Financing Ethiopia's Primary Care to 2035: A Model Projecting Resource Mobilization and Costs

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Acknowledgements

Foreword

This work is done as part of the HEPCAPS2 Project and aligned with the 20-year Vision of primary care ("Visioning Ethiopia's Path Towards Universal Health Coverage Through Primary Health Care"). The FMOH has been closely engaged in the process of creating the model and identifying scenarios to pursue. This paper provides the basis for further discussion and collaboration in Ethiopia, and ultimately further use of this type of analysis by the FMOH to strengthen the development of Ethiopia's primary care.

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Acronyms

CSA	Central Statistical Agency
EHSP	Essential Health Service Package
ETB	Ethiopian Birr
FMOH	Federal Ministry of Health
GDP	Gross Domestic Product
GGE	General Government Expenditure
GHE	Government Health Expenditure
GoE	Government of Ethiopia
GTP2	2nd Growth and Transformation Plan
HEP	Health Extension Program
HMIS	Health Management Information System
HSDP	Health Sector Development Plan
HSTP	Health Sector Transformation Plan
IBEX	Integrated Budget and Expenditure
LIC	Low Income Country
LMIC	Low-Middle Income Country
MDG	Millennium Development Goal
MOFED	Ministry of Finance and Economic Development
NGO	Non-Government Organization
NHA	National Health Accounts
OOP	Out-of-Pocket
PEPFAR	President's Emergency Plan for AIDS Relief
PHC	Primary Health Care
PHCU	Primary Health Care Unit
PPP	Purchasing Power Parity
THE	Total Health Expenditure
UMIC	Upper Middle Income Country
US	United States

Executive Summary

This paper presents the results of modeling to project Ethiopia's future resources to finance primary health care and compare them with the likely costs of providing primary care according to current government plans.

The paper explores different scenarios related to health financing contributions and costs, as well as economic, financial, and demographic situations. This model serves to promote financially viable actions towards primary care expansion and reform. The questions that the model aims to answer are:

- Given the historical trends, what are plausible and likely projections to 2035 for Ethiopia's resource mobilization and primary care costs?

- Given different economic, demographic, and health service scenarios, what are the possible effects on resource needs and resource availability? What are the gaps in financing implied by different scenarios and how might they be addressed?

- How much of domestic resources are needed for health care spending to reach lower-middle and upper-middle income country benchmarks of spending per capita in 2025 and 2035 respectively?

Using Ethiopia's national health accounts data, the composition and share of primary care in national health spending is estimated. Primary care largely represents services delivered at the district (woreda) level, including primary hospitals. Primary care expenditure also includes a share of spending on higher-level hospitals that deliver outpatient services and a share of government administration costs at higher levels. All financial estimates in this analysis for all years are done in nominal Ethiopian Birr, to avoid complications from unpredictable exchange rate changes. Inflation is factored into the analysis.

Two distinct modeling exercises were done: one estimates resource mobilization for primary care; the other estimates costs of delivering services. For resource mobilization, two different approaches are used. One is based on trends extrapolated from the five National Health Accounts (NHAs) done since the late 1990s. Another approach models GDP growth trends and elasticity of spending levels in relation to income. With both approaches, a variety of assumptions are used to examine scenarios relating to government, private, and rest of the world expenditure projections.

For service costs, this report primarily presents the results of a cost function based modeling representing estimates of actual costs of providing primary care in aggregate. This estimate is compared with the normative costing model that was developed by the Federal Ministry of Health (FMOH) for its next 5-year health transformation plan (to 2020) using the OneHealth Tool as well as the forecasted estimates of the essential health service package from 2005-2015 and policies to reduce out-of-pocket (OOP) spending.

Overall, our projections indicate substantial increases are needed in total primary care spending on government services, of which government funding, external funding, and household OOP spending are today the main sources. The government needs to increase its level of spending in order to finance its current primary health care goals under realistic scenarios for primary care development and slowdown or decline in external resources. Even with the mildly optimistic external resource scenario of levels remaining at the high level in 2010/11 and increasing only with inflation over the next 20 years, along with the historically-based trend of government funding is not enough to cover the costs of the current primary care system over time. High growth of GDP narrows the potential resource gap but doesn't eliminate it. The current medium and high growth GDP assumptions are also highly optimistic for the next 20 years.

Our results indicate that the adequacy of future financing for primary care is highly sensitive to assumptions about future growth of government and external funding. In our model, depending on the assumptions used, results range from about 40% "deficit" (funds mobilized less than funds required) to a more than 200% surplus (funds mobilized exceed funds required). Timing is also important. High growth forecasts may create "surpluses" in the later years even though they result in predictions of "deficits" in the earlier years.

Ethiopia has ambitious plans to advance to lower and upper middle-income status during its next 20-year growth and transformation period. Our modeling suggests that with the right policies, Ethiopia can match levels of spending at least comparable to today's lower middle-income countries during this time. This would result in much more resources devoted to primary care in Ethiopia, which would likely significantly improve the health conditions of its people and advance its efforts to achieve universal health coverage based on a primary care approach.

1 Introduction

Problem Statement

Ethiopia has made rapid progress in improving population health outcomes, as evidenced by its early achievement of child mortality reduction goals. Following rapid scale-up of initial investments in basic health services, it now faces new challenges to continue and sustain its progress. This will require expanding service coverage, scope and quality to meet the demands of a growing adult population, a double burden of communicable and non-communicable diseases, and an increase in health service utilization. Sustainable financing strategies will be critical for Ethiopia to continue providing quality health care services, especially primary care, as the external funding landscape, health needs, and demand for quality of care change with the transition into a middle-income country by 2035[1].

Health has been a priority for the Government of Ethiopia (GoE), as evidenced by the scale up of primary care services through the Health Extension Program (HEP) since 2004/05. Although it provides strong political support for health progress, GoE has provided a declining share of its own-revenue towards health over the last 10 years, supporting only 16% of the total health expenditure (THE) according to the 2010/11 National Health Accounts (NHA) (FMOH, 2014). GoE relies heavily on external donors (50%) and out-of-pocket spending (34%) to finance services for its population of over 94 million (FMOH, 2014 and World Bank, 2014a). Primary care is proportionally more reliant on these external resources, yet total funding still falls short of ambitious health sector plans to provide an array of cost-exempt services and meet the health-specific targets of national plans. The resulting resource gaps inhibit essential service delivery and could jeopardize further expansion of the primary care system (Mann, Alebachew, and Berman, 2013).

Objectives of the Modeling

Under the Federal Ministry of Health's (FMOH) primary care vision, one of the strategic recommendations is to develop a model to estimate resource mobilization needs for health, reflecting economic growth, demographic changes, increased demand for quality, change in health benefit package, and changing external contributions to health. Evidence-based decision-making will be essential to inform policy and leverage political support for the necessary increases in domestic health investments by the GoE.

With the vision in mind, a model was developed with the FMOH to forecast Ethiopia's future health resources compared with the likely costs of providing primary care services according to current government plans. The model explores different scenarios related to health financing contributions, as well as economic, financial, and demographic situations. It serves to promote financially viable actions towards primary care expansion and reform. The questions that the model answers are:

- Given the historical trends, what are plausible and likely projections to 2035 for Ethiopia's resource mobilization and primary care costs?
- Given different economic, demographic, and health service scenarios, what are the possible effects on resource needs and resource availability? What are the gaps in financing implied by different scenarios and how might they be addressed?
- How much of domestic resources are needed for health care spending to reach lower-middle and upper-middle income country benchmarks of spending per capita in 2025 and 2035 respectively?

The conceptual framework for the health finance projection model posits that past resources mobilized for primary care equal the costs of primary care since amount spent was fully utilized in providing the services actually delivered. However, future projections on resources mobilized may not equal the projections of primary care costs. It is the size and direction of potential differences between resources available and the costs of services intended to be provided that is our topic of interest, especially when resource mobilization projections may be less than resources desired to support services over the next 20 years. See Annex A for more details of this framework.

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[1] As part of the 2nd Growth and Transformation Plan for the economic development of the country it is assumed that Ethiopia will reach low-middle income development status by 2025 and upper-middle income status by 2035.

Data and Definitions

The following key method assumptions underpin this work, which follows:

1. **Units of Measurement:** All of the work presented is in nominal Ethiopian Birr (ETB) terms, except when benchmarking Ethiopia's health finance status to other countries. This avoids complications of estimating changes in exchange rates between ETB and United States dollar (US$), and allows for inflation to be easily removed and obtain real values in ETB as well as estimate the purchasing power parity (PPP) for ease of comparing values across countries. All monetary figures are rounded up to the nearest 1,000 ETB, even though data on resources mobilized and our model predictions are more precise (to the ETB). This is done for ease of reporting.
2. **Data Sources:** Whenever possible we used official government data. This consists of data obtained from the Ministry of Finance and Economic Development (MOFED) audited accounts for data including GDP and general government expenditure estimates and data endorsed by the FMOH via NHAs (1996-2011), and Annual Performance Reports for the 5-year Health Sector Development Plans (HSDPs).
3. **Primary Care Definition:** We applied and augmented the FMOH's definition of primary care. This consists of: 1) care offered by health care providers located at the woreda (district) level or below, within the primary health care unit[2] (PHCU), including promotive, preventative, outpatient curative care services, and other services of primary hospitals; 2) some primary care services offered at secondary and tertiary facilities (hospitals); and 3) a share of administration costs at federal, regional, and woreda levels.

Organization of Report

This paper is organized into 6 sections along with technical annexes. Each section summarizes the different parts of this work, with greater focus on the overall findings from the projections. The more technical pieces are presented in the annexes. Section 2 consists of the resource mobilization projections based on different assumptions. Section 3 briefly describes the primary care cost projections, comparing with the Health Sector Transformation Plan (HSTP) costs estimated by the FMOH using the OneHealth tool and cost projections for the essential health service package from 2005-2015. Section 4 compares the resource mobilization and cost projections, and showcases a series of possible 20-year scenarios and financing surplus or deficit results. Section 5 compares the resources mobilized for the health sector with the HSTP cost scenarios; and benchmarks the findings against averages for low, low-middle, and upper-middle income countries along with select country specific per capita spending on health. Section 6 consists of discussion and conclusions of this work.

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[2] This includes services offered at the newly expanded primary hospitals as part of the PHCUs.

2 Resource Mobilization Projections

The health care finance projection model makes scenario-based projections about Ethiopia's resources mobilized by financing sources for health and primary care. The model draws on two approaches, referred to as the historically-based and the GDP-based projections. When making future projections, assumptions used in different scenarios influence outcomes. Table 2.1 highlights the different assumptions initially used for each financing source and projection approach. Any of the financing source assumptions in Table 2.1 could be combined under each projection approach to create different funding scenarios for Ethiopia's overall health sector, and more specifically primary care, over the next 20 years.

| Table 2.1 Assumptions for Financing Source based on Two Projection Approaches				
Financing Source	Assumptions	Historical Trend	GDP-Based	
			Medium GDP	High GDP
Gov't	Trend extrapolated from NHAs[3]	X		
	GHE trend from NHAs applied to GDP and GGE growth assumptions		X	X
	Rises to previous highest point (GHE as % of GGE) by 2025[2]	X	X	X
External	Trend extrapolated from NHAs	X	X	X
	Increase from 2010/11 only by US inflation	X	X	X
	Remains at 2010/11 level in nominal ETB terms	X	X	X
	Decrease by 50% in from 2010/11 to 2035		X	X
Household OOP	Trend extrapolated from NHAs	X		
	Apply constant income elasticity for OOP health spending		X	X
Other Private	Trend extrapolated from NHAs	X		
	Apply constant income elasticity for other private health spending		X	X

[3] The trend extrapolated from the NHA data sets was estimated by smoothing the slopes between each NHA based on the best-fit line from each NHA observation to the next for each financing source and smoothed over the whole period of five NHAs. For government, ROW, and household OOP this was a polynomial trend, and a linear trend was the best-fit line for the other (private and local NGO) financing group.

Historically-Based Approach

For the historically-based approach, the projections are based on the NHA data and trends by financing source that occurred over the 15-year time period (1996-2011). The historical trend for primary care expenditures is based on the allocation classifications from the 5th NHA (2010/11) and is estimated that 64% of total health expenditures were primary care while the remaining 36% were non-primary care. Further detail on how the primary care to non-primary care ratio was estimated, along with the breakdown by financing source, is in Annex B.

Figure 2.1 Examples of Key Resource Mobilization Scenarios Using the Historically-Based Approach (Total & Primary Care), in Billions (B)
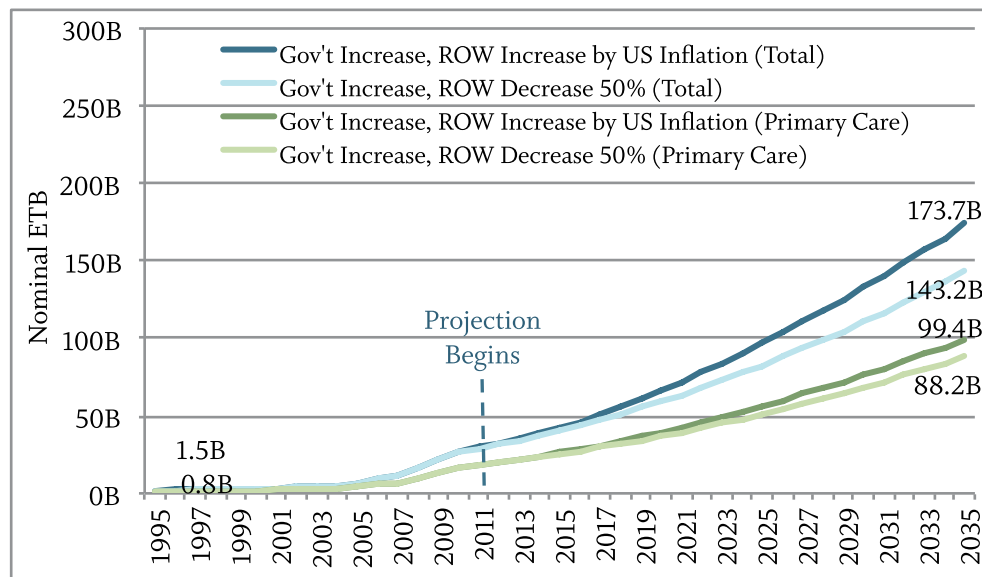
Two scenarios are explored under the historically-based approach projection (see Figure 2.1). Both of these scenarios assume that the government contribution increases to the previous highest point of spending as a percent of general government expenditure (GGE) by 2025, 6.7%[5], and maintains this level of contribution until 2035. Furthermore, both household out-of-pocket (OOP) and other financing sources for health are assumed to increase based on previous trends. See Annex C for details on how projections were conducted. For external resources, we explore two possibilities with the underlying assumption that Ethiopia will continue to grow and develop, and therefore external resources may not continue the same rapid growth as previously experienced[6]. A third option, that external resources continue to expand according to the trend up to 2011, was analyzed but is not presented here. The period up to 2011 was a period of very rapid increase in external funding to health Ethiopia. We do not feel that future increases at that rate of growth are likely. A reduction in external funding has already begun with funding cuts from programs such as the President's Emergency Plan for AIDS Relief (PEPFAR)[7], or a shift of focus on sustainability, like with Global Fund exploring possibilities of government's to increase contributions in procuring drugs currently supplied by this organization.

Under the first scenario, external resources only increase by the average annual US inflation[8]. The second scenario, external resources between 2010-2020 would only increase by US inflation and then would decrease by 50% between 2020-2035 (adjusted for US inflation).

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[5] The previous highest point of GHE as a percent of GGE according to the 5 NHA data points is from 1995/96 at 6.7%.
[6] Some of the recent rapid growth of external resources is partially due to accounting issues in capturing all expenditure data for health from development partners in some of the earlier NHA years. For example, the most recent NHA (2010/11) was able to capture Center for Disease Control (CDC) funding and this increased the external contribution for health by 3 percentage points (going from 47% to 50% of total health expenditure).
[7] Between 2011 and 2012, PEPFAR funding enacted decreased by 12%. The proposed amount for 2013 is 83% from the previous proposed amount in 2012. (Center for Global Health Policy, 2012) A substantial cut in PEPFAR funding within one year for Ethiopia.
[8] This is based on the premise that development partners would increase their contributions to adjust for their own inflation, not Ethiopia's, and thus use US inflation rate as a proxy.

GDP-Based Approach

The GDP-based projections are different from the historical approach because the assumptions for financing sources are based on two GDP growth rates rather than the previous trends in health financing from the five NHAs. The exception to this is external resources, and the assumptions for this financing source are the same as the historically-based projections. Government expenditure was estimated using government health expenditure (GHE) as a percent of GGE (influenced by the GDP growth rate), and both household OOP and other (private and local NGO) are based on the income elasticity for spending on health for each financing source (obtained from Abt Associates (2013) for low income countries). See Annex C for more details on these projections.

Two GDP growth rates are assumed[9]. The medium GDP growth rate is a 16% annual increase, where 10% of the growth is from inflation and 6% is real growth. The high GDP growth rate is 20% annual increase, where the inflation remains the same (at 10%), but the real growth rate is assumed at 10%. Both of these GDP growth assumptions are higher than the historical trend, which assumes an average annual increase of 14%. At the time of model development and writing this report, the 2nd Growth and Transformation Plan (GTP2) was not available. Therefore, the economic growth projections estimated for GTP2 could not be aligned in this modeling - something that could be done in the future.

Table 2.2 Average Annual Percent Increase for Health Spending by Financing Source Based on Two Projection Approaches			
	Historically-Based	**Medium GDP (16%)**	**High GDP (20%)**
Government	11%	17%	21%
Household OOP *(GDP-Based - OOP income elasticity: 1.098)*	10%	17%	21%
Other (Private and Local NGOs) *(GDP-Based - Other income elasticity: 1.26)*	5%	31%	35%

Table 2.2 highlights the difference in average annual growth rates under the two different projection approaches. Overall, the GDP-based approaches assume a much higher annual increase in government, household and other private spending on health[10]. Thus, the GDP-based projections estimate substantially more resources being mobilized for health compared to the historical based projection.

Under the GDP-based approach, we assume a slight declining trend of GGE as a percent of GDP. Historically, GGE as a percent of GDP experienced an increase between 1995-2000 and then began a steady decline until 2010/11. Since there is no indication that fiscal policies will change, especially around avoiding large tax increases in order to promote economic growth, our assumption is that this slight decline would continue until 2035 (Figure 2.2). Therefore, the projections for GGE as a percent of GDP is assumed to have a slight decline from just under 18% to about 14% by 2035. With the GDP-based projection approach assuming a higher GDP growth rate compounded over time, leads to a 2 to 4 times higher absolute GGE by 2035 (Figure 2.3) compared to the historically-based approach, and ultimately a significantly higher GHE.

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[9] These two growth rates were provided during a consultation with the World Bank.
[10] External resources were not included in this comparison since the projected amounts are the same for the historical and GDP-based projections.

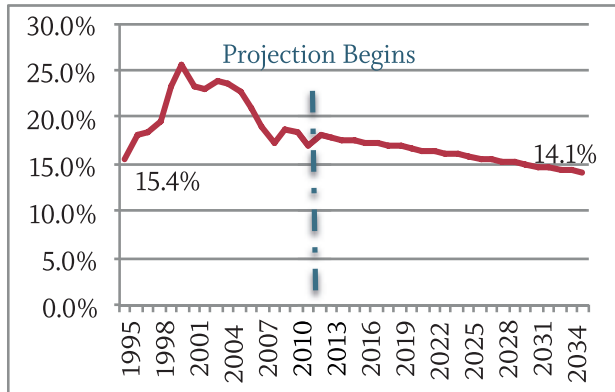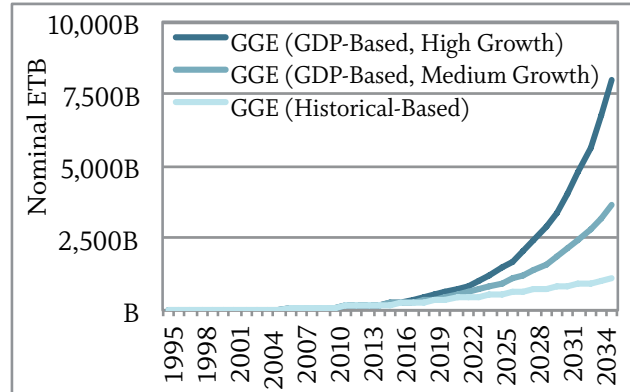**Figure 2.2 Historical Trend Projection of GGE as a Percent of GDP**

Figure 2.3 Effects of Projection Approaches on GGE (Nominal ETB), in Billions (B)

Figures 2.4 and 2.5 showcase the two GDP growth rate projections and scenarios, where there is very little difference on whether external resources increase by US inflation or decrease by 50% from 2020-2035. This is because the very optimistic assumptions about GDP increase and government spending increase more than compensate for the estimated slowdown or decline in external funding.

Figure 2.4 Examples of Key Resource Mobilization Scenarios Using the Medium GDP-Based Approach (Total & Primary Care), in Billions (B)
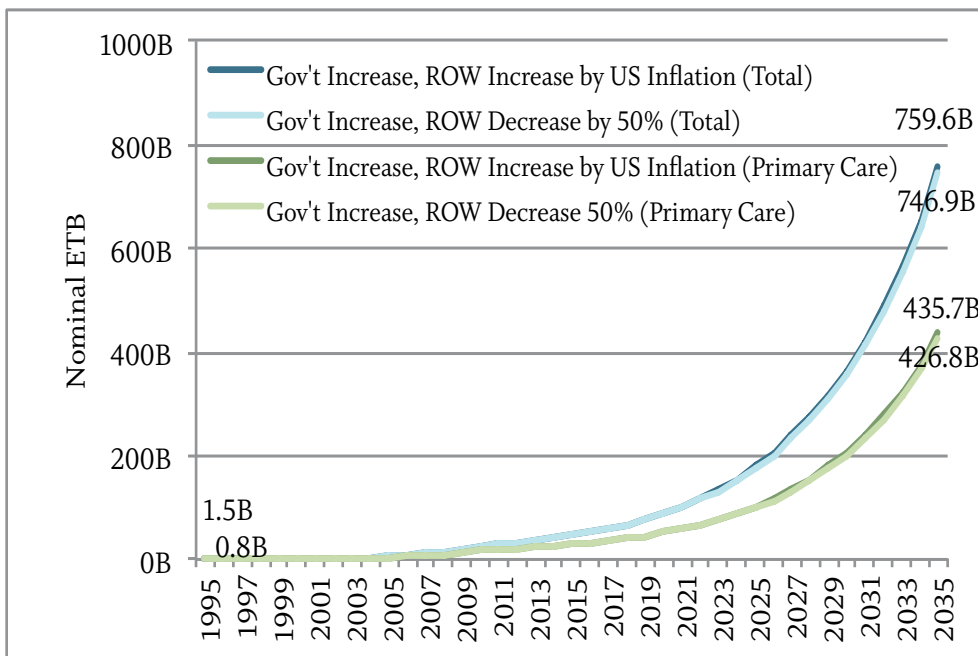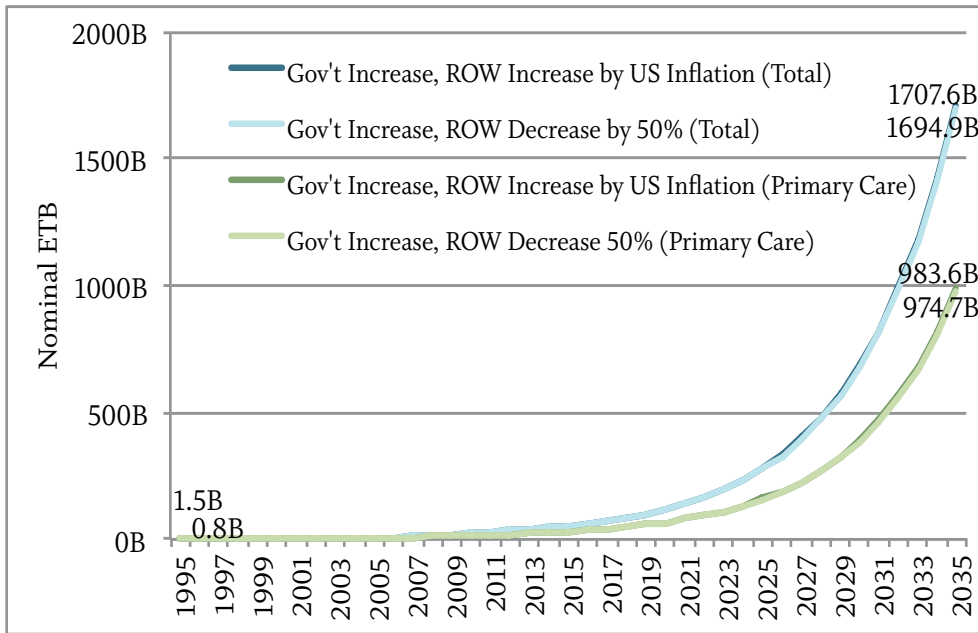
Figure 2.5 Examples of Key Resource Mobilization Scenarios Using the High GDP - Based Approach (Total & Primary Care), in Billions (B)

3 Primary Care Cost Projections

Primary care cost here refers to the estimated future expenditures needed to deliver the primary care services. To forecast the actual primary care costs we use a cost-function approach. This approach consists of two steps: 1) identify a regression model to predict the cost of providing public primary care services at woreda level and 2) use the model to get projections based on changes in parameters (health coverage, socioeconomic status, demographic changes, scope of services, and inflation) forecasted over 20 years. Due to data limitations, the forecasted primary care costs does not include some economic changes, a quality parameter, some capital expenditures or recent regional level spending specifically for health facilities not captured in 2011 expenditure data[11]. See Annex D for further details on this approach.

There are two opportunities to compare our cost-function estimates of primary care with other recent government costing exercises. First, in 2005, an Essential Health Services Package (EHSP) was developed by the FMOH to represent promotive, preventive and curative health services to be provided through primary care at the community (health post) level, health centers and district hospitals (FMOH, 2005). According to FMOH (2005), the annual per capita amount for the EHSP between 2005-2015 was estimated at US$21.01 or ETB 195 (using the 2005 exchange rate[12], and adjusted for inflation). We compare this cost (multiplied by population estimates from CSA (2013)) with the primary care cost estimates from the cost-function approach (HEPCAPS).

Figure 3.1 Comparing HEPCAPS and EHSP 2005 Costs, in Billions (B)
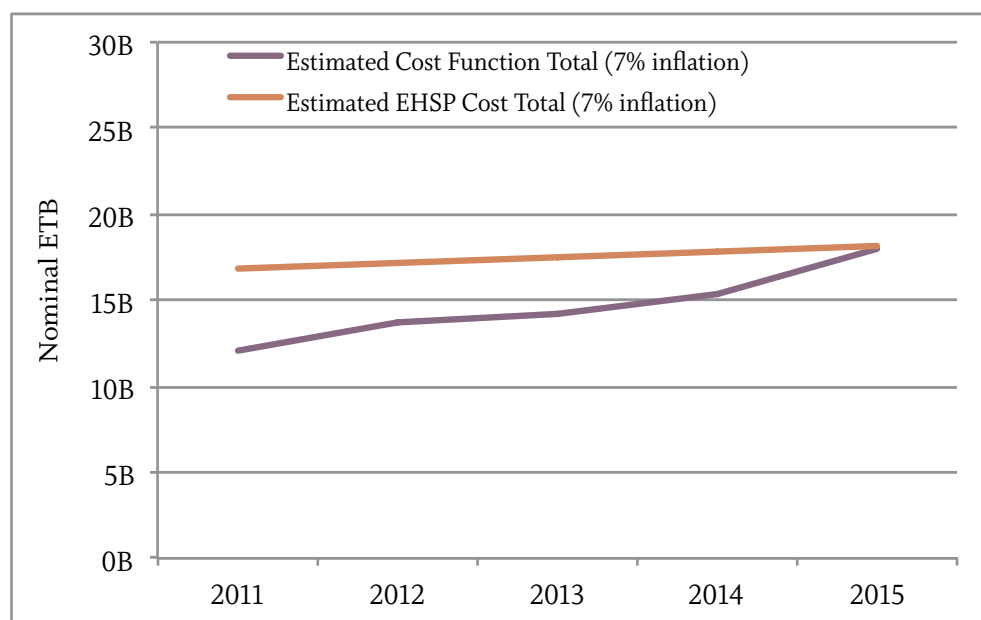
Referring to Figure 3.1, the estimated EHSP costs for primary care services is slightly higher than the our primary care estimates using the cost-function approach with the average difference over five years equaling 18%. By 2015, the HEPCAPS primary care costs converge with the EHSP costs estimates. We expect the EHSP estimates to be higher given they were based on normative service cost estimates for a standard set of services to be provided, while the HEPCAPS estimates are based on expenditures for actual service provision at health facilities, which may not always deliver the complete package of services.

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[11] In some instances, regions used their own treasury funds to provide additional financial resources directly to health centers. Unique cases, such as this, are not captured in the primary care cost model and this is a caveat within this projection leading the model to underestimate such costs.
[12] Assume that 2005 exchange rate was used to convert financial data into US dollars since it did not specify, and needed to convert to birr to compare with the cost estimates from the cost-function approach. Official exchange rate was obtained from World Bank (2015).

Figure 3.2 Comparing HEPCAPS and HSTP Primary Care Costs, in Billions (B)
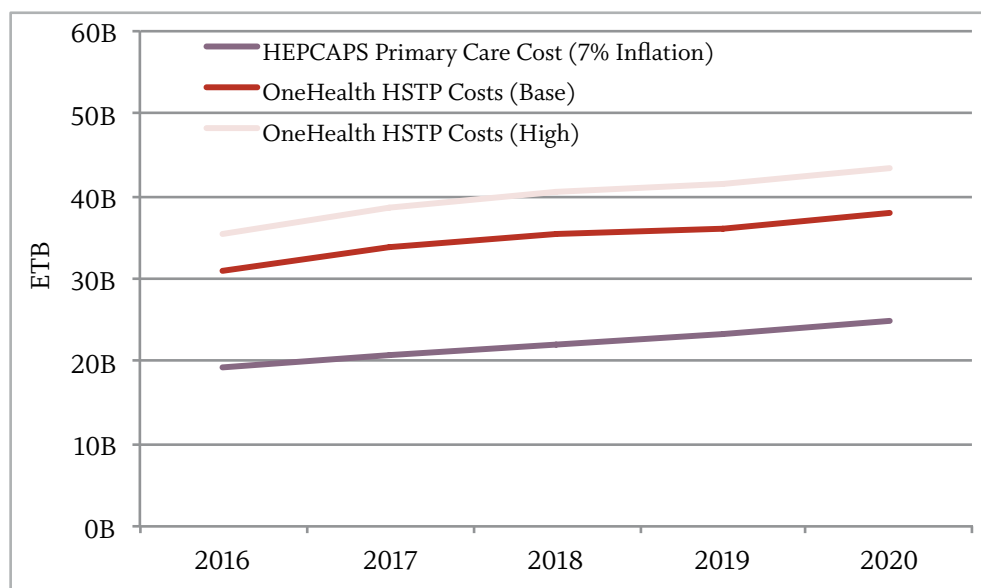
A second opportunity for assessing the plausibility of our cost-function estimates is by comparing the estimated primary care cost, using the cost-function approach, with the draft Health Sector Transformation Plan (HSTP) costs for primary care[13]. This is more relevant, since the HSTP estimates costs prospectively through 2020. The average annual difference between the base case scenario for HSTP and our cost estimates for primary care is 12.35 billion birr or 35.6% (Figure 3.2). Similar to EHSP, we expect the HSTP cost estimates to be higher given that it is based on the standards to provide primary care (normative costing), while our estimates attempt to capture the actual costs of providing primary care services.

The three cost approaches presented (EHSP, HSTP, and HEPCAPS) are either an overestimate or underestimate of the resource need to delivering primary care services. Both the EHSP and the HSTP cost estimates are potentially overestimates of the resource need since they are based on standards to provide primary care or 'normative costing' exercises. The HEPCAPS costing is an underestimate of the resources needed due to limited inclusion of capital investments, future changes in services offered among primary care facilities to meet changes in health needs, and future improvements that may be made in quality of services provided.

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[13] The OneHealth Tool was used to estimate the costs for HSTP. This draft document states that 36% of the estimated HSTP costs goes to the PHCUs and 16% to federal, regional, and woreda level activities (of which 50% is assumed to go to primary care level activities). Therefore, primary care costs accounts for only 44% of the total HSTP costs, with the remainder going to secondary and tertiary level activities.

4 Comparing Different Scenarios of Financing for Primary Care with Estimates of Resource Need

This section reviews six public sector primary care financing scenarios: two under each of the three different resource mobilization projection approaches. These scenarios draw on the different financing source assumptions as outlined in Table 3.1, for resources mobilized specifically for primary care. These scenarios are then compared to the forecasted primary care costs until 2035 to identify any potential future financing gaps. Household OOP spending was included based on retained revenue that was collected and utilized by the primary care facilities.[14] Other private financing sources, such as NGOs, were not included in the estimates of resources mobilized for primary care because the cost side of the model was unable to include them.

The financing scenarios are listed in Table 4.1.

Table 4.1 Financing Scenarios for Projection Model		
Historically-Based Trends	**Medium GDP Growth**	**High GDP Growth**
Scenario 1: Gov't Increase, External Increase by US Inflation	**Scenario 3**: Gov't Increase, External Increase by US Inflation	**Scenario 5**: Gov't Increase, External Increase by US Inflation
Scenario 2: Gov't Increase, External Increase by US inflation till 2020, Decrease by 50% from 2020-2035 (adjusted for US Inflation)	**Scenario 4**: Gov't Increase, External Increase by US inflation till 2020, Decrease by 50% from 2020-2035 (adjusted for US Inflation)	**Scenario 6**: Gov't Increase, External Increase by US inflation till 2020, Decrease by 50% from 2020-2035 (adjusted for US Inflation)

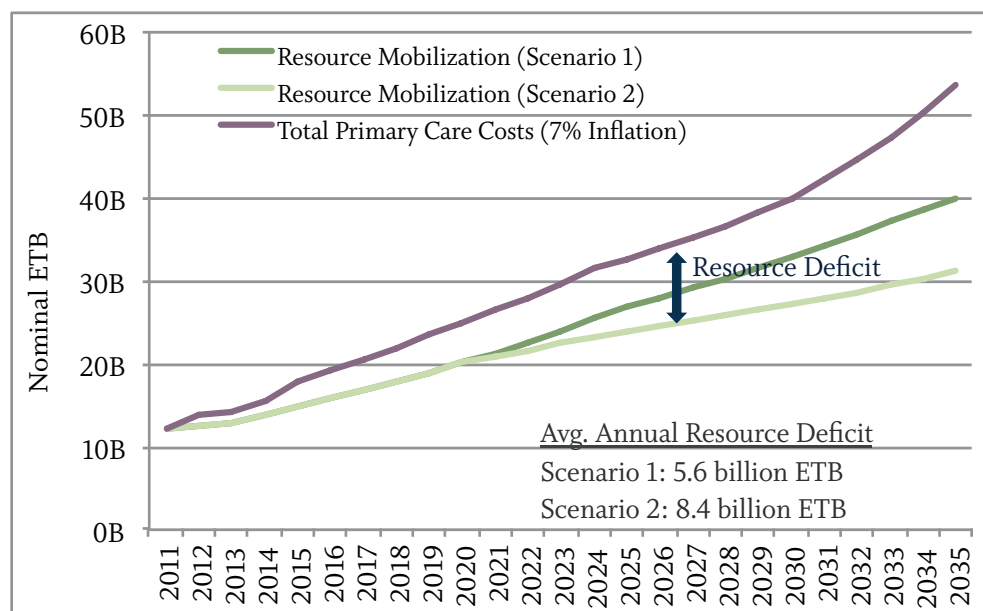**Figure 4.1 Historically-Based Scenarios (2016-2020), in Billions (B)**
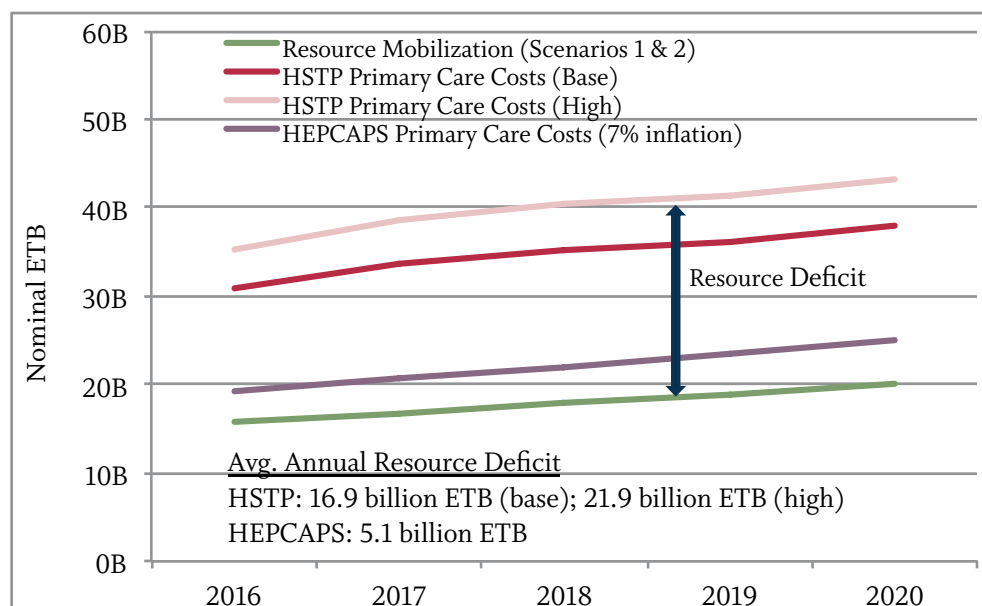
14 Resource mobilization projections only include the average retained revenue collected for household contributions and the primary care cost projections only include the retained revenue utilized. This means that both sides of the model are excluding other household payments used for primary care services.

The findings of the scenarios listed in Table 4.1 under each approach are illustrated over a 5-year interval (2016-2020)[15] and 20-year interval (2011-2035). For the 5-year interval the HSTP costs (base and high estimates)[16] are included. During this 5-year period the two scenarios for the historical and GDP projections are the same, where external resources would increase by US inflation only. After 2020 is where the scenarios begin to diverge from each other with scenarios 2, 4, and 6 demonstrating a decrease in external resources by 50% from 2020-2035.

As seen in Figure 4.1, over the next 5 years both the HSTP and HEPCAPS cost estimates are not fully covered by the resource mobilization scenarios 1 and 2 under the historically-based projection. According to the HSTP cost for the base case scenario, there will be an average annual resource deficit of 16.9 billion birr over the next 5 years. On the other hand, the high case scenario for HSTP will see a resource deficit of 22 billion birr per year, on average. The resource gap using the HEPCAPS cost estimates is just over 5 billion birr, annually[17].

Under the historically-based approach, there will be significant resource deficit under the two different scenarios given the current trajectory for primary care costs (Figure 4.2) when the projections are extended over 20 years.

Figure 4.2 Historically-Based Scenarios (2011-2035), in Billions (B)

Similar to the historically-based projection, the medium GDP growth projection will also show significant resource deficit over the next 5 years (Figure 4.3). According to the HSTP cost for the base case scenario, there will be an average annual resource deficit of 15.1 billion birr over the next 5 years. On the other hand, the high case scenario for HSTP will see a resource deficit of 20 billion birr per year, on average. The resource gap using the HEPCAPS cost estimates is 3 billion birr.

However, when the GDP-based scenarios are extended to 2035, the compounded increase in government funding erases the deficit in later years. For the medium GDP-based approach, there is a resource deficit from 2011-2020 and then a resource surplus after 2022 (for scenario 3) and after 2024 (for scenario 4).

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[15] These years are aligned with the HSTP, which is for 2015/16-2019/20. Here 2016 is for the year 2015/16 and 2020 is for the year 2019/20 in order to keep the dates consistent with the 20-year projection interval.

[16] HSTP costs data is presented in US dollars and therefore converted using the current exchange rate of 1 USD = 20.13 ETB.

[17] In 2011, the GHE was 4.13 billion birr, therefore the HEPCAPS average resource deficit is almost equal to the most recent estimates of Ethiopia's GHE, while the resource deficits under HSTP is almost equal to Ethiopia's total health expenditure in 2011 (16.96 billion birr) for the base case and more than for the high case scenario.

Figure 4.3 GDP-Based Scenarios, Medium Growth (2016-2020), in Billions (B)
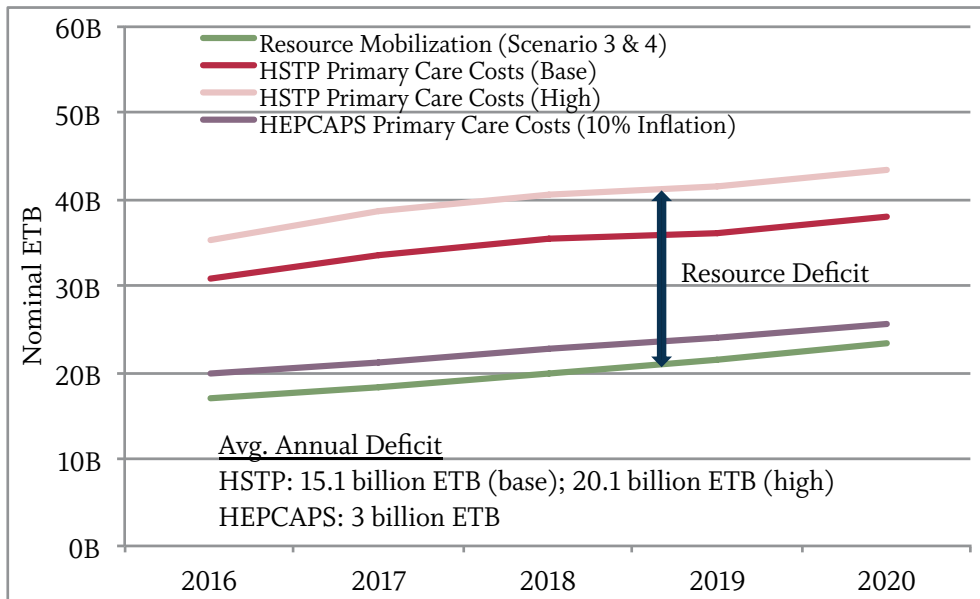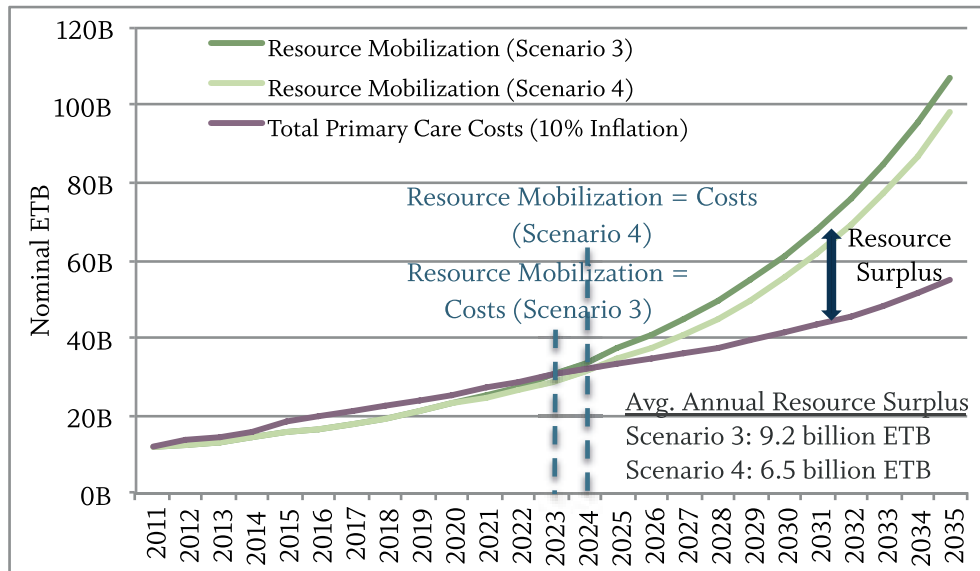

Figure 4.4 GDP-Based Scenarios, Medium Growth (2011-2035), in BIllions (B)

Over the next 5 years resource mobilization scenarios under the high GDP growth projection (Figure 4.5) will equal HEPCAPS cost by 2019 and HSTP base case cost by 2020. Nevertheless, the average annual resource deficit for the HSTP base case cost is 13 billion birr, while the HSTP high case scenario is 18 billion birr. Looking at the HEPCAPS cost, the annual resource deficit is just over 800 million birr on average.

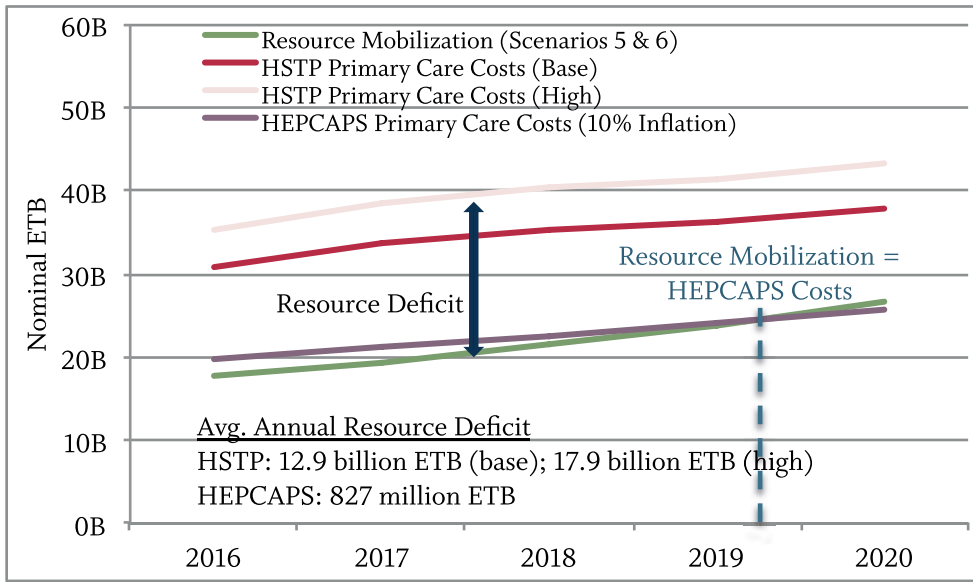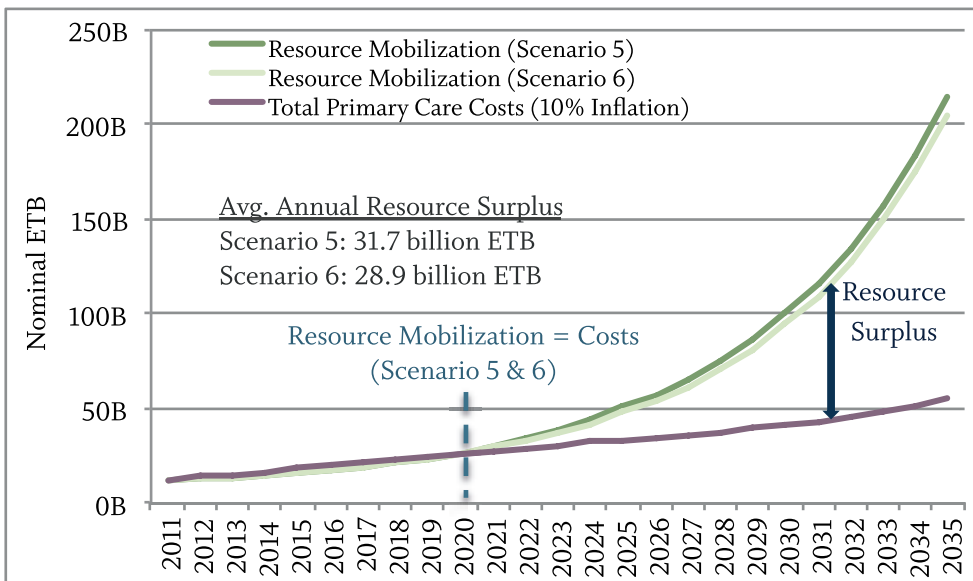**Figure 4.5 GDP-Based Scenarios, High Growth (2011-2020), in Billions (B)**

Figure 4.6 GDP-Based Scenarios, High Growth (2011-2035), in Billions (B)

Under the high GDP-based projection, the increase in government funding is larger and occurs sooner. As shown in Figures 4.5 and 4.6, a small resource deficit occurs from 2011 until around 2020. After 2020 there will be a resource surplus.

5 Comparing Estimates of Overall Health Care Financing to LIC, LMIC and UMIC Benchmarks

This section considers how the per capita resources mobilized for the whole health sector by 2025 and 2035 (milestone years for Ethiopia expected to reach low-middle and upper-middle income country status, respectively), in PPP terms (2005 international dollars) compares to benchmarks based on low-income country (LIC), lower-middle income country (LMIC), and upper-middle income country (UMIC) averages[17] along with other key African countries.

Table 5.1 Benchmarking Figures for Per Capita Spending on Health	
Country	Per Capita Health Spending in 2010 (PPP, international $ 2011)
LIC	81.99
LMIC	189.27
UMIC	631.94
Rwanda	138.55
Ghana	160.37

Source: World Bank (2015)

Under all of the different scenarios, Ethiopia would reach LMIC per capita level spending on health (PPP) by 2025 (refer to Figure 5.1). However, only under the GDP-based scenarios will Ethiopia reach UMIC per capita health spending (PPP) by 2035. This is based on quite optimistic annual GDP growth scenarios for the next 20-years. By 2025 and 2035, Ethiopia will surpass Rwanda and Ghana's 2010 per capita spending on health.

Figure 5.1 Resource Mobilization Projections at 2025 and 2035

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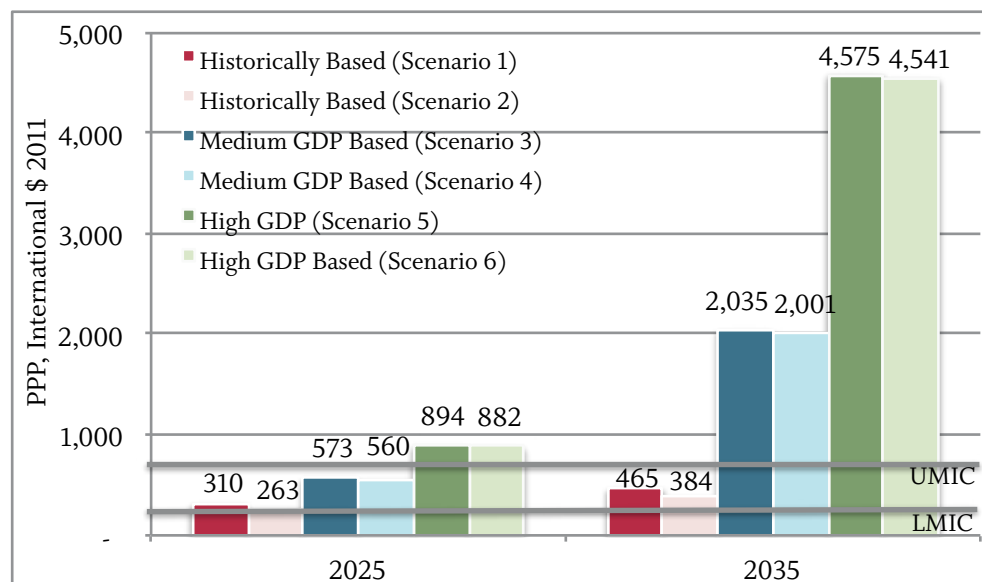
[17] LIC, LMIC, and UMIC total health per capita spending in PPP and percent of GDP were obtained from the World Bank database known as the World Development Indicators Data Bank (World Bank, 2014a).

6 Conclusions

Overall, our projections indicate that the government needs to increase its level of spending in order to finance its current primary health care goals under realistic scenarios for primary care development and slowdown or decline in external resources. The historically-based projection scenarios are not enough to cover the costs of the current primary care system over time, with a significant resource gap of more than 15 million birr under the HSTP cost scenarios. High growth of GDP narrows the potential resource gap, but the medium and high growth GDP assumptions are optimistic for the next 20 years and even under these growth assumptions a resource gap will remain until about 2020 at the earliest.

Ethiopia has ambitious plans to advance to lower and upper middle-income status during its next 20-year growth and transformation period. Our modeling suggests that with the right policies, Ethiopia can match levels of spending at least comparable to today's lower middle-income countries during this time. With consistently rapid GDP growth over the next 20 years, Ethiopia may achieve upper-middle income country health spending. This would result in much more resources devoted to primary care in Ethiopia, which would likely significantly improve the health conditions of its people and advance its efforts to achieve universal health coverage based on a primary care approach.

The findings from this health finance projection model are meant to provide the FMOH evidence for improved decision-making for health financing and to facilitate financial preparedness for possible changes in resource availability and resource need for primary care. This exercise was proposed to help the FMOH better plan the financing for its 20-year Vision for primary care ("Visioning Ethiopia's Path Towards Universal Health Coverage Through Primary Health Care"). A few important elements missing from this work is the inclusion of a quality parameter on the primary care costs and the effects that community based health insurance and social health insurance (once implemented) will have on the resource mobilization and costs (via increase in demand in health care services). Nonetheless, evidence from this type of analysis could improve the FMOH's advocacy power in order to increase domestic resources for health and for primary care more specifically.

Potential Future Work

1. This modeling work can benefit from the use of improved data, and should incorporate the primary care costs that are part of a primary health care costing study soon to be completed.

2. Another NHA round will be implemented soon and the historical based projection approach will benefit from more recent estimates of health finance expenditures by financing source.

3. Certain aspects of the cost estimates have not been included but may have implications on primary care financing – especially once social health insurance is implemented. Understanding the potential financial outcomes and associated costs of improving quality, equity, and implementing certain schemes such as health insurance is needed.

4. FMOH will benefit from improving its analytical capacity around health financing, especially understanding the short and long-term financial implications of policies, strategies, and programs before implementation. Providing training for key staff at FMOH to conduct such a modeling exercise could facilitate this need.

The projections reported are only a subset of many other projections that could result from applying different assumptions as well improving the underlying data used in the model. We hope to enable the FMOH to use the approaches described here to project and assess different scenarios of future primary care financing through an iterative and interactive approach.

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Annex A: Conceptual Framework for the HEPCAPS Health Care Finance Projection Model

The conceptual framework illustrates how the health finance projection model was developed given historical and potential future trends. Overall, this framework is composed of the resources available (resource mobilization) for health – disaggregated by primary care and non-primary care[1] – and primary care costs. Figure A.1 illustrates the conceptual framework for the past and current periods. For the current and past periods of health financing we assume that past resources mobilized for primary care equal the costs of primary care since actual expenditure was fully utilized to provide the services actually delivered.

Figure A.1 Conceptual Framework, Current and Past Periods
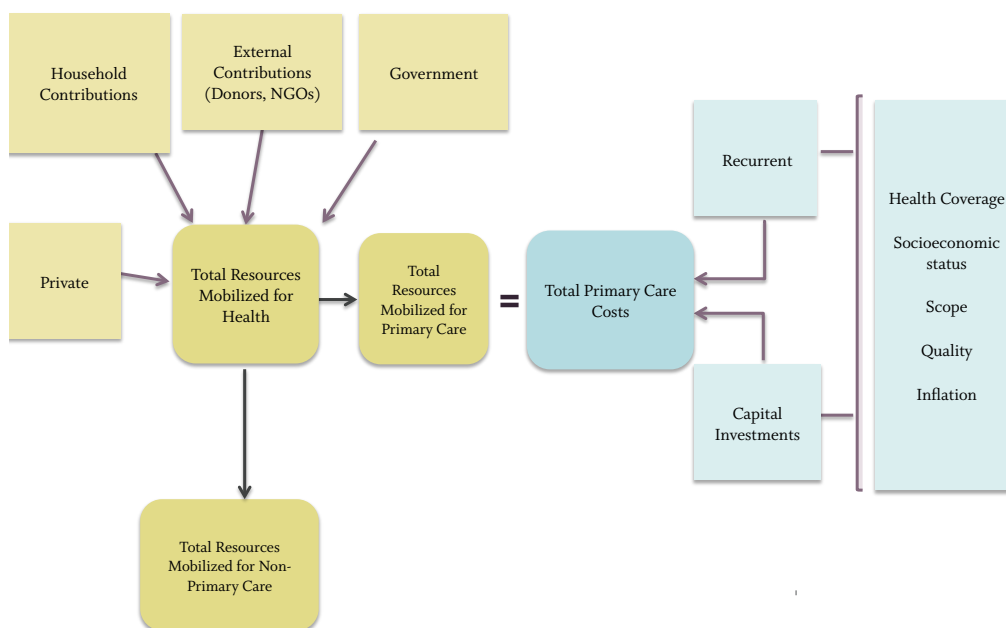
The left-hand side of the framework demonstrates the financing sources that contribute to the total resources mobilized for health, and specifically those mobilized for primary care. The right-hand side of the framework consists of primary care costs that incorporate recurrent and capital expenditures including the effects of changes for coverage, scope in services, and improved quality.

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[1] "Non-primary care" consists of secondary and tertiary levels of care. When combining resources mobilized with costs, these levels of care were not included given that this modeling work is based on the FMOH's 20-year Vision for Primary Care Towards Universal Health Coverage.

Figure A.2 Conceptual Framework, Projections for the Future
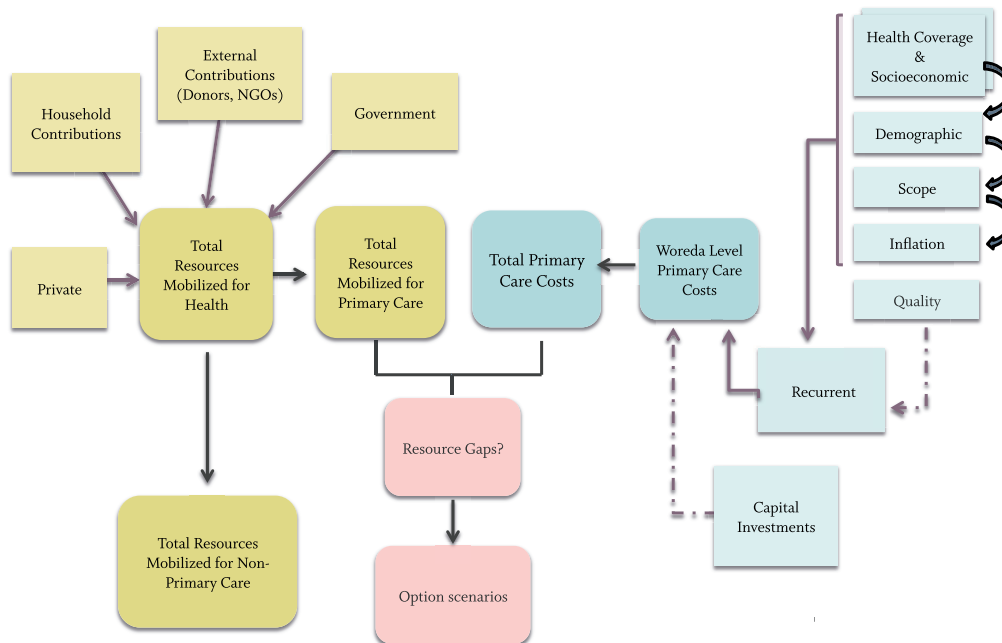
The future projections of resources mobilization and total costs for primary care are based on a slightly different conceptual framework (Figure A.2). The left-hand side of the second framework consists of the same financing sources and allocation for primary care and non-primary care as in Figure A.1. However, the future projection scenarios for resources mobilization may not equal the projections of primary care costs as these are now estimated separately based on different parameters. It is the size and direction of potential differences between resources available and the costs of services intended to be provided that is our topic of interest, especially when resource mobilization projections may be less than resources desired to support services.

For the future primary care cost projections, the right-hand side of the second framework consists of key parameters for recurrent costs. This is slightly different due to limitations in data (discussed in more detail in Annex D). For example, we have not yet been able to incorporate explicitly quality improvement. For capital investment we have only estimated the addition of new primary hospitals and any capital investments provided from external resources. Other health financing programs, such as social health insurance (SHI) and community based health insurance (CBHI) schemes are also not included since they are not fully operational and at this time SHI is not expected to finance primary care. Based on this framework, we estimate the potential resource gap over time under different financing source and economic growth scenarios and assumptions over the next 20 years.

Annex B: Current Health Financing Trends and Estimating Primary Health Care Expenditures

Current Health Financing Trends

As Ethiopia experienced rapid economic growth, the health sector benefited with a substantial increase in health funding. As evidence in Figure B.1, Ethiopia's total health expenditure (THE) as a percent of gross domestic product (GDP) increased over the 15 years despite the drastic increases in GDP – especially after 2005. Ethiopia is just below the average THE as a percent of GDP compared to other low-income countries and more than one percentage point below the average for Sub-Saharan Africa (Table B.1). However, Ethiopia's contribution to health is in between the average percent for low-middle income and upper-middle income countries. As long as Ethiopia could maintain this higher level of spending on health (as a percent of GDP) despite rapid growth, its health sector will greatly benefit.

Figure B.1 Trends in Total Health Expenditure as % of GDP and GDP (nominal ETB), in Billions (B)
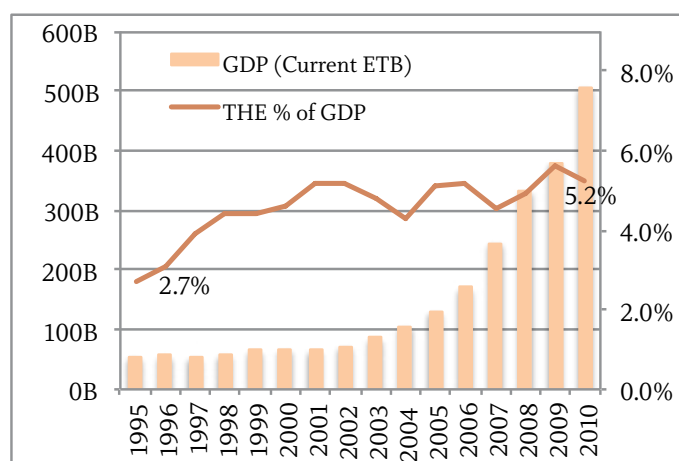
Source: FMOH (1996); FMOH (2003); FMOH (2006); FMOH (2008); FMOH (2014)

Table B.1 Benchmark Indicators of THE as a Percent of GDP

Benchmarks Indicators	THE as % of GDP*
Low Income Countries	5.61
Low-Middle Income Countries	4.35
Upper-Middle Income Countries	6.10
Sub-Saharan Africa	6.39

*An average was taken between 2010 and 2011 for each area given Ethiopia's THE % of GDP is in between years 2010 and 2011

Source: World Bank (2014b)

Although there appears to be a high level of spending based on GDP, per capita spending on health is still quite low in Ethiopia compared to other countries. Ethiopia's 2010/11 health expenditure per capita was just under US$52 per person (PPP) per year in constant 2011 international dollars, below the average spending in low-income countries and substantially below the per capita spending in Rwanda ($139) and Ghana ($161) (Table B.2).

Table B.2 THE Per Capita in PPP (Constant 2011 International $)

	2010	2011	2012	2013
Low Income Countries	78.06	82.46	84.76	92.16
Low-Middle Income Countries	202.61	222.61	232.94	250.00
Upper-Middle Income Countries	643.50	692.05	768.65	829.82
Sub-Saharan Africa	176.04	183.20	185.81	199.68
Rwanda	138.55	147.99	157.79	161.76
Ghana	160.36	165.65	195.25	214.25
Ethiopia	51.53	60.18	60.69	68.53

Source: World Bank (2015)

Most of the increase in health spending for Ethiopia was driven by a rapid increase in external funding. Between 1995/96 and 2010/11, the Government of Ethiopia's (GoE's) spending on health has declined as a percentage of the General Government Expenditure (GGE), dipping down from 6.7% in 1995/96 to 4.4% in 2010/11 (Figure B.2 (a)). Referring to Figure B.2 (b), it is clear that despite the rapid growth in GDP, GGE has not increased at the same pace from 15.4% of GDP in 1995/96 to only 18.6% in 2010/11. This may reflect a broad government policy not to increase the public sector at the expense of private sector growth. However, constrained growth in GGE over time implies that in order to increase its own contributions to health the Government would have to shift funding from other sectors or rely more on other sources of funds.

Figure B.2 Historical Trends in GDP, General Government Expenditure, and Government Health Expenditure (Nominal ETB), in Billions (B)
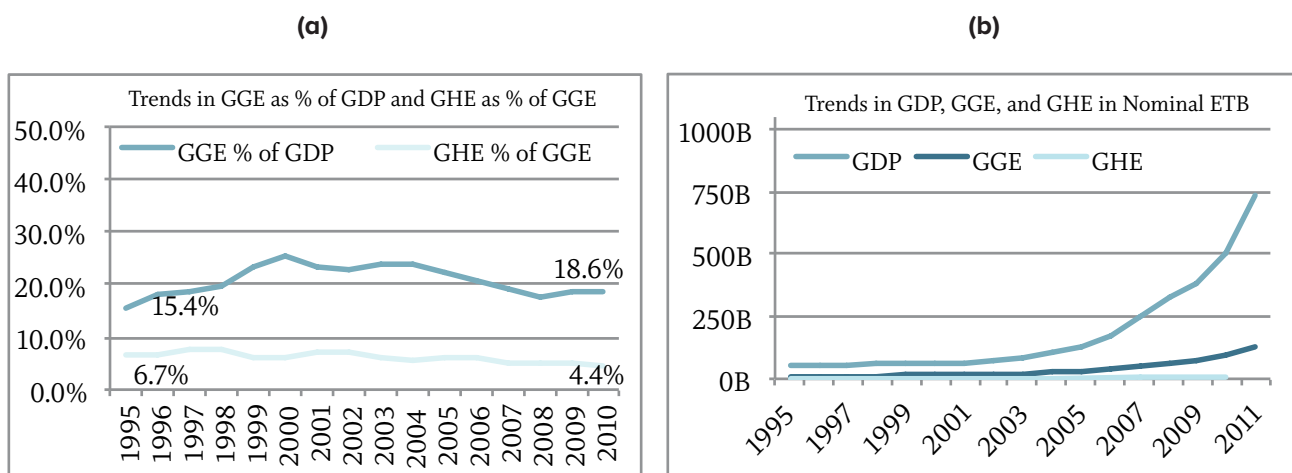

Source: Adapted from FMOH (1996), FMOH (2003), FMOH (2006), FMOH (2008), FMOH (2014); MOFED (2015)

No universal standards exist for the optimal amount of funding for each sector given GGE levels; meaning resource allocation is based on the discretion of the Government according to priority setting and resource need across sectors. Health may also benefit from other sectors' expenditures such as roads, electricity, and water, by positively influencing health facilities' abilities to provide quality services, and thus health outcomes. For example, investments in infrastructure could increase accessibility to health facilities where access to health care services, among other factors, was found to be a significant factor in reducing maternal mortality rate (Bulatao & Ross, 2003) and child mortality (Fay, Leipziger, Wodon, & Yepes, 2005).

Concurrently with increases in external financing (Figure B.3), the absolute amount of government funds going to the health sector has not increased at the same rate as the increase in GGE, and therefore government health expenditure (GHE) as a percent of GGE has been a declining trend according to the last 5 NHAs. This trend may need to be reconsidered taking into account potential changes in the flow of external funds. Domestic spending on health constitutes only 15% of the THE according to the latest NHA in 2010/11, while external resources and household out-of-pocket (OOP) contributions make up more than 70% of the THE (Figure B.4).

Figure B.3 Last 15 Years of Health Financing by Source in Billions (B)
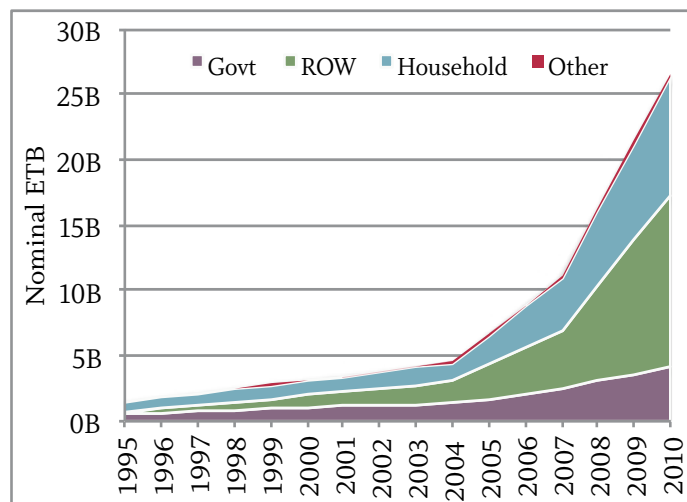
Source: FMOH (1996); FMOH (2003); FMOH (2006); FMOH (2008); FMOH (2014)

Figure B.4 THE by Finance Source in 2010/11
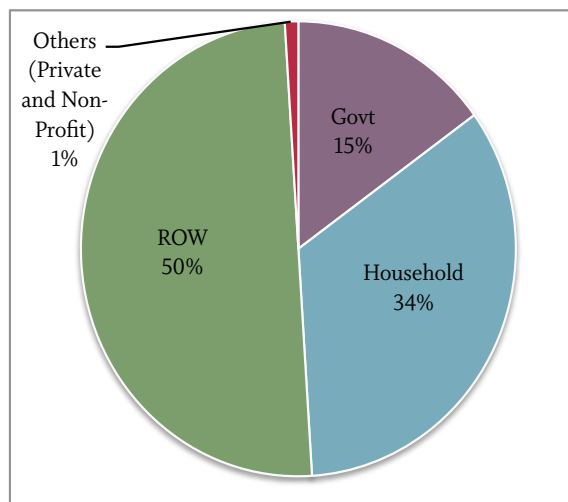
Source: FMOH (2014)

Along with other factors, economic growth has implications for evolving health needs demanded of the health care system. As the nation makes its economic transition from low-income to low-middle and upper-middle income status[2], new health challenges arise from an aging population, a double burden of communicable and non-communicable diseases, and increased health service utilization following development and the introduction of insurance schemes (WHO, 2014 and FMOH, 2013). A sustainable financing strategy, balancing various needs and priorities, will be critical if Ethiopia is to provide primary care services appropriate to its changing external funding landscape and anticipated economic and epidemiologic changes.

Estimate Shares of Primary Health Care in THE Based on NHA

The 5th National Health Accounts (NHA) in 2010/11 provides the most comprehensive information on flow of funds from health financing sources to health providers out of Ethiopia's 5 NHAs. NHA 5 was therefore used to identify the primary care and non-primary care (secondary and tertiary health care) allocations for the projection model.

We applied and augmented the FMOH's definition of primary care. This consists of: 1) care offered by health care providers located at the woreda (district) level or below, within the primary health care unit[3] (PHCU), including promotive, preventative, or basic outpatient curative care services; 2) some primary care services offered at secondary and tertiary levels of care; and 3) a share of administration costs at federal, regional, and woreda levels. Little documentation and data exists on the percent allocation for primary care services offered at higher levels of care and administration costs in Ethiopia. Therefore, the allocations of expenditures for primary care and non-primary care were based on expert consultations and literature search.

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[2] Under the 2nd Growth and Transformation Plan, it is assumed that Ethiopia will reach low-middle income status by 2025 and middle-income status by 2035.
[3] This includes services offered at the newly expanded primary hospitals as part of the PHCUs.

Table B.3 Primary Care Allocations from the 5th NHA Service Providers

100% allocation
1. Family planning centers
2. Public PHCU (Health Center and Health Posts)
3. Not for profit (NGO) PHCU-Health Centers, clinics and posts
4. Other All other out-patient multi-specialty and co-operative services centers
5. All other out-patient community and other integrated care centers
6. Provision and administration of public health programs
7. Offices of physicians (Private Clinics)
8. Offices of other health practitioners
9. Providers of home health care services
10. Alternative or traditional practitioners
11. Providers of all other ambulatory health care services

50% allocation
1. Public Medical and Diagnostic Laboratories

25% allocation
1. Federal Hospitals
2. Regional/Zonal Hospitals
3. Private for Profit Hospitals
4. Private not- for-profit Hospitals

Allocation varies by financing source based on allocation of all other providers (59%)
1. All other miscellaneous sale and other suppliers of pharmaceuticals and medical goods
2. Government administration of health
3. All other providers of health administration

Table B.3 showcases the health providers that were considered to be completely or partially under primary care. The health providers considered 100% within the primary care system include public PHCUs, family planning centers, and provision and administration of public health programs. Given our definition of primary care[4], partial allocations were given to other health providers – considering that primary care services are offered at higher levels of care. Table B.4 highlights the health providers and percent allocation determined by expert opinion.

Table B.4 Non-Primary Care Allocation from 5th NHA Service Providers

100% allocation
1. Specialty (other than mental health and substance abuse) hospitals
2. Community care facilities for the elderly
3. Providers of home health care services
4. Blood and organ banks
5. Private Pharmacies
6. Public Pharmacies
7. Retail sale and other suppliers of optical glasses and other vision products
8. Retail sale and other suppliers of medical appliances (other than optical goods and hearing aids)
9. Establishments as providers of occupational health care services
10. All other industries as secondary producers of health care
11. Rest of the world
12. Research institutions
13. Education and training institutions
14. Other institutions providing health-related services

50% allocation
1. Public Medical and Diagnostic Laboratories

75% allocation
2. Federal Hospitals
3. Regional/Zonal Hospitals
4. Private for Profit Hospitals
5. Private not-for-profit Hospitals

Allocation varies by financing source based on allocation of all other providers (41%)
1. All other miscellaneous sale and other suppliers of pharmaceuticals and medical goods
2. Government administration of health
3. All other providers of health administration

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[4] Primary care is defined as care offered by health care providers located at the woreda level or below, which includes promotive, preventative, or basic outpatient curative care services; and includes imputed amounts of primary care offered at higher levels of care along with a share of administration costs.

Based on the allocation classifications in 2010/11 it is estimated that 64% of total health expenditures were primary care while the remaining 36% were non-primary care (Figure B.5). Households and ROW contribute a majority of the primary care funds in 2010/11 covering 36% and 54.8%, respectively, of total primary care expenditures. The Government only contributes to only 9% of the total primary care expenditures. Referring to Figure B.5, out of the Government's total health expenditure only 37% goes towards primary care. On the other hand, a majority of the households (68.31%) and external expenditures (70.26%) are for primary care. This illustrates that Ethiopia's primary care system is vulnerable in the future if external resource flows for health are not sustained or the Government does not increase its own spending on health, especially on primary care, with rapid economic growth and the desire to reduce household OOP spending on health[5].

Figure B.5 Health Financing Source by Primary Care and Non-Primary Care, NHA 5 2010/2011
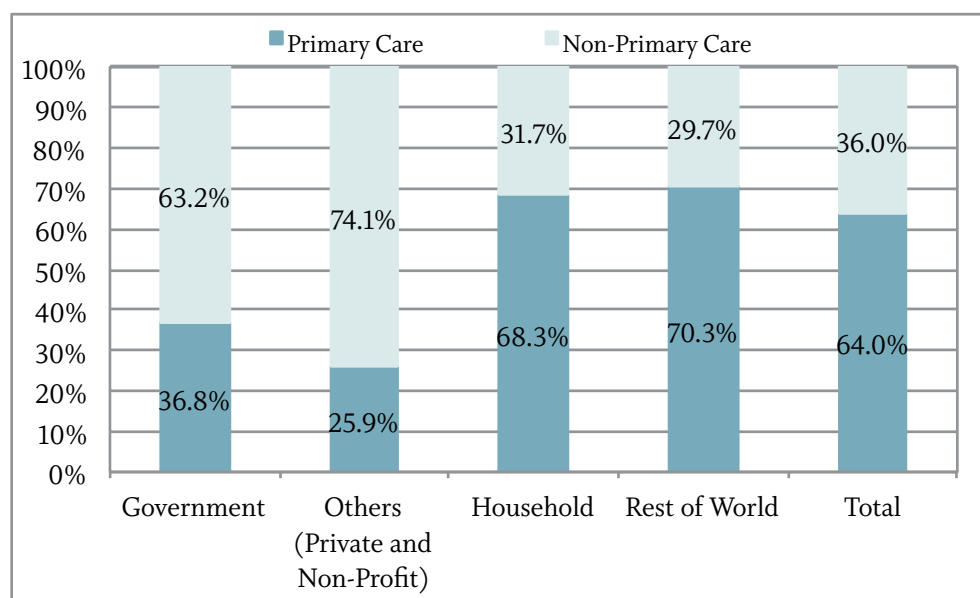
Although the primary care and non-primary allocation is subject to the assumptions used, a further investigation was conducted on whether the imputed amounts for primary care (25% of higher level hospitals providing primary care services and share of health administration costs) have a significant impact on the above calculations. Table B.5 highlights the top 4 service providers for the primary care expenditure allocation. The first three clearly define primary care providers (office of physicians, public PHCUs, and provision and administration public health programs) comprise of 52.02% of the primary care expenditures, while the imputed amount for higher levels of care was only 5.75%. Overall, these 4 groups for primary care account for almost 60% of THE. It is possible that higher levels of care provide less than 25% of primary care services, however reduction in this amount will only cause a miniscule reduction in the primary care allocation. This ratio felt justified as service providers operating over the last 20 years are more likely to have performed primary care services as opposed to secondary and tertiary services, given the nature of the developing health system infrastructure.

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[5] Under the revised Health Care Finance Strategy (still in draft form and not yet approved by Council of Ministers), one of the strategic objectives is to reduce household OOP spending on health at the point of use.

| Table B.5 Breakdown of Top 4 Service Providers Groups for Primary Care Allocation	
Health Service Provider	Percent of Total Health Expenditures
HP.3.1 Offices of physicians (Private Clinics)	10.53%
HP.3.4.5.1 Public PHCU (Health Center and Health Posts)	14.70%
HP.5 Provision and administration of public health programs	26.79%
All hospitals (Except Specialty) (22.98% *0.25)	5.75%
THE Allocated to Primary Care just from these 4 groups	**57.77%**

Furthermore, changing the percent allocation of 4 health providers that had varying allocations (shown in Table B.3 and B.4) provides very little change in expenditures for primary care and by financing source. These providers are as follows:

- Public Medical and Diagnostic Laboratories (HP.3.5.1)
- All other miscellaneous sale and other suppliers of pharmaceuticals and medical goods (HP.4.9)
- Government administration of health (HP.6.1)
- All other providers of health administration (HP.6.9)

The draft Health Sector Transformation Plan (HSTP) 2015-2020 estimates roughly 44% of the total health spending for the next 5 years to be for primary care. This includes an estimated 36% of expenditures for the public PHCUs, and an imputed amount of the 16% of expenditures for federal, regional and district activities (50% going to primary care). It is important to note here that this estimate, unlike our primary care definition and assumptions, is not capturing primary care services being offered at secondary and/or tertiary levels of care. Therefore, we assume that this percent allocation in the expenditures for primary care to be less than our estimates.

Figure B.6 shows the trend in primary care expenditure (resources mobilized) by financing source with the back projection of primary care expenditures using the estimated ratio as shown in Figure B.5.

Figure B.6 Trend in Primary Care Resources Mobilized, in Billions (B)
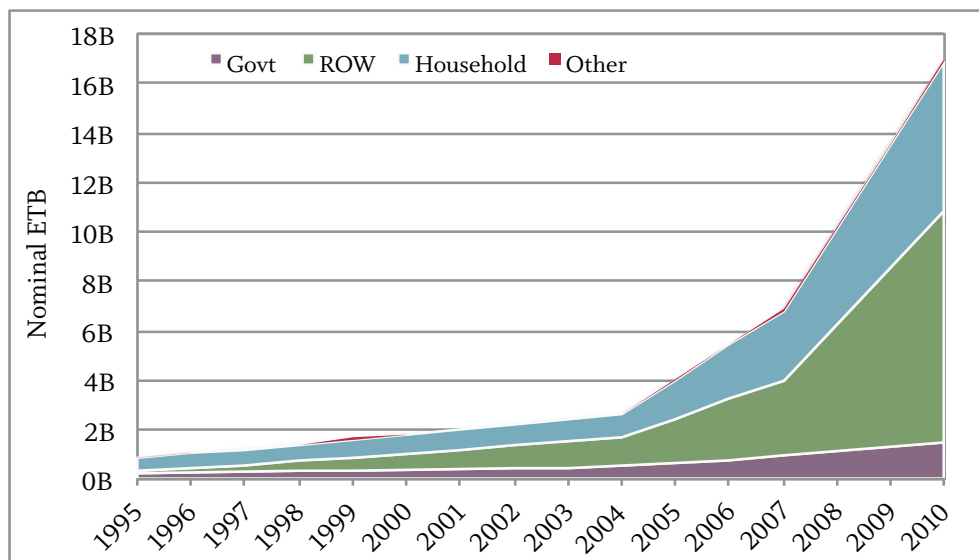
Source: Calculations based on data from FMOH (1996), FMOH (2003), FMOH (2006), FMOH (2008), FMOH (2014)

With the primary care and non-primary care expenditures determined, forecasts of future primary care expenditures are estimated. Annex C provides the technical details on the two projection approaches used to estimate future resources mobilized for health and primary care, and key scenarios under each approach.

Annex C: Estimating Historically-Based and GDP-Based Projections

The health care finance projection model makes scenario-based projections about Ethiopia's resources mobilized by financing sources for primary care. The model draws on two approaches, referred to as the historically-based and the GDP-based projections. When making future projections, assumptions used in different scenarios have major influences on the outcomes. A number of different assumptions were initially used for each financing source and projection approach to explore various scenarios for Ethiopia's health system resource mobilization envelope over the next 20 years. Only a few of the scenarios explored are presented.

Historically-Based Projections

For the historically-based approach, the projections are based on the NHA data (5 NHAs were conducted since 1995) and trends by financing source that occurred over the 15-year time period. This approach does not take into consideration other external factors that may influence financial contributions to the health sector, such as economic growth. This annex reviews the methodology used to forecast each financing source's contribution to health based on the trend from 1995-2011.

Three main assumptions are used for the historically-based projection approach. First, historical resources mobilized are equal to expenditures. Historically, Ethiopia could not spend more resources on health then it was able to mobilize from the various financing sources. This allows us to use the NHA health expenditure data to forecast plausible trends in the future. Second, this forecasting approach is not tied to potential influencing factors for health financing such as GDP growth. Third, the estimated allocations for primary care and non-primary care for each financing source is assumed to remain constant over time. It is possible to change the estimated primary care and non-primary care allocations for each financing source as another potential scenario. This is something that could be done in the future with the facilitation of the FMOH.

Current Historically-Based Trend

Before exploring the two scenarios used in the summary in depth, we look at the current historically-based trend for each financing source – government, household OOP, ROW, and other private – based on the previous 5 NHAs. The current historically-based trend assumes that the previous 15-year trend in financial contributions for health for each funding source would continue over the next 20 years despite changes in economic growth, development status, or other factors that may influence these contributions over time.

For the current trend projection, either a simple linear or polynomial trend is used for each financing source. Table C.1 shows the specific techniques used for the current trend by financing source. Using Excel, a trend line was selected based on the following criteria:
* Goodness of fit (R^2 and Akaike Information Criteria (AIC)[6]);
* Visual inspection;
* Analysis of projected figures in relation to macroeconomic indictors, relative to historic and projected trends (i.e. Government Health Expenditure as % of GGE); and
* Relevance to political and economic context.

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[6] AIC produces a number that is comparable across different models to see which trend line is the best fit based on the different equations. This measurement is not influenced by the additional variable problem, which is the draw back for the R^2 estimate. This estimate is calculated by taking the residual sums of squares (RSS) – the summed difference comparing the predicted values with the observed values – for a defined equation (based on the trend line). An AIC number that is lower than another AIC number means that the equation that produced the lower AIC number is a better fit.

## Table C.1 Current Trend Projection Methods by Financing Source

Government	Trend lines were developed from the 5 historic NHAs (1995-2011). A 2nd order polynomial trend line ($y = 2E+07x^2 - 1E+08x + 9E+08$) was chosen with time as the independent variable. This trend line was chosen based on goodness of fit ($R^2 = 0.9798$ and AIC = 275.77), visual inspection, and relevance to political and economic context. In particular, this model yields steadily decreasing trends for GHE as % of GDP and GHE as % of GGE from 2011-2035, which reflects the current trend in domestic resource allocation for health according to the NHA. This model choice is then justified given the scenario's assumption that current trends will continue.
ROW	Trend lines were developed from the 5 historic NHAs (1995-2011). A 2nd order polynomial trend line ($y = 1E+08x^2 - 1E+09x + 2E+09$) was chosen with time as the independent variable. This trend line was chosen based on goodness of fit ($R^2 = 0.93906$ and AIC = 275.77) and visual inspection. Historically, ROW has increased from less than 1% to less than 3% of GDP between 1995 and 2011. This model predicts ROW as a percent of GDP will remain constant at 2%. This is consistent with the past, and an ambitious current trend estimation of donor giving, especially in light of Ethiopia's growing economy.
Household	Trend lines were developed from the 5 historic NHAs (1995-2011). A 2nd order polynomial trend line ($y = 7E+07x^2 - 7E+08x + 2E+09$) was chosen with time as the independent variable. This trend line was chosen based on goodness of fit ($R^2 = 0.96441$ and AIC = 282.52), visual inspection, and relevance to political and economic context. This trend continues to portray households as a major contributor to Ethiopia's health revenue.
Other Private (for-profit and local NGOs)	Trend lines were developed from the 3 historic NHAs (2004-2011). The first two NHAs were not used due accounting method differences, where the first 2 NHAs did not accurately depict the contributions from this financing source. A linear trend line ($y = 3E+07x + 5E+07$) was chosen with time as the independent variable. This trend line was chosen based on goodness of fit ($R^2 = 0.98817$ and AIC = 97.78), visual inspection, and relevance to political and economic context. This trend demonstrates a continuation of the private, local NGOs, and others as minor contributors to Ethiopia's health revenue.

Figure C.1 Current, Historically-Based Projection for Total Resource Mobilization (1995-2035), in Billions (B)
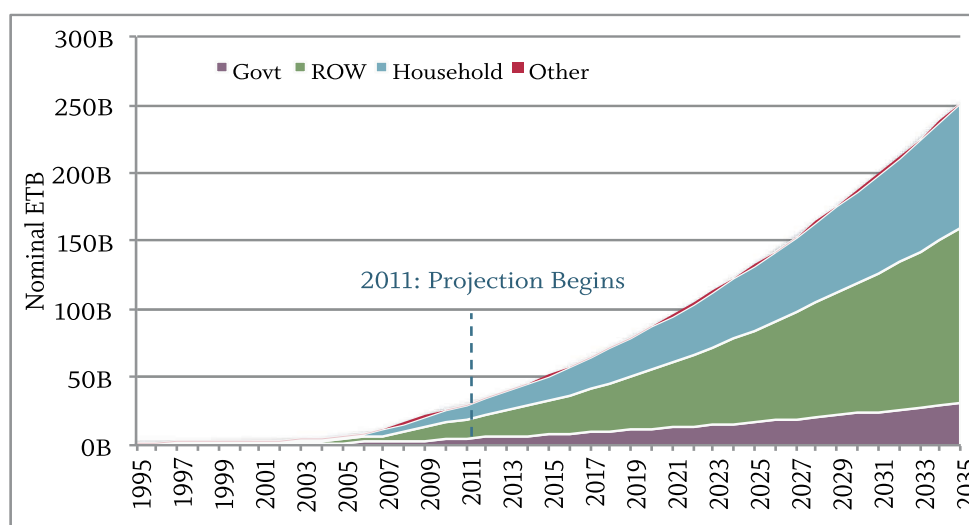
We then apply the percent allocation for primary care for each respective financing source (see Appendix B, Figure B.5) to obtain the current historically-based projection for primary care resource mobilization from 2011-2035.

Figure C.2 shows that external resources and household OOP contributions for primary care dramatically increase in nominal birr over the next 20 years. Government contributions for primary care increase but at a much slower rate, while other private remains to be a very small contributor for resource mobilization for health.

Figure C.2 Current, Historically-Based Projection for Primary Care Resource Mobilization (1995-2035), In Billions (B)
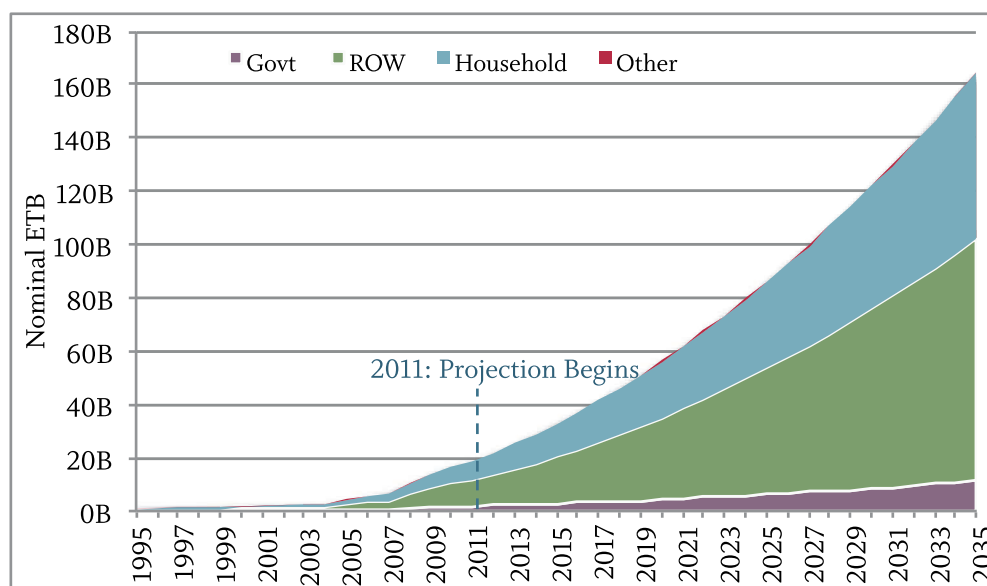
Despite determining the current historically-based trend, this does not take into account other critical factors that determine the level of contributions by financing source. The FMOH is aware of the current health financing situation, where more domestic resources are needed in light of the potential rapid decline in external resources over the next 20 years. Currently, the FMOH is in the process of implementing a number of policies and strategies to reflect the changing external resource landscape, health needs, and demand for quality of care associated with the transition into a middle-income country. These include a revised National Health Policy, a revised Health Care and Financing Strategy, a new 5-year health plan (Health Sector Transformation Plan (HSTP)) where quality and equity are the focus, and the 20-year vision for the primary health care system. All of which are aligned with the second Growth and Transformation Plan (GTP2) that states Ethiopia will reach lower-middle and upper-middle income country status by 2025 and 2035, respectively.

Scenarios 1 and 2

Two other, more likely scenarios are explored for the historically-based projection approach. These scenarios are ones that the FMOH felt were more realistic, and assume an increase in domestic spending as well as a much less optimistic picture on the external resource envelope for health over the next 20 years. Under the two scenarios it is assumed that government contribution gradually increases to the previous highest point of spending as a percent of GGE by 2025, 6.7%[7], and maintains this level of contribution until 2035. Furthermore, both household OOP and other financing sources for health are assumed to increase based on previous trends (current historically-based trend, as shown above). The main difference with the two scenarios explored is based on assumptions around external health contributions.

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[7] The previous highest point of GHE as a percent of GGE according to the 5 NHA data points is from 1995/96 at 6.7%.

For scenario 1, external resource contribution is assumed to remain constant in real terms with annual increase by US inflation only. This is based on the premise that development partners would increase their contributions to adjust for their own inflation, not Ethiopia's, and thus US inflation rate is used as a proxy for this type of adjustment. The average US inflation rate was taken from 2010-2019 based on International Monetary Fund (IMF) estimates and projections (IMF, 2014). This amounts to an average inflation rate of 1.83% for the US. However, this assumption is still relatively optimistic in the sense that it does not foresee any real reduction in external contribution, based on the 2010/11 figures, which accounts for 50% of total health expenditure. Figure C.3 illustrates the projection under scenario 1 by financing source.

Figure C.3 Scenario 1, Total Resources Mobilized (1995-2035), in Billions (B)
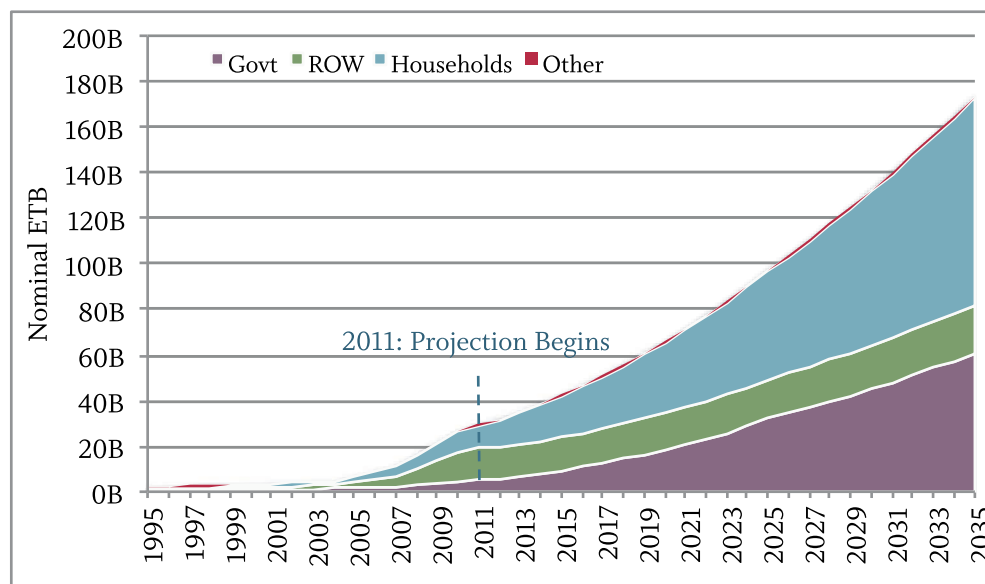

Unlike the current historically-based trend projection, this scenario clearly shows a more rapid increase in government health contributions, while external resources remain relatively constant in nominal birr. However, household OOP spending on health is still to increase considerably. The Government is currently trying to put strategies in place that will potentially avoid this from happening but would ultimately require the Government to mobilize even more resources over time.

Referring to Figure C.4, scenario 1 shows a slightly different picture for primary care resource mobilization. Here, the Government is contributing less to the total primary care contributions, while households contribute even more than when looking at the total resource envelope for health. This demonstrates that a shift in how the Government spends its resource for health (non-primary care vs primary care) would also have to occur an not just focus on mobilizing more domestic resource for health overall.

Under scenario 1, external contributions are assumed to remain constant in real terms based on the 2010/11 estimates. However, a reduction in external funding has already begun with considerable funding cuts from programs such as the President's Emergency Plan for AIDS Relief (PEPFAR)[8], or a shift of focus on sustainability, like with Global Fund exploring possibilities of government's to increase contributions in procuring drugs currently supplied by this organization. Therefore, under the second scenario (Figure C.5) external resources between 2011-2020 would only increase by US inflation (HSTP assumes constant external contribution from 2015-2020) and then would decrease by 50% between 2020-2035 (adjusted for US inflation). Household and government contributions compensate for the declining trend in external resources for health.

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[8] Between 2011 and 2012, PEPFAR funding enacted decreased by 12%. Furthermore, the proposed amount for 2013 is 83% from the previous proposed amount in 2012. (Center for Global Health Policy, 2012) A very drastic cut in PEPFAR funding within one year for Ethiopia.

Figure C.4 Scenario 1, Primary Care Resources Mobilized (1995-2035), in Billions (B)
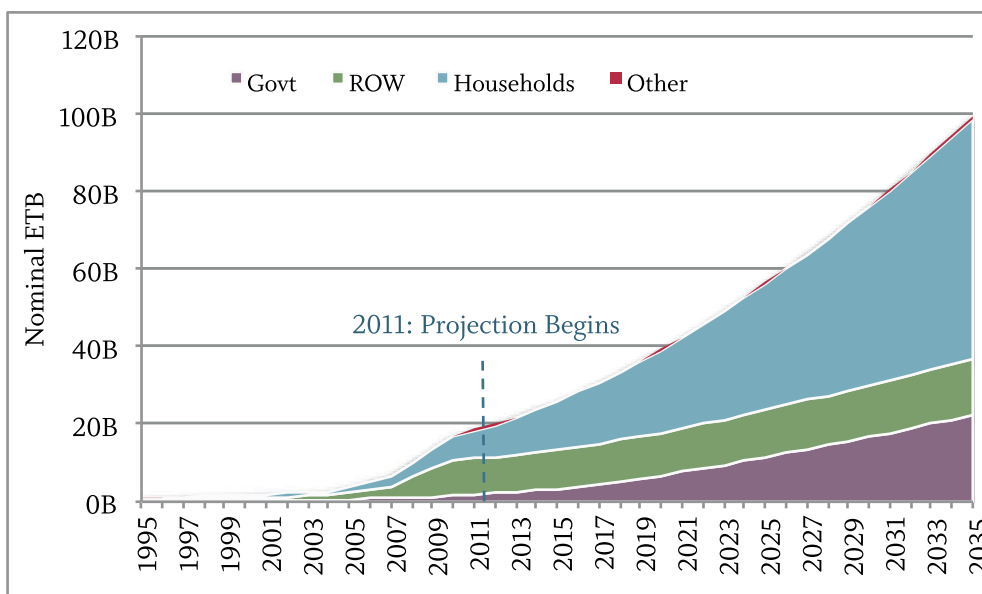
Figure C.5 Scenario 2, Total Resources Mobilized (1995-2035), in Billions (B)
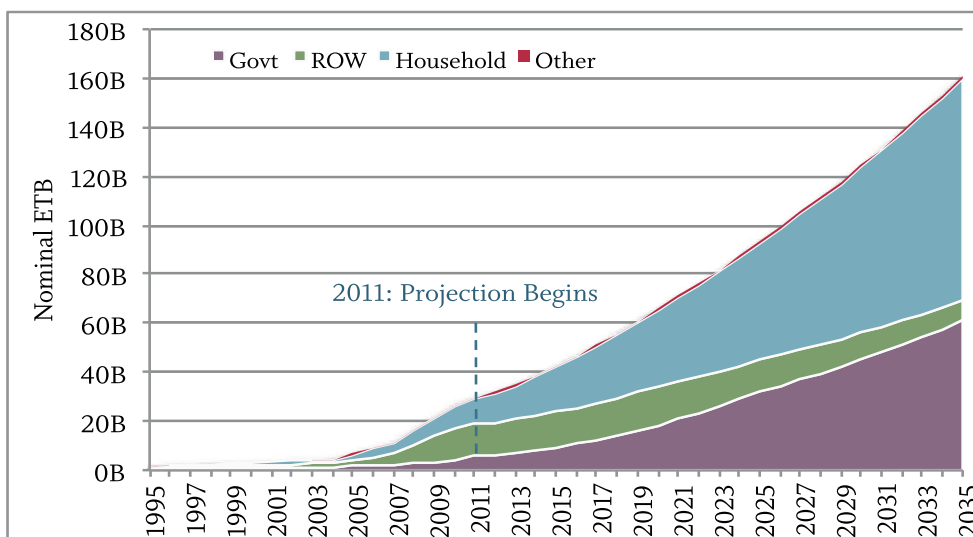
Limitations exist when basing future projections on historical trends. First, the historical data used for this approach is limited in availability (only 5 data points over 15 years) and quality (accounting methodologies improved in more recent NHAs). Second, using past information from varied political and economic contexts to make future projections can lead to extrapolating from possibly one-time conditions. Ethiopia's political conditions and economic situations (rapid economic growth in recovery from crisis and the growth of the private sector) undoubtedly influenced GDP growth, general government expenditure, and health expenditure for all funding sources. Third, predicting the continued external resource contributions to health (and primary care) in Ethiopia is uncertain as Ethiopia transitions into a low-middle income country and upper-middle income country, and the nation pursues more domestically supported and sustainable fiscal policies for health. External funding is also influenced by factors such as global or donor country-specific economic conditions, shifts in types of funding provided by donor regardless of Ethiopia's economic development, etc.

GDP Based Projections

The GDP-based projections are different from the historical approach because the assumptions for financing sources are based on two GDP growth rates rather than the previous trends in health financing from the five NHAs. In this approach, the starting point was NHA 5. The exception to this is external resources, and the assumptions for this financing source are the same as the historical-based projections.

The two GDP growth rates assumed is based on *medium* GPD growth and *high* GDP growth rates[9]. The medium GDP growth rate is a 16% annual increase, where 10% of the growth is from inflation and 6% is real growth. The high GDP growth rate is 20% annual increase, where the inflation remains the same (at 10%), but the real growth rate is assumed at 10%. Both of these GDP growth assumptions are higher than the historical trend, which assumes an average annual increase of 14% (including inflation). This difference in GDP growth rates of the historically-based approach compared to the GDP based approach has implications on the GGE, and congruently on GHE.

Under the GDP based approach, we assume a slight declining trend of GGE as a percent of GDP. Historically, GGE as a percent of GDP experienced an increase between 1995-2000 and then began a steady decline until 2010/11. Since there is no indication that fiscal policies will change, especially around avoiding large tax increases in order to promote economic growth, our assumption is that this slight decline would continue until 2035 (Figure C.6). Therefore, the projections for GGE as a percent of GDP is assumed to have a slight decline from just under 18% to about 14% by 2035. With the GDP based projection approach assuming a higher GDP growth rate compounded over time, leads to a 2 to 4 times higher absolute GGE by 2035 (Figure C.7) compared to the historically-based approach, and ultimately a significantly higher GHE.

Figure C.6 Historical Trend Projection of GGE as a Percent of GDP
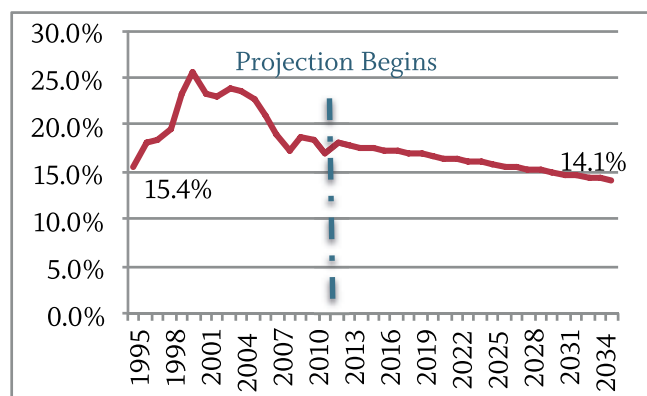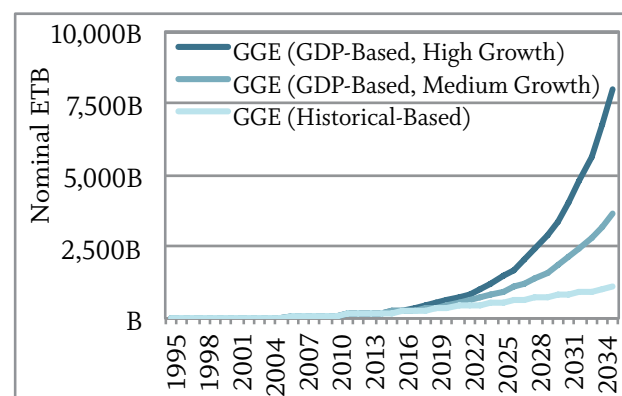

Figure C.7 Historical Trend Projection of GGE (Nominal ETB), in Billions (B)

Since the GDP-based approach assumes a significantly higher GDP, and thus GGE, over time compared to the historical approach, GHE in absolute terms is also substantially higher than the historical projections (despite having the same overall assumption) since it is contingent upon GGE (see Figure C.8 and Figure C.9).

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[9] These two growth rates were provided during a consultation with the World Bank.

Figure C.8 Medium GDP-Based Trend in GDP, GGE, and GHE in Nominal ETB, in Billions (B)
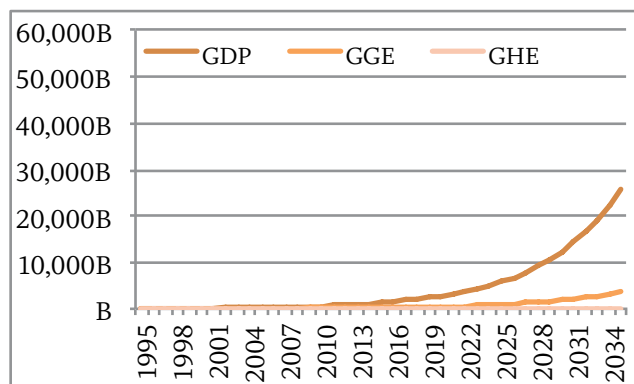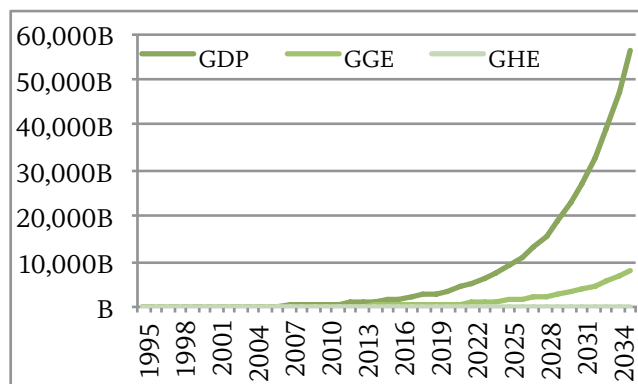

Figure C.9 High GDP-Based Trend in GDP, GGE, and GHE in Nominal ETB, in Billions (B)


Based on Abt Associates (2013), income elasticity for health spending for household OOP and other private resources is 1.098 and 1.26, respectively, for low-income countries.[10] Therefore we assume that a 1% increase in nominal GDP for Ethiopia leads to a 1.098% increase in household OOP and 1.26% increase in other private health spending. We move forward with using this assumption for the total health resource projection scenarios, although for primary care other private resource availability and need are not included for the primary care projection scenarios. It is assumed that this will not impact much in the way of the resource gap analysis since this affects both sides of the equation. For this projection approach, four scenarios are explored in depth under the medium and high growth rate assumptions (highlighted in Table C.2)

Table C.2 Various Scenarios under the GDP Based Projection Approach for Total Resources Mobilized	
Medium GDP (16% annual GDP growth)	**High GDP (20% annual GDP growth)**
Scenario 3: External Increase by US Inflation, Gov't Increase, and Income Elasticity for household OOP and Other Private	Scenario 5: External Increase by US Inflation, Gov't Increase, and income elasticity for household OOP and Other Private
Scenario 4: Gov't Increase, External Increase by US inflation till 2020, Decrease by 50% from 2020-2035 (adjusted for US Inflation), and Income Elasticity for household OOP and Other Private	Scenario 6: Gov't Increase, External Increase by US inflation till 2020, Decrease by 50% from 2020-2035 (adjusted for US Inflation), and Income Elasticity for household OOP and Other Private

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[10] These income elasticity ratios are based on published findings and reports reviewed and used in Avila, Connor, and Amico (2013) for low-income countries.

Figure C.10 Scenario 3, Total Resources Mobilized for Medium GDP Growth (1995-2035), in BIllions (B)
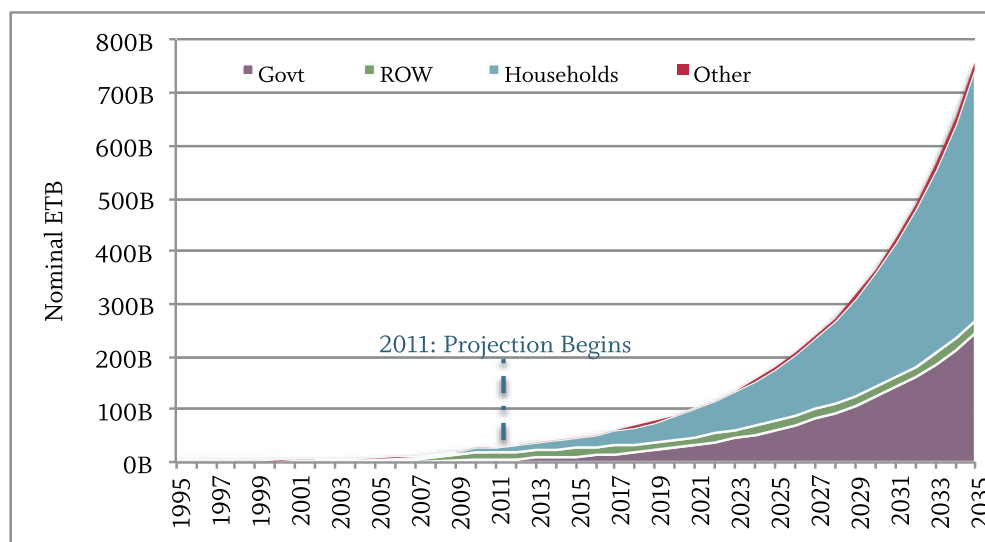
Figures C.10 and C.11 illustrate the medium GDP growth projection for total resources mobilized by financing source. Under scenario 3 (Figure C.10), government contribution steadily increases to its previous highest point by 2025 of 6.7% of GGE and remains constant from 2025-2035. Furthermore, external resources remain constant in real terms from the 2010/11 contributions with only an increase by development partners' inflation (US inflation used as proxy). Household OOP and other private contribution assume income elasticity for low-income country, as described above. Scenario 4 has the same assumption for government, household OOP, and other private contribution. The difference is with external resources, which assumed that this contribution would remain the same in real terms from 2010/11 until 2020 (adjusted for US inflation). After 2020, it is assumed that there will be a decline in funds of 50% by 2035 (adjusted for US inflation). Both of these scenarios assume an even greater increase in both household OOP and government contributions to the health sector over the next 20 years compared to the historically-based projection approach scenarios.

Figure C.11 Scenario 4, Total Resources Mobilized for Medium GDP Growth (1995-2035), in Billions (B)
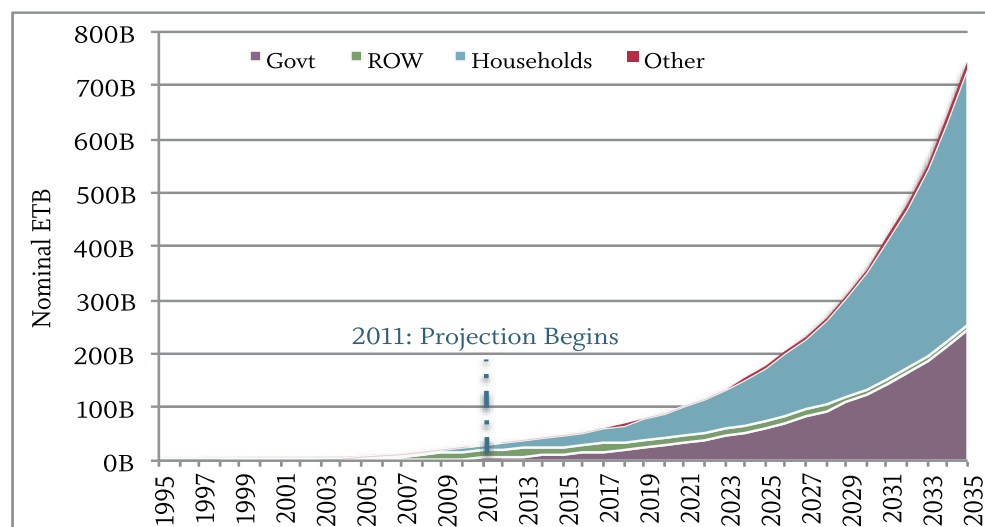
Under the medium GDP growth scenarios, the amount of health funding by 2035 is about 4 times more than the historically-based approach scenarios (Scenarios 1 and 2) by 2035. This relationship is even more prominent with the high GDP growth scenarios, as illustrated in Figures C.12 and C.13.

Figure C.12 Scenario 5, Total Resources Mobilized for High GDP Growth (1995-2035), in Billions (B)
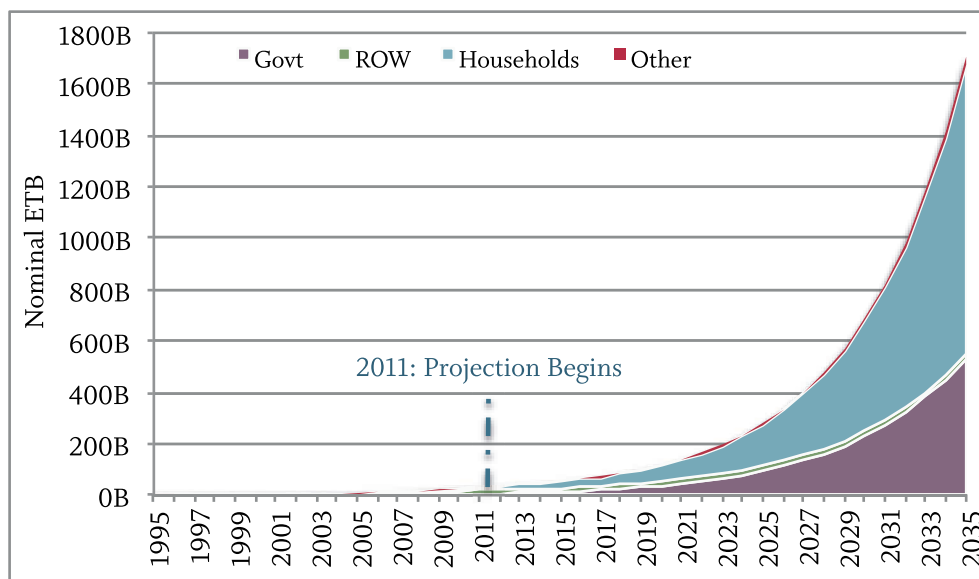

Figure C.13 Scenario 6, Total Resources Mobilized for High GDP Growth (1995-2035), in Billions (B)
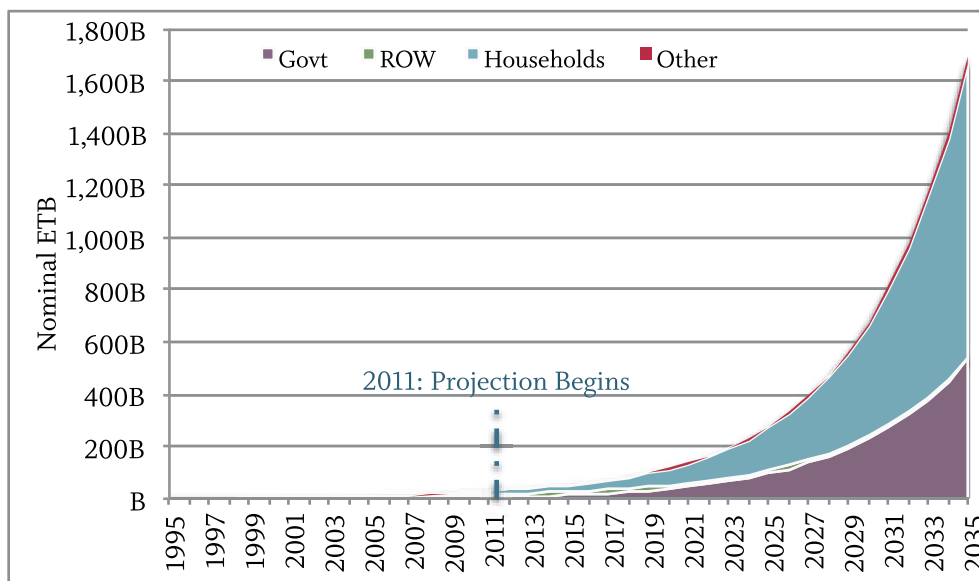

Table C.3 highlights the difference in average annual growth rates for government, household OOP, and other private contributions under the two different projection approaches. Overall, the GDP based approach assumes a much higher annual increase in government, household and other private spending on health compared to the historically-based approach[11].

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[11] External resources were not included in this comparison since the projected amounts are the same for the historical and GDP based projections.

Table C.3 Average Annual Percent Increase for Health Spending by Financing Source Based on Two Projection Approaches			
	Historically-based	Medium GDP (16%)	High GDP (20%)
Government	11%	17%	21%
Household OOP *(GDP-Based - OOP income elasticity: 1.098)*	10%	17%	21%
Other (Private and Local NGOs) *(GDP-Based - Other income elasticity: 1.26)*	5%	31%	35%

Three important limitations exist in this approach to project the future resources mobilized for health. First, as stated previously, this approach does not base ROW spending for health on GDP and if funding streams to countries like Ethiopia are dependent on economic status then as Ethiopia transitions to LMIC and even UMIC certain donors (such as Global Fund) will redistribute their funds to LICs in more need. Second, the two rates of growth for GDP are quite high and might possibly overestimate Ethiopia's economic growth for the next 20 years; meaning that resources mobilized from government, household OOP, and other private may also be overestimated. Third, government expenditure is still loosely based on historical trends (GHE as a percent of GDP trend) to calculate GHE under this approach. A better option to calculate GHE based on GDP might be to use the income elasticity estimates for government health spending provided by Avila, Connor, and Amico (2013) for low-income countries – 1.305[12].

Overall this approach assumes significantly higher contributions from all of the financing sources, except ROW since this uses the same historical trends as in the previous projection approach. This is partially due to the assumed higher nominal GDP growth rates along with the different methodology to estimate the 3 out of the 4 financing source contributions to the health sector over the next 20 years.

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[12] At the time of this report, this other option to forecast GHE under the GDP-based approach was not done.

Annex D: Estimating Primary Care Costs

The objective of the primary care cost module is to estimate and predict the total and per capita primary care costs over a 20-year time frame that capture economic, scope, quality, and demographic changes as well as changes in demand for primary care services. For this model only demographic, socioeconomic, and minimal scope (primary hospital roll-out) changes were accounted for due to data limitations.

Forecasting Approaches for Primary Care Costs

After much consultation with other experts in this field, we outlined 2 potential approaches to forecast Ethiopia's primary care costs: micro-costing and cost function. The micro-costing approach sets out to cost specific types of services and then add up the total cost across the different services. When adding up the total cost with this approach, one would have to use some kind of average or norm. This average or norm is not very good at predicting actual service delivery costs at scale. This approach is based on estimates of the average time spent on different tasks by health workers as well as the average use of drugs and supplies. Actual time use can vary a lot from a norm-based average. A time-motion study could provide empirical evidence on how health providers spend their time in providing health services but these are costly and also subject to sampling and non-sampling errors. The second option is the cost function approach. This approach defines a regression model that predicts primary care costs based on explanatory factors (such as health inputs), while controlling for geographical differences. In the case of Ethiopia, these geographical differences would be regional and woreda level variation.

Table D.1 Forecasting Approaches for Estimating Future Primary Care Costs	
Micro-costing Approach	**Cost Function Approach**
• Cost specific services and then add up across the services • When add up have some kind of average or norm and not very good at predicting actual service delivery • Frequently uses time and motion studies to break down time allocation by health providers and analyze separately Challenges • Unit cost study conducted in 2007 to help determine the SHI premiums • Unit cost study conducted in 2011 for only 1 federal hospital • Separate exercise by the FMOH for normative costing using OneHealth Tool – Avoid duplication	• Define regression model that predicts primary care cost based on key health inputs and controlling for regional and woreda level differences Challenges • Limited health coverage data available by woreda from the Woreda Based Annual Plans (2011 & 2012) • Direct on-budget health expenditure data (recurrent) by woreda from IBEX via World Bank (2008, 2009, 2010, 2011) • Only 1 year where can combine the two data sets
Moved Forward with Cost Function Approach	

| Table D.2 Highlights of Data Sources for Micro-Costing Approach		
Data Source	**Overview**	**Limitations**
FMOH (2007)	Purpose: 1. Facilitate decision-makers in undertaking macro-economic and programmatic planning 2. Facilitate lobbying for donor support in health care financing, especially for social health insurance (SHI) coverage policy 3. SHI premium setting 4. Tool for reimbursement decision Regions: 8 Tigray, Afar, Amhara, Oromia, Somali, SNNPR, Harari, and Addis Ababa Sample Size: 60 13 zonal hospitals, 4 district hospitals, 5 private hospitals, 3 NGO hospitals, 27 health centers, and 8 health posts	1. Dated 2. Unit cost for district hospitals was calculated by taking the average unit cost between health center and zonal hospitals (general referral hospitals)
Wang, Kutanov, Mitiku, and Abebe (2011)	Purpose: Develop provider payment mechanism for SHI scheme to reimburse hospitals for inpatient health services delivered to the beneficiaries of SHI scheme Regions: 1 Addis Ababa Sample Size: 1 St. Paul Hospital, a referral hospital	1. Only sample size of 1 2. St. Paul is a hospital of excellence and therefore not at the same quality level compared to other hospitals in the country
OneHealth Tool (Futures Institute, 2014)	Model for supporting the costing, budgeting, financing and national strategies development of the health sector in developing countries with a focus on integrated planning and strengthening health systems. Ethiopia is using this tool to cost its Health Sector Transformation Plan (2015-2020)	1. Want to avoid duplicating work

Data challenges exist in Ethiopia to employ either of these costing approaches. Three sources of data exist if one wanted to conduct the micro-costing approach. Table D.2 provides an overview and limitations for each of the data sources. The main concern with FMOH (2007) is that this study is quite dated (7 years old) and a number of services have been added to the essential service health package. Furthermore, assumptions used due to lack of data such as averaging unit costs between zonal hospitals and health centers in order to obtain a unit cost for district hospitals is potentially crude and does not capture variability among the costs of such hospitals. As for Wang, Kutanov, Mitiku, and Abebe (2011), this study only included a sample size of 1, St. Paul Hospital, and therefore does not provide a clear picture for costing at the primary care level. The OneHealth Tool is the closest thing that would allow us to use the micro-costing approach. The FMOH has launched its 5-year health sector plan, the Health Sector Transformation Plan (HSTP), and used the OneHealth Tool to estimate health sector costs for the next 5 years. These cost estimates capture normative costs for providing a set standard of health services (baseline) and reaching the targets for the next 5 years. The purpose of this work was to use the actual costs of providing primary care services, and not based on norms or standards; and to not lead to a duplication of efforts.

We explored using the cost function approach given the limitations to use the alternative (micro-costing). Only two data sources exist for this approach: 1) Limited health coverage data from the Health Management Information System (HMIS) obtained via woreda based annual plans, and 2) Direct on-budget health expenditure data from the Integrated Budget and Expenditure (IBEX) system. Although there are multiple years of woreda based annual plans, we only have the health management information system (HMIS) data from these reports for 2 years – 2011 and 2012[13]. As for the data from the IBEX system, we have data for 2008, 2009, 2010, and 2011. Therefore, only leaving one year where we could combine these two data sets to run a regression model. Despite data limitations with the cost function approach, this was the best option compared to the two costing approaches and their respective data limitations.

Steps for Cost Function Approach

Figure D.1 illustrates the basic steps that we took to estimate the primary care costs for Ethiopia over the next 20 years (until 2035) aligned with Ethiopia's vision.

**Figure D.1 Steps to Forecast Primary Care Costs using Cost Function Approach**
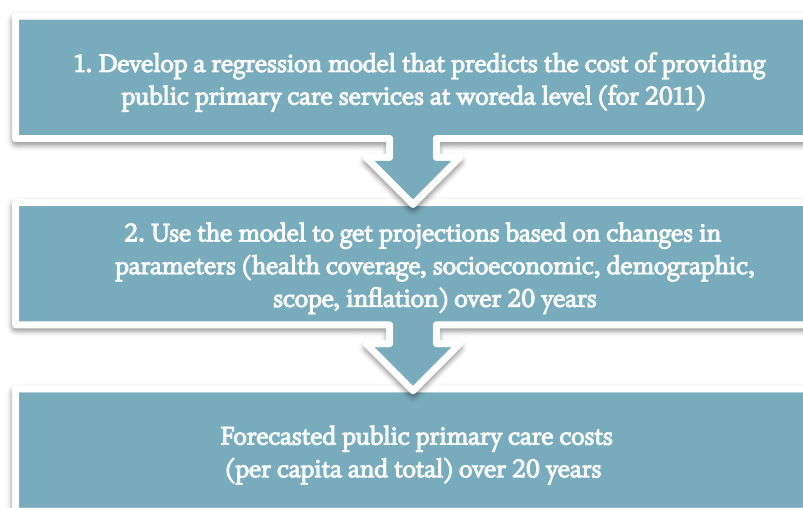
Once the regression model was defined, the following assumptions were made to estimate actual primary care costs:

1. **Health coverage:** Forecasted average annual rate of increase (%) for health coverage indicators based on historical trends (next 20 years, to 2035)
2. **Socioeconomic:** Assume 5% annual decrease in poverty rate for all woredas (next 20 years, to 2035)
3. **Demographic:** Forecasted average annual woreda population growth of 2% based on medium variant estimates for Central Statistical Agency
4. **Scope:** Limited data from Amhara, Oromia, and SNNPR; assume 1 primary hospital for each woreda in next 10 years (2025).
5. **HH OOP:** Household OOP was included based on retained revenue that was collected and utilized by the primary care facilities.[14] Limited data on retained revenue from facilities and utilization rate, assume average 140,000 ETB used per year for health center and 2.05 million ETB per primary hospital. This is presented as OOP contributions.
6. **Inflation:** 7% average annual rate (to compare to historically-based projections); 10% average annual rate (to compare GDP-based projections)

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[13] Resource mobilization projections only include the average retained revenue collected for household contributions and the primary care cost projections only include the retained revenue utilized. This means that both sides of the model are excluding other household payments used for primary care services.

In order to compare the estimated primary care costs with the resources mobilized for primary care some level of cost for primary care services offered at higher levels of care (beyond woreda level) needs to be incorporated given our primary care definition. No data exists specifying a percent cost of providing primary care services at this other level of health care. To overcome this issue we assume the percent difference between actual woreda level costs and resources mobilized (only external and government) for primary care services in 2011 is equivalent to the additional costs of primary care services offered beyond the primary care system. The difference between the resources mobilized and woreda level primary care costs is a 4.2%. This, along with the other factors that influence primary care costs, is illustrated in Figure D.2.

Figure D.2 Primary Care Cost Projections, in Billions (B)
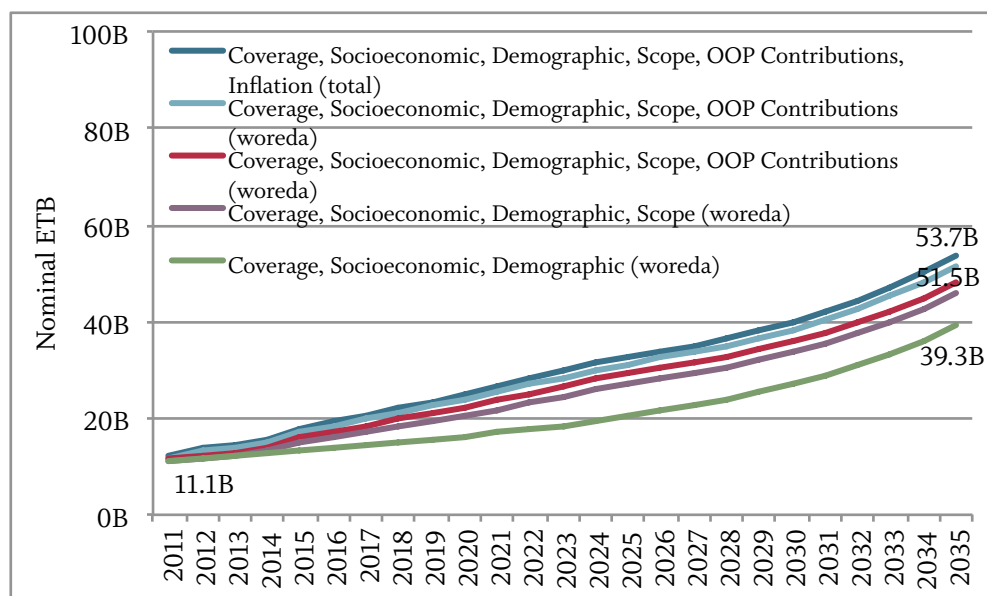
The top line of the graph (in dark blue) in Figure D.2 is the final primary care cost projection that is used to compare with the resource mobilization scenarios for the resource gap analysis over a 20-year timeframe. This cost estimate includes changes in coverage, socioeconomic status of the woreda, demographics, expansion of primary hospitals or "scope", household OOP contributions or retained revenue that is used, and inflation. The last factor, inflation, consists of either 7% to compare with the historically-based resource mobilization projection scenarios or 10% for the GDP-based resource mobilization projection scenarios.