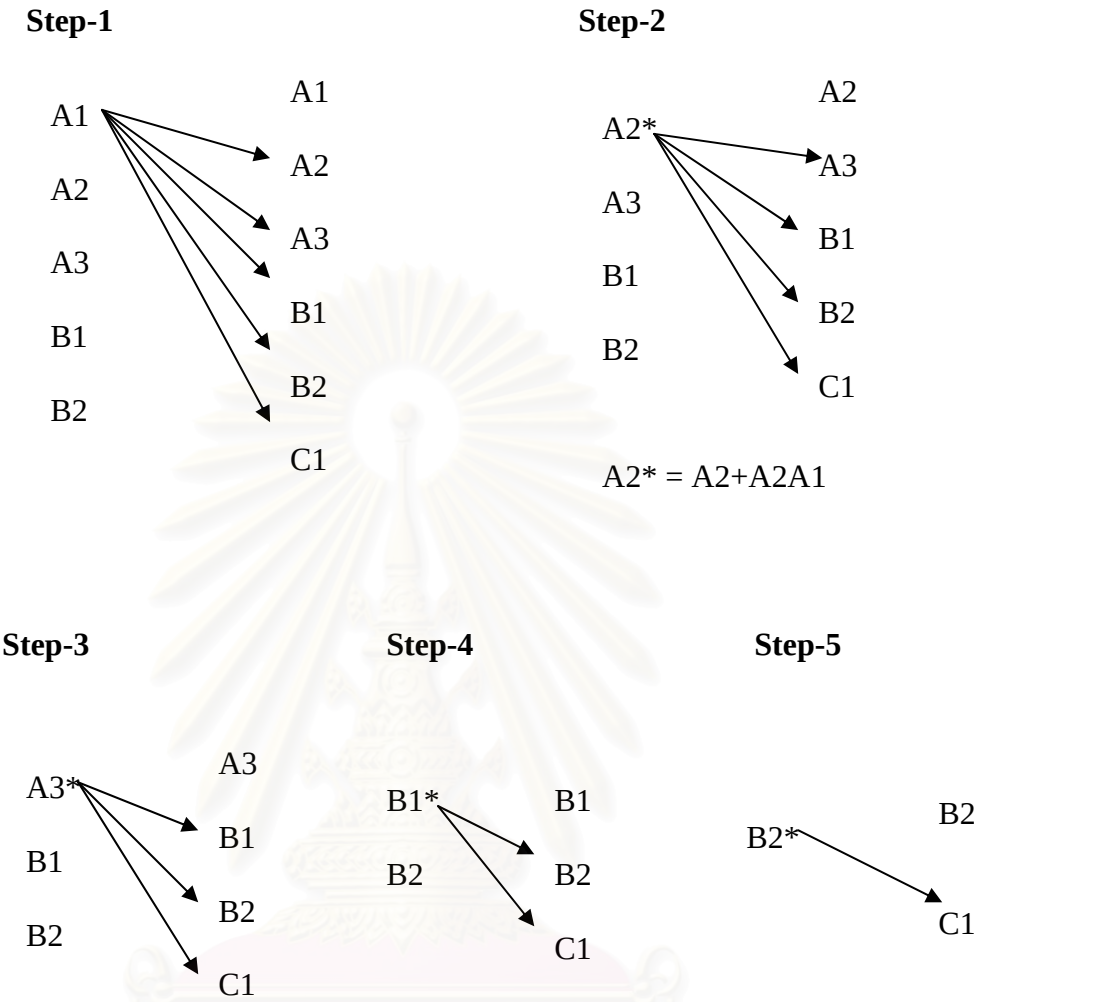
2.6.1 Direct Allocation Method

Direct Allocation Method is the simplest technique where total direct cost of each transient cost centre (NRPCC & RPCC) directly allocates its cost to absorbing cost centers ignoring the relationship within the cost Centres (Tisayaticom et al, 2007). Because of this weakness it could underestimate the cost in all final cost centres (Drummond, O'Brien, Stoddart and Torrance, 1997).

2.6.2 Step Down Allocation Method

Step down allocation method takes into account the relationship of services provided with in the cost centres. One of the two main principles of this method is that; the sequencing of cost centres is taken as an important step. The cost centre which serves to most centres is ranked as highest. Second principle is that there is no upward costing from lower cost centres to higher cost centres. NRPCC is always located above RPCC and cost is allocated from highest cost centre to allocates its cost to lower cost centres according to its relative importance. When the total direct cost of above centres are allocated down to the lower cost centres the highest cost centre becomes zero. Then the next centre below to highest cost centre in line allocates its total direct cost indirect cost to cost centres below it. This process continues until the entire costs are allocated from NRPCC and RPCC to the absorbing cost centres. This cascade of allocation refers to step down allocation method at the end of process the full cost of PS and NPS will be sum of its own direct cost and indirect cost which is allocated in a cascade manner. (Tisayaticom et al, 2007).

Figure 2.1 Step-down Allocation techniques (Tisayaticom et al, 2007)



A denotes NRPCC, B denotes RPCC and C denote PS.

2.6.3 Double Distribution Method (Step Down with alteration)

Double distribution method (step down with alteration): it's a reciprocal method, mathematically used and computer based. The step down with iteration or multiple allocations allows full adjustment for interaction of overhead departments. (Drummond et at, 1997 & Mogyorosy and Smith, 2005). In the first distribution the cost is assigned to the general service units are allocated to all the other departments (general and Patient service) in accordance with measures of the relative demand exerted on the entity whose cost are apportioned. After the first distribution the cost allocated to the general services are redistributed to the final cost centres, either by direct or step down method (Viroj, 1997 cited in Limassanthithum, 2004). This method reduces bias resulting from ranking of cost centres. (Drummond *et at*, 1997 & Mogyorosy and Smith, 2005).

2.6.4 Simultaneous equation allocation method

The simultaneous equation allocation method is also mathematical and computer based, where it makes full adjustment for interaction of overhead departments. This method uses infinite round of allocation and provide allocation of cost by solving a set of simultaneous equations. Theoretically it is most accurate method but more complex in nature and difficult to implement. (Drummond et at, 1997 & Mogyorosy and Smith, 2005)

2.7 Related Research Studies on Costing

Tisayaticom et al, (2007) studied unit cost of Nam Sach Hospital of Vietnam-with the main objective of the study was estimating the unit cost per outpatient visit and unit cost per admission or per inpatient day. One of the main focus of the study was to find out a suitable methodology and to develop a hospital costing manual for Vietnam. The study prposed that step down allocation is more sensitive in bringing

out a significant result than direct appointment technique. In conclusion the study proposed to apply step down allocation method for analyzing the unit cost of hospital services for developing countries such as Vietnam.

An extensive effort of WHO assembled data on unit cost (Hospitals and health Centres) of 49 countries for various years (1973-2000). These data were then used to predict unit cost in countries for which data are not yet available, by a modeling exercise, using a series of models from WHO-choice project. Some of the study results confirm that unit cost are expected to be correlated positively with GDP per capita and case mix and negatively related with capacity utilization. Also that unit cost of hospital varies within the countries and basing cost effectiveness or budgeting exercises on the result of single facility or even a small group of facilities could give misleading results. (Adam et al, 2003)

Lewis et al (1996) studied on measuring public hospital costs by analyzing the actual costs of inpatient, emergency and outpatient services in a Dominican Hospital. They applied a set of set of survey instruments to a large sample of patients to measure costs of all hospital staff time, in-kind goods (drugs, medical supplies, reagents, etc) overhead and depreciated value of plant and equipment related to the treatment of each patient. The study applied step down technique to assign indirect cost to direct service departments. The study results indicated that budget is over 50% higher than actual cost of services, reflecting to high degree of waste in the system and low productivity. Another major finding was even though the physician represents the major bulk of personnel spending, the study resulted only 12% of contracted time of staff physicians, including time dedicated to treatment, supervision, administration and teaching. Though, the personnel spending represent 84% of the hospital's total budget, and the treatment cost of patients never exceed 12% of hospital budget. These results suggest gross inefficiency, chaotic medical care and poor hospital management. (Lewis et al, 1996).

The unit costs of inpatient hospital days was studied by Oostenbrink et al, (2003) to provide data from health providers perspective and to give an insight into the extent to which categories and total cost differ between hospitals of Netherlands. They collected unit cost 22 wards and 11 intensive care units of general and university hospitals involved in clinical trials with 'piggy –backed' economical evaluations. Direct costs such as nursing cost and cost of materials were calculated by dividing annual cost per category of the nursing department by annual number of inpatient days. Overhead allocations and accommodations were allocated to nursing departments by applying direct allocation method. The study result showed that the mean cost for inpatient day were EUR 230 (range EUR 154- 311) in general hospitals and EUR323 (range: EUR209-EUR400) in university hospitals. The mean costs for ICU were EUR1125. Between 34-84% of cost were made up of nursing costs and there were wide variations of cost between hospitals. The unit cost in university hospitals are 40% higher than in general hospital and unit cost of ICU were almost five times higher than unit cost of wards in general hospitals. The unit cost of ICU is approximately 3.5 higher than general wards in university hospitals. These results provide insight into range of costs of inpatient days, into the differences between general hospitals, university hospitals, and ICU, and the variation in cost categories between hospitals (Oostenbrink et al, 2003).

Jabr (2004) studied on break even analysis and willingness of CVD patients to pay for the catheter unit service in Ram Allah Hospital, Palestine. The purpose of the study was to investigate whether the government subsidizes the catheter unit or not. The methodology use on cost analysis was step down method to allocate overhead costing and equivalent diagnosis was used to determine breakeven point. The results of the study revealed that variable cost consists 50% of total cost and portion of fixed cost as 44%. It was also determined that variable cost for diagnosis as $ 141, for balloon is $532 and for pace maker as $ 1,690. The final result he found out was that the numbers of patients who seek the service exceed the breakeven point in each of the procedures. The study further revealed that the all patients who seek services are willing to pay more than the actual cost of service. (Jabr, 2004).

Laekawipat (2004) analyzed the cost and unit cost of Rongkwang Hospital Phrae province for fiscal year 2003. The study analyzed the unit cost by using simultaneous equation method. The study revealed the total direct cost of all operation as 36,823,964.50 baht and 63.86, 25.75, 10.39 baht as percentage of labour cost, material cost and capital cost respectively. The unit cost of outpatient department as 235.17 baht/visit comprising 144.63 baht as routine service cost and 90.54 in medical care cost. The unit cost of inpatient service was 2,549.95 baht/visit compromising 2008.56 baht in routine service cost and 541.39 baht in medical care cost. This study recommends on decreasing hospital cost through awareness, thus improving efficiency and promoting community health care.

A unit cost analysis was carried out on the results of the Health Facility Survey in Sri Lanka in the year 1992. The main goal of the study was to estimate the costs of inpatient and outpatient services of both government and private health facilities. The data collected were cleaned and validated before analysis of unit costs. The health facilities were classified into complex inpatient, basic inpatient and outpatient facilities. Cost calculations were carried out only on facilities that provide western care. Cost per bed-day available, bed day occupied, admission cost and outpatient unit cost were found for all the facilities. Service indicators were calculated for bed- occupancy rate, bed turnover rate, and average length of stay. Stata Version (5.0) was used to perform all the cost analysis in this study. (Somanathan, 1998).

The study found out that state basic facilities like complexes have lower unit cost per bed day and admission than the private ones. The researcher also found out that in state complex facilities, in spite of providing highly specialized services provided, due to higher occupancy rates enable them to achieve a lower cost per day. The study also implied that it’s better to extend existing facilities rather than building new ones. In addition to above findings, the study confirmed that unit cost were higher in tertiary facilities on other hand the lower level facilities also showed relatively high unit cost due to low occupancy and turnover rates. This study suggested the need to improve utilization of health care at the lower level health facilities and to ensure an efficient referral mechanism in the country. (Somanathan, 1998).

Analysis of total direct cost per unit of single major operation in Ratchaburi Hospital was done for the year 2000. The analysis was conducted from the provider's perspective in a retrospective manner. Randomized samples were collected from total number of major operations performed in the hospital. Data collecting forms were used as an instrument to collect data. The study revealed that the total direct cost for all operations was 9,002,815.4 Baht. Cardiovascular surgery had the highest total direct cost of 3, 0375 Baht and orthopedic surgeries highest total direct cost per unit (disease) of 81,653.5. The operation with lowest service charges higher than cost owes neurology surgery i.e. Craniotomy and the different cost was 5,320.6Baht. The operation that had higher cost than the lowest service charge was orthopedic surgery that is a type of external fixation and the different cost was 78,653.5 Baht.

The study recommends that the administrator of the operating room should have a control over materials, especially suture materials. The operating room should have expensive but durable assets to reduce capital costs in future. (Thomyawat, 2002)

2.8 Health care reform, major issues in achieving universal coverage

In a country health care can be financed using different sources of funding; it includes government funds and funds from the private sector. Health care financing can be the most important component in health care reforms of a country (Hsiao, 2000). Health care reforms aimed at establishing a universal coverage, has been a policy debate for many years (Buchmuellar, Grumbach, Kronick and Kahn, 2004). According to Krueger (1993) governments have three options to secure universal access to services such as insurance; health insurance can be provided (similar to public education) or the government can mandate the employers to ensure provision of the service for their workers and dependants or the government can mandate individual citizens to purchase the insurance service. There are various ways of achieving universal coverage and there is no simple method which can be applied easily. Each

country need to consider various factors determining it's economic, political and social status and apply the most feasible and suitable option (Nitayarumphong and Mills, 2005).

Several types of health care reforms have been used in the countries, which have already achieved universal coverage. Japan and Korea are examples of countries that have experienced rapid development of health insurance system in terms of population coverage. After implementing a social insurance programme Korea achieved universal coverage in 12 years mainly as result of economic boom of the country. Likewise Taiwan achieved high coverage of health care by establishing a single National Health Insurance Fund and high economic growth. Taiwan's reform was also uniquely characterized by strong political factors that underlined the development efforts. (Nitayarumphong and Mills, 2005).

The very recent health reform of Thailand highlights from the lesson learned by Asian countries and Latin America, on four major issues considered as feasible measures for other developing countries in achieving universal coverage. They are:

(i) The fast –track implementation approach requires major reforms, with health legislative changes. It requires considerable efforts from the government and strong political will to carry out the policy.

(ii) Bismarck Model or insurance system such as social security system, which pays health services through contributions to health funds. It is usually independent of government but works within a tight frame work of regulations. The Bismarck model has been applied to many developing countries because it results in less political conflicts and more decentralized form of management, and provides greater consumer choice. There is always a choice of other models like Beveridge model (based on tax) but it has to be made based on each country's economic status and level of development.

(iii) The third decision to be made is how to manage funds whether it should be single fund or multiple fund approach. The main advantage

of using multiple funds approach is, it leads to less political conflicts, as it can be developed based on existing health insurance funds, and the major disadvantage is that it can produce inequity of provision of health services. The administrative cost of managing these funds can lead to insufficiency in the health system.

(iv) The fourth issue is comprehensive benefits coverage versus catastrophic illness benefit coverage. Though comprehensive may be unsustainable, however the advantage of this coverage is that minor illness are taken care of before it changes into more serious situation that requires intensive and more expensive treatments leading to catastrophic consequences. (Nitayarumphong and Mills, 2005).

According to Thailand's health care reform there are certain technical elements that should also be considered in achieving universal coverage for all. They are sources of finance, allocations of financial intermediaries, nature of financial intermediaries, payments to service providers, nature of service providers and regulation of system as whole.(Anne Mills, 2005 cited in Nitayarumphong and Mills, 2005).

2.9 Health Care financing policy

Healthcare financing policy is a means to end and thus depending on what ends are to be achieved. The society must decide what goals they need to reach with health care financing policy. The main goals of a country must be to raise revenue and to achieve equity of health care financing, risk pooling, efficiency in financing and sustainability of health financing system. The government can finance in number of forms such as general tax revenues, deficit financing, use of inflation, ear marked taxes, government sponsored lottery and betting. Often government has the capability to increase its total taxes and reallocate more funds for health care. (Hsiao, 2000)

Considering the review and lessons learned from other developing countries, Maldives has to decide what the country has to go towards in achieving universal coverage with the available resources and other possible funding sources. In Maldives there are no direct tax systems, but indirect taxes and revenues are derived mainly from import and export taxes and with higher tax on the imports of transport vehicle. The largest component of general tax revenues in low- income countries are from duties taken for exports and imports (Hsiao, 2000). However in Maldives, Tourism also accounts for a large percentage of the revenue and the government also has access to Zakat money (a portion of rich peoples wealth that has to be distributed to poor, according to Islam), which can create a fund for health financing. Raising sufficient and sustainable revenues is an efficient and equitable manner to provide individuals with both essential health services and financial protection against unpredictable catastrophic financial loses cause by illness and injury (Pablo and George, 2006). And to manage these revenues in a way that pools health risk equitably and efficiently. As the population of Maldives is about 300,000 only, that provides a better opportunity for achieving a universal coverage than most of other developing countries.

2.9.1 Equity

Equity in financing can be divided into three major aspects namely vertical, horizontal and intergenerational as used in public finance literature. Vertical equity addresses to question of equal treatment of equals, or payment according to ability. A progressive system is one which health care payment rises as the income rises. Where as in horizontal equity is that, those with equal ability to pay, actually paying equal payments regardless of gender marital status, occupation etc. Most of the time equity in health care delivery is based on the concept of horizontal equity. In this context it means the people in equal need of health care should receive the same treatment regardless of their income. It is assumed that most equity analysis that those different degrees of health have different medical needs and those in same state of health has same needs. (Hsiao, 2000).

The unique geographical distribution of Maldives necessitates decentralization of services to the periphery level in order to standardized and improve the equity and efficiency of health service delivery. Though evidence suggests that the impacts of decentralization on service deliveries are weak, there are cases of decentralization leading to improved expenditure allocations across the services. According to Hutchison and La Ford 2004) in Bolivia an analysis of expenditure patterns following decentralization showed local government had better knowledge of local needs which resulted in reallocations that improved health access to health care services. Another effective way of reaching the periphery could be resource mobilization for equitable and efficient and sustainable health care delivery within the country.

Maldives is in urgent need of health care reform in financing health care. The most important issue is to cut down the out of pocket payments and preventing catastrophic situations arising from health care expenditure. Universal health insurance coverage could be the best option for a small population and also because of how islands are disbursed naturally. However the country may require decentralizing the health care delivery so that health care is equitable and efficiently served. There is also a need to analyze the risk pooling mechanisms in order to achieve a universal coverage of health care. The out of pocket expenditures for health, can be a major factor in jeopardizing an equitable health system in many developing countries. Hence in the absence of financial risk pooling in a country the poor suffers most and leads into poverty, while trying to meet medical care cost through out of pocket payments. (Limwattananon, Tangcharoesathien and Prakongsai, 2007)

2.9.2 Risk Pooling Mechanisms

Risk pooling is the collection and management of financial resources so that unseen financial risks become predictable and that can be distributed among all the members of the pool. Risk pooling together with prepayment are critical for providing financial protection. This process improves health risk and facilitate establishment of insurances and improves people's welfare. Risk pooling allows individuals to pay a

predetermined amount to protect themselves from large unknown medical expenses. There are many ways in which governments can finance public insurance system that can be accessed on the basis of equity, efficiency and sustainability, administrative feasibility and feasibility. There are several types of public and private pooling arrangements by reducing fragmentation, lowering administrative costs, by providing basis for an effective risk pooling and purchasing. (Gottret and Schieber, 2006).

The government policy makers must assess the most appropriate ways to pool health risk and provide financial protection to the people of the country. The four main health insurance mechanisms that can be applied to direct risk pooling arrangements, to promote prepayment and revenues, and purchase services (Gottret and Schieber, 2006). They are:

(i) National Health Service System

National Health Service system, there are three main features such as, first and foremost the primary funding comes from the general revenues, and secondly ministry provides medical coverage for the entire population of the country. The Health Ministry provides services through a network of public providers. In developing countries with low and middle income, Ministries of Health generally functions as the national services and exist along with other pool risking arrangements. So they are not considered as the solely responsible for the entire population of the country. The National Health Service relies on a broad revenue base to pool risks, broadly. They are potential to be equitable and efficient unless the decisions are decentralized or shared with the local authorities.

(ii) Social Health Service System

Social Health Insurance system is generally portraying independent or quasi – independent insurance funds. This system relies on mandatory earmark payroll contributions from individuals and employers, and its link to the right to a defined health benefit package. This coverage is progressively extended to sub population and then

to whole population. However, social insurance system may not be able to cover health care cost of whole population, unless people are able to contribute to it. They may require an infusion of resources from general revenues and additional subsidies from external aids or ear marked taxes. Though there are many preconditions for its success such as high level of income and economic growth, dominance of formal sector versus private sector, growing urban population (Like in Maldives), room to increase labour cost, quality health care infrastructure , strong administrative capacity and ability to extend the insurance system. (Gottret and Schieber, 2006)

(iii) Private and Voluntary Health Insurance

Private and voluntary health insurance provides supplement for publicly funded coverage's, usually found in high-income countries, where there are voluntary contribution through non-income based premiums (not tax or social security contributions). The private health insurance system can play some important roles in a country's social coverage, such as a primary source of coverage to the population, or act as a duplicate in covering the same services and benefits as public coverage. They can also play the role as complementary or supplementary such as covering the services that are not covered by the public coverage. However this system has its limits and barriers to access because of affordability and premium volatility. (Gottret and Schieber, 2006)

(iv) Community Based Health Insurance

Community Based Health Insurance is defined as non- profit prepayment plans for health care controlled by community with voluntary membership. It can operate according to the core values and cover beneficiaries that are not covered by other health coverage. Evidence shows that it can reduce out- of – pocket spending and contribute to greater use of health resources. However the sustainability is questionable, often they are unable to raise significant resources due to limited income and its small size, thus making it vulnerable to failure. However it's vulnerable, it can also sustain with government intervention such as subsidies, technical assistance and for-

mal financial arrangements. It may not work in low income countries, for solving the bulk of health financing problems. (Gottret and Schieber, 2006)

Maldives need to assess the best and most appropriate mechanism or mechanisms from mentioned groups like having a National Health Service system together with social service system, and additional private systems if possible. Country needs to decrease the out of pocket and catastrophic health situations, by providing fair co-payment mechanisms, and government subsidies to seek services in abroad. Health care financing should be made sustainable by risk pooling mechanism, and by diversification of source of finance through official and private sector contributions.

Universal Health Insurance scheme managed and regulated by government may also be a good model for Maldives. When policy perspective is taken, basic health financing functions are generally embodied in three style of financing models: namely, National Health Service: compulsory universal coverage national revenue financing and national owner ship of health sector inputs. The second model is social insurance: compulsory universal (or employment group targeted) coverage under social security, which is publicly mandated system financed by employee and employer contributions to non- profit funds, with public and private owner ship of inputs. Lastly it is the private insurance: that is employer based or individual purchase of private health ownership of health sector inputs. (Pablo and George, 2006). The experiences of most of the developing countries especially indicates that using all three models of insurance or risk pool fragmentations significantly impedes effective risk pooling.

2.9.3 Efficiency

In regard to the issue of efficiency there are three main aspects to it; they are efficiency in raising finance, efficiency in public finance and efficiency in the provision of health care. The government has to find an optimal taxation method so that it does not exceed the burden to the people, whilst simultaneously pursuing a high standard of equity. Throughout the provision of health care there should be a major focus

on sustaining allocative efficiency and technical efficiency. Here policy makers have to focus on the supply side of the market. Supply side measures are designed to encourage efficiency and equity, are therefore important prerequisite for overall successes

Another important issue is the purchasing of supply side, includes numerous arrangements used by purchasers of health care services to pay medical care providers. A large variety of arrangement exist mostly with government owned scheme provide services though publicly owned facilities, where staff are public employees. Sometimes services are purchased through either direct payments or contracting arrangements. (Pablo and George, 2006). In the context of Maldives services have to purchase from public and some limited private facilities.

2.9.4 Payments

Payments can be discussed as two parts; they are incentive for consumers and providers

The health insurance can be designed by incorporating deductibles, co-payments, coinsurance and payment ceilings. Secondly the country may subsidize the premium that consumers have to pay. However each of these options must be used with caution as there are always possibilities of over utilization of the service and distortion in relative price of insurance, causing loss of economic efficiency. (Hsiao, 2000).

There are number of incentives concerning payments for the providers. Here the unit of payments can be specified by various definitions of service, ranging from all service rendered by the provider or given period of time (e.g.: a monthly salary) to a single act performed. Units of payments for hospitals include fee-for service, per diem, per admission, per case (DRG- diagnosis related group) or prospective budget. In case of single physician payment can be on the basis of fee-for service, capitation

or salary. Each of these different mechanisms of payment creates differential financial rewards for providers as well as risks to players in the system. Nevertheless providers can decide on the modality of treatments and quantity of service and drugs as the incentive structure affects cost, efficiency and quality of health care service. (Hsiao, 2000).

2.9.5 Sustainability

Sustainability is the ability of the system to produce benefits valued sufficiently by users and stakeholders, to ensure sufficient resources to carry on or continue services with long term benefits. There are three aspects to sustainability in health care; they are financial, political and organizational sustainability. It is vital to maintain a stable financing through the uncertainties and cyclical fluctuations. Efforts can be made to sustain the financing by incorporating voluntary private health insurances, and forms of community financing etc., these mechanisms have been even successful in achieving sustainable systems in the past. The organizations sustainability is necessary for the success of health program and sustainability is dependent on changes of managerial and technical capabilities and trained health professionals. Politics determine the amount of general taxes available and how much of those taxes can be used for health care. (Hsiao, 2000).

Experiences of Thailand's universal coverage scheme highlighted that political leader ship, commitment and the smooth running of health care infrastructure, geographical distribution of well function health care services in urban and rural area as a basis for smooth implementation of their universal coverage. Also relevant knowledge and research evidence on cost was very vital for policy formulation and implementation of universal coverage, its successes and sustaining health care. (Tangcharoensathein, Prakongsai, Limawathanon, Patcharanarumol and Jongudomsuk, 2007).

2.10 A Review of mission report on universal coverage scheme in Maldives

According to a mission report (MOH, 2007) on Universal coverage, the government of Maldives has a policy goal to implement universal coverage in Maldives by 2010 for the whole population.

2.10.1 Mission Objectives

(i) How much resources are required to provide universal healthcare coverage for the whole population?

(ii) How to pay healthcare providers for outpatient and inpatient services?

(iii) The fiscal capacity of the country to provide adequate finance to the whole population.

2.10.2 The main policy goals are to:

(i) Ensure equitable access to health care by all

(ii) Get a progressive financial contribution by formal sector and public and private employee and to finance the poor, the elderly and the disabled from the government budget.

(iii) Ensure equity through different co-payment policy where by people in the Atoll level co-pass less than urban (Male') residents, while poor are exempted from co-payment

(iv) Prevent catastrophic health expenditure by providing full coverage of comprehensive package, full subsidies to emergency evacuation expenditure, subsidies to overseas treatments and exempting co-payment for poor.

(v) Achieve system efficiency through rational use of primary health care, the application of National Essential Medicine List, use of generic me-

dicines, proper provider payment method and efficient use of health resources, and designing of appropriate co- payment method

(vi) Ensure long term financial substantiality by diversification of source of finance, and contribution of formal sector employees.

2.10.3 Key designs of the Universal Healthcare Coverage Scheme

(i) Population Coverage

The population coverage is planning to start on 2008 and to complete by 2010. The target is first to government employees, followed by private employees finally focusing on poor and elderly and the rest of all other groups in the population that is not covered. At present the proposed payer is government for all the categories accept the private sector where by the individual employers are bound to pay.

(ii) Benefit Packages

- One single comprehensive benefit package equitably covers the whole population
- Outpatient services
- Inpatient services
- Essential medicines for outpatient and inpatient services
- One way Emergency Evacuation expenditure [requires definition of emergency]
- Partial funding of overseas medical treatment [requires definition], per diem and round trip tickets

Disease prevention, health promotion and other public health programs and functions are to be fully funded by the government and these are outside the benefit package of this UC scheme.

(iii) Co-payment policy

- Outpatient and inpatient needs will be defined at two proposed rates, like lower rates for services at atoll and higher rate for services in Male'
- Exemption for poor
- A proposed ceiling price per case to be introduced for overseas treatment and no round co-payment for air tickets

(iv) Sources of finance

Existing sources of healthcare finance includes

- The routine annual MOH allocation of labour cost and capital investment to Health centres, Atoll Hospitals, Regional Hospitals and IGMH
- The Prevention, Health Promotion and other Public Health functions by the MOH
- All non-labour operating budget , health related social assistance budget
- The medical allowance to all government employee, Rf 1,000 per year

New sources of health finance include payroll contributions by the public and private employee for their non-working spouses and dependants below 18 years. (MOH, 2007).

CHAPTER III

METHODOLOGY

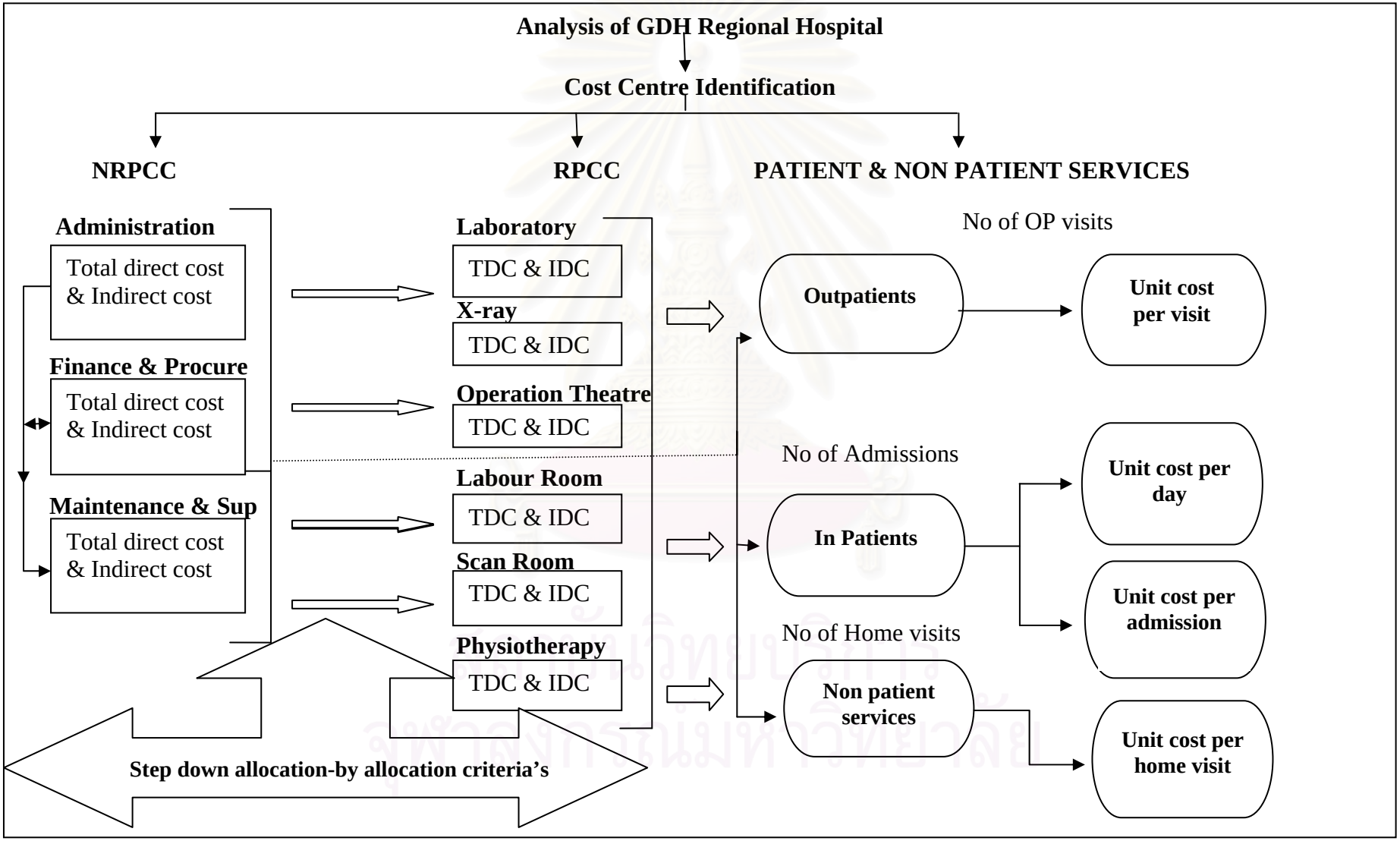
3.1 Research Design

This research study is a descriptive study focusing on provider perspective using secondary data to analyze the cost and unit cost of, inpatient and outpatient services of the G.DH. Regional hospital, in the year 2007. The data were retro- gathered from statistical records (hard and soft) from hospital and DMS, Ministry of Health. Cost information's were collected from January 2007 to December 2007.

3.2 Conceptual Framework

The conceptual frame work (figure3.1) of this study relates the costing methodology of the study. The costing study was carried out according to the steps shown in the conceptual frame work. First part represents the analysis of hospital organization for identification of cost centres and followed by compiling of total direct cost of each cost centre. The total direct cost and indirect costs of NRPCC and RPCC are then passed down to PS and NPS according to a given allocation criteria where by full cost of each cost centre of PS and NPS are determined and unit cost was obtained at the end of the analysis.

Figure 3.1 Conceptual Frame Work



3.3 Study Population and Sample

The population of this study was 18 cost Centres of G.DH. Regional Hospital, Maldives. The cost centres were categorized as the following.

(i) General Administration

(ii) Finance, procurement and supply

(iii) Maintenance and support services

(iv) Laboratory

(v) X-ray

(vi) Labour Room

(vii) Operation Theatre

(viii) Scan Room

(ix) Physiotherapy

(x) Out Patient Department

(xi) Observation

(xii) Dressing Room

(xiii) Dental

(xiv) Male Ward

(xv) Female Ward

(xvi) Surgical Ward

(xvii) Paediatric Ward

(xviii) Intensive Care Unit

(xix) Public Health Unit

3.4 Data Collection

Prior to proceeding with data collection, Hospital Administration was consulted regarding the availability and accessibilities of cost information about the hospital. Next an official permission was sought from Ministry of Health to conduct the study in G.DH. Regional Hospital and use the data. An official permission was granted from research and ethical review committee of MoH.

3.4.1 Instrument

The following instruments were used to collect data for the study. (Represented in Appendix B 1-B10).

- Salaries and allowances, fringe benefits (Labour Cost)
- Time allocation of staff to different cost centres
- Material Cost (Medical Supplies)
- Material Cost (Office Supply)
- Material Cost (Non Medical supplies)
- Public utility cost, like, water electricity
- Capital Cost
- Allocation of cost
- Total operating cost
- Output services, such as umber of admissions, operations, investigations etc.
- Microsoft excel program for analysis

3.4.2 Data source

The following records were used as means of data source

- The organogram (organizational chart) of the hospital
- List of the hospital staff :from the administration department of the Hospital
- Labour cost information : from salary sheets, or individual records available as soft copies
- Medical supplies information: from DMS, MOH and which were later verification by the Hospital Procument and Supply Department.
- Office supply and other general supply: from Procument and Supply Department though their weekly stock indent sheets, bills and invoices.
- Capital cost information: from the DMS, their annual account sheets and past recordings and verified with the hospital records.
- Floor space or operating area was measured in square feet with the help of hospital floor plan in soft format, available at the Maintenance Department of the Hospital. The operating area of cost centres were used to calculate the utility costs and depreciated cost.
- The allocation criteria was defined through discussions with key people and the analysis of Hospital department functions, activity statistics of different departments through log books
- The number of output services like number of admissions, length of stay and number of outpatient visits were obtained from the log books of respective departments and through hospital medical records from administration.
- Output like number of surgeries, number of obstetric patient, number of X -rays/scans were obtained from those respective department log books and medical records in the administration department.

3.5 Study Method

The methodology of study was based on step down method cost allocation method. Prior to step down process four main steps were carried out in order to prepare the data set for step down analysis.

3.6 Cost Centre Identification

Cost centre identification was the foremost and an important step of cost analysis of a hospital.

First an analysis was done on Hospital's organization structure (represented in Fig-3.2, page 45) and function of all departments. This was done through careful evaluation of hospital organization chart and discussion with the hospital administrator (Manager), directors, accountant and Section in charges. Each unit or section of hospital is classified into cost centre according to its functions, use of resources and main service output. It was classified in to four groups, described below and summarized in Table 3.1 in page 46.

(i) Non Revenue Producing Cost Centres (NRPCC):

These cost centres are responsible for the management and support the operation of the remaining cost centers. There were 3 cost centers that can be included in this class, from the management and supportive services of the hospital. Though these centres do not generate tangible revenue to the hospital, they provide full support to the operation of whole hospital.

(ii) Revenue Producing Cost Centres (RPCC):

The cost centres included in this group were all the cost centres that provide medical or ancillary service to the patients (outpatient and inpatients).These cost centres are also able to produce revenue to the hospital by collecting a fee directly from the patient. However these cost centres does not collect fees from the patients as Hos-

pital is a public Hospital. The cost centres were, laboratory, X-ray, Physiotherapy, Scan Room, Operation theatre, and labour room

(iii) Patient Service (PS):

This group is further divided into two groups as outpatient department and in-patient department. They both provide service directly to the patient. In this Hospital the Outpatient Department can be split into 4 cost centres and inpatient into 5 cost centres. In the inpatient department there were three private rooms which were managed by the female ward and thus were considered as a part of the female Ward.

(iv) Non Patient Service (NPS):

There was only one section that can be taken as a non patient service centre that is Public Health Unit of the Hospital. Public health unit conduct health education and health promotion, health awareness and health surveillance programme for the entire region (G.DH. and Gaafu alifu atoll).

Figure 3.2 Organization chart of G.DH Regional Hospital

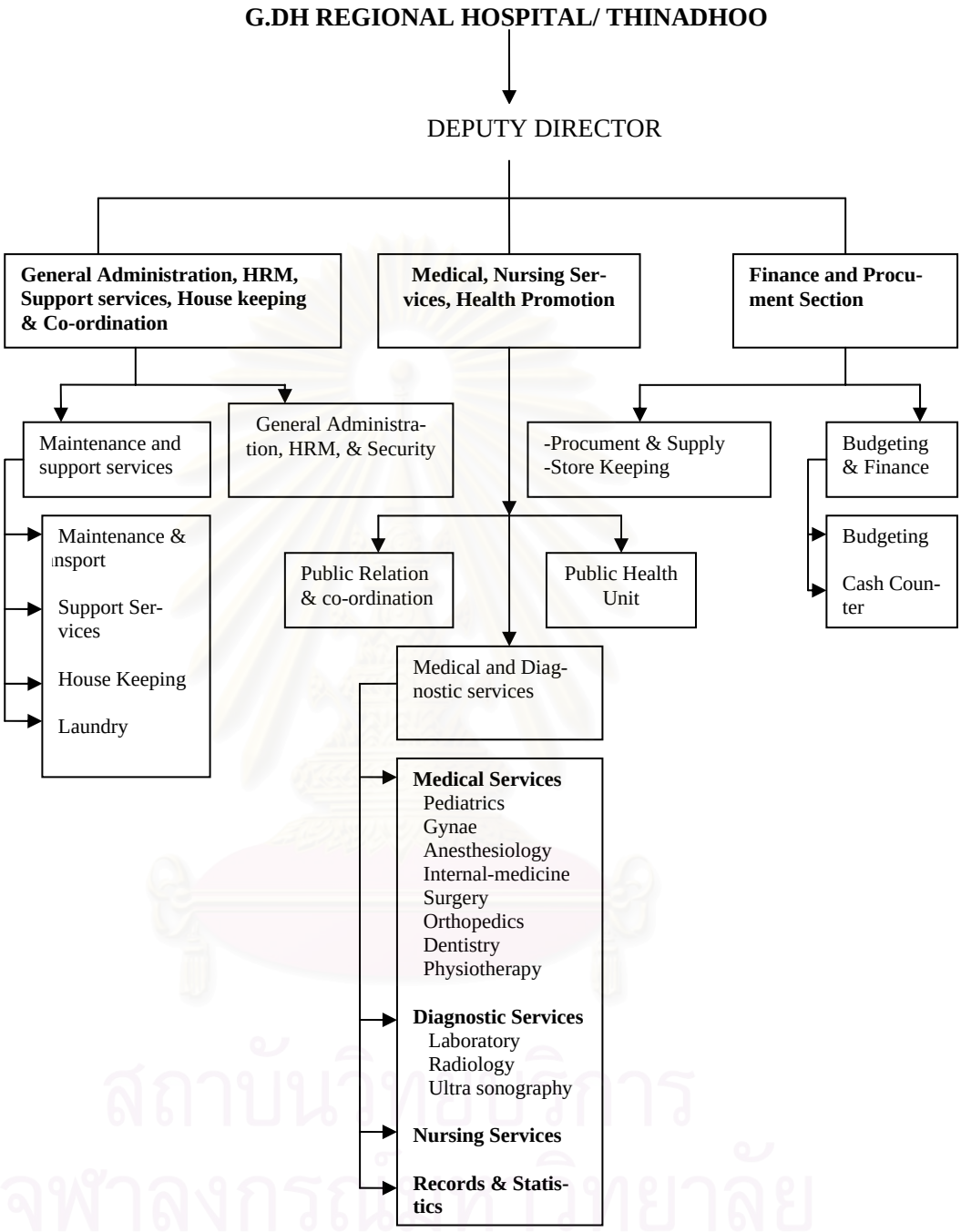


Table-3.1 Categorization of Hospital sections

Category	Code	Name of Cost Centre
NRPCC – Non Revenue Producing Cost Centre	A01	Administration
	A02	Finance Procument & Supply
	A03	Maintenance &Support Service
RPCC-Revenue Producing Cost Centres	B01	Laboratory
	B02	X-Ray
	B03	Labour Room
	B04	Operation Theatre
	B05	Scan room
	B06	Physiotherapy
PS – Patient Services (Out Patients)	C01	Out Patient
	C02	Observation
	C03	Dressing Room
	C04	Dental
PS- Patient Services (In- Patients)	D01	Male Ward
	D02	Female Ward
	D03	Surgical Ward
	D04	Pediatric Ward
	D05	Intensive Care Unit
NPS- non Patient Services	E01	Public Health Unit

3.7 Compiling the Total Direct Cost

3.7.1 Labour Cost

In the second step the direct cost of each cost Centre were collected respectively. There are three main types of cost involved in the total direct cost of each cost centre. Labour cost, material cost and capital cost were compiled separately for each cost centre and later summed up as the total direct cost each cost centre.

To collect labour cost the administration was approached to get the list of personnel who worked for the hospital in the year 2007. Then their actual salaries and other allowances were calculated for the same year, the salaries for the people who worked for shorter period less than one year were calculated individually according to the duration of service. The total labour cost includes:

- Basic Salary
- Professional allowance: allowance given to local professional and technical staff who hold, diploma (20% of basic salary), or graduate degrees (40% of basic salary).
- Medical allowance: (given to all local staffs once in three months)
- Long term allowance, (given to personnel who has worked for the government more than 10 yrs)
- Special bonus (given once a year for all Muslims staffs, during the month of fasting)
- Over time allowance (maximum 1/3 of basic salary)
- Living Allowances and Special Allowances :(given to all expatriate who works for the hospital)
- Fringe benefits: (paid for expatriate in the form of house rent and utility bills)

In addition to that while determining the labour cost , the staff who works for more than one cost centre, personnel's full time equivalent salary was used to reflect their salary contribution from each cost centre. When determining their full time equivalent salary the medical doctor's salary was divided according to the percentage of their working hours in each cost centre. For nurses who work in more than one cost centre, their working hours were weighted according to bed capacity of the cost centre they work. The number of bed in the ward was weighted with number of total duty hours of the staff.

No labour cost was allocated to the scan room as there are no assigned staffs or technicians in the scan room. It was simply as a room for performing scans and ECG. The doctor who works in the OPD performs scans during OPD hours and whenever necessary ad those cost proportions were included within the labour cost of OPD.

3.7.2 Material Cost

In compiling material cost for the costs were divided into following groups;

(i) Medical Supplies

Medical Supplies: Medical supplies include all the medical consumables used while providing a medical procedure to a patient. The cost information for medical consumables was collected from the DMS of Ministry of Health. They were responsible for sending all the medical consumable to all the regional hospitals. Medical consumables are regularly supplied to the regional hospital, every six months to the request of the Hospital and whenever required. The cost information's collected from the ministry were later verified with the hospital records. The list of material indented to the cost centres were collected from the supply section and later compile with the unit prices from the Ministry records. The hospital was not aware of the cost of these medical consumables. The cost of materials which was received from DMS, still in the storage at the end of the year was not included, as the aim was to calculate the cost of material which was used within the year 2007.

(ii) Drugs

The cost components for the drugs used within the inpatient wards and in emergencies were also bought and sent to the hospital by DMS. The cost information and list of drugs sent to the hospital was collected from DMS and later verified with the hospital. The hospital use a very small proportion of drug from its own cost, medicines used only in emergencies and those drugs in case of drugs not available in the private pharmacies. Even the drugs which are used in the hospital for routine and emergency purposes were sometimes replaced by the patients. The cost information for drugs was obtained from weekly indent records of the supply department. As there is no pharmacy attached to the hospital the routine drugs which is taken for doctors prescriptions was not included in the study. These costs are borne directly by the patients.

(iii) Office Materials and General supplies:

Office materials and general supplies are managed with in the Hospital procument and supply section and these cost information was obtained directly from the supply department, in the form of hard copies in log books, and prices from bills and invoices. These include, materials bought for the, general housekeeping, maintenance of utilities, such as electricity and maintenance of vehicles and sea transport vessels.

(iv) General Utilities:

General utilities includes: electricity expanse, internet facilities, and telecommunication and telephone facilities. This information was collected from the administrative department and calculated for one whole year and then divided into the different cost centers according to the operating floor are in square feet. Square feet of the cost centers were measured from a hospital floor plan, which was in the form of soft copy. For this calculation floor area of the general space area, walk ways, and garden area, which is used by all the cost Centres were not included, however the utility cost for these areas were included in the total expanses.

First the utility cost for one square feet is calculated and this unit was multiplied by the total square feet of the each cost centre individually.

Utility cost for a square feet = $\frac{\text{Total Utility Expanse for the year}}{\text{Total operating area } (ft^2)}$

Utility Cost for cost centre = Utility cost for square feet x Operating area of respective cost centre (ft^2)

Note: The utility cost of water was could not be separated, as the hospital generates its own water supply from the ground by means of pumps. Therefore there were no costs or bills for water supply. However the electricity required for the water pumps is included within the electricity cost.

(v) Others Costs:

- Staff Traveling Cost
- Expanses for material Transport from the DMS, Male to the Regional Hospital
- Expanses for staff improvement programme
- Maintenance expenses

(vi) Food cost:

Usually food cost is also a part of material cost but food cost could not be included in the study as the hospital does not have the facility to provide the food for inpatients.

3.7.3 Capital Cost

Capital cost compromise of major equipments, vehicles, vessels, machineries, buildings etc. these are all the inputs of the hospital that last for more than one year. There were two separate building in the hospital, the main building and a small attachment. The allocations of depreciation cost of building to each cost centre were based on the share of floor space occupied by each cost centre.

Medical Equipments and instruments were purchased and send to the hospital by DMS. The information from DMS was verified with the administration and all cost centers. All the cost centres were observed and a individual inventory of capital items were taken , with the help of hospital staff and the available soft copy of inventory was also obtained from the hospital for verification and compared for any missing items.

Capital cost compiling techniques:

Creese & Parker (1994) enlighten that straight line method of evaluating capital cost as one valid approach for most purposes of costing. In many costing studies straight- line depreciation method was used as it's the simplest technique (Tisayaticom, *et al*, 2007). However this method is not adequate if the costing is based on economical values or in economical costing. In such case, annualized capital cost per year can be depreciated using discount rates and annualizing factor from standard tables. The discount rate is the bank interest rates of the country it can be like 8% or 10%. Sometimes the exchange rate can also be used as a shadow value for discount rates.

Nevertheless for this study straight line method was due to time limitations and unavailability of needed information. At present there are no standard estimated life years for buildings and assets in Maldives. As such literature on costing and international accounting standards were used as a reference to determine the life years for buildings and other assets, and were finalized in consultation with MoH. Straight line depreciation method was applied, and all capital costs were depreciated using the following life years.

Building…….....	30 years	(Tisayaticom et al, 2007)
Major equipment and machines ……...	10 years	(American Hospital Association, 1978)
Medical Instruments…….....	5 Years	(Tisayaticom et al, 2007)

Office Equipments……	10 Years	(American Hospital Association, 1998)
Office Furniture…….	10 Years.	(Govt. of Michigan, 2003)
Vessels (Sea)…….....	10Years	(American Hospital Association, 1998)
Vehicles (Land)…….	10Years	(American Hospital Association, 1998)
TV/Communicating system……	7 years	(Capital asset commodity table, 2007)

The equipments purchased and used beyond the useful life will years were not estimated even though they are still in service. Most of the medical instruments (like forceps, stethoscopes, etc) were not included in the capital cost as it had no cost value though they are still in service. Other than medical instruments, cost of all the equipments, furniture and vehicles were included in the estimation of the study.

$$\text{Depreciation Cost of Building} = \frac{\text{Cost for construction and finishing of Building}}{\text{Number of useful life years}}$$

$$\text{Depreciation cost of Equipments} = \frac{\text{Purchasing Price of the Equipment}}{\text{Number of useful life years}}$$

3.8 Data Analysis

After completion of data collection all data were fed into a Microsoft excel sheet designed for costing activity by step-down method. The data were entered, cost centres were coded accordingly (refer Table-3) and cost information were transferred into the sheet as capital cost, material cost and labour cost. There by the total direct cost of each cost centre were determined by summing up all the cost of each cost centre respectively.

Total direct cost (of each cost centre) = Capital (Depreciated) cost + Labor Cost + Material Cost

Total Operating cost (of each Cost centre) = Labor cost + Material Cost

3.9 Defining Allocation Criteria

Allocation criteria (Table 3.2) were defined based on services and activities of which the NRPCC and RPCC provide their services to other cost centre, PS and NPS. Therefore cost from both NRPCC and RPCC, based on allocation criteria were allocated to PS and NPS respectively. The criteria were based on service statistics or activity statistics which the higher costing centre provides to the rest of the centres. The direct cost from NRPCC and RPCC is distributed according to the criteria to the PS and NS. The cost absorbed by the PS and NPS from the higher cost centre will become the indirect cost of the absorbing cost centres (PS & NPS).

The criteria for the administrations and finance, was defined after discussion with the key informants of the administration. Tisayaticom, *et al* (2007) proposes that, for cost centres whose services are not homogeneous, two criteria can be applied. However it should be noted that allocation criteria and allocation factor can be very sensitive and significant to the final unit cost than allocation technique (Boyles, 1982, cited in Tisayaticom *et al*, 2007, page 8). There for the allocation criteria of NRPCC and RPCC must be the most relevant function and of the individual cost centres as it represent the cost centre function for study period. So by any change in the proportion of these allocation criteria there could be significant difference in the unit costs of the hospital.

Table-3.2 Allocation criteria

	Cost Centre	Allocation Criteria	Data Source
A01	Administration	80 % of cost based on number of patients 20% of cost based on number of hospital personnel	Key informant interview/ data on OP visits and IP day
A02	Finance, Procument and supply	80 % of cost based on number of patients 20% of cost based on number of hospital personnel	Key informant interview/ data on OP visits and IP day
A03	Maintenance and support services	Cost of material used by each cost centre	From material cost data
B01	Laboratory	No of investigations done for each cost centre	Statistical records 2007
B02	X-ray	No of investigation done for each cost centre	Statistical records2007
B03	Labour Room	No of obstetric patients	Statistical records 2007
B04	Operation Theatre	Number of surgery done for each cost centre	Statistical record 2007 and Log Book
B05	Scan Room	Number of scan done for each cost centre	Statistical records 2007
B06	Physiotherapy	Number of treatment provided for each cost centre	Statistical records 2007

3.10 Full Cost and unit cost estimation

Costs were allocated from each cost centre to other cost centre by using step down allocation method. In step down allocation two main principles were applied, they are sequencing of cost centres by ranking the cost centre which provides to most cost centres as highest. Second no cost was allocated upward from the lower cost centres. The costs were allocated in accordance with allocation criteria's in Table 3.2. First the total direct cost of highest cost centre (A01) was allocated down to all the lower centres. Next the total direct and indirect cost of following cost centre, of NRPCC was allocated down until cost becomes zero. In the same manner all the cost centres of NRPCC and RPCC allocates its cost to absorbing cost centres (PS and NPS).

To determine the unit cost for patient services and non patient services, the total sum of indirect cost which was allocated to these Centres from NRPCC and RPCC and its own direct cost was summed up and then divided by the number of Inpatient admissions and Outpatient visits respectively. The unit cost is the ratio of full cost and outputs of Patient Services and Non patient Services.

$$\text{Unit Cost of Outpatient department} = \frac{\text{Total Cost of OPD}}{\text{Number of outpatient visits}}$$

$$\text{Unit Cost of Dressing Room} = \frac{\text{Total Cost of Dressing Room}}{\text{Number of outpatient visits}}$$

$$\text{Unit Cost of Observation Room} = \frac{\text{Total Cost of Observation Room}}{\text{Number of outpatient visits}}$$

$$\text{Unit Cost of Dental Department} = \frac{\text{Total Cost of Dental Service}}{\text{Number of outpatient visits}}$$

$$\text{Unit Cost of Male Ward} = \frac{\text{Total Cost of Male ward}}{\text{Number of admissions/days}}$$

$$\text{Unit Cost of Female Ward} = \frac{\text{Total Cost of Female ward}}{\text{Number of admissions/days}}$$

Unit Cost of Surgical Ward = Total Cost of Surgical ward / Number of admissions/days

Unit Cost of Paediatric Ward = Total Cost of Paediatric ward / Number of admissions/days

Unit Cost of Intensive Care Unit = Total Cost of ICU / Number of admissions/day

CHAPTER IV

RESULTS

4.1 General Data

G. DH. Regional Hospital is a 50 bed hospital managed by 170 staffs. However during the year a total 196 staffs worked in the Hospital due to turn over of staffs. There were about 24 doctors, 59 nurses, 29 paramedics and 33 office and 51 maintenance staffs. About 29.59% of total staffs worked in the Hospital in 2007, were nurses. There was a high turn overate among nurses population. About 25.5 % of staff of 2007 worked in maintenance and support services. No staff worked in the scan room directly used as a room to do the investigations. In the year 2007 there were 29195 out patients at an average of 79 patients per day. The total number of admissions was 1999 out of that 591 as medical, 281 surgical 414 obstetric, 578 Pediatrics', 59 orthopedics, 16 other patients. Total bed occupancy for the year was 5169 with bed occupancy rate of 30.13. Total length of stay was 5638 with an average of 3.01. Throughout the year 197 major surgery and 234 minor surgeries were done. Out of the diagnostic investigation, 48445 laboratory investigations, 4910 X-rays, 1151 ultra sound scans and 416 electro cardiograms were done in the hospital. Health promotion activities includes 878 workshops, 3890 home visits 11 school health programs and 27 education session in the hospital.

The total operating area of the Hospital was divided into two buildings, the main building and another small building which was later built to increase the operating capacity. The Table 4.1 represents total operating areas occupied by each cost centre.

All the cost in this study was calculated in Maldivian Rufiyaa (Rf), the exchange rate is 1 US dollar is equal to Rf 12.85. Appendix –C6 represent the cost profile in both Rf & US dollars.

Table: 4.1 Operating Areas of GDH. Regional Hospital

Cost Centre	Square feet of area	%
Administration	1,610	7%
Finance, procument and supply	1,145	5%
Maintenance and support services	2,068	9%
Laboratory	611	3%
x-ray Department	461	2%
Labour Room	475	2%
Operation Theatre	1,009	4%
Scan Room	378	2%
Physiotherapy	427	2%
OPD	3,046	13%
Observation	504	2%
Dressing Room	252	1%
Dental	427	2%
Male Ward	2,282	10%
Female Ward	3,154	14%
Surgical Ward	1,892	8%
Paediatric Ward	1,821	8%
Intensive Care Unit	727	3%
Public Health Unit	446	2%
Total	22,737	100%

4.2 Total Direct Costs of Cost Centres

The direct cost profiles of GDH Regional Hospital for the year 2007 are represented in Table 4.2, and 4.3 respectively. More details on labour cost, material cost and capital cost are shown in appendix- C1, C2, and C3& C4.

The total labour cost of the Hospital is Rf 10,638,243.10. Labour cost consists of Rf 5,490,525.00 (52%) as salary and the remaining 48% contributes to allowances and benefits for the employees. The largest portion of salary is attributed to the maintenance and support services section amounting to Rf 2,782,309.73 (26.2%) and the lowest portion is attributed to Dental Services which amounted to Rf 109,110.19 (1%). No labour costs are utilized by the Scan Room.

The total material cost for the Hospital is Rf 5,278,083.75 for the year 2007. The largest portion of the material cost is also utilized by the maintenance and support services, Rf 1,177,897.63 (23%) and the least cost was utilized by the scan room.

Total depreciation cost is Rf 2,528,134.94 and the total depreciation capital cost for building is Rf 1,837,513.09 and for equipment is Rf 690,621.88 respectively. The largest portion of total depreciation cost (39%) is borne by Laboratory services.

The total direct cost, when categorized into groups of cost centres, the highest proportion labour cost (36%) and material cost (42%) was incurred by the NRPCC. The highest capital cost (53%) was incurred by RPCC.

Table 4. 2Total direct cost of GDH. Regional Hospital in 2007

Cost Center	Labour Cost (Rf)	%	Material Cost (Rf)	%	Capital Cost (Rf)	%	Total Direct Cost (Rf)	%
Administration	534,639.91	5%	976,594.95	18%	79,033.34	3%	1,590,268.20	9%
Finance,procument and supply	463,718.29	4%	140,127.30	3%	37,331.05	1%	641,176.64	3%
Maintainance and support services	**2,782,309.73**	**26%**	**1,177,897.63**	**22%**	259,178.58	10%	**4,219,385.94**	**23%**
Laboratory	327,330.56	3%	379,982.41	7%	**981,833.74**	**39%**	1,689,146.71	9%
x-ray Department	114,565.69	1%	201,403.32	4%	85,591.60	3%	401,560.61	2%
Labour Room	348,607.04	3%	71,873.82	1%	31,728.06	1%	452,208.92	2%
Operation Theatre	396,069.97	4%	355,902.29	7%	135,214.83	5%	887,187.09	5%
Scan Room	0.00	0%	38,207.81	1%	42,420.53	2%	80,628.34	0%
Physiotherapy	163,665.28	2%	44,402.43	1%	64,216.64	3%	272,284.35	1%
OPD	1,420,069.07	13%	333,356.23	6%	147,115.65	6%	1,900,540.94	10%
Observation	475,720.41	4%	87,131.24	2%	42,300.69	2%	605,152.34	3%
Dressing Room	283,686.48	3%	42,070.77	1%	27,732.90	1%	353,490.16	2%
Dental	109,110.19	1%	161,901.97	3%	77,065.22	3%	348,077.38	2%
Male Ward	543,914.28	5%	307,844.10	6%	83,591.86	3%	935,350.23	5%
Female Ward	733,220.45	7%	465,411.83	9%	133,767.43	5%	1,332,399.71	7%
Surgical Ward	348,061.49	3%	270,059.73	5%	80,087.67	3%	698,208.89	4%
Paediatric Ward	384,613.40	4%	225,625.10	4%	80,654.29	3%	690,892.80	4%
Intensive Care Unit	336,059.37	3%	96,981.27	2%	110,833.17	4%	543,873.81	3%
Public Health Unit	872,881.49	8%	53,735.54	1%	28,437.72	1%	955,054.75	5%
Total	**10,638,243.10**	**100%**	**5,430,509.75**	**100%**	**2,528,134.97**	**100%**	**18,596,887.81**	**100%**

Table 4. 3Total direct cost to categories of cost centres of GDH. Regional Hospital in 2007

Group of cost center	LC	%	MC	%	CC	%	TDC	%
1.NRPCC	**3,780,667.93**	**36%**	**2,294,619.88**	**42%**	375,542.97	15%	**6,450,830.79**	**35%**
2.RPCC	1,350,238.55	13%	1,091,772.08	20%	**1,341,005.40**	**53%**	3,783,016.03	20%
3.OP	2,288,586.14	22%	624,460.21	11%	294,214.47	12%	3,207,260.82	17%
4.IP	2,345,868.99	22%	1,365,922.03	25%	488,934.41	19%	4,200,725.43	23%
5.NPS	872,881.49	8%	53,735.54	1%	28,437.72	1%	955,054.75	5%
Total	**10,638,243.10**	**100%**	**5,430,509.75**	**100%**	**2,528,134.97**	**100%**	**18,596,887.81**	**100%**

4.3 Indirect Costs

The total direct costs and indirect costs of NRPCC and total cost (direct and indirect cost) of RPCC were allocated down to the other absorbing cost centres of PS and NPS. The figures are represented in tables 4.4 & 4.5. The allocation factors are used to divide the direct of transient cost centres to the absorbing cost centres (refer Appendix –C5). The total indirect cost from NRPCC to other cost centre was Rf 5,358,693.64 and RPCC was Rf 4,875,153.17, making a total of Rf 10,233,846.81 as the total indirect cost. Out of that 32% is utilized by the Outpatient Department, also has the highest portion of indirect cost. Only 2.3% of indirect cost was utilized by the Intensive care unit, while 17% and 18% utilized by the female ward and surgical ward respectively.

Table 4. 4 Direct & Indirect Cost Allocation by Step-down

Code	A1	A2	A3	B1	B2	B3	B4	B5	B6
A01	-								
A02	1,473.16	-							
A03	8,838.96	3,575.26	-						
B01	1,039.88	420.62	220,320.18	-					
B02	363.96	147.22	80,360.17	-	-				
B03	1,107.47	447.96	110,606.44	-	-	-			
B04	1,258.25	508.95	547,697.11	-	-	-	-		
B05	-	-	58,797.90	-	-	-	-	-	
B06	519.94	210.31	68,330.79	-	-	-	-	-	-
C01	972,334.52	393,298.43	513,001.04	920,816.38	91,182.55	-	-	109,021.39	280,619.86
C02	46,832.64	18,943.28	134,086.04	43,120.11	4,128.59	-	-	6,056.74	-
C03	252,725.03	102,224.45	64,742.60	239,592.82	22,940.13	-	-	-	-
C04	63,432.56	25,657.76	249,150.52	60,021.88	2,729.09	-	-	-	-
D01	11,520.12	4,659.76	473,740.49	73,190.11	40,864.46	-	179,158.88	3,634.05	15,087.09
D02	34,782.19	14,069.01	716,221.06	242,563.67	135,431.34	564,370.80	-	12,113.49	16,972.98
D03	17,223.85	6,966.85	415,594.22	120,472.21	67,263.63	-	1,223,688.96	6,177.88	15,087.09
D04	1,221.86	494.23	347,213.89	187,185.32	104,511.77	-	-	1,211.35	3,771.77
D05	4,273.90	1,728.74	149,244.23	23,964.90	13,380.40	-	33,803.56	1,211.35	9,806.61
E01	171,319.91	69,296.99	82,693.49	-	-	-	-	-	-
Total	**1,590,268.20**	**642,649.80**	**4,231,800.17**	**1,910,927.39**	**482,431.95**	**564,370.80**	**1,436,651.40**	**139,426.24**	**341,345.39**

Cost Centre codes & names

A01- Administration

A02- Finance Procument and Supply

A03- Maintenance and Support Service

B01-Laboratory

B02-X-ray

B03-Labour room

B04- Operation Theatre

B05-Scan Room

B06- Physiotherapy

C01-OPD

C02-Observation

C03-Dressig Room

C04-Dental Dep

D01-Male Ward

D02-Female Ward

D03-Surgical Ward

D04-Paediatric Ward

D05-IntensiveCareUnit

E01- Public Health Unit

Table 4.5 Indirect costs of GDH. Regional Hospital in 2007

Cost Centre	Indirect cost from NRPCC (Rf)	Indirect cost from RPCC (Rf)	Total Indirect Cost (Rf)	%
OPD	1,878,633.99	1,401,640.16	**3,280,274.16**	**32%**
Observation	199,861.97	53,305.45	253,167.41	2%
Dressing Room	419,692.08	262,532.95	682,225.03	7%
Dental	338,240.84	62,750.97	400,991.81	4%
Male Ward	489,920.36	311,934.58	801,854.94	8%
Female Ward	765,072.26	971,452.27	1,736,524.53	17%
Surgical Ward	439,784.92	1,432,689.76	1,872,474.68	18%
Paediatric Ward	348,929.97	296,680.20	645,610.18	6%
Intensive Care Unit	155,246.87	82,166.82	237,413.69	2%
Public Health Unit	323,310.38	-	323,310.38	3%
Total	**5,358,693.64**	**4,875,153.17**	**10,233,846.81**	**100%**

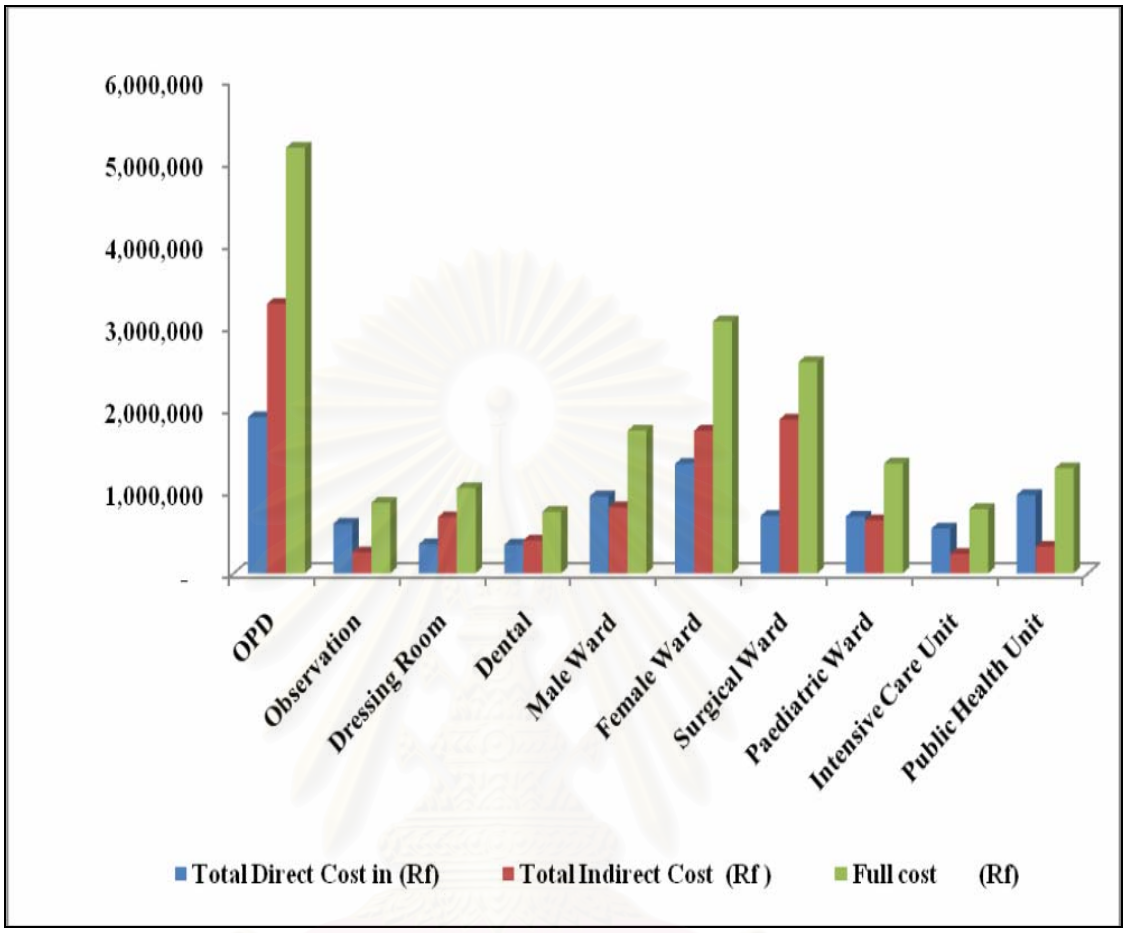
4.4 Full Cost

The full cost details are represented in Table 4.6 and illustrated in graph 4.1. The total expenditure of the Hospital is Rf 18,596,888 which includes total direct cost of Rf 8,363,041.00 and indirect cost of Rf 10,233,846.81. Approximately 28% (Rf 5,180,815) of full cost was absorbed by the outpatient department of patient services, followed by the Female Ward, which accounted for 17% (Rf 3,068,924) followed closely by the surgical ward which accounted to 14% (Rf 2,570,684). Dental Services utilized the lowest costs of only 4% (Rf 749,069) of total full cost of the hospital.

Table 4.6 Full Cost of G. DH. Regional Hospital in 2007

Cost Centres	Total Direct Cost (Rf)	Total Indirect Cost (Rf)	Full cost (Rf)	%
OPD	1,900,541	3,280,274	**5,180,815**	**28%**
Observation	605,152	253,167	858,320	5%
Dressing Room	353,490	682,225	1,035,715	6%
Dental	348,077	400,992	749,069	4%
Male Ward	935,350	801,855	1,737,205	9%
Female Ward	1,332,400	1,736,525	3,068,924	17%
Surgical Ward	698,209	1,872,475	2,570,684	14%
Paediatric Ward	690,893	645,610	1,336,503	7%
Intensive Care Unit	543,874	237,414	781,288	4%
Public Health Unit	955,055	323,310	1,278,365	7%
Total	**8,363,041**	**10,233,847**	**18,596,888**	**100%**

Graph 4.1 Full costs of GDH.Regional Hospital in2007



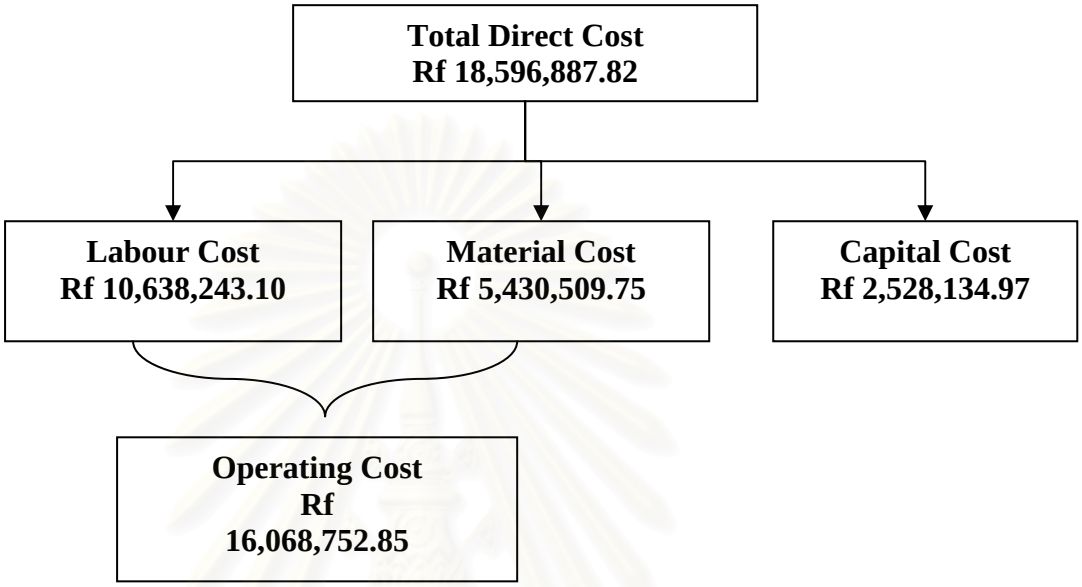
4.5 Total Cost Profile of G.DH.Regional Hospital

The total direct cost of GDH Regional Hospital is Rf 18,596,887.81, as shown in Table 4.7 and figure 4.1. The total direct cost comprise of, Rf 10,638,243.10(57.68%) as labour cost, Rf 5,430,509.75 (28.62) as material cost and Rf 2,528,134.97 (13.71%) as capital cost. Out of the cost profile the highest percentage of 57.20% is consumed as labour cost and the least consumed cost was for the capital cost (13.59%). The total operating cost was Rf 16,068,752.84 which is approximately 86.4 % of total direct cost of the hospital.

Table 4.7 Total Cost Profile of G.DH.Regional Hospital in 2007

	Rf	%
Labour Cost	**10,638,243.10**	**57.20%**
Material Cost	**5,430,509.75**	**29.20%**
Capital Cost	**2,528,134.97**	**13.59%**
TOTAL OPERATING COST	**16,068,752.85**	**86.41%**
TOTAL DIRECT COST	**18,596,887.82**	**100.00%**

Figure 4.1 Total Cost Profile of GDH. Regional Hospital in 2007



4.6 Unit Cost

The unit costs of GDH. Regional hospital in the year 2007 is represented in the Table 4.8 and graphs 4.1, 4.2 and 4.3. The unit costs of services were estimated according to the no of patient visit, admissions for different purposes. Unit cost for each outpatient visit (Consultation) is Rf 232, a visit to observation or emergency care unit is Rf 821 and unit cost dressing room is Rf 178 /visit. Unit cost incurred to provide service for one dental visit is Rf 514. Therefore the highest unit cost incurred, is a visit to the Observation of the hospital and the lowest unit cost is an outpatient visit to the dressing room to treat a minor injury or wound.

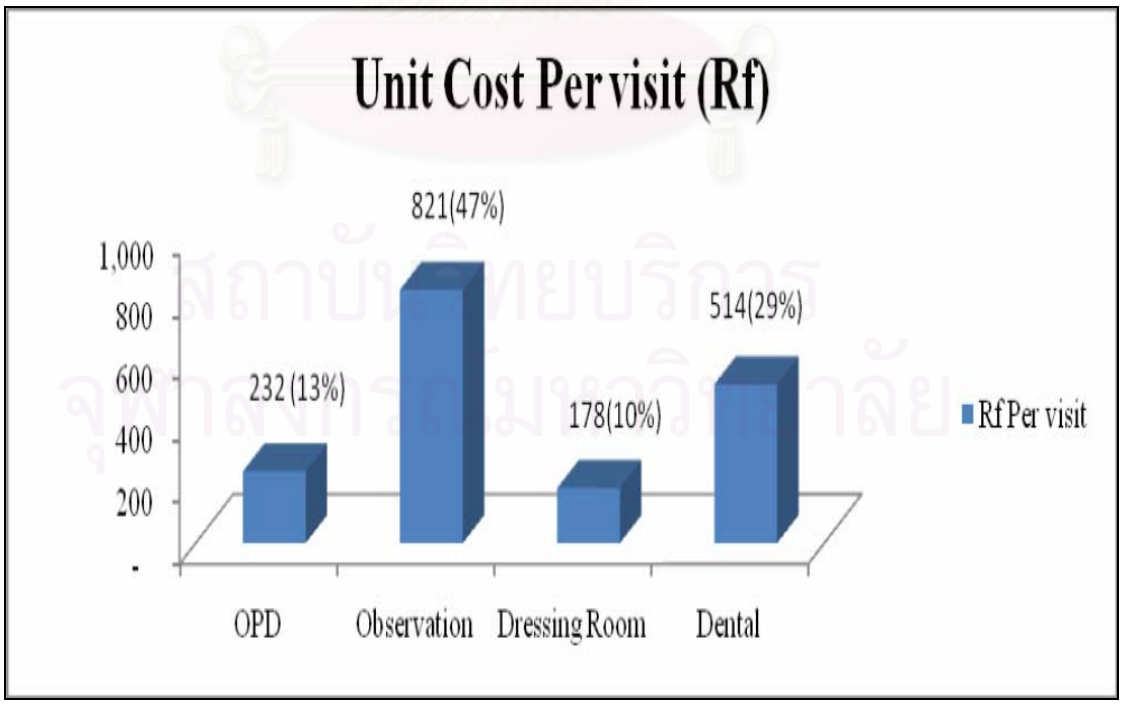
The unit cost of OPD is divided as unit cost as per inpatient admission and Inpatient day at the hospital. The unit cost of IP admission for Male ward, female ward, surgical ward, Paediatric ward and ICU are Rf 7,687, Rf 4,097, Rf 6,910, Rf 2,312 and Rf 10,558 respectively. Unit costs for the Inpatient day were Rf 3,016, Rf 1,280, Rf 2,158, Rf 907, and Rf 3,508 respectively. The highest unit cost for inpatient admission and inpatient day is for the ICU. The lowest unit cost was in Paediatric ward, both per admission (Rf 2,312) and admission day (Rf 907). About 47% of outpatient cost was utilized by the observation room. Out of inpatient services 32% was utilized as inpatient day's unit cost for ICU and 34% as inpatient admission for ICU as well.

The hospital performance indicators (represented in Table: 4.9 page73 and appendix C7 and C8)) that the percentage of admission was highest in Female ward (37%) and bed turn overate of 50 %. The lowest percentage of admission was 11% in the Male ward. The average length of stay was highest (3.20 days) at Female and surgical ward.

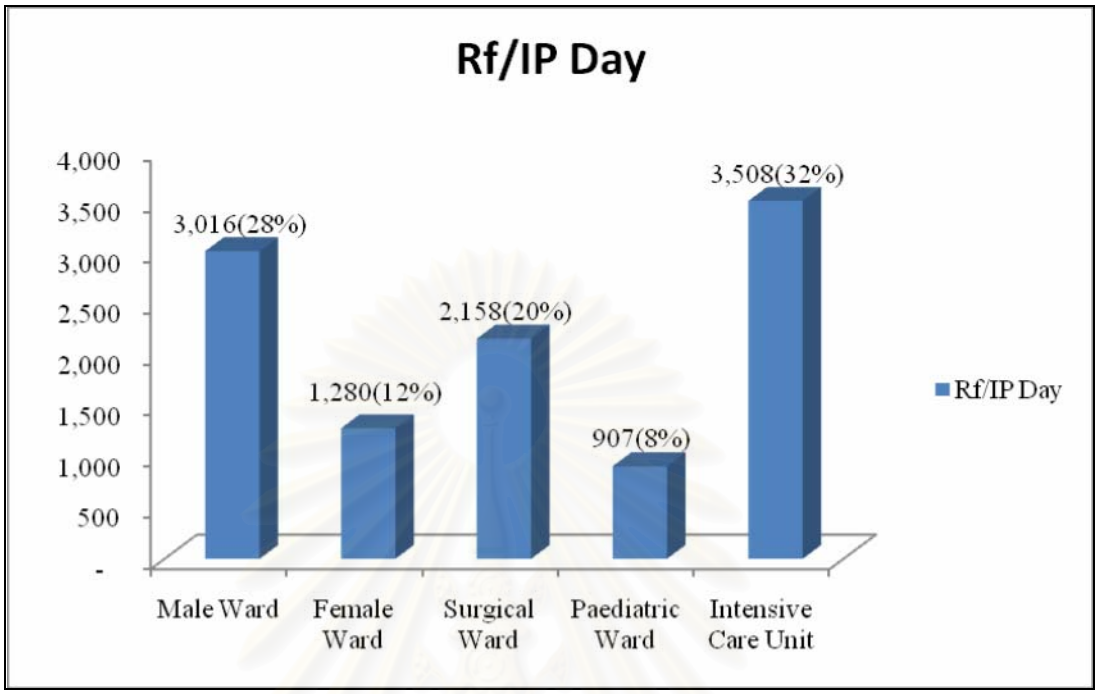
Table 4.8 Unit cost of the health services of GDH. Regional Hospital in 2007

Cost Centre	Rf Per visit	Rf/IP Admission	Rf/IP Day	Rf/Home Visit
OPD	232			
Observation	**821**			
Dressing Room	178			
Dental	514			
Male Ward		7,687	3,016	
Female Ward		4,097	1,280	
Surgical Ward		6,910	2,158	
Paediatric Ward		2,312	907	
Intensive Care Unit		**10,558**	**3,508**	
Public Health Unit				329

Graph 4.2 Unit cost for Outpatients of G.DH. Regional Hospital in 2007



Graph 4.3 Unit cost per inpatient per day for G.DH. Regional Hospital in 2007



Graph 4.4 Unit cost per admission for G.DH. Regional Hospital in 2007

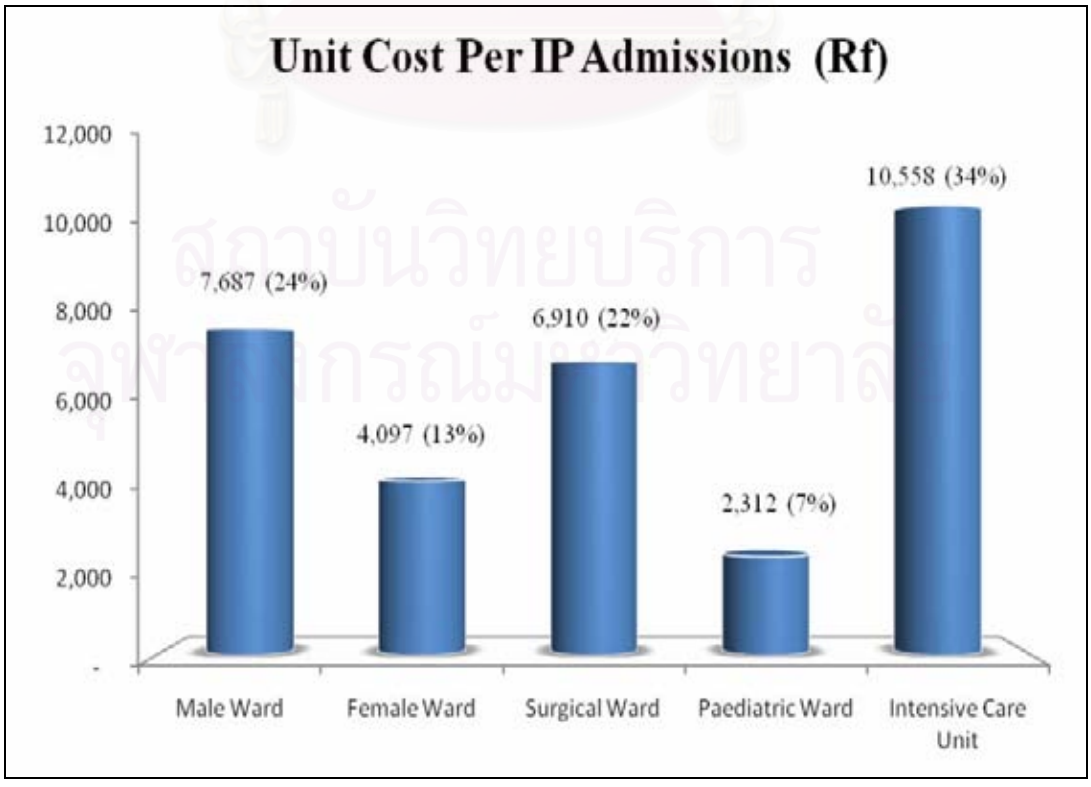


Table 4.9 Hospital Performance Indicators (G.DH. Regional Hospital)

Cost Centre	Beds	Average LOS	Occupancy rate	Bed turnover rate (patients per bed)	% admission	% patient days
Male Ward	8.00	2.55	507%	28	0.11	0.10
Female Ward	15.00	3.20	228%	50	0.37	0.41
Surgical Ward	8.00	3.20	245%	47	0.19	0.20
Pediatric Ward	12.00	2.55	297%	48	0.29	0.25
Intensive Care Unit	2.00	3.01	328%	37	0.04	0.04
All IP wards	**45.00**	**2.93**	**280%**	**44**	**1.00**	**1.00**

4.7 Cost Comparison

At present there are no costing studies done in Maldives, however some quick estimation of unit cost have been done by the MOH, which comprises the unit cost for IGMH and other atoll hospitals (together as one). This estimation is the only costing information available in Maldives with which study results can be compared with. However even the IGMH unit cost was based only on operating cost of the Hospital making the comparison itself very limited.

Table 4.10 attempts to compare costs of IGMH Health Services and the unit cost of G.DH. Regional Hospital. The comparison suggest that even though the operating cost of GDH Regional hospital is approximately 10 times lower than the operating cost of IGMH, the unit cost OPD and IPD are higher. These results suggest low health care utilization in GDH Regional Hospital. The low utilization may be because IGMH provides tertiary care while the sample hospital only provides secondary care.

Table 4.10 Cost comparison of IGMH and G.DH. Regional Hospital

Costs	IGMH(2007)	GDH. Regional Hospital (2007)
Total Operating cost	154,158,002	16,068,752
Labour Cost	71,590,817	10,638,243.10
Material Cost	64,596,111	5,430,509.75
Unit cost for Out Patient	130	232
Unit Cost for In- patient	2467	(7687/ 4097/6910/2312/10,558)*

*****the unit cost of all in patient wards

CHAPTER V

DISCUSSION & CONCLUSION

5.1 Discussion

This study attempted to analysis the cost and unit cost of G.DH. Regional Hospital for the year 2007. The study was able to generate cost profile and unit costs of health services of the Hospital for the sample year. Main findings can be categorized as follows.

5.1.1 High Expenditure of the Hospital

The total expenditure of the hospital in 2007 was Rf 18,596,887.81, the total operating cost of the hospital turned out to be very high. About 86.4% of total hospital cost (Table 4.7) was incurred as the operating cost of the hospital to provide daily services. According to the results of the study the hospital has exceeded the provided annual budget of Rf 9,221,940, for the year 2007. Even though the budget exclude the expenses of medical equipments and medical supplies required for the hospital. Reasons or factors leading to these high expenses are explored in the cost breakdowns.

5.1.2 High labour cost

According to the study findings, approximately 90% of the total budget of the Hospital was spent on labour cost. This implies to inefficiency and high wastage or alternatively, it could also be a miscalculation of expected budget or inability to obtain requested budget due to system difficulties. The inefficiencies mentioned here refers to the inability of hospital staff to allocate resources appropriately to the required services. Hospital records show that 22 of 24 doctors are expatriates and that the majority of all other professionals are also expatriates. Expatriates professionals

enjoys comparatively higher salaries and other incentives compared to local staff to attract qualified professionals to work in islands (rural). However, approximately 40% of total labour cost attributes to the medical doctors; few medical doctors actually worked throughout the year, indicating a high labour turn over. Further, staff accommodation for expatriate employees are rented and maintained throughout the year in spite of the high turn creating an additional cost burden and wastage of limited resources. Both financial and personal reasons contribute to the high turnover rate of expatriate staff in the Hospital, and turnover of labour leads to mismanagement of labour cost and high wastage of hospital budget. However, expatriate staffs are not contracted and recruited by the hospital, and are hired centrally by the DMS/Ministry of Health, thus, the inefficiencies and mismanagement of the labour costs cannot be solely attributed to the Hospital only.

Lewis et al, (1996) states that cost of health care is heavily weighted upon the personnel given the labour-intensive nature of the service, which is also reflected in the study findings. The human resource limitations in the country, especially at island (rural) level makes the country, to a large extent, dependent on expatriate medical personnel to provide basic health services. As such technical and professional staffs have to be imported from other countries just as any equipments and drugs.

5.1.3 High material cost and capital cost

Material and capital cost approximately covers 29.20% and 13.59% of the total cost of the Hospital. The materials cost will be significantly higher if total drug cost and food cost are included. As the Hospital does not have its own pharmacy service, most of the prescribed drug costs are borne personally by the patients and is not included in the hospital budget. The hospital also does not take the responsibility of providing food for in patients.

Regardless of these two important costs, material costs and capital costs were found to be significantly high. The following factors provide some explanation to the reason behind the high costs of material and capital costs.

(i) All materials and capital items are imported from other countries.

(ii) From the material cost and capital, all medical consumables and medical equipments are procured and transported to Hospital by DMS of Ministry of Health, adding the cost of transportation and other logistical costs to the final cost of the item.

(iii) The highest percentage of material cost was taken up by the maintenance and support services, the reason behind this could be:

- The utility cost for support service was high as well as the material needed to maintain vehicles; including fuel and other general tools are quite expensive.
- Poor quality of maintenance service and poor quality materials, such as electrical appliances, materials have to be replaced more frequently leading to a high cost.
- The hospital lacks qualified technical and bio-medical engineering staffs to maintain the transport vehicles and medical equipments and machineries. This unawareness on doing a correct task leads to, inability to achieve the maximum output of resources otherwise known as lack of technical efficiency. Technical efficiency can be described as the pursuit of maximum output for a given level of resources or minimum cost for a given level of output (Hsio, 2000).

Out of the capital cost the laboratory consumed the highest (39%) proportion of capital costs. Laboratory equipments are comparatively expensive as there are many state of the art high-tech machineries involved in laboratory investigations and some of the machines at the Hospital are of latest technology.

5.1.4 Total Direct and Indirect Costs

The highest indirect cost was allocated to OPD services and lowest to ICU from both NRPCC and RPCC. Outpatient department utilized the highest proportion of full cost of the Hospital. As mention earlier the highest part of labour cost was attributed by OPD as the OPD services are generally provided by highly paid professional staffs allocating a large percentage of wages of the staff to the OPD full cost. OPD cost also includes the highest portion (32.6%) of the indirect cost and the remaining direct cost (capital& material costs). Moreover the highest proportions of patients who seek health services from the Hospital are served in the OPD. Approximately 94% of patients receive service from the outpatient department only. Secure

5.1.5 Unit cost

The highest unit cost for outpatient services is for observation room (Rf 821) or emergency care. This could be because the number of patients who receive care from the observation is comparatively lower compared to the total outpatients. The observations are equipped with many high cost medical equipments necessary for medical emergencies. The unit cost of dental (Rf 514) is also quite high when compared with the unit cost of OPD consultations (Rf 232). The reason being that the total visits to dental is fewer and dental services uses costly sophisticated machineries, equipments and medical supplies that is significantly different from other consultation services. Furthermore, dental consultations often include procedures which require the usage of high cost medical consumables. Among the unit cost of inpatient services the highest unit cost was highest for ICU with costs ranging from Rf 10,558 per admission to Rf 3508 per admission day. ICU admissions are fewer than most other inpatient services, lowering the utilization of machineries and equipments in ICU. In general ward, Male ward has the highest unit cost per admission (Rf, 7,687) and for admission per day (Rf 3,016). Male ward had the fewer number of admissions than other wards. The Pediatric ward had the lowest unit cost per admission (Rf 2,312) as well as

unit cost per day (Rf 907) resulting from the high turnover rate of patients (48) in this ward.

Low hospital performance indicators and the high unit costs indicate a low utilization rate of hospital services in the G.DH. Regional Hospital. The unit cost of the Hospital's IPD services is higher because the number of patients who seek service is still low. This could be due to draw backs in the referral system or quality of health care provided by the Hospital. Quite often patient bypasses the referral system and seek services from the tertiary care hospital (IGMH), where tertiary care is provided.

The low admission rate in the Hospital could be due to many factors. Unavailability of accommodation facilities for visiting patients from other islands, inter island and inter atoll transport costs, are some key factors that leads to low admission rate. As such, patients often only seek consultation with the doctor due unavailability of accommodations or waiting areas for the patient and relatives, refusing admission unless it is an absolute emergency.

5.2 Strength and Benefits of the study

The major strength of this study is that this study is the first costing study for a hospital in Maldives, and provides some important and useful insight for resource management in hospitals, especially for other regional hospitals in Maldives. The study also indicates some gaps in resource mobilization as well as managing resources, encouraging hospital administrators and managers to go for such studies to identify resource utilization, and possible areas of reducing wastage and costs, and improve financial and operational efficiency. The methodology used in this study provides an appropriate setting which can be applied to all the hospitals in the Maldives.

As the study on unit cost was carried out with the aim of providing some useful insights which can support the scaling up of the development of a health insurance system, the study also reviewed literatures on possible approaches to develop a health insurance scheme in Maldives. The literature review provides a number of alternative types of insurance system from which the Government of Maldives can choose the best fit to the Maldivian population. Options include National Health Service Scheme or a Social Security Scheme or a joint scheme incorporating both. Maldives must consider the economic, political and social status of the country in the development of a health insurance scheme.. The other issues that has to be scrutinized to approach a health care financing scheme includes financing policy, equity issues, risk pooling mechanisms, efficiency in health care, payment mechanisms and sustainability of a universal coverage programme.

5.3 Limitations

(i) The analysis of this costing includes only a minor percentage of drug cost. The cost of prescribed drugs and food charges could not be included resulting a lower material cost as there is no attached pharmacy at the Hospital and Hospital does not provide food for patients.

(ii) There were no separate utility bills or charges for different cost centres and utility cost were divided into different cost centres according to their operating space, and does not take into account the machineries that different cost centres uses and the electricity consumption of these machineries. As such cost computations may not be totally accurate.

(iii) There are no estimated life years for any of the capital items or buildings in Maldives, thus capital depreciation were calculated based on costing literature and international life year tables which might not be the most appropriate life years for the Maldives.

(iv) The some cost information of physiotherapy equipments was not available and the costs of the same type of equipments at IGMH were used instead which may have minor differences in the cost.

(v) The costing study was based only on one year's data for one sample hospital making the usage of data somewhat limited. As such the unit cost results will be highly sensitive to any changes in the scenario of the Hospital during the sample year such as the changes in bed occupancy rate, increases in the price of materials, or changes in the hospital capacity. Any change in these scenario and number of other factors that influence the cost, the unit cost will not remain the same.

5.4 Conclusion

This study was done in an attempt to provide insight to the unit cost of one Maldivian Hospital in order to assist the scaling up of a premium for the development of a health insurance scheme in the country. The main objective of the study was to analyze the cost and unit cost of inpatient and outpatient services of G.DH. Regional Hospital.

The cost information from 18 cost centres of the GDH. Regional Hospital were collected and compiled as labour cost, material cost and capital cost. The data analysis was done using step down allocation with the incorporation of allocation criteria. The study results provided a useful insight of cost and unit cost of GDH. Regional Hospital for 2007. The total expenditure of G.DH. Regional Hospital for the period is Rf 18, 596, 887.81 and total operating cost is Rf 16,068,752.84. The total operating cost is 86.4% of total direct cost. The expenditure of the Hospital had exceeded the total allocated budget of 2007 suggesting wastage and system inefficiencies.

57% of total direct cost contributes to labour cost, which amounted to Rf 10,638,243.10. Labour cost includes Rf 5,490,525.00 (52%) as salary and the remaining 48% comprises of all the allowances and benefits provided for employees. The largest portion of labour cost was given as the salary Rf 2,782,309.73 (26.2%) to the

maintenance and support services and the least was Rf 109,110.19 (1%) to the Dental Services and no labour cost was utilized by the Scan room. The higher labour cost suggests inappropriate resource allocation of hospital system or rather health delivery system of the country. High labour costs can be attributed to the high percentage of expatriate health professional working in the Hospital and the high wages and high turnover rates.

The total material cost for this Hospital is Rf 5,278,083.75 for the year 2007, of which the largest portion is utilized by the maintenance and support services (Rf 1,177,897.63, 22%) and the least cost were utilized by the scan room. The material cost was high since all the materials used in the hospital were imported items and there was wastage of materials due to technical inefficiencies, and additional logistical and transport costs associated with delivering the items from Male' to Thinadhoo. The total depreciated capital cost for building is Rf 1,837,513.09, for equipment Rf 690,621.88 and total depreciation cost is Rf 2,528,134.94.

The total indirect cost from both NRPCC and RPCC allocated down to patient and non patient's services was, Rf 10,233,846.81. The highest portion (32%) of indirect cost is allocated to OPD. The total full cost of hospital was Rf 18,596,887.81

The unit cost for the Hospital OPD is Rf 232 for general consultation and Rf 514 for dental consultation. The observations had the highest cost among all OPD services, as the emergency care is equipped with high technology equipment to treat emergency condition and the utilization rate of these equipments low. The unit cost for inpatient services was different from one another and it was estimated as per admission and per admission day for each ward separately. The highest unit cost was for ICU with Rf 10,558 per admission and Rf 3,508 per admission day. The lowest unit cost was in Paediatric ward for both per admission (Rf 2,312) and admission day (Rf 907). The study results suggest low utilization of health services of the G. DH. Regional Hospital and shows evidence of patients bypassing of referral system by the patients.

5.5 Recommendations

5.5.1 Policy Implications

- Though the main aim of this study was to give an idea in scaling up a premium for the developing insurance system; this result of unit cost of services may be used with caution considering the many limitations of the study.
- Encourage hospitals on evidence based decision making and management may be a fundamental step towards a successful health care reform
- Reinforce and regulate the existing referral health system, so that the health utilization rate is higher at the Regional health facilities of the country and to review and control the bypassing the referral system by patients.
- Review and reinforce recruitment policies of DMS /Ministry of health, especially on contracting expatriate staff to ensure full benefits of hiring expatriate professionals are enjoyed by the patients and the system instead of wasting scarce resources.
- Perhaps, integration of waiting facilities for the patients who are from the other islands, but seek service in GDH. Regional Hospital may be an additional effort to improve the utilization rate of the hospital.

5.5.2 Information and Recording System

- The upgrading or developing a central accounting and information system of Ministry of health is essential for further costing studies.
- The existing accounting system and information system of the hospital should be improved for easy access of cost information’s for efficient decision making and proper management.

- The existing inventory of the hospital can be developed further, with more information such as useful life years, the year purchased, purchasing price, which is very vital to bring about evidences in cost information's and monitoring the changes.
- Estimation of life years for hospital building and assets is vital to produce evidence based costing information.
- Availability of all cost information through data base could be a wiser step for the hospital's management and decision making.
- The regional hospital need to be informed of the cost information on all the categories of things (Medical equipments & Medical consumable) to facilitate a better understanding of their own accounting system.
- All the staff of the hospital should be informed of cost information's on machineries, materials that they use daily, to make the staff realize the value of the resources used and to promote efficient and cautious use of resources.

5.5.3 Planning, Decision Making

- To reduce the wastage of the hospital, especially in labour cost, it is essential to evaluate and analyze the factors affecting leading to high labour turnover and focus on retention of qualified staff. This may require the Ministry of Health to review and revise the remuneration packages of staff as well as start focusing on the long term development of qualified local medical personnel.
- It's vital for hospital administrators to use better allocation and technical efficiency methods, such as allocating appropriate for appropriate services and upgrading the technical competencies of the personnel at all the level of the hospital, for efficiency and sustainability and quality care.

- Research based evidence on cost of services are important key component in pricing of hospital services and for approaching health insurance coverage.
- Unit cost analysis on different procedures and treatment of disease conditions would give the hospital administration an easier way on pricing and budgeting for those services.
- Costing studies are key factors in strengthening the costing capacity and decision making process of the health care management.

5.5.4 Further Studies

- Undertake costing studies with all related expenses including drug and food cost to provide policy makers and hospital management a more realistic unit cost.
- Carry out similar studies based on prospective approach instead of retrospective approach as the later approach often contains some information gaps which can be filled by former approach, providing Ministry of Health, and Hospital managements with more accurate and reliable evidence for decision making and budgeting purposes.
- Conduct multiyear costing studies of different hospitals settings to analyze the trends of unit cost over time and the factors leading to these changes. These studies can be used for policy making, monitoring and evaluation health financing system and by hospital managers for internal control purposes.
- Perform costing studies immediately prior to introducing health insurance scheme, to use as base line data, and to conduct regular tracer studies to evaluate utilization rate and demands of Hospital services.

REFERENCES

Adam,T. & Evans, D.B.(2006). Determinants of variation in the cost of inpatient stay versus outpatient visits in hospital: A multi country analysis. Social Science and Medicine. 63, 1700-1710. Geneva:WHO

Adam,T., David B Evans,D.B. & Muray,M.J.L. Econometric estimation of country-specific hospital Costs, Global programme on Evidence for Health Policy (GPE/EQC). World Health Organization, Retrieved December 10, 2007 at http://www.resource-allocation.com/content/1/1/3

American Hospital Association [AHA]. (1998). Estimated Useful Lives of Depreciable Hospital Assets. (The internal Revenue service Publication, no.946). Retrevied on March 25, 2008 from Googles Website: http://www.cg.state.sc.us/gasb34/training/segment2/handouts/AM1_Useful_Lives.pdf.

American Hospital Association [AHA]. (1978), Estimated Useful Lives of Depreciable Hospital Assets. (840 North Lakeshore Drive). Chicago: Illinois 60611.

Buchmueller,T.C., Grumbach,K., Kronick,R. and Kahn,J.G. (2005). The effect of health insurance on medical care utilization and implications for insurance expansion: A review of literature. , Medical Care Reserch and Review, 62 (No.1), page 3-30. RetrievedJun6,2007,from Website: http://mcr.sagepub.com/cgi/content/abstract/62/1/3

Carrin, G. & Evlo, K. (1995). A methodology for the calculation of health care costs and their recovery. (WHO Document).Geneva:WHO

Creese, A & Parker, D. (1994). Cost analysis in primary health care. A training manual for programme managers. Geneva: World Health Organization.

.Drummond,M.F., Bernie J. O'Brien,B.J., Stoddart,G.L. & Torrance, G.W. (1997). Methods for economic evaluation of health care programmes. New York: Oxford University Press.

Gottret, P. & Schieber,G. (2006). Health financing revisited: A practioners's Guide. Washington DC: World Bank 2006.

Green, A. (2007). An introduction to health planning for developing health systems.New York: Oxford University Press.

Hsiao, W. (2000). Health Care Financing in Developing Nations: A Background paper. School of Public Health President, Harvard University: President and fellows of Harvard College.

Jabr, S.F. (2004). Break-Even analysis and willingness of CVD patients to pay for the service of catheter unit in Ram Allah Hospital, Palestine. Master Thesis, Bangkok: Faculty of Economics, Chulalongkorn University,Thailand.

Krueger, A.B (1993). Observation on Employment – Based Government Mandates with particular Reference to health Insurance. (Working paper #323 (Draft). Washington DC: World Bank, Prince Town University,

Laekawipat,S. (2004). Cost and unit cost analysis of Rongkwang hospital Phrae Province in fiscal year 2003. Master Thesis, Faculty of Graduate Studies, Mahidol University, Thailand.

Lewis,M.A., LA Forgia, G.M. & Sulvetta, M.B.(2003). Measuring Public Hospital Cost: Empirical Evidence From The Dominican Republic. Social Science and Medicine, 43,221-234. Washington DC: World Bank.

Limwattananon,S., Tancharoensanthein,V. and Prakongsai,P. (2007). Catastrophic and poverty impacts of health payements: results from national household surveys in Thailand.
Bulletin of the World Health Organization, 2007. 85 (8), 600-606. Geneva: WHO.

Limasantithum,N.(2004). Cost- Effectiveness Analysis of Chronic Diseases Management: Comparison between King Chulalongkorn Memorial Hospital and Public Health Center 16 Lumpini. Master Thesis, Faculty of Economics, Chulalongkorn University, Thailand.

Ministry of Health, Maldives [MOH]. (2007). Mission Report on Universal Coverage in Maldives. A debriefing session on Universal coverage. Male'/Maldives, October 25, 2007.

Ministry of Health[MOH], Maldives. (2007). Health System. Retrieved January 17, 2008, from MOH /Maldives Website: http://www.health.gov.mv

Ministry of Planning and National Development [MPND], Maldives. (2007). Census 2006 , Retrieved January 16, 2008 from Mop/ Maldives website :http://www.planning.gov.mv.

Ministry of Health [MOH].(2006). Health Master Plan (2006-2015). Male': Ministry of Health, Maldives.

Mogyorosy,Z. & Smith,P. (2005). The main methodological issues in costing health care services: A literature review. Centre for Health Economics, York: University of York, United Kingdom.

Nitayarumpong, S. & Mills, A. (2006). Achieving Universal Coverage of Health Care. Thailand: National Health Security Office

Oostenbrink,J.B, Woulde,T.B, Agothoven,M.V., Koopmanschap, M.A. and Rutten,F.F.H. (2003). Unit costs of inpatient hospital days. Pharmacoeconomics,2003. 21(4),263-271. Netherlands: Adis International Limited.

Somanathan, A. (1998). Unit Cost Analysis of Public and Private Health Facilities in Sri Lanka in 1992. (Occasional Paper No. 6). Srilanka: Health Policy Programme, Institute of Policy Studies of Sri Lanka.

Shepard,D.S., Hodgkin, D. & Anthony,Y. (1998). Analysis of Hospital Costs: a manual for Managers. Geneva: World Health Organization.

Tangcharoensanthein, V., Wibulpholprasert,S. & Nitayaramphong,S. (2004).Knowledge –based changes to health systems: the Thai experience in policy development. Bulletin of the World Health Organization, 2004. 82(10), 750-756. Geneva: WHO.

Tangcharoensanthein, S., Prakongsai,P., Limwattananon,S., Patcharanarumol,W. & Jongudomsuk,P. (2007). Achieving universal coverage in Thailand, What lesson we learn? A case study by the Health System Knowledge Network. Bangkok: International Health Policy Program Ministry of Public Health, Thailand.

Tisayaticom, K., Tangcharoensathien, V. & Patcharanarumol, W. (2007). Hospital Costing Manual: An application for Vietnamese setting. Bangkok: Evidence for Health Policy; IHPP, Thailand.

Thomyawat,T. (2002) Analysis of Total Direct cost per unit of single major operation in Ratchaburi Hospital for the 2000 fiscal year. Master Thesis, Faculty of Graduate Studies, Mahidol University, Thailand

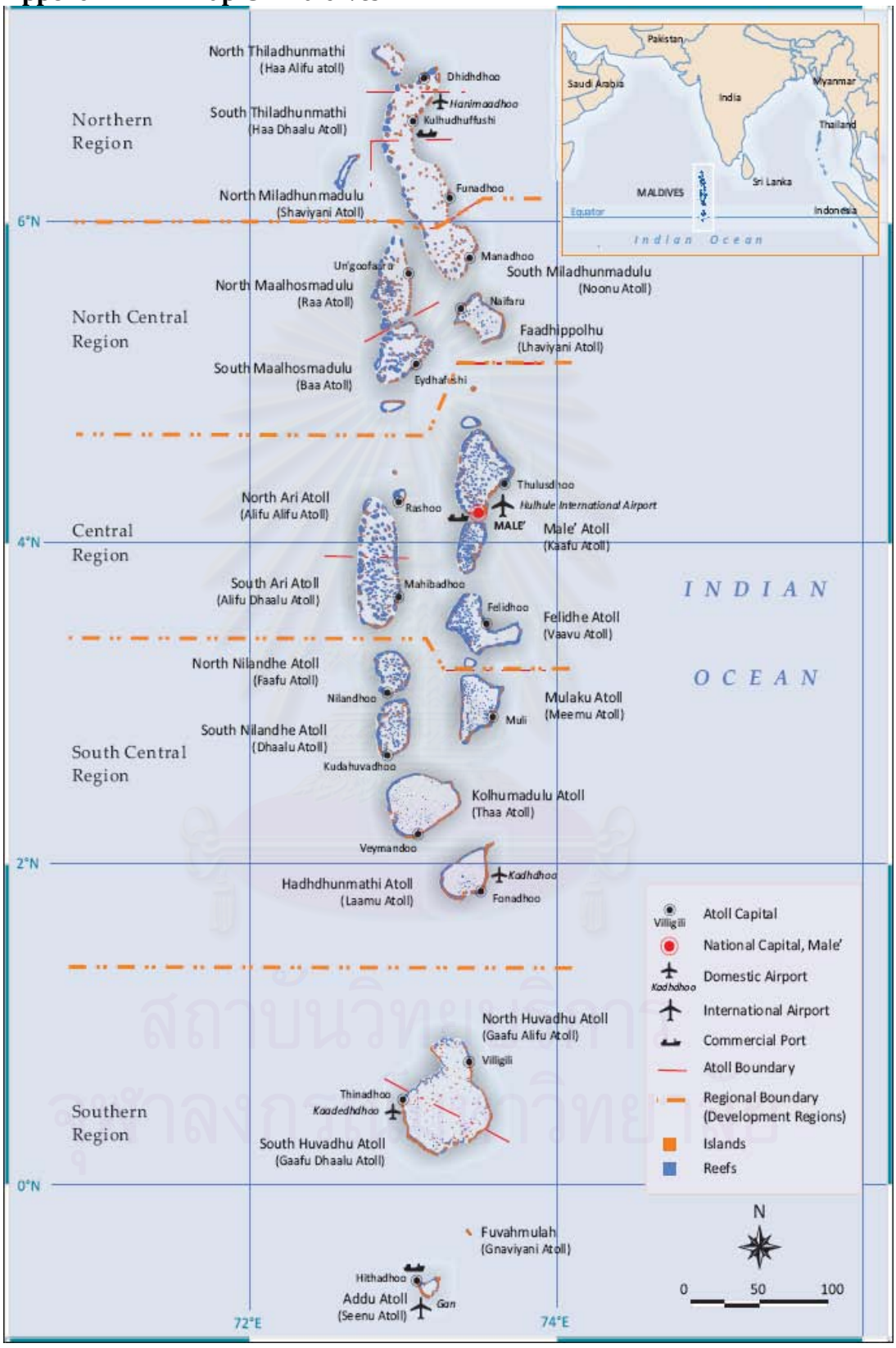
World Health Organization [WHO]. (2007). National Health Account. Retrieved November 1, 2007, from WHO Official Website:http://www.who.int/nha/country/mdv/en/

World Health Organization [WHO]. (2007). Country Health system Profile. Retrieved January 17,2008, from WHO official website http://www.who.int/nha/country/mdv/en/

Wikipedia,the free encyclopedia (2007) . Maldives. Retrieved January 17, 2008, from Wikipedia Website: http://en.wikipedia.org/wiki/Maldives

APPENDICES

Appendix –A Map Of Maldives



Appendix- B1 Record form for Labor Cost: Salary Allowances and other fringe benefits (Rf)

Cost Centre ……
Month/ Year……...

Staff Name	Sal-ary	Professional Allowance	Long Term Allow-ance	Medical Allowance	Living Allowance	Overtime	Total Sal-ary	Remarks
Total								

Appendix-B2 Record form for time allocation of staff: (staff who serves for more than one cost centre)

Month:

Cost Centre	Name of the staff	Proportion of time spent in cost centers (hrs/week)			Total percent-age of time in each cost centre /week	Allocated time for ser-vice/week	Total Salary	% of labour cost/centre
Total								

Appendix -B 3 Record Form for Material Cost in Rf: Medical Supplies (like, drugs, solutions, small equipments and other accessories)

Month:

Cost Centre	Name of the supply	Cost of medical supply	Total	Remarks
Total				

Appendix B-4 Record form for material Cost: Office Supply

Month: ……..

Cost Centre	Name of the supply	Cost of office supply	Total (Rf)	Remarks
Total				

Appendix B-5 Record form for material cost: Non Medical Supply (Cleaning items, solutions, etc)

Month……

Cost Centre	Name of the Material	Cost of Material	Total (Rf)	Remarks
Total				

Appendix-B6 Record form for Material Cost: Public Utilities cost (Rf)

Cost Centre ……..

Month	Electricity Cost	Water Supply Cost	Telephone	Internet Cost	Other utilities cost	Total
Total						

Appendix-B7 Record form for Capital Cost; Major Equipments, Buildings etc

Cost centre	Name of the capi-tal item	Date of purchase	Purchasing price	Useful life years	Depreciated value	Total
Total						

<u>Apendix-B8 Record form for allocation of cost: (overhead cost to different cost centres)</u>

Month:

Cost Centre code	Name of cost centre	Proportion of cost from transient cost centre to Patient and non patient services	Defining allocation criteria/source	Remarks

Appendix-B9 Record form for Total Operating cost

Code	Cost centre name	Total Labour cost	Total Material Cost	Total Operating cost	Remarks
Total					

Appendix- B10 Record form for output of services

Month……..

Cost centres	Number of patient visits	Number of diagnostic services obtained	Number of admissions	Number of deliveries	Number of operations	Average no of bed days	Remarks
Total							

Appendix – C1 Labour cost profile of GDH. Regional Hospital in 2007

cost center categories	Rf	**%**
NRPCC	**3,780,667.93**	**36%**
RPCC	**1,350,238.55**	**13%**
OP	**2,288,586.14**	**22%**
IP	**2,345,868.99**	**22%**
Non PS	**872,881.49**	**8%**
Total	**10,638,243.10**	**100%**

Appendix-C2 Labour Cost details of G.DH. Regional Hospital in 2007

Cost center	Salary	Prof	Long/Living	Medical	Overtime	Fringe Benefits	Bonus	Other	Total	%
Administration	275,934	10,389	43,126	10,621	55,276	33,876	5,907	99,510	534,640	5%
Finance, procument and supply	239,331	9,011	37,406	9,212	47,944	29,382	5,124	86,309	463,718	4%
Maintenance and support services	1,435,983	54,065	224,434	55,273	287,663	176,292	30,743	517,856	2,782,310	26%
Laboratory	168,939	6,361	26,404	6,503	33,843	20,740	3,617	60,924	327,331	3%
X-ray Department	59,129	2,226	9,241	2,276	11,845	7,259	1,266	21,323	114,566	1%
Labour Room	179,920	6,774	28,120	6,925	36,043	22,088	3,852	64,884	348,607	3%
Operation Theatre	204,416	7,696	31,949	7,868	40,950	25,096	4,376	73,718	396,070	4%
Scan Room	0	0	0	0	0	0	0	0	0	0%
Physiotherapy	84,470	3,180	13,202	3,251	16,921	10,370	1,808	30,462	163,665	2%
OPD	732,915	27,594	114,549	28,211	146,821	89,978	15,691	264,310	1,420,069	13%
Observation	245,525	9,244	38,374	9,451	49,185	30,142	5,256	88,543	475,720	4%
Dressing Room	146,414	5,513	22,883	5,636	29,330	17,975	3,135	52,801	283,686	3%
Dental	56,313	2,120	8,801	2,168	11,281	6,913	1,206	20,308	109,110	1%
Male Ward	280,721	10,569	43,875	10,805	56,235	34,463	6,010	101,236	543,914	5%
Female Ward	378,424	14,248	59,145	14,566	75,808	46,458	8,102	136,470	733,220	7%
Surgical Ward	179,639	6,763	28,076	6,915	35,986	22,054	3,846	64,783	348,061	3%
Paediatric Ward	198,504	7,474	31,025	7,641	39,765	24,370	4,250	71,586	384,613	4%
Intensive Care Unit	173,444	6,530	27,108	6,676	34,745	21,293	3,713	62,549	336,059	3%
Public Health Unit	450,505	16,962	70,411	17,341	90,247	55,307	9,645	162,465	872,881	8%
Total	***5,490,525***	***206,719***	***858,129***	***211,339***	***1,099,889***	***674,057***	***117,547***	***1,980,038***	***10,638,243***	***100%***

Appendix- C3 Material cost details of cost centres of G.DH. Regional Hospital in 2007

Cost center	Utilities	General & Office supply	Drugs & Medical Supply	Maintanence &House keeping	0thers	Total	%
Administration	119,813	25,455		96,937	734,391	976,595	18%
Finance,procument and supply	85,167	6,363		25,597	23,000	140,127	3%
Maintainance and support services	515,975	204,190		449,971	7,762	1,177,898	22%
Laboratory	45,471	13,373	307,472	13,666		379,982	7%
x-ray Department	34,283	7,632	149,184	10,304		201,403	4%
Labour Room	35,368	1,567	20,859	10,630	3,450	71,874	1%
Operation Theatre	75,060	7,369	247,464	22,559	3,450	355,902	7%
Scan Room	28,148	1,600		8,460		38,208	1%
Physiotherapy	31,758	1,905	1,195	9,545		44,402	1%
OPD	226,634	28,790	9,817	68,115		333,356	6%
Observation	37,531	2,350	28,208	11,280	7,762	87,131	2%
Dressing Room	18,763	783	9,123	5,639	7,762	42,071	1%
Dental	31,759	2,445	118,153	9,545		161,902	3%
Male Ward	169,795	6,267	72,988	51,032	7,762	307,844	6%
Female Ward	234,644	11,751	136,852	70,522	11,643	465,412	9%
Surgical Ward	140,743	6,267	72,988	42,300	7,762	270,060	5%
Paediatric Ward	75,993	9,401	109,629	22,840	7,762	225,625	4%
Intensive Care Unit	54,056	1,567	21,230	16,247	3,881	96,981	2%
Public Health Unit	33,200	10,557		9,978		53,736	1%
Total	**1,632,000**	**349,633**	**1,305,161**	**955,169**	**826,386**	**5,430,510**	**100%**

Appendix- C4 Capital cost details of G.DH. Regional Hospital in 2007

Cost Centre	Depreciation cost of Equipment and Vehicles	Depreciation cost of building	Total Depreciation cost
Administration	37,329.51	41,703.83	79,033.34
Finance,procument and supply	11,211.43	26,119.62	37,331.05
Maintainance and support services	235,866.43	23,312.15	259,178.58
Laboratory	961,380.02	20,453.72	981,833.74
x-ray Department	70,170.20	15,421.40	85,591.60
Labour Room	15,818.74	15,909.32	31,728.06
Operation Theatre	101,451.20	33,763.64	135,214.83
Scan Room	29,759.00	12,661.53	42,420.53
Physiotherapy	49,931.38	14,285.26	64,216.64
OPD	45,170.83	101,944.81	147,115.65
Observation	25,418.54	16,882.15	42,300.69
Dressing Room	19,293.00	8,439.90	27,732.90
Dental	62,780.10	14,285.12	77,065.22
Male Ward	7,214.40	76,377.46	83,591.86
Female Ward	28,219.76	105,547.67	133,767.43
Surgical Ward	16,778.67	63,308.99	80,087.67
Paediatric Ward	19,698.90	60,955.39	80,654.29
Intensive Care Unit	86,517.41	24,315.76	110,833.17
Public Health Unit	**13,503.57**	**14,934.15**	**28,437.72**

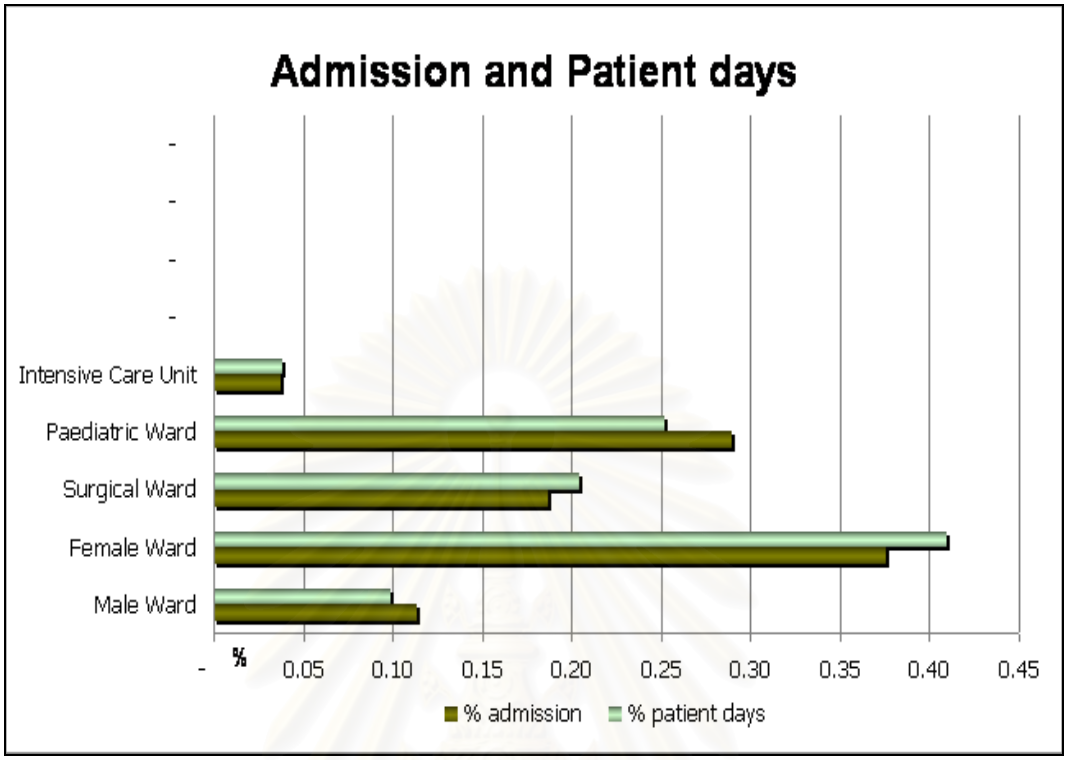
Appendix- C5 Allocation Factor Table

Code	Cost Center	A1	A2	A3	B1	B2	B3	B4	B5	B6
A01	Administration	0								
A02	Finance,procument and supply	0.0009	0							
A03	Maintainance and support services	0.0056	0.0056	0						
B01	Laboratory	0.0007	0.0007	0.0521	0					
B02	x-ray Department	0.0002	0.0002	0.0190	-	0				
B03	Labour Room	0.0007	0.0007	0.0261	-	-	0			
B04	Operation Theatre	0.0008	0.0008	0.1294	-	-	-	0		
B05	Scan Room	-	-	0.0139	-	-	-	-	0	
B06	Physiotherapy	0.0003	0.0003	0.0161	-	-	-	-	-	0
C01	OPD	0.6114	0.6120	0.1212	0.4819	0.1890	-	-	0.7819	0.8221
C02	Observation	0.0294	0.0295	0.0317	0.0226	0.0086	-	-	0.0434	-
C03	Dressing Room	0.1589	0.1591	0.0153	0.1254	0.0476	-	-	-	-
C04	Dental	0.0399	0.0399	0.0589	0.0314	0.0057	-	-	-	-
D01	Male Ward	0.0072	0.0073	0.1119	0.0383	0.0847	-	0.1247	0.0261	0.0442
D02	Female Ward	0.0219	0.0219	0.1692	0.1269	0.2807	1.0000	-	0.0869	0.0497
D03	Surgical Ward	0.0108	0.0108	0.0982	0.0630	0.1394	-	0.8518	0.0443	0.0442
D04	Paediatric Ward	0.0008	0.0008	0.0820	0.0980	0.2166	-	-	0.0087	0.0110
D05	Intensive Care Unit	0.0027	0.0027	0.0353	0.0125	0.0277	-	0.0235	0.0087	0.0287
E01	Public Health Unit	0.1077	0.1078	0.0195	-	-	-	-	-	-
	Total	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

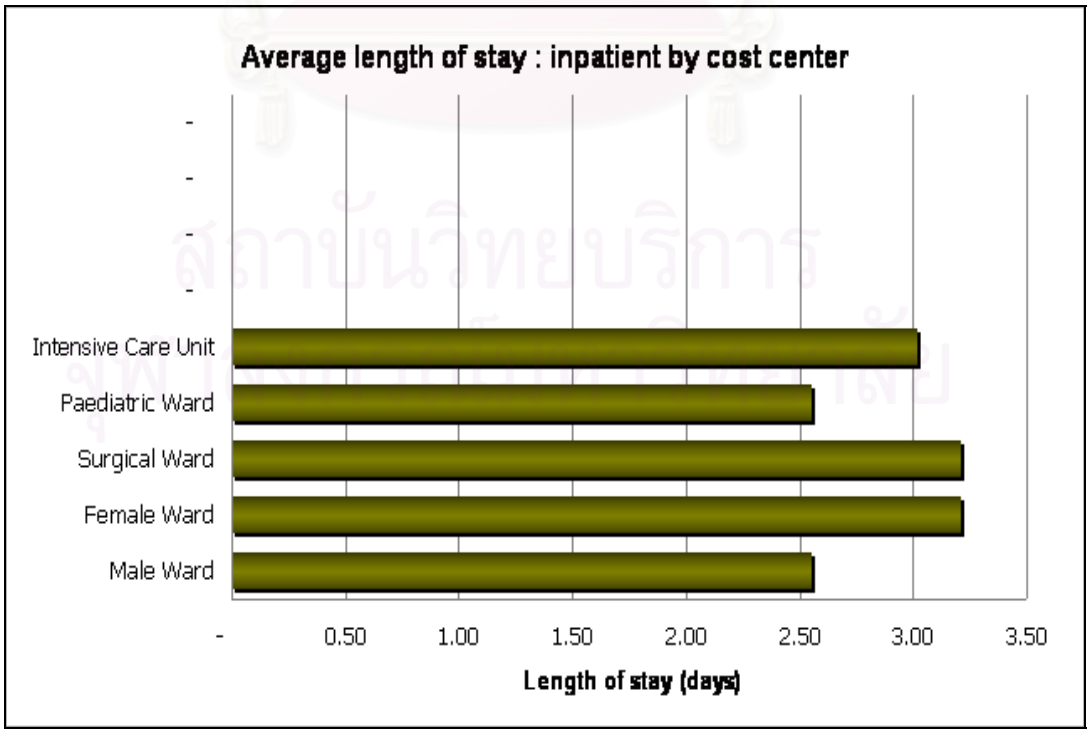
Appendix- C6 Cost profile in Rufiyaa and US dollars

Cost	In Rf	In US Dollars
Total Direct Cost	18,596,887.81	14,447,228.62
Operating Cost	16,068,752.84	1,250,486.60
Labour Cost	10,638,243.10	827,878.84
Material Cost	5,430,509.75	422,607.76
Capital Cost	2,528,134.97	196,742.02
Unit cost for OPD Services		
OPD	232	18.05
Observation	821	63.89
Dressing Room	178	13.85
Dental Services	514	40
Unit cost for Admissions		
Male ward	7,687	598.21
Female Ward	4,097	318.83
Surgical Ward	6,910	537.74
Paediatric Ward	2,312	179.92
ICU	10,558	821.63
Unit cost for admission day		
Male ward	3,016	234.71
Female Ward	1,280	99.61
Surgical Ward	2,158	167.94
Paediatric Ward	907	70.68
ICU	3,508	272.99
Unit cost for non patient service		
PHU	329	25.6

Appendix- C7Admission and patient days of GDH Regional Hospital in 2007



Appendix-C8 Average length of stay: Inpatient by cost centres of G.DH.Regional Hospital in 2007



BIOGRAPHY

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