COST OF PROVISION OF ESSENTIAL HEALTH SERVICES IN PUBLIC HEALTH CENTERS OF JIMMA ZONE, SOUTH WEST ETHIOPIA.

By

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A Thesis submitted to Department of Health Economics, Management and Policy, Faculty of public health, Institute of health, Jimma University, in partial fulfillment of the requirements for the degree of Master of public health (Health Services Management)

November, 2018

Jimma, Ethiopia

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ABSTRACT

Introduction: - Improvement of universal coverage of essential health service through the use of cost-effective strategies continues to be a challenge, particularly in Ethiopia. There is a paucity of knowledge on the cost of essential health services that poses a challenge in the cost analysis of these services. Generation of up -to-date information on the costs of essential health service (EHS) is therefore crucial for budgeting and allocation of adequate resources to health centers.

Objective:-To analyze the costs of essential health services at public health centers in Jimma Zone.

Methods and participants: - A facility based cross-sectional study was conducted in public health centers of Jimma zone from April 10 to may 9, 2018. Sixteen selected health centers located in eight districts of the zone were included. The cost study was conducted from a provider perspective using retrospective, standard costing approach. A checklist developed by Management Sciences for Health (MSH) was adopted to collect relevant cost data. Unit cost of each service was calculated by dividing the costs of inputs incurred by the total number of output of the respective services during the base year. Step-down allocation (SDA) was used to allocate costs to final services. Data were coded and entered in EPI-DATA and exported to Ms-excel 2016 and SPSS version 20 for descriptive analysis to display frequency, percentage, total cost, and unit costs essential health services.

Results: The Average annual cost of providing essential health services at health centers in Jimma zone was USD 109,806.03 with standard deviation of USD 50,564.9. Most (83.7%) of the total Annual cost was spent on recurrent items. Nearly half (45%) of total annual cost was incurred by personnel followed by drugs and consumables that accounted around one third (29%) of the total Annual cost. Similarly, around two third (65.9%) of the total annual cost was incurred for provision of essential health services at the final cost center. The average overall unit cost was USD 7.4 per EHS services per year.

Conclusion: - With carefully attentive effort, health center costing is possible in our settings and cost of essential health services can be estimated. Cost of Essential health services provision at health centers were low and so, necessitating funding of significant resources to provide standard health care services. The variability in unit costs and cost components for EHS also suggest that the potential exists to be more efficient via better use of both human and material resources

Key words: Cost, Essential Health Services, Health centre, Jimma, South West Ethiopia.

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ACRONYMS

ANC	Antenatal Care
BPHS	Basic Package of Health Services
CMH	Commission on Macroeconomics and Health
ED	Emergency Department
EHS	Essential Health Services
EHSP	Essential Health Service Package
EMIS	Expenditure Management Information System
EML	Essential medicines list
EPI	Extended Public Immunization
ETB	Ethiopian Birr
FMOH	Federal Ministry of Health
FP	Family Planning
HC	Health Centre
HEFD	Health Economics and Financing Directorate
HMIS	Health Management Information System
HPP	Health Policy Project
HSTP	Health Sector Transformation Plan
IPHS	Indian Primary Healthcare Standards
LMIC	Lower and Middle Income Country
MSH	Management Sciences for Health
NBE	National Bank of Ethiopia
NGO	Non-Governmental Organization
NHA	National Health Accounts
PHC	Primary Health Care
PNC	Postnatal care
RHB	Regional Health Bureau
SDG	Sustainable Development Goal
SDP	Service Delivery Points
UHC	Universal Health Coverage
USD	United States Dollar
WDR	World Development Report
WHO	World Health Organization

CHAPTER 1:-INTRODUCTION

1.1. Background of the Study

Good health is a main target of all households and governments in all countries. All over the world, health care systems are increasingly being tasked to improve the quality of health services and to reduce the rate of cost increases. However, escalating health expenditures have been a universal phenomenon in recent decades. The degree of escalation has been highest in low income countries (1).

EHS are a limited list of guaranteed minimum public health and clinical interventions delivered at the community, first and second level of care that provide the best value for money. In most countries, the package of services includes sexual, reproductive and maternal health; newborn and child health; infectious diseases, including tuberculosis, malaria and HIV/AIDS; non-communicable diseases; and mental health. Hence, the adequate funding and delivery of EHS at healthcare facilities were found to have paramount importance. Essential package of health services (EHSP) are frequently referred to different terminologies like essential health benefits, essential services, primary healthcare services, essential services package, essential health package, and essential package of health services, primary health care package, core package of interventions or minimum packages, the motivation behind such a development is the belief that current government spending in many countries is miss allocated, and could be better directed to meet the health needs of populations (2).

Defining the service package as an EHS in part responds to health (and thus access to healthcare) as a human right, as outlined in the World Health Organization (WHO) Constitution that recognize essential health services (EHS) as the building blocks for universal health coverage (UHC), the cornerstone of the Primary Health Care (PHC) delivery strategy and promoted through health for all and primary healthcare in the Alma Ata Declaration and the sustainable development goals (SDGs) that prioritize provision of good quality EHS as a path to achieve UHC goals (3). Hence, EHSP is a package and policy intervention designed to direct resources to priority areas of health service delivery to reduce disease burdens and ensure equity in health that are cost-effective, equitable, efficient, affordable and acceptable (2, 3, 4).

The priority areas vary across countries, depending on the criteria and strategies used to define them. They may reflect areas of high public health burden, or areas that are key to meeting development commitments, or they may be areas with high cost-benefit. Overall, an EHS thus aims to define a fair service package that will reduce the population's burden of disease and against which providers and state can be held accountable. This involves multiple dimensions of health systems, range from service delivery to governance and financing. Cost-effectiveness would seem to be the most important criterion of an EHS in a resource-constrained setting but, in real life, most developing countries develop an EHS primarily for the equity objective, which is often seen in the context of a poorly functioning health system that fails to deliver care to citizens. The global interest in EHS also came with the resolution adopted on Universal Health Coverage (UHC) by the 58th World Health Assembly in 2005 (5).

Ethiopia designed its EHSP in 2005 with the aim of committing scarce resources on the services which provide the best 'value for money' owing to the fact that there is no universal EHSP that applies to every country. The aspiration of the government to have public sector facilities that provide a minimum standard of care which fosters an integrated service delivery approach essential for advancing the health of the population (6). Thus, based on the EHSP, the required packages for essential health services for the area were defined as "the essential package of services that the government can avail and provided to treat and control those health problems that are more prevalent in an area, and thereby serve citizens in an equitable manner" (7). In the light of this, Federal Ministry of Health (FMOH) advocates provision of EHS and reassuring its' commitment to ensure provision of good quality EHS at primary care level. This is highlighted by the Health Sector Transformation Plan (HSTP 2015-2035) titled, *'Envisioning Ethiopia's Path to Universal Health Care through strengthening of Primary HealthCare'* (8).

The costs of essential health services are determined by identifying all resources used in its production and all resources spent by health centers for provision actual annual essential health services during fiscal year. This resource can be distinguished as recurrent or capital costs. Recurrent costs' are those incurred in the course of a year and are usually purchased regularly, this includes salary and benefits, drug & consumables and administration & utilities. Capital cost refers to those that last longer than one year, such as buildings, vehicles equipment and furniture (1, 9).

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This cost study was conducted from the health care provider perspective, a point of view which is concerned with all costs related to delivering packages of essential health services at health centres regardless of whether (or how) they are paid by purchasers to estimate resources incurred when providing essential health services at public health centers in EFY 2009. The cost estimation was done for actual essential health services given in health centers on an annual bases rather than using theoretical estimation. The EHS component included in costing were Limited curative and chronic care, Emergency services, Laboratory tests and preventive services like EPI, Maternal and Child health services.

Akin to other health facilities in Ethiopia, public health facilities of Jimma zone operate under a constraint resource which limits universal coverage of essential health care to its population. Majority (89%) of population in Jimma zone dwellers are rural with an estimated 60 to 80% health problems that attributable to communicable diseases and nutritional problems. The health coverage of the zone as measured by the ratio of health facilities to the population is about 52%. Currently, healthcare provision within the zone is carried out and the health services is rendered to citizens through 5 public hospitals, 118 health centers, and 555 health posts along with several different privately owned and NGO clinics (10). Since, Effective provision of health services at best value of money could result in improvement of health care need of majority of segments of the population by addressing those major health problems through provision those services at health centers, this cost study help to assess how well resources are used in different types of health facilities as well as to assess how adequately funded these services are (11).

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1.2. Statement of the Problem

Provision of essential health services at reasonable cost that realize the ultimate goal of Universal Health Coverage (UHC) is a worldwide challenge (2, 5). Globally health care system is faced with significantly pressure to contain raising costs of providing health services (9). The study done in Indonesia revealed the primary care providers spent only 27% of the total facility's expenditure on drugs and supplies in 2010/11, while 52% went to health care personnel (12). Similarly, the study from Bangladesh showed a wide variation of costs of providing EHS at health facilities with the costs for medicine and supplies account for the majority of the total cost while the average costs per visit were USD 7.03 for antenatal care, USD 4.57 for postnatal care, USD 4.30 for limited curative care, USD 2.23 for immunization, (USD 0.72) for family planning and USD 29.45 births by normal delivery during 2015 fiscal year (13).

The scarcity of health care resources is even worse in sub Saharan Africa where health care facilities consume between 50-80% of available public sector resources (1, 3 and 14). The study done through WHO-CHOICE found out that many low-income countries government health spending was significantly lower than USD 12 per person, estimates were put at USD 2 per capita in Vietnam, USD 1.4 per capita in Uganda, and USD1.3 per capita in Nepal. The study also highlighted the high proportion of salaries to the total cost of providing essential health services, 45%-60% in this study in 2002/2003. The high over-head costs of 20%-42% is worrisome and this area is where efficiency gains may have to be made and innovative strategies such as contracting out services and proper monitoring of use of utilities may have to be adopted to bring down the cost (15).

Budgeting, cost efficiency assessment and cost effectiveness analysis depend on the availability of health service cost information for researchers, health policy decision makers, and health care managers. However, the substantial gaps remain in the availability of this information in developing countries resulting robust allocation and subsequent inefficient utilization of scarce health care resources on essential health services (16). Cost studies that generate costing information on EHS is very relevant in making informed decision with the singular aim of improving the effective provision of EHS with resource at hand and contributes to improvement in the equity and efficiency of the healthcare system particularly when undertaken from healthcare provider perspective.

Although, several costing studies have been conducted on essential health services, some studies were conducted over a decade ago (9, 17-28) while other studies did not explore health centers (1, 18 and 21). Some focused on measuring efficiency at service delivery point (11, 21 and 29) while others focus on cost accounting (15, 30-33). For this reason, a little is known about the costs of providing essential health services at health centres from provider perspective.

The Ethiopian health care is mainly funded by the government and donor funds and usually maimed by financial constraints or inadequate funding thereby limiting the development of the sector. Health managers are ignorant about the actual cost of the services they produce and deliver. The very notion of "cost" is not clear to the great majority of them (9). In addition to this, the actual costs of components of health care delivery system are also often not available as budgetary provisions cover only the recurrent expenditures like salary and drugs but do not reflect the investments already done in the form of infrastructure and equipment (34). There were also limited studies which inform the costs of essential health services in Ethiopia from provider perspective, at health centre level, in recent period. Given the limited health care resources in Ethiopia, coupled with the wide range of essential health services provided free of charge, efficient use of these resources is essential. Therefore, assessment about the gap between total amount resources required and amount that will available to healthcare facilities ought to be done as cost information assumes greater importance to facilitate adequate financing and effective provision of essential health service. It is also important to identify how much cost is being levied by the government per unit health services delivered at health centers as they are the most peripheral units of health care service delivery point next to health post that tasked to provide essential health services under intense pressure of health care resources expenditure. Hence, this study aimed at contributing to the reduction of this crucial gap by examining the costs of essential health services.

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1.3. Significance of the study

There is limited empirical, detailed and standardized costing of essential health services being provided in the health centers that contributed to understandings in the justification of budget allocation and economic evaluation. Hence, this cost study:-

- Enhance the exercise of cost schemes and avails information for governmental, donors and non-governmental stakeholders in the health care system and will inform resource requirements and its implication in health financing and costing of health care services
- Generate information that could serve as a piece of evidence that better enable the district health service planners, health service managers, health center managers and policy makers to budget and allocate the appropriate resources that will ensure effective provision of health care services.
- Envisaged to serve as baseline information for the studies to come and close the existing information gap regarding costing essential health services at SDP.
- Provide evidence in setting up of similar level of health centers under federal ministry of health or regional/zonal/ health departments.
- provides an overview of the cost profile of the components of essential health services, and indicates the total amount of resources needed to improve the services

CHAPTER TWO: LITERATURE REVIEW

2.1. Overview

Now a day, health system reforms with focus on UHC have been implemented as overall trends in many countries to meet the needs of public health in the context of rapidly changing socioeconomic issues and health resource constraints (3).

Evidence has revealed that even countries with the highest health per capita in the world are not capable of covering all Health services to all people and they need to use essential health services (20). EHS used as one of the methods of three WHO prerequisites to improve efficiency and equity (35).

The idea that governments in low and middle-income countries should direct their money towards a package of essential health services, has gained ground in recent years. The cost of delivering the essential health service was estimated at USD12 per capita in low-income countries, and USD 22 per capita in middle-income countries (3).

According to World Development Reports (WDR), in many low-income countries government health spending is significantly lower than USD 12 per person, for example estimates are put at USD 2 per capita in Vietnam, USD 1.4 per capita in Uganda, and USD 1.3 per capita in Nepal. In middle-income countries there is a variation in spending levels around the USD22 estimated as necessary to finance the essential package. Among the lower-middle income countries: Bolivia spends USD 25 per capita, Cameroon USD 24, Thailand USD 73, and Philippines USD 14. Of the upper-middle income countries South Africa spends USD 158 per capita on health, Saudi Arabia USD 322, Mexico USD 132, the Republic of Korea USD 377 and Venezuela USD 89, Afghanistan spends USD 5.50 per capita. The difference in figures among Low and middle income countries (LMIC) reflects demographic structures, epidemiological conditions and labor costs in the two settings (36).

2.2. Essential Health services

2.2.1. Ethiopia's essential healthcare package

The government of Ethiopia published its "Essential Health Services Package for Ethiopia" in 2005 with the intention of providing a minimum standard of quality care that fosters an integrated service delivery approach essential for advancing the health of the population.

The EHSP for Ethiopia envisages two financing arrangements in providing essential health services by health facilities. These two arrangements are exempted services and services offered on cost-sharing services. However, high cost services to be offered on cost recovery basis are not part of the EHSP. During the design of the EHSP for Ethiopia, a macro-level annual cost of providing essential services on the basis the required health professionals and supervisory staff, facilities, equipment and supplies as well as selected diagnostic facilities and supportive services is estimated (6).

Ethiopia's essential healthcare package (EHCP) was defined in 2005 by outlining types of services and the levels of service provision (community, health center/post, and district-level hospital). The package contains promotive, preventive, curative, and rehabilitative interventions are considered to be the minimum that people can expect to receive through the various health delivery mechanisms and facilities within their reach and should be available to all Ethiopians irrespective of income, gender, and place of residence (7).

The scope of the EHCP is limited to the provision of essential services at the health post, health center and district hospital levels. Components and guiding principles of EHCP for Ethiopia includes Family Health Services, Communicable Disease Prevention and Control Services, Hygiene and Environmental Health Services, Health Education and Communication Services and Basic Curative Care and Treatment of Major Chronic Conditions (6, 7).

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2.3. Type of costs

The resources used for essential health service provision can be distinguished as recurrent or capital costs (9). Most capital costs involve investment in physical facilities (e.g., buildings) and durable equipment (e.g., vehicles) that have a market value, even while being used in a production process. The capital inputs need to be replaced over time because they wear out, accounting for their costs is done separately because the amounts are relatively large when needed, and because they need to be purchased infrequently (1, 15). Recurrent costs are those costs incurred for inputs that are directly related to the production process at the service facility, like staff salaries, supplies, utilities. Indirect recurrent costs are those costs incurred for administration and management of a broader number of related outputs (1, 15).

2.3.1. Capital costs

The study done in India from primary healthcare facilities perspective using step-down costing approach reported that a considerable amount (7.7%) of total health centre cost spent on capital items. it was reported a total cost of USD 5,072 was spent on capital goods at service delivery points and One-third of capital cost was spent on the building and another third on the land. Only 5.7% of all capital costs were spent on instruments and equipment (18).

The study in Ghana health facilities reported that 35.8% of the total annual cost was spent on capital items like buildings, equipments and vehicles (19).

The Indonesian study done using same methodology to this study also found out that about 14% total costs were spent on capital goods at health facilities. The same study found that 1% to 10% was spent on vehicles (20).

Another cost study reported that the capital costs comprise a low proportion of total annual costs, less 10% for health centers' total annual cost; from which building only consume much (40%) of total capital cost (30).

According to another the study done in northern India employing mixed method costing approach, the total running cost of public health centre was estimated to be USD 24,282 in one year period. This study also revealed that twenty (20%) of those cost were spent on capital goods (37).

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2.3.2. Recurrent costs

The main cost drivers for public health care facilities were found to be recurrent categories that include both human resources, and drugs & consumables among others.

Several studies showed that the chunk of the expenditure was spent recurrent part of health service expenditure, where majority of it was incurred on salaries, drugs and consumables (11, 12, 16, 18, 20, 21, 23, 26, 28, 34, 37 and 38).

According to the study from Indonesia's primary care providers spent only 27% of the total facility's expenditure on drugs and supplies in 2010/11, while 52% went to health care personnel. Human resources and drugs & supplies constitute the majority of costs (46% and 40%, respectively) in health centers, with a lower proportion of costs attributed to indirect expenses (14%) (12).

Similarly, the study from Bangladesh revealed that about 68.27 % of the recurrent costs were incurred on the salaries and allowances of the staff while the next highest amount was spent on medicines, which comprised 16.4% of the recurrent costs (13).

According to Zambian district health service report following cost study from provider perspective revealed that about 27% - 39% of recurrent cost were spent on personnel, up to 45% were spent on drugs and consumables (21).

Cost study in Baluchistan, Pakistan reported average actual annual recurrent expenditure of USD5616 on basic health service unit. The study also reported that recurrent cost comprising 86% on salaries and 14% on non-salary items. Pharmaceutical cost was observed top take up to 20-30 % of total recurrent cost in four different health facilities in Pakistan (22).

The study done in India reported a total cost of USD 24,282 was incurred on this PHC in a year. The recurrent cost was USD 19,210 annually, which constituted roughly four-fifths of all the costs. Salaries constituted 62% of the costs, drugs and equipment 10% of recurrent costs and vaccines and other family welfare items constituted 4% of the total annual costs (28).

In Rwanda, medicine costs and personnel comprise, respectively, 38% and 42% of the cost of the minimum package of health services (30).

According to the study from northern India about half (42.3%) and 10.2% of total health centre cost spent on salaries & allowances and medicines & consumables (37).

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In Cambodia health facilities employing SDA, assuming the minimum package of health services covers up to 60% of the population, personnel and medicine costs would respectively represent 38% and 52% of total costs. This study revealed that recurrent costs comprise a very high proportion of total costs, from over 90% for health centers. Drugs and supplies comprise on average 64% (all HCs) of all recurrent costs, while personnel costs up to 30 % (HCs) of recurrent cost. Annual recurrent health center costs excluding depreciation averaged USD 0.96 per capita; with a range from USD 0.44 to USD1.69.Since staff costs comprise only 30.7% of total costs on average for health centers (39).

Future Group international also reported salaries consume as 70% and non-salaries as 30% of the total cost of the primary healthcare in Pakistan (40).

The total costs delivering health services in India for the year 1991-92 was estimated to be USD 24,250. Of the total costs, curative care accounts for 32%, followed by child care (17%) and communicable diseases control (tuberculosis and malaria; 17%). Salaries of the staff constitute 62% of the total costs. In absolute terms, salary costs were highest for curative care and child care (41).

According to another study done from in Ethiopia Health centers from viewpoint of provider reported that around half (53%) of the recurrent costs spent on drugs and consumables while human resource accounts for an average of 35% of the total recurrent costs (42).

2.4. Cost of essential health services

Global evidence shows that countries and health systems that prioritize comprehensive primary health care experience better health outcomes and lower health care costs compared to countries with more selective primary health approaches. The EHS package is often the basic set of services covered by all insurance policies or national governments as countries transition to UHC (38). WHO estimated cost for public sector provision of the EHS in sixteen ESA countries in 2008 and reported approximately USD 14- USD 25 per capita at primary care level and USD 40- USD 74 per capita, including referral hospital services, compares well with the USD 60 per capital (43).

The study done in Bangladesh by 2015, estimated an average costs per visit for antenatal care (USD 7.03), postnatal care (USD 4.57), control of diarrheal diseases (USD 1.32), acute respiratory infection (USD 1.53), integrated management of child illness(USD 2.02), sexually transmitted infections (USD 4.70), reproductive tract infections (USD 3.56), tuberculosis(USD 41.65), limited curative care (USD 4.30), immunization (USD 2.23), family planning (USD 0.72), births by normal delivery(USD 29.45) and C-section (USD 114.83) (13). The cost per ANC visit is most costly in Somalia (USD 9.25) (44) followed by Rwanda (USD 7.12) (30) and Malawi USD 5.22 (45). Similarly, the unit cost per treated case of EPI were found to be (US$ 10.20) in Gedo region of Somalia (44).

The unit cost per ANC visit ranges from USD 3.83 in Burkina Faso (43) to USD 21.00 in Ghana [44] after converting the unit cost from the literature to 2014 US dollars. For most countries, the unit cost per ANC visit varies between USD 5 and USD 11 dollars, notably in Rwanda (30), Somalia (44) and Malawi (45).

The average total cost of immunization per live birth internationally, according to UNICEF and GAVI, is presently US USD 15 to US USD 18, although these costs are expected to increase with the advance of new technologies (46). One study reporting on Uganda, Ghana and Malawi, found that medicine and supplies were the most costly component of maternal health services, comprising, on average, half of the unit costs of services (47).

2.5. Empirical evidences on cost analysis of essential health services

2.5.1. Empirical Evidences from the developing countries

Globally, cost of health services provides important information for policy making, and many costing studies have been conducted in the last decades in developing countries. Those cost studies includes those done in Bangladesh (13), South Africa (21), Burkina Faso (24), Egypt (31) and Ghana (16, 38), Cambodia (39), Somalia (44) and, Malawi (45).

The South African study analyzed actual and estimated costs that are associated with treatment of patients at the inpatient, theatre and outpatient departments of five district hospitals. Using the top-down and step-down methods of overhead costs allocation, the investigators found, among others, that staff costs averaged 70% of departmental costs (21).

Study done in Thailand using top-down approach indicated that total cost of running the primary health center on Fiscal Year 2004 was USD 44,513.328, which the capital cost accounted 23.6 % and recurrent cost was 76.0 % (25).

Another study done at Papua, New Guinea from facilities perspective reported that majority of health care expenses were accounted for recurrent costs, while 16% of all 'health centers' cost spent on capital item. Physical infrastructure, staff time allocation, service outputs and quality of services added that cost analysis at individual health units can help identify sources of inefficiency, and provide managers with indications of where gains in productivity might be achieved (26).

The Egyptian study analyzed costs and efficiency, using the step-down method to allocate the costs of overhead and intermediate services to final services departments. For one major hospital, annual personnel costs were 58% of total expenditures in 1993/1994, while 14% of the total cost was on drugs and medical supplies (31).

The study done in Northern India employing the step-down methods of overhead costs allocation also estimated the total cost incurred during 1991/1992 at a 'primary health centre' in India through inclusion of capital costs for building, furniture, vehicles and equipment as well as the recurrent costs for salaries, drugs and vaccines, diesel and maintenance. This study concluded that salaries constitute the biggest cost item, about 40% per head per year (37).

Another study done in 11 district health facilities in Ghana that done from provider perspective revealed that annual personnel cost accounted for 58 % of total expenditures while 14 % of the total health facilities cost was incurred by drugs and medical supplies.

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This study revealed that material costs make up the majority of direct costs for essential health services for two reasons: the high input prices of materials and low labor costs (38).

The cost study done using mixed method of cost allocation on the EPHS in the three zones of Somalia identified and listed the most costly essential health services as normal delivery (ranging from USD 30 to USD 67 per delivery), PNC (USD 8.30–USD 17.68 per pregnant woman), Expanded Programme on Immunization (EPI) (USD 10.20–USD22.40 per treated case), and pneumonia (USD 8.78–USD 21.42 per treated case) (44).

The Malawian study analyzed Using the top-down and step-down methods of costs allocation revealed that the cost of providing district health services from provider perspective as the 33 % of primary health care facility cost of essential health services were spent on salaries and wages, while 30 % is spent on medical supplies (45)

2.5.2. Empirical evidences from cost studies on essential health services in Ethiopia

The main cost drivers for PHC facilities are both HR, and drugs and supplies. For health centers, drugs consist of half (53%) of the recurrent costs on average, while Personnel accounts for an average of 35% of the total recurrent costs. For primary hospitals, Personnel and drugs are more evenly distributed (41% and 38%, respectively) and indirect costs (operational costs excluding drugs and supplies and salaries) are higher compared to health centers. Personnel and drugs and supplies constitute the majority of costs (46% and 40%, respectively) in OPD departments in health centers, with a lower proportion of costs attributed to indirect expenses (14%) (11).

The study carried out in Ethiopia on immunization of children during the Child Health Days indicated that at an average cost per child per one round was USD0.56 [32]. When measles were included in the package the average cost per child per round was USD1.04. The total cost of one round of the Enhanced outreach services in Amhara and Oromiya considered together was 44.7 million Birr or USD5 million. The average cost per Woreda of the immunization program was 120,527 Birr (USD13, 367) per round without measles and 184 271 Birr (USD20, 435) with measles (27).

According to other studies done in Butajira, one of the districts of Ethiopia employing step-down costing approach and provider perspective, health facilities spent on average USD6.25 per ANC visit, USD 15.7 per delivery and USD 7.7 per PNC visit (33).

The overall facility unit cost for health centers is 219 ETB, and the major cost driver is drugs and supplies with an average unit cost of 72 ETB. The departments with the highest average unit costs for health centers are also IPD and Delivery. The average OPD and MCH unit costs for health centers are 208 ETB and 216 ETB, respectively. Similarly with IPD and Delivery departments, outliers are influencing the average unit costs for both OPD and MCH departments. The average unit cost for OPD becomes 136 ETB once one outlier (in Benishangul-Gumuz with a unit cost of 2,993 ETB) is removed from the estimate. The revised average unit cost for the MCH department is 151 ETB once three identified outliers are removed from the estimates. Two of these outliers are from Oromia, with average unit costs of 1,565 ETB and 795 ETB, while the third is located in Benishangul-Gumuz at 697 ETB (48)

2.6. Conceptual Framework for cost analysis of essential health services

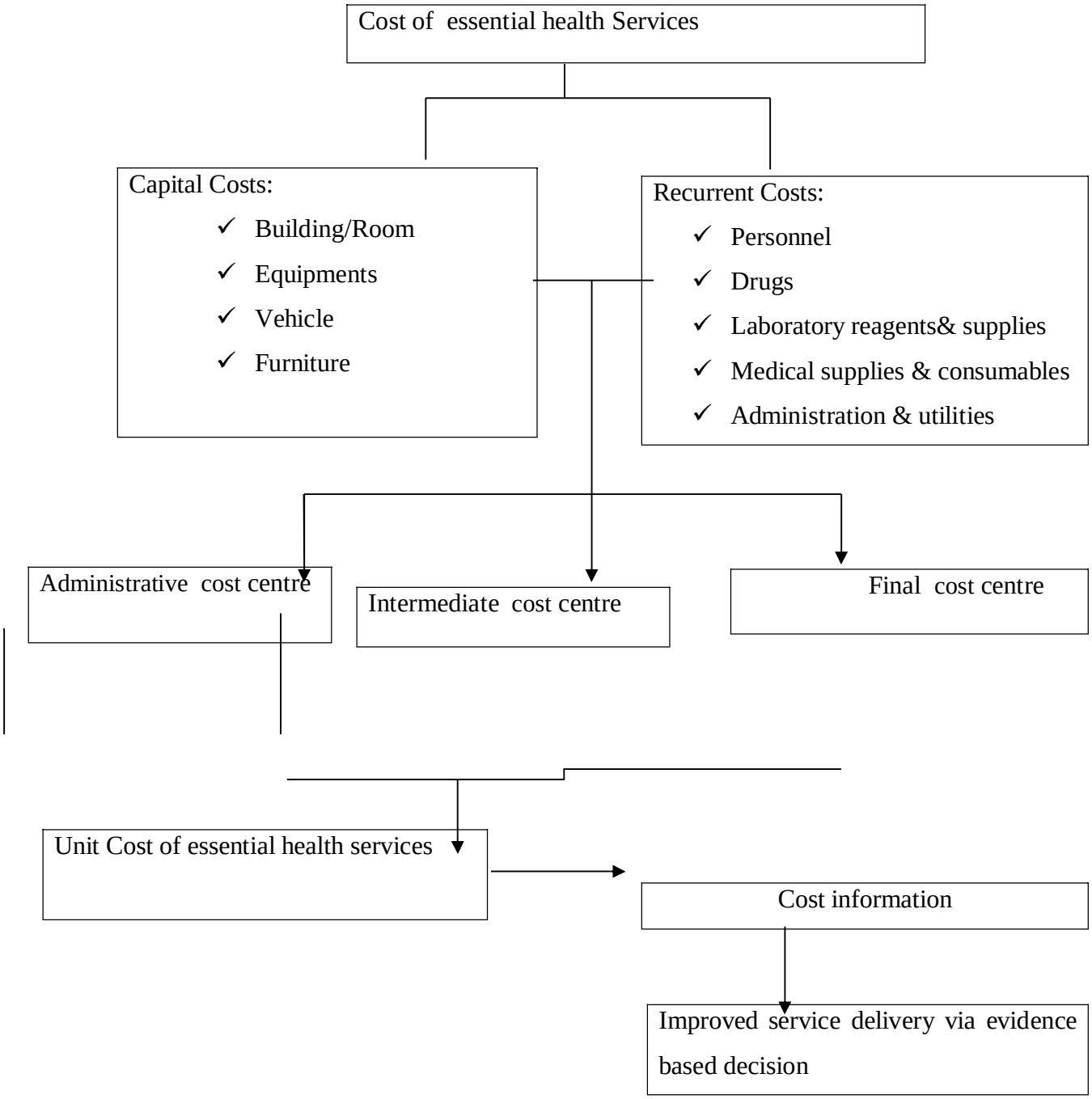

Figure 1:-Conceptual Framework

Source:-researchers' own construct 2018, following review of the literatures discussed above.

CHAPTER THREE:-OBJECTIVES

3.1. General objective

The general objective of this study is to analyze the costs of the essential health services of public health centers in Jimma Zone.

3.2. Specific objectives

- To estimate the recurrent costs of essential health services across public health centers in Jimma Zone.
- To estimate the capital costs of essential health services across public health centers in Jimma Zone.
- To calculate the unit costs of essential health services in public health centers in Jimma Zone.

CHAPTER FOUR:-DESIGN AND METHODS

4.1. Description of the study Area

The study was conducted in health centers of Jimma Zone. The Zone is located in Oromia Regional State, 345 kilometers to the Southwestern direction of the capital of Ethiopia, Addis Ababa. It has 21 Woredas' (districts) with 555 total Kebeles'-(the smallest administrative units).

According to the 2017 central statistical agency projection there is a total population of 3,153,297 inhabitants in the zone. The zone has 5 public hospitals, 118 health centers, and 555 health posts with the total annual budget of USD 11,004,366.81 for all public health facilities under the umbrella of zone health departments (10). The study was carried out from April10, 2018 to May 9, 2018.

4.2. Study design

The study utilized a cross-sectional design from the health provider perspective using step-down costing approach for 2009 EFY (July 8, 2016 – July 31, 2017).

4.3. Population

4.3.1. Source population

The source populations were all public health centers, all health care professionals of all public health centers and all documents used all public health centers to deliver essential health services at Jimma zone.

4.3.2. Study Population

The study populations were selected public health centers, selected health care professionals of selected public health centers and documents used at those selected public health centers to deliver essential health services at Jimma zone.

4.4. Eligibility criteria

- Public health centers that has been in fully functional for at least one year prior to fiscal year under investigation.
- Public health centers with all financial and expenditure reports of fiscal year under investigation
- Public health centers with health professionals who served for the last 6 months at the area prior to fiscal year under investigation.

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4.5. Study variables

- The total and unit cost per cost centre for essential health services
- Types of costs included in the cost study:-
  - ✓ Capital: - Cost of building/rooms of building, equipment cost, Furniture cost and Vehicle costs.
  - ✓ Recurrent: - personnel cost, administrative cost, pharmacy costs, medical supplies and consumables' cost and Laboratory supplies costs.

4.6. Definition of terms and Operational definitions of the study

Average costs: - The total costs divided by the total number of respective service output of all selected health centers of Jimma zone.

Building cost: - Cost obtained after total depreciated construction cost of health centre divided to the number of room at health centre.

Capital cost: - All resources spent, allocated or due spend on buildings/rooms of buildings, equipments purchasing, Furniture's and Vehicles at health centers.

Recurrent cost: - All resources spent, allocated or due spend on personnel, administrative and supportive departments, pharmacy unit/medicines, medical supplies and consumables' and Laboratory supplies, reagents and consumables' at health centers.

Complements of earnings: - personnel costs due to additional benefit result from housing allowances, overtime, transport allowances, uniform, incentives etc.

Cost: - A cost is the monetary value of a resource that is used to deliver specific essential Health services at Jimma zone health centers.

Cost analysis: - the processes through which financial and non-financial health centers data are disaggregated and manipulated to determine the costs of essential health services at study area.

Cost centre:-These are units/case team/ within the health centre that are the centers of activities and will be assigned different categories. They are classified into

(a) *Overhead cost center:*-These cost centers provide support services that are necessary for effective running of the health centers. They include likes of administrative, supportive departments and transport.

(b) *Intermediate cost center:* - These centers provide ancillary services and support the final cost center. The dealing with patients at these centers is not intensive. They include pharmacy and laboratory

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(c)*Final cost center/ patient care:* - These cost centers are directly responsible for patient care and services. They include; out-patient department, child health services, chronic care services, maternal and family health services etc.

Essential Health Services Package (EHSP):- a selected lists from Ethiopian (EHSP) that are relevant to Jimma zones. The component were Limited curative and chronic care, Emergency services, Laboratory tests and preventive services like EPI, Maternal and Child health services.

EFY (Ethiopian fiscal year):- In the Ethiopian calendar, the year starts on September 11 and ends on September 10 according to Gregorian calendar. Hence, EFY 2009 started on July 8, 2016, and ended on July 7, 2017 (49)

Personnel cost per cost centers':- cost obtained by summing up cost of all personnel worked at each cost centers.

Unit cost: - A cost calculated by dividing the total cost of providing a service (inputs) by the number of clients or output (38).

4.7. Sample size

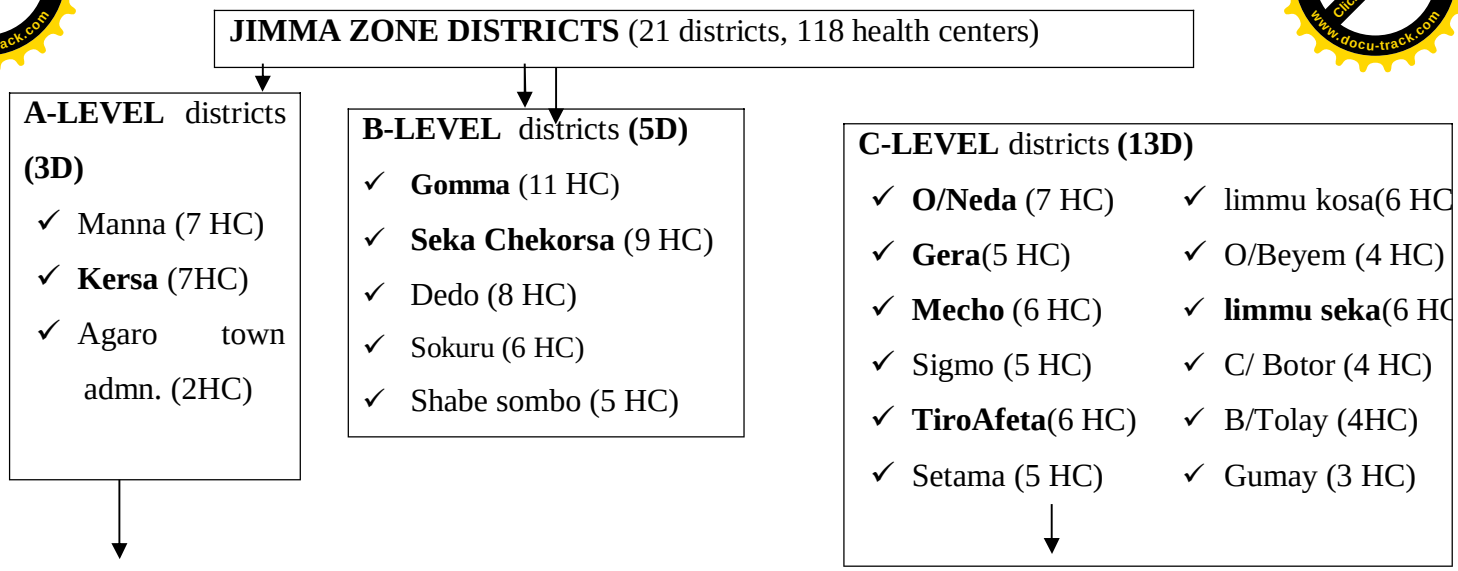
The sample size was determined by using information obtained from WHO Tools for Assessing the Operationality of District Health Systems. This document suggests it would be enough to take 40% of the total districts provided that the number of district is greater than 20 and two or more health facilities per district to determine number of final samples (50). Accordingly, 16 public health centers of eight districts were determined.

4.8. Sampling method and procedure

A total of sixteen public health centers were selected for the data collection. Stratified Sampling method with proportional allocation was used for the selection (Fig. 2) of the districts and the health centers for this study. Firstly, all the 21 districts in tin Jimma zone were grouped by their level of infrastructure as A, B and C.

Secondly, 8 districts; 1 from A, 2 From B, and 5 from C level were randomly selected using the information from document developed by WHO.

Thirdly, 2-PHC; one from district capital other from rural part of district C were randomly selected from previously selected districts.



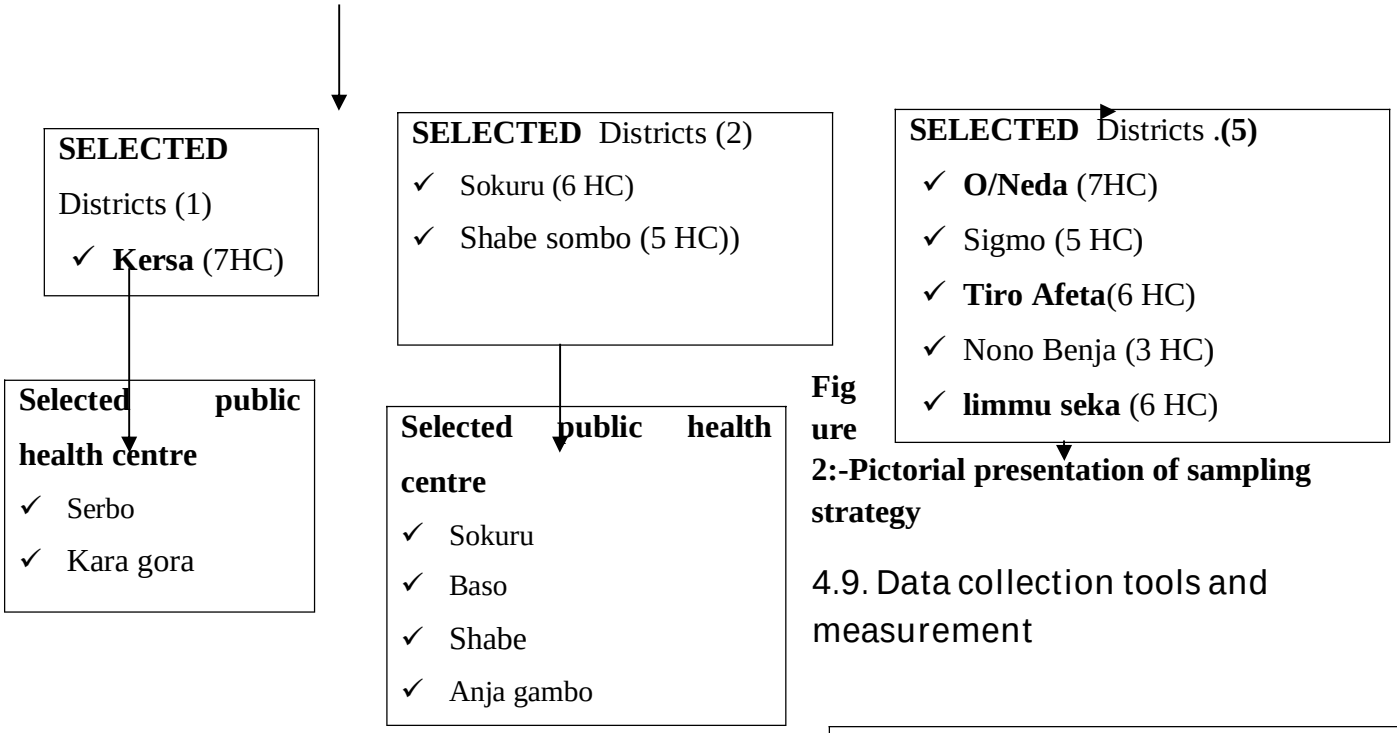


Figure 2:-Pictorial presentation of sampling strategy

4.9. Data collection tools and measurement

4.9.1. Data collection tools

Document review checklist included nine sections: building, equipment, vehicle, human resources/personnel, existing incentives, supplies, operations and maintenance costs among others was used to collect data. All health care related costs collected in the data covered a one- year

Selected public health centre

- ✓ Boneya
- ✓ Asendabo
- ✓ Sigmo,
- ✓ Robe
- ✓ Ako
- ✓ Dimtu
- ✓ Nono,
- ✓ Soloka
- ✓ Seka,
- ✓ Atnago

period (2009 EFY) through document review, physical measuring of rooms and counts of equipment. The prices of items were obtained through store -keeper invoices and from Jimma PFSA hub. In order to calculate staff salaries, the average salaries per staff type were graded as indicated by the federal Ministry of Health. Utilization data, such as number of essential health service visit like number of ANC visits and the number of deliveries at the various health centers, were also collected via document reviews.

4.9.2. Measurement

4.9. 2.1. Cost Analysis Framework

4.9.2.1.1. Packages of Essential Health Services

The essential health services defined above included in the cost analysis were guided by the services identified and prioritized in the EHSP for Ethiopia document (22). The broad components of services were defined with specifically defined services and activities for implementation at health centers [**Annex V**].

4.9.2.2. Scope and Costing Approach

The cost analysis was conducted from a provider perspective. The study included a representative selection of Health Centers in Jimma Zone. The scope of the cost object included limited curative and chronic care, emergency services, laboratory tests and other preventive services like outreach services, EPI, maternal and child health services. The analysis had included all recurrent costs (personnel, drugs, medical supplies, utilities, and other recurrent costs) and all relevant capital costs associated with providing each essential health services at each health centre.

4.9.3. Method of Cost estimation and analysis

Annual costs for the year 2009 EFY were calculated for each of the sixteen (16) health centers. While there are several methods in costing health care services, WHO, Alliance for Health Policy (4) and a systematic review of costing methods (51) concluded that no method is better than the others in all criteria. They suggested the choice of method depends on available data, the study setting and other factors. Therefore, the step-down allocation (SDA) approach as discussed in the WHO manual (15) was found to be the choice and hence, used in this study [**Annex III**].

4.9.3.1. The step-down allocation (SDA)

The step-down allocation (SDA) is a method in which the resources necessary to run a health center were first identified and then allotted to selected service departments on an allocation basis (5, 15). Accordingly, costs for each of the sixteen public health centers

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were calculated using SDA costing approach, which required the calculation of both capital and recurrent costs [**Annex IV**]. Firstly, The final product defined as curative care service, chronic care service ,emergency care service, maternal health service (ANC, PNC, Institutional delivery), family planning services, child health services and EPI services .

Secondly, cost centers based on the functions of the departments were defined. Three cost centers were identified: overhead, intermediate and final costs centers.

Thirdly, cost for each input was identified.

A list of resources generated and grouped into the following cost categories:-personnel, administration, drugs & medical supplies, building and equipment costs. The total annual costs were estimated by multiplying and summing quantities consumed on each specific item by the unit price. Fourthly, the categorized costs were assigned to the three cost centers. Some costs can be assigned immediately to certain cost centers. Accordingly, personnel, administration, pharmacy, laboratory and vehicle costs were assigned directly to the relevant cost centers. In addition, personnel, building cost, equipment was distributed to direct cost centers. Fifthly, all costs reallocated from the two cost centers (indirect and intermediate) cost to the direct cost centers. In the final step, the unit cost was calculated. The allocated costs for each direct cost center was divided by the number of visits of each of these centers. Accordingly, the unit cost for direct services was calculated. All resources mobilized by health centers for the EHS delivery was identified, quantified and valued in ETB applying step down approach and then converted to USD using national bank exchange rate during fiscal year of service provision. Personnel cost was estimated through taking salaries of the staff and by adding the duty incentives as a benefit.

Costs related to medical supplies were estimated by taking the total quantity of the supplies at each department and using the current market cost of the supplies and multiplying together (1). Costs of medical equipments were estimated by quantifying the equipments at each department and taking the current market cost of the equipments. Capital costs were annualized using a discount rate with their respective useful life years. A discount rate of 5 % was chosen in conformity with most economic evaluation studies conducted in developed and developing countries and in the absence of any accepted alternative rate used in Ethiopia. Based on expert opinion and literature review a useful life of 10 years was used for equipment and 30 years for building (1, 15).

The administration costs which included maintenance, water and electricity, was estimated by taking 5 % of medical equipment for maintenance using floor area/building room/ for water electricity and cleaning. Vehicle and motor bike costs were also be estimated in the same way as for medical equipments (1, 15).

Step 1:- Define the final products

- ✓ Curative care service,
- ✓ Chronic care service
- ✓ Emergency care service,
- ✓ Maternal health service (ANC, PNC, Institutional delivery),
- ✓ Family planning services,
- ✓ Child health services
- ✓ EPI services

Step 2:- Define cost centers

- ✓ Overhead,
- ✓ Intermediate and
- ✓ Final costs centers.

Step 3:- Identify full costs of each input

- ✓ Capital:- buildings, furniture's, equipment and vehicle costs
- ✓ Recurrent:-personnel, administration & support , drugs , medical , laboratory supplies and consumables

Step 4:- Allocation of recurrent cost of each final cost center

Step 5:-Allocating of capital cost to each final cost center.

	Overhead	Intermediate and	Final costs centers
	recurrent cost of each	recurrent cost of each	recurrent cost of each
	capital cost to each	capital cost to each	capital cost to each

Step 6:- Computing total cost and unit cost of EHS

- ✓ Total cost :-sum of all cost at all cost centers
- ✓ unit cost per cost centre:- sum of all cost at each cost centers divided by number of volume of services
- ✓ overall unit cost per health centre:- sum of all cost at all cost centers divided by number of volume of services one time

Figure-3:-schematic presentations of the step-down costing approach [Mogyorosy Z, 2005]

4.10. Data type

Mostly data that intended to be collected were secondary. Data were collected through review of various records, registers, reports and facility observations. There was document review, physical counting number of room used by each service to of physical counting equipment used at each room by each service. The prices of drugs & consumables were obtained from store-keeper invoices. Personnel/staffing/, drugs & consumables and Utilization data, such as number of EHS visits at the various health centers, were also collected via document reviews.

4.11. Data collectors

The data collection was performed by health professionals from the hospitals and health centers that were not part of study population. Three data collectors were carried out data collection that supervised by the principal investigator. The data collectors were provided with a one day-training which included explanation about the study design, costing theory and concepts, data collection methods and techniques and the data collection instruments used. They were also informed about the type and sources of secondary data needed to be collected for the study. A research advisor supervised the initial procedures including training of data collectors, pre-test and the 1st data collection on 5 % of the study facility.

4.12. Data quality management

The data collection tool was pre-tested. The Principal investigator had discussed with the research advisor on regular basis and reviewed the collected data for completeness. The collected data was summarized on the same day of the data collection. The quality of the data was confirmed by using different types of documents containing the same information.

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Entire data were checked by the principal investigator for the consistency, regularity and completeness.

4.13. Data processing and analysis

4.13.1. Data processing

Data was edited, coded, entered and analyzed using SPSS version 20 and Microsoft Office Excel 2007. Descriptive analysis was applied to display frequency, percentage, total cost, and unit costs health services.

4.13.2. Data analysis

Unit costs of each service was calculated by dividing the costs of inputs incurred along each of the services during the base year by the total number of output of the respective services of that year. SDA was used to allocate shared costs to final service and the annual cost and unit cost was computed

4.14. Sensitivity analysis

Univariate sensitivity analysis was performed to see the effect of changes of variables that are subject to change over time to assist in the generalization of the study results. Given that several studies use 3-7 % discount rates, sensitivity analysis is to assess the impact of using a higher discount rate (7 %). The life span of buildings was also varied (from 30 years to 20 years). In addition, with expectation of a future increase in utilization of EHS at the health centers a 10 % increase was assumed and then, the threshold for significance was set at 10 % change in costs or higher (52). Discounting rate, useful life, potential increase in utilization and personnel expenditure had a little impact on total annual cost as well as unit cost of essential health services at health centers.

4.15. Ethical consideration

Ethical approval was obtained from the Ethics Review Board of Institute of Health, Jimma University and given to the Oromia Regional Health Bureau (ORHB). Then a letter of cooperation from RHBs was also taken for Jimma Zone. Verbal consent was obtained from health centers' heads and all other respondents to be contacted for information before enrolling them as the study participant/unit. During the consent process, the respondents got information regarding the purpose of the study, why and how they are selected as the respondents of the study, and what will be expected from them.

4.16. Plan for dissemination of results

The result will be presented to Jimma University, Institute of health science school of graduate studies and the documents will be disseminated to the University community, Zonal Health department and local organizations that support and coordinate with those health centers to ensure better health service delivery. In addition, the result will be disseminated through presentation of findings at different meetings, workshops when opportunity present itself and publishing in scientific journals.

5. RESULTS

5.1. Background characteristics of health centers

All the selected health centers' have similar structure having about 19 rooms with standard deviation of 2.75 and the average number of staff per HCs was 21 with standard deviation of 5.94. The average actual population covered by a Public Health Centre (PHCs) was 14,579 with standard deviation of 7992.79. The result showed the attendance recorded & service provided at departments within the health centers. For instance, the number of ANC visits, deliveries and PNC visits, immunization service, chronic, curative child health etc varied among the health centers. For instance, there were only 820 ANC visits at Boneya health center while 4133 ANC visits were recorded at Serbo health center. Similarly, there were only 401 attendances for child health service at Boneya while 2,067attendance for child health service were recorded at Serbo health center **[Table -3].**

Table 1:- The background characteristics at public health centers in Jimma zone for EFY 2009

Health centre Characteristics	**PHC (n = 16)**		
	Mean	**Range [MIN-MAX]**	**SD**
Number of rooms at Health centre	19	8 (14- 22)	2.75
Population covered/served per year	14579	56466 (19227-75693)	7992.79
Human Resources/personnel/	21	26214 (6566-32780)	5.94
Emergency per year	1396	18 (11-29)	484.57
Curative per year	985	2365 (614-2979)	794.45
Chronic care per year	3490	4136 (1077-5213)	604.5

Maternal (ANC,PNC ,delivery, FHS)	6071	5908 (1539-7447)	323
ANC	1821	6717 (1685-8402)	746
PNC	849	3313 (820-4133)	349
Delivery	972	1547 (382-1929)	398
Family planning service	74	1767 (437-2205)	8.25
Child health per year	1518	89 (46-135)	69.85
EPI per year	1453	1657 (410-2067)	654.4
Outreach service per year	985	2762 (683-3445)	565.7

5.2. Total financial resource at health centers

The total budget allocated for running the health centers to provide essential health services in the sixteen public health centers in 2009 Ethiopian financial year was USD 1,568,103.91 while the mean annual budget for providing essential health services at HCs was USD 98,006.49 with standard deviation of 31,532.4 and with a lowest allocated value of USD 59,704.81 at Robe HC to the highest of USD 110,096.03 at Shebe health center **(Figure-4).**

By the financial year, 94% of those available budgets at health centers were recurrent in type and 97% of those available health centers budget were spent on providing essential health services.

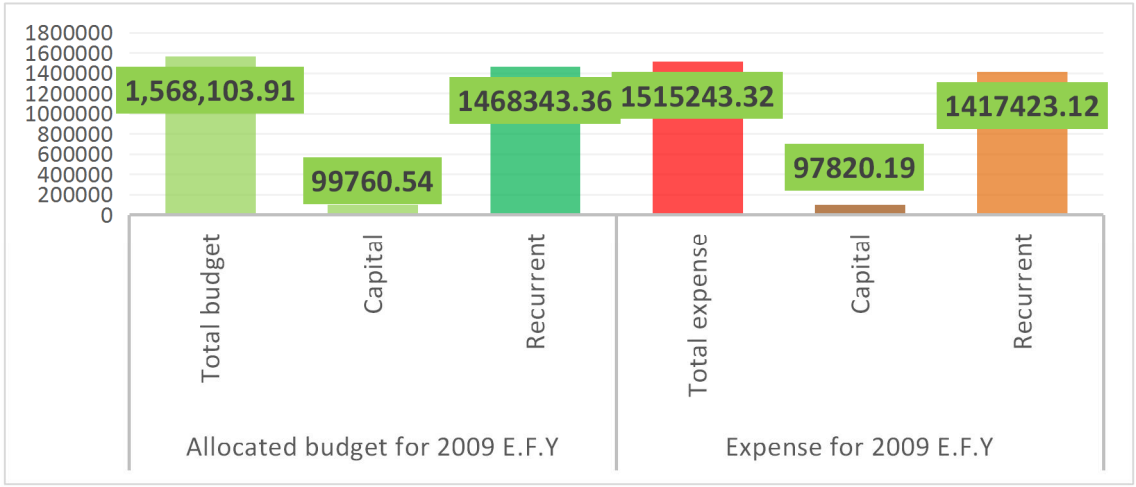

Figure 4:-Financial and expenditure resources (USD) at health centers of Jimma zone in EFY 2009

5.3. Total Annual costs at health centers

The total cost of running the health centers in providing essential health services in the sixteen public health centers in 2009 Ethiopian financial year was USD 1,754,150.18 while the mean annual costs those services at HCs were USD 109,806.03 with standard deviation of USD 50,564.9 and a range from USD 49,393.85 at Boneya HC to USD 179,374.63 at Seka health center.

The largest part of total annual cost USD1,227,872.7 (65.9 %)] were absorbed by the final cost centers (the service departments) followed by overhead cost centre which absorbed 21.9 % of the total annual cost while the intermediate cost centre were absorbed only 12.2% percent of total annual expenditure **[Table 2].**

Table 2:-Summary of cost of providing essential health services per cost centre (USD) in Jimma zone for EFY 2009

cost centre	Personnel	Medicine/drugs	Laboratory supplies	Medical consumables	Admn. & utility cost	Building	Equipments	Furniture	Vehicles	total Annual cost
Overhead										
Administrative .& utilities	178654.9					7429.1	5253.1	5373.1		215019.2
Transport	37944.4				18308.9				121104.9	194309.9
Intermediate					35260.6					
Pharmacy	75888.8					7429.1	1500.9	1343.3		104470.9
Laboratory	75888.8			1115.6	18308.9	3525.7	30018.9	1343.2		120581.2
Final					8688.9					
Emergency	77469.8	26463	5385.2	929.7		7429.1	9005.8	2686.5		147677.8
Curative	77469.8	120028.6	34619.2	8075.1	18308.9	7429.1	7504.7	5373		278808.3
Chronic care	77469.8	92620.5	13163.8	2231.3	18308.9	7429.1	4502.8	10746		226472.2
Outreach service	75888.8	42057.3	3162.7	2603.2	18308.9		1500.9			134212.3
MFHS	37944.4	77971.4	14104.1	6800.2	8999.3	11143.6	9005.7	5373		180651.1
Child health	37944.4	66157.5	12821.9	2656.3	18308.9	7429.1	5253.3	2686.5		153257.8
EPI	37944.4	47727.9	2051.5	2231.3	18308.9	3651.6	1500.9	2686.5		106793.4

Two third (65.9%) of the total cost incurred for provision of essential health services at HC was on accounted for various essential health services at the final cost centre. Curative health services accounts the highest with 15.2%, followed by chronic care service with 12.5% while EPI consumed the least, with 5.8% of total annual cost per health centre **[figure-5].**

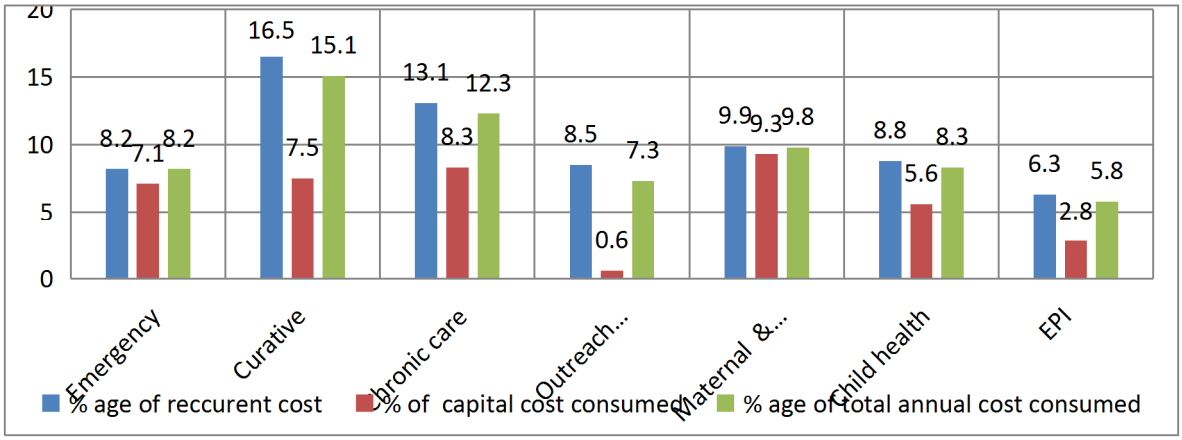

Figure 5:- Percentage of total annual cost spent on final cost centre of health centers of Jimma zone for EFY 2009

5.3.1. Total annual recurrent cost

The total annual recurrent cost was USD 1,468,174.55 while the mean annual recurrent cost per health center was USD 91,760 with standard deviation of USD 42,344.22. It also contributed to 83.7% of total annual cost. Among the recurrent cost component, the highest proportion was incurred by Personnel which accounted for USD 790,508.49 with standard deviation of USD 16,831.01. It comprised for 53.8 % of the total annual recurrent cost. The lowest proportion of recurrent cost, USD 26,562.78 was incurred by medical supplies & consumables with that also comprised for (1.9%) of the total annual recurrent cost with standard deviation of USD 794.47.

The average cost for personnel was USD 49,406.78 per health centre where the greater parts (53%) were absorbed by the final cost centers followed by overhead cost centre which absorbed 28 % of the total personnel costs while only 19 % of the total personnel cost were absorbed by intermediate cost centre.

The average cost for medical supplies & consumables USD 1,660.17 per health centre. The total medicine, Laboratory supplies & reagents and medical supplies & consumables cost was USD 584,595.49 (28%) of total annual cost) from which medicine shared USD 472,553.58 (21.9%), Laboratory supplies & reagents consumed USD 85,479.13 (4.8%) and USD 26,562.79 (1.5%) spent on medical supplies &consumables while average cost of medicine USD 29,534.61 per health centre, that of Laboratory supplies & reagents was USD 5,342.45 and medical supplies &consumables consumed USD 1,660.17.

Over two third (70%) of medicines, laboratory supplies and medical consumables cost were from revolving fund where it was 74% for medicine and 52% for laboratory & medical consumables. About 100 % of the total medicine, laboratory cost and 95.8% of medical consumables were allocated to the final cost centers respectively. Curative consuming the highest percentage with 25.4% of medicine, 40.5% of laboratory supplies and 30.3% medical supplies &consumables cost while emergency consume the lowest medicine cost (5.6%) and medical consumables cost (3.5%) while EPI consume the lowest laboratory supply cost (2.4%).

The Average annual cost administration and utility were USD 12,355.88 per health centre with the highest cost was spent on stationary and others' office consumables &supplies with USD 4,242.67 per health centre which is about 34% of the total cost of administration and utility followed by health centers' maintenance cost with total cost of USD 56,810.65 for all health centers [USD 35,50.67 per health centre] while the lowest cost was spent on electricity, water and telephone bill with total cost of USD 6,861.97for all health centers [USD 428.87 per health centre], USD 5,509.36 for all health centers [USD 344.34 per health centre] and USD 5,509.356054 for all health centers [USD 4,394.7 per health centre] which constitute about 3.2% , 2.8% and 2 % of the total administration and utility cost respectively.

It can be evidently said that the cost center which incurred the highest cost was final cost centre which consumes USD 109,542.817 for all health centers which is about 58% of the total cost of administration and utilities, followed by overhead cost centre which absorbed 28 % of the total administration and utility costs while only 14 % of the total

administration and utility cost were absorbed by intermediate cost centre administration **[Figure-6 and Table -3].**

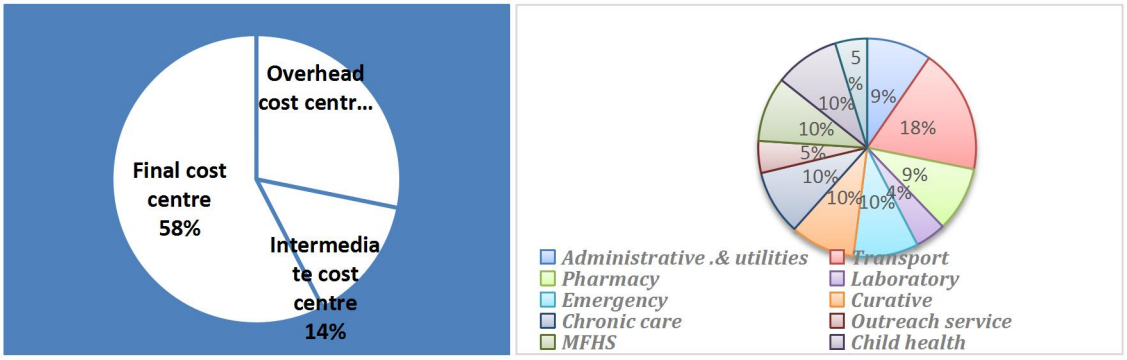

Figure 6:-Percentage of total administrative, supportive & utility cost per cost centre.

Table 3:- Annual Recurrent costs of delivering Essential health care services (USD) at Health centers of Jimma zone for EFY 2009

Cost components	PHC (n = 16)				
	SUM	Mean	SD	% Total Annual Cost	% Recurrent Cost
Personnel	790508.5	49406.8	16,831.22	45%	53%
Administration	197694.0	12355.8	5,961.32	10%	13%
Medicine	472553.6	29534.5	42344.22	22%	26%
Lab.sup& cons	85479.2	5342.4	18762.12	5%	4.4%
Med. Sup & cons	26562.79	1512.51	2303.18	2%	1.6%
Total recurrent cost	584595.5	91760.9	10274.0	83.3%	100%

5.3.2. Annualized capital cost

The total annual capital cost was USD 285,975.6 and the mean of USD 17873.4 with standard deviation of USD. It also contributed to 16.7 % of total annual cost. Among the total annual capital cost the highest proportion was incurred by Health centers' building cost with USD 75,047.28 (26.2%) & the mean annual equivalent cost of USD 4,690.45 per health centre followed by building with total annualized cost of USD 62958.41 & mean annual equivalent cost of USD 3,934.91 per health centre.

The depreciation costs of buildings accounted for USD 110,958.4 (3.6 %) of the total annual costs and about 22% total annual capital cost. It can also be evidently said that the

Final cost centre (maternal & family health services, curative chronic, child health & etc) have the highest annualized cost of building at USD 2,745.29, as they occupied more number of rooms which consumed about 71% of the total annual buildings cost.

The depreciation of equipment also accounted for about was USD 121,104.91 (4.2%) of the total annual cost and 26.2% total annual capital cost. Half (51 %) of the costs calculated under the heading "equipment" were attributable to the final cost centers while 42% to intermediate cost centers.

The total cost of furniture was USD 1679.06 per health centre and accounted for 1.6% of the total health centers' costs. Over three fourth (79 %) of the costs calculated under the heading "furniture" were attributable to the final cost centers while 14% to intermediate cost centers.

The total annualized cost of the vehicles was USD 75,047.28 which represented about 6.9% of the total annual cost and about 42% of the total of the annualized capital costs. About 100 % of the total vehicle cost was allocated to the over head cost center **[Table 4].**

Table 4:- Annual capital costs of delivering Essential health care services (USD) at Health centers in Jimma zone for EFY 2009

Cost components	PHC (n = 16)				
	SUM	Mean	SD	% Total Annual Cost	% Recurrent Cost
Buildings	62958.40	3934.9	1549.07	3.6%	22.01
Equipments	75047.29	4690.4	1219.59	4.2%	26.24
Furniture's	26865.03	1679.1	1167.22	1.6%	9.39
Vehicles	121104.92	7569.06	1071.88	6.9%	42.34
Total capital cost	285975.65	17873.4	10274.01	16.3%	100%

The final cost centre namely maternal and family health services consume more building costs compare to others that might be attributed to the number of rooms required to provide full scope of essential maternal and family health service while maternal and family health

services and emergency service consume large part of furniture's cost. Similarly, laboratory services consumed largest part of capital equipment costs that might be due number and sophistication of durable medical equipment used at the department **[Figure 7-9].**

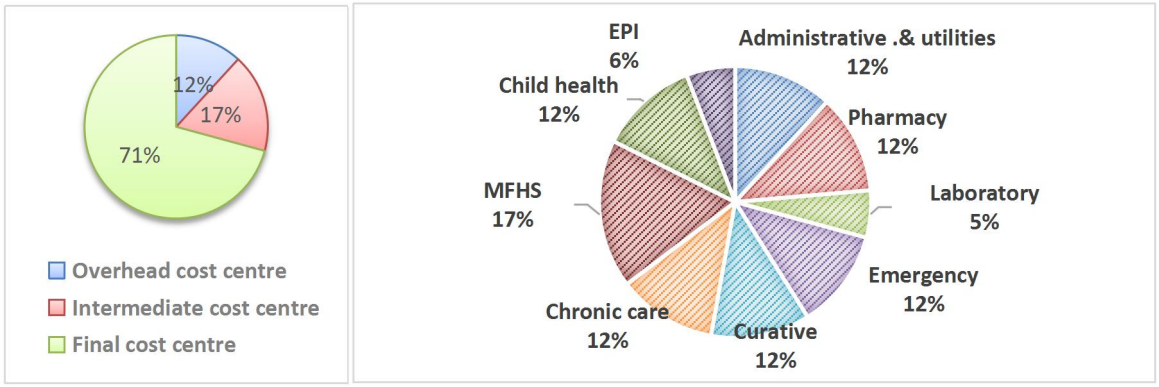

Figure 7:- Proportional allocation of buildings costs to cost centers

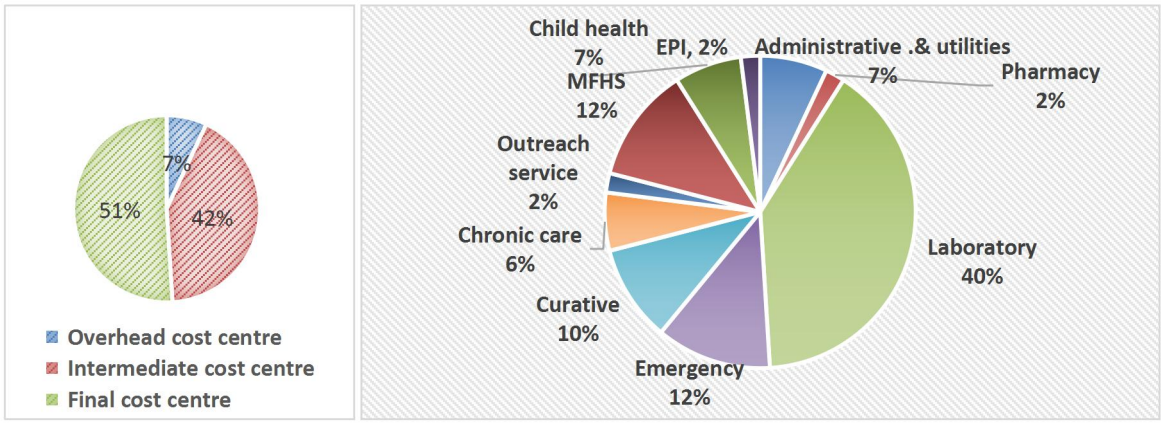

Figure 8:-Proportional allocation of equipment costs to cost centers

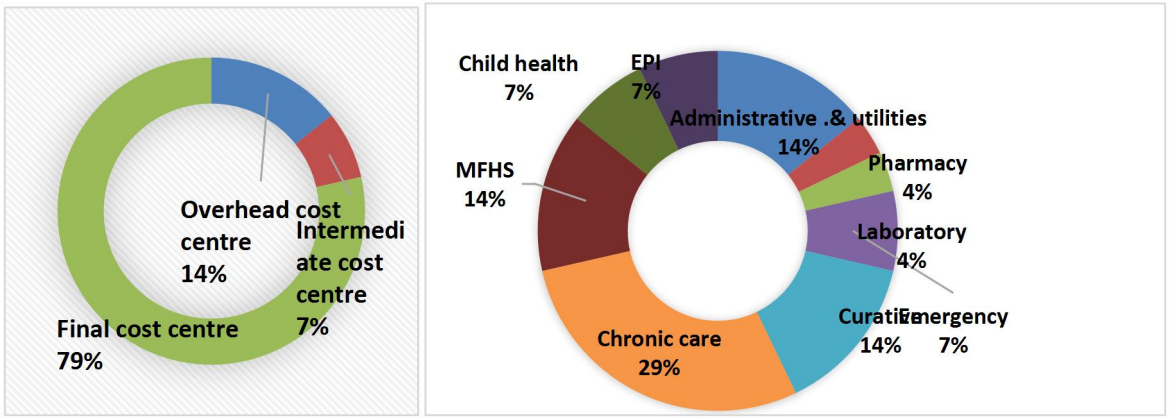

Figure 9:- Proportional allocation of furniture's costs to cost centers

5.4. Cost of essential health services

Overall the average unit cost for all essential health services provided by the financial year was USD 7.34. The most expensive unit of output is child health service with USD 9.72 while the least expensive unit of output was being the pharmacy services USD 0.62. All

health centers spent on average USD 9.72 per child health service visit, USD 9.12 per family health service visit, USD 3.84 per delivery and USD 2.79 per ANC visit. Variations in the unit cost within individual health centre and between services at health centers were discovered with personnel having higher costs than other cost drivers.

However, some the unit cost Like for ANC and delivery services did not differ substantially at health centers. For instance, the estimated unit cost for child health service at Baso health center was USD 14.23 and USD 4.27 at Serbo health center while an average cost of providing one full antenatal care to a pregnant woman was USD 1.11 at Serbo health center and USD 6.17 Kara Gora at health center. Moreover, personnel cost was the largest cost category and that therefore, implies that services which require a relatively high proportion of personnel time/number are likely to be expensive. Child health service had relatively high unit cost (USD 9.72) while PNC (USD 2.12), laboratory services (USD 0.81) and pharmacy service visit (USD 0.62) had relatively low unit cost respectively. The unit costs per services provided are given on the table below **[Table-5 and 6].**

Similar to unit cost analysis based on total cost, Unit cost based on recurrent costs also indicated that cost of health care provided varies within health centers and between services at individual health center. The variations in the unit cost were attributable to recurrent expenditure like personnel cost drivers as capital costs (buildings, vehicle, furniture and equipments) contribute relatively small percentage (less than one fifth) to total annual cost. Hence, the resultant unit cost of services based on recurrent cost did not show much difference to that of unit cost analysis based on total cost where child health service had relatively high unit cost (USD 8.75) while institutional delivery (USD 1.09), laboratory service (USD 0.81) and pharmacy service visit (USD 0.62) had relatively low unit cost per output **[Table-5].**

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Table 5:-Cost of each unit of output of the EHS for cost centers (USD) in Jimma zone public health centers for EFY 2009

Service category	Total output	Total cost	Unit cost of each service	SD
Pharmacy	**167625**	104470.96	0.62	0.17
Laboratory	149283	120581.23	0.81	0.22
Emergency	22340	147677.83	6.61	1.79
Curative	39093	278808.25	7.13	1.94
Chronic care	55850	226472.19	4.06	1.13
Outreach service	23244	134212.18	5.77	1.57
MFH services	97136	180651.09	1.86	0.50
ANC	29139	81292.98	2.79	0.75
PNC	13598	28904.17	2.16	0.58
Delivery	15543	59614.85	3.84	1.04
FP service	1189	10839.07	9.12	2.48
Child health	15762	153257.82	9.72	2.64
EPI	24285	106793.4	4.39	1.19
Total	233264	1452924.90	7.34	2.12

Exchange rate at 22.9 ETB per USD;

Note: unit cost is for one time visit/attendance/appointments/.

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Table 6:- Total annual cost & Average unit cost of all EHS (USD) in Jimma zone by health centers [EFY 2009]

Health centre	Total annual	Total beneficiaries'	Overall unit cost
Ako	163084	14561	11.2001
Anja gambo	57917.1	11892	4.87026
Asendabo	134685	22223	6.06059
Baka gudo	70077.3	8759	8.0006
Baso	65620.6	6727	9.7548
Boneya	49416.1	6736	7.33611
Dimtu	76660	11208	6.83976
Kara gora	159292	9514	16.743
Nono	53857.9	22291	2.41613
Robe	79917.7	8062	9.91288
Seka	179455	19252	9.32139
Serbo	101420	33527	3.02503
Shebe	155547	29376	5.29503
Sigimo	172255	11081	15.545
Sokoru	174634	14384	12.1409
Soloka	61100.4	9261	6.5976

Exchange rate at 22.9 ETB per USD;

Note: unit cost is for one time visit/attendance/appointments/.

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5.5. Sensitivity Analysis

The total annual costs at were affected by discount rate variation and useful life of capital items at health centers to some extent but not to level of significance set prior to the study. The average annual cost of providing range of essential health services at health centre varies from USD 109634.39 to USD 111682.63 on varying discount rate from 5% to 7% for the capital costs that only resulted 1.3% of change in total cost and 1.8 % of change in overall all unit cost on average. Useful life of capital items affected both total capital and annual costs to some extent. For building alone using useful life 20 years instead of 30 years resulted in fluctuation of total capital cost by 22.1% (from USD 17873.47 to USD 105699.48) and affected total annual cost by 3.6% (by changing from USD7.34 to USD 7.08) on average by changing mean annual cost from.1and also affected overall all unit cost **[Table-7].**

On the other hand, increasing the average number of the attendants at health centre (like ANC, Delivery and immunization, family health services) visits by 10% has lower impact on the unit costs. For instance, increasing the number of EPI beneficiaries by 10% (from 1518 to 1669) resulted in a 9.3 % reduction in cost per EPI attendant (from USD 4.4 to USD 3.9), increasing the number of ANC visits by 10% (from 1821 to 2003) resulted in a 9.3 % reduction in cost per ANC visit (from USD 2.79 to USD 2.5), and increasing institutional deliveries by 10% (from 971 to 1069) reduced the unit cost per delivery by 9.3% (from USD 3.84 to USD 3.4) and similar reduction will happen for the child health services by increasing child health services attendants by 10%.

Effect of increasing personnel cost on total annual cost was also explored. For instance, having an expectation that the number of staff will increase in future due to government policies or health care reforms like HSTP to provide an improved health care for its' citizen, if there is a 10% increase in personnel cost at health centers, resulted in increment of annual recurrent cost by 5.4 %. Similarly, the average annual cost of providing care will increase by 4.5% (from USD 109634.3 to USD 114,575.1) while overall unit cost will increase by 4.3% (from USD 7.34 to USD 7.67) **[Table-8].**

Table 7: effect of varying useful life & discounting rate on cost of EHS (USD) in Jimma zone for EFY 2009

Variables		capital cost	total cost	Laboratory cost	ANC service cost	Inst. delivery service cost	Family PLN service cost	Child health service cost	EPI service cost
Discounting rate	**5 %**	17873.48	109634.38	7536.33	5080.81	3725.92	677.44	9578.61	6674.59
	7 %	19921.73	111682.64	7670.69	5170.93	3791.47	691.77	9749.38	6793.58
Change in %		10.3	1.8	1.7	1.7	1.7	2.1	1.7	1.7
Building	Using 20 years life span	13938.58	105699.49	6870.47	4650.78	3382.38	634.19	8773.06	6130.57
	Percentage change (%)	22.1	3.6	8.8	8.5	9.2	6.4	8.4	8.2
Equipment	Using 10 years life span	16642.24	108403.15	7046.21	4769.74	3468.90	650.41	8997.46	6287.38
	Percentage change (%)	6.9	1.1	6.5	6.1	6.8	3.9	6.1	5.8

Table 8:- Effect of increasing number of staffs' on total cost of EHS (USD) in Jimma zone for EFY 2009

Mean (N=16)			
Variable	personnel cost	Total recurrent cost	Total annual cost
Personnel cost by 2009	49406.78	91760.91	109634.39
10% increase	54347.46	96701.59	114575.06
Change in percent	9.1	5.4	4.5

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CHAPTER SIX: DISCUSSION

This study analyzed the costs associated with providing essential health services at selected sixteen health center in Jimma zone to generate comprehensive evidence on cost of essential health services that enables those health center managers not only on assessments of how well resources are used to provide essential health services but also enable them to identify the focus & potential area for cost containment.

Though all the study health centers had basic infrastructure listed in Ethiopian health care standards, there were variation in some of background characteristics like number of rooms, number and pattern of staff, the catchment areas, and number of visit for each EHS during fiscal year. Most (93.8%) of health centre had adequate room number as stated and listed in Ethiopian health centre standards (54). The average number of room for health centre buildings' was [19] and it is higher that the number stated under minimum standard for primary health centre in Nigeria [13] (55). Similarly, with regard to number of health centre staff, the average number health centers staff [21] is lower than number stated in Ethiopian health centre standards [30] (54). But, it is close to those recommended by minimum standard for primary health centre in Nigeria [23] (55) and IPHS [18] (56). This figure is also higher than the finding from Ghana [7] (38). Although there were variations in the population covered by the health centre, Most of the health centers within the maximum numbers stipulated in the Ethiopian health centre standards (i.e. maximum 25,000 for HCs) (54). The average population covered by Health Centre (HCs) was 14,579. It is higher than the figure from Ghanaian health centre [11,418] (38).

Regarding financial resource, most of available budget at health centers (94%) were recurrent in type which is higher than what is stated in NHA VI (90%) (49). similarly, 97% of those available health centers budget were spent on providing essential health services. There were variations in costs across the selected health centre. This could be emanated from the differences in number of clients visited each health centre and allocated/ available/ resources.

The average annualized cost for providing essential health services through a health center was USD 109,683 which is USD7.4 per capita. This finding is close to the finding from Syria where average costs per EHS were USD 6.01., USD 2 per capita in Vietnam, USD 1.4 per capita in Uganda, and USD 1.3 per capita in Nepal (36).

But, it is lower than Ethiopian national average spending on health per capita of USD 20.77 in 2011/12 (58) and USD 28.65 in 2013/14 (49). It is even very low when compared with the World Health Organization (WHO) recommended minimum spending of USD 64 per person per year to provide basic health care services in developing countries (47). It is also lower than the findings from the study conducted in Kassena-Nankana district of northern Ghana where the cost of running a health centre for a year was estimated to be USD 136,014 (57). The difference could be due to difference in amount of resources allocated to the primary health care such as the health centers and might also be methodological difference for cost accounting.

In this study, the recurrent cost accounted for more than three fourth (83.7%) of total annual costs. In this regard, this findings close to the study done in Burkina Faso (24), Thailand (25) and Ghana (38) where recurrent cost accounted for More than three fourth (81%, 76.38%, and 80%) of total annual costs respectively.

The main cost drivers for health centers were personnel, and drugs & consumables among others. Personnel cost accounted for the largest proportion, nearly half (45%) of total annual cost and 53.8% of the recurrent costs. This is close to the finding from another study done on primary health care in entire Ethiopia through federal ministry of health that explained 46%of total annual cost went to human resources at health centers (8). This findings is corroborated with other studies in different countries where personnel cost emerged as the highest cost component (11, 12, 16, 21, 23, 28, 37 and 38).

However, it is higher than the figure from Ethiopian health care delineation study where human resource accounts for an average of 35% of the total recurrent costs (11)

it is also lower than the figure from Indonesia where Indonesia's primary care providers spent 52% on health care personnel (12). The difference might be attributed to wage rate differentials in the facilities and staffing patterns of essential health providers. The study showed that an increase in personal cost through increase in the number of staff has an impact on total annual costs. Hence, it implies that Personnel cost is an important cost

variable in the provision of essential health services which policy makers should consider when planning on improving provision of essential health services.

From the study it was observed that drugs & consumables were the second key cost drivers which consumed nearly one third (29%) of total annual cost. This finding is close to figure from the study done in Indonesian, Argentina, Pakistan, Malawi and New Guinea where Indonesia's and Argentineans' primary care providers spent only 27% of the total facility's expenditure each on drugs and supplies (3, 12) where different health facilities in Pakistan top take up to 20-30 % of total recurrent cost (22) and where drugs & consumables consumed 30% annualized total cost at each country, New Guinea (26) and Malawi (45) However, the figure from this study is lower than the figure from two studies done in our country where finding from resource tracking and management project primary health care cost study series explained drugs & supplies constitute (40%) in health centers expenditure while figure from Ethiopian health care delineation study stated health centers on average, spent half (53%) of the recurrent costs drugs & consumables (48).

it is higher than the study done in Burkina Faso (24) and North India (37) where it consumed 22 % and 21.8% total annual cost respectively. The difference in figures between studies might be attributed to type of infrastructure, supplies and drug used and difference in pharmaceutical logistic management performances.

Two third (65.9%) of the total annual cost incurred for provision of essential health services at health centers was on accounted the final cost centre usually so called direct service centers. Curative health services accounted the highest with 15.2%, followed by chronic care service with 12.5% while EPI consumed the least, with 5.8% of total annual cost per health centre. In addition to curative health services, health centers are expected to place more emphases on preventive care such as antenatal care, vaccination, family planning, postnatal Care (PNC) as it was one of the main components of essential health services. This finding is close to the findings from two studies done in northern India, where preventative component of essential health services were curative health services component dominated (25 and 37). however, The findings in this study is contrary the finding from the study done in 11 districts of health facilities of Ghana where the large proportion (66%) of total annual cost were spent on preventative and promotive component of essential health services (38).

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There were not only variations in attendance recorded & service provided at departments within the health centers but also in unit costs between services at health centers with services such as maternal health services, curative and chronic care. Child health service had relatively highest unit cost USD 9.7, which is higher than findings from Burkina Faso that indicated an average cost per Child health as USD 27.6 (24). Child health service followed by family health service with unit cost per output of USD 9.1, which is higher than findings from Burkina Faso that indicated an average cost per FP as USD 0.51(24).

The curative service had an average unit cost of USD 7.2, which is by far lower than findings from Burkina Faso that indicated an average cost per curative health service visit as USD27.6 (24).

In contrast, the average unit cost per PNC was 2.2 USD, per laboratory service was USD 0.6 and per pharmacy service visit was USD 0.8; which were relatively low unit cost. The average unit cost per ANC visit is slightly similar to the studies in Uganda, Malawi and Ghana where the unit cost per ANC visit was estimated as USD 2.21in Uganda (19), USD 3.23 in Malawi (45), and USD2.97 in Ghana (57). However it is lower than the one our country where the average unit costs per ANC visit was estimated as USD 5.1 (33). Unit cost per institutional delivery in this study was in line with the one in Rwanda where unit cost per institutional delivery was estimated as USD2.71 (30). It is also lower when compared with USD 10.22 in Malawi (45), USD15.5 in Ethiopia (48) and USD7.66 in Ghana (57).

Study done in Ethiopia on immunization of children during the Child Health Days indicated that at an average cost per child per one round was USD 0.56 (27) and cost per EPI was USD 1.17 in Burkina Faso, which is very lower than unit costs in this study (USD 4.4) (24). This might be related to the lower cost vaccination during the campaign days rather than routine vaccination activities. A possible explanation variation in reported unit cost could be the time difference between studies and a possibility related to consumer prices inflation which necessitate discounting for the time difference and adjusting for inflation, even adjusting for inflation does not guarantee for valid comparison due to relative higher inflation of health care costs as compared to general inflation rate. In addition, location and utilization or population coverage could be reasons for the variations.

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The average annual cost of providing range of essential health services at health centre varies from USD 109634.39 to USD 111682.63 on varying discount rate from 5% to 7% for the capital costs that only resulted 1.3% of change in total cost and 1.8 % of change in overall all unit cost on average. There was not much difference in the annual and unit costs with the change in discount rates and useful life's as reflected by the percentage of change attributed this variation, which is within the threshold(10%) anticipated.

A 10% increase in personnel cost at health centers, could resulted in increment of annual recurrent cost by 5.4 % and the average annual cost by 4.5%; which implies that personnel cost is a key cost driver at health centers.

In general, budgetary allocations on primary healthcare in Ethiopia are not adequate to meet the growing demands for health care. For instance, the Abuja Declaration of 2001 required African governments to commit at least 15% of their national budgets to health, but in 2010/11 while the budget allocated to the health sector by the government of Ethiopia was only 5.6% of total spending (48). However, it is still necessary to make effective use of limited budget.

CHAPTER 7:-CONCLUSIONSAND RECOMMENDATIONS

7.1:- CONCLUSION

- Cost of providing essential health care service through health center is low.
- Recurrent cost categories and final cost centers are the major area of resource consumption at health centers.
- The variability in unit costs and cost components of all essential health services, suggest that potential exists to reduce costs through efficient use of both human and material resources like personnel, drugs and medical supplies.
- The unit costs of essential health services provided at health centers mainly depends on the intensity of use of the resources and utilization pattern for essential health services.
- Further work is required to explore the key drivers of efficiency and interventions that may facilitate efficiency improvements at health centers.

7.2:- RECOMMENDATIONS

For the government (FMOH and RHB)

- Personnel cost should be carefully considered while human resource planning as it was found to be Prime cost variable in this study.
- Significant resources needs to funded health cent health spending is far below what is nationally recommended to provide adequate essential health service at those area
- The FMOH, as the main provider, financing agency and regulator for health system, should intensify its efforts to control rising of healthcare costs by introducing the control measures.

For The health centers /Health centre managers/

- Should effectively direct health centers under their umbrella to provide essential health services with acceptable standard and actual service
- The health centers /Health centre managers should make sure not only use generic procurement but also strictly follow PPA guide line in every step of purchasing drug & consumables for health centers as the cost incurred for drug & consumables was founded as important cost drivers.
- The health centers /Health centre managers should develop strategies for efficiency gain (especially on personnel cost) by making best use of available budget.
- Health centers should also place more emphases on preventive care such as antenatal care, vaccination, family planning, postnatal Care (PNC) as it was one of the main components of essential health services since curative components takes larger share in this study.

LIMITATIONS OF THE STUDY

Record keeping at the health centers was poor and could affect the study results. In some circumstance, cost of essential health services were relied on estimations of prices from the markets as some of the health centers got capital items through donation with no cost records on them.

Building costs was calculated indirectly based on the number of room shared among essential health services and total health centre construction cost as it was difficult to obtain reliable cost of building of the health centers. Similarly, personnel cost across cost centre were allocated indirectly based on the number and type of profession working at cost centre rather than staff time allocation pattern that bases on time-motion to assess time contribution of staff performing multiple tasks.

In spite of these stated limitations, the methodology used in this study is applicable across various settings & the estimates from this study are reflective of the current level of health centers and services delivered at them.

AREA FOR FURTHER RESEARCH

This study demonstrated that cost analysis at health centers can be adopted in conducting similar study in another area. Hence, large scale cost assessments (national/regional wise study) is one of the potential area of future researchers to provide better, comprehensive and concise idea of the public health expenditure at national/regional/ level.

The question than arises from the findings in this study regarding unit cost at health centers is *"are the health centers with high unit costs simply better resourced than others? Or are the health centers with low unit costs more efficient than those with relatively higher cost*?" hence, the answer to this question can also be found through the future researches.

Personnel cost was found to be the major contributor to the total and unit cost at health centers, it is considerably important to know whether these health centers had efficient staff allocation. Therefore, there is need to do a further study to assess staffing levels as well as staff work load.

Similarly, the study was conducted from the health care provider perspective to estimate resources incurred when providing essential health services. Costs from clients' angle and opportunity cost of alternative were not included in the analysis and an area to be explored by future researchers'.

Though, the finding from this study is relatively reliable and may serve as a starting point for future cost studies; the incoming study should particularly focus on the following areas:

- Cost effectiveness or cost efficiency analyses of essential health care interventions at different level of care to identify & choose priority interventions and related cost each level of care.
- Allocation and sustainability of health care resources and factors affecting effective usage available budget at service delivery point.

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ANNEXES

Annex I: - Data collection check lists for essential Health service costing at health centers (ETB) in Jimma zone [EFY 2009]

Section 1: - Check lists to assess Health center characteristics

Section 1.1:-background information

Name of district			
District capital			
Health centre name			
Years of operation/establishment			
Location of health centre	Woreda		
	kebele	Urban	
		Rural	
Catchment population	Male		
	Female		
	Total		
Contact number of in-charge			
Date of assessment			

Section 1.2:- Essential health service utilization in EFY 2009 at selected health centers

Essential health services	**Number of beneficiaries during fiscal year**
Emergency per year	
Curative per year	
Chronic care per year	
ANC	
PNC	
Institutional Delivery	
Family planning service	
Child health per year	
EPI per year	
Outreach service per year	
Others'(if any)	

Section 2:- Resource inventory check list for identifying Cost of running a health centre [reference year is 2009 EFY]

Section 2.1:-Human resource for health

1. The number of full time staffs assigned to this health center in 2016/17 ----------
2. The salary of health centers' staff in 2016/17 fiscal year? Total ---------- average --------

Section 2.1.1:-*Personnel [HRH] cost at study health center*

Code	HR by profession	**quantity**	**Gross monthly salary**	**Other benefits** (Complements of earnings	**Gross salary for the year**	**Total (staff cost)**
1	Administrative and supportive staffs					
2	HO					
3	Nurse					
4	Midwife					
5	Envt'tal health personnel					
6	HE-supervisor					
	Lab. Personnel					
7	Pharmacy personnel					
8	Daily laborers					

NOTE: - Administrative staff s include staffs for worked at management , finance, HR departments while supportive staffs include janitors, guards, drivers, secretary and etc.

Section 2.2.:-Check lists to assess Building cost

1: In which year was this health facility built...

2: Who constructed the health facility ……..

3: What is the construction cost? (Local currency)……

4: Total number of rooms at health centers……

5: Activities carried out at each room……..

Section 2.2.1:-health centers' building cost

S.N.	Block	Room	Department using it/activities
1.			
2.			
3.			
4.			

Section 2.3:-Check lists to assess Functioning equipment and furniture's cost

Section 2.3.1*:-General and medical equipment*

	Equipment	**Number**	**Unit cost**	**Service years**	**Total**
General Equipments	computer				
	printer				
	Photo copy machine				
	Solar panel				
	Borehole				
	Generator				
	Pumping machine				
	Water tanks				
	Other				
Medical Equipments					
	Autoclave				
	Weighing scale				
	Exam couch				
	Blood pressure machine				
	others				
Furniture's	Tables				
	chairs				
	File cabinet				
	others				

Section 2.4:-Check lists to assess Transportation cost

Section 2.4*: - vehicles form*

Registration No.	Description/Type	Value/ Cost	Useful Life	Total Cost

Section 2.5:-Check lists to assess Drugs, laboratory supplies and medical consumables

Section 2.5.1: -Drugs and medical consumables

Name Of Drug and consumables	**Quantity consumed by fiscal year**	**unit price**	**Annual Total price**
TABS			
Artesonate-amodiaquine(6-13 years)			
CAPSULES			
Amoxycillin-250			
Amoxycillin-500			
Chloramphenicol			
INJECTIONS			
Diclofenac			
Diaxepam			
Gentamycine			
Promethazine			
Oxytocin			
Buscopan			
SUSPENSIONS			
Amoxycillin			
Co-trimoxazole			
Flucloxacillin			
Metronidazole			
Erythromycin			
SYRUPS			
Paracetamol			
Multivitamin			
Promethazine			
OINTMENT			
diclofenac gel			
Kalamin lotion			
Cotton			

Gauze			
Lab/med.Consumables and supplies			
Cotton			
Bandage			
Dispensing envelope			
Paster			
Gauze B. (rolls)			
Surgical gloves (Box)			
Plaster (rolls)			
Liquid soap (Galon)			
RDTs			
HIV test kits			
Syphilis test kits			
Others			

Section 2.6:-Check lists to assess Administrative and utility cost

Section 2.6*.1:- Administrative a*nd utilities costs

Items	**Direct Cost paid per that year**
Electricity(VRA)	
Water	
Telephone	
Cleaning products	
Repairs, plumbing, roofs etc.	
Spare parts	
Servicing fees	
Fuel	
Lubricants	
Others	
Total costs	

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Section 2.6.2:-*Stationery*

Name of stationery	Quantity consumed	Unit price	Total	Total value
Folders				
Files arch				
Flat files				
Stapler				
Staple pins				
A 4 paper				
A3 paper				
Envelopes (A4)				
Envelopes (A3)				

Section 2.7:-Check lists to assess capital equipment maintenances at health centers

S.N.	Type of capital equipment maintained	Frequency of maintenance	Unit price	Total	Total value

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Annex II: - Direct allocation form

Cost centers	**Personnel**	**Medicines /sundries/**	**Utilities/ cleaning/**	**Building**	**Medical and non medical equipment**	**Others**	**Total**
Overhead							
Administration							
Transport							
Ancillary/intermediate							
Pharmacy							
Laboratory							
Final							
Emergency							
Curative							
Chronic care							
Outreach service							
ANC							
PNC							
Inst. delivery							
FP							
Child health							
EPI							

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Annex III:-Cost centers

Cost center	**Allocation criteria**
Overhead	
Administration, support departments and utilities	Proportion of direct costs of the cost center
Transport	Vehicle operation cost and capital vehicle/bike cost
Intermediate Cost Centre	
Pharmacy	Value of drugs supplied to cost centers
Laboratory	Number of tests carried out for each cost centers
Final cost centre/by health service categories	
Emergency service	No. Of Visits
Curative care service	HC- patient day and admission
Chronic care service	Visit and follow up/ HC-patient
Maternal and child health (FP, ANC/PNC, institutional delivery)	Client day /no. Of delivery and referral for higher level,
Outreach service	No. Of beneficiaries
Child health services	No. Of beneficiaries
EPI	No. Of individual vaccinated/**children** +adult)

Annex IV:-Summary of cost allocation

Costs	**Method of allocation**
Personnel	Total personnel expenditure * %age weighted of visited
Administrative & utilities	Total expenditure on administrative and utilities*proportion of patients
Drugs	Direct (drug costs of each health centers' calculated and allocated directly to relevant service)
Lab. Supplies	Direct (drug costs of each health centers' calculated and allocated directly to relevant service)
Medical consumables	Direct (laboratory supply costs of each health centers' calculated and allocated directly to relevant service)
All drugs, lab. & Med supp…	Direct (all drug ,lab supplies and medical consumables costs of each health centers' calculated and allocated directly to relevant service)
Buildings	Annual recurrent cost * proportion of patients
Vehicle	Annual recurrent cost * proportion of patients
Furniture	Annual recurrent cost * proportion of patients
Equipments	Annual recurrent cost * proportion of patients

Annex V:-Cost categories

Category Description	
1. Recurrent cost	
Personnel cost	It includes gross income of staff, complements of earnings (i.e allowances & overtime) human resource costs and cost of performance -based incentives (both monetary and value of non-monetary).
Administrative cost	It includes electricity, water, telephone bills, cleaning products, repairs, post office, printing, photocopying, and stationary. In addition, cost of spare parts purchased, servicing of the means of transport, fuels and lubricants consumed were also included.
Pharmacy costs	These costs included the costs of drugs and vaccines consumed within the period.
Laboratory costs	This group included all laboratory supplies used in the period.
Medical supplies cost	This group included all medical consumables used in the period.
2. Capital cost	
Cost of building	It refers to all the rooms in the health care centre. The total cost of constriction as well as Numbers of room used.
Vehicle costs	These included all vehicle costs (motorcycles, four-wheel vehicles, ambulance and bicycles).
Equipment cost	It includes cost of general equipment and equipment in the various rooms (waiting room, consulting room etc.)
Furniture cost	It includes cost of furniture in the various rooms (waiting room, consulting room etc.)

Annex VI:-The Exhaustive list and grouping of costs items

Recurrent cost	**Personnel cost** • all HCs' staff Salaries • all HCs' staff Complementary earnings	**Administrative cost** • Telephone/fax charges • Electricity/water charges • Stationery requirements • Office materials & supplies • cleaning agents • Transport and vehicle operational cost: Tools, Spares/accessories, Fuels, lubricants, & paraffin and Servicing fees & repairs	**Pharmacy costs** • Drugs [EML]	**Medical and Laboratory costs** • Lab. supplies and consumables • medical supplies and consumables
Capital cost	**Vehicles cost** • 4- wheel • 2- wheel	**Equipments cost** • Laboratory equipment • Office equipment • Medical equipment	**HC buildings and rooms cost**	**Furniture's cost** • All HC furniture like tables, file cabinet chairs

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Annex VII: - **The Exhaustive list** of component of essential health services given at health centre

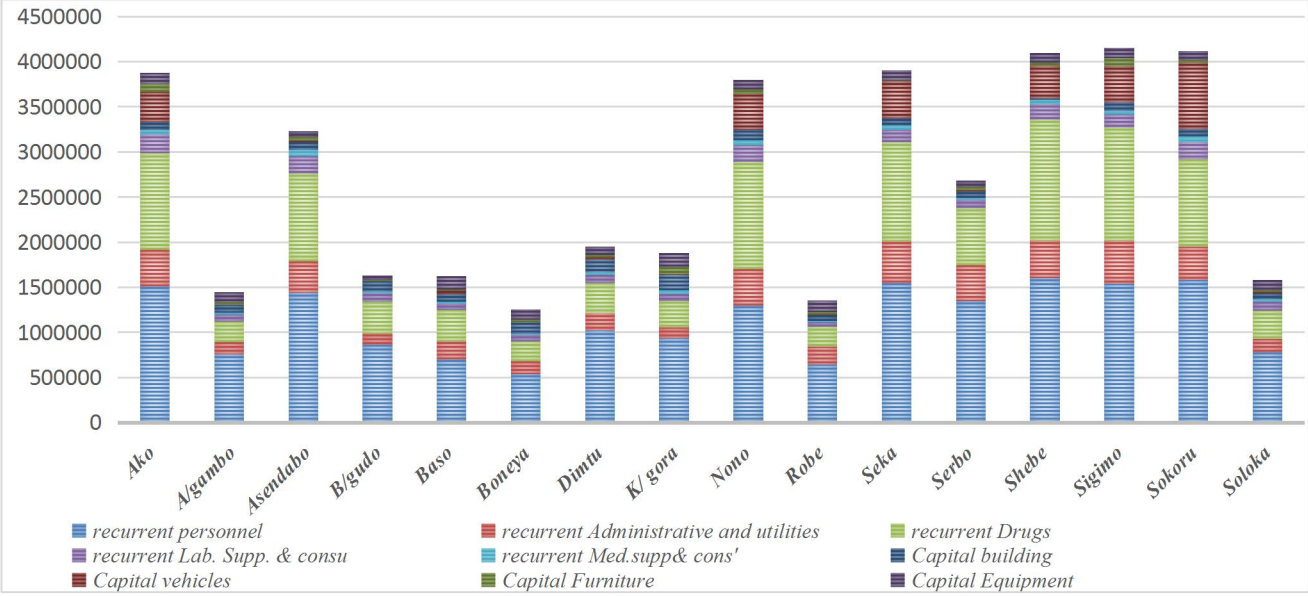
Essential health service categories	**Component of essential health services**
Curative/chronic care	➢ Emergency service (Motor vehicle accident, gunshot and others) ➢ Curative care (Limited disease condition) like TB, malaria, STD, ENT , ophthalmic and other notifiable disease & treatable condition) ➢ Chronic care (ART, DM , HTN & CVD, Asthma, epilepsy) ➢ Child health (diarrhea, malnutrition, respiratory infection, helminthiatis, measles)
Preventive/ Promotive care	➢ Maternal and child health (maternal, child & EPI) Maternal (FP, ANC, PNC, delivery and MWH service) ➢ Immunization:-EPI (Vaccination) in HC ➢ Outreach service (Nutritional and dietary consulting, BHC and health promotional service and other community health service)

Annex VIII: - Costs distribution at health centers [ETB] in Jimma Zone [EFY 2009]

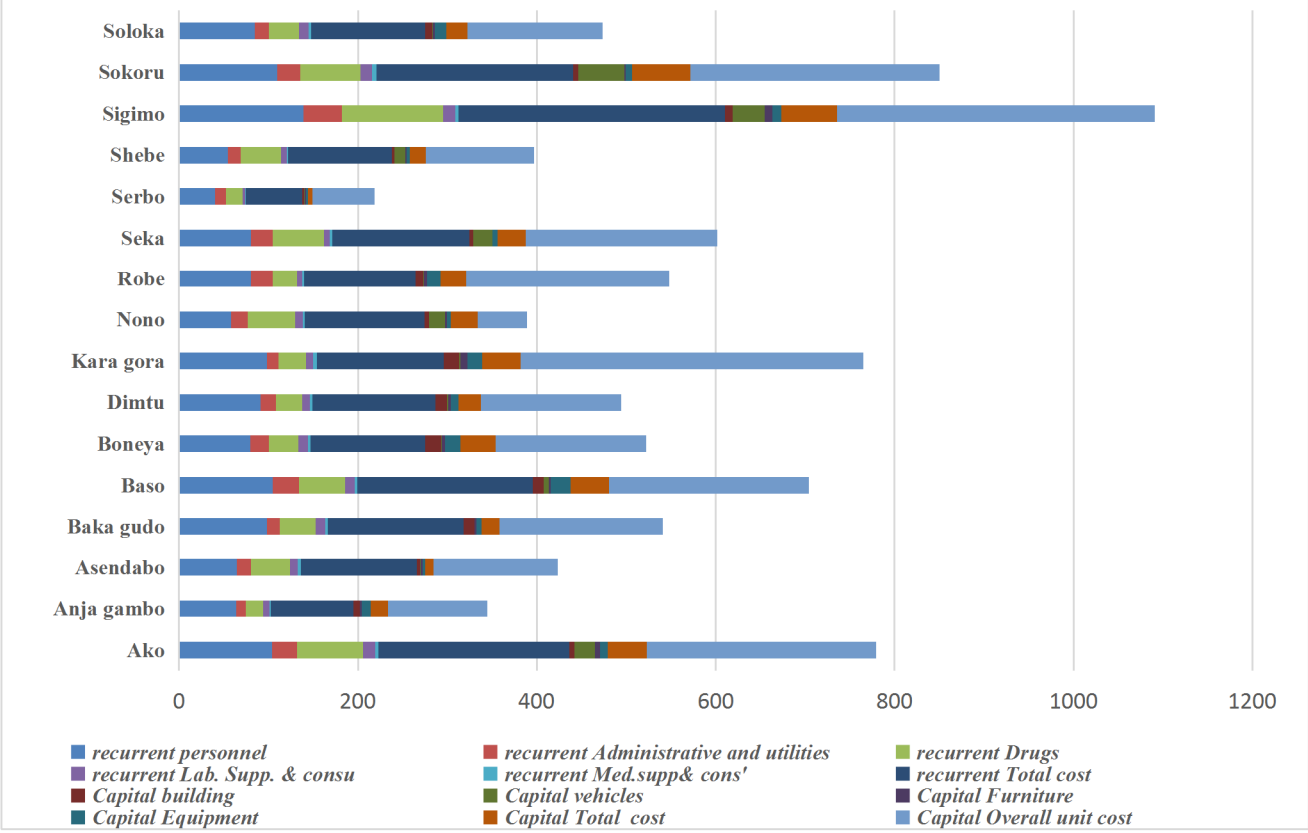
8.1. Total cost distribution at health centre [Table]

health centre name	*Recurrent*						*Capital*				*Annual*		
	personnel	*Administrative and utilities*	*Drugs*	*Lab. Supp. & consu*	*Med.supp & cons'*	*Drugs, lab.&Med supp & consmbs*	*building*	*vehicles*	*Furniture*	*Equipment*	*Total Recurrent cost*	*Total capiatal cost*	*total annualcost*
Ako	**1511101**	**407486**	**1072367**	**204115**	**49747**	**1326229**	**87344.06**	**333939**	**88299**	**122905.3**	**3102143**	**632487.4**	**3734630.4**
A/gambo	**759796**	**129350**	**227808**	**81596**	**23313**	**332718**	**80957.41**	**2652.01**	**25815**	**118557.1**	**1098320**	**227981.2**	**1326301.7**
Asendabo	**1436971**	**351776**	**969345**	**193112**	**72417**	**1234874**	**84712.62**	**17437.93**	**38483**	**65212.24**	**2878431**	**205845.3**	**3084276.3**
Atnago	**860848**	**124839**	**353431**	**91638**	**26182**	**471251**	**109619.4**	**2307.55**	**14420**	**49796.3**	**1326568**	**176143.1**	**1604769.4**
Baso	**702786**	**197405**	**345676**	**73207.85**	**20916.5**	**439800.4**	**81740.34**	**41150**	**11455**	**152122.4**	**1318301.5**	**286468**	**1502711.1**
Boneya	**537827**	**140830**	**221951**	**67966**	**19419**	**309336**	**121867.2**	**6189.77**	**21841**	**117219.94**	**864510**	**267117.88**	**1131627.9**
Dimtu	**1022466**	**188689**	**332409**	**97754.72**	**27929.92**	**458093.5**	**140499.9**	**17343.9**	**28258**	**98797.06**	**1545215.6**	**284898.74**	**1755513.833**
K/ gora	**934450**	**122355**	**292461**	**77529**	**42678**	**412668**	**167315.1**	**10437.82**	**76440**	**154276.91**	**1347044**	**408469.83**	**3647798.232**
Nono	**1297076**	**404069**	**1183913**	**190320**	**54856**	**1429089**	**110551.7**	**397741.9**	**55330**	**100557.88**	**2983617**	**664181.23**	**1233345.668**
Robe	**646845**	**197435**	**216755**	**49671**	**14191**	**280617**	**67348.07**	**9129.88**	**26072**	**124772.91**	**1006023**	**227322.67**	**1830114.381**
Seka	**1546321**	**463108**	**1100218**	**133626.3**	**53468**	**1287312**	**78275.16**	**405082.1**	**11844**	**111443.78**	**2955376.3**	**606645.53**	**4109526.679**
Serbo	**1349903**	**397744**	**631562**	**91477**	**18295**	**741334**	**69491.17**	**16184.15**	**33600**	**71046.98**	**2132198**	**190322.3**	**2322520.298**
Shebe	**1604639**	**407505**	**1341832**	**175630**	**50180**	**1567642**	**8672.3**	**365513.8**	**37462**	**108204. 9**	**3424776**	**519852.89**	**3562021.832**
Sigimo	**1537208**	**479785**	**1255191**	**144809**	**41374**	**1441374**	**89701.66**	**397205.9**	**96666**	**110219.03**	**3305329**	**693792.74**	**3944628.887**
Sokoru	**1580693**	**371752**	**965450**	**189356**	**66011**	**1220817**	**76322.26**	**742795.2**	**27746**	**97501.54**	**3165161.4**	**944365.28**	**3999121.742**
Soloka	**781854**	**145102**	**315975**	**96544**	**27584**	**440103**	**67977.7**	**9439.16**	**21755**	**116721.43**	**1183305**	**215893.57**	**1399198.575**
Total	**18110784**	**4529230**	**10826344**	**1958351.87**	**608561.42**	**13393257.99**	**1442396.05**	**2774550.07**	**615486**	**1719355.73**	**33636318.69**	**6551787.59**	**40188106.89**
Mean	**1159771.22**	**274605.5**	**492496.5**	**97149.36**	**34651.96**	**606292.5**	**83226.48**	**17390.91**	**28002**	**110831.4**	**1838706.82**	**285683.39**	**2511756.681**

8.2. Total costs distribution at health centers [Figure]



8.3. Overall unit cost at health centers



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8.4. Unit cost of essential health services per cost centers

Cost centers	*Total vol.of. activities*	*personnel*	*medicine*	*lab.supp & consu.*	*Med.supp .& consu.*	*Adm.,supportive & utilities*	*Building*	*equipments*	*Furniture*	*Vehicle*
Adm. ,supportive & utilities	215608	18.9				1.9	0.8	0.6	0.6	
Transport	215608					3.7				12.8
Pharmacy	204218	8.5				2.1	0.8	0.2	0.2	
Laboratory	149283	11.6			0.2	1.3	0.5	4.6	0.2	
Emergency	22340	79.4	27.1	5.5	1	18.8	7.6	9.2	2.8	
Curative	39093	45.4	70.3	20.3	4.7	10.7	4.3	4.4	3.1	
Chronic care	55850	31.7	37.9	5.4	0.9	7.5	3.1	1.84	4.4	
Outreach service	23244	74.8	41.4	3.1	2.5	8.9		1.5		
Maternal	97136	8.94	18.4	3.3	1.6	4.3	2.6	2.1	1.2	
child health	15762	55.15	96.2	18.6	3.9	26.6	10.8	7.6	3.9	
EPI	24285	35.8	45.1	1.9	2.1	8.5	3.4	1.4	2.5	
Total	238852	75.8	45.3	8.2	2.5	18.3	6.1	6.9	1.5	

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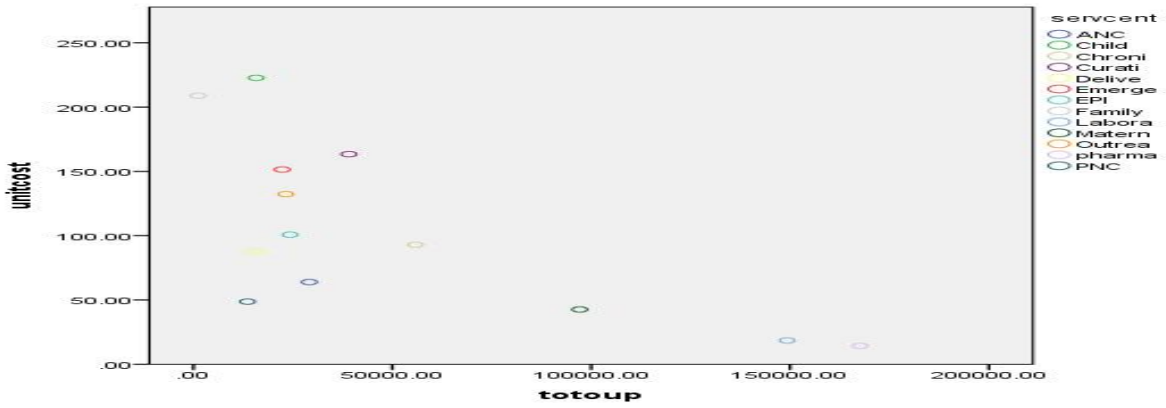
8.5. Total annual & average unit cost per selected health centre in Jimma zone

Health centre	total annual	total beneficiaries'	Overall unit cost
Ako	3734630.41	14561	256.4817258
Anja gambo	1326301.752	11892	111.5289062
Asendabo	3084276.289	22223	138.7875754
Baka gudo	1604769.349	8759	183.2137629
Baso	1502711.079	6727	223.3850274
Boneya	1131627.883	6736	167.9970135
Dimtu	1755513.833	11208	156.6304276
Kara gora	3647798.232	9514	383.4137305
Nono	1233345.668	22291	55.32931084
Robe	1830114.381	8062	227.0050088
Seka	4109526.679	19252	213.4597278
Serbo	2322520.298	33527	69.27313204
Shebe	3562021.832	29376	121.2561898
Sigimo	3944628.887	11081	355.9813092
Sokoru	3999121.742	14384	278.0257051
Soloka	1399198.575	9261	151.0850421
Total value	40188106.89	238854	168.2538575
Mean value	2511756.681	14928	168.253

8.6. Average unit cost versus total number of output at health centers

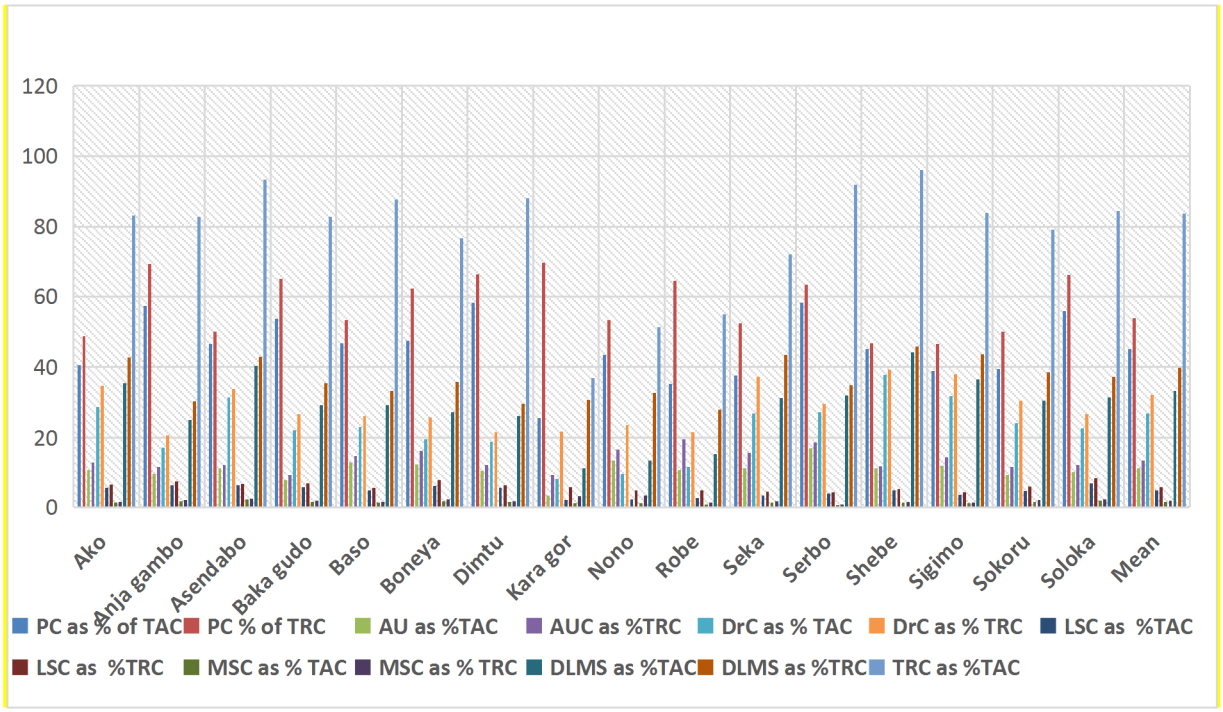


8.7. Summary of cost of providing essential health services per cost centre (ETB) at health centers in Jimma zone (EFY 2009)

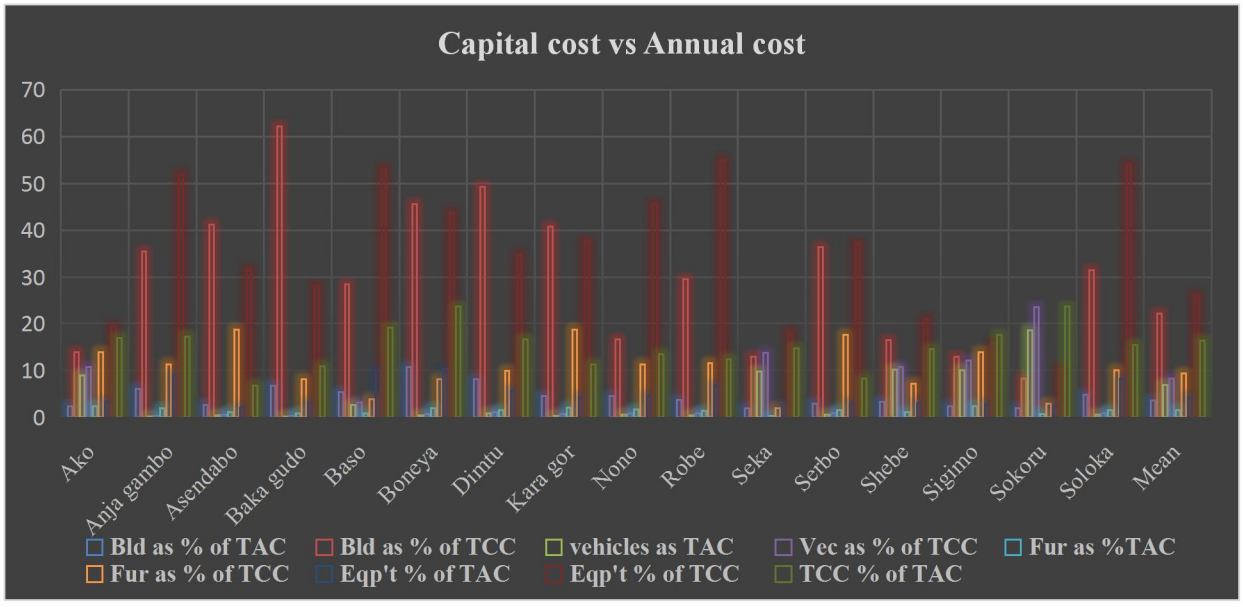
8.7.1. Total cost

cost centre	Personnel	Medicine/ drugs	Laboratory supplies	Med.supp. & consum.	Admn.& utility cost	Building (AEC)	Equipments (AEC)	Furniture (AEC)	Vehicle (AEC)	total Annual cost
Overhead cost centre										
Administrative .& utilities	4093037.6				419461.4	170202.7	120354.9	123097.1		4926153.9
Transport	869317.7				807830				2774550	4451697.7
Intermediate cost centre										
Pharmacy	1738635.5				419461.4	170202.7	34387.1	30774.2		2393461.1
Laboratory	1738635.5			25559.5	199066.4	80774.2	687742.3	30774.2		2762552.2
Final cost centre										
Emergency	1774857.1	606275.3	123376.2	21299.6	419461.4	170202.7	206322.7	61548.5		3383343.6
Curative	1774857.0	2749891.4	793132.8	185002.7	419461.4	170202.7	171935.6	123097.1		6387580.7
Chronic care	1774857.0	2121963.4	301586.3	51119.2	419461.4	170202.7	103161.3	246194.3		5188545.7
Outreach service	1738635.4	963544.6	72459.1	59639.1	206175.9		34387.1			3074841.2
MFHS	869317.7	1786346.8	323128.2	155791.7	419461.4	255304.1	206322.7	123097.1		4138769.7
Child health	869317.7	1515688.2	293752.9	60856.1	419461.4	170202.7	120354.9	61548.6		3511182.5
EPI	869317.7	1093460.7	47000.4	51119.2	206175.9	83658.9	34387.1	61548.6		2446668.7

8.7.2. Recurrent costs spent as percentage of both total annual and recurrent cost at health centers



8.7.3. Capital costs spent as percentage of both total annual and capital cost at health centers



Annex IX: Sensitivity analysis [EFY 2009]

9.1. Effect of varying useful life & discounting rate on Annual cost of EHS (**ETB**)

Variables		capital cost	total cost	pharmacy cost	Laboratory cost	Emergency service cost	Curative service cost	Chronic care	Outreach service cost	ANC service cost	PNC service cost	Inst. Deliveryservice cost	Family PLN service cost	Child health service cost	EPI service cost
Discounting rate	5 %	409486.7	2511756.7	149591.3	172659.5	211458.9	399223.8	324284.1	192177.6	116402.9	41387.7	85362.1	15520.4	219448.9	152916.8
	7 %	456412.7	2558682.7	152258.2	175737.7	215228.9	406341.2	330065.5	195603.7	118467.6	42138.5	86863.8	15848.7	223361.3	155643
Change in %		10.3	1.8	1.7	1.7	1.7	1.8	1.8	1.7	1.7	1.8	1.7	2.1	1.7	1.7
Building															
Using 20 years life span		319337.1	2421607.1	135609.9	157404.5	198571.7	365662.7	297857.7	176777.3	106550.7	38745.7	77491.4	14529.6	200993.4	140453.2
Percentage change (%)		22.1	3.6	9.3	8.8	6.1	8.4	8.1	8	8.5	6.4	9.2	6.4	8.4	8.2
Vehicle															
Using 5 years life span		401151.9	2503421.9	140191.6	162722.4	205280.6	378016.7	307920.9	182749.8	110150.6	40054.8	80109.5	15020.5	207784.1	145198.5
Percentage change (%)		2.1	0.3	6.4	5.8	2.9	5.3	5	4.9	5.4	3.2	6.2	3.2	5.3	5.1
Furniture															
Using 10 years life span		400425.6	2502695.6	140150.9	162675.2	205221	377907	307831.6	182696.8	110118.6	40043.1	80086.3	15016.2	207723.7	145156.3
Percentage change (%)		2.2	0.4	6.3	5.8	2.9	5.3	5.1	4.9	5.4	3.2	6.2	3.2	5.3	5.1
Equipment															
Using 10 years life span		381278.7	2483548.7	139078.7	161430.7	203650.9	375015.8	305476.5	181299.1	109276.1	39736.8	79473.6	14901.3	206134.5	144045.8
Percentage change (%)		6.9	1.1	7	6.5	3.4	6.1	5.8	5.7	6.1	3.9	6.8	3.9	6.1	5.8

9.2. Effect of varying useful life & discounting rate on unit cost on some of EHS [ETB]

Variables		*pharmacy cost*	*Laboratory cost*	*Emergency service cost*	*Curative service cost*	*Chronic care*	*Outreach service cost*	*ANC service cost*	*PNC service cost*	*Inist. delivery service cost*	*Family PLN service cost*	*Child health service cost*	*EPI service cost*
Discounting rate	*5 %*	14.3	18.5	151.5	163.4	92.9	132.3	63.9	48.7	87.9	208.9	222.8	100.9
	7 %	14.5	18.8	154.2	166.3	94.6	134.6	65.1	49.6	89.5	213.3	226.7	102.5
Change in %		1.4	1.6	1.8	1.7	1.8	1.7	1.8	1.8	1.7	2.1	1.7	1.6
Building													
Using 20 years life span		12.9	16.9	142.2	149.7	85.3	121.7	58.5	45.6	79.8	195.5	204.1	92.5
Percentage change (%)		9.8	8.6	6.1	8.4	8.2	8.1	8.5	6.4	9.2	6.4	8.4	8.3
Vehicle													
Using 5 years life span		13.4	17.4	147.1	154.7	88.2	125.8	60.5	47.1	82.5	202.1	210.9	95.7
Percentage change (%)		6.3	5.9	2.9	5.3	5.1	4.9	5.3	3.3	6.1	3.3	5.3	5.2
Furniture													
Using 10 years life span		13.4	17.4	146.9	154.7	88.2	125.8	60.5	47.1	82.4	202.1	210.9	95.6
Percentage change (%)		6.5	5.8	2.9	5.3	5.1	4.9	5.4	3.3	6.2	3.2	5.4	5.2
Equipment													
Using 10 years life span		13.3	17.3	145.9	153.5	87.5	124.8	60	46.8	81.8	200.5	209.2	94.9
Percentage change (%)		7.3	6.5	3.7	6.1	5.8	5.7	6	3.9	6.9	4.1	6.1	5.9

8.3. Effect of increasing service volume on unit cost on some of EHS [ETB]

Variables	*pharmacy cost*	*Laboratory cost*	*Emergency service cost*	*Curative service cost*	*Chronic care*	*Outreach service cost*	*ANC service cost*	*PNC service cost*	*Inist. delivery service cost*	*Family PLN service cost*	*Child health service cost*	*EPI service cost*
Using average pharmacy service = 10477	14.3											
10% increase in pharmacy service = 11524	12.9											
Change in percent	9.1											
Using average laboratory visit = 9330		18.5										
10% increase in laboratory visit = 10263		16.8										
Change in percent		9.1										
Using average emergency visit = 1396			151.4									
10% increase in emergency visit = 1536			137.9									
Change in percent			9									
Using average curative care visit = 2443				163.4								
10% increase in curative care visit = 2688				148.5								
Change in percent=				8.9								
Using average chronic care visit = 3491					92.9							
10% increase in chronic care visit = 3840					84.5							
Change in percent					9.							
Using average outreach beneficiaries' =1453						132.2						
10% increase in outreach service visit = 1598						120.2						
Change in percent=						9.1						
Using average ANC visit = 1821							63.9					
10% increase in ANC visit =2003							58.1					
Change in percent							9.3					