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**COST ANALYSIS OF "SAMADIGAMA" PRIMARY
HEALTH CARE UNIT IN SRI LANKA**

Mrs. Godagedara Vidanelage Samanthi Dilruk Bandara

**A Thesis Submitted in Partial Fulfillment of the Requirements
for the Degree of Master of Science Program in Health Economics**

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Thesis Title COST ANALYSIS OF “SAMADIGAMA” PRIMARY HEALTH
CARE UNIT IN SRI LANKA
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การวิเคราะห์ต้นทุนของหน่วยบริการสาธารณสุขมูลฐาน "สะมาติกามา" ประเทศศรีลังกา.

(Cost Analysis of "Samadigama" Primary Health Care Unit in Sri Lanka) อ.

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การศึกษานี้มีจุดมุ่งหมายเพื่อวิเคราะห์ต้นทุนทั้งหมดและต้นทุนต่อหน่วยของหน่วยบริการปฐมภูมิสะมาติกามา(Samadigama)เฉพาะในมุมมองของผู้ให้บริการ.หน่วยบริการปฐมภูมิสะมาติกามาเป็นรูปแบบบูรณาการของบริการรักษาพยาบาลและป้องกันโรคไว้ในหน่วยเดียวที่ระดับปฐมภูมิซึ่งเริ่มก่อตั้งเมื่อ ค.ศ. 2007 ตั้งอยู่ในประเทศศรีลังกาดอนใต้ ตำบลฮัมบันโตตะ (Hambantota District) ตามแนวคิดบริการสุขภาพระดับปฐมภูมิตั้งเดิมของไต้หวัน ข้อมูลที่เก็บรวบรวมเป็นข้อมูลของปี ค.ศ. 2008จากแหล่งข้อมูลทุติยภูมิ และจากการสังเกต การคำนวณต้นทุนต่อหน่วยของแต่ละแผนกที่ให้บริการผู้ป่วยใช้วิธี Step-down technique

ผลการศึกษาพบว่าต้นทุนต่อหน่วยของหน่วยตรวจผู้ป่วยนอก คือ 147.00 รูปีศรีลังกา, คลินิกแพทย์ 261.00 รูปีศรีลังกา, คลินิกวัคซีนเด็ก 940.00 รูปีศรีลังกา, คลินิกวางแผนครอบครัว 561.00 รูปีศรีลังกา, คลินิกทันตกรรม 418.00 รูปีศรีลังกา และคลินิกอายุรเวท 232.00 รูปีศรีลังกา ต้นทุนต่อหน่วยค่อนข้างสูงเนื่องจากการขาดบุคลากรที่ปฏิบัติงานเต็มเวลา และการใช้บริการที่ไม่ทั่วถึง การศึกษานี้ได้เสนอให้เพิ่มจำนวนบุคลากรที่ปฏิบัติงานเต็มเวลา และจำนวนชั่วโมงทำงาน ซึ่งจะทำให้ต้นทุนต่อหน่วยลดลงถึงร้อยละ 35 ของหน่วยตรวจผู้ป่วยนอก ร้อยละ 75 ของคลินิกแพทย์ และ ร้อยละ 9 ของคลินิกทันตกรรม

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ลายมือชื่อนิติ.....



ปีการศึกษา

2551

ลายมือชื่ออ.ปรึกษาวิทยานิพนธ์หลัก.....



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SAMANTHI BANDARA: COST ANALYSIS OF "SAMADIGAMA" HEALTH CARE UNIT IN SRILANKA. THESIS ADVISOR: ASSOC. PROF. SOTHITORN MALLIKAMAS, Ph.D., 122 pp.

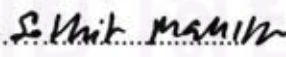
This study aims to analyze total cost and unit cost of Central Dispensary "Samadigama" in provider's perspective. CD "Samadigama" is an integration model of providing curative and preventive care services through one center at the primary level facility. This model is currently established in 2007 and implementing at southern part of Sri Lanka, namely Hambantota district, which is based on Classical Primary Care Concept in Taiwan. We use the step-down technique to calculate the unit cost of each patient service department. The data in year 2008 are collected using secondary sources and observation method.

We find that the unit costs are Rs.147.00 for OPD, Rs. 261.00 for medical clinic, Rs. 514.00 for antenatal clinic, Rs. 940.00 for well baby clinic, Rs. 561.00 for family planning clinic, Rs. 418.00 for dental clinic and Rs. 232.00 for ayurvedic clinic. The unit costs are relatively high due to lack of full-time staff and underutilization of services. Therefore, we suggest extending number of full-time staff and number of service hours the results show that the unit costs will be reduced by 35% of OPD, 75% of medical clinic and 9% of dental clinic as so on.

Field of Study: Health Economics

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Student's Signature.....

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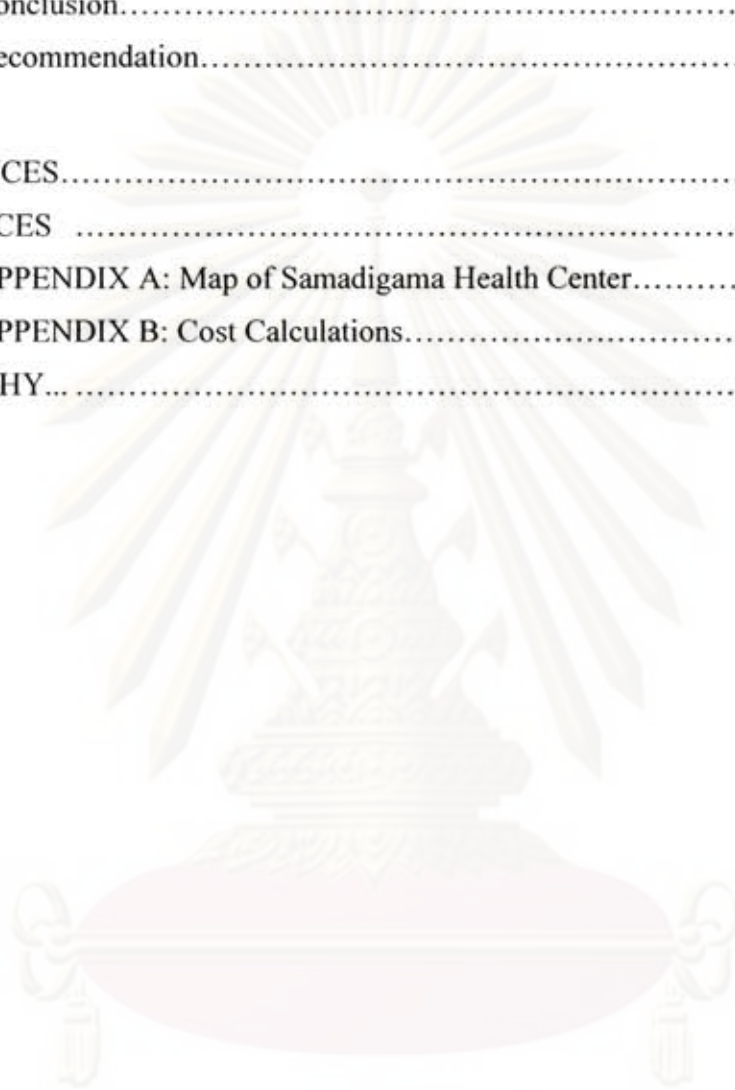
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LIST OF ABBREVIATIONS

ANC	Antenatal Clinic
BH	Base Hospital
CC	Capital Cost
CD	Central Dispensary
DH	District Hospital
ETU	Emergency Treatment Unit
FCC	Final Cost Centers
FP	Family Planning
ICC	Intermediate Cost Center
LC	Labour Cost
MC	Material Cost
MCH	Maternal & Child Health
MH	Maternity Home
MO	Medical Officer
MOH	Medical Officer for Health
MoH	Ministry Of Health
MOIC	Medical Officer for In-charge
OCC	Overhead Cost Centers
OPD	Out-Patient Department
PDHS	Provincial Director for Health Service
PHC	Primary Health Care
PHI	Public Health Inspector
PHM	Public Health Midwife
PHNS	Public Health Nursing Sister
PS	Patient Service
PU	Peripheral Unit
SL	Sri Lanka
WB	Well Baby

CHAPTER I

INTRODUCTION

This chapter will focus on rationale, research questions, research objectives and scope of the study. Finally, expected benefits of the study will be discussed.

The cost escalation of health sector has become a universal phenomenon in all over the countries. Hence, low and middle income countries especially are confronting many difficulties in improving and maintaining the health status of citizens and how to execute sustainable and efficient fund raising mechanism as well as allocate scarce resources among various health needs in an equitable manner. Though Sri Lanka has public-private mix health system, majority refers to public sector which is totally free at the point of delivery. The transitions in the epidemiology and demography, which have resulted the changes in mortality and morbidity pattern as well as a rapid increasing in aging population. Thus, it is required an urgent need of rational method of health care financing and delivery system though Sri Lanka has been obtained higher level of health status through widely spread health institutional system.

The Ministry of Health in Sri Lanka has been currently examining the evidence for rationalizing primary health care system following the policy documents of Health Master Plan (2007-2016) and the Hospital Re-Categorization Policy (2005). Thus, the Ministry of Health has been considered the new “Samadigama” health center (named as Central Dispensary Samadigama) as a pilot in order to develop a comprehensive primary health care model in the country. The Central Dispensary “Samadigama” is newly constructed in 2007 based on Classical Primary Care Concept in Taiwan, which is an integration model of providing curative and preventive care services through one center

at the primary level facility. The study of cost analysis of Samadigama health center makes an attempt to provide evidence with respect to the purpose of rationalizing PHC system.

1.1 Rationale

Sri Lanka has achieved exceptional health indices as a developing country. This is especially true of low infant and maternal mortality rates as well as high life expectancy rate, compared to countries with similar GDP and per-capita health expenditures. A part of this success lies in empowerment (by universal adult franchise in 1931), welfare policies such as free education, food subsidies, and establishment of a widespread network of free primary health services. Hence, health sector of Sri Lanka has brightened as “Good Health at Low Cost” in the world (Hsiao & Associates, 2001).

Nevertheless, the growing expectations of access to quality care, increasing demand and changing demand pattern for health care services are resulted due to the epidemiological and demographical transitions. Because, the transition caused to; increasing of aging population, changing of disease pattern from communicable diseases to non-communicable diseases, decreasing of fertility rate and child mortality etc. Moreover, improvement of technology as well as people’s tendency, stimulation of obtaining higher education status have influenced to grow up people’s knowledge with regard to the importance of healthy life and good health status as nations. Ultimately, these changes affect to raise the problem of cost escalation of health sector of Sri Lanka alike other developed and developing countries (Gottret & Sciber, 2006). Thus, increasing demand for health needs is faster than raising the financial resources. Then the government has to tradeoff between scarce resources and the policy goals which are equity, efficiency, quality and accountability of health services in the citizens. In this

context, the Sri Lanka's health sector is confronting many problems which can be defined as follows:

- Supplies of the public health services are inadequate to meet the needs due to growing demand for quality care and changing disease pattern since insufficient resources and inefficient resource allocation.
- de Silva & Attanayake (1992) shows that the study on Underutilization of facilities in Central Dispensaries and Peripheral Units in selected MOH areas of Gampaha District in Sri Lanka, which reports high average cost per outpatient visit. The correlation coefficient between utilization and cost per outpatient visit in this study is -0.76 . More specifically, an existing imbalance of the input structure of lower level health care institution caused to increase an imbalance between demand and supply of services. In other words, undersupply or non-supply of complementary inputs (e.g. hospital attendants, drugs and consumables) cause to wastage resources, reduce the quality of services and the level of utilization etc. Thus, most of the resources available in the Primary Health Care Units (PU, DH, CD, and CD & MH) are idle.
- According to Somanathan et al (2000) suggest that rural, peripheral and outpatient facilities (CDs, CD & MHs) have high unit costs due to lower utilization rate and in turn, complex institutions (Teaching Hospitals) also have high unit cost per outpatient visit due to on one hand, such complex units use more sophisticated equipments as well as senior, qualified staff and, on the other hand the levels of utilization are relatively high (over-crowded) (Somanathan, 1998).
- There is no formal referral procedure in SL and bypassing from lower level institution to tertiary care and private hospitals (de Silva et al. 2007; de Silva & Attanayake, 1992). Most of the higher level institutions are located in urban

areas. This phenomenon causes to arise the problems of inequity as well as high catastrophic expenses due to more cost of seeking care and impoverishment.

- Somanathan (1998) concludes that a redistribution of over-utilized patient load in complex facilities to underutilized lower level facilities would reduce the average cost of lower level facilities and improve efficiency.
- According to the above costing studies, all the studies may suggest a need of restructuring the existing lower level facilities in order to respond to the gap of demand and supply of health needs, to reduce average cost and to increase accessibility to service to remote, rural and disadvantage groups.

Considering the empirical evidences mentioned above, policy makers in the health sector have already taken actions in order to address the disparities of health services such as inequality of health services, cost escalation due to unnecessary or imbalance of demand/supply of health needs, inequity, and less quality of PHC services. In this context, the next challenge for the Ministry of Health is that how to provide services at the first contact level health facilities for the people in an equitable and sustainable manner. There are many evidences that are emphasizing the significant of restructuring primary health care system in the country.

- (i) Health Master Plan (HMP), 2007-2016 (JICA/MOH, 2007), which is the latest and most important policy guideline in Sri Lanka, which has emphasized the need of reorganizing primary care services as a strategic plan of health development. The above point is noted in the HMP document as “Rationalizing Primary Health Care Delivery Structure (No. 1.1.2 b)”. Therefore, this policy formulation requires more information with regard to the re-structuring of PHC system in the country.

- (ii) The Hospital Re -categorization document (2005) published by the Health Ministry, which has also proposed to reorganize the health institution in the country. In that document by sub heading of No. 4.1.4 defines the proposed primary health care system in details. The Ministry has proposed to expand the services of three kinds of existing outpatient facilities such as “Central Dispensaries”, “Maternity Homes” and “Central Dispensary & Maternity Homes”, and they are re-named as “**Primary Medical Care Unit**”.
- (iii) The Central Dispensary (CD) **Samadigama** is a primary health care institution that is newly constructed. The policy and planning-makers in the health ministry are examining CD Samadigama as an evidence for rationalizing primary health care in order to better address the demographic and epidemiological challengers of the health system due to some facilities of CD Samadigama could be similar to the proposed facilities of primary medical care unit at the Hospital Re-Categorization policy.
- (iv) The study of Health Care Facility Survey conducted in Sri Lanka in the year 1992, which found that the utilization of lower level health facilities is quite low and unit cost also very high due to low occupancy and turnover rates. Thus, to increase use of these lower level facilities and to formulate referral procedure need to be expanded of health facilities in the lower level institutions that are better than building the new health centers. Likewise, it is worth to do many studies to examine the alternative ways of expanding the existing primary health care facilities.
- (v) Hospital managers need information on costing of hospitals to allocate the limited resources in a more efficient manner (Tisayaticom et al, 2007).
- (vi) Lewis, Forgia & Sulvetta (2003) reveals that the better information on costing are very useful for improving health services, more effective use of public resources and better rationing of healthcare.

- (vii) Hospital costing & unit cost information could be useful at macro level in identifying the resource gap and projecting future cost of providing health services (de Silva, 2007).
- (viii) And costing information would be helped at micro level in conducting economic evaluation in order to find the alternative approach to financing particular component of health services and for identifying possible areas of cost curtailment (Creese & Parker, 1994; de Silva et al, 2007; Mogyony & Smith, 2005).
- (ix) A means of assessing the availability of data relating to health care costing would help to fill the gap of costing information (NCMH, 2002).
- (x) No one has done the costing study at the Samadigama health center and this is the first study doing cost analysis of CD Samadigama.

1.2 Research Question & Objectives

1.2.1 Research Question:

There two type of research questions as;

i. Primary Research Questions

What are the total costs and unit costs of final cost centers (patient service centers) at Central Dispensary Samadigama in year 2008?

ii. Secondary Research Questions

1. What are the total direct costs (MC, LC and CC) of each individual cost centers?
2. What are the total indirect costs of final cost centers?

3. What are the proportions of operating costs of total costs profile (LC and MC) incurred for the unit cost of each patient care centers?
4. What are the total outputs of each final cost centers?

1.2.2 Research Objectives

1.2.2.1 General Objective

To analyze the total costs (Full cost) and unit costs for patient service centers in the CD Samadigama in year 2008.

1.2.2.2 Specific Objectives

- To calculate the total direct and indirect costs of each overhead, intermediate and final cost centers.
- To calculate the total direct and indirect costs of final cost centers.
- To calculate the operating (LC and MC) cost of each final cost centers.
- To analyze the cost profile of Samadigama health center.

1.3 Scope of the Study

The scope of the study is to examine analysis of total costs and unit costs of each final/patient cost centers of Central Dispensary Samadigama in year 2008 in term of provider perspective. The study is focused on accounting costs as well as economic costs which incurred by both the government budget and foreign or local funds as donations.

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1.4 Expected Benefits of the Study

- Samadigama is the “model health center” constructed in the country. Hence, this study is an exploratory study conducting the cost accounting at the health center in order to explore in part of examining the evidence for rationalizing primary health care system in the country.
- Ministry of Finance is another beneficiary of this study. Because, the Ministry of Finance and Budgeting department has requested the Ministry of Health to carry out the costing analyses at the CD Samadigama in order to allocate the resources to construct such kind of health centers in the other parts of the country.
- The costing information of the study will help other sectors such as private health sector and funding agencies as well.
- Unit cost will help government/private hospital sector/third party (insurance company) to subsidy/set the price/charge for the services.
- The costing information will provide the assistance for the cost evaluation studies in order to assess the alternative programmes or interventions within the health center.
- To identify elements for cost curtailment.
- Unit costs can be used to measure efficiency, affordability and equitability of programmes or departments of health services.
- The output of the study will be a benchmark to this type of hospitals in future.
- Finally, to contribute to the Health Information System (HIS) database.

CHAPTER II

LITERATURE REVIEW

The literature review examines the different methodologies adopted by Sri Lanka and other countries in the matter of hospital costing studies. This chapter will devote particular attention to various types of costing analyses, method of analysis such as the step-down technique for instance, data collection tools like the scenario building technique and different forms of cost classification.

2.1 Costing Studies

de Silva, Samarage and Somanathan (2007) define the costing studies more broadly in their research study. They identify four types of major costing areas, namely;

- Costing of institutional settings – Individual wards, IP/OP care, Hospital/Institutions
- Costing of diseases and disabilities
- Costing of interventions
- Costing of services

2.2 Policy Implication of Costing Studies

Shepard, Hodgkin and Anthony (1998) have cited that findings of costing analysis help to measure performance of the hospitals. Hospitals are viewed as vital and necessary community resources that should be managed for the benefit of the community. Therefore, cost analysis help to department managers, hospital administrators and policy makers to determine whether the community needs (demand of services) fulfilled through their institutions or not. Moreover, cost analysis is a technique to allocate direct and

indirect cost to the cost centers or the department. Thus, pooling of disaggregated data supports to the financial accounting system to rearrange the existing financial information. And the cost analysis helps to future budget and financing, evaluating the operation and modification if necessary, set the price and charges. Finally, cost finding and analysis are also of value to management in ensuring that costs do not exceed available revenues and subsidies.

de Silva et al. (2007) show purposes of costing in three levels. One is macro level purposes such as policy and decision making, future budgeting, prioritization, identify the resource gap, forecasting for the future, evaluating alternative financial strategies. Second one is mezzanine level purposes. There are identifying optimal services provision, complementary/substitute cost to service user, equity and sustainable concern, and assessing service utilization. Third one is micro level purposes. This includes assessing efficiency of hospitals, prioritizing interventions, identified cost containments, cost evaluating studies etc.

Creese & Parker (1994) identified that the retrospective study helps to measure previous decisions in terms of affordability, efficiently and equitably. Moreover, the costing analysis makes future projections to build a new programmes or revised existing programmes. Adam, Evans & Murray (2003) suggest three application of unit cost information on (i) Budgeting and planning (ii) efficiency assessment of the hospitals and (iii) economic evaluation (cost-effectiveness, cost-utility and cost-benefit studies).

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2.3 Classification of Costs

2.3.1 Economic Cost and Accounting Cost

Cresse & Parker (1994) and de Silva et al. (2007) cite when doing costing study need to consider both economic (opportunity cost) and accounting cost in order to make more precise of the study. Accounting cost includes only what the hospital actually spend by themselves. But economic cost includes accounting cost as well as opportunity cost it means cost/value of next best opportunity that has foregone. In the hospital context, it involves donations from local or foreign organizations, volunteers. For example, hospitals might have equipments from foreign aids, thus use replacement cost to calculate cost of that kind of resources (de Silva et al., 2007). Creese & Parker (1994) introduce “shadow price” that can be used to infer for the donated goods. For volunteers, use current minimum wage or wage of similar workers can be adopted to economics cost calculation. However, economic cost analysis implies broad picture regarding the government capacity to generate contribution from society or other sources.

2.3.2 Costs by Input

This involves two categories. One is the goods that last longer than one year such as building, vehicle, equipments, furniture etc.. Second is the cost that usually incurred regularly. i.e. personnel, supplies: drugs, vaccines, and operation and maintenance: for vehicle insurance, fuel, repairing and for building: cleaning, water, electricity (Creese & Parker, 1994: de Silva et al., 2007). According to Tisayaticom, Tangcharoensathien & Patcharanarumol (2007) it can be divided into three main categories such as capital cost, labour cost and material cost.

2.3.3 Cost by Apportionment

Cost of the hospitals can be divided into “direct” and “indirect” cost. Direct cost means the cost involving a single cost center/department. Costs relating to multiple cost centers are known as indirect cost or overhead cost (de Silva et al., 2007; Mogyorosy & Smith, 2005; Creese & Parker, 1994; Shepard & Hodgkin, 1998).

2.3.4 Shared Cost

The same types of inputs are used for different types of activities or programmes. Creese & Parker (1994) define that these types of costs are as shared costs. Shepard & Hodgkin (1998) and de Silva et al. (2007) also explain that most of the times in hospitals have disaggregated data or on the other word, data are not attributed to specific department. Thus, they cite that the researchers have used different techniques to collect the disaggregated data.

2.4 Scenario Building Technique

Scenario technique can be used to collect the data on shared resources such as vehicles, building, multi-task personnel. This technique is used in Sri Lanka at first by de Silva et al. (2007) on the study of “Assessment of the prospect of paying wards in government hospitals as complementary financing for hospitals”. Moreover, Edirisinghe, (2002) and Kasturiratne (2003) used for cost analysis of District hospital and cost estimation for patient day for a medical ward respectively. The technique involves 4 steps.

- (i) Collation of all information and characteristics relating to issue/problem. i.e. Dimension of the hospital or department, building materials used
- (ii) Listing all assumptions employed. i.e. equal time allocation of staff in a child clinic. This is merely rule of thumb. For example, interview method can be used to find the time allocation of staff and equipments. As, the data are related to the past, the researcher can make proxies- variable that it is expected to be very closely related to the direct cost determination.
- (iii) Combining empirical information and assumptions to reach cost estimates
- (iv) Discussed the limitations

2.5 Cost Analysis

A unit of hospital cost analysis involves a number of steps. Shepard & Hodgkin (1998) has followed seven steps which based on the method of Hanson and Gilson, 1996. There are:

- I. Define the final product.
- II. Define cost centers.
- III. Identify the full cost for each input.
- IV. Assign inputs to cost centers.
- V. Allocate all costs to final cost centers.
- VI. Compute total and unit cost for each final cost center.
- VII. Report results.

In 2007, JICA –EBM costing study team has followed 4 steps in order to obtain step-down cost accounting exercise in one teaching hospital in Sri Lanka. The steps are:

- I. Establishment of Cost centers
- II. Establishment of data collection system
- III. Integration of collection data
- IV. Implement a step down cost accounting

2.5.1 Cost Center Identification

According to Shepard & Hodgkin (1998) and JICA –EBM costing study team (2007), cost centers can be divided into 3 categories. There are overhead cost centers, intermediate cost centers and final/patient cost centers. Shepard & Hodgkin (1998) cite if the cost analysis does not involve patient charges or revenue, it is appropriate to apply cost center identification mentioned in above. Anyway, when the study is considered regarding the hospital revenue, it is necessary to divide cost centers into revenue cost centers, non-revenue cost centers and patient service centers as well.

2.5.2 Defining Allocation Criteria

Appropriate allocation criteria need to be determined to allocate the costs of overhead and intermediate costs (indirect cost) centers (transient cost centers) to patient services centers (absorbing cost centers). Tisayaticom et al. (2007) shows that the allocation criteria based on what services are provided by overhead/intermediate cost centers to the patient centers. Nevertheless, Shepard & Hodgkin (1998) say allocation criteria based on knowledge and skill of hospital management and they will help to formulate allocation criteria at the research.

2.5.3 Full Cost Determination

Four basic techniques of cost allocation are commonly used to calculate the indirect cost of absorbing cost centers. The techniques can be divided into 4 types mainly.

i. Direct Allocation - Tisayaticom et al. (2007) have mentioned that direct allocation is direct cost of each NRPC & RPCC directly allocated to the patient services centers.

ii. Step-down Method

This method is very popular in unit cost analysis of hospital settings. The method has four explicit principles as follows:

1. Make the sequencing of cost centers based on consumptions of costs by other departments
2. Allocate cost from higher cost centers to lower cost centers
3. Don't allocate cost to upward
4. At the end of allocation process, highest cost center become zero

JICA –EBM costing study team (2007), Kasturiratne, (2003), Edirisinghe, (2002), Lanerolle (1996), Shepard & Hodgkin (1998) and Tisayaticom et al. (2007) are some examples for researchers who adopted the step-down method in their studies.

iii. Double Distribution Method

At first, each transient cost center distributes its cost to all other cost centers. Then, the cost of each center distributes to others as in the step-down method.

iv. Simultaneous Equation

This method is based on the reciprocal allocation of the cost completely and can be represented by a series of algebraic equation that recognizes all the services that are provided for other centers.

Finally, it can be calculate full cost of absorbing cost centers as sum of direct costs and indirect costs (costs allocated from transient cost centers).

Full cost of absorbing cost centers = Total direct cost + Total indirect cost

2.5.4 Unit Cost

Unit cost can be calculated by full cost divided by number of patient visits in that particular department.



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CHAPTER III

HEALTH SYSTEM IN SRI LANKA

This chapter will devote precise explanation on national health system in Sri Lanka with brief introduction of geographical, economic, political and social background and finally broad explanation of Samadigama health centre.

3.1 Country Profile: Sri Lanka

Sri Lanka is a small island in the Indian Ocean with a land area of approximately 62,705 square kilometers. Topographically, the island consists of a south central mountainous region which rises to an elevation of 2,502 meters and is surrounded by broad lowland plains at an elevation of 0-75 meters above sea level. Sri Lanka is a low-income country with a per capita income of around US\$ 930. The country was late in adopting economic development strategies such as market liberalization and export orientation. The economic growth rate is 6% -7%, aided by the increase of exports, but both budget deficits and external debts have been worsening. The population of SL for the year 2005 was estimated to be 19.6 million. The average annual growth rate is recorded as 1.1 for the island. Little over half of the population is concentrated in the Western, Central and Southern provinces. These three provinces together make 23.2% of the total land area of the country. During 2003, Sri Lanka had approximately 307 persons per square kilometer (population density). The district of Colombo (capital city) has the highest density of 3,410 persons per square kilometer. One of the most clearly visible features in Sri Lanka's population age composition is that the older age groups (60 +) has increased. The median age which remained around 21.3 years until 1981, has increased to 25.6 by 1994 (DHS 1999). It could also be observed that the proportion under 30 years of age decreased from 37.4% in 1994 to 32.9% in 2001. Sri Lanka has passed through the

classical phases of demographic transition to reach the third phase of a declining birth rate (28.4 in 1980 to 18.9 in 2003 per 1000 population) and a relatively stable low death rate (5.9 per 10,000 population since 2001).

Sri Lanka has a parliamentary democratic system of government in which, sovereignty of the people and legislative powers are vested in parliament. The executive authority is exercised by a Cabinet of Ministers, presided by an Executive President. The President and Members of the Parliament are elected directly by the people. For the purposes of administration, Sri Lanka is divided into 9 provinces, 25 Districts, and 321 Divisional Secretary areas. The Provincial administration is vested in the Provincial Councils, composed of elected representatives of the people.

3.2 National Health Policies

The vision of public health sector in Sri Lanka is *to foster a healthier nation that contributes to its economic, social, mental and spiritual well-being. And “To achieve the highest attainable health status by responding to people’s needs, working in partnership, to ensure access to comprehensive high quality, equitable, cost effective and sustainable health services”*, is the mission of the health sector. Following the mission and vision, the government has formulated and developed the health policy by three steps over the years. At first, in 1992, the Presidential Task Force was a draft policy document. A result of review of this policy in 1997 published a new policy document which was a second step. Nevertheless, it is limited only a document. The third attempt was the Health Master Plan, which was published in 2007 addressing challenges to an innovative progress of the health system improvement in Sri Lanka as well as over-viewing the transitional situation in terms of health service needs and financial sustainability on the medium- and long-term perspectives. The main goals of the government health policy can be summarized

into following eight broad areas: (Revitalization Primary Health Care, Regional Conference, 2008)

- i. Reform the organizational structure and management to improve efficiency, effectiveness and accountability;
- ii. Establish mechanisms to provide need-based care, set priorities and allocate resources equitably;
- iii. Focus on vulnerable groups and community needs that required special attention; the elderly, disabled and mental health;
- iv. Improve patient care provision and quality by reorganizing the health care delivery system especially at district and provincial levels;
- v. Rationalize human resource development;
- vi. Increase life expectancy by reducing preventable deaths from both communicable and non-communicable diseases;
- vii. Improve “Quality of Life” through healthy lifestyles and by reduction of preventable diseases and disabilities; and
- viii. Facilitate health promotion through IEC activities and through media.

Following socialist welfare package introduced in the 1940s, a massive expansion of health and education services was realized throughout the country in the 1950s and 1960s.

3.3 Health Expenditure

Sri Lanka has the public-private mix health system. The government is responsible for public health sector as the main provider, the organizer of financing services as well as the regulator. In terms of health expenditure pattern of Sri Lanka is that total health expenditure (THE) as a percentage of GDP was 4.1% in 2004. In 2001, it was 3.7% as a percentage of GDP. Obviously, THE seems that it is increasing over the

last years. In terms of finance by source, in 2003 total public sources of financing accounted for Rs.28.4 billion which is 41 per cent of total amount of financing while the private sources financed Rs.41 billion which is equivalent to 59 per cent. In 2004, public funds accounted for Rs.39 billion equivalent to 45 per cent of total financing and private sources accounted for Rs.47 billion equivalent to 55 per cent of total financing. These figures show that private sector contribution is quite increased comparing with the public financing. Moreover, out-of-pocket (OOP) is also the most important source of financing. Table 3.1 shows the trend of financing in health sector.

Table 3.1 Health Financing by Sources -1998, 2001 & 2004

Expenditure item	1998	2001	2004
Total Health Expenditure (% GDP)	3.5	3.7	4.1
Total Health Expenditure on Health (Rupees Million)	35,476	50,489	86,441
Total Health Expenditure per capita (US \$)	28	31	44
General Government Health Expenditure (%THE)	49.6	46.6	45.0
General Government Health Expenditure (%GGE)	6.6	6.1	7.0
General Government Health Expenditure (Rupees Million)	17,607	23,623	39,700
Social Security Expenditure (% GGHS)	0.2	0.4	0.3
Private Expenditure on Health (% THE)	50.4	53.4	55.0
Private Expenditure on Health (Rupees Million)	17,860	26,982	47,000
Net Out-of-pocket spending (% PvtHE)	89.5	87.1	88.9
Net Out-of-pocket spending (Rupees Million)	15,981	23,501	35,656
Private Pre Paid Plans (% PvtHE)	2.0	3.4	3.2
Private Pre Paid Plans (Rupees Million)	385	921	1302
External Funded Expenditure (% THE)	2.8	3.1	n/a
External Funded Expenditure (Rupees Million)	982	1576	n/a

Source: National Health Accounts, 2003-2004, Sri Lanka

3.4. Organization of Health Facilities

Sri Lanka health sector has been a successful model of “good health at low cost” in the 20th century among the developed and developing countries. Health care delivery in SL is organized through public and private sectors. Health care consists the allopathic (Western) system which covers more than 85% of total health requirement, and traditional system namely Ayurvedic, Unani Siddha and Homeopathy. Consumers are free to choose services from both public and private sectors.

The public sector provides entire range of preventive, curative and rehabilitative health care, free at the point of delivery. The public sector curative services are provided through a wide network of health care institutions from central dispensaries and to teaching hospitals. It is achieving 95% of the demand for inpatient care and 50% of the demand for outpatient services. The private sector provides mainly curative care which is approximately close to 50% of the demand for outpatient care and most of the health centers are located in urban and sub-urban areas.

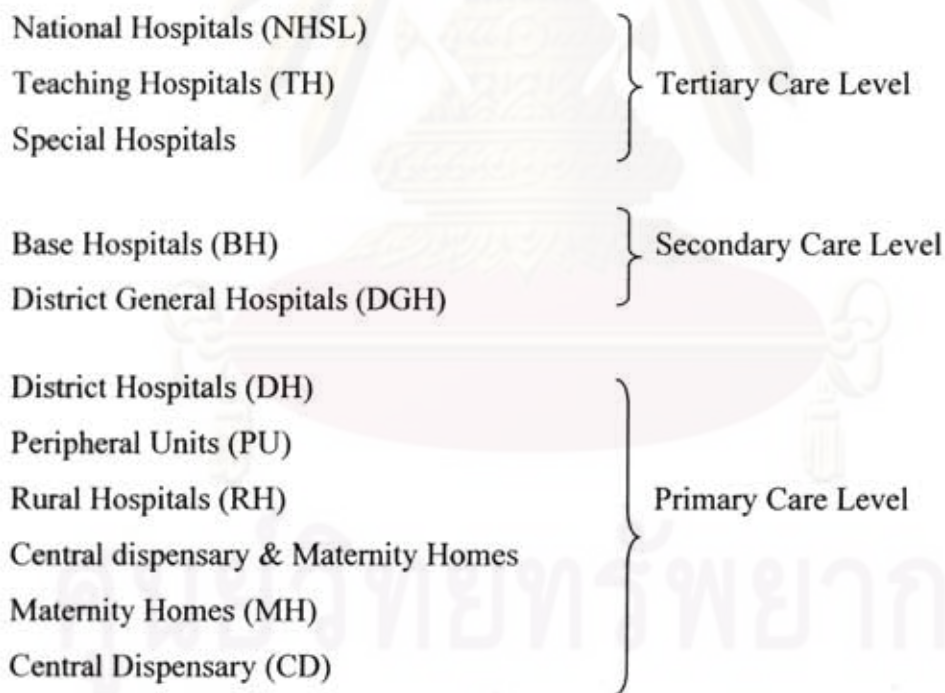
The preventive health care services are provided by the provincial councils according to the policy guidelines of the Epidemiology Unit, Family Health Bureau and Special Disease Control Programmes/Campaigns. However, health outcomes are quite high though financing on health services are relatively low. The basic health indicators summarize in the table 3.2.

Table 3.2 Basic Health Indicators - 1995, 2000 & 2003

Year	Infant mortality rate ('000)	Life expectancy at birth Female	Life expectancy at birth Male	Maternal mortality rate (per 10,000 live birth)	Total fertility rate	Population growth rate (%)	Population (million)	GDP per capita (US \$)
1995	16.5	75	68	2.4	1.9	1.1	18.3	704
2000	13.3	76	70	2	1.9	1.4	19.3	844
2003	11.2	77	71	1.4	1.8	1.3	19.2	962

Source: Annual Health Bulletin, 2005 Sri Lanka

The range of hospitals includes sophisticated teaching hospitals to maternity homes and central dispensaries. This system can be shown by a graph as follows.

Figure 3.1 Present Hierarchies of Hospitals

The above system includes three levels of categories such as tertiary care, secondary care and primary care as well. NHSL, TH and Special Hospitals include the tertiary care level hospitals. Secondary care includes BH and DGH. Then, DH, rural

hospitals and peripheral units and CD & MH and CD are included to primary care level services. But in 2007, the hospital re-categorization paper is divided the above three levels into four levels. Thus, the hospitals will be re-categorized under the following groups;

- (i) Teaching Hospitals/Provincial Hospitals.
- (ii) District General/District Base Hospitals - All existing General and Base hospitals will be renamed as District General Hospitals or District Base Hospitals. Each district will have one District General Hospital and one to two District Base Hospitals.
- (iii) Divisional Hospitals – All District Hospitals, Rural Hospitals and Peripheral Units will be renamed as Divisional Hospitals.
- (iv) Primary Medical Care Units – Central Dispensaries & Maternity Homes will be renamed as Primary Medical Care Units.

The hospital system re-categorized in the above will be upgraded over the next five years based on criteria as in below (Hospital Re-Categorizing Paper, 2005, MoH).

- Number of Hospital beds
- OPD attendance/admission
- Bed occupancy rate/turnover rates
- Number of transfers
- Distance to the nearest tertiary care hospital
- Access to hospital - i.e. Availability of public transport facilities, geographical location
- Availability of monetary and human/physical resources and etc.

3.5 Primary Health Care System

Following the “Health for All” resolution adopted by WHO Member States in 1977, and the “Alma Ata Conference in 1978”, a feature of health development in Sri Lanka has been the priority given for strengthening the health system established in 1926, within the framework of Primary Health Care approach. One such model was the Health Unit program of the International Health Board (IHB) of the Rockefeller Foundation, which helped to create a primary health care system in Sri Lanka. This program established a community-based public health network across the country, which became the basis of the national health policies during the last sixty years. At the present, there are two types of primary care level facilities. One is only for outpatients such as “Central Dispensaries”, “Maternity Homes”, and “Central Dispensary & Maternity Homes”. And the next with bed capacity is Peripheral Units, District Hospitals and Rural Hospitals.

Primary Health Care (PHC) is the important and preliminary approach to health development. It is a broad and comprehensive concept that places national health development into the overall social and economic development as embraced in its definition: PHC is an *“essential health care based on practical, scientifically sound and socially acceptable methods and technology made universally accessible to individuals and families in the community through their full participation and at a cost that the community and country can afford to maintain at every stage of their development in the spirit of self reliance and self determination. It forms an integral part of both the country’s health system, of which it is the central function and main focus, and of the overall social and economic development of the community. It is the first level of contact of individuals, the family and community with the national health system bringing health care as close as possible to where people live and work and constitutes the first element of a continuing health care process”*. (Frequently asked questions on primary health care to mark 30th anniversary of the Alma Ata Declaration, 2008, p.3)

3.5.1 Issues and Policies of the Primary Care Level Facilities

The Declaration of Alma-Ata in 1978 formally adopted primary health care (PHC) as the means for providing comprehensive, universal, equitable health care services for all countries. Thus, community based health programmes have been developed in a number of developing countries as early as the beginning of 20th century focusing on the goal of “Health for All by the year 2000”. Because most of the countries understood that first contact of health needs of people should be more rational in order to obtain national health development. The report of the “Revitalizing Primary Health Care, Country Experience: Sri Lanka” mentioned that the country’s health indicators show a steady improvement over recent decades. Hall & Taylor have cited in their article in 2003 as “by 2002, many people in resource poor settings still do not have equitable access to even basic services”. de Silva & Attanayake (1992) also shows that resource constraints such as lack of drugs, lack of staff in Central Dispensaries in selected MOH areas of the Gampaha district is linked with under-utilization of health care facilities in peripheral units in the country. This makes an economic sense that under-utilization of facilities creates high average cost per outpatient visit. On the other hand, the authors conclude that while under utilization and wastage of resources are the common features of lower level institutions. On the other hand, over-crowding or over-utilization causes to decline the quality of services, which have become concomitant feature of the higher health care level institutions.

Somanathan (1998) cites that costs of lower level facilities are very sensitive to the levels of utilizations. And, the author concludes that a redistribution of patient load from overcrowded complex hospitals to underutilized basic care facilities that would reduce the cost of lower level facilities and improve efficiency. de Silva et al (2007) and de Silva & Attanayake (1992) reveal that there is no formal referral system in the country. Therefore, people in community level are bypassing the lower level facilities to

tertiary care level facilities. Thus, Somanathan (1998) and Somanathan et al (2000) show that cost per outpatient visit is quite high in complex hospitals due to use of very sophisticated equipments and manpower (MO instead RMO and trained nurses). Hence, this by-pass phenomenon make unnecessary burden on tertiary facilities as well as secondary care level hospitals. De Silva & Attanayake (1992) and de Silva et al (2007) conclude the findings as the need of restructured lower level institutions rather than continue to supply services in PHC units and it is needed to maintain lower level facilities in order to ensure access to services to remote, rural population in terms of equity and quality perspectives. Moreover, Somanathan (1998) emphasized that it is better to expand existing facilities rather than building new ones.

In the recent past, there are number of policy initiatives have taken place in the country. The Commission on Macroeconomics and Health, work related to the Millennium Development Goals, Annual Health Summit and finally Social Determinants of Health are few of such initiatives. As a result of a tremendous effort, the latest policy document which is Health Master Plan that was launched in 2007. Ensuring equity in health care through easy access to quality and modern health care with emphasis on the lower income groups and the more vulnerable in the society as well as achieving an efficiency and sustainable welfare system in the country are the main factors focusing in the Medium-term 2007-2016. The policy document is identified five strategies and its inter-relationship as follows:

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Figure 3.2 Five Strategies & its Interrelationship



Source: Revitalizing Primary Health Care:Country Experience –Sri Lanka, 2008

Following the first strategy of “to improve comprehensive health services delivery and health actions”, the summary of HMP is recommended to implement the rationalized primary health care delivery structure in very recently. Moreover, the Hospital Re-categorizing Paper was published in 2005 with a view to facilitate planned/organized hospital development mechanism. The hospitals will be categorized under the following groups.

1. Teaching Hospitals/ Provincial Hospitals
2. District General/ District Base Hospitals
3. Divisional Hospitals
4. Primary Medical Care Units

Considering Primary Medical Care units, this category will be upgraded with expanding the services in the existing CDs, MHs and CD & MHs. Proposed services are:

- Outpatient care
- Limited emergency care: facilities for stabilization of patients before referring to secondary or tertiary care medical institutions.
- Facilities for a poly-clinic including Ante-Natal & Post-Natal, Family Planning, Child Health, Well Women etc..

3.5.2 Samadigama Health Center

(i) Background

Dharma Drum Mountain Social Welfare and Charity Foundation (DDM) from Taiwan has been supporting the health sector following Tsunami disaster in 2004. It has built a new village with 300 houses called “Samadigama Village” with a Health Center benefiting the Tsunami affected community. This is a primary health care institution called as Central Dispensary Samadigama. Newer model village is construed in Hambantota district which is situated in the southern province in the country. The closest hospital with bed capacity is Peripheral Unit Ambalantota which is a secondary care institution and located 10 Km away from CD Samadigama. And the people living this area are of poor socio-economic standards. Their income is based on mainly agriculture, fisheries and salt industry. Appendix A shows the geographical map of Samadigama.

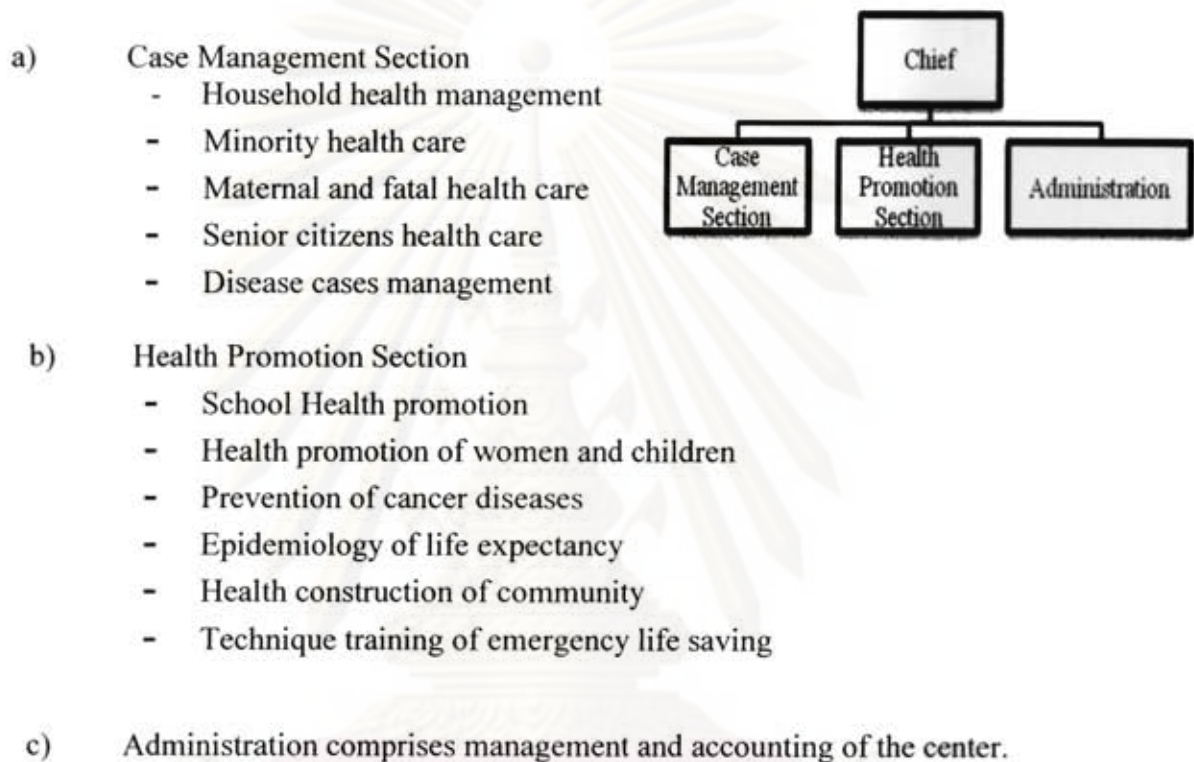
(ii) Service Structure

The dispensary started its operation in July 2007. The Ministry of Health bears the operational costs of the dispensary since its inception. The model is based on the classical primary health care concept of Taiwan. Its structure and functions need to be observed, which is important when improvements to primary health care are envisaged in Sri Lanka. Classical Taiwan Healthcare Centre at primary level has a vision that includes the following elements (Field Mission Report: MDPU, 2008).

- Health Promotion
- Public Hygiene
- Primary Health Care
- Education
- Community Networking

- Intersectoral Collaboration
- International Cooperation

Healthcare Centers in Taiwan were initiated at the district level and are now available in every village and city. A healthcare centre is structured as follows.



In the Samadigama health center itself, the integrated health promotion and case management are delivered under the one roof. The concept also fosters reaching out to the community. Table 3.3 shows the service schedule currently provided at the CD Samadigama.

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Table 3.3 Time Schedule of Services providing CD Samadigama

Name of the Service	Time Schedule
OPD	Tuesday and Thursday
Medical Clinic	Thursday
Ayurvedic Clinic	Monday
Dental Clinic	Tuesday and Thursday
ANC	Every Wednesday in the first and last week of the month
Well Baby Clinic	
Family Planning Clinic	

Source: Data collection for the study.

In addition to above, PHI and PHMs are conducting health education programmes with taking advice from MO of the dispensary. For examples:

- Early Childhood Care for Development (ECCD) – Once/two months
- Brest Feeding Management - Once/ three months
- Complementary Food Feeding Programme – once/month
- Family Planning Awareness Programme and so on.

Currently the intended services mentioned in the above are not totally provided at the CD Samadigama. For example, the Emergency Treatment Unit is not functioning; OPD, Medical clinics, Dental clinics are opened limited days only due to lake of the staff.

(iii) Comparison of CD Samadigama with Proposed Primary Medical Care Unit by Ministry of Health

As mentioned in Chapter I, the Ministry of Healthcare was proposed to re-categorize the medical institutions in Sri Lanka by next five years according to the Hospital Re-Categorized Policy and Health Master Plan. The primary level institutions will be renamed as divisional hospitals and primary medical care units. The category of divisional hospitals includes district hospital, peripheral and rural hospitals. All the CDs and CD & MHs are to be renamed as primary medical care units. According to the re-categorization guideline, the primary medical care units will have the following functions area.

- Outpatient care
- Limited emergency care: ETU – facilities for stabilization of patients before referring to the secondary or tertiary care medical institutions
- Poly-Clinic facilities: Ante-Natal & Post-Natal, Family planning, Child health, well women etc.

In addition to above, CD Samadigama has the facilities as Dental Clinic, Ayurvedic Clinic, PHM & PHI Offices, Conference room. Likewise, the structure and functions of the existing CD and CD & MHs need to be considered.

A number of 472 central dispensaries and maternity homes are available in the country. Considering in the service provided at the existing institutions, CDs are providing curative care services such as symptomatic treatments only. Maternity Homes are delivered only antenatal clinics and well baby clinics. And CD & MHs are providing both services of CD and MH through one unit. All the services provided at these institutions are on the full- time. In comparison to the existing dispensaries, CD Samadigama has been structured in an attempt to provide preventive and curative health

services through one center This concept is similar to the proposed Primary Medical Care Unit by the Ministry of Health.

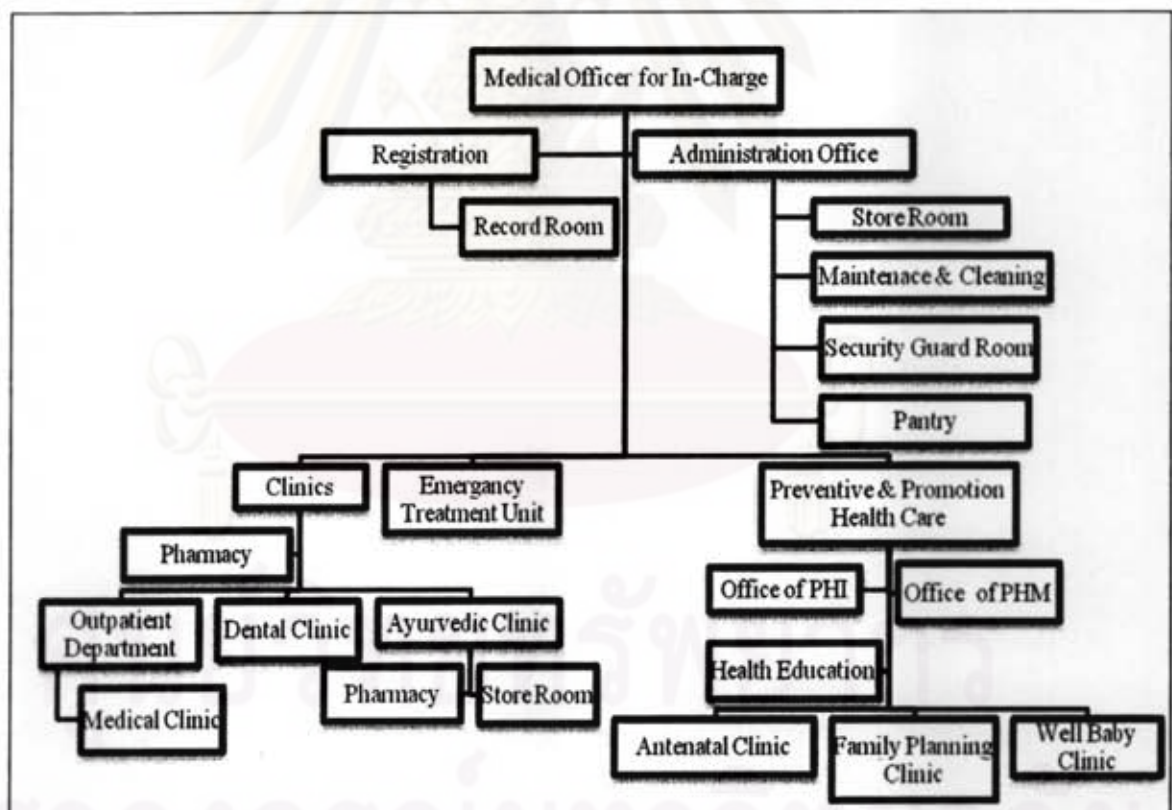
(iv) Staff Structure

In terms of human resources, the Registered Medical Office/s works in the existing CDs as an In-Charge of the dispensary. The RMOs were recruited into only the CDs that comes as a result of the government policy that is due to lack of Medical Doctors in the hospitals, the students who passed the Advance Level Exam were given a medical training and they are recruited to the primary care facilities as RMOs. But the Medical Doctors who are graduated from the medical schools. The salaries of them are not the same. MOs are paid higher salary than RMOs. The staffs of RMO, dispenser, one hospital attendant, one ordinary labour, one sanitary labour and one security guard are the cadre for CDs approved by the ministry. In addition above, CDs & MHs have one/two midwives as well. The proposed cadre for CD Samadigama is as follows:

- 1 Medical Officers (full- time)
- 1 Dental Surgeon & 1 Hospital Attendant for Dental Clinic(twice/week)
- 1 Ayurvedic Doctor , 1 Dispenser & 1 Ordinary Labour for Ayurvedic Clinic (once/week)
- 1 Public Health Nursing Officers (twice/month)1 Dispenser (full-time)
- 1 Area Public Health Inspector (Full-Time)
- 1 Area Public Health Midwife (Full-Time)
- 2 PHMs (twice/month)
- 1 Driver (for the ETU)
- 2 Ordinary Labours
- 1 Sanitary Labour and 1 Security Guard

PHI, PHNS and PHMs involve with preventive services and health promotion activities under MOIC at the CD Samadigama and MOH Ambalantota. Nevertheless, the existing staff structure of CD Samadigama is not sufficient to provide the proposed services. Two thirds of the staffs work as part-time. They are 1 MO (MOIC), 1 dental surgeon, 1 ayurvedic doctor, 3 PHMs, 1 dispenser and 1 ordinary labour for ayurvedic department, 1 ordinary labour for dental clinic. Others are PHI, PHM and watcher. They work as on the full-time basis. In addition, these are 5 volunteers/community supporting officers facilitating to the service provision of CD Samadigama. The operational structure of the new health center can be illustrated by figure 3.4.

Figure 3.3 Organization Chart – Samadigama Health Center



Source: Data collection for the study

At last it is needed to be summarized the whole system of CD Samadigama. The comparison of CD Samadigama with the existing PHC units seems the variation in terms of the services and the staff. As PHC units are situated at the village level, geographical statuses of those areas are not much varied. On the other hand, the vision of CD Samadigama and the proposed Primary Medical Care Unit are to deliver the integrated services of preventive and curative care under one roof. This research report makes an attempt to provide costing analysis with regard to the structure and the functions of CD Samadigama.



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CHAPTER IV

METHODOLOGY

In keeping with the objective of the study, the methodology adopted by the study will be expressed in this chapter. Thus, following areas will be explained; (a) research design, (b) conceptual framework, (c) study population and sample, (d) methods of data collection and (e) cost analysis. In terms of cost analysis which is adopted five steps as shown in the conceptual framework is based on the step-down technique. In addition, scenario building technique was used as a data collecting tool with regard to the shared inputs.

4.1 Research Design

The research study is a descriptive study focusing on provider perspective. Primary and secondary data from January 2008 to December 2008 were collected retrospectively to analyze the total cost and unit cost of patient services at the CD Samadigama. The costing analysis was conducted through two modules. One was to analyze the total cost and unit cost of the existing system at the CD. The second module was the intended system which was analyzed the costs as same in the above model. The statistical records from CD Samadigama and other related offices as well as In-Depth interview with health personnel at the CD were used. An official permission to conduct the study at the CD Samadigama was granted by the Ministry of Health.

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4.2 Conceptual Framework

The conceptual framework was drawn based on the cost analysis method adopted by the study (see page 36; Figure 4.1). It was followed 5 steps (Shepard, Hodgkin & Anthony, 1998; Hanson and Gilson, 1996). At **first**, cost centers need to be identified. In the case of administrative perspective, the cost centers were distinguished based on the nature of their work – overhead centers, intermediate (ancillary) and patient (final) cost centers (table 4.2). Within each of the latter groups, 15 cost centers were defined (figure 4.1).

The **Second** is to assign inputs to the cost centers (direct cost determination). With regard to the method of direct cost determination need to be considered. The data at the small health centers especially, was problematic. Their expenditures were attributed to specific cost centers or department. Most of the resources were shared and disaggregated. In this case, many studies have applied different techniques to make approximations for costs of shared inputs which were quite subjective (Mills, 1991; Creese & Parker, 1994). This study was adopted **Scenario Building Technique** to collect the disaggregated data of each cost center. The second step followed 2 steps. Collecting costs of inputs, which included only particular departments themselves (direct cost) was the first step. Next was a way of giving/allocating costs of shared resources (or line costs) based on scenario technique, to a particular place or event that where there was no data. The scenario technique followed 3 steps in order to collect the shared/indirect cost of inputs such as labour, material and capital resources. The steps were (a) list the empirical information, (b) list the assumption employed and (c) costing exercise.

The **third** step was the allocation criteria determination. Appropriate allocation criteria needed to be determined in order to step down costs from overhead cost centers and intermediate cost centers (Transient cost centers) to patient service centers

(Absorbing cost centers). The Step-Down method was adopted to allocate the indirect costs that could not be allocated directly to the final cost centers at an earlier stage. Due to interdependence of different inputs into services in a hospital setting, the step-down costing method was ideal to breakdown the costs. Then full cost determination that the sum of direct and indirect cost was the **fourth** step. **Finally** unit costs were computed as total cost divided by number of patient visits.

4.3 Study population and Sample

According to the cost centers' nature of work, the study population and sample were classified as follows. The cost centers were lined according to the prioritization of each center.

1. Office of the Administrative & Registration
2. Maintenance and Cleaning
3. General Store Room
4. Health Education
5. Office of the PHI
6. Office of the PHM
7. Pharmacy
8. Sterilizer Room
9. Outpatient Department
10. Medical Clinic
11. Dental Clinics
12. Antenatal Clinic
13. Well Baby Clinic
14. Family Planning Clinic
15. Ayurvedic Clinic

4.4 Data collection

Data collection could be divided in to two parts as sources of data collection and methods of data collection.

4.4.1 Source of data collection

The data were collected using two types of sources.

1. Primary Source

Primary data could be defined as the data which are collected especially for the thesis/project. The methods of in-depth interview and self-observation were conducted to collect the data of time allocation of each health personnel, time used of equipments and materials etc.(Shepard & Hodgkin, 1998: Creese & Parker, 1994). Most of the hospitals in developing countries may not be reported costs by individual departments, or that information may be very incomplete or arbitrary. Thus, the headings mentioned in the below were used as a guideline for in-depth interview in order to obtain complementary information from each department.

- What are the main activities involved in the staff's duty lists?
- How many hours the staff is working in one department per week?
- What is the mid-point salary of the staff?
- What are the allowances taken by each person except basic salary?
- How many hours that medical equipments, electric appliances etc. are used?

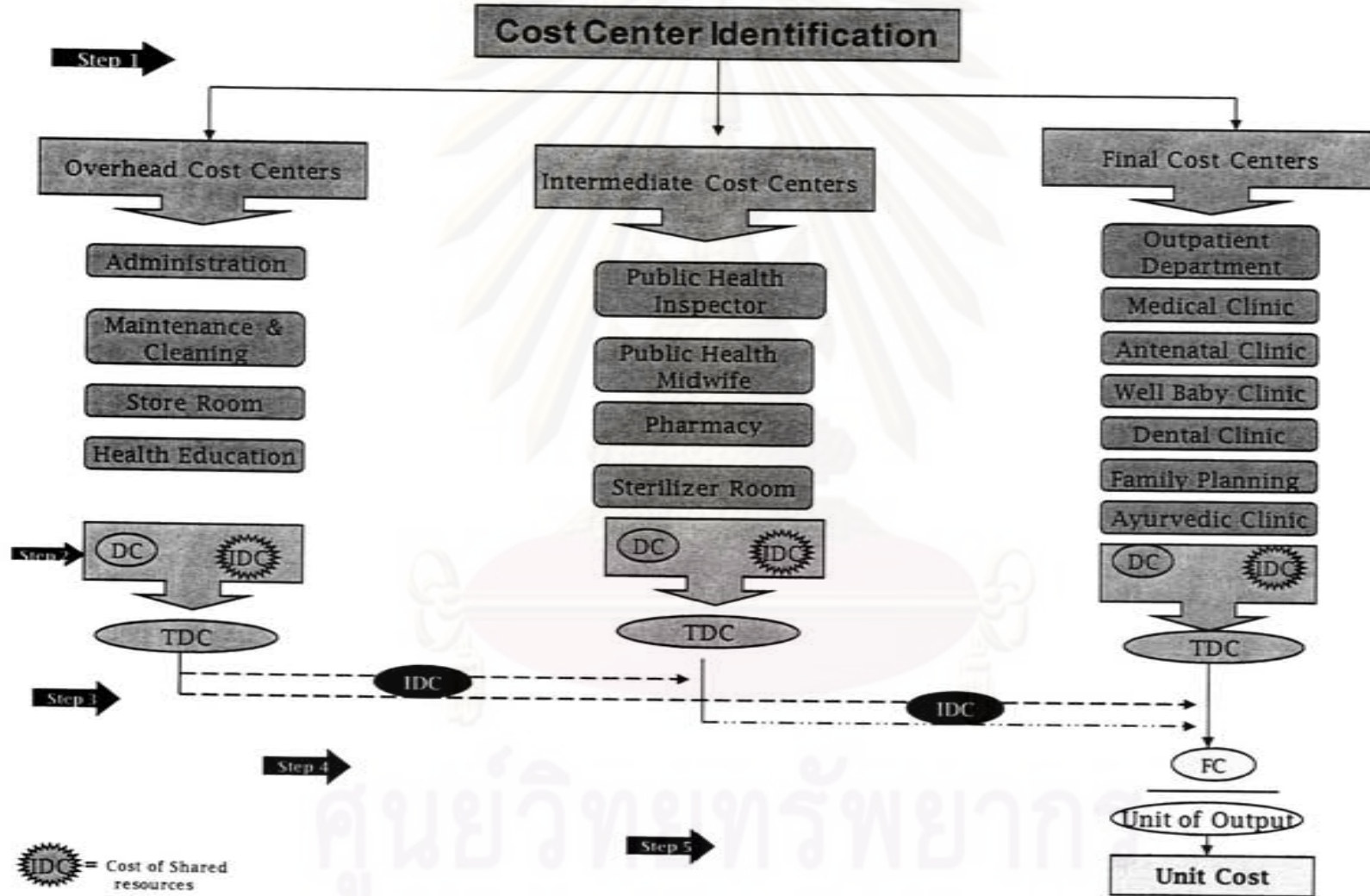
2. Secondary Source

Secondary source involves the data that were collected for some purpose other than the research situation. For example, Patient's records, statistical records, inventory books, attendant sheets and other administrative documents that were used as secondary data sources at the research.



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Figure 4.1: Conceptual Framework



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4.4.2 Methods of data collection

Methods of data collection could be summarized as in the table 4.1.

Table 4.1 Methods of Data Collection

Objective	Variable	Unit of output /Scale	Type of Data	Data Source
Costs of each cost center -Overhead	1. Labour cost <ul style="list-style-type: none"># of staffSalary & fringe benefits	Midpoint salary, Rupees/Month	Primary & secondary data	- In-depth interview & observation method -Personal records (Diary) - Record form
-Intermediate -Patient care	2. Material cost <ul style="list-style-type: none">Medical materialsNon-medical materialsOperational & maintenance	Rupees/Month	Primary & Secondary data	-In-depth interview & observation method - Records from Medical Supply Division, Bio-Medical Department -Monthly Bills -Inventory lists
	3. Capital cost <ul style="list-style-type: none">EquipmentsBuildingLand	Rupees/Month, year	Primary & Secondary data	- Floor plan of the building - Inventory lists - MoH records
Unit of service	Final/patient service centers	Number of Patient visit/month	Secondary data	- Record form

4.5 Cost Analysis

Data analysis of this study was conducted through five steps which were followed the step-down method.

4.5.1 Cost center identification and grouping

A cost center can be defined as “a production or service location, function, activity or item of equipment for which costs are accumulated” (Costing for Hospital Management, EBM study, 2007, p.2-13). The cost centers can be distinguished according to the nature of their work. It provided a road map for allocating resources and a framework to clear explicit functions of each center. In the context of Sri Lanka, all the services are free of charge at the point of delivery. Therefore revenue of cost centers was not included.

Cost centers were divided into 3 groups such as overhead, intermediate and final cost center (Shepard, Hodgkin & Anthony, 1998). Defining and grouping of cost centers was as follows (Table 4.2).

(i). Overhead Cost Centers (OCC)

Overhead cost center provides tremendous support to the overall functions of the health center. Its costs are shared among the patient-related cost centers. The departments, General administration, Maintenance and Cleaning, Store Room and Health Education were distinguished under this category. These cost centers also could be identified as transient cost centers.

(ii). Intermediate Cost Center (ICC)

This provides ancillary services to the final/patient cost centers. It includes pharmacy, office of PHI and PHM as well as sterilizer room as well. Intermediate cost centers could be known as transient cost centers.

(iii). Final Cost Center (FCC)

This provides final services directly to the patients. It involves curative and preventive services such as OPD, MCH clinic, Family planning, Dental clinic, Ayurvedic Clinic and Emergency Treatment Unit (still not functioning). Also, this cost center category could be known as absorbing cost center.

Table 4.2 Cost center Categorization

Category	Code	Name of the cost center
Overhead Cost Center (OCC)	A 01	Gen. Admin. & Registration
	A 02	Maintenance & Cleaning
	A 03	General Store Room
	A 04	Health Education
Intermediate Cost Center (ICC)	B 01	PHI Unit
	B 02	PHM Unit
	B 03	Pharmacy
	B 04	Sterilizer Room
Final Cost Center (FCC)	C 01	Outpatient Department
	C 02	Medical Clinic
	C 03	Dental Clinic
	C 04	Antenatal Clinic (ANC)
	C 05	Well Baby Clinic (WB)
	C 06	Family Planning Clinic (FP)
	C 07	Ayurvedic Clinic

4.5.2 Assign inputs to the cost centers (Direct Cost Determination)

The costs that belong to one cost center could be defined as the direct cost. As most of the inputs of the dispensary were shared or jointed or they are multi task components, this step was followed two tasks. One was to compile the direct costs that involve only certain cost centers. Secondly, shared costs, which were incurred for utilities (i.e. water and electricity etc) and multi-task personnel etc. that were not maintained by a certain ward/department or intervention, needed to be allocated and apportioned to the cost centers according to the “scenario building technique”. The scenario building technique actually could be used as a data collecting method of disaggregation data that was applied the research study on “Assessment of the prospects of paying wards...” by the authors, de Silva et al (1997) in Sri Lanka. Moreover, WHO report published in 1994 named “*Cost Analysis in primary health care; A training manual for programme managers*” done by Creese Andrew and David Parker, they has explained how to calculate “shared resources” which are the same type of inputs used for deferent programmes or activities as joint resources.

In this study was considered the provision of bundle of services to the representative individuals or a group of people in terms of provider perspective. For an example, MCH clinic included the costs of time allocation of the staff, vaccine, instruments and consumable drugs for family planning as well as building and utilities etc. Public Health Midwife had assigned to Antenatal clinic (ANC) directly, but she might work in family planning clinic as well as health education programme too. Thus, it was needed to be clarified the costs of multi-task personnel into an individual departments.

The scenario technique was carried out 3 steps.

a). *List the empirical information of each cost centers available at the time the exercise is conducted.*

- The dimensions of the whole building and in turn the cost centers wise.
- Number of staff and their time allocation into each department.
- The mid-points of the salary scale were used (Shephard & Hodgkin, 1996 and de Silva et al, 1997).
- List of equipment and materials
- Treatment protocols of each facility were taken a discussion with the MOIC of the dispensary.
- Monthly bills for utilities were collected.

b). *List the assumption employed*

In this step, assumptions with regard to the allocations of physical and human resources into each department were adopted.

- The study was adopted the linear depreciation method to depreciate the capital goods.
- Uses of materials such as cleaning utensils, stationery are assumed to be linearly distributed over the assumed usage span.
- And, **table 4.3** shows dimensions of determining the cost of MC, LC and CC.
- Drugs and other consumables and materials, linens etc. are allocated according to the treatment protocol of each cost center. i.e. MCH clinic has standard and necessary drugs, vitamins such as iron, calcium, Vitamin C, folic acid , vaccines etc.

Table 4.3 Dimensions of Cost Allocation

Input	Component that determine the cost
Equipment	Time used
Building/Space	Time used/space used
Personnel	Time worked
Supplies	Volume/Weight
Building operation & maintenance	Time used/space used

Source: Creese & Parker, 1994

c). *Costs estimation and discussed the limitation arising from the use of assumptions*

Chapter V and Appendix B will be explained the cost calculations in detail.

Costs involved in this study were classified based on uses of inputs such as capital costs and recurrent costs. Recurrent cost could be divided into two parts such as labour cost, material cost. In below, each type of cost was identified. The appendix B will show the different types of forms which were used to calculate costs of capital, human and material inputs employed at the dispensary.

4.5.2.1 Capital Cost

This category included the land, building, vehicles and medical equipments, machinery etc. all these last more than one year. As the land for this health center was donated, the opinions from the residents and a land valuer of this area were taken in order to obtain the cost of land. Moreover, the actual value per square foot for the building was obtained taking advice from a senior engineer at the Central Engineering Consultancy Bureau (CECB). In this case, the study was adopted “**Straight Line Method**”, as this

method provides long-term financial commitments, in order to calculate the average annual financial cost of capital goods (Creese & Parker, 1994). Number of working years or useful life years of capital goods were considered as mentioned in the below. Unit of measurement of capital goods was time used or space used (% of square feet used).

Applying life years for the capital goods (only for the major goods) are:

Building	30 years
Major equipments and machines.....	10 years
Medical Equipments.....	5 years
Vehicle	5 years
Office Equipments	10 years

Sources: Creese & Parker, 1994: "Useful Life Years", American Hospital Association, 1998

The replacement costs of capital goods were taken into account as the capital goods were donated. The authors, Creese & Parker, 1994 and Shepard et al, 1998 emphasize that if inputs were donated or prices of such goods were not recorded, the replacement costs (or current purchasing value/price) of each items should be included in calculation of hospital unit cost instead of ignoring such costs in order to be a more realistic cost estimation.

4.5.2.2 Labour Cost

All types of health personnel working in the health center were included into the cost estimation. There were 2 MOs, 1 ayurvedic doctor, 1 PHI, 4 PHMs, 2 dispensers, 2 ordinary labours, 1 watcher and 5 volunteers. The mid-point of the salaries and all the

type of allowances and fringe benefits were included into the labour costs. Moreover, instead of ignoring the time spends of volunteers, the wage rate that was paid to workers who do equivalent work in health sector was used. The time allocations of difference type of staff (the multi-task personnel) into different programmes were considered. The time allocation of staff could be varied due to type of patient, day of treatment, severity of the case and personal idiosyncrasies of patient (de Silva et al, 2007). Thus, an in-depth interviews as well as observation method were adopted in order to clarify different task of the staff into different department or patients (Creese & Parker, 1994 and Kasturiratne, 2003).

4.5.2.3 Material Cost

Material cost could be divided into following groups.

(i) Supplies

1) *Medical Supplies*

This category included drugs, vaccines and consumables as well as small equipments (life year less than one year or unit price less than \$ 100). The drug lists and other consumable medical materials were taken from the inventory records. The costs of such items were obtained using the prices list in the year 2008 taken from Medical Supply Division. Then, combining both records could be calculated cost of medical supplies.

2) *Non-Medical Supplies*

Stationery, furniture (less than one year), linen, cleaning and kitchen utensils were included in non-medical supplies. According to usage pattern of these materials, this could be distributed linearly over the departments.

(ii) Operation and maintenance

Operation and maintenance costs included cost of building and vehicles. The component of operation and maintenance cost of vehicle was ignored as a vehicle was not available at the dispensary. Cost of operation for buildings was included utilities such as water and electricity. The health center does not have separate water meter and electricity meter for each department separately. An engineer of Ceylon Electricity Board was consulted with regard to obtain the running cost of each electric appliances based on their wattage. Cost for water bills were calculated as the average unit price of water, the number of unit used per person and the number of persons were multiplied together. Then, it could be obtained cost for water incurred by each department eventually (de Silva et al, 1997).

(iii). Other Operating Cost

This included operating cost that not included in above such as :

- Staff traveling – Per- diem
- Training programme for staff – In service or short term
- Cost of transportation of medical/other equipments from MSD or other place

4.5.3 Allocation Criteria Determination

The allocation criteria needed to be clearly defined, which was based on the types of services provided by overhead cost centers and intermediate cost centers to the final cost centers. The criteria supported to the transient cost centers to step down the cost to the absorbing cost centers. Table 4.4 (p.51) shows different allocation criteria involved in each cost centers of the dispensary.

4.5.4 Full Cost Determination

The study was adopted the step-down technique to calculate the indirect cost of absorbing cost centers. There are three principles highlighted in the step-down technique. One is to rank the cost centers, which are based on the quantity of services provided by the transient cost centers to the other centers. In other words, the cost centers who supported tremendously to others and had the large total direct cost, which could be ascended. For example, general administration had the large cost and it was stepping down from the top to the bottom. Second is, the costs that were never stepping upward. And finally, when the costs reach to final cost center, it became zero. It meant that the total cost of overhead and intermediate costs were absorbed by the final cost centers. Eventually, the full costs of final cost centers were obtained by addition the total direct cost and the total indirect cost as follows:

$$\text{Full cost of final cost centers} = \text{Total direct cost} + \text{Total indirect cost}$$

Table 4.4 Allocation Criteria

Code	Name of the cost center	Allocation Criteria	Data Source
A 01	General Administration	<ul style="list-style-type: none"> • 80% of cost based on patient load • 20% of cost based on services provided by the transient cost centers 	<ul style="list-style-type: none"> • Discussion with hospital administration and the staff • Patients Records
A 02	Maintenance & Cleaning	<ul style="list-style-type: none"> • 90% of cost based on patient load • 10% of cost based on services provided by the transient cost centers 	<ul style="list-style-type: none"> • Discussion with hospital administration and the staff • Patients Records
A 03	General Store Room	<ul style="list-style-type: none"> • 80% of cost based on patient load • 20% of cost based on services provided by the transient cost centers 	<ul style="list-style-type: none"> • Discussion with hospital administration and the staff • Patients Records
A 04	Health Education	<ul style="list-style-type: none"> • 75% of cost based on preventive care services • 15% of cost based on curative care services • 10% of cost based on services provided by the transient cost centers 	<ul style="list-style-type: none"> • Discussion with hospital administration and the staff • Patients Records
B 01	PHI Unit	<ul style="list-style-type: none"> • 6% of cost based on ancillary services • 14% of cost based on curative care services • 80% of cost based on preventive care services 	<ul style="list-style-type: none"> • Discussion with hospital administration and the staff • Patients Records • Staff diaries
B 02	PHM Unit	<ul style="list-style-type: none"> • 6% of cost based on ancillary services • 14% of cost based on curative care services • 80% of cost based on preventive care services 	<ul style="list-style-type: none"> • Discussion with hospital administration and the staff • Patients Records • Staff diaries
B 03	Pharmacy	<ul style="list-style-type: none"> • 10% for ancillary service and 90% based on patients lord 	<ul style="list-style-type: none"> • Discussion with hospital administration and the staff • Patients Records
B 04	Sterilizer Room	<ul style="list-style-type: none"> • 100% based on number of patients visits 	<ul style="list-style-type: none"> • Discussion with hospital administration and the staff • Patients Records • Other statistical Records

4.5.5 Unit Cost Calculation

After obtaining the full cost, unit cost of final cost centers were calculated as the total cost (full cost) divided by number of patient visits (Total cost / number of patient visits). The formula in below were used.

- a) Recurrent cost = Labour Cost + Material Cost
- b) Total Cost = TDC [CC* + LC + MC] + IDC [CC* + LC + MC]
- c) Unit cost of OPD = $\frac{\text{Total cost of OPD}}{\text{\# of patients visits}}$
- d) Unit cost of Medical Clinic = $\frac{\text{Total cost of Medical Clinic}}{\text{\# of patients visits}}$
- e) Unit cost of Antenatal care = $\frac{\text{Total cost of Antenatal clinic}}{\text{\# of pregnant mothers' visits}}$
- f) Unit cost of WB = $\frac{\text{Total cost of child clinic}}{\text{\# of children visits}}$
- g) Unit cost of FP = $\frac{\text{Total cost of FP clinic}}{\text{\# of women visits}}$
- h) Unit cost of Dental clinic = $\frac{\text{Total cost of Dental clinic}}{\text{\# of patients visits}}$
- i) Unit cost of Ayurvedic clinic = $\frac{\text{Total cost of Ayurvedic clinic}}{\text{\# of patients visits}}$

CHAPTER V

RESULTS AND DISCUSSION

This chapter will focus on results and discussion of the costing study. The results include the cost calculations of the existing system and the intended system of CD Samadigama. Then, the above couple of calculations will be expressed through the following areas; a) General Background b) Total Direct Costs, c) Total Indirect Costs, d) Full Cost, and e) Unit Costs. Finally, both models will be discussed simultaneously.

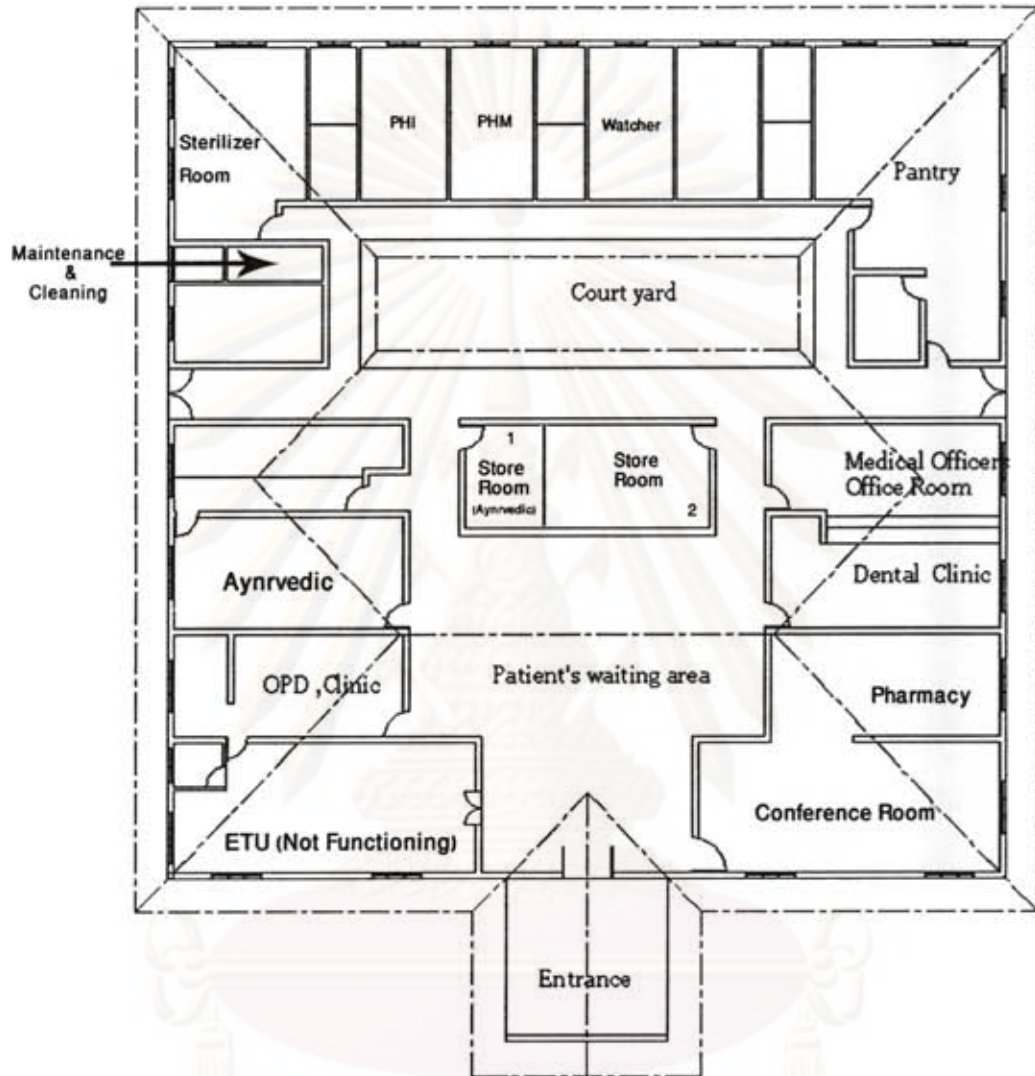
5.1 Existing System

5.1.1 General Background

The total floor area of CD Samadigama building is approximately 9657.25 square feet. A 75% of them are allocated to OPD, Medical Clinic, Ayurvedic Clinic, Dental Clinic, ANC, WB Clinic, FP Clinic, PHI Office, PHM Office, Store Rooms, Pantry, Sterilizer Room, Conference Room, MOIC Office, Pharmacy and Security Guard's Room. These areas are equal to 7236.81 square feet. The rest of total floor area is 2420.44 (25%) square feet which are still not used. The figure 5.1 shows floor plan in the operating areas occupied by each department.

The conference room is used for health education programmes. Despite the full equipped ETU unit at the dispensary, it is not functioning due to lack of full time staff. Currently the watcher's accommodation is provided inside the building as the security guard room was not built outside the dispensary.

Figure 5.1 Floor Areas at the CD Samadigama



Source: Administration Records at the CD Samadigama

The administration costs include cost of general administration, pantry and security (Jayatissa, 1995). And the patients' waiting area is common for all patient service departments. Thus, costs of waiting areas were apportioned to the patient cost centers based on time used.

The existing staff include 1 MO (MOIC), 1 Dental surgeon, Ayurvedic doctor, 4 PHMs, 1 PHI, 2 ordinary labours for dental and ayurvedic clinic, and 2 dispensers for ayurvedic clinic and OPD. The MOIC and the dental surgeon are based at PU Ambalantota and work at CD Samadigama on part-time basis. And the ayurvedic doctor belongs to the Indigenous Medicine Department of Southern Province and works at CD Samadigama as part-time basis too. The 3 PHMs come from Ambalantota MOH office to the Samadigama center twice per month for MCH clinics (See table 3.1 – The time schedule of services at CD Samadigama). The PHI and 1 PHM have their permanent office at the dispensary and work on full-time basis at the dispensary and in the field. 1 dispenser and 1 ordinary labour who worked at ayurvedic clinic come from the ayurvedic dispensary of this area. Moreover, 1 ordinary labour who belongs to the PU Ambalantota works at the dental clinic of CD Samadigama as part-time basis. The security guard was recruited to the dispensary as a full time worker.

There are 5 volunteer workers at the dispensary named Community Supportive Officers (CSOs) in order to support the services delivery of the dispensary. According to the methodology, costs of time spend of CSOs were included into the costing exercise. Thus, the CSOs are divided into three staff categories for the purposes of the study as: two of them are attached to the pharmacy at the dispensary as one for a dispenser and other one for an ordinary labour, the next two persons support to the each department as ordinary labours except dental and ayurvedic clinics and the last one who employs with the maintenance and cleaning department as a sanitary labour. The table 5.1 shows the staff structure of the dispensary.

Table 5.1 Existing Staff Structure of Central Dispensary Samadigama

	Staff Category	Type of service	Number of days /week
1	1 MO (MOIC)	Part time	2
2	1 Dental Surgeon	Part time	2
3	1 Ayurvedic Doctor	Part time	1
4	1 Public Health Inspector	Full time	6
5	1 Public Health Midwife	Full time	6
6	3 PHMs	Part time	1
7	Dispenser (Ayurvedic Clinic)	Part time	1
8	Ordinary Labour (Dental Clinic)	Part time	2
9	Ordinary Labour (Ayurvedic Clinic)	Part time	1
10	2 Volunteer workers (Or. Labour)	Full time	6
11	2 Volunteer workers (Dispenser & Or. Labour - OPD)	Part time	2
12	1 Volunteer worker (Sanitary Labour)	Full time	6
13	Security Guard	Full time	7

Source: Data collection for the study

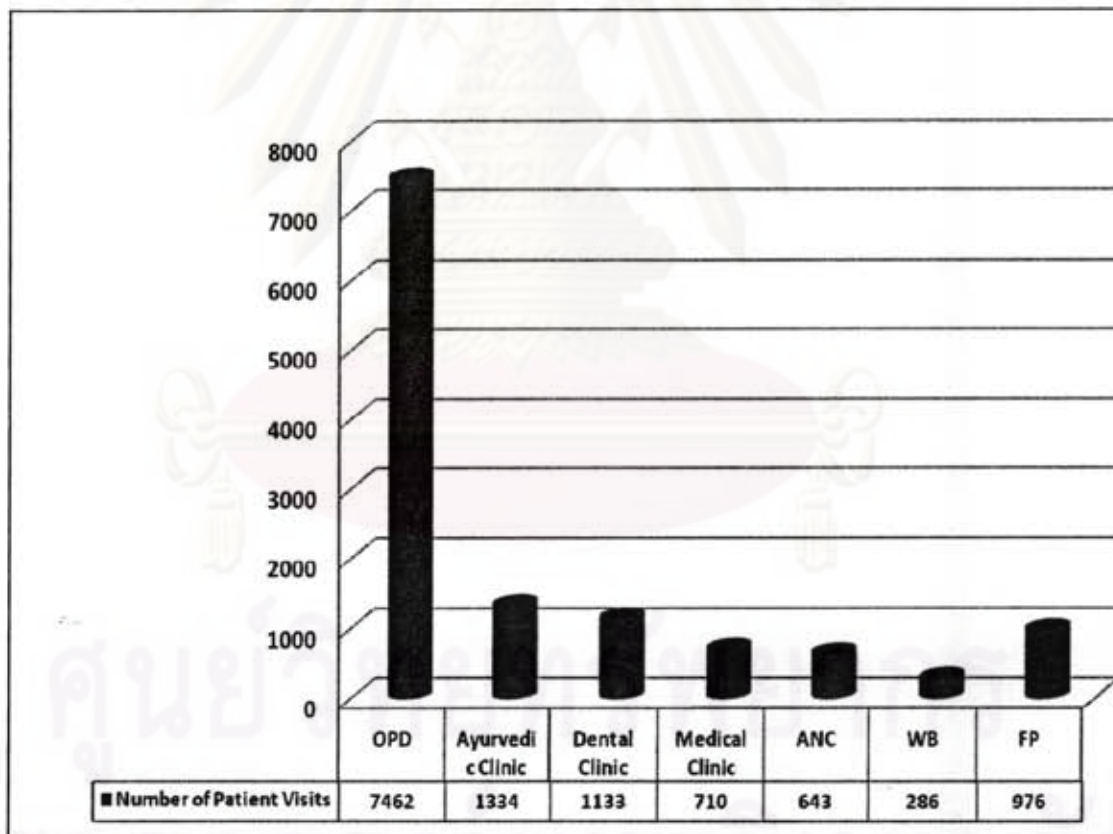
Table 5.2 Number of Patients Visits – 2008

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
OPD (2 days/week)	607	802	582	654	615	668	855	597	492	545	515	530	7,462
Dental (2days/week)	90	124	82	102	95	81	117	115	72	65	97	93	1,133
Medical Clinic (once/week)	-	30	36	39	36	54	90	84	88	82	87	84	710
Ayurveda (once/week)	-	-	-	-	-	262	207	290	180	135	125	135	1,334
ANC (Twice/month)	90	50	43	44	54	55	59	55	46	52	47	48	643
WB (Twice/month)	9	9	14	8	21	46	32	28	26	34	30	29	286
FP (Twice/month)	37	24	-	29	21	20	5	36	20	28	34	22	976
Total	833	1,039	757	876	842	1,186	1,365	1,205	924	941	935	941	12,544

Sources: Data collection for the study: Field Mission Report at CD Samadigama, 2008, MDPU

Table 5.2 shows patients visits of each department in the year 2008. The OPD department was taken the highest proportion of total patient visits which was 63%. Average number of OP visits per month is 600. And per day OP visits ranged 50 to 100. Ayurvedic department was reported the next highest patient visits which was 12% of total patient visits. The next was the dental department. It was 10%. And other departments were medical clinic, ANC, WB and FP. Their proportions were 6%, 5% and 2% respectively. Figure 5.2 demonstrates the patient visits in terms of each department as proportions of total patient visits.

Figure 5.2 Number of Patients Visits - 2008 (as proportions of total visits)



5.1.2 Total Direct Cost

The total direct cost of CD Samadigama in 2008 is Rs. 3,212,370.52. In terms of cost classification, the highest percentage stands at 61% of total direct cost for labour cost which is Rs. 1,977,341.87. Then capital and material costs are 22% (Rs. 677,370.51) and 17% (Rs. 557,658.14) respectively. Figure 5.3 and table 5.3 present the whole picture of these figures.

Figure 5.3 Total Direct Cost by Cost Classification - 2008



Table 5.3 Total Direct Cost of Departments – 2008 (Sri Lankan Rupees)

Code	Department	Capital Cost	%	Material Cost	%	Labour Cost	%	Total	%
A 01	Administration	252,098.00	37.22	7,686.80	1.38	248,799.60	12.58	508,584.40	15.83
A 02	Maintenance & Cleaning	6,270.74	0.93	1,822.00	0.33	194,760.00	9.85	202,852.74	6.31
A 03	Store Room	18,709.40	2.76	241.10	0.04	47,082.80	2.38	66,033.30	2.06
A 04	Health Education	15,238.50	2.25	511.00	0.09	162,475.21	8.22	178,224.71	5.55
B 01	PHI Office	18,214.50	2.69	1,559.24	0.28	85,069.25	4.30	104,842.99	3.26
B 02	PHM Office	20,730.20	3.06	3,326.00	0.60	232,905.40	11.78	256,961.60	8.00
B 03	Pharmacy	12,741.50	1.88	188,960.15	33.87	158,169.60	8.00	359,871.25	11.20
B 04	Sterilizer Room	33,291.00	4.91	2,046.20	0.37	44,039.20	2.23	79,376.40	2.47
C 01	OPD	80,289.75	11.85	9,490.76	1.70	159,261.20	8.05	249,041.71	7.75
C 02	Medical Clinic	29,087.09	4.29	3,105.84	0.56	59,257.20	3.00	91,450.13	2.85
C 03	Dental Clinic	127,655.55	18.85	19,728.11	3.54	189,072.00	9.56	336,455.66	10.47
C 04	Ayurvedic Clinic	27,025.52	3.99	110,561.85	19.85	87,725.00	4.44	225,312.37	7.01
C 05	ANC	12,477.92	1.84	141,78.80	2.54	104,809.75	5.30	131,466.47	4.09
C 06	WB Clinic	11,053.92	1.63	42,762.25	7.67	101,957.83	5.16	155,774.00	4.85
C 07	FP Clinic	12,486.92	1.84	151,678.04	27.19	101,957.83	5.16	266,122.79	8.28
	Total	677,370.51	100.00	557,658.14	100.00	1,977,341.87	100.00	3,212,370.52	100.00

Note: Exchange Rate:- \$ 1: Rs. 100.00

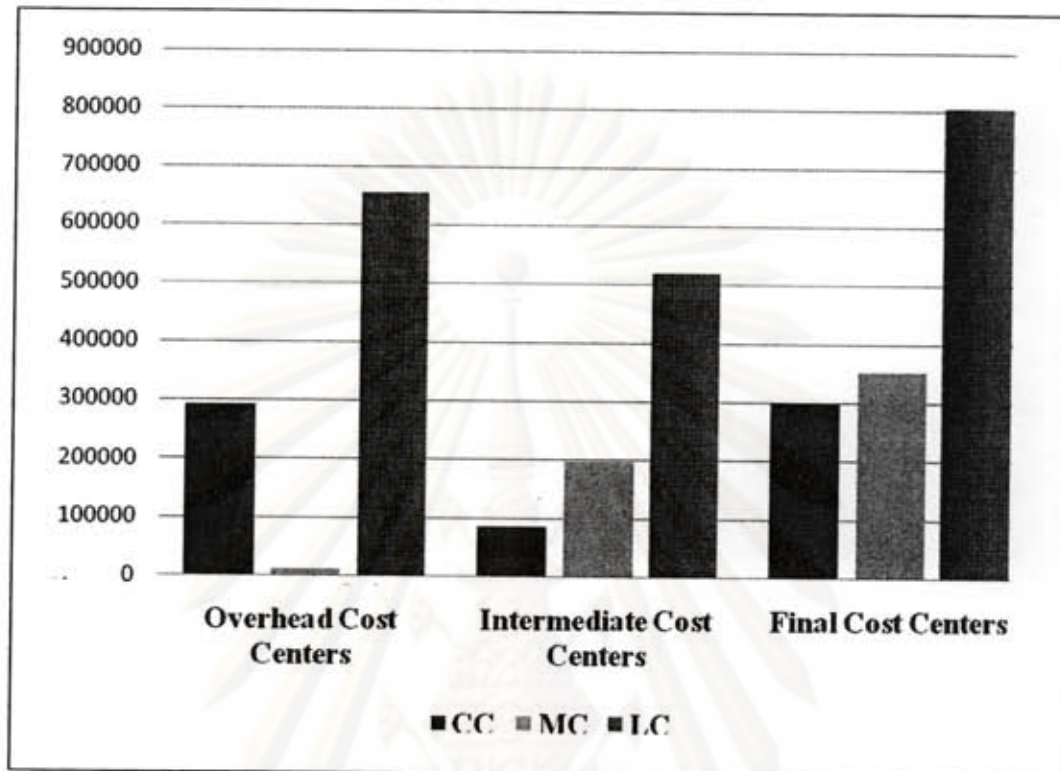
The largest portion of labour cost was incurred by the preventive care services such as ANC, WB, FP, PHI, PHM and health education. This proportion stands 40.56%. The next highest labour cost was represented by the administration department which is 12.79%. The largest proportion of material cost was incurred by the pharmacy. It is Rs. 188,960.15 (33.87%). The next place is the family planning department. It is Rs. 151,678.04 (27.19%). The percentage, 36.35% is the largest portion of total capital cost which was borne by administration department. And dental and OPD departments, which are taken the next second and third places as 18.41% and 11.58% respectively.

Table 5.4 Total Direct Cost by Cost Center Categories – 2008 (Rupees)

	CC	%	MC	%	LC	%	Total	%
Overhead Cost Centers (A 01 – A 04)	292,316.64	43	102,60.90	2	653,117.60	33	955,695.14	30
Intermediate Cost Centers (B 01 – B 04)	849,77.20	13	195,891.59	35	520,183.45	26	801,052.24	25
Final Cost Centers (C 01 – C 07)	300,076.67	44	351,505.65	63	804,040.81	41	1,455,623.13	45
Total	677,370.51	100	557,658.14	100	1,977,341.86	100	3,212,370.51	100

Table 5.4 presents the total direct cost by cost center categories. The final cost centers (C 01 – C 07) are the most important cost category of total expenditure components at the center. This category has consumed the largest portion of total direct cost which is 45%. It is equivalent to Rs. 1,455,623.13. The overhead cost centers have used the next higher total costs which were Rs. 955,695.14 (30%). Moreover, intermediate cost centers have bearded the lowest costs of total direct costs which was 25% of total direct costs. The figure 5.4 shows the utilization of total direct costs by each cost center category.

Figure 5.4 Total Direct Cost by Cost Centers and Cost Classification – 2008



5.1.3 Total Indirect Cost

Total indirect costs are obtained using step-down technique. Total direct costs and total indirect costs of overhead cost centers and intermediate cost centers were allocated down to the final cost centers (absorbing cost centers) following the allocation criteria (table 4.4). Table 5.6 illustrates allocation of the direct and indirect cost from up to down.

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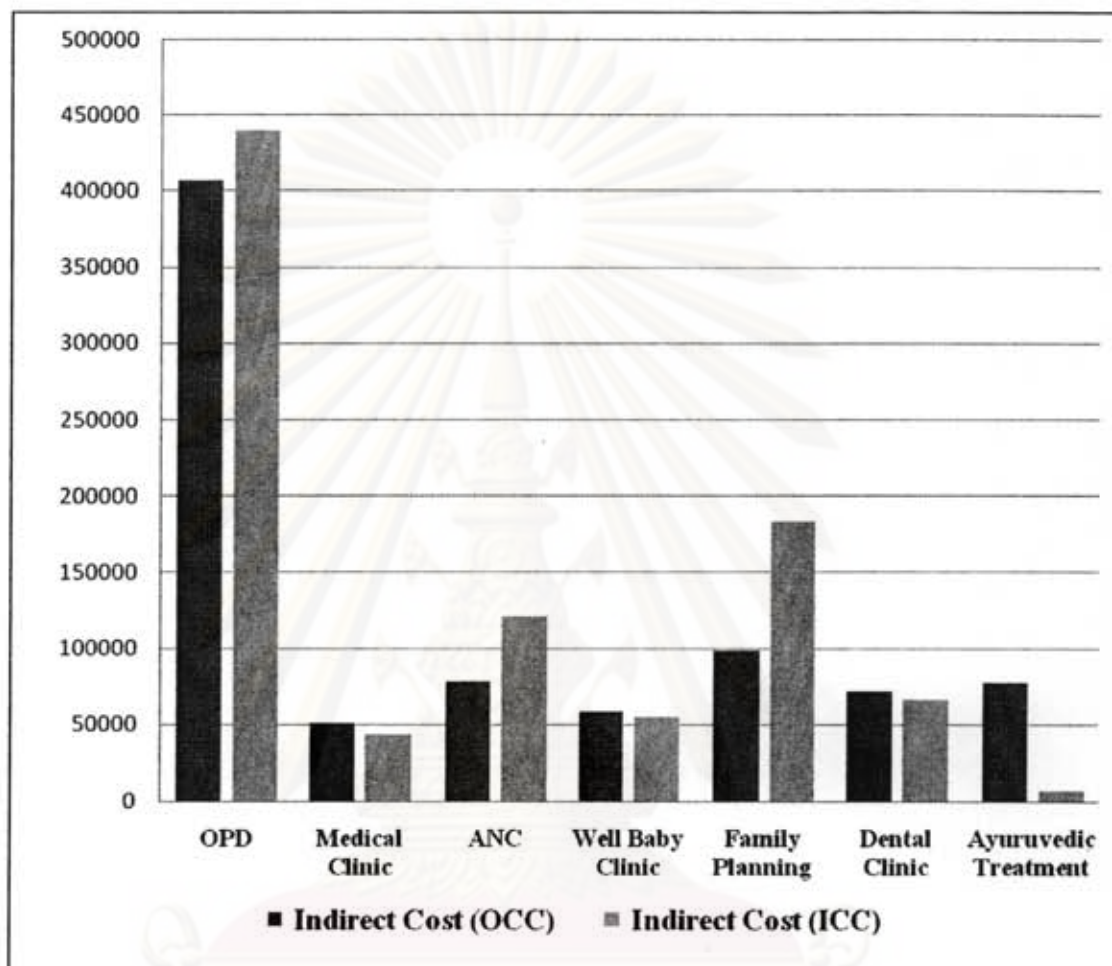
Table 5.5 Total Indirect Cost (Sri Lankan Rupees)

Code	Cost Center	Indirect Cost of OCC*	Indirect Cost of ICC*	Total Indirect Cost	%
C 01	OPD	407,510.86	439,870.69	847,381.55	48%
C 02	Medical Clinic	50,991.27	43,174.08	94,165.34	5%
C 03	ANC	78,002.30	120,814.77	198,817.07	11%
C 04	Well Baby Clinic	58,757.17	54,222.93	112,980.10	6%
C 05	Family Planning	98,534.88	182,964.27	281,499.16	16%
C 06	Dental Clinic	71,523.85	66,218.51	137,742.36	8%
C 07	Ayurvedic Clinic	77,058.40	7,103.42	84,161.81	5%
	Total	842,378.73	914,368.67	1,756,747.40	100%

*- Overhead Cost Centers (OCC) and Intermediate Cost Centers (ICC)

The highest portion of total indirect cost stands at 48% for OP department. It consists Rs. 407,510.86 from overhead cost centers and Rs. 439,870.69 from intermediate cost centers. The next large portion is related to the FP clinic. It is 16% as a proportion of total indirect cost. It is also contained Rs. 98,534.88 from overhead cost centers and Rs. 182,964.27 from intermediate cost centers. In generally, the highest expenditure of intermediate cost centers reported from Maternal & Child Health and FP clinics. Moreover, MCH and FP clinics utilize the second highest portion of total indirect cost. It is 33% and equivalent to Rs. 593,296.33. Figure 5.6 presents the percentages of utilization of overhead and intermediate cost centers by final cost centers.

Figure 5.5 Utilization of Overhead and Intermediate Costs by Final Cost Centers



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Table 5.6 Direct Costs and Indirect Cost Allocation by Step-Down Technique – Existing System

		Department Providing Services										
	Name of the cost center	Total Direct Cost	A 01- GA	A 02- M&C	A 03 - GSR	A 04 - HE	B 01 - PHI	B 01 – PHM	B 03 - Pha	B 04 - SR	Full Cost	
Department Receiving Services	A 01 Administration	508,584.40	0.00									
	A 02 Maintenance and Cleaning	202,852.74	10,171.69	0.00								
	A 03 Store Room	66,033.30	10,171.69	4,260.49	0.00							
	A 04 Health Education	178,224.71	15,257.53	4,260.49	1,609.31	0.00						
	B 01 PHI Office	104,842.99	25,429.22	2,130.24	1,609.31	0.00	0.00					
	B 02 PHM Office	256,961.60	25,429.22	2,130.24	1,609.31	0.00	2,680.24	0.00				
	B 03 Pharmacy	359,871.25	10,171.69	4,260.49	8,046.55	9,967.60	2,680.24	5,776.21	0.00			
	B 04 Sterilizer Room	79,376.40	5,085.84	4,260.49	3,218.62	9,967.60	2,680.24	11,552.42	0.00	0.00		
	C 01 OPD	249,041.71	240,051.84	113,115.97	43,129.50	11,213.55	13,133.15	28,303.44	320,619.22	77,814.88	1,096,423.26	
	C 02 Medical Clinic	91,450.13	24,412.05	11,503.32	3,862.34	11,213.55	1,313.32	2,830.34	32,061.92	6,968.50	185,615.47	
	C 03 ANC	131,466.47	20,343.38	9,586.10	3,218.62	44,854.21	36,451.20	78,556.49	0.00	5,807.08	330,283.54	
	C 04 Well Baby Clinic	155,774.00	8,137.35	3,834.44	1,931.17	44,854.21	16,081.41	34,657.27	0.00	3,484.25	268,754.10	
	C 05 Family Planning	266,122.79	32,549.40	15,337.76	5,793.51	44,854.21	54,676.80	117,834.73	0.00	10,452.75	547,621.95	
	C 06 Dental Clinic	336,455.66	36,618.08	17,254.98	6,437.24	11,213.55	2,063.78	4,447.68	48,092.88	11,614.16	474,198.02	
	C 07 Ayurvedic Clinic	225,312.37	44,755.43	21,089.42	0.00	11,213.55	2,251.40	4,852.02	0.00	0.00	309,474.18	
		Total	3,212,370.52	508,584.40	2,13,024.43	80,465.48	1,99,352.04	134,011.76	288,810.61	400,774.02	116,141.61	3,212,370.53

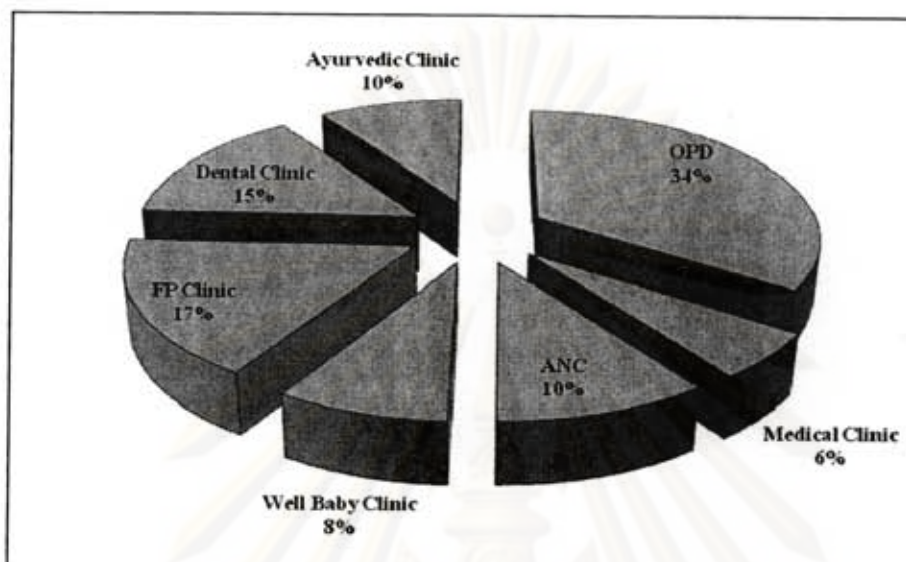
5.1.4 Total Cost (Full Cost)

The total costs of final cost centers are provided in the table 5.7 below. A proportion of 23% of total direct costs is utilized by the Dental clinic, which is the highest portion. On the other hand, FP clinic is the second large direct cost. It is 18% of total direct cost. OPD incurs 17% of total direct cost, which is the third large cost. Nevertheless, the largest amount of total indirect cost is incurred by the OPD that is 47% of total indirect cost. Thus, 34% of total cost is bearded by the OPD and on the other hand, FP clinic expends 17% of total cost. Both departments stand first and second places of total cost profile respectively. The third large total cost, which is 15%, is obtained by the dental clinic. Finally, considering as a whole, the large portion of full costs is bearded for the curative care services compared to the preventive care.

Table 5.7 Total Cost of Final Cost Centers

	Cost Center	Total Direct Cost	%	Total Indirect Cost	%	Total Cost	%
C 01	OPD	249,041.71	17%	847,381.55	47%	1,096,423.26	34%
C 02	Medical Clinic	91,450.13	6%	94,165.34	5%	185,615.47	6%
C 03	ANC	131,466.47	9%	198,817.07	12%	330,283.54	10%
C 04	Well Baby Clinic	155,774.00	11%	112,980.10	7%	268,754.10	8%
C 05	Family Planning Clinic	266,122.79	18%	281,499.16	17%	547,621.95	17%
C 06	Dental Clinic	336,455.66	23%	137,742.36	8%	474,198.02	15%
C 07	Ayurvedic Clinic	225,312.37	15%	84,161.81	5%	309,474.18	10%
	Total	1,455,623.13	100%	1,756,747.40	100%	3,212,370.53	100%

Figure 5.6 Total Costs of Final Cost Centers



In considering cost profile in CD Samadigama as a whole, the highest costs borne by labour cost. It is Rs. 1,977,341.86. It is equivalent to 62% of total cost. Secondly, Rs. 677,370.51 is spent for the capital cost. It is reported 21% as a percentage of total cost. Material cost is Rs. 557,658.14 (17%). And total operating cost is Rs. 2,535,000.00 (table.5.8). It is 79% of total cost.

Table 5.8 Cost Profile of CD Samadigama

Cost Category	Cost (Rs.)	%
Capital Cost	677,370.51	21%
Material Cost	557,658.14	17%
Labour Cost	1,977,341.86	62%
Total Operating Cost	2,535,000.00	79%
Total Cost	3,212,370.52	100%

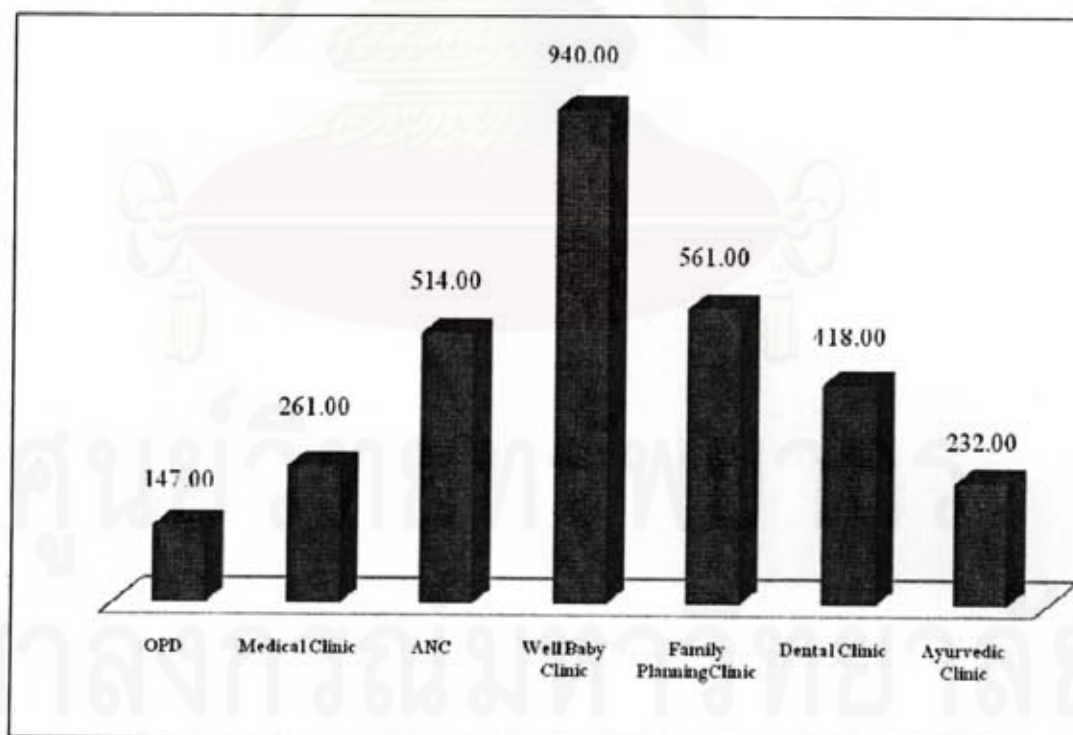
5.1.5 Unit Cost

Unit costs of patient visits of final cost centers are as follows:

Table 5.9 Unit Costs of Final Cost Centers

Department	Unit Cost (Rs.)
OPD	147.00
Medical Clinic	261.00
ANC	514.00
WE	940.00
FP	561.00
Dental Clinic	418.00
Ayurvedic Clinic	232.00

Figure 5.7 Unit Cost of Final Cost Centers



Reported unit cost of OP visit is Rs. 147.00. That is the lowest cost per patient visit at the CD Samadigama. The highest unit cost per patient visit is presented by WB clinic that is Rs. 940.00. It is because, providing high expensive vaccines (Pentavalent, MMR etc.) for child care. Comparing with other services, MCH and FP services have high unit costs per patient visit. In generally, medical services for chronic diseases are expensive as chronic diseases are required long term treatments. Therefore, cost per patient visit in medical clinic of CD Samadigama is higher than unit cost of OPD visit. Unit cost per patient visit of ayurvedic clinic is Rs. 232.00, which is relatively high due to this clinic at CD commenced in July 2008 and it thus, could provide services in the short period.

Considering with regard to the final results as a whole, the unit costs are likely relatively high. It could be identified many factors that are affecting to high unit costs. Currently, the intended service structure is not functioning at the dispensary. Because, non-availability of full-time staff, limited service hours for OPD and medical clinic, the use of expensive inputs such as qualified staff (MO instead RMO/AMO), sophisticated equipments as well as large space (floor area), these could be the main factors. Therefore, two possible factors need to be taken into account. One of the recommendations is recruiting full-time staff. The next is to extend the services hours in order to increase the level of utilization as well. Following these two points, the study was done cost simulation assuming the full-time staff is recruited and an average patient load per day is increased as 80 per day for OPD and 40 per day for medical clinic in order to examine the alternatives ways for further improvements of the dispensary.

5.2 Intended System

5.2.1 General Background

In order to explore the new primary health care model, the intended system of CD Samadigama needs to be taken into account. An exposure of the background of intended system once again needs to be considered. Considering the service provision, intended services range an integration of preventive and curative services. In terms of preventive services, poly-clinic facilities such as antenatal and post natal, family planning, child health, well women clinics, are delivered full time basis through the office of PHI/PHM which being implemented at CD Samadigama. The clinics are opened twice per month. In terms of curative services, outdoor care services are provided full time basis as follows;

OPD	-	6 days/week (Saturday is a half-day)
Medical Clinic	-	One day/week
Dental Clinic	-	2 days/week
Ayurvedic Clinic	-	One day/week

In addition to the above, Emergency Treatment Unit is not included in this costing analysis due to ETU is not functioning though the full equipped ETU has been established for limited emergency care.

On the other hand, in order to provide the proposed services structure as above, the staff structure needs to be assumed. Following the Government Establish Code and Norms (protocol), assumed staffs are as follows;

Table 5.10 Intended Staff and Service Hours

Staff Category	Service Hours
Medical Officer	Full-time basis
1 Dental Surgeon	Twice/week
1 Ayurvedic Doctor	Once/week
1PHI & 1PHM	Full-time basis
1PHNS	Twice/month (MCH clinics)
2 PHMs	Twice/month (MCH Clinics)
1 Dispenser and 1 Ordinary Labours	Once/week (Ayurvedic clinic)
1 Ordinary Labour	Twice/week (Dental Clinic)
1 Dispenser, 2 Ordinary Labours, Security Guard and 1 Sanitary Labour	Full-time basis

Medical officers and other health staff are recruited to the public health sector according to the Public Administration Policy and Medical Minutes. Though the escalation of health expenditure has been in the country, the government is responsible and could be capable in providing almost adequate health staff and free health care to the nation, free at the point of delivery. There is no possibility to hire medical staff especially, medical doctors in order to fill the gaps of lack of MOs in the public sector, due to unavailability of medical doctors' labour market.

In terms of service utilization, patients load in each patient/final service department are estimated as in the table 5.11, based on the concept of excess demand. There are two evidences fostering with respect to an existing excess demand at the CD Samadigama. One is discussion with health staff, patient and villagers were revealed that the villagers in Samadigama and nearby areas (within Lunama Area PHI) are attending to

the closest hospital PU Ambalantota in the other days except clinic days at the CD Samadigama. It meant that villagers are expected to seek care when the need arise. Secondly, in theory, a mismatch between realized demand (level of demand for services during a particular time period) and realized capacity (level of services provided with constrained - resource constrained capacity) causes to an imbalance of health care market that there is a disequilibrium named an excess demand. In other words, an excess demand is created when realized demand is greater than realized capacity (de Silva and Attanayake, 1992). According to the above definition, it could be defined as lack of staff at the CD Samadigama could be one reason for existing excess demand.

Considering the government guidelines, in generally a central dispensary is located within one Area PHI which is demarcated having population ranging from about 10,000 to 25,000 (Areas PHM or number of GN Divisions). Hence, the latter guideline is considered when costs of services provision for different number of patients at the CD Samadigama are simulated.

Table 5.11 Estimated Patients Visits – 2008

Department	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Total
OPD (6 days/week)	1,800	1,800	1,692	1,800	1,800	1,800	1,800	1,800	1,440	1,800	1,800	1,800	21,132
Dental (Twice/week)	90	124	82	102	95	81	117	115	72	65	97	93	1133
Medical Clinic (Once/week)	-	160	160	160	160	160	160	160	160	160	160	160	1760
Ayurveda (Once/week)	-	-	-	-	-	262	207	290	180	135	125	135	1334
ANC (Twice/month)	90	50	43	44	54	55	59	55	46	52	47	48	643
WB (Twice/month)	9	9	14	8	21	46	32	28	26	34	30	29	286
FP (Twice/month)	67	80	57	91	79	77	90	93	77	100	91	74	976
Total	2,056	2,183	2,008	2,165	2,169	2,441	2,425	2,501	1,961	2,306	2,310	2,299	27,264

Sources: Data collection for the study: Field Mission Report, MDPU, 2008

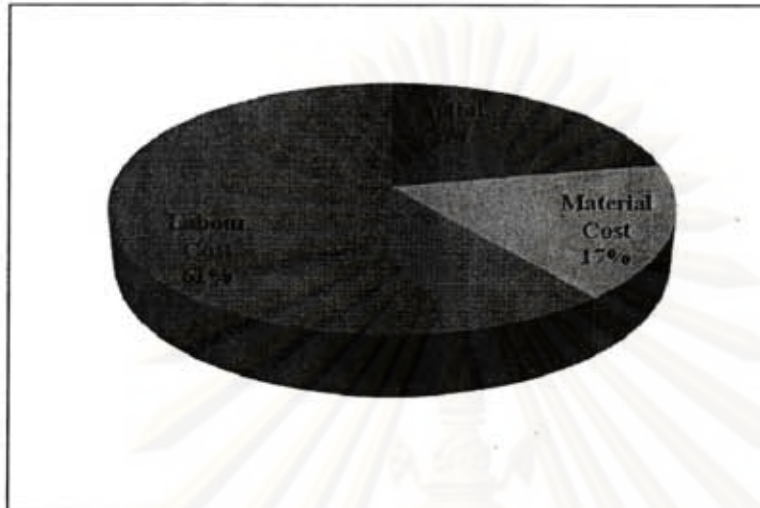
Considering number of patients in OPD, average number of patients visits per day of existing system approximately was 80 (Average number /month (620) divided by number of service days (8) equal to approximately 80/day ($620/8= 80$). Hence, patients' visit per month is 1800 which comprises as 80 multiple by 20 days addition with 50 (number of patients in Saturday) multiply by 4 days. But in March and September patients were less from 6% and 20% of average number due to two seasons which are Yala and Maha of rice cultivations of Sri Lanka. Thus, that seasonal effect is considered when the number of patients for OPD is estimated. Anyway, seasonal factors for the patients' attendants of medical clinic have not been affected. Thus, medical clinic caters an average of 40 patients per day and 160 patients per month (40×4 days/month). Whilst, number of patients visits for preventive care such as ANC, WB and FP clinics are impossible to adjust as existing services on preventive care are the same as proposed service structure and assumed that the all eligible mass of this service area are attending to the MCH clinics regularly. Moreover, patient load of ayurvedic clinic and dental clinic are not changed due to existing system are providing such services as the intended system.

5.2.2 Total Direct Cost

The total direct cost of CD Samadigama in 2008 is Rs. 4,428,377.91. The highest percentage stands at 61% of total direct cost for labour cost which is Rs. 2,689,803.72. Then capital and material costs are 22% (Rs. 974,882.59) and 17% (Rs. 763,691.59) respectively. Figure 5.7 and table 5.12 (p.75) present the whole picture of these figures.

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Figure 5.8 Total Direct Cost by Cost Classification



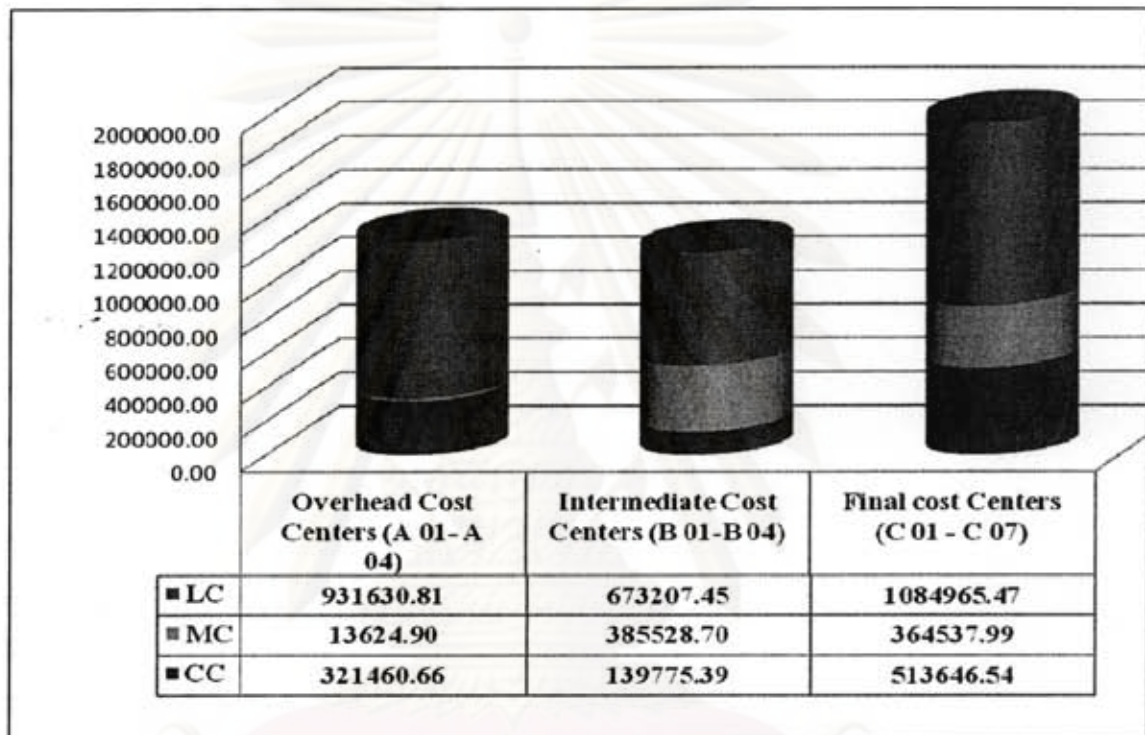
The largest portion of labour cost is 30% of total labour cost which is incurred by the preventive care services such as ANC, WB, FP, PHI, PHM and health education. The next highest labour cost is represented by the administration department which is 20%. The largest proportion of material cost is incurred by the pharmacy. It is Rs. 378,552.26 (50%). The next place is the family planning which is Rs. 151,610.21 (20%).

The largest portion of total capital cost is borne by the OPD which is Rs. 285,024.07 (29%). Administration department is 28% of total capital cost which is equivalent to Rs. 275,196.00. Dental clinic is taken the third place as 13% of total capital cost.

In terms of cost center category, the final cost centers (C 01 – C 07) are consumed the largest portion of total direct cost which is 44%. It is equivalent to Rs. 1,947,631.98. The overhead cost centers use the next higher total costs which are Rs. 1,198,512.44 (29%). Moreover, intermediate cost centers beared the lowest costs of total direct costs

which is 27% of total direct costs. The figure 5.8 shows the utilization of total direct costs by each cost center category

Figure 5.9 Total Direct Costs (Cost Center Category wise)



5.2.3 Total Indirect Cost

Total indirect costs are obtained by adopting the step-down technique. Total direct costs and total indirect costs of overhead cost centers and intermediate cost centers (Transient Cost Centers) were allocated down to the final cost centers (Absorbing cost centers) following the allocation criteria (table 4.4). Table 5.13 (p.76) represents allocation of the direct and indirect cost from up to down.

Table 5.12 Total Direct Cost (Sri Lankan Rupees)

Code	Department	CC	%	MC	%	LC	%	Total Direct Cost	%
A 01	Administration	275,196.05	28%	10,730.80	1%	532,558.00	20%	818,484.85	18%
A 02	Maintenance & Cleaning	7,717.33	1%	2,142.00	1%	194,760.00	7%	204,619.33	5%
A 03	Store Room	23,308.78	2%	241.10	0.5%	40,126.00	1%	63,675.88	1%
A 04	Health Education	15,238.50	2%	511.00	0.5%	164,186.81	6%	179,936.31	4%
B 01	PHI Office	22,396.55	2%	1,581.24	1%	85,069.25	3%	109,047.04	2%
B 02	PHM Office	25,156.25	3%	3,348.00	1%	232,905.40	9%	261,409.65	6%
B 03	Pharmacy	43,562.65	4%	378,552.26	50%	311,193.60	12%	733,308.51	17%
B 04	Sterilizer Room	48,659.93	5%	2,047.20	0.5%	44,039.20	2%	94,746.33	2%
C 01	OPD	285,024.07	29%	22,396.04	3%	415,284.68	15%	722,704.79	16%
C 02	Medical Clinic	37,909.97	4%	4,778.62	1.5%	83,767.60	3%	126,456.19	3%
C 03	Dental Clinic	127,659.22	13%	19,867.11	3%	189,072.00	7%	336,598.33	8%
C 04	Ayurvedic Clinic	27,025.52	3%	110,523.62	14%	87,725.00	3%	225,274.14	5%
C 05	ANC	12,480.92	1%	14,088.01	2%	105,125.67	4%	131,694.61	3%
C 06	WB Clinic	11,056.92	1%	41,274.38	5%	101,995.26	4%	154,326.55	3%
C 07	FP Clinic	12,489.92	1%	151,610.21	20%	101,995.26	4%	266,095.39	6%
	Total	974,882.59	100%	763,691.59	100%	2,689,803.72	100%	4,428,377.91	100%

Table 5.13 Direct Costs and Indirect Cost Allocation by Step-Down Technique- Intended System (Sri Lankan Rupees)

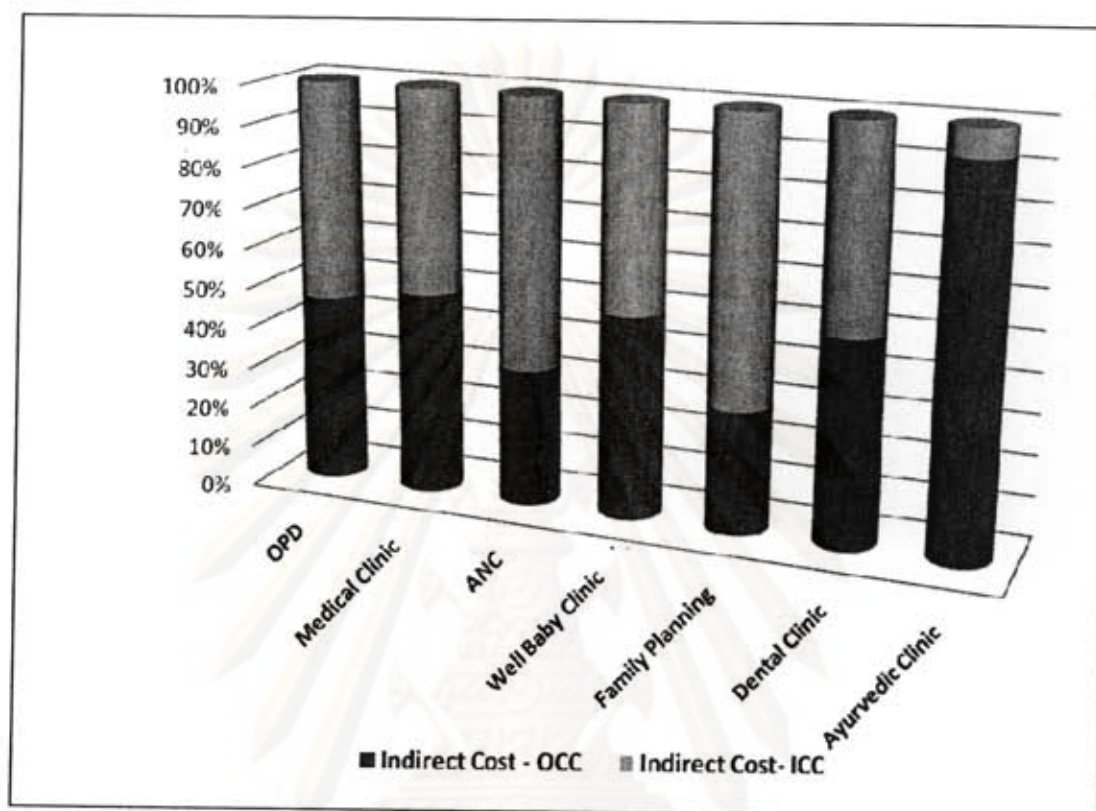
	Department	Total Direct Cost	Department Providing Services								Full Cost	
			A 01- GA	A 02- M&C	A 03 – GSR	A 04 - HE	B 01 – PHI	B 01 - PHM	B 03 – Pha	B 04 - SR		
Department Receiving Services	A 01 Administration	818,484.85	0.00									
	A 02 Maintenance & Cleaning	204,619.33	16,369.70	0.00								
	A 03 Gen.Store Room	63,675.88	16,369.70	4,419.78	0.00							
	A 04 Health Education	179,936.31	24,554.55	4,419.78	1,689.31	0.00						
	B 01 PHI Unit	109,047.04	40,924.24	2,209.89	1,689.31	0.00	0.00					
	B 02 PHM Unit	261,409.65	40,924.24	2,209.89	1,689.31	0.00	3,077.41	0.00				
	B 03 Pharmacy	733,308.51	16,369.70	4,419.78	8,446.54	10,530.00	3,077.41	6,186.21	0.00			
	B 04 Sterilizer Room	94,746.33	81,84.85	4,419.78	3,378.61	10,530.00	3,077.41	12,372.42	0.00	0.00		
	C 01 OPD	722,704.79	510,734.55	155,134.30	54,733.55	11,846.25	17,879.75	35,941.88	688,457.57	110,734.61	2,308,167.25	
	C 02 Medical Clinic	126,456.20	39,287.27	11,933.41	4,730.06	11,846.25	1,507.93	3,031.24	54,763.67	9,569.66	263,125.69	
	C 03 ANC	131,694.61	13,095.76	3,977.80	1,351.45	47,384.99	41,852.77	84,132.46	0.00	2,734.19	326,224.01	
	C 04 WB Clinic	154,326.55	6,547.88	1,988.90	675.72	47,384.99	18,464.46	37,117.26	0.00	1,367.09	267,872.86	
	C 05 FP Clinic	266,095.39	26,191.52	7,955.60	2,702.89	47,384.99	62,779.16	126,198.69	0.00	5,468.38	544,776.61	
	C 06 Dental Clinic	336,598.33	26,191.52	7,955.60	3,378.61	11,846.25	861.67	1,732.14	39,116.91	6,835.47	434,516.50	
	C 07 Ayurvedic Clinic	225,274.13	32,739.39	99,44.51	0.00	11,846.25	1,292.51	2,598.21	0.00	0.00	283,695.00	
		Total	4,428,377.90	818,484.85	220,989.03	84,465.36	210,599.94	153,870.48	309,310.50	782,338.14	136,709.40	4,428,377.91

Table 5.14 Total Indirect Cost by Cost Center Category

Code	Department	Indirect Cost of OCC	%	Indirect Cost of ICC	%	Total Indirect Cost	%
C 01	OPD	732,448.64	66%	853,013.81	62%	1,585,462.46	64%
C 02	Medical Clinic	67,796.99	6%	68,872.50	5%	136,669.49	6%
C 03	ANC	65,809.99	6%	128,719.42	9%	194,529.41	8%
C 04	Well Baby Clinic	56,597.49	5%	56,948.81	4%	113,546.30	5%
C 05	Family Planning	84,235.00	8%	194,446.22	14%	278,681.22	11%
C 06	Dental Clinic	49,371.98	4%	48,546.19	4%	97,918.17	5%
C 07	Ayurvedic Clinic	54,530.15	5%	3,890.72	2%	58,420.87	2%
	Total	1,110,790.24	100%	1,382,228.53	100%	2,493,018.77	100%

The highest portion of total indirect cost stands at 64% for OP department. It consists Rs. 732,448.64 (66%) from overhead cost centers and Rs. 853,013.81 (62%) from intermediate cost centers. The next large portion is related to the FP clinic. It is 11% as a proportion of total indirect cost. It is also consisted as Rs. 84,235.00 (8%) from overhead cost centers and Rs. 194,446.22 (14%). Moreover, MCH and FP clinics utilize the second highest portion of total indirect cost. It is 21% of total indirect cost. Figure 5.9 presents the percentages of utilization of overhead and intermediate cost centers by patient/final cost centers.

Figure 5.10 Utilization of Overhead and Intermediate Costs by Final Cost Centers



5.2.4 Total Cost (Full Cost)

The highest proportions of total direct cost and total indirect cost are 37% and 64% respectively which are consumed by the OP department. On one hand, dental clinic includes the second large indirect cost which is 17% of total direct cost and on the other hand, FP clinic belongs 14% of total direct cost. Both OPD and FP departments stand first and second places of total cost profile respectively. The third large total cost, which 10% is obtained by the dental clinic. Considering as a whole, the big portion of full costs bearded for the curative care services. It is greater than 50% of full costs. The next, preventive care is spent less than 50% of total/full costs. Total direct and indirect costs of

final cost centers are provided in the table 5.14 in below. And figure 5.10 represents the total expenditure by each patients department as a proportion of total cost.

Table 5.15 Total Direct, Indirect and Full cost of Intended System

Code	Department	Total Direct Cost	%	Total Indirect Cost	%	Full Cost	%
C 01	OPD	722,704.79	37%	1,585,462.46	64%	2,308,167.25	52%
C 02	Medical Clinic	126,456.20	6%	136,669.49	6%	263,125.69	6%
C 03	ANC	131,694.61	7%	194,529.41	8%	326,224.01	7%
C 04	Well Baby Clinic	154,326.55	8%	113,546.30	5%	267,872.86	6%
C 05	Family Planning	266,095.39	14%	278,681.22	11%	544,776.61	12%
C 06	Dental Clinic	336,598.33	17%	97,918.17	5%	434,516.50	10%
C 07	Ayurvedic Clinic	225,274.14	11%	58,420.87	2%	268,175.59	6%
	Total	1,963,150.01	100%	2,465,227.91	100%	4,412,858.51	100%

Figure 5.11 Total Expenditure of Final Cost Centers (Patient Service Department)

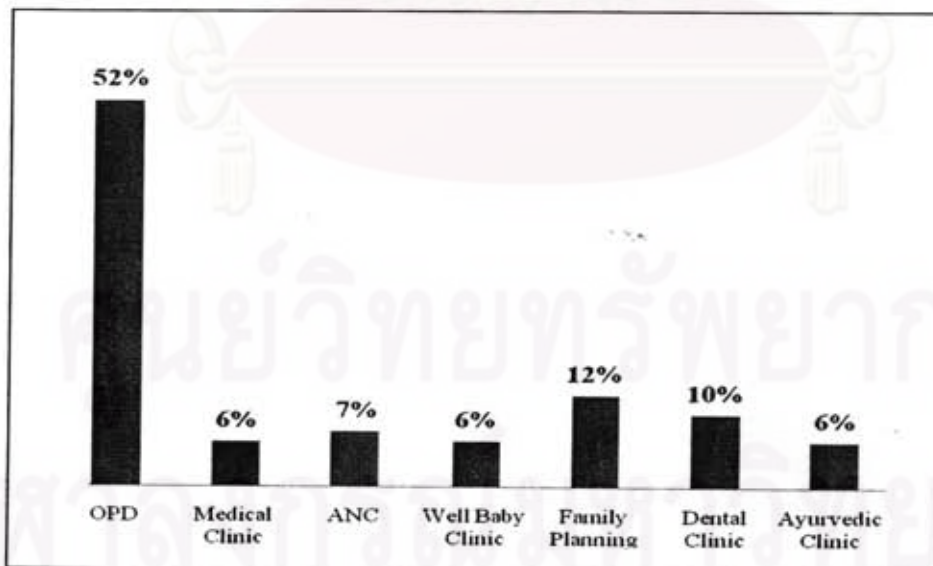


Table 5.16 Cost Profile of Intended System

Cost Category	Cost Rs.	%
Capital Cost	974,882.59	22%
Material Cost	763,691.59	17%
Labour Cost	2,689,803.72	61%
Operating Cost	3,453,495.31	78%
Full Cost	4,428,377.91	100%

In terms of cost profile of CD Samadigama, labour cost is more than 50% of full costs. It is 61% which is equivalent to Rs. 2,689,803.72. Material cost is Rs. 763,691.60 while capital cost is 976,882.60. Eventually, operating cost is the biggest portion of full cost which is 78% and equivalent to Rs. 4,428,377.91.

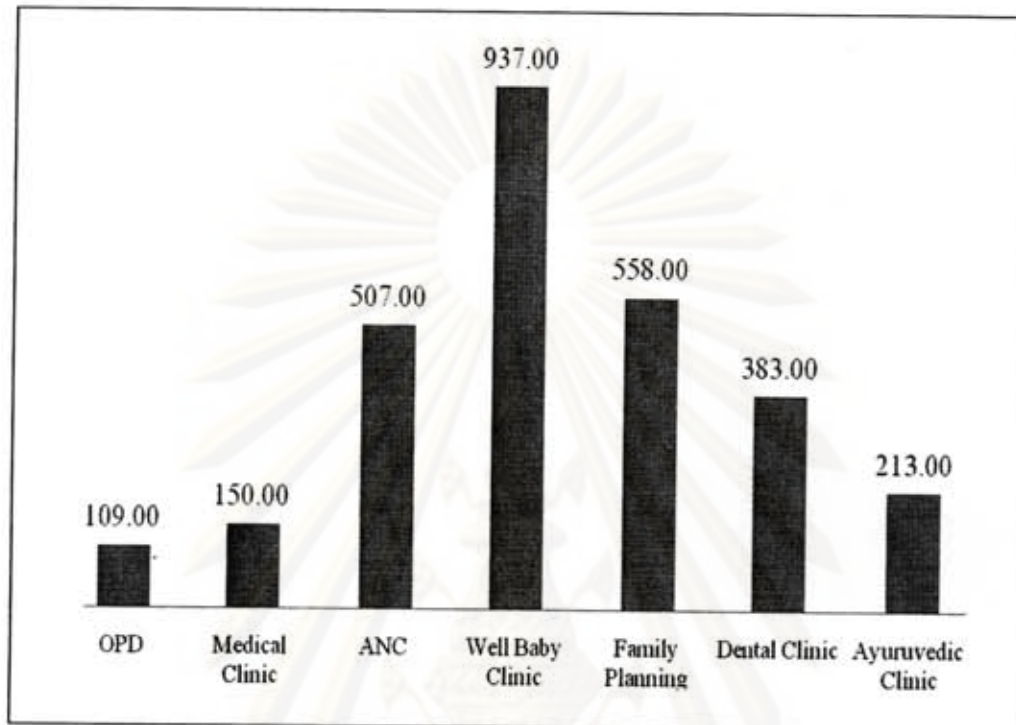
5.2.5 Unit Cost

Unit costs per patient visit of final cost centers are as follows:

Table 5.17 Unit Costs of Final Cost Centers

Department	Unit Cost (Rs.)
OPD	109.00
Medical Clinic	150.00
ANC	507.00
WE	937.00
FP	558.00
Dental Clinic	383.00
Ayurvedic Clinic	213.00

Figure 5.11 Unit Cost of Final Cost Centers



Cost per OP visit is Rs. 109.00. And medical clinic reports unit cost per visit as Rs. 150.00. They are the lowest cost per patient visit at the CD Samadigama. The highest unit cost per patient visit is presented by WB clinic that is Rs. 937.00. Comparing with other services, MCH and FP services have high unit costs per patient visit. Therefore cost per patient visit in medical clinic of CD Samadigama is higher than OPD. Unit cost per patient visit of ayurvedic department is Rs. 213.00.

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5.3 Cost Estimates under alternative assumptions

The above cost simulation assumes a patient load of 80 per day for OPD and 40 per day for medical clinic. But, in the real world the patient load could vary as either higher or lower number per day. Hence, the study is redo cost simulation assuming an interval of minimum and maximum patient load per day as the OPD visits are 50 and 100 per day and the medical clinic visits are 20 and 60 per day. The calculated cost can be illustrated as follows:

Table 5.18 Cost Profile of Minimum & Maximum Patient per day

Cost Category	OPD = 50: Medical Clinic= 20 per day visits		OPD = 100: Medical Clinic= 60 per day visits	
	Cost Rs.	%	Cost Rs.	%
Capital Cost	990,968.74	23%	990,968.74	22%
Material Cost	664,493.20	15%	861,243.27	19%
Labour Cost	2,657,976.16	62%	2,657,976.16	59%
Operating Cost	3,322,469.37	77%	3,519,219.43	78%
Full Cost	4,313,438.11	100%	4,510,188.20	100%

According to the above results, labour costs and capital costs are approximately similar in both maximum and minimum numbers per day visits while material cost being fluctuated within 2%. On the other hand, final outputs need to be considered too. Table 5.19 shows the unit costs in both cost simulations..

Table 5.19 Unit Costs of Maximum & Minimum Number of Patient Visits

Department	OPD=50:MeC=20 per day visits	OPD=100:MeC=60 per day visits
	Unit Cost (Rs.)	Unit Cost (Rs.)
OPD	158.00	93.00
Medical Clinic	188.00	117.00
ANC	527.00	507.00
Well Baby Clinic	944.00	937.00
FP Clinic	569.00	547.00
Dental Clinic	410.00	370.00
Ayurvedic Clinic	233.00	205.00

If number of OPD visits are 100 per day, unit cost can be reduced by Rs. 65.00 comparing with number of 50 visits per day. Moreover, unit cost per medical clinic could be reduced by Rs. 70.00 if per day visits can be increased from 20 to 60 visits. Unit costs of other departments except OPD and medical clinic, are decreased even their patient visits unchanged due to allocation criteria which are apportioned indirect cost to the final cost centers based on number of patient visits.

5.4 Discussion

With regard to the costing analysis above, the following factors are needed to be discussed.

5.4.1 Resource Utilization

5.4.1.1 Capital Resources

Central Dispensary Samadigama has been physically designed in a way that it can accommodate both preventive and curative services. However, floor areas are too large for the intended level of services (Field Mission Report, 2008). A 25% of total floor area still is not used. The same level of services could be provided with much smaller floor area than CD Samadigama. Thus, this costing exercise is ignored those unused floor areas. On the other hand, there are many sophisticated medical equipment and office furniture. Most of them are not available in the other existing CDs. Whilst, CD Samadigama still is not using some of medical equipments. For an example, X-ray Apparatus, Autoclave as well as full equipped ETU unit are few of them. Hence, still unused medical equipments are not considered. And there are 3 air conditioned rooms. But, the staffs are not using air-conditioner due to adequate ventilation comes when the large windows are opened. Hence, costs of air conditioning are not included in the study.

The total depreciated capital cost in 2008 was Rs. 677,370.00. 67% of this amount are spent for land and building. It is Rs. 453,349.00 (see appendix B). Large floor areas at the limited time were used that may be likely coursed to be spent a large amount of money for such capital goods. Comparison cost of land and building of existing system with intended system, Rs. 750,842.00 has to be spent for floor areas by the intended system. Because, building of the dispensary are used full-time. It is 77% of total capital costs. Moreover, the large equipments costs stand at Rs. 52,906.00 for the dental unit, because that department is used expensive and sophisticated machineries.

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According to the production theory, capital goods are fixed when increasing of volume of production is within the real capacity of such machineries/equipment. More capital goods are required when goods or services are produced beyond the maximum capacity of capital goods. In this context, costs of land & building, medical equipments and office furniture can be identified as the fixed costs. Because, such capital goods are adequate for providing the needs of the service population in Lunama area.

Moreover, costs (depreciation) of land and building of intended system increased due to time used of such inputs are increased. But costs of medical equipments and furniture are the same for both existing and intended systems as such goods are depreciated annually in both model due to time used of some of such goods was difficult to obtain due to inadequate and incomplete records.

5.4.1.2 Human Resource

The existing human resources in CD Samadigama are inadequate. Especially, lack of full time staff is a big issue when providing the intended services to the population who are seeking medical care from this unit. Still there is not available even a full-time medical officer. Anyway, with regard to the existing staff, the study was taken into account. Labour cost is the main component in the cost profile in CD Samadigama. It was more than 50% of total cost. Because, the medical staff of the dispensary are qualified. For examples, MO is qualified (Bachelor of Medicine and Bachelor of Surgery) and paid higher salary compared to RMO (see chapter III) as well as PHI, PHNS and PHMs are qualified. Cost of time allocation for field visits of 1 PHM who works full-time basis at the dispensary, are included to the costing exercise. Because, costs of contraceptive materials, which are circulated at the house-hold wise and the number of recipients, who received such materials, these are included into this costing exercise. On the other hand,

costs for field services of Area PHI are ignored as his routing tasks in the field range widely and these are not fixed. Though existing system has included cost of CSOs, the costs of such staff are ignored at the intended system. Because, it is assumed that the extended staff of intended model are adequate. On the other hand, community or voluntary participation may not be followed in other location of the country. And community participation should be used to complement services and not really to substitute (Field Mission Report, 2008).

The biggest portion of labour cost is borne by preventive care services such as ANC, FP, WB and Health Education. In contrast, preventive care services are incurred high labour cost due to national health policies and long term MCH programmes such as National Immunization Programme, Family Planning Programmes and Health Education programmes as well. In terms of cost centers, both existing and intended models bear the highest labour costs for administration department due to it includes 3 cost centers in to one center which is the cost centers of administration, security and pantry. Moreover, intended system spends 16% of total labor cost for OPD as the services are provided full-time basis. As OPD services of existing system were part-time, such system has spent 8% of total labour cost on OPD.

5.4.1.3 Material Goods

Material goods comprise drug cost, utilities, stationery and linen. In terms of drug cost of existing system, total drug cost was Rs. 495,801.63. The pharmacy spends Rs. 186,516.63 of total drug cost which is the highest portion of total drug cost. Next, FP clinic has used Rs. 149,142.30. Because, the clinic spends on number of contraceptive methods such as Depo-Provera, IUCD, Oral-Pills etc. Ayurvedic clinic also expends considerable amount for drugs which is Rs. 108,489.00. Likewise, it is assumed that drug

costs of pharmacy for intended system are double. It is Rs. 373,033.26. Most of the researches done in Sri Lanka regarding hospital costing, which reveal that the staffing and drug costs are major components of unit costs (Somanathan, 2000).

Utility costs include costs of water and electricity. Considering in water bill, it was Rs. 8,707.07 in 2008 (see appendix B). Water consumptions in order by departments are OPD, Ayurvedic and Dental clinics. Because, these departments are reported the highest number of patient visits in 2008. Moreover, water bill of intended model is double due to patient load of OPD and medical clinic is also double. Thus, water bill of such model is Rs. 17,878.79. In terms electricity, total electricity bill was Rs. 47,085.00. On average, monthly bill is Rs. 3,929.00. And, dental clinic utilizes the highest electricity bill which is Rs. 18,496.00 for the whole year as such department is using high electricity consumed machineries. In the intended system, electricity bill is Rs. 57,652.00. Electricity bill is not increased in the intended system as same as water bill increased due to a less number of electric appliance are used. But, it is observed that walls obstruct the disperation of natural light into the room due to the physical building design, which could be caused to increase the electricity bill. Values for stationeries such as inventory books, patients' record cards etc. are imputed due to the real values of as such stationeries are impossible to obtain as such things are produced by the government press and supplied them free of charge.

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5.4.2 Service Utilization

CD Samadigama delivers integration of preventive and curative services through one center. The coverage area of CD Samdigama is not officially recognized. Anyway, Lunama PHI Area including Samadigama PHM Area that include 10 Grama Niladari divisions, are covered (see Appendix A). The service schedule of the center is provided in the table 3.3. Table 5.2 and 5.10 illustrate the patient load of existing system and intended system in each month of the year 2008. Number of patient visits of OPD per day ranges 50 to 100. In terms of existing system, as OPD opened twice per week, in other days of week, patients are attending to the nearest hospital of PU Ambalantota which are located 10 Km away from Samadiigama. Moreover, medical clinic open only 2 hours per week only. Thus, a discussion with medical staff of the dispensary seems that the villagers are expected to seek care when the needs arise. But unavailable of sufficient staff is a major drawback for implementation the services regularly. Hence, the full time staff is required to meet the needs of intended service structure. Thus, service provision on OPD and medical clinic is extended through increasing the number of full time staff. As a result of that, number of OPD and medical clinic visits are increased.

Patient visits of ayurvedic and dental clinics are considerable. It is reflected that people have a need to seek such kind of services even at the primary care facility. Oral health is one major component of health promotion and preventive programmes.

MCH services are provided regularly as a twice per month and patients' visits are also regular. People are quite sensitive such kinds of preventive care as they know that effectiveness of preventive treatments are more powerful in the life. Likewise, patients' perceptions on full time service provision at the dispensary are straightforward. Because,

adequate space, availability of drugs and kindness perception of staff, these are few reasons which are affecting to improve patients' perception.

5.4.3 Unit Cost

Unit costs of final cost centers of existing system are likely high due to effecting of many reasons. Three medical officers for curative, preventive and ayurvedic services have attached at the CD Samadigama and their salaries are greater than the RMOs. Moreover, PHI and PHM office are stationed within health center premise. Likewise, a combination of preventive function with curative services in a one center is more advanced than other CDs (the old systems currently functioning at the country) in the country. And, this integration system is required more resources at one time. Moreover, lack of full time staff cause to reduce the level of utilization. In other words, limited services hours obstruct to provide more services that result to decrease the amount of output (number of patient visits). A large floor area is another reason for high unit cost. As discussed above (in 5.4.1.1), capital cost is quite high than material cost due to the use of large spaces either in the limited service hours or at the expanded service system. For example, Shafeeq (2007) and Somanathan (2000) report that material costs is a major component of hospital cost profile than capital cost. Because, material cost includes high drug cost which denotes as recurrent cost.

In addition the existing system and the intended system, a cost simulation was done within a range of maximum and minimum patient per day. When OPD visits per day are 50, unit cost is Rs. 158.00. But, if OPD visits can be increased from 50 to 100, unit cost can be reduced as Rs. 93.00. Also medical clinic ranges from 20 to 60 per day, unit cost will be reduced from Rs. 187.000 to Rs. 117.00.

Comparison the cost analysis of CD Samadigama with prior costing studies done in Sri Lanka, which can be summarized under the following services: a) cost per patient visit of OPD, b) medical clinic, c) dental clinic and d) ayurvedic clinic of some institutions (see table 5.20 in p.92).

In terms of cost per OPD visit, de Silva and Attanayake (1992) report average cost per OP visit in deferent CDs. For examples, CD - Halpe-Katana presents Rs. 35.00 for cost per patient visit with an average of 46 patients daily. The lowest unit cost is Rs. 23.00 which is reported on the average of 73 patients in the CD Andiambalama. On the other hand, CD Dewalapola shows Rs. 53.00 as average cost with 29 average patient visits. These type of CDs can be knows as traditional or existing CDs as explained in chapter III. Such institutions provide only symptomatic treatments and limited resources are available (see chapter III). However, unit cost per patient visit of CD Samadigama is quite high with comparing the latter unit cost per patient per day.

According to the study of Edirisinghe (2000) in Dompe District Hospital, unit cost per day is Rs. 64.00 with an average of 450 patients daily. This type of hospitals are provided indoor care and has a number of trained staff. Considering other clinics of this hospital, unit cost of medical clinic per patient is Rs. 74.00 per clinic day. An average of patients per clinic day is 215 which are five times as intended medical clinic of CD Samadigama. Whilst, unit cost dental clinic is higher than CD Smadigama. Because, utilization rate of dental clinic of Dompe District hospital is likely low. But, such clinic of intended system at the Samadigama reports less unit cost per patient per clinic day. It is Rs. 384.00 with 20 patients as an average per clinic day. Anyway, in terms of service and staff structure as well as physical structure, CD Samadigama stands below than District Hospitals. But it seems that those unit costs of institutions, Dompe hospital and CD Samadigama are likely different due to utilization of such services of both hospitals are widely gapped.

Somanathan (1998) and Somanathan et al (2000) classify hospitals as complex, intermediate and basic. Complex hospital includes teaching and other specialized hospitals. Unit cost of inpatient care facilities of such institutions is high as these facilities have sophisticated equipments, senior and qualified staff as compared to lower level facilities. Hospitals with inpatient facilities (not have any facilities of intensive care, blood bank, etc) and only outpatient facilities are classified as basic and outpatient care. Somanathan (1998) reveals unit cost per OP visit to ayurvedic facilities is Rs. 46.00 in complex hospitals and Rs. 56.00 in outpatient only. But cost per patient visit of ayurvedic clinic at the CD Samadigama ranges Rs. 200.00 to Rs. 220.00.

Finally, considering as a whole, unit costs of each facility in CD Samadigama is relatively high. But comparing CD Samadigama with other institutions, all of them are not homogeneous in terms of functions and staff structure, level of hospital. On the other hand, CD Samadigama can easily be piloted or as a benchmark for such service model which is not available still in the country.

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Table 5.20 Reported Cost per Patient Visit of Selected Studies

	Name of the Study	Average Patient per day/per Clinic Day	Cost * Rs.
OPD	de Silva and Attanayake (1992)		
	CD - Halpe-Katana	46	38.00
	CD- Dewalapola	29	53.00
	CD- Andiambalama	73	23.00
	Somanathan et al (2000) Complex***	-	338.00
	Somanathan et al (1998) Basic**	-	88.00
	Edirisinghe (2002) District Hospital	450	64.00
	CD - Samadigama (Existing Syatem)	77	147.00
	CD - Samadigama (Intended Syatem)	80	109.00
Medical Clinic	Edirisinghe (2002) District Hospital	215	74.00
	CD -Samadigama (Existing System)	16	261.00
	CD -Samadigama (Intended System)	40	150.00
Ayurvedic Clinic	Somanathan (1998) Complex	-	46.00
	Somanathan (1998) Outpatient	-	56.00
	CD -Samadigama (Existing System)	48	232.00
	CD -Samadigama (Intended System)	48	212.00
Dental Clinic	Edirisinghe (2002) District Hospital	18	454.00
	CD -Samadigama (Existing System)	20	415.00
	CD -Samadigama (Intended System)	20	384.00

Note: *Price adjusted using the GDP implicit price deflators. (Index numbers 1990 = 100)

**Covers only 4 districts of Sri Lanka in the 1991 survey.

*** Covers only 7 districts of Sri Lanka in the 1998 survey

Sources: de Silva et al (2007), de Silva and Attanayake (1992)

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5.5 Limitations

The study is faced mainly few limitations. Viz:

- The health center has not received the electricity bills since its interception due to administrative problems at the district. Hence, the bills were calculated for the whole year taken consultation from an engineer in the Ceylon Electricity Board (see appendices B).
- Due to water leakage, the water bills of last months were high. Anyway, the health center had two bills for last two months. An average unit cost and number of unit consumption per patient are obtained and then monthly bills were calculated based on patients load in each department (see appendices B).
- Coverage area of CD Samadigama is not still demarcated due to there is no referral procedure in Sri Lanka. This could be an obstruction when taking an effort on an explicit picture of service coverage of such service model is captured.

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CHAPTER VI

CONCLUSION AND RECOMMENDATION

The last chapter of the thesis will conclude the findings of the study at first, through the cost profile and the unit costs of CD Samadigama. The next, policy implication of the study will be explained.

6.1 Conclusion

The Classical Taiwan PHC model adopted at CD Samadigama are studied as an evidence in a way to rationalizing primary health care system, based on the re-categorization of health institutions policy in 2005. That guidelines lead to upgrade the facilities of primary health care institutions of the CDs and CD & MHs and to be renamed as primary medical care unit instead CDs, CD & MHs. Proposed facilities in the primary medical care unit are as follows:

- Outpatient Care
- Limited emergency care
- Poly-Clinic facilities

In addition to the above facilities, CD Samadigama has dental clinic, ayurvedic clinic, office of PHM and PHI as well as conference room. However, the study was considered all the services which are currently provided at the center.

The study mainly aimed to calculate the full cost and the unit costs of this newer model. But, under-supply of inputs- human resources especially medical doctors and non-

supply of complementary inputs such as hospital attendants, labourers are the major issues for implementation of the intended service. It was observed that the full-time staff is required to fully realize this integration model. Thus, the study was conducted in two forms of cost analysis which were 1) Existing System at the dispensary and 2) Intended System which was done under alternative assumptions.

Considering with regard to the hospital costing, total costs (cost profile) need to be considered at first.

Table 6.1 Cost Profile

Cost Category	Existing System		Intended System (OPD=80;MeC*=40 per day visits)		% of increasing cost
	Cost Rs.	%	Cost Rs.	%	
Capital Cost	677,370.51	21%	974,882.59	22%	30%
Material Cost	557,658.14	17%	763,691.59	17%	27%
Labour Cost	1,977,341.86	62%	2,689,803.72	61%	27%
Operating Cost	2,535,000.00	79%	3,453,495.31	78%	27%
Full Cost	3,212,370.52	100%	4,428,377.91	100%	28%

*- MeC denotes Medical Clinic.

According to the above figures, both systems were spent approximately the same proportion of their full costs on capital, material and labour costs. Labour cost was the main component of the cost profile in the CD Samadigama. It was 61% as a percentage of full cost. Then capital costs placed the next highest portion of full cost which was 22%. Though material cost was expended relatively less amount of full cost, drug cost was a major component of material cost. In the 2008, the dispensary was spent for drugs as Rs. 680,898.06 and Rs. 495,801.63 for intended and existing systems respectively. At

the intended model, the total cost (full cost) was increased when the full-time staff existed and the level of utilization was increased. Thus, capital cost was increased by 30% as the time uses of space was expanded. Labour and material costs were also increased by the same proportion as 27% due to the new staff, increasing utilities and required more drugs and consumables as well.

In addition to the above findings, cost simulation assumed a patient load of minimum and maximum number per day visits as 50 and 100 per day visits for OPD and 20 and 60 per day visits for medical clinic respectively. The levels of utilization of other departments were not changed due to services of those departments were provided as the same in the proposed guideline. Thus, the levels of utilization in year 2008 were estimated with assumption made according to the existing system that can be illustrated as in the table 6.2.

Table 6.2 Number of Patient Visits - 2008

Department	Existing System	Intended System		
		OPD=50:MeC=20 per day visits	OPD=80:MeC=40 per day visits	OPD=100:MeC=60 per day visits
OPD	7,462	13,148 (45%)	21,132 (65%)	25,828 (71%)
Medical Clinic	710	1,679 (58%)	1,760 (60%)	2,639 (73%)
Dental Clinic	1,133	1,133	1,133	1,133
Ayurvedic Clinic	1,334	1,334	1,334	1,334
Antenatal Clinic	643	643	643	643
Well Baby Clinic	286	286	286	286
Family Planning Clinic	976	976	976	976
Total	12,544	19,200	27,264	32,840

Note: Figures in parentheses indicate changes of number of patient visits relative to patient load of existing system.

Then, total costs could be calculated that costs which were spent on services provided by the dispensary to the patient load shown in the above table.

Table 6.3 Cost Profile of each Model

Cost Category	Existing System		Intended System					
	Cost Rs.	%	OPD=50:MeC=20 per day visits		OPD=80:MeC=40 per day visits		OPD=100:MeC=60 per day visits	
			Cost Rs.	%	Cost Rs.	%	Cost Rs.	%
Capital Cost	677,370.51	21%	974,882.59	15%	974,882.59	22%	974,882.59	22%
Material Cost	557,658.14	17%	664,271.20	15%	763,691.59	17%	861,021.27	19%
Labour Cost	1,977,341.86	62%	2,689,803.72	62%	2,689,803.72	61%	2,689,803.72	59%
Operating Cost	2,535,000.00	79%	3,354,074.93	77%	3,453,495.31	78%	3,550,824.99	78%
Full Cost	3,212,370.52	100%	4,328,957.52	100%	4,428,377.91	100%	4,525,707.59	100%

Considering the above figures, though services hours and patient load are increased in the intended models (cost simulation) relative to the existing model, material cost is varied within 2% while capital cost and labour cost are remained as the same. In theory, material and labour cost (recurrent cost) vary when number of volumes in production is increased. In this context, the staff and capital inputs are not varied due to such inputs are sufficient that the similar services could be provided using the same inputs to the much more patients than CD Samadigama (e.g. CD Hali-ela: 121 per day OPD visits, CD Keppetipola; 99 per day OPD visits in 2007).

Considering cost center categories, final cost centers category is consumed a large amount of full cost which is 44% and 45% of intended and existing systems respectively. The next big portion stands for overhead cost centers and finally intermediate cost centers. In terms of total indirect cost, both systems spent a big amount for OPD at first

and secondly for the FP clinics. Because, the high service utilizations seem at the OP department and on the other hand, FP clinic uses a big amount for the drugs and other consumables such as contraceptive materials.

Considering the above discussion on cost components as a whole, the intended system could be figured more rational view with regard to the capacity of the dispensary. Moreover, CD Samadigama expends a greater amount of total cost on curative care services than preventive care services as a result of national health expenditure being allocated more resource on curative care services too.

Unit costs of each service are calculated in a same manner, which means that the full cost of each department divided by unit of output-number of patient visits of relative department. Unit costs calculated by the study can be summarized as follows;



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Table 6.4 Unit Cost of Patient Service Centers

Department	Existing System	Intended System					
		Per day visits OPD=50: MC=20		Per day visits OPD=80: MC=40		Per day visits OPD=100: MC=60	
	Cost Rs.	Cost Rs.	% of Increasing/decreasing cost	Cost Rs.	% of cost deduction	cost Rs.	% of decreasing cost
OPD	147.00	158.00	7%	109.00	-35%	93.00	-58%
Medical Clinic	261.00	188.00	-39%	150.00	-74%	117.00	-123%
Antenatal Clinic	514.00	527.00	2%	507.00	-1%	507.00	-1%
Well Baby Clinic	940.00	944.00	0%	937.00	0%	937.00	0%
FP Clinic	561.00	569.00	1%	558.00	-1%	547.00	-3%
Dental Clinic	418.00	410.00	-2%	383.00	-9%	370.00	-13%
Ayurvedic Clinic	232.00	233.00	0%	213.00	-9%	205.30	-13%

When OPD visits per day is 80 and the department provides the services for 6 days per week, unit cost of such department could be decreased by 35%. In other words, average cost could be reduced when number of output (number of services provided) could be increased. Comparing of 50 patient per day of OPD, it seems that the dispensary could be provided more services. In terms of medical department, unit cost is reduced by 74% when per day visits are 40. Thus, when per day visits of OPD and medical clinic are 100 and 60 in turn, unit costs could be reduced by 58% and 123% respectively with compared to the existing system. As a whole, increasing number of patients of OPD and medical clinic effect to other department to reduce their unit costs because, allocation

criteria is based on the number of patient visits in order to allocate the total direct and indirect costs of transients cost centers to the final/absorbing cost centers. It means that an amount of absorption of total indirect cost (costs of transient cost centers) by a certain department vary when number of patient load increase or decrease in any department.

Above table illustrates that unit cost of OPD is increased by 7% at the intended system with compared to the existing system, when service time period is increased from 2 days per week to 6 days per week. The time uses of space, drugs and other utilities are increased when the levels of utilization increase. In other words, average cost is increasing when quantity of services (number of patients treated) are increased that such situation could be defined on one hand, as “Diseconomies of Scale” and on the other hand, resources available at the dispensary could have been the capacity to provide more services to more patients. It is provided the evidence by the above calculations. Nevertheless, unit cost of medical clinic is deducted by 40% when services hours are increased from 2 hours of existing system to 8 hours (one day) of intended system. But at this context, the time uses of space are not increased as the same as the level of utilization expand of medical clinic such average cost deduction therefore, could be defined as “Economies of Scale”.

6.2 Recommendation

- The CD Samadigama could be a pilot if the full complement of staff exists.
- Average cost could be reduced when the level of utilization could be increased and the full time staff could be recruited.
- An integrated model of preventive and curative care services is more advantage than providing such services by the different institutions.

- The floor area of CD Samadigama needs to be reduced in order to cut down the unnecessary cost born by capital cost.
- The ayurvedic clinic functioning at the dispensary provides the more valuable services on health promotion and prevention through a model of full cooperation of western medicines and traditional medicines.
- Participation of Community volunteers to the service provision at the dispensary give a message to other locations of the country that they can be complementary input where the lack of complementary inputs or supportive staff are insufficient. Thus, on one hand, an interrelationship of community and primary health care provision could be built and on the other hand, volunteers are the short term alternative solution at the situation of lack of full-time staff.
- A referral system could be originated when service population could be demarcated and an ambulance service could be provided.
- Unit cost could be useful for government/private health sector/funding agencies in order to set the price or to subsidy of such kind of services.
- When doing the projections for future budgeting, unit costs of this study could be helpful.
- This study could be a benchmark in future when cost evaluation studies will be done.
- Costing information of this study contributes to the Health Information System (HIS).

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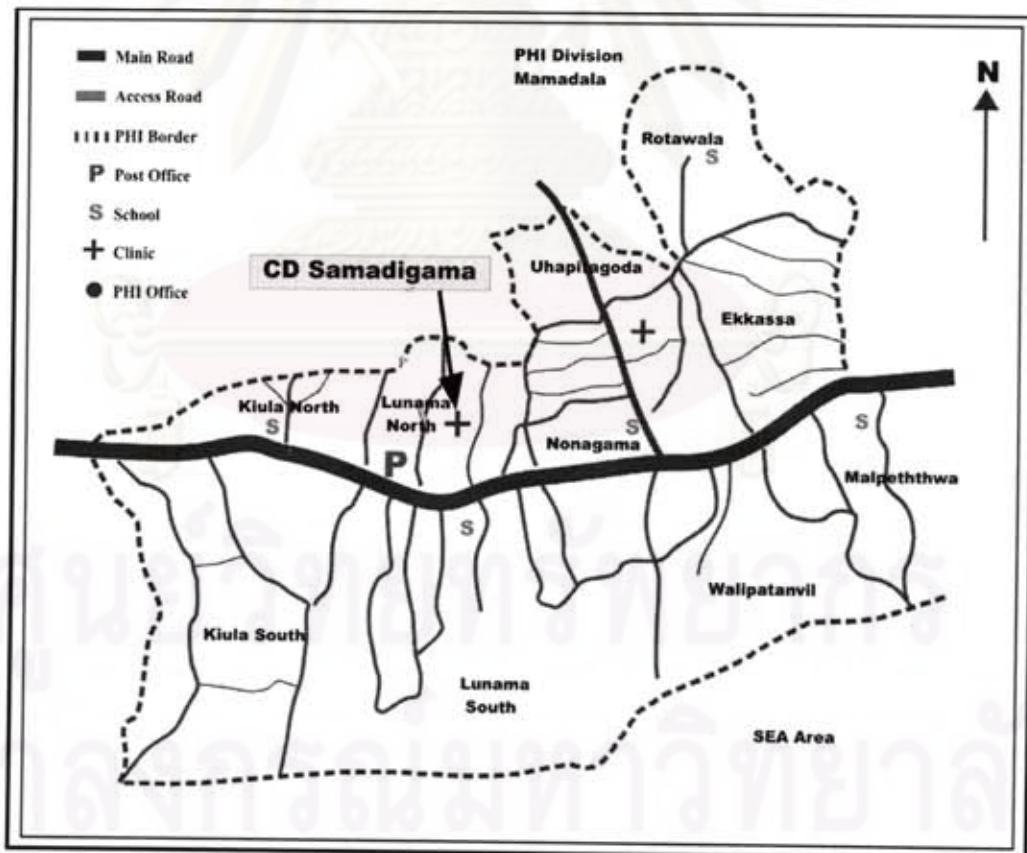


Appendices

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Appendix A

Map of Samadigama Health Center, Hambantota, Sri Lanka



Appendix B

COST CALCULATIONS

I. Capital Cost

This includes resources that last more than one year.

Land:

It is assumed as the land is given for 30 years lease in order to work out opportunity cost of the land. Hence, current value of a perch of land is around Rs. 8000.00. Usually cost of land is available as cost per perch. A perch is equal to 272.25 square feet. Therefore,

Formula - 1

$\frac{8000.00}{272.25 \text{ Sq.ft.}} = \text{Rs. } 29.40 = \text{Unit cost/ square foot}$
$\frac{29.40}{30 \text{ years} \times 365} = \text{Rs. } 0.003 = \text{Opportunity cost/square foot/day}$
$0.003 \times \# \text{ of sq.ft per department} \times \# \text{ of days used per year} = \text{Cost of land/department/year}$

Linear depreciation was assumed for the land (Shepherd et al., 1998). The valuation of the land was obtained from the opinions of the residents and a land valuer of this area.

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Building:

The building of the health center was donated. It is newly constructed in year 2007. The actual cost per square foot was obtained from a civil engineer at the Central Engineering Consultancy Bureau (CECB). Cost of building per square foot is Rs. 3500.00 including bathroom fittings, wiring etc. Linear depreciation and a life span of 30 years are assumed with regard to the building (Sheppard et al, 1998). Cost of building per day is calculated using the formula in below, for each department separately.

Formula 2

$\text{Step 1 } \frac{3500.00 \times \# \text{ of sq. feet}}{10950^*} = \text{Cost of building of the department / day}$
$\text{Step 2 } \text{Cost of building of the department / day} \times \# \text{ of days used/year} = \text{Cost of building/year/dept.}$

*- Number of days for 30 years = 365 x 30 = 10950

Table 1.1 shows the depreciated cost of both land and building for each department per year. Costs of building and land of administration department is included pantry, watcher's room, entrance and walking areas too (Jayatissa, 1995).

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Table 1.1 Depreciatory costs of land and building per year 2008 (Sri Lankan Rupees)

Department	# of Square feet	Time used (days/hours)	Cost of Land (Rs.)	Cost of Building (Rs.)	Total (Rs.)
Admin. & Registration	268.8	96 hrs	77.00	8,248.00	8,325.00
Security & Pantry	1752	365	1,918.00	204,400.00	206,318.00
Maintenance & Cleaning	58.5	288	50.54	5,385.20	5,435.74
Store Room	186	288	160.70	17,122.20	17,282.90
Health Education	532.95	26	42.00	4,429.00	4,471.00
PHI Office	169.1	288	146.00	15,566.00	15,712.00
PHM Office	179	288	154.70	16,478.00	16,632.70
Pharmacy	355.6	96 hrs	102.40	10,911.60	11,014.00
Sterilizer Room	177.31	96 hrs	51.00	5,440.00	5,491.00
OPD *	354.45	500hrs	427.50	45,530.00	45,957.50
Medical Clinic*	354.45	96 hrs	82.08	8,741.76	8,823.84
Dental Clinic*	355.6	96	658.80	69,916.00	70,574.80
Ayurvedic Clinic*	568.75	28	210.15	22,310.00	38,606.30
ANC*	135.75**	63 hrs	48.30	5,216.00	5,264.30
WE*	135.75**	57 hrs	43.70	4,719.60	4,763.30
FP*	135.75**	57 hrs	43.70	4,719.60	4,763.30
Total	5,312.51	-	4,216.57	449,132.96	453,349.53

* - Cost of land and building of waiting area and wash rooms are included

** - The same floor area is used an equal time in the same day.

Note: Total square feet of waiting area is 1924.3. Thus, cost of land per day is Rs. 5.80 (1,924.3 sq.ft. x Rs. 0.003). Also, cost of building per day is Rs. 615.00 (1924.3 sq.ft. x Rs. 0.32).

Total number of square feet of the building - 9,657.25 Sq.ft (100%)
 Used floor area - 7,236.81 Sq.ft (75%)
 The rest (unused floor area) - 2,420.44 Sq.ft (25%)

Medical Equipments

All kinds of medical equipments that last more than one year or unit price is more than \$ 100 are included to this category. The straight line depreciation method is assumed. As all these equipments are donated, the replacement costs are adopted (Creese & Parker, 1994). The price lists in 2008 for the surgical equipments are given by the Medical Supply Division and Bio-Medical Department of MoH. Total costs of medical equipments which are currently used are Rs. 141,561.00.



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Table 1.2 Depreciatory Costs of Medical Equipments (Sri Lankan Rupees)

Item Description	Qty	Life Span	Unit Price Rs.	PHM	Sterilizer Room	OPD	Medical Clinic	ANC	WB Clinic	Dental Clinic	FP Clinic	Ay. Clinic
Mini high pressure sterilizer	1	15	360,000.00		24,000.00							
Nebulizer with Adult & Pediatric Masks	1	10	20,000.00			1333.00	666.00					
Suction Apparatus Adult	1	10	150,000.00			10,000.00	5,000.00					
Sphygmomanometer	2	10	7,500.00			375.00	375.00	750.00				
Stethoscopes Adult	2	10	14,000.00			933.00	466.00	466.00	466.00		466.00	
ENT Examination Sets	1	10	140,000.00			9,333.00	4,666.00					
Ophthalmoscope	1	10	8,000.00			533.00	266.00					
Glucometers	2	10	5,000.00			250.00	250.00	166.00	166.00		166.00	
Steam sterilizer	1	15	40,000.00		2,666.00							
X-Ray Illuminators-Single	1	10	15,000.00			1,000.00	500.00					
Examination Spot Lamp	1	5	20,000.00			666.00	666.00	666.00	666.00		666.00	666.00
Examination Beds	2	15	16,000.00			533.00	533.00	266.00	266.00		266.00	266.00
Medication Trolley-Stainless Steel	1	10	14,000.00			280.00	280.00	280.00	280.00		280.00	
Dressing Trolley	2	10	7,500.00			150.00	150.00	150.00	150.00		150.00	
Folding Screen/Bed Side	2	15	5,500.00			73.00	73.00	73.00		367.00	73.00	73.00
Thermometers-Digital	2	10	750.00	75.00		37.50	37.50					
Dressing Forceps	2	5	2,083.00			416.00	416.00					
Kidney Trays-8"	2	10	2,400.00			96.00	96.00	96.00	96.00		96.00	
Scissors Sharp Point-8"	1	5	3,700.00								740.00	
Scissors Straight-8"	1	5	3,400.00								680.00	

Table 1.2 Depreciatory Costs of Medical Equipments (Sri Lankan Rupees) cont;

Item Description	Qty	Life Span	Unit Price Rs.	PHM	Sterilizer Room	OPD	Medical Clinic	ANC	WB Clinic	Dental Clinic	FP Clinic	Ay. Clinic
Stainless Stell Pails	1	5	2,700.00							540.00		
Gynecological Bed	2	15	62,000.00			1,377.00	1,377.00	1,377.00	1,377.00		1,377.00	1,377.00
Weighing Scale Adult	2	10	1,700.00			28.00	28.00	28.00	28.00		28.00	28.00
Height Measuring Tape	2	5	1,200.00			120.00	120.00	120.00	120.00			
Measuring Tape	1	5	60.00	12.00								
Pinard	2	5	1,056.00	211.00		211.00						
Urine Test Kit	1	5	2,000.00	400.00								
Mackintosh	2	5	800.00	160.00		160.00						
Light Cure Machine	1	10	4,000.00							4,000.00		
Scalar	1											
Vibrator	1											
High Speed H/p	1	10	40,000.00							4,000.00		
Low Speed H/p	1											
Treatment Chair-Portable	1	15	10,000.00							666.00		
Dental Chair & Unit	1	15	650,000.00							43,333.00		
Wheel Chair	1	10	17,500.00			1,750.00						
Sponge Holders-16cm	1	5	300.00								60.00	
Total				858.00	26,666.00	29,654.50	15,965.50	4,438.00	3,615.00	52,906.00	5,048.00	2,410.00

Office furniture, Cleaning/Kitchen Utensils and Linen

The prices of office furniture were taken from Damro Manufacturing Company (PVT) LTD., No.57, Hambantota as the brand name of all furniture is Damro. The prices cleaning/kitchen utensils and linen were obtain from the Sisil Showroom in Ambalantota, the Chandula Stores in Piliyandala, Abans Showroom in Ambalantota. The life years are assumed. The linear depreciation method is used (C/N). Table 1.3 represents the depreciatory costs of the above capital goods.



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Table 1.3 (A): Depreciatory costs of office furniture (Sri Lankan Rupees)

Item Description	Qty	Life Span	Unit Price	Admin. Office	Store room	Health Education	Pharmacy	PHI	PHM
Steel cupboards	2	15	8,500.00	566.00					
Filling Cabinets	3	15	17,500.00	3,500.00					
Magi Boards-2"x2"	2	10	2,000.00	200.00					200.00
Notice Boards-2"x3"	2	10	1,750.00	175.00					175.00
Water Filter	2	8	2,900.00						362.00
Photocopy Machine	1	10	129,950.00	12,995.00					
Computer + Computer Chair & Table 1/set	1	5	60,890.00	12,178.00					
Refrigerator (SiSil)	1	10	35,000.00						
Writing Tables	9	12	11,000.00	1,832.00	916.00		916.00	916.00	916.00
Armed Chairs	8	15	7,100.00	946.00	473.00		473.00	473.00	473.00
Dining Table	1	12	7,840.00	653.00					
Waiting Chairs/4 sets/1 line	12	15	13,620.00						
Library Cup Board	3	15	16,000.00	1,066.00					
Book Rack	3	12	9,300.00	775.00				775.00	775.00
Conference Table / 6 pieces 1/set	1	12	29,715.00			2,476.00			
Plastic Chairs	50	12	500.00	1,250.00			83.00	83.00	83.00
Armed Chairs – Fabric	30	15	4,100.00			8,200.00			

Table 1.3 (B): Depreciatory Costs of office furniture (Sri Lankan Rupees)

Item Description	Qty	Life Span	Unit Price	Sterilizer Room	OPD	Medical Clinic	ANC	Well Baby Clinic	Dental Clinic	FP Clinic	Ayurvedic Clinic
Steel cupboards	2	15	8,500.00								
Filing Cabinets	3	15	17,500.00						566.00		
Magi Boards-2"x2"	2	10	2,000.00								
Notice Boards-2"x3"	2	10	1,750.00								
Water Filter	2	8	2,900.00								
Photocopy Machine	1	10	129,950.00		362.00						
Writing Tables	9	12	11,000.00		580.00	580.00	580.00	580.00	580.00	580.00	
Armed Chairs	8	15	7,100.00	916.00	458.00	458.00	229.00	229.00	916.00	229.00	229.00
Dining Table	1	12	7,840.00		236.50	236.50	118.25	118.25	118.25	118.25	
Library Cup Board	3	15	16,000.00		1,556.00	1,556.00	1,556.00	1,556.00	1,556.00	1,556.00	1,556.00
Book Rack	3	12	9,300.00		1,066.00	1,066.00					
Plastic Chairs	50	12	500.00		83.00	83.00	83.00	83.00	83.00	83.00	83.00

Table 1.3 (C): Depreciatory costs of cleaning/pantry utensils and linen (Sri Lankan Rupees)

Item Description	Qty	Life Span	Unit Price	Admin. Office	Cleaning	Store room	Health Education	Pharmacy	PHI	PHM
Small Basket	10	2	75.00	75.00		37.50	37.50	37.50	37.50	37.50
Plastic Bucket	2	2	165.00	165.00						
Pedal Dust Bin	6	2	200.00	100.00						
Brush Small	1	1	35.00		35.00					
Floor Wiper	1	1	150.00		150.00					
Mop Bucket	1	2	650.00		325.00					
Garbage Bin	1	3	975.00		325.00					
Tea Spoon Set (6 Pcs)	1 set	2	90.00	45.00						
19" Tray	2	5	150.00	60.00						
Glasses	12	2	50.00	300.00						
Tea Set	2	5	800.00	320.00						
Table Cloth	10	1	200.00	200.00				200.00	200.00	200.00
Curtains	13	5	90.00	54.00			54.00	18.00	18.00	18.00
Total				3,7455.00	835.00	1,426.50	10,767.50	1,727.50	2,502.50	3,239.50

Table 1.3 (D): Depreciatory costs of cleaning/pantry utensils and linen (Sri Lanka Rupees)

Item Description	Qty	Life Span	Unit Price	Sterilizer Room	OPD	Medical Clinic	ANC	WB Clinic	Dental Clinic	FP Clinic	Ayurvedic Clinic
Small Basket	10	2	75.00		18.75	18.75	9.37	9.37	37.50	9.37	9.37
Plastic Bucket	2	2	165.00								
Pedal Dust Bin	6	2	200.00		100.00	100.00	100.00		100.00		100.00
Table Cloth	10	1	200.00	200.00	200.00	200.00	100.00	100.00	200.00	100.00	100.00
Curtains	13	5	90.00	18.00	18.00				18.00		18.00
Total				1134.00	4678.25	4298.25	2775.62	2675.62	4174.75	2675.62	2095.37

2. Recurrent Cost

Recurrent cost can be divided into two categories.

I. Labour Cost

In-depth interview and observation method were applied to collect data of time spends of the personnel (Shepard et al, 1998: Kasturiratne, 2003). The formula in the below is used to calculate the cost of time spend by a single staff on a single department. Labour costs include midpoint of the new salary scale, allowances/fringe benefits etc.

Formula 3

$\frac{\text{Salary per month}}{\text{\# of working hour per month}} = \text{Cost per hour}$
$\text{Cost per hour} \times \text{\# of hours working in one department/year} = \text{Cost of the department/year}$

MOIC, dental surgeon, 2 ordinary labours in OPD and one ordinary labour in dental clinic work 184 hours per month (8 hour/day x 20 days/month and 4 hrs/day x 6 days). And, other staff work 176 hours per month (8 hour/day x 20 days/month and 4 hrs/day x 4 days).

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จุฬาลงกรณ์มหาวิทยาลัย

Table 2.1 (A): Labour Costs

Department	MOIC	Dental Surgeon	Ayurvedic Doctor	PHM 1	PHM 2	PHM 3	PHM 4	PHI
Administration	13,913.60 (64)							
Maintenance & Cleaning								
Store Room	6,956.80 (32)							
Health Education				23,623.82 (167)	23,623.82 (167)	20,776.47 (167)	27,229.35 (167)	27,095.75 (167)
PHI Office								44,943.25 (277)
PHM Office							192,779.40 (1182)	
Sterilizer Room							3913.20 (24)	
OPD	119,135.20 (548)							
Medical Clinic	19,131.20 (88)							
Dental Clinic		131,500.80 (576)						
Ayurvedic Clinic			39,453.00 (224)					
ANC	2,608.80 (12)			7,426.65 (52.5)	7,426.65 (52.5)	6,531.53 (52.5)	40,690.12 (250)	
WE Clinic	2,608.80 (12)			6,719.35 (47.5)	6,719.35 (47.5)	5,909.43 (47.5)	39,874.90 (245)	
FP Clinic	2,608.80 (12)			6,719.35 (47.5)	6,719.35 (47.5)	5,909.43 (47.5)	39,874.90 (245)	
Total	166,963.20 (768)	131,500.80	39,453.00	44,489.17	44,489.17	39,126.86	344,361.87	72,039.00

Note: Figures in parentheses show the time spend by each staff at the each department.

Table 2.1 (B) Labour Costs

Department	Dispenser for Ayurvedic	Ordinary Labour for Ayurvedic	Dispenser for Pharmacy	Ordinary Labour for Pharmacy	Or. Labour 1 (2208)	Or. Labour 2 (2208)	Sanitary Labour (2208)	Ordinary Labour for Dental	Security Guard (full-time)	Total (A+B)
Administration					20,063.00	20,063.00			19,4760.00	248,799.60
Maintenance & Cleaning							194,760.00			194,760.00
Store Room					20,063.00	20,063.00				47,082.80
Health Education					20,063.00	20,063.00				162,475.21
PHI Office					20,063.00	20,063.00				85,069.25
PHM Office					20,063.00	20,063.00				232,905.40
Pharmacy			81,408.00 (768)	76,761.60 (768)						158,169.60
Sterilizer Room					20,063.00	20,063.00				44,039.20
OPD					20,063.00	20,063.00				159,261.20
Medical Clinic					20,063.00	20,063.00				59,257.20
Dental Clinic								57,571.20 (576)		189,072.00
Ayurvedic Clinic	24,864.00 (224)	23,408.00 (224)								87,725.00
ANC					20,063.00	20,063.00				104,809.75
WE Clinic					20,063.00	20,063.00				101,957.83
FP Clinic					20,063.00	20,063.00				101,957.83
Total	24,864.00	23,408.00	81,408.00	76,761.00	220,693.00	220,693.00	194,760.00	57,571.20	194,760.00	1,977,341.87

Note: Figures in parentheses show the time spend by each staff at the each department.

II. Material Cost

This included medical materials, non- medical materials and operation & maintenance. Medical goods included drugs, vaccines and other consumables. Non-medical goods were stationery, furniture etc.(life year less than one year). According to the assumed usage pattern, non-medical goods were distributed.

In terms of Operation and maintenance cost for **building**, de Silva et al. (1997) calculate the running cost for specific appliances such as lights, machines according to their wattage taking consultation from an engineer of Ceylon Electricity Board. This study was also adopted the following formula.

Formula 4

$$\text{Cost of an electric appliance} = (\text{Wattage of appliance}/1000) \times \text{Unit Cost} \times \text{Number of Hours}$$

The formula in the below was used in calculation for water consumption.

Formula 5

Expenditure on water was divided by the number of units used each month for two months;

$$\frac{\text{Monthly Expenditure}}{\text{Number of units of that month}} = \text{Cost/unit/month}$$

$$\frac{\text{Cost/per unit of two months}}{2} = \text{Average cost/unit}$$

$$\text{Cost of department} = \text{Average cost/unit} \times \text{Number of unit used per person} \times \text{Number of person}$$

Table 2.2: Summary of Cost Calculations on Capital, Material and Labour Resources

Department	Water Bill	Electricity Bill	Cleaning Utensils	Stationery & Linen	Drugs	Land & Building	Medical Equipments	Office Furniture and Others	Labour Cost	Total
Administration		7,008.80		678.00		214,643.00		37,455.00	248,799.60	508,584.40
Cleaning		192.00	1,630.00			5,435.74		835.00	194,760.00	202,852.74
Store Room		241.10				17,282.90		1,426.50	47,082.80	66,033.30
Health Education		511.00				4,471.00		10,767.50	162,475.21	178,224.71
PHI		781.24		778.00		15,712.00		2,502.50	85,069.25	104,842.99
PHM		2,548.00		778.00		16,632.70	858.00	3,239.50	232,905.40	256,961.60
Pharmacy		1,643.52		800.00	186,516.63	11,014.00		1,727.50	158,169.60	359,871.25
Sterilizer Room		2,046.20				5,491.00	26,666.00	1,134.00	44,039.20	79,376.40
OPD	5,476.86	3,613.90		400.00		45,957.50	29,654.00	4,678.25	159,261.20	249,041.71
Medical Clinic	521.44	2,384.40		200.00		8,823.84	15,965.00	4,298.25	59,257.20	91,450.13
Dental Clinic	832.01	18,496.10		400.00		70,574.80	52,906.00	4,174.75	189,072.00	336,455.66
Ayurvedic Clinic	978.87	693.98		400.00	108,489.00	22,520.15	2,410.00	2,095.37	87,725.00	225,312.37
ANC	473.40	2,321.40			11,384.00	5,264.30	4,438.00	2,775.62	104,809.75	131,466.47
WB Clinic	210.15	2,282.40			40,269.70	4,763.30	3,615.00	2,675.62	101,957.83	155,774.00
FP Clinic	214.34	2,321.40			149,142.30	4,763.30	5,048.00	2,675.62	101,957.83	266,122.79
Total	8,707.07	47,085.44	1,630.00	4,434.00	495,801.63	453,349.53	141,560.00	82,460.98	1,945,514.31	3,212,370.52

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จุฬาลงกรณ์มหาวิทยาลัย