

Costs of Publicly Funded Primary Care Facilities, Departments, and Exempted Services in Ethiopia



HARVARD T.H. CHAN
SCHOOL OF PUBLIC HEALTH

 **B.I.C.**
Breakthrough International Consultancy PLC



ኢትዮጵያ ፌዴራል የወጪና ስፖርት ሥርዓት
የፖ.ሪ ጥብቃ ማኅበር
Federal Democratic Republic of Ethiopia
Ministry of Health

Peter Berman, Abebe Alebachew, Carlyn Mann, Anubhav Agarwal, and Engida Abdella

Resource Tracking and Management Project
Primary Health Care Cost Study Series: Paper 1

December 2016

Acknowledgements

The authors would like to acknowledge the support and inputs of many colleagues at the Federal Ministry of Health (FMOH). Of particular note are: Dr. Addis Tamire, Ato Abdujelil Reshad, Dr. Sinetsehay Chanayalew, and Wayziro Mekdim Enkossa for providing guidance and leadership during the study. We would also like to acknowledge the Health Care Financing Technical Working Group for reviewing the tools and assisting in sample selection. We are thankful for the cooperation of the regional health bureaus, zonal, and woreda health offices for their assistance in the sample selection. The time commitment provided by the woreda office of finance and economic cooperation and specific health facilities during the data collection process is greatly appreciated. We are also grateful for those willing to participate in the key informant interviews at the woreda and facility levels for their views and support during the data collection process.

Grant support from the Bill & Melinda Gates Foundation as part of the Resource Tracking and Management Project at the Harvard T.H. Chan School of Public Health in partnership with Breakthrough International Consultancy, PLC is gratefully acknowledged. All errors remain the responsibility of the authors.

Foreword

Analyzing the costs of primary care services is one of the three components of the Resource Tracking and Management (RTM) project carried out in collaboration with the Ethiopian Federal Ministry of Health (FMOH). RTM is a three year program funded by the Bill & Melinda Gates Foundation (BMGF) and implemented by the Harvard T.H Chan School of Public Health (HSPH) and Breakthrough International Consultancy, PLC (BIC). The primary health care (PHC) cost study was conducted to provide timely and relevant evidence on the financing sources for the provision of primary care services; actual costs of providing PHC services and specific exempted services in health facilities; specific revenue sources for each health facility; and the current productivity of resources with potential for policies to promote efficiency gains.

Part of a series of papers, this first document reports the estimated unit costs for services provided by primary hospitals and health centers as well as the costs of specific exempted services – health services provided free-for-all regardless of socio-economic status. Cost estimates from health posts are not included in this report due to data quality concerns (see Section 2 below). The findings can contribute to the FMOH's 5-year Health Sector and Transformation Plan, improving advocacy towards more domestic resources for health – one of the goals under the National Health Care Financing Strategy, and be valuable inputs for the implementation and scale-up of social health and community-based health insurance schemes. A second paper (forthcoming) examines the productivity and efficiency of resource use in health centers, and identifies possible areas for improvement and future analytical work to assess efficiency in resource use and allocation.

Suggested Citation:

Berman, P; Alebachew, A; Mann, C; Agarwal, A; Abdella, E. 2016. Costs of Publicly Funded Primary Care Facilities, Departments, and Exempted Services in Ethiopia. Harvard T.H. Chan School of Public Health; Breakthrough International Consultancy, PLC: Boston, Massachusetts and Addis Ababa, Ethiopia.

Table of Contents

Acknowledgements	2
Foreword	2
Acronyms	5
Terms & Definitions.....	6
Executive Summary	8
1. Introduction	10
Background & Rationale	10
Objectives.....	10
2. Methods	11
Sampling Framework.....	11
Data and Analysis	12
Costing Framework.....	13
Costing Approach for Health Centers and Primary Hospitals.....	13
Costing Approach for Exempted Services	15
3. Characteristics of Sampled Health Facilities	17
Summary Statistics by Facility Type	17
Expenditure by Facility Type.....	18
4. Unit Cost Estimates.....	22
Primary Hospital Unit Costs by Department and Cost Components	22
Health Center Unit Costs by Department and Cost Components.....	22
Regional Distribution of Unit Costs by Health Facility	23
5. Cost Analysis for Exempted Services	25
Unit Costs for the Expanded Program on Immunization (EPI)	28
Unit Costs for Family Planning Services	28
Unit Costs for Antenatal Care (ANC) and Postnatal care (PNC)	28
Unit Costs for Tuberculosis (TB), Antiretroviral Therapy (ART) and Malaria.....	28
6. Limitations	30
Unit Cost Estimates for Health Facilities and Departments	30
Unit Cost for Exempted Services	31
7. Conclusions	32
References	34
Annex A: Technical Details of Cost Accounting Approach	35
Cost Accounting Framework.....	35
Health Post Unit Cost Approach	36
Costing of Exempted Services at Facility Level.....	37
Annex B: Model for Non-Program Drugs and Supplies Allocation	38

List of Tables

Table 2.1: Final sample for analysis by geographic location*	12
Table 3.1: Basic summary statistics by health facility type for EFY 2006	18
Table 3.2: Basic expenditure data by health facility for EFY 2006	19
Table 4.1: Summary of unit costs for primary hospitals (ETB)	22
Table 4.2: Summary of unit costs for health centers (ETB)	23
Table 5.1: Unit cost of providing exempted services in primary hospitals	26
Table 5.2: Unit cost of providing exempted services in health centers	27

List of Figures

Figure 2.1: Sampling Framework for data collection	11
Figure 2.2: Top-Down Costing Approach	15
Figure 3.1 Average proportions of cost drivers for total health facility expenditure (EFY 2006)	20
Figure 3.2: Cost Components by Department Primary Hospitals and Health Centers	21
Figure 4.1: Average Unit costs for primary hospital departments by geographic location (ETB)	24
Figure 4.2: Average unit costs for health center departments by geographic location (ETB)	24
Figure A1: Summary of Cost Accounting Stages	35

Acronyms

ANC4	At least 4 antenatal care visits
ART	Anti Retroviral Therapy
BIC	Breakthrough International Consultancy, PLC
BMGF	Bill & Melinda Gates Foundation
ETB	Ethiopian Birr
EPI	Expanded Programme on Immunization
EFY	Ethiopian Fiscal Year
FMOH	Federal Ministry of Health
HMIS	Health Management Information System
HPMRR	Health Post Monthly Report and Request Form
HSPH	Harvard T.H. Chan School of Public Health
IP	In-Patient
IPD	In-Patient Department
MCH	Maternal and Child Health
MDG	Millennium Development Goal
NGO	Non-Governmental Organization
OPD	Out-Patient Department
PHC	Primary Health Care
PHCU	Primary Health Care Unit
PNC	Postnatal care
RRF	Report and Requisition Form
RTM	Resource Tracking and Management
SNNPR	Southern Nations, Nationalities, and Peoples' Region
TB	Tuberculosis
UHC	Universal Health Coverage
WOFEC	Woreda Office of Finance and Economic Cooperation
WorHO	Woreda Health Office

Terms & Definitions

Average: The arithmetic average, which is the sum of all values for a specific variable divided by the total number of observations for that variable. This is prone to be influenced by extreme values due to outliers (very small or large values in the data that are not within the normal distribution).

Median: The true middle observation when all observations of a variable are sorted in sequential order, and less prone to be influenced by extreme values.

Per capita contact rate: The total patient volume of a health facility divided by the reported catchment population for that health facility.

Outpatient Department: Curative services that do not require admission into a health facility and are provided in the outpatient department. Some outpatient treatments are provided in the Maternal and Child Health (MCH) department, but these were classified under the MCH department.

Inpatient Department: Provides procedures that require a patient to be admitted and have close monitoring during and after procedures.

Maternal and Child Health Department: Provides non-emergency maternal and child health services (such as immunizations or ante-natal care and some acute treatment), excluding deliveries.

Delivery Department: Provides basic obstetric care (health centers) and comprehensive obstetric care (primary hospitals), including pre-and post-delivery care.

Cost: In this study, cost is defined as the monetary value of non-capital, recurrent expenditures incurred and resources used to produce a defined set of health service outputs or to operate specific health facilities. The recurrent costs include drugs and supplies, salaries, and other operational costs (e.g., electricity, running water, maintenance, etc.), which are incurred on a regular basis that can be allocated as direct costs or indirect costs. Capital costs were not included in this study.

Unit Cost: Total recurrent, non-capital cost or expenditure plus the value of resources used (e.g., in-kind or drugs and supplies consumed), incurred by a health facility or department to provide service for one patient.

Exempted Services: Services that are offered for free to everyone regardless of income level, mostly covering maternal and child health services.

Primary health care unit (PHCU): The unit of organization encompassing primary health care facilities and related community-based activities, including primary hospital, primary health center, health post, and the health or women's development army.

Woreda: A district in Ethiopia that is the third administration level that typically encompasses 100,000 people. A PHCU is usually within one woreda.

Primary Health Care Facilities in Ethiopia¹

Primary hospital: A health facility within the primary health care unit (PHCU) that provides inpatient and ambulatory services. This includes all of the same services offered at health centers (listed below), as well as additional emergency surgical services, including Caesarean sections and blood transfusions. It is a referral center for health centers that reside within the primary hospital's catchment area. This health facility typically has an average inpatient capacity of 35 beds and a staff of 53 people. Serves 60,000-100,000 people in a woreda. Investment in developing primary hospitals is still ongoing, so not all PHCU's have one, and currently some primary hospitals serve several woredas.

Health center: A health facility within the PHCU that provides promotive, preventive, curative and rehabilitative outpatient care including basic laboratory and pharmacy services. This health facility typically has the capacity of 10 beds for emergency and delivery services. Health centers serve as a referral center for health posts, and provide supportive supervision for health extension workers (HEWs). Serves 15,000-25,000 people in a woreda.

Health post: A health facility within the PHCU that mainly provides promotive and preventive health care services. A typical health post has two HEWs and they provide services in the health facility and in the community (often going house-to-house). Serves 3,000-5,000 people in a woreda.

¹Description of primary health care facilities in Ethiopia adapted from FMOH (2012) and Alebachew, Hatt, and Kukla (2014)

Executive Summary

This report is the first of several presenting the results from a study analyzing costs of primary health care services provided at government primary hospitals and health centers in Ethiopia during the Ethiopian Fiscal Year (EFY) 2006 (2013/14 in the Gregorian calendar). The study was carried out in collaboration with the Ethiopian Federal Ministry of Health's Finance and Resource Mobilization Directorate as part of the Resource Tracking and Management Project, implemented by Harvard T. H. Chan School of Public Health and Breakthrough International Consulting, Plc. with financial support from the Bill & Melinda Gates Foundation.

The study collected data from a representative sample of 6 primary hospitals and 47 health centers from selected agrarian regions, urban centers, and developing regional states. (A supplementary sample of primary hospitals is currently being analyzed and will be combined with those reported here in a subsequent report). Using well-documented service costing methods, the study estimated the total costs (expenditure) on primary health care services at study facilities as well as the total costs of services at the level of different service departments in each facility consisting of outpatient, inpatient, maternal and child health, and delivery services. Total costs are reported in terms of cost per capita in relation to the catchment population area of each facility, as well as unit costs of service outputs/client contacts for facilities in total and by service department. The study also estimated the costs of specific preventive and curative services currently exempted from user fees in public facilities.

The study results provide valuable inputs for fiscal planning; for example, to estimate resource needs for program financing, expansion, and development. Unit cost estimates also provide the basis for assessing allocation of funds across the mix of inputs used to deliver health services, as well as for analysis of technical efficiency in service delivery. Costing of fee-exempted services can be used to estimate government resource mobilization requirements needed to substitute for externally financed inputs such as those for drugs and supplies for these priority services.

On average in our sample, primary hospitals spent far less per person in the catchment areas (94 Ethiopian birr (ETB)) compared to health centers (174 ETB). The rather low per capita expenditure among primary hospitals is likely due to extremely high catchment areas in three (of the six sampled) primary hospitals; each had over a million people in their identified catchment population, covering multiple woredas. The average per capita spending for primary hospitals becomes 180 ETB when excluding the three primary hospitals with the extremely high catchment populations. An outlier is also inflating the average per capita expenditure estimate for health centers, which is reduced to 130 ETB per person once this health center is removed from the estimate. This lower per person health spending for public health centers reflects the narrower scope and technical content of the services they provide compared to primary hospitals.

Urban facilities generally spend more per person than rural facilities. A significant share of health facility expenditure is spent on drugs and supplies - about 40% for primary hospitals and 50% for health centers. Department level analysis also details the relative shares of different inputs in expenditure on different packages of services. Overall, Ethiopian primary health care facilities seem to be allocating appropriate proportions of spending to human resources and drugs and supplies in relation to international comparisons. In contrast, some lower income countries underspend on drugs and supplies relative to their expenditures on human resources.

Unit cost analysis describes the cost of providing specific bundles of outputs to individual contacts for services. The average departmental unit costs in primary hospitals vary from 223 ETB for OPD visits to 647 ETB for deliveries. The average departmental unit costs in health centers vary from 208 ETB for OPD visits to 772 ETB for deliveries (adjusted for outliers). Unit costs were similar across geographic locations for OPD and MCH, but significantly higher unit costs for inpatient services and deliveries were measured in urban facilities.

Costs per service for a variety of fee-exempted services were also measured. Lower costs were observed for individual immunizations (148-263 ETB for primary hospitals and 65-129 ETB for health centers depending on vaccine type) and higher costs were observed for service bundles requiring repeated delivery or care over time. For example, during EFY 2006 a standard tuberculosis treatment cost 1,648 ETB and 1,331 ETB (adjusted for outliers), on average, for primary

hospitals and health centers, respectively. Similarly, primary hospitals and health centers spent 1,418 ETB and 1,316 ETB respectively for antiretroviral treatment (ART) for HIV/AIDS. This estimate is only during EFY 2006, and not for the lifetime of the patient receiving ARTs.

The report concludes with a discussion of limitations and some conclusions from this part of the work. Almost all data were collected from official government reports and forms. However, as reported in the limitations, in some areas the incompleteness and poor condition of these data sources posed significant problems. This resulted in dropping a sizable number of observations from the study, and data filling and adjustment being done where deemed appropriate. Original plans to provide comparable data for services provided from health posts could not be completed due to data problems. Detailed treatment or intervention-specific costs could not be estimated since the study was unable to do a detailed time allocation study of health workers to allocate human resources time spend providing specific treatments, or attribute some drugs and supply consumption to specific treatments/interventions. In the current presentation, different outputs are bundled by service departments using simple arithmetic sums. Work is ongoing to estimate output indices, which could capture differences in inputs for different services in the same bundle.

Total government health spending in Ethiopia was approximately 4.13 billion ETB or per capita spending of 52 ETB as of 2010/11 (FMOH, 2014). This number had certainly increased by the time of the data collection for this study. The estimated per capita spending in this study of 147 ETB and 130 ETB (adjusted for outliers) on services at primary hospitals and health centers, respectively, in 2013/14 reflects Ethiopia's policy emphasis on primary care services. However, the unit costs for specific service output bundles seem high relative to Ethiopia's low level of health spending. This may reflect an imbalance between supply side input quantities and the utilization of or demand for services, or issues of efficiency or quality. Further analysis of these data and subsequent reports will further explore technical efficiency and the determinants of these quantities and possible explanations for levels and variability.

1. Introduction

Background & Rationale

Ethiopia's primary health care (PHC) system delivers promotive, preventive and essential curative health services at the first tier of health service delivery. This includes the community (health development army), health post, health center, and primary hospital levels, referred to in Ethiopia as the primary health care unit (PHCU). The health sector's visioning document ("Envisioning Ethiopia's Path Toward Universal Health Coverage Through Strengthening Primary Care") emphasizes the goal of universal health coverage (UHC), with primary health care at the forefront. The document recommends sustained investment in health promotion, disease prevention, and basic curative and rehabilitative services within the PHCU.

Few representative data on the costs or resources used to provide services at primary health care facilities exist for Ethiopia. One previous costing exercise in Ethiopia consisted of a very small sample of health facilities to cost out the potential social health insurance benefits package (FMOH, 2007). The results of that study do not reflect the significant changes to the health system since 2007. Other work includes normative costing exercises for the health sector 5-year plans and the essential health service package (FMOH, 2005). This type of costing is based on standards and norms to provide health care services, but might not reflect the real costs of service provision under field conditions.

Health service costing data have a variety of uses, such as contributing to service budgeting and planning, pricing, and reimbursement methods for public sector services. They can be valuable inputs in estimating service delivery efficiency, explaining causes of variations in cost/output ratios, identifying the right strategies to improve efficiency and quality, and support efforts to mobilize more domestic resources for health. The measurement of this type of data, and subsequent analyses that it can be used for, will contribute to the transformation agendas in the 5-year Health Sector Transformation Plan (HSTP) of equitable and quality of health care; improving data quality and use for effective decision-making; and woreda transformation (FMOH, 2015).

This report is the first of several that uses data from PHC facilities in Ethiopia for the Ethiopian fiscal year (EFY) 2006 (2013/14 in the Gregorian calendar). This report presents the findings from the unit cost analysis for the PHCU facilities. Further results are reported for exempted services estimating the unit costs for specific services under respective departments.

Objectives

The overall objective of this analysis is to estimate the cost of providing PHC services at government health facilities. More specifically, this includes estimating the unit costs of services at department level for primary hospitals and health centers. This report includes estimations of the unit cost for key services that are exempt, or free, to all of those who receive such services from government PHC facilities. As noted in Section 2 below, cost estimates for health posts could not be reported due to data quality issues.

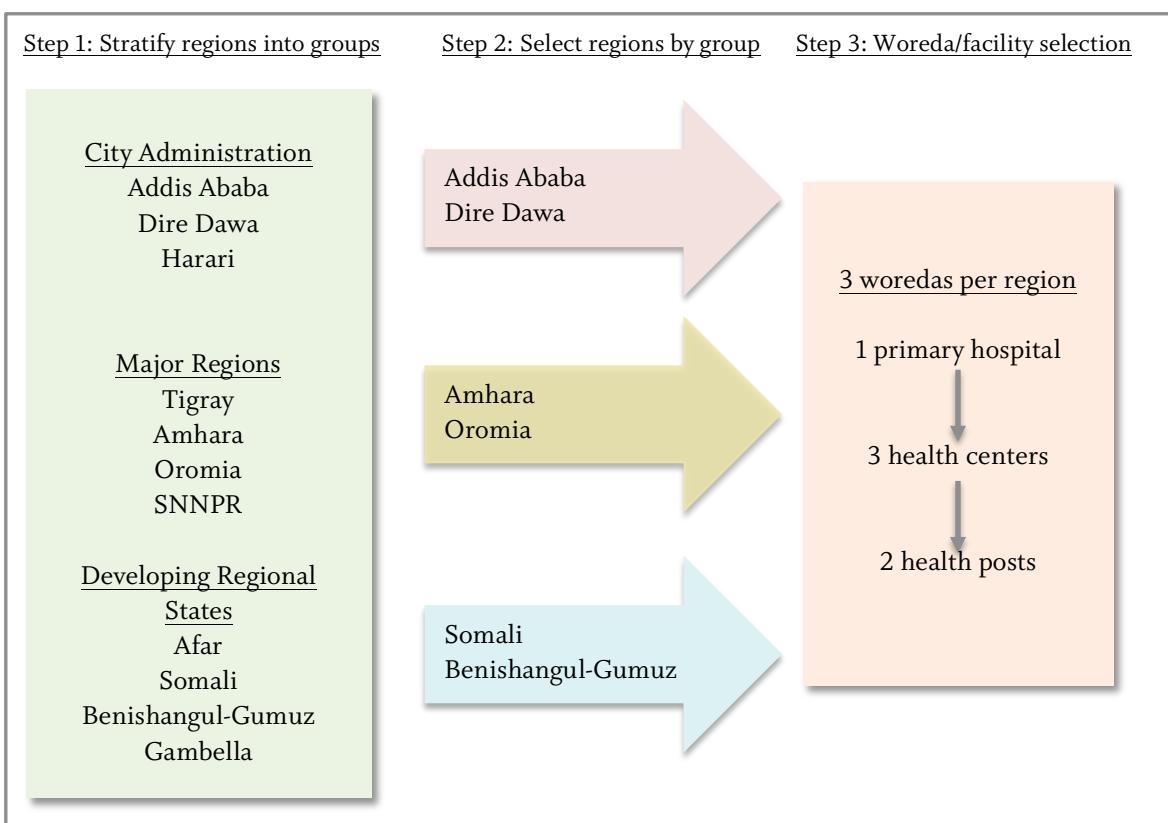
This work supports efforts by the Federal Ministry of Health (FMOH) to advocate for more domestic resources for health, one of the goals included in draft national health financing strategy and HSTP. The study will also assist the FMOH to develop evidence-based strategy and policy changes for sustainable financing of primary care, and build capacity to mobilize, allocate, utilize, and target primary care resources more efficiently, effectively, and equitably at the federal, regional, and woreda levels.

2. Methods

Sampling Framework

A multi-stage cluster sampling method was used to account for variation among regions and woredas (districts) with regard to major determinants that affect health service demand and utilization (Figure 2.1). This approach, in addition to having logistical advantages, ensures that units with particular characteristics (urban, rural, etc.) were included in the sample. Two regions, or city administrations, were selected within each stratified group. Three woredas were selected within each identified region, and in each selected woreda one primary hospital, three health centers (under the primary hospital catchment), and two health posts (under at least one of the health centers catchment) were selected for data collection. Ultimately, the inclusion of health posts for the analysis was not possible due to incomplete data records (more details of this are provided later in this section).

Figure 2.1: Sampling Framework for data collection



Note: Benishangul-Gumuz, Addis Ababa, Dire Dawa, and Somali did not have functioning primary hospitals at time of data collection.

Problems encountered during the woreda/facility selection and data collection process ultimately decreased the original sample size from 96 PHC facilities to 76. There were fewer functioning primary hospitals in the sampled regions than expected¹. Benishangul-Gumuz and Somali regions had no functioning primary hospitals during the data collection year, and there were no primary hospitals in Addis Ababa. Data collection efforts were halted in some areas, for example in Somali, because critical elements of data for all PHC facilities were either unavailable or unusable.

Additional health facilities were removed from the study sample during data cleaning in instances where extrapolation would not reliably correct missing values or there was too much missing data. This reduced the sample size of PHC

¹ Primary hospitals are a relatively new PHC level, and establishing this facility type across the country takes time.

facilities used for the analysis to 58 (see Table 2.1). In total, 18 PHC facilities (1 primary hospital, 7 health centers, and 10 health posts) were excluded from the analysis because of incomplete data records.

Table 2.1: Final sample for analysis by geographic location*

Health Facility Type	Major Regions		Developing Regions		City Administration		Total for Analysis (sum of rows)
	Amhara	Oromia	Benishangul-Gumuz	Somali ^d	Addis Ababa	Dire Dawa ^f	
Primary hospitals	3	3	0	0	0	0 ^e	6
Health Center	9	9	5 ^c	0	9	8	40
Health Post ^b	3 ^a	4 ^b	1 ^a	0	0	4 ^b	12
Total	15	16	6	0	9	12	58

*Data was collected from 76 PHC facilities (7 primary hospitals, 47 health centers, and 22 health posts). Poor data quality led to a reduction in the sample size from 76 to 58 PHC facilities during data analysis, where 1 primary hospital, 7 health centers, and 10 health posts had incomplete or poor data quality records beyond 'fixing' using extrapolation.

^aThe final cost estimates for health posts are not reported due to data quality issues even though an analysis was carried out for 12 health posts.

^aSix health posts were visited during data collection for both Amhara and Benishangul-Gumuz, but only 3 (for Amhara) and 1 (for Benishangul-Gumuz) had necessary data to estimate total cost, and thus unit cost.

^bFive health posts from Oromia and Dire Dawa were visited during data collection but only 4 from each region had necessary data to estimate total cost, and thus unit cost.

^cTwo woredas in Benishangul-Gumuz (Assosa and Bambasi) only had two functioning health centers at time of data collection; and all human resource data was missing from two other health centers in this region therefore could not be included in analysis.

^dThe data available among Somali Region health facilities was very limited and aggregated to woreda level.

^eOnly one primary hospital was sampled in Dire Dawa but was upgraded from a health center during EFY 2006, and therefore excluded since not a good representation of primary hospital costs.

^fDire Dawa sample selection process based on primary hospitals and health centers with data availability and accessibility (not based on woreda selection first since woredas do not exist in this city administration).

PHC facilities often had missing or incomplete service statistics, such as drugs and supplies consumed and number of patients served by department, as well as financial data such as salaries for health care workers. Among the 58 PHC facilities that included in the analysis, only 55% (32 out of 58 PHC facilities) had complete service statistics and financial data. Primary hospitals had relatively well-kept records, with 5 out of 6 (83%) primary hospitals having complete data. Only about half of the health centers (21 out of 40, or 53%) in the study had complete data, while only half of the health posts in the analysis had complete data (6 out of 12). Further review of PHC facility records is needed in order to identify areas for improvement in record keeping. A brief note showcasing some of the data quality issues was shared with the Financial Resource Mobilization Directorate (FRM) at FMOH as evidence highlighting specific record-keeping issues. This note can be used as an initial input to rectify problems identified within the data records system at facility and woreda levels that were encountered and documented during the course of data collection for this study.

Data and Analysis

This study was retrospective. All inputs and outputs are measured for one full year, Ethiopian fiscal year (EFY) 2006 (Gregorian calendar 2013/14), to avoid any cost distortions related to seasonal effects. This study does not include the change in unit costs over time due to possible salary increases or changes in human resources, drugs cost increases, or changes service provision.

Secondary data was extracted from health facilities and other related health and financial administrative institutions, pulling from health utilization (drug consumption, utilization rates, etc.), financial, and administrative records (e.g., formal staff assignments, job descriptions, etc.). A paper-based survey instrument was used to extract the necessary data from the health facilities and other related institutions for this study. The tools and sampling for the study were reviewed and approved by the FMOH and the Health Care Financing Technical Working Group (HCF-TWG), convened by FRM. Double data entry was performed using CS Pro software. An Excel-based tool adapted from the Joint Learning Network and Stata 14TM was used to conduct the analysis.

Data presented includes the arithmetic average, median, minimum, and maximum values. The arithmetic average is prone to be influenced by extreme values on the outputs due to potential outliers in the data set – either inputs into the costing analysis or the final unit cost output. The median minimizes this effect and is the true middle observation, when all observations of a variable or output are sorted in sequential order. The minimum and maximum are sometimes presented to show the range of values for a particular variable or output.

Costing Framework

Methods used by Hanson and Gilson (1996) and Creese and Parker (1994) were the basis for the costing framework and analysis. “Cost” is defined in this study as the monetary value of non-capital, recurrent expenditures incurred and resources used to produce a defined set of health service outputs or to operate specific health facilities. The recurrent costs include drugs and supplies, salaries, and other operational costs (e.g., electricity, running water, maintenance, etc.), which are incurred on a regular basis that can be allocated as direct costs or indirect costs. Direct costs are costs directly attributable to a specific service output, consisting of drugs and supplies and salaries. Not included are any additional costs incurred either by the health provider or patient, such as procuring drugs and supplies from a private pharmacy when stock-outs occur. This implies that our cost estimates potentially under or over estimate the costs incurred by facilities for drugs and supplies procured in the private sector depending on the relationship between the prices from the public procurement system through Pharmaceutical Fund and Supply Agency (PFSA) and market prices². Indirect costs are other operational costs (e.g., electricity, running water, etc.) that cannot be attributed directly to a specific output. Both direct and indirect costs are included in the estimates with an exception for health posts, which included only direct costs.

Costs were estimated irrespective of where the money to cover such costs came from. The sources of funding include revenue obtained by the health facility through user fees (or household out-of-pocket); funds provided by the federal block grants via the Woreda Office of Finance and Economic Cooperation (WOFEC) (formerly known as the Woreda Office of Finance and Economic Development (WOFED)); financial and in-kind contributions provided from development partners that are managed by the FMOH (e.g., the Millennium Development Goal (MDG) Performance Pooled Fund³); reimbursements received from federal government to the woreda for the fee waiver program; community donations; and funds from the community based health insurance scheme (where applicable), or directly from local and international non-governmental organizations (NGOs). However, the value of in-kind technical support provided by partners and NGO's was not included in this costing exercise.

Costing Approach for Health Centers and Primary Hospitals

Primary hospitals and health centers recurrent unit costs are based on estimated costs and outputs aggregated at the facilities' cost center or department level, such as all outpatient care visits or inpatient discharges, and not for specific diseases or treatments. The existing institutional arrangement was used to identify the cost centers for primary hospitals and health centers. The outpatient department (OPD), inpatient department (IPD), maternal and child health

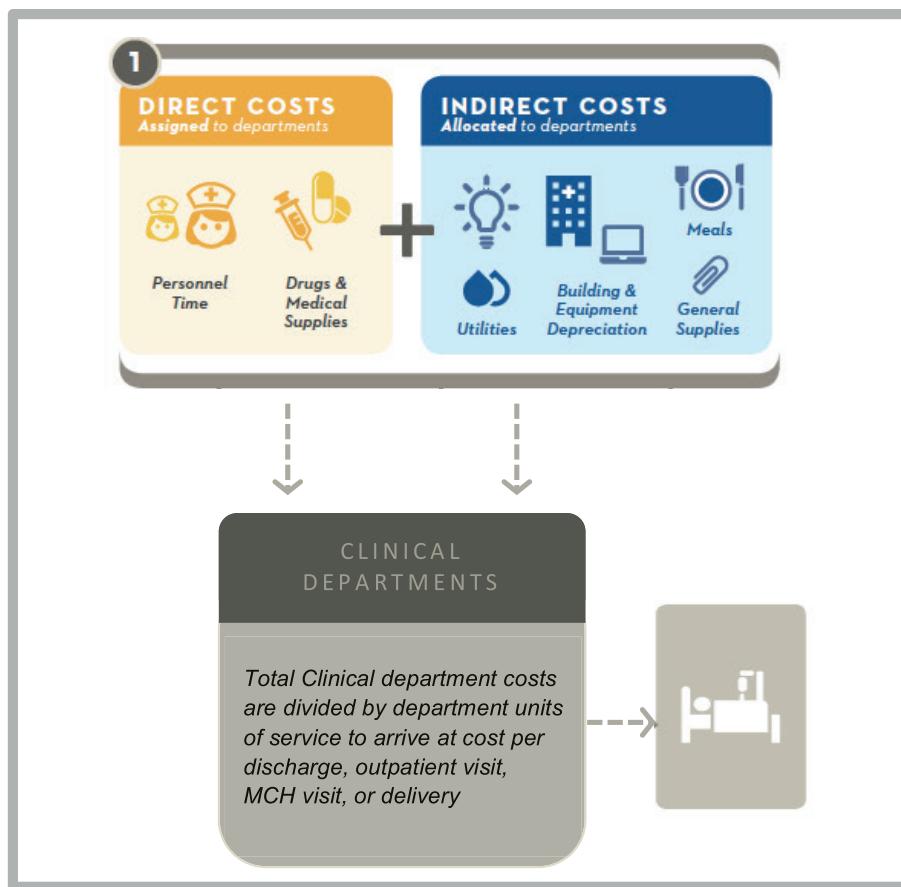
² Total drugs and supplies consumed for EFY 2006 was multiplied by the price obtained from the PFSA for such supplies to estimate the total drugs and supplies cost for each facility. This method allowed for the inclusion of drugs and supplies that were not only procured by the health facility directly but also those received in-kind either from the FMOH and/or donors, which is especially important for determining the costs of exempted services where the drugs and supplies are allocated to health facilities from the FMOH. By using the price from PFSA we were unable to include

³ This is now referred to as the Sustainable Development Goals Performance Pooled Fund.

(MCH) department, and the delivery department are the four defined cost centers for health centers and primary hospitals. OPD consists of providing curative services that do not require admission and are provided in the outpatient department. Some outpatient treatments are provided in the MCH department also, but these were classified under the MCH department and cannot be separately identified. IPD is for procedures that require a patient to be admitted and have close monitoring during and after such procedure. MCH department provides non-emergency maternal and child health services (such as immunizations or ante-natal care), excluding deliveries. Lastly, the delivery department focuses on basic obstetric care (health centers) and comprehensive obstetric care (primary hospitals), including pre-and post-delivery care. Detailed unit cost data between complicated and uncomplicated delivery cases was not feasible due the nature of the cost study and available data.

Direct and indirect costs were allocated across the defined departments or cost centers for primary hospitals and health centers. Staff cost allocation was based on their formal work assignments, since a detailed time-motion based allocation was not feasible for this study. Key informant interviews at the facility were used to adjust any allocations of human resource (HR) cost where staff work in more than one department. A two-step approach was used to allocate the drugs and supplies costs by department. The first step consisted of focusing on program drugs and supplies that are used for specific treatments that would be offered under one of the four departments (see Box 1). For example, Rifampicin regimens are for tuberculosis treatments that would be offered in the OPD, while condoms are part of family planning, which resides under the MCH department. The second step was to allocate drugs and supplies that could not be clearly allocated by department, which includes non-program drugs and supplies for IPD, OPD and Delivery department. The MCH department was not included because services offered at the MCH department are only considered as program-related services, such as family planning and vaccinations. A simple bivariate regression model was used to determine a weighting scheme to allocate non-program costs based on the relationship between non-program drugs and supplies costs and inpatient discharges and outpatient visits for each health facility. See Annex B for more details of the model used. Findings from this model indicated a 1:4 ratio between OPD and IPD non-program costs. This is consistent with other literature that showed similar estimates (Özaltın and Cashin, 2014). It was assumed that the Delivery department non-program drugs and supplies costs would be equivalent to IPD because delivery is a medical intervention and sometimes leads to admitting the mother and newborn, and thus more resource intensive than an OPD visit. To allocate the non-program costs across the three departments, one-ninth (11.1%) of the costs went to OPD, four-ninths (44.4%) went to IPD and the remaining four-ninths (44.4%) went to the Delivery department. Indirect costs are allocated based on the patient load by department. In other words, the total indirect costs for a health facility were added up and then divided by the patient load for each of the four departments.

Figure 2.2: Top-Down Costing Approach



Note: Building & equipment depreciation was not factored into the scope of this study.

Source: Adapted from Özaltın and Cashin (2014)

Costing Approach for Exempted Services

The costing framework for exempted services, or services offered for free to all regardless of income level, uses a similar approach as the primary hospitals and health centers departmental unit costs. Exempted services were classified under respective departments for primary hospitals and health centers (see Box 1). Health centers not offering a certain exempted service did not have specific service costs allocated and omitted from such estimates. The human resource and indirect costs are based on average per visit cost for all patients across the 4 defined departments. For example, tuberculosis falls under OPD and therefore the HR and indirect cost per client for a particular health center or primary hospital for OPD is applied to the tuberculosis unit cost. Similarly, immunizations services fall under the MCH department, so the HR and indirect costs per patient for MCH would be applied to the expanded program on immunization (EPI) unit cost. This assumption, that the health workers spend equal amounts of time per patient for different exempted services, was required due to lack of information on allocation of health workers' time across different service types. The drugs and supplies costs are based on the specific drugs and supplies consumed for a particular exempted service at each health facility. This means that for any exempted service that falls under the same department (e.g., TB, ART, and

Box 1. Costed exempted services by department

OPD

Tuberculosis, ART, malaria, leprosy

MCH

EPI (all vaccines), family planning, ANC, PNC

Delivery

Delivery

Estimating unit costs for leprosy (an exempted service) was not possible as explained in Section 5. ANC and PNC unit cost estimates use a slightly different approach than the remaining costed exempted services.

malaria under OPD), or the whole facility in the case for health posts, the cost variations are due to the drugs and supplies consumed rather than changes in HR or indirect costs (since they are the same per unit). The data used for number of patients served for a particular service came from the Health Management Information System (HMIS).

The unit costs for antenatal care (ANC) and postnatal care (PNC) were estimated slightly differently, given that the drugs and supplies consumed could not be attributed directly to that particular service, unlike other exempted services such as malaria or TB treatment, since they are also used for other non-exempted services. We used a cost-mix approach with normative and field-based costs to estimate the unit costs of these two exempted services.

The drugs and supplies unit cost for these two services was obtained from the One Health tool data that was used for the HSTP costing (FMOH, 2015). These data consisted of unit cost of drugs and supplies for specific ANC and PNC procedures and treatments, national estimates of the average percent of the population in need⁴ of different procedures and treatments within the ANC and PNC benefit packages, and estimates of average coverage rates for each of the main procedures and treatments in 2015. The coverage rates for these two services came from the HMIS. The One Health tool estimates were based adding up across the percentage of women receiving at least four ANC visits (ANC4) who received each of the costs procedures and treatments, and does not cost ANC services that did not reach the ANC4 coverage threshold. A PNC visit within the first 24 hours of newborn's birth was used to estimate the coverage rate for PNC based on target population.

We used this information from the One Health tool to estimate the unit costs of drugs and supplies as part of the exempted service cost for ANC and PNC by a two-step process. First we estimated the coverage that would result for specific procedures and treatments for ANC4 and PNC of the total population in need based on the national averages. For example, an ANC4 treatment of hypertensive disorder case management is estimated for only 5% of pregnant mothers, of which 30% were estimated to receive this treatment – according to the One Health Tool data. This equates to 1.5% of all pregnant mothers. We then multiplied this figure by the estimated drugs and supply unit costs for providing the various ANC4 and PNC treatments. Using the same example as before, the cost for drugs and supplies to treat a single case of hypertensive disorder is estimated at 175.7 birr. The final estimated unit cost for drugs and supplies for this particular treatment becomes 2.63 birr when the likely number of cases treated is factored into all ANC cases. All cost estimates for each treatment for ANC4 were added together to obtain the unit cost of drugs and supplies for an average ANC4; the same was done for PNC. Indirect and HR unit costs were estimated using the same methods as the other exempted services. For ANC, we multiplied indirect and HR unit costs by the 4 visits reflected in ANC4.

While this approach of combining normative and actual costs is not ideal, simply using actual costs was not possible with the data available. Our approach may result in ANC and PNC unit costs being higher than actual because of the use of normative estimates for the drugs and supplies inputs. (Of course, they could also be lower if there was systematic overtreatment in study facilities, but this seems less likely). However, it allows for the inclusion of cost estimates for these two very important services for maternal and child health care.

The results from the PHC cost analysis excluded health posts since only 9 of 22 health posts sampled had adequate data (with considerable extrapolation) and the final unit cost estimates obtained were deemed unreliable. This first point of care is increasingly important in Ethiopia, especially with the upgrade of health extension workers to Level IV – comparable to diploma nurse training – and with HEWs providing some basic curative services. Cost estimates of health care services provided by HEWs are still needed, especially in light of additional costs incurred for changes made within the primary care system such as HEWs providing basic curative services. More effort is needed to improve record keeping among health posts that would allow for assessing the costs of providing services at this level of care.

⁴ This indicator varied by treatment type for both ANC and PNC services. The ANC treatments are based on the baseline of pregnant mothers for 2015. The PNC treatments are based on either number of pregnant mothers or births depending on the treatment type. For example, treatment of newborn sepsis uses births as target population while treatment of postpartum hemorrhage uses pregnant women as the target population.

3. Characteristics of Sampled Health Facilities

Summary Statistics by Facility Type

Basic characteristics and service statistics for the health facilities included in this study are shown in Table 3.1. Each health facility has its own catchment population that they serve based on the reported population figures within the woreda and the defined area. The standard catchment population, defined by the FMOH, for primary hospitals is 100,000 people and health centers is 25,000 people. Primary hospitals are relatively new PHC facilities, and the rollout has been gradual with the aim to have one primary hospital in each woreda across Ethiopia. Since the expansion of primary hospitals is still underway, most primary hospitals currently have a catchment population substantially higher than the standard, and typically serve multiple woredas. As a result, the average catchment population for primary hospitals in this study was almost 7.5 times more than the standard, with a range between 22,000 to 1.5 million people. The primary hospital with a catchment population of 22,000 is more comparable to a health center, which leads us to believe that this facility might be a health center upgraded to a primary hospital, though the catchment population should have changed with the upgrade. The average catchment population for health centers in this study is slightly more than the standard, at 32,237, ranging from 11,349 to almost 100,000 people. The health center with the highest catchment population in the study is from Addis Ababa, with this facility being more comparable to a rural primary hospital in number of wings, services offered, and people served. This study found that primary hospitals, on average, have almost 3 times the staff compared to health centers. Health centers have substantially less number of patients across all departments with the exception of MCH, with almost 5,000 patients, on average, compared to primary hospitals for EFY 2006. The average per capita contact rate (or total patient volume divided by catchment population for each health facility) for health centers is more than double (0.914) compared to primary hospitals (0.34). The per capita contact rate simply uses the catchment population as the denominator and doesn't account for any possible spillover effects that facilities may experience from other woredas.

Table 3.1: Basic summary statistics by health facility type for EFY 2006

Primary Hospitals	n	Mean	Median	Minimum	Maximum
Catchment Population	6	743,667	677,500	22,000	1,500,000
Per capita contact rate	6	0.340	0.120	0.020	1.230
Total OPD Visits	6	33,617	35,554	18,690	45,843
Total IPD Discharges	6	2,136	1,551	1,036	3,963
Total MCH Visits	6	7,868	5,710	3,018	14,310
Total Deliveries	6	984	743	507	1,848
Total Staff	6	161	170	139	175
Clinical Staff	6	65	64	50	86
Non-Clinical Staff	6	96	99	79	110
Health Centers	n	Mean	Median	Minimum	Maximum
Catchment Population	39*	32,237	28,342	11,349	93,792
Per capita contact rate	39*	0.914	0.805	0.138	2.234
Total OPD Visits	40	17,511	13,141	1,513	68,740
Total IPD Discharges	30+	61	43	2	200
Total MCH Visits	40	12,719	10,966	1,189	41,307
Total Deliveries	40	272	239	1	753
Total Staff	40	58	47	11	143
Clinical Staff	40	26	20	4	68
Non-Clinical Staff	40	31	25	7	78

* One health center did not have catchment population data available.

[†] Only 30 health centers had IPDs; those health centers that did not have IPDs were not included in this statistic.

Expenditure by Facility Type

The health facility expenditure information is shown in Table 3.2. On average, primary hospitals spent 6.6 million Ethiopian birr (ETB) more than health centers for EFY 2006. Outliers might be influencing the average for health center expenditures, as evident by the difference between average and median (800,000 ETB), and a wide range (with a difference between the minimum and maximum of 19.7 million ETB). This might be due to potential outliers for drugs and supplies expenditures, with a large difference seen between the average and median (1.03 million ETB) and a wide range between the minimum and maximum with the difference of 19.24 million ETB.

Per capita cost is estimated as the ratio of total recurrent costs for a health facility to its catchment population, indicating the birr per person that a health facility is spending. The average per capita expenditure was higher for health centers (174 ETB) compared to primary hospitals (94.26 ETB). The rather low per capita expenditure for primary hospitals is mostly due to three of them having over a million people in their identified catchment populations, making the denominator for the per capita calculation very high. The average per capita spending for primary hospitals becomes 180 ETB (6 birr higher than for health centers) when excluding the three primary hospitals with the extremely high catchment populations. An outlier might also be influencing the average per capita expenditure estimate for health centers; health centers spend an average of 130 ETB per person once the outlier is removed from the estimate. Further analysis by regions for health centers show that urban facilities generally spend more per capita than rural facilities. Oromia has the lowest per capita expenditure of 60 ETB, while Addis Ababa has the highest of 187 ETB (excluding

an outlier of 1,800 ETB which was from a health center in Benishangul-Gumuz). For primary hospitals, Amhara has the lowest average per capita spending of 8 ETB while Oromia's is the highest at 340 ETB. This corresponds with the primary hospitals in Amhara having catchment populations of more than million people, while the same facilities in Oromia have catchment populations closer to the standard.

Table 3.2: Basic expenditure data by health facility for EFY 2006

Primary Hospitals	n	Mean	Median	Minimum	Maximum
Total health facility expenditure	6	11,314,376	11,869,421	7,480,503	13,907,738
Drugs and pharmaceutical supplies expenditures	6	4,345,166	4,730,113	2,082,608	5,889,315
Human resource expenditures	6	4,531,782	4,296,772	3,750,932	6,194,557
Indirect expenditures	6	2,437,428	2,169,896	1,292,662	4,062,542
Per capita expenditure	6	94.26	33.14	7.70	340.02
Health Centers	n	Mean	Median	Minimum	Maximum
Total health facility expenditure	40	4,735,917	3,924,119	708,694	20,429,931
Drugs and pharmaceutical supplies expenditures	40	2,717,665	1,690,499	288,368	19,532,789
Human resource expenditures	40	1,461,847	1,241,827	302,088	3,507,968
Indirect expenditures	40	556,404	287,367	22,197	1,956,514
Per capita expenditure	39*	173.61	107.22	31.05	1,800.15

* Only 30 health centers had IPDs; those health centers that did not have IPDs were not included in this statistic.

The main cost drivers for PHC facilities are both HR, and drugs and supplies (Figure 3.1). For health centers, drugs consist of half (53%) of the recurrent costs on average, while HR accounts for an average of 35% of the total recurrent costs. For primary hospitals, HR 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. The proportion of total facility expenditures on drugs and supplies among the studied Ethiopian primary care facilities is substantially higher compared to those documented from other countries' primary care facilities. For example, 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 (Ensor and Indradjaya, 2012).

Figure 3.1: Average proportions of cost drivers for total health facility expenditure (EFY 2006)

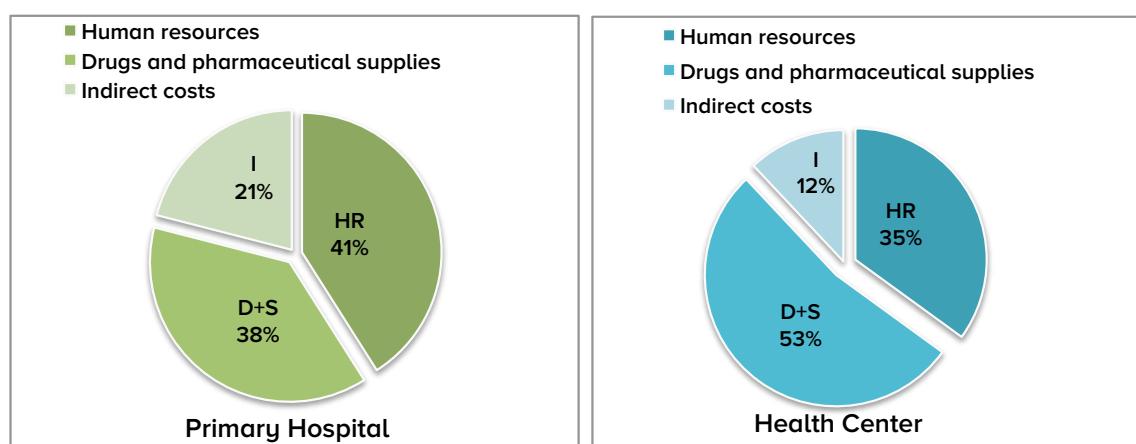
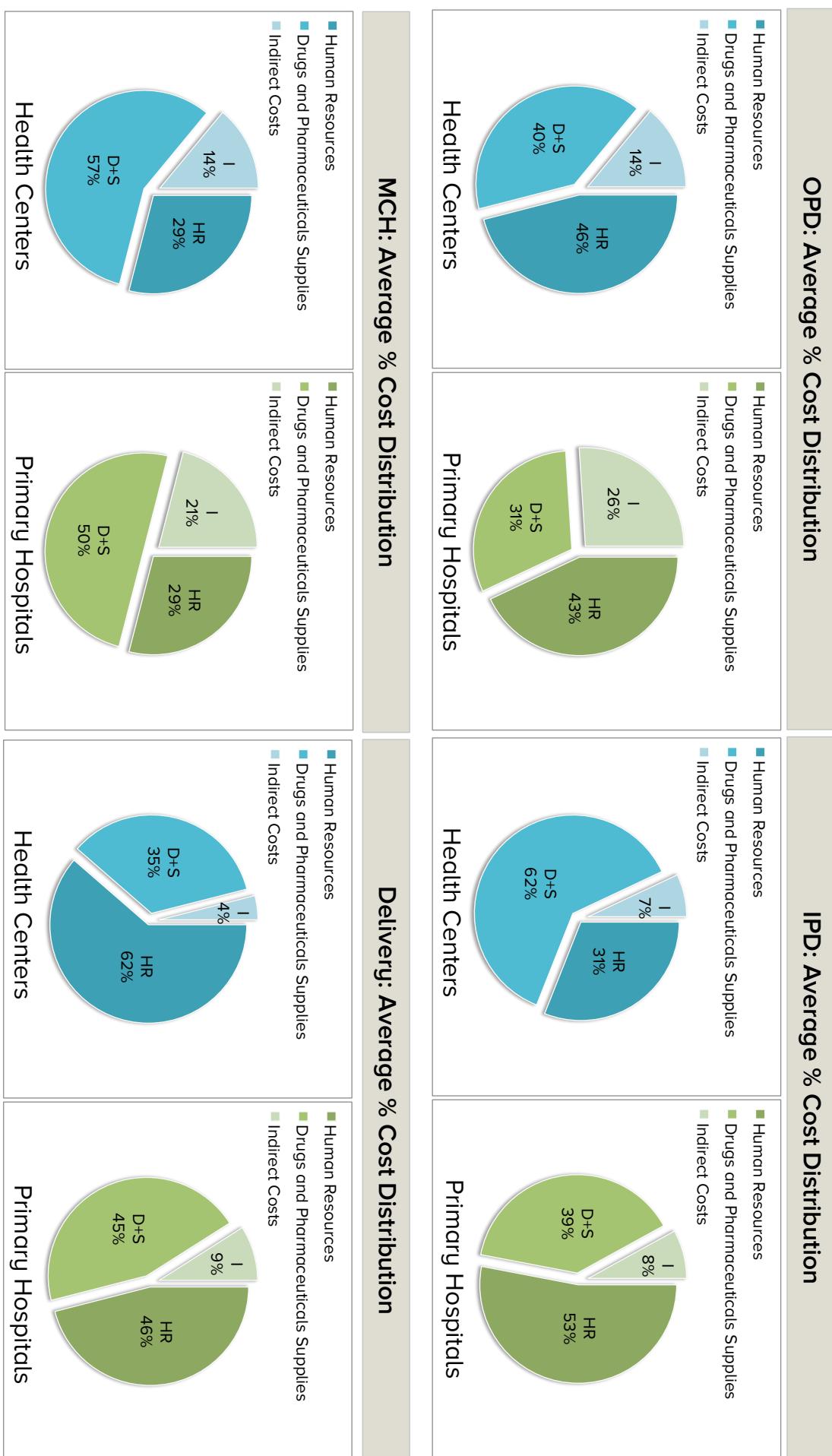


Figure 3.2 illustrates the cost components of departments by facility type. Human resource costs as a proportion of the departments' costs are lowest for MCH departments for both primary hospitals and health centers (29% on average), with MCH departments spending a greater proportion on average on drugs and supplies (57% in health centers and 50% in primary hospitals) relative to other departments, with the exception of IPD for health centers. Among health centers, delivery departments have the highest proportion of HR costs (62%), while for primary hospitals IPD has the highest proportion of HR costs (53%). Human resources 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%). In primary hospitals however, OPD costs are distributed almost equally between HR and drugs (43% and 31% respectively), with a slightly lower proportion attributed to indirect costs (26%). In primary hospitals the delivery department's costs are evenly split between drugs and HR costs (45% and 46%, respectively).

Figure 3.2: Cost Components by Department Primary Hospitals and Health Centers



4. Unit Cost Estimates

This section presents the unit cost results for primary hospitals and health centers, and includes total health facility unit costs, department-wise unit costs, and the regional distribution of the estimated unit costs. The health facility unit cost is the ratio of the total recurrent costs relative to total number of patient contacts for a given health facility. The department-wise unit cost is the ratio of total recurrent costs estimated for that department relative to the total patient contacts of that department. Patient contacts are measured simply as the sum of all patients served by department or facility as a whole regardless if repeated visits by the same person during EFY 2006.

The overall facility unit cost is higher among primary hospitals (269 ETB) compared to health centers (219 ETB). The major cost driver for both facility types is drugs and supplies, with an average unit cost of 110 ETB for primary hospitals and 72 ETB for health centers.

Primary Hospital Unit Costs by Department and Cost Components

Table 4.1 shows both the average and median values estimated for primary hospitals, as well as the breakdown of average unit cost by component (human resources, drugs and supplies, and indirect). The overall facility unit cost for primary hospitals is 269 ETB, and the major cost driver is drugs and supplies, with an average unit cost of 110 ETB.

For unit costs by department in primary hospitals, IPD is the highest (807 ETB), while OPD is the lowest (223 ETB). The average unit costs for HR is also highest for IPD at 443 ETB per discharge, which is higher than the average drugs and supplies unit cost at 326 ETB per discharge. The second highest department unit cost for primary hospitals is Delivery, at 647 ETB. Similar to IPD, within Delivery HR unit costs are higher than drugs and supplies. Both of these departments (IPD and Delivery) typically require more HR time for service provision compared to MCH and OPD departments, but the high HR costs might also be attributed to inefficiencies in human resource allocation based on patient load. Such inefficiencies are explored in a separate paper.

Table 4.1: Summary of unit costs for primary hospitals (ETB)

Primary Hospitals						
Cost Type	N	Average	Median	Average HR Cost	Average Drugs and Supplies Cost	Average Indirect Cost
Health facility unit cost	6	269	274	108	110	56
OPD unit cost	6	223	220	95	68	57
IPD unit cost	6	807	836	443	326	67
MCH unit cost	6	317	263	76	132	55
Delivery unit cost	6	647	597	275	269	54

Health Center Unit Costs by Department and Cost Components

Table 4.2 shows both the average and median values estimated for health centers, and the average unit cost by component (human resources, drugs and supplies, and indirect). 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. Caution must be taken when interpreting

the unit cost findings for these two departments, and other results, when there are substantial differences between the average and median estimates. The average unit cost for IPD was 2,159 ETB, while the median was 340 ETB. Four outliers from Amhara, Addis Ababa, Benishangul-Gumuz, and Oromia are influencing the average estimates for this department, with unit cost estimates of 8,598 ETB, 10,170 ETB, 11,555 ETB, and 19,400 ETB, respectively in these facilities. The revised average unit cost estimate for IPD is 579 ETB once the four outliers are removed. For Delivery, the average unit cost was even higher, at 4,020 ETB per delivery, with a median of 647 ETB. This discrepancy is due to three outliers in the data set. One health center in Addis Ababa reported only one delivery for EFY 2006, however the expenditures for the delivery department in that facility were 119,000 ETB. Another health center in Benishangul-Gumuz reported expenditures for the Delivery department of over 2 million ETB, but had only 170 deliveries for EFY 2006. The third health center, although not as extreme as the previous two, was in Dire Dawa. This health center's Delivery department had an expenditure of slightly more than 420,000 ETB but only 120 deliveries recorded for EFY 2006. A revised average unit cost for the Delivery department among health centers becomes 705 ETB per delivery once outliers are removed from the estimates.

Table 4.2: Summary of unit costs for health centers (ETB)

Health Centers						
Cost Type	N	Average	Median	Average HR Cost	Average Drugs and Supplies Cost	Average Indirect Cost
Health facility unit cost	40	219	146	53	72	14
OPD unit cost	40	208	124	57	50	17
IPD unit cost	30 ⁺	2,159	340	105	211	24
MCH unit cost	40	216	145	42	83	20
Delivery unit cost	40	4,020	647	401	226	26

⁺ 10 health centers did not have IPDs and therefore excluded from IPD unit cost estimates.

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.

The outliers identified across departments for both health centers and primary hospitals might be due to reporting errors, or might reflect actual inefficiencies in resource use. Conclusions cannot be determined unless the health facilities are revisited to determine the cause of such issues.

Regional Distribution of Unit Costs by Health Facility

Regional variations by health facility type are shown in Figures 4.1 and 4.2. For OPD and Delivery, there is little variation of unit costs for primary hospitals between Amhara and Oromia, the two regions included in the hospital analysis (Figure 4.1). However, Oromia has a substantially higher average unit cost for IPD discharges (977 ETB) compared to Amhara (556 ETB), while Amhara has almost double unit cost for MCH compared to Oromia. In Figure 4.2, health centers in the two major regions of Amhara and Oromia typically have lower unit costs across departments compared to city administrations and even developing regions, with an exception for MCH in Benishangul-Gumuz.

Figure 4.1: Average Unit costs for primary hospital departments by geographic location (ETB)

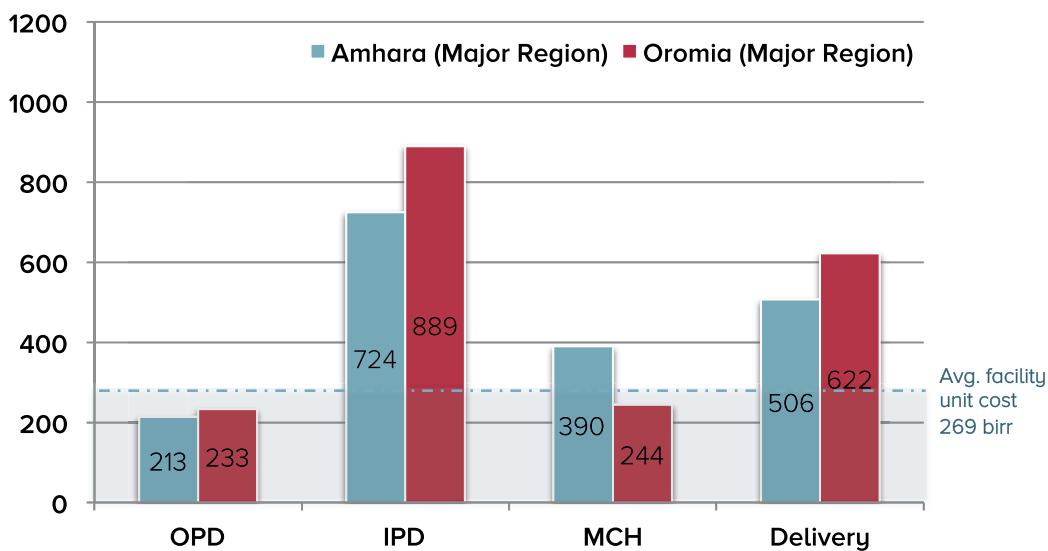
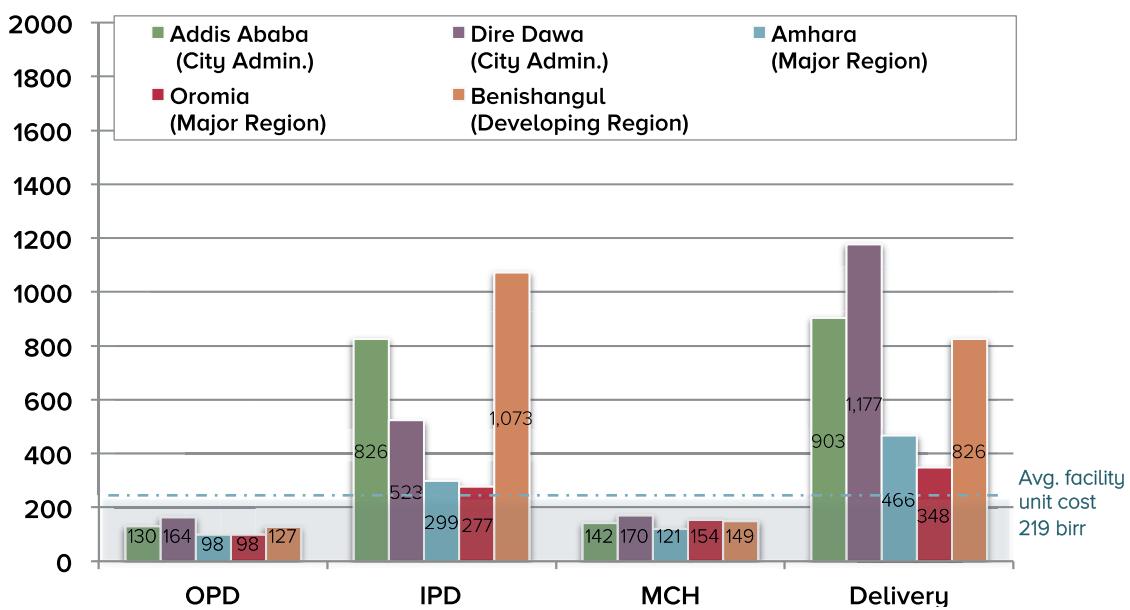


Figure 4.2: Average unit costs for health center departments by geographic location (ETB)



5. Cost Analysis for Exempted Services

This analysis estimates the recurrent unit cost for exempted services, or services provided for free to all people regardless of household income, provided at primary hospitals and health centers. Exempted services, according to the FMOH standards, are: expanded program on immunization (EPI), antenatal care (ANC), treatment for tuberculosis (TB), family planning, post-natal care (PNC), leprosy, delivery, HIV care, and treatment for malaria.

The exempted services included in the sub-analysis for primary hospitals and health centers are: EPI and specific vaccine costs under EPI, family planning, ANC, PNC, deliveries (which was also included in the section above), TB treatment, anti-retroviral treatment (ART), and malaria treatment. The study was not able to estimate unit costs for leprosy due to limitations in record keeping; the HMIS system does not include reporting on the number of cases for leprosy. The unit cost of providing services to those with leprosy could not be estimated without the number of cases as the denominator.

Measuring the recurrent unit costs of providing exempted services is important to enable the government to be prepared for future changes in overall health system financing. Today, most commodities for exempted services are funded by external sources, while government pays for the HR and indirect costs. Unit cost estimates for these services can be used to model future demands on government funding if external funding declines. Findings from this analysis will support the FMOH to ensure that sustainable financing mechanisms are in place to continue providing such services for free, as well as to estimate the fiscal implications of revising the exempted service list.

Tables 5.1 and 5.2 present the unit cost estimates for exempted services in primary hospitals and health centers. Both average and median are shown for the sampled facilities, along with the proportion of unit costs spent by component (HR, drugs and supplies, and indirect costs). More detailed discussion of individual findings follows these tables.

Table 5.1: Unit cost of providing exempted services in primary hospitals

Service Group	Costing service unit	N	Average (birr)	Median (birr)	Cost Components
Expanded Programme on Immunization (EPI)	Per vaccination	6	177	170	HR: 42% D+S: 21% I: 37%
Pentavalent (DPT-HepB-Hib) vaccination	Per vaccination	6	214	210	HR: 35% D+S: 34% I: 32%
Pneumococcal vaccination	Per vaccination	6	263	213	HR: 36% D+S: 39% I: 25%
Rotavirus vaccination	Per vaccination	6	185	179	HR: 40% D+S: 23% I: 37%
Measles vaccination	Per vaccination	6	153	147	HR: 49% D+S: 6% I: 45%
BCG vaccination	Per vaccination	6	148	143	HR: 51% D+S: 3% I: 46%
Family Planning	Per acceptor/year ^a	6	580	471	HR: 18% D+S: 67% I: 14%
Antenatal care	4 visits/year ^b	6	586	563	HR: 57% D+S: 2% I: 41%
Delivery	Per delivery	6	647	597	HR: 46% D+S: 45% I: 9%
Postnatal care	Per visit/year ^c	6	156	151	HR: 56% D+S: 8% I: 36%
Tuberculosis treatment	Per case ^d	6	1,634	1,254	HR: 11% D+S: 81% I: 8%
Anti-Retroviral Therapy (ART)	Per case/year ^e	6	1,418	1,452	HR: 10% D+S: 84% I: 6%
Malaria treatment	Per case ^f	5*	233	244	HR: 43% D+S: 34% I: 23%

HR = Human Resources D+S = Drugs + Supplies I = Indirect

*One primary hospital was missing data on number of malaria cases treated for EFY 2006 and could not estimate the unit cost for malaria treatment per case, reducing the sample size from 6 to 5 primary hospitals.

^aThe first time an individual between 15-49 years receives a modern contraceptive service in the calendar year (from HMIS) or the average annual cost for family planning per acceptor.

^bAt least four ANC visits during EFY 2006.

^cA PNC visit within 24 hours of a newborn's birth during EFY 2006.

^dTuberculosis case (all forms) that was registered at the health center for EFY 2006 (from HMIS).

^eA person living with HIV/AIDS (adult or child) that received ART for EFY 2006 (from HMIS), with assumption that an individual did not stop treatment or miss regimens throughout the year.

^fNew malaria case (complicated or severe) registered at the health center during EFY 2006 (from HMIS).

Table 5.2: Unit cost of providing exempted services in health centers

Service Group	Costing service unit	N	Average (birr)	Median (birr)	Cost Components
Expanded Programme on Immunization (EPI)	Per vaccination	40	94	84	HR: 45% D+S: 39% I: 17%
Pentavalent (DPT-HepB-Hib) vaccination	Per vaccination	40	129	123	HR: 33% D+S: 56% I: 11%
Pneumococcal vaccination	Per vaccination	40	120	116	HR: 33% D+S: 56% I: 10%
Rotavirus vaccination	Per vaccination	39*	92	84	HR: 43% D+S: 44% I: 13%
Measles vaccination	Per vaccination	39*	70	63	HR: 63% D+S: 15% I: 22%
BCG vaccination	Per vaccination	38*	65	57	HR: 68% D+S: 9% I: 24%
Family Planning	Per acceptor/year ^a	40	552	359	HR: 14% D+S: 78% I: 8%
Antenatal Care	4 visits/year ^b	40	256	231	HR: 70% D+S: 5% I: 25%
Delivery	Per delivery	40	4,020	647	HR: 58% D+S: 38% I: 4%
Postnatal Care	Per visit/year ^c	40	74	68	HR: 59% D+S: 17% I: 24%
Tuberculosis Treatment	Per case ^d	31*	4,180	1,259	HR: 14% D+S: 87% I: 3%
Anti-Retroviral Therapy (ART)	Per case/year ^e	26*	1,316	1,091	HR: 8% D+S: 88% I: 4%
Malaria Treatment	Per case ^f	31*	1,575	126	HR: 68% D+S: 25% I: 18%

HR = Human Resources D+S = Drugs + Supplies I = Indirect

*The sample size is different due to missing data for some of the health centers or some health centers did not provide this type of service. Rotavirus: 1 health center did not have data on number of rotavirus vaccines administered for EFY 2006; Measles: 1 health center did not have data on number of measles vaccines administered for EFY 2006; BCG: 2 health centers did not have data on number of BCG vaccines administered for EFY 2006; Tuberculosis: 9 health centers did not have functional TB services (no clients and drug consumption); ART: 14 health centers did not have functional ART services (no clients and drug consumption); Malaria: 9 health centers did not have data on number of patients treated for malaria.

^aThe first time an individual between 15-49 years receives a modern contraceptive service in the calendar year (from HMIS) or the average annual cost for family planning per acceptor.

^bAt least four ANC visits during EFY 2006.

^cA PNC visit within 24 hours of a newborn's birth during EFY 2006.

^dTuberculosis case (all forms) that was registered at the health center for EFY 2006 (from HMIS).

^eA person living with HIV/AIDS (adult or child) that received ART for EFY 2006 (from HMIS), with assumption that an individual did not stop treatment or miss regimens throughout the year.

^fNew malaria case (complicated or severe) registered at the health center during EFY 2006 (from HMIS).

Unit Costs for the Expanded Program on Immunization (EPI)

The average recurrent unit cost for the EPI vaccines administered at health centers and primary hospitals is 94 ETB and 177 ETB per vaccination, respectively. Among primary hospitals, a majority of this cost comes from HR (42%) followed by indirect costs (37%) and drugs and supplies (21%). Similar to primary hospitals, a majority of the EPI costs for health centers is comprised of HR (45%) followed by drugs and supplies (39%) and indirect costs (17%). Looking more closely at the individual vaccines under this program, the average unit costs vary. Under health centers, the BCG vaccine had the lowest cost to administer, at 65 ETB per vaccination, while the pentavalent vaccine had the highest cost to administer, at 129 ETB per vaccination. However, the latter vaccine is potentially still more cost-effective because it protects a child against 5 killer diseases (diphtheria, pertussis, tetanus, hepatitis B and Hib). The average recurrent unit costs findings for the specific vaccines under EPI are slightly different for primary hospitals. Among these health facilities, the Pneumococcal vaccine had the highest cost to administer, at 263 ETB per vaccination, while the BCG vaccine had the lowest cost to administer, at 148 ETB per vaccination. The HR time spent administering each vaccine and associated indirect costs were assumed to be the same for all vaccines, and therefore the variations in per vaccination cost for immunizations are due to diverging drug costs.

Unit Costs for Family Planning Services

Ethiopian public health facilities offer a number of family planning services, including the provision of birth control (pill, injectables, and intrauterine device (IUD)), condoms, and emergency contraception. An “acceptor” for family planning is a patient of reproductive age (15-49 years) receiving a modern contraceptive method. Each acceptor is counted only once, the first time s/he receives a contraceptive service for EFY 2006. “Acceptors” thus includes both new acceptors well as repeat acceptors from the previous year. Contraceptive services include provision of contraceptive supplies as well as routine check-ups for ongoing use of a long-term method such as Norplant, IUD, etc. The average recurrent unit cost for a family planning service is moderately high for both health centers and primary hospitals. Among health centers, the average recurrent unit cost for family planning is 552 ETB per acceptor per year, while for primary hospitals it is 580 ETB per acceptor per year. Drugs and supplies is the major cost driver for family planning services at both primary hospitals (67%) and health centers (78%).

Unit Costs for Antenatal Care (ANC) and Postnatal care (PNC)

The ANC unit costs are based on at least 4 ANC visits for EFY 2006, and PNC unit costs are based on a typical PNC visit within the first 24 hours a newborn’s birth for EFY 2006. The methods for these calculations are described above in the Methods section. ANC services offered vary by need, and this may include regular check-ups, tetanus toxoid shots, and/or syphilis detection and treatment. The average recurrent unit cost for an ANC4 visit is substantially lower among health centers (256 birr) compared to primary hospitals (586 birr). No outliers exist for the ANC4 unit cost estimates for either primary hospitals or health centers. PNC services offered may consist of a mother or newborn receiving services such as treatments for newborn sepsis, treatment of postpartum hemorrhage, prescribing Chlorhexidine for treatment of the umbilical cord among newborns, among others. The unit cost of an average PNC service is more than double the cost for primary hospitals (156 birr) compared to health centers (74 birr).

Unit Costs for Tuberculosis (TB), Antiretroviral Therapy (ART) and Malaria

The next three exempted services – tuberculosis treatment, ART, and malaria treatment – have a unit of measurement on a per case basis. Per case is applicable for service groups where the treatment regimen continues for an extended period of time, with possible multiple visits to the health facility during the duration of treatment or calendar year. This should not be confused with or valued as a proxy (substitute) for “per visit cost”.

Tuberculosis treatment unit cost includes all forms of TB cases. “Per case” for this service is the number of smear-positive TB cases receiving TB treatment at a health facility during EFY 2006. The average recurrent unit cost per TB case per year is 4,180 ETB for a health center. There are three health centers with unit costs that are outliers. If removed from the estimation, then the average unit cost per TB case becomes 1,331 ETB for health centers. This is also much closer to the median value of 1,259 ETB per TB case for a health center. Among primary hospitals, the average unit cost per TB case per year is 1,634 ETB. Drugs and supplies are the main cost drivers of TB treatment for both

primary hospitals (81%) and health center (87%).

Antiretroviral treatment recurrent unit cost estimates are based on the number of people living with HIV/AIDS currently receiving ART for EFY 2006. This means that it does not represent the unit costs for the provision of ART over the individual's lifetime. Furthermore, this does not adjust for a patient stopping treatment or missing a regimen throughout the EFY 2006. In order to do such analysis it would require further analysis on survival rate, which is beyond the scope of this study. The average unit cost for providing ART for health centers and primary hospitals is 1,316 ETB and 1,418 ETB per case per year, respectively. Some health centers were not included in this unit cost estimate because not all of sampled health centers provide ART services. Similar to family planning and TB costs, a majority of ART costs are for drugs and supplies, consisting of 84% of the costs for primary hospitals and 88% of the costs for health centers.

Malaria treatment includes both complicated or severe cases (infections complicated by organ failure or abnormalities in patients blood or metabolism) and uncomplicated cases (malaria attack that lasts 6-10 hours) (FMOH, 2005; CDC, 2015). Uncomplicated cases would have a lower unit cost estimate compared to complicated ones, however the distinction between these two types of malaria cases was not possible in this study. "Per case" for this service is based on new malaria cases recorded for EFY 2006 as per the standard HMIS format. During key informant interviews, some health professionals stated that "new malaria cases" recorded also included those being treated at the beginning of EFY 2006. This might not be the case for all health facilities, say if an individual was diagnosed but refused treatment or somehow failed to receive treatment. Therefore, it is possible that the estimates presented in Tables 5.1 and 5.2 are an underestimation of the average unit costs to provide malaria treatment services. Only 24 out of the 40 health centers had sufficient data for the number of new malaria cases during the EFY 2006. The average recurrent unit cost in health centers for malaria treatment is 1,575 ETB per case per year. However, there were 5 health centers with unit costs that are considered to be outliers. The revised average unit cost estimate is 134 ETB per case when the identified extreme values are excluded, and this is also close to the median unit cost of 124 ETB per new malaria case per year. The average unit cost of malaria treatment at primary hospitals is 233 ETB per case. No outliers exist for this unit cost. Human resources are the main cost driver for malaria treatment in primary hospitals (43%) and in health centers (68%).

6. Limitations

Limitations in the results presented in this report include data quality issues, lack of data, and issues beyond the scope of this study. The specifics of these limitations are highlighted below by analysis type – unit cost estimates by health facility, and unit cost estimates for exempted services.

Unit Cost Estimates for Health Facilities and Departments

- This cost study only includes recurrent costs; capital costs are not captured. Capital costs may not vary much by type of facility when amortized over long periods of time. These costs could be added later from other data sources on inputs and their costs.
- Health posts are excluded from this analysis because of significant data quality issues to accurately estimate unit costs.
- Estimation of program drugs consumption was done using the monthly Report and Requisition Forms (RRFs). In cases where the entire set of RRFs pertaining to EFY 2006 were not available for specific facilities, extrapolation was carried out using the available RRFs. This can potentially affect the accuracy of drug consumption estimates.
- Unit cost estimates might be affected by the quality of data available for this study. The number of patient contacts used for the denominator is sourced from multiple HMIS reporting periods. For a number of health facilities, the HMIS forms could not be collected to account for the entire study period (EFY 2006) despite best attempts during data collection. Extrapolations of available data were performed to account for missing data where possible, and therefore introducing potential estimation biases. In contrast, per capita cost estimates use reported catchment population as the denominator, where imputation techniques such as extrapolation were not needed for this single data point and not susceptible to such estimation bias.
- Unit cost estimates for facilities and departments combine different patient contact outputs into a single number by simply adding together the different outputs at each level. However, the value of inputs, especially HR and drugs and supplies, to produce different outputs, is certainly not the same. Costing at the level of specific types of treatments or visit was not possible for this study except for the exempted services. Simply adding up the numbers is not an ideal approach. This problem is found in many other costing studies of multi-product facilities. We are working on better methods to capture this effect of case mix on cost estimates.
- This study did not capture any variations in quality of care associated with cost differences. Low unit costs could therefore reflect either efficiency or low quality, and we cannot distinguish between them.
- Some health facilities rely on technical assistance from donors, non-governmental organizations, etc. to administer certain exempted services. This study does not include costs incurred from such technical assistance because it is not collected by the individual health facilities. This also affects exempted service estimates.
- The unit costs presented in this study are specific to individual facility types and do not reflect combined costs resulting from patient referral from one health facility to another.
- Indirect costs by department does not account for the space and/or other factors that would influence the allocation of such costs. Alternatively, it is based on patient load by department, which was the best proxy given available data.
- The cost analysis does not include any additional costs incurred by health provider or patients who purchase drugs and supplies from private pharmacies when stock-outs occur at the facility.
- Disaggregating costs by different types of services is not possible, except for the exempted services estimates, given the available data and costing approach used. Most exempted services were costed by using a department level allocation for HR, indirect costs, and specific drugs and supplies consumed related to that particular service, while costing other service types such as c-section versus normal delivery was not possible.

Unit Cost for Exempted Services

- Disaggregating family planning by specific type of service, such as contraceptive use, was not possible given the available data from health facility records.
- Leprosy could not be included due to lack of data within the HMIS on the number of leprosy cases identified and treated.
- The estimated unit cost of drugs and supplies for PNC and ANC is based on normative costs rather than field representation, and might be overestimating the unit costs of these two services.
- Not capturing HR time allocation differences between various exempted services (and only using the average by department with associated exempted services) was due to limits on the scope of this study. HR costs by service type may therefore be inaccurately estimated.
- A more detailed disaggregation of drugs and supplies costs between exempted and non-exempted services is possible for some services. However, this estimation would represent an overestimate of non-exempted and underestimate of exempted service drugs and supplies costs, because leprosy was not included in the unit cost estimates given the exclusion of reporting numbers of leprosy cases in the HMIS.

7. Conclusions

This study provides new evidence on primary health care costs across Ethiopia. One previous costing exercise in Ethiopia consisted of a very small sample size of health facilities to cost out the potential social health insurance benefits package (FMOH, 2007). Since that exercise was conducted 10 years ago, it does not capture changes to the health system since 2007. Other work consists of normative costing exercises for the health sector 5-year plans, with the most recent use of the One Health tool that was used to cost out the HSTP (2015/16-2019/20) under varying assumptions of target achievements (FMOH, 2015), and the essential health service package (FMOH, 2005). This type of costing is based on standards and norms to provide health care services, but might not reflect the real costs of service provision under field conditions. Up-to-date costing information supports the FMOH to make evidence-based decisions to ensure more efficient, effective, and equitable mobilization, allocation, utilization, and targeting of primary care resources.

The findings presented in this paper highlight unit cost levels and differences across primary hospitals and health centers, departments, geographic location, and exempted services. Overall unit costs for government provided primary care services are low in absolute terms, reflecting Ethiopia's overall low level of spending. However, spending on primary health care services could also be seen as relatively high when considering them within the overall low total government per capita expenditure of ETB 52 (2010/11) excluding external sources⁵. External sources of funding for government health care account for an additional ETB 167 per capita (FMOH, 2014). Most of the total health expenditure is being spent on primary health care services, with a recent estimate consisting of 64% of total health spending allocated to primary care for 2010/11 in Ethiopia (Berman, Mann, Ricculli, 2015). This in part supports the overall high level of spending for the primary care system. Not surprisingly, unit costs are higher for primary hospitals (269 ETB) compared to health centers (219 ETB). Hospitals tend to have more highly qualified staff and a more costly composition of other inputs compared to health centers.

The unit costs of services at government health centers seem relatively high on a per patient basis in relation to Ethiopia's overall government health spending. There could be several reasons for this. Facilities might be highly staffed or supplied relative to the demand for or utilization of services. This could be reasonable in a rapidly growing system, which anticipates significant future increases in demand and is taking proactive measures to be prepared for that to happen. Or, inefficiencies in the use of resources to deliver services could be contributing to the relatively high unit costs for this health facility. Further analysis will explore these questions.

Unit cost results show some patterns of variation between facility types and location. For example, health centers in the major regions have lower department-level unit costs, as compared to the urban or developing regions, except for the MCH departments. We will explore these differences further in the next report. A variety of factors, including quality of care, cost implications due to stock-outs, or additional costs incurred because of remoteness (e.g., additional transportation costs to delivery drugs and supplies from the PFSA hubs to a more remote health facility) may contribute to such differences. Further work is needed to understand this better.

Exempted services include some relatively costly elements as well, most of which are currently financed by external sources. As one example of this, the most expensive exempted services were TB treatment and ART for both primary hospitals and health centers. Almost 90% of the cost for these two services comes from drugs and supplies, which is largely supported by external sources. This will have substantial implications for the domestic health sector budget if external support for these programs decreases due to continued rapid economic development, changing global financial landscape, and additional competing priorities with the Sustainable Development Goals (SDGs). Further work is being done to analyze the fiscal implications of government funding of these inputs, should domestic resources increasingly be needed to replace external funding, and should demand for and coverage of these priority services increase in the future. This will provide evidence to support policy dialogue and action around financing exempted services over the medium (based on HSTP targets for the next 5 years) and long term (PHC led UHC strategy over the next 20 years) for the FMOH.

⁵ Author estimates using data from FMOH (2014).

Addressing major data limitations of this study would further refine future unit cost estimates for service provision within the PHCU. Data quality and availability were the largest hurdles faced during data collection and analysis. Although the FMOH has in place a good system of reporting and recording of input- and output-related data, we found that very often these data are not complete or available at the facility level. To strengthen health system performance for quality and efficiency, more effort will be needed to assure that essential data are maintained and used. This is one of the key goals of HSTP in its transformational agenda for an “information revolution”.

Unit cost estimates for health posts were excluded due to insufficient record keeping. However, this is an increasingly important level of care with the scale-up of Level IV HEWs and there is a need to understand additional costs associated with this transition. Improvements in record keeping and introduction of regular audits, especially for health posts and health centers, would minimize the need for “data filling” and potentially over/under estimating the unit cost findings. Furthermore, cost implications of stock-outs, geographic location of a facility, and capital inputs are not included in these estimates due to study feasibility and other data limitations.

Ethiopia is in the process of making changes within its primary health care system in order for it to be more sustainable and adaptable to the changing health needs of its population. Such changes include revisions to the essential health service package list, exempted service list, expanding primary hospital coverage, and introduction of community based and social health insurance schemes. With these and other changes to the primary care system come potential additional costs. This study serves as a baseline for the FMOH and others on the recurrent costs to administer services within the current PHCU structure, and provides some of the necessary evidence to estimate the potential additional costs that might be incurred based on changes in service packages and exemptions in the future.

Future analytical work using the data from this study could facilitate in answering broad policy questions and provide strategic direction on areas of mobilizing, allocating, utilizing, and targeting PHC resources. This includes, but is not limited to:

- Identifying potential efficiency gains within and across health facilities.
- Estimating the costs to deliver the benefit package for community based health insurance and social health insurance schemes at the PHC level.
- Understanding financial implications of revising the essential health service package.
- Strengthening the budgeting and planning process, and improve advocacy capacity for additional resources for health at woreda level.
- Identifying more sustainable funding mechanisms for the provision of exempted services.

While the focus of this paper is on the actual recurrent costs, further reports will examine productivity and efficiency in resource use and allocation, consider ways to improve the financial performance of primary health care service delivery, and examine the implications of increased funding of exempted services from domestic resources.

References

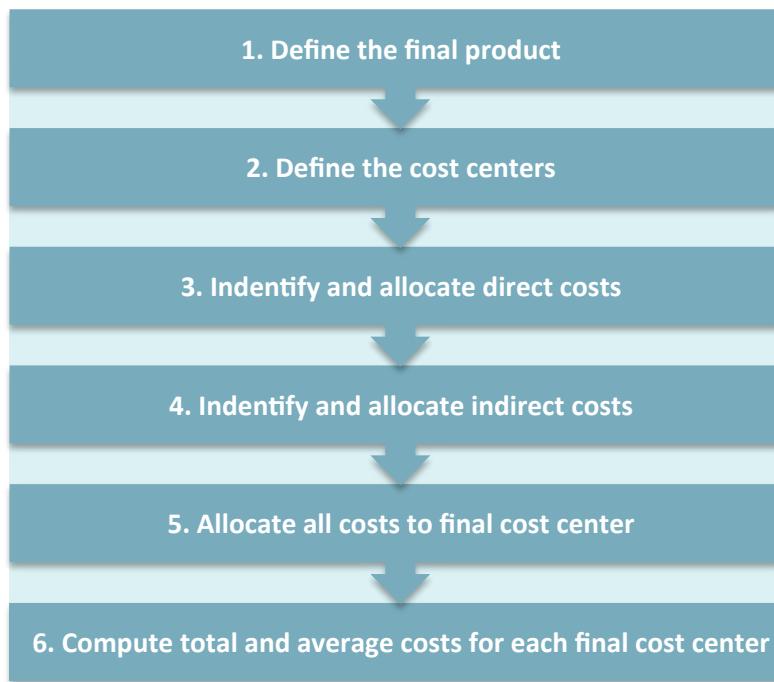
- Alebachew A., Hatt L., Kukla M., N. S. (2014). Universal Health Coverage Low-Income Context : an Ethiopian Case Study, (January), 19.
- Berman, P; Mann, C; and Ricculli, ML. (2015). Financing Ethiopia's Primary Care to 2035: A Model Projecting Resource Mobilization and Costs. Harvard T.H. Chan School of Public Health: Boston, MA.
- Center for Disease Control (CDC). 2015. About Malaria: Disease. Retrieved from: <http://www.cdc.gov/malaria/about/disease.html>. DOA: April 20, 2016.
- Creese, A; and Parker, D. 1994. Cost Analysis in Primary Health Care, A training manual for programme managers. World Health Organization: Geneva.
- Ensor, T., & Indradjaya, S. 2012. The Costs of Delivering Health Services in Indonesia: Report on a Prospective Survey 2010-2011. June 2012.
- FMOH. 2005. Essential Health Service Package for Ethiopia. Federal Ministry of Health: Addis Ababa, Ethiopia.
- FMOH. 2007. Baseline Assessment of Unit Cost of Health Services at Different Levels of Care, Background study for introducing Social Health Insurance. Planning and Programming Department, Federal Ministry of Health: Addis Ababa, Ethiopia.
- FMOH. 2012. Health Center – Requirements. Ethiopian Standard, ES3611:2012. First edition. Federal Ministry of Health: Addis Ababa, Ethiopia.
- FMOH. 2014. Ethiopia's Fifth National Health Accounts, 2010/2011. Health Care Financing Team of Policy, Planning and Finance General Directorate, Federal Ministry of Health. Addis Ababa, Ethiopia.
- FMOH. 2015. Health Sector Transformation Plan (HSTP) 2015/16-2019/20 (2008-2012 EFY). Federal Ministry of Health: Addis Ababa, Ethiopia.
- FMOH, HEPCAPS II Project. 2015. Health Extension Workers Time Motion Study Complemented by In-depth Interviews within Primary Health Care Units in Ethiopia. Ethiopian Federal Ministry of Health, Harvard T.H. Chan School of Public Health, Yale Global Health Leadership Institute, JSI Research & Training Institute, Inc.: Addis Ababa, Ethiopia, Boston, Massachusetts, and New Haven, Connecticut.
- Hanson, K; and Gilson, L. 1996. Cost, Resource Use and Financing Methodology for District Health Services: A Practical Manual. Bamako Initiative Management Unit, UNICEF.
- Özaltın, A., and C. Cashin, eds. Costing of Health Services for Provider Payment: A Practical Manual Based on Country Costing Challenges, Trade-offs, and Solutions. Joint Learning Network for Universal Health Coverage, 2014.
- Institute for Health Metrics and Evaluation (IHME). 2015. Health Service Provision in Ghana: Assessing Facility Capacity and Costs of Care. Seattle, WA.

Annex A: Technical Details of Cost Accounting Approach

Cost Accounting Framework

The costing framework and analysis follow the major steps and recommendations outlined in guidelines by Hanson and Gilson (1996) and Creese and Parker (1994) for conducting a cost accounting analysis in primary health care and hospitals (see Figure A.1). “Cost” is defined in this study as the monetary value of non-capital, recurrent expenditures incurred and resources used to produce a defined set of health service outputs or to operate specific health facilities. The recurrent costs include drugs and supplies, salaries, and other operational costs (e.g., electricity, running water, maintenance, etc.), which are incurred on a regular basis that can be allocated as direct costs or indirect costs. Direct costs are costs that are directly attributable to a specific service output and consists of drugs and supplies and salaries. Indirect costs are those that cannot be attributed directly to a specific output, which includes the other operational costs (e.g., electricity, running water, etc.). In this cost analysis both direct and indirect costs are included. Costs were estimated irrespective of where the money to cover such costs came from. These sources include revenue obtained by the health facility through user fees (in other words, household out-of-pocket); funds provided by the federal block grants via the WOFEC resources (funds and in-kind contributions); funds provided from development partners that is managed by the FMOH (e.g., the MDG Performance Pooled Fund); funds received from the fee waiver program, community donations, or community based health insurance scheme (where applicable); or directly from local and international NGOs. However, technical support provided in-kind by partners and NGO's was not included in the costing exercise.

Figure A1: Summary of Cost Accounting Stages



1 Defining the Final Product

The first step is defining the final product or services for which unit costs are computed. This depends on several factors, including the purpose of the cost analysis, data availability as well as service provision arrangement. While taking into account these factors we aggregated the outputs to a single index that corresponds well to particular departments for both primary hospitals and health centers. These departments are referred to below with the subscript (k) where k=1....n. For each of these units, the index of outputs is represented by the letter (Q) where q=1...n. Based

on this, the output is aggregated to the following indices:

- Outpatient (OPD) visits
- Inpatient (IPD) discharges
- Maternal and Child Health (MCH) visits
- Deliveries

2 Defining Cost Centers

The costing analysis is at the level of facility cost centers, which has been defined in such a way that they correspond with the health facilities' organizational, administrative and accounting structure. Based on this, we have organized all costs into the following three cost centers:

- Patient care cost centers, principally service delivery departments
- Intermediate cost center (pharmacy, laboratory, and diagnostics), and
- Overhead cost centers

3 Identify and Allocate Direct Costs

All relevant inputs (direct and indirect recurrent costs) are identified and assigned to a cost center. First, direct cost are identified and assigned into each cost center. Health post estimates do not include indirect costs.

4 Identify and Allocate Indirect Costs

Once direct costs are allocated to each cost center, the costs assigned to overhead and intermediate cost centers are allocated to patient service cost centers (facility departments) in such a way that it resembles the actual use of resources by each of the department as closely as possible, using the step-down accounting approach. Direct cost of departments providing patient services are used as main allocation factors for indirect cost as appropriate.

5 Allocate all costs to final cost center

Cost estimates are generated only at the level of final cost centers. This is because data on the number of clients served is not available in standardized and uniform formats for intermediate cost centers.

6 Compute Total and Average Costs

For computing unit cost for each cost center, the total cost of each final cost center is divided by the total output of that cost center. Using this approach, at each facility (i) we estimate the total costs for each final cost center (k) as the sum of direct cost allocated to the cost center plus indirect cost allocated to cost center (k) from overhead and intermediate departments

$$TC_{i,k} = DC_{i,k} + IC$$

The average cost of an index output Q_k in unit (k) at facility (i) is then:

$$AC_{k,i} = \frac{TC_{k,i}}{TQ_{k,i}}$$

By comparing these average costs across the different facility types sampled we have estimated the mean and median costs of specific index outputs (but not specific interventions).

Health Post Unit Cost Approach

The approach to estimate unit costs for health posts was more simplified, as they do not have departments. We review the approach used for this health facility, even though the final estimates from the analysis are not reported in this paper. The unit cost estimates for health posts account for direct costs associated with HR and drugs and supplies consumed. Indirect costs are not part of any estimates at this level because it was not possible to obtain such cost data and a majority of health posts do not have utilities such as running water and electricity. Health posts are comprised mostly of health extension workers (HEWs)⁶ who provide services within the health facility as well as through outreach work and house-to-house provision of services in the community. One recent study found that HEWs spend, on average,

⁶ Among some regions, such as Benishangul-Gumuz, a nurse was also staffed at a health post along with the HEWs.

about 43% of their time providing services at the health post, with the remaining time being spent outside the health post devoted to service provision in community, travel time to households, trainings, etc. (FMOH and HEPCAPS II Project, 2015). Cost per output is estimated by taking the total number of patients served at the health posts and in the community as the denominator. The health posts have “family folders”, where they keep track of the services provided to individuals at the health posts and within a household. It was assumed that the total number of patients served and services provided in the family folders accurately capture both patients served at the health post and in the community. The data on consumption of drugs and supplies was sourced from the Health Post Monthly Report and Request (HPMRR) forms. Health post estimates do not include capital costs (e.g., construction of health posts) or HEW housing within a kebele (village) that is typically provided mostly through community contributions.

Costing of Exempted Services at Facility Level

Where possible, the cost related to exempted services is also estimated separately by slightly modifying the above approach. One adjustment is that we have estimated the cost of drugs associated with particular exempted services. The average human resource cost and average indirect cost associated with the department where a particular exempted service is usually provided, is then added to that cost, to arrive at unit cost of exempted service. This method does not account for the cost of general supplies like disposables, which cannot be associated with a particular exempted service.

Annex B: Model for Non-Program Drugs and Supplies Allocation

A simple bivariate linear regression was conducted to determine a weighting scheme based on the relationship between non-program drugs and supplies costs and inpatient discharges and outpatient visits for each health facility. It was assumed that the Delivery department non-program drugs and supplies costs would be equivalent to IPD because delivery is a medical intervention and sometimes leads to admitting the mother and newborn, and thus more resource intensive than an OPD visit. Stata software package was used to run the model.

$$npdrugs_{hr} = \alpha + \beta_1 IPD_discharge_{hr} + \beta_2 OPD_visit_{hr} + \varepsilon_{hr}$$

where the dependent variable, $npdrugs$ is non-program drugs and supplies for a particular primary hospital, h , in region, r . The two independent variables are inpatient discharges, $IPD_discharge$, and outpatient visits, OPD_visit , for a particular primary hospital, h , in region, r . Only primary hospitals were observed for this particular model because this type of health facility have full-fledge inpatient departments, which can better represent the ratio of the non-program costs, as opposed to health centers, which have smaller inpatient departments or do not have such departments. It is possible that this may overestimate the allocation to IPD and Delivery for health centers. The coefficient values for $IPD_discharge$ were 51.47 birr and OPD_visit was 12.84 birr. This implies that the difference between these two variables is 4 or a 1:4 ratio. In other words, an inpatient discharge is associated with four times the non-program drug consumption costs compared to an outpatient visit. This is a similar ratio found in Özaltın and Cashin (2014). To allocate the non-program costs across the three departments, one-ninth of the costs went to OPD, four-ninths went to IPD and the remaining four-ninths went to the Delivery department.