January 2018

COSTING OF MALAWI'S SECOND HEALTH SECTOR STRATEGIC PLAN USING THE ONEHEALTH TOOL

USAID
FROM THE AMERICAN PEOPLE

HP+
HEALTH POLICY PLUS

JANUARY 2018

This publication was prepared by Catherine Barker (Palladium) of the Health Policy Plus project.

Suggested citation: Barker, C. 2018. *Costing of Malawi's Second Health Sector Strategic Plan using the OneHealth Tool*. Washington, DC: Palladium, Health Policy Plus.

ISBN-13: 978-1-59560-163-6

Health Policy Plus (HP+) is a five-year cooperative agreement funded by the U.S. Agency for International Development under Agreement No. AID-OAA-A-15-00051, beginning August 28, 2015. HP+ is implemented by Palladium, in collaboration with Avenir Health, Futures Group Global Outreach, Plan International USA, Population Reference Bureau, RTI International, ThinkWell, and the White Ribbon Alliance for Safe Motherhood.

This report was produced for review by the U.S. Agency for International Development. It was prepared by HP+. The information provided in this report is not official U.S. Government information and does not necessarily reflect the views or positions of the U.S. Agency for International Development or the U.S. Government.

Contents

List of Figures and Tables

Acknowledgments

This report is a result of contributions by staff within the Department of Planning and Policy Development in the Ministry of Health. The author would like to thank the following for their support:

- Gerald Manthalu and Finn McGuire for spearheading the Health Sector Strategic Plan II (HSSP II) development and costing process
- Peter Hutchinson, Trish Araru, and Kassa Mohammed for their support in coordinating the HSSP II costing process, collecting data, and providing feedback to the OneHealth team
- Health Policy Plus consultant Sosten Chilumpha for his invaluable support in coordinating data collection, collecting raw inputs, and following up with stakeholders
- Michelle Ferng, Cassie Nemzoff, Giselle Hadley, and Laura Boonstoppel from the Clinton Health Access Initiative for their critical support with data collection and analysis, and facilitation of the HSSP II prioritization workshop
- Health Policy Plus staff who contributed to reviewing initial data inputs, entering data into the OneHealth Tool, and reviewing this report, specifically, Arin Dutta (Palladium), Henry Mphwanthe (Palladium), Michel Tchuenche (Avenir Health), Ricardo Silva (Palladium), and Tom Fagan (Palladium)
- Ministry of Health staff, development partners, implementing partners, and others who attended workshops and meetings for data collection, data validation, and HSSP II prioritization

Abbreviations

CHAM	Christian Association of Malawi
CIP	Capital Investment Plan
EHP	essential health package
FTE	full-time equivalent
FY	fiscal year
GDP	gross domestic product
GOM	Government of Malawi
HRH	human resources for health
HSSP	Health Sector Strategic Plan
MOH	Ministry of Health
OHT	OneHealth Tool
RMNCH	reproductive, maternal, newborn, and child health
TB	tuberculosis

Executive Summary

Malawi's Health Sector Strategic Plan 2017–2022 (HSSP II) aims to move the country toward universal coverage of quality, equitable, and affordable health services, with a specific emphasis on improving the health status of the population, financial risk protection, and client satisfaction. The HSSP II has eight strategic objectives focused on delivering a revised essential health package (EHP) free of charge to all citizens and strengthening health systems for efficient delivery of the EHP.

The Ministry of Health (MOH) selected the OneHealth Tool (OHT), a model for medium- to long-term strategic planning for the health sector, to inform development of the revised EHP and estimate total financial resource requirements for HSSP II implementation. The HSSP II cost analysis is the second application of the OHT in Malawi; it also was used to cost the country's first Health Sector Strategic Plan (HSSP I).

Through a consultative, comprehensive, and evidence-driven process, the MOH—with technical assistance from the Health Policy Plus (HP+) project, funded by the U.S. Agency for International Development—identified the highest priority, most cost-effective interventions and activities to include in the HSSP II, and set feasible scale-up plans for intervention coverage and health systems investments. Prioritization scenarios providing varied inputs on the types of interventions included, intervention coverage scale-up, human resources for health (HRH) recruitment, and infrastructure investment informed the final selection of HSSP II targets and related resource needs estimates.

HSSP II Cost Results

The final prioritized HSSP II requires US$2,613 million across all five years, with costs increasing from $504 million to $540 million from fiscal year (FY) 2017/18 to FY 2021/22. The total cost per capita each year remains at about $30. EHP service delivery under objective 1, HRH costs under objective 4, and infrastructure investments under objective 3 represent about 93% of total HSSP II costs.

	2017/18	2018/19	2019/20	2020/21	2021/22
Total costs (US$ millions)	$504	$521	$519	$528	$540
Cost per person (US$)	$30	$30	$29	$29	$30

Costs associated with delivering the EHP under HSSP II objective 1 account for the majority (58%) of the overall HSSP II costs. Objective 1 costs include commodities (64% of objective 1 costs) and program management (36%). Commodity cost requirements increase from $175 million in 2017/18 to $198 million in 2021/22 due to assumed increases in coverage of EHP interventions. HIV has the highest commodity resource requirements; HIV commodities represent 62 percent of total commodity costs across all five years. The programs with the largest growth in commodity resource needs from 2017/18 to 2021/22 are oral health (111% increase), mental health (79%), and tuberculosis (20%). Program management costs are highest in the first year of HSSP II implementation, reflecting investment in activities such as program-specific in-service training and monitoring and evaluation at the onset of the strategic plan. The highest-cost programs for program management are HIV ($238 million from 2017/18 to 2021/22); tuberculosis ($71 million); and reproductive, maternal, and newborn health ($61 million).

Human resources for health costs under objective 4 represent one-quarter of the HSSP II costs. These costs increase from $115 to $148 million from 2017/18 to 2021/22, as Malawi aims to absorb 90 percent of the projected graduates from health training colleges by 2022 and scale up the number of health surveillance assistants based in the community. Approximately 64 percent of HRH costs cover salaries and 7 percent cover pre-service education.

Objective 3, which focuses on infrastructure investments, represents 10 percent of the HSSP II resource requirements. This objective includes the costs of constructing and renovating facilities, and procuring medical equipment under the Capital Investment Plan (CIP). The priority investments under the CIP implementation period include $94 million for new construction of facilities, $80 million for rehabilitation, and $85 million for equipment.

Financial and Health System Constraints

According to the latest projections of overall resources available for the health sector, the Government of Malawi and donors have committed allocations of approximately $607 million to the health sector in 2016/17. Projected commitments to the sector are lower for subsequent years ($565 million in 2017/18, $432 million in 2018/19, and $423 million in 2019/20), partially due to the lack of funding forecasts from some donors, but also due to presumed declines in external funding in line with recent trends. Given these projections, there is an estimated overall funding gap of about $488 million, or 19 percent of the HSSP II resource requirements.

	2017/18	2018/19	2019/20	2020/21	2021/22
Total resources available (US$ millions)	$565	$432	$423	$423	$423
Resources per person (US$)	$33	$25	$24	$24	$23

In addition to financing constraints, Malawi may face HRH challenges in meeting HSSP II targets. Even if Malawi meets its ambitious HRH recruitment targets, there are projected shortages of specific cadres, including medical officers and laboratory technicians (56% gap for each in 2022) that could affect meeting EHP service delivery targets.

Conclusions and Recommendations

The OHT costing exercise provided an evidence base for revising the EHP and developing HSSP II targets and activities. Although this exercise informed prioritization of the HSSP II, the projected resource requirements still greatly exceed the resources available for achieving HSSP II targets, even after focusing exclusively on EHP interventions. For this reason, the following is recommended:

- **Identify and address health sector inefficiencies to further reduce costs.** Even with projections of moderate economic growth of more than 3 percent per year, Malawi faces significant constraints in mobilizing additional domestic resources for health, including a high fiscal deficit and large public debt. Also, recent analyses suggest that little revenue could be generated through introduction of proposed earmarked taxes for health, and that Malawi may not be ready to introduce social health insurance because large proportions of the population are poor (71% earning less than US$1.90 per day) and work in the informal sector (89%). Given these constraints and predicted declines in donor funding, the best way forward is for the government to mobilize

additional resources for health through efficiency gains, particularly as the country strives to reduce out-of-pocket payments for improved financial protection as it moves toward universal health coverage. Two areas in which the MOH could focus to achieve efficiencies are the following:

  - *High rates of commodity wastage*. A study found that as much as 70 percent of commodities dispensed from medicines stores at health centers and hospitals are not accounted for. Reducing commodity wastage would amount to significant cost savings; these wastage costs are estimated to be $148 million (6% of total HSSP II costs) across all five years of the HSSP II, assuming current commodity wastage rates stay constant.
  - *Relatively large program management costs for individual disease programs*. Individual disease programs have high program management costs, accounting for one-fifth of total HSSP II costs. Program management activities often are not integrated (e.g., each program plans for separate in-service training, monitoring and evaluation systems, supervision visits, and other activities), which leads to high costs. Programs should analyze their program management costs to determine whether activities could be implemented in a more efficient manner (e.g., integrated training) and identify low-priority activities that may not have a direct impact on supporting EHP service delivery and achieving HSSP II targets that could be scaled back or not implemented in order to reduce costs.

- **Work with donors to secure predictable, adequate funding for the health sector.** Malawi will remain dependent on external financing in the medium to long term due to macroeconomic constraints. However, recent declines in donor funding and discontinued use of pooled funding mechanisms due to a lack of confidence in the government puts the health sector in jeopardy. Also, donors tend to make short-term and earmarked funding commitments, creating difficulties in reallocation based on need or planning how services will be funded in the long term. As a result, Malawi should work closely with donors to secure adequate funding for priority activities in the HSSP II, including EHP service delivery, and better coordinate and predict trends in external health funding going forward. The largest donor, the Global Fund, indicates its funding levels over a three-year grant period, but other donors, including the U.K. Department of International Development, the U.S. Agency for International Development, the U.S. Centers for Disease Control and Prevention, and others, are unable to provide accurate projections of future funding levels. Thus, these donors should work with the newly established Aid Coordination Unit within the MOH to ensure there is no overlap or gaps in annual spending across donors and indicate early and often any potential changes in future funding levels and priority areas for the donor.
- **Institutionalize use of the OHT for evidence-based decision making**. The OHT can be used to track HSSP II implementation progress and inform annual operational planning, particularly for decisions related to resource allocation and policy and budget development. Assumptions should be updated on a routine basis, as estimates of costs, health system requirements, and the health impacts of scaling up interventions should reflect changes in demography, disease burden, programs, and strategies. To facilitate greater institutionalization of the OHT, annual refresher training for MOH staff is recommended.

1. Introduction

Malawi has made tremendous progress on certain health indicators over the implementation period (2011–2016) of its first Health Sector Strategic Plan (HSSP I), meeting the Millennium Development Goals and exceeding national targets for reductions in infant and under-five mortality (see Table 1). However, progress on maternal and neonatal mortality has been slow; maternal and neonatal mortality rates remain among the highest in sub-Saharan Africa, at 439 deaths per 100,000 live births and 27 deaths per 1,000 live births, respectively (NSO and ICF, 2017). Malawi also still faces a high burden of communicable disease and malnutrition, as evidenced by an adult HIV prevalence rate of 8.8 percent, a tuberculosis (TB) prevalence rate of 363 cases per 100,000 population (above the World Health Organization threshold for a TB emergency), and 37 percent of children under five suffering from stunting. There are large inequities in the disease burden and health service utilization. For instance, the child mortality rate is nearly twice as high for those in the lowest wealth quintile as those in the highest quintile (NSO and ICF, 2017).

Table 1. Progress on Select Health Indicators

Indicator	Baseline (2010)	Achieved (2016)	Target Met?
Impact			
Maternal mortality ratio *(deaths per 100,000 live births)*	675	439	No
Neonatal mortality rate *(deaths per 1,000 live births)*	31	27	No
Infant mortality rate *(deaths per 1,000 live births)*	66	42	Yes
Under-five mortality rate *(deaths per 1,000 live births)*	112	63	Yes
HIV prevalence among people ages 15–49 (%)	10.6	8.8	Yes
Coverage			
Contraceptive prevalence rate (%)	42	58	No
One-year-old children fully immunized (%)	80.9	71.3	No
Pregnant women completing four antenatal care visits (%)	46	51	No
Antiretroviral therapy coverage among pregnant women (%)	35	83	Yes

Notes: 2016 targets are based on the HSSP I and the Millennium Development Goals (HIV prevalence only).
Sources: NSO and ICF, 2017; GOM, 2017a.

Low coverage of critical health services and poor-quality services contribute to Malawi's stalled progress on certain health outcomes. For example, 71 percent of children in Malawi are fully immunized, fewer than half (45%) of children under five sleep under an insecticide-treated net, and just 51 percent of all pregnant women attend at least four antenatal care visits (NSO and ICF, 2017).

These low coverage estimates are attributable to and exacerbated by health system constraints. Malawi continues to face severe shortages of trained health workers, poor health infrastructure and equipment, weak supply chains, dependence on donor funding with high out-of-pocket spending, and weak governance structures. For instance, just 24 percent of health facilities on average maintained sufficient stock to cover one to three months of supply for 23 tracer medicines and medical supplies in fiscal year (FY) 2015/16 (GOM, 2017a). Further, only six in

10 facilities have regular electricity and both running water and soap, and an estimated 67 percent of health worker posts are vacant (MOH and ICF International, 2014; GOM, 2017a). The health financing situation in Malawi has worsened in recent years. Donor funding has declined due to the 2013 "Cashgate" scandal, yet Malawi continues to rely on donor funding. Donors represented 54 percent of total health expenditure in 2014/15, and international donors no longer pool resources with the Ministry of Health (MOH), leading to increased fragmentation and poor coordination in the health sector (Health Policy Project, 2016a; MOH, 2016).

Malawi's Health Reforms

To address persistent challenges and sustain progress toward universal health coverage, the MOH has proposed and begun implementing several health reforms. They include but are not limited to the following: decentralization of health service delivery to the district councils, making central hospitals autonomous, establishing a health fund for which additional public revenue is raised and ring-fenced for the health sector, establishing a national health insurance scheme, expanding contracts with the Christian Health Association of Malawi (CHAM) to allow citizens living outside an eight-kilometer radius of a government facility access to essential services for free, and revising the essential health package (EHP). The aim of these reforms is to improve service quality, equity, financial protection, and client satisfaction, leading to better health outcomes.

One of the ongoing health reforms—the newly revised EHP—is a cornerstone of the second Health Sector Strategic Plan (HSSP II): Towards Universal Health Coverage. The HSSP II emphasizes universal access to and rapid scale-up in coverage of critical, high-impact interventions, as specified in the EHP (see Annex A). Malawi introduced an EHP in 2004 with the aim of delivering interventions that address the major causes of Malawi's disease burden free of charge to all citizens. However, poor operationalization of the EHP, expansion of the number of interventions included in it over time, and inadequate criteria for inclusion of an intervention resulted in a financially unobtainable and unsustainable package that failed to significantly improve service availability, quality, equity, or financial protection. As a result, the MOH revised the EHP in 2017 during the HSSP II development period (see Box 1). The new EHP maximizes health impact, given the resources available and based on revised intervention inclusion criteria and updated estimates of disease patterns, intervention cost-effectiveness, and resources available to the health sector.

Box 1. Malawi's Essential Health Package

- Redesigned in 2017 by the MOH with technical assistance from the University of York
- Inclusion criteria considered intervention cost-effectiveness, feasibility, equity, continuum of care, complementariness, and donor funding
- Revised EHP—if implemented—is estimated to avert 20 million disability-adjusted life years

HSSP II Objectives

The HSSP II (2017–2022), created through a consultative and evidence-driven process, was developed within Malawi's overall development and health policy framework. Malawi intends to become a middle-income country under Vision2020, and health is a high priority in its Third Growth and Development Strategy 2017–2022 (GOM, 2017a). Under its National Health Policy (2017–2030), Malawi aims to improve population health and financial protection toward universal health coverage (GOM, 2017a). With these policy goals in mind, the HSSP II set eight

objectives for Malawi's health sector (see Box 2). Each objective has specific strategies, activities, and targets to guide HSSP II operationalization.

The HSSP II also reflects Malawi's commitment to international initiatives. The HSSP II contributes to the Sustainable Development Goals by scaling up EHP interventions and addressing social determinants of health. Global targets specific to disease areas, such as the 90-90-90 targets for HIV, are incorporated into the HSSP II. It also strives to meet internationally recognized standards and conventions, including the Abuja Declaration target of allocating 15 percent of the government budget to health by 2022.

Sub-sector strategic plans, such as those covering community health, infrastructure, pharmaceuticals, HIV, TB, family planning, and other health areas, helped guide HSSP II target setting and development (GOM, 2017b; GOM, 2015; GOM, unpublished; NAC, 2014; MOH, 2015). However, the HSSP II reflects a prioritized set of objectives, strategies, activities, and targets based on projections of the resource envelope, health system constraints, and health impact, meaning that the targets and costs within it are designed to be achievable and may differ from sub-sector strategic plans.

Box 2. HSSP II Strategic Objectives

1. Increase equitable access to and improve quality of healthcare services.
2. Reduce environmental and social risk factors that have a direct impact on health.
3. Improve the availability and quality of health infrastructure and medical equipment.
4. Improve availability, retention, performance, and motivation of human resources for health for effective, efficient, and equitable health service delivery.
5. Improve the availability, quality, and utilization of medicines and medical supplies.
6. Generate quality information and make it accessible to all intended users for evidence-based decision making through standardized and harmonized tools across all programs.
7. Improve leadership and governance across the health sector and at all levels of the healthcare system.
8. Increase health sector financial resources and improve efficiency in resource allocation and utilization.

HSSP II Targets

The MOH set specific impact and service delivery targets for the HSSP II based on sub-sector strategic plans, consultations, and past achievements. The HSSP II aims to significantly reduce mortality rates and incidence of diseases such as HIV and malaria (see Table 2). To achieve these targets, the MOH plans to scale up coverage of high-impact interventions. For instance, by 2022, the MOH aims to have 95 percent of births attended by a skilled health worker, 92 percent of one-year-old children fully immunized, 85 percent of the population using insecticide-treated nets, and 60 percent of women of reproductive age using modern contraceptives. Specific scale-up plans and targets are discussed in Chapter 5 of this report and in the HSSP II.

Table 2. Baseline and Target HSSP II Impact Indicators

Indicator	Baseline (2016)	Target (2022)	Percentage change from 2016 to 2020
Maternal mortality ratio *(deaths per 100,000 live births)*	439	350	-20%
Neonatal mortality rate *(deaths per 1,000 live births)*	27	22	-19%
Infant mortality rate *(deaths per 1,000 live births)*	42	34	-19%
Under-five mortality rate *(deaths per 1,000 live births)*	63	48	-25%
HIV incidence *(per 1,000 person-years, ages 15–49)*	4.1	2	-51%
Malaria incidence *(per 1,000 people)*	380	200	-47%

Source: GOM, 2017a.

2. Methodology

The OneHealth Tool

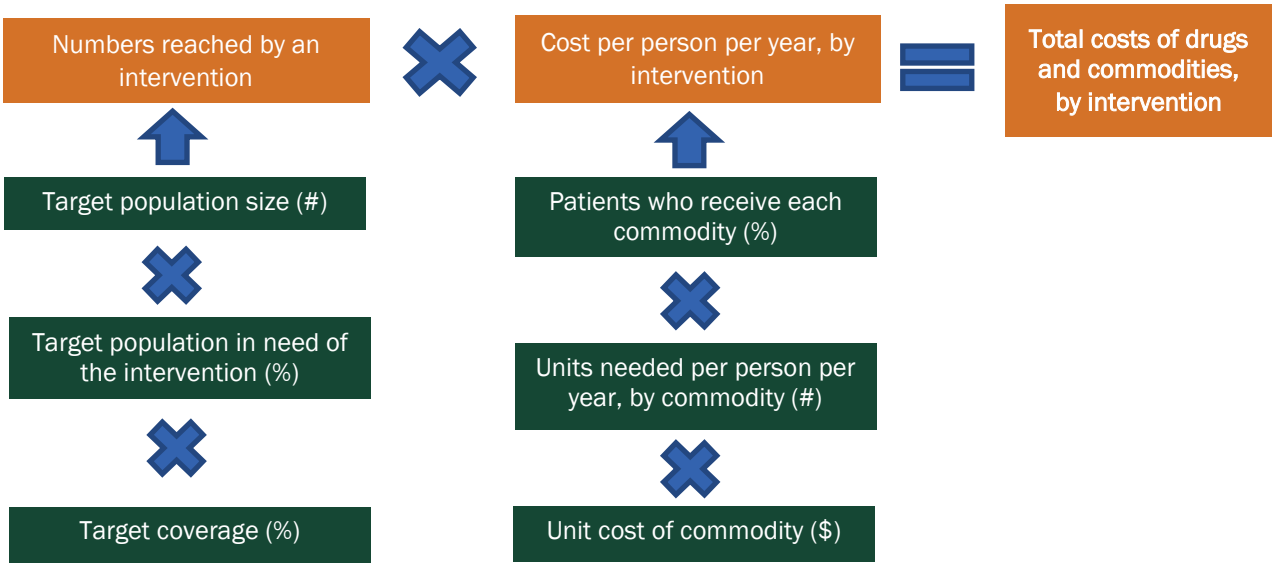
The MOH selected the OneHealth Tool (OHT) to estimate the cost of implementing the HSSP II. The OHT is a model for medium- to long-term (3 to 10 years) strategic planning in the health sector, created by an international consortium comprising the World Health Organization, several United Nations agencies, and Avenir Health. The OHT estimates the costs of an entire health system, including service delivery and cross-cutting health systems requirements. It is a dynamic model integrated within the Spectrum suite of models, which allows for the linking of cost assumptions with health outcome models. More information on the OHT and its application in other countries is available (see Barker et al., 2015; Stenberg and Chisholm, 2012; and Perales et al., 2015).

Costing Health Services in the OneHealth Tool

The OHT estimates health service costs under individual disease programs, including the costs of medicines and supplies needed to deliver specific interventions, such as antenatal care or measles vaccinations, and the costs of program management activities, such as training, monitoring and evaluation, supervision, advocacy, and communication.

The OHT uses an ingredients-based cost approach. Program management costs are based on the cost and quantity of the inputs required to carry out the activities. Total commodity costs are estimated by multiplying the average unit cost per intervention by the number of cases per year (see Figure 1). The average unit cost per intervention is determined based on the cost, quantity, and frequency of use of each commodity and the percentage of cases that require each commodity. The number of cases per year is calculated based on the population size of those targeted to receive the intervention, the percentage of the target population in need of the intervention, and the percentage of people in need who actually receive the service (i.e., coverage).

Figure 1. OneHealth Tool Methodology for Calculating Commodity Costs



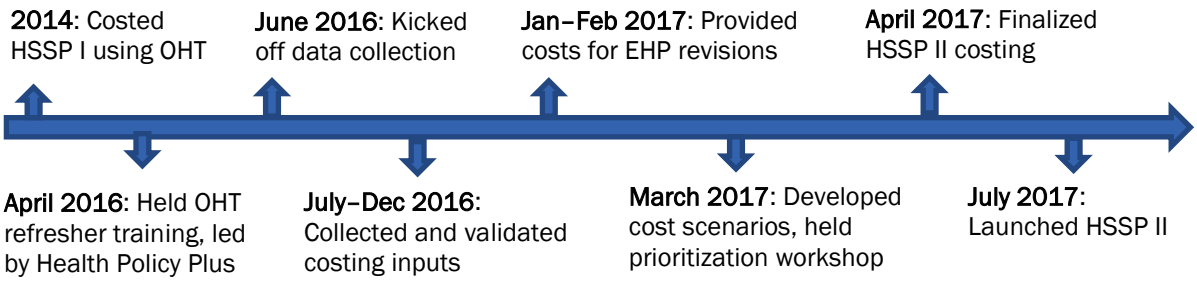
Costing Health System Components in the OneHealth Tool

The OHT estimates cross-cutting health system costs separately from those of specific health services. These health system costs are based on World Health Organization health system building blocks and captured under six components: infrastructure and equipment, human resources for health (HRH), logistics, health information systems, health financing, and governance.

OneHealth Tool Application in Malawi

The HSSP II costing built on a previous application of the OHT in Malawi. In 2014, the MOH used the OHT to estimate the cost of the HSSP I (see Figure 2). This cost analysis was primarily used to update cost estimates for interventions in the EHP and was limited, in that it did not cost all health programs or health system components. For instance, HSSP I costing excluded the cost of oral health, health financing activities, health information systems, the supply chain, and governance initiatives. The HSSP II costing team, comprising the Health Policy Plus project (funded by the U.S. Agency for International Development) and MOH staff, improved on the initial HSSP I cost analysis by expanding the scope of the costing to include additional disease program and health system costs, updating baseline assumptions, and collecting data on new targets.

Figure 2. HSSP II Costing Timeline



In addition to estimating overall HSSP II resource requirements, the HSSP II costing team provided updated information to inform revision of the EHP. The MOH and University of York used updated unit costs by intervention and projected caseloads from the OHT to analyze intervention cost-effectiveness and identify a package that fit within the overall resource envelope. Although the OHT cost data were a critical input during the EHP revision process, the OHT costing estimated only the commodity cost per intervention; other costs essential to delivering an intervention, such as those related to facility operation and health information systems, were costed for the entire health sector and not disaggregated for each individual intervention. Therefore, health system costs were not considered in the EHP cost-effectiveness analysis. Because some interventions may be more health system intensive than others (e.g., require more time from health workers), using the OHT unit costs may have biased the analysis toward inclusion of interventions with low commodity costs.

Data Collection Process and Costing Assumptions

Inputs for the OHT costing were collected from MOH staff, development partners, implementing partners, clinicians, and other stakeholders working in the health sector through data collection workshops and meetings. Data sources included costed sub-sector strategic plans, commodity quantifications, the Malawi Demographic and Health Survey 2015/16, programmatic data from the Malawi Health Information System Programme, the Central

Medical Stores Trust, and other studies and assessments. Expert opinion was used in cases of missing or incomplete data. Table 3 shows how OHT costs were mapped to HSSP II objectives.

Table 3. Costs Included in HSSP II Costing, by Objective

Objective	Costs captured under the objective
1. EHP	Costs of commodities (including wastage) and program-specific management activities (e.g., in-service training) in support of EHP service delivery
2. Social determinants of health	Activity costs for environmental and community health, epidemic preparedness and response, vermin and vector control, and safe housing and working conditions
3. Infrastructure	Costs of facility construction and rehabilitation, medical equipment, ambulances, and infrastructure management activities
4. HRH	Costs of HRH salaries, pre-service training, and management activities
5. Medicines/supply chain	Costs of activities related to improving regulation, procurement, warehousing, distribution, and rational use of medicines
6. Health information systems	Costs of activities related to sector-wide routine data management and use, monitoring and evaluation, reporting, research, and information and communications technology
7. Leadership and governance	Costs of activities related to organization and management, coordination, financial management, health reform implementation, regulation, and public-private partnerships
8. Health financing	Activities related to improving resource mobilization, pooling, and strategic purchasing

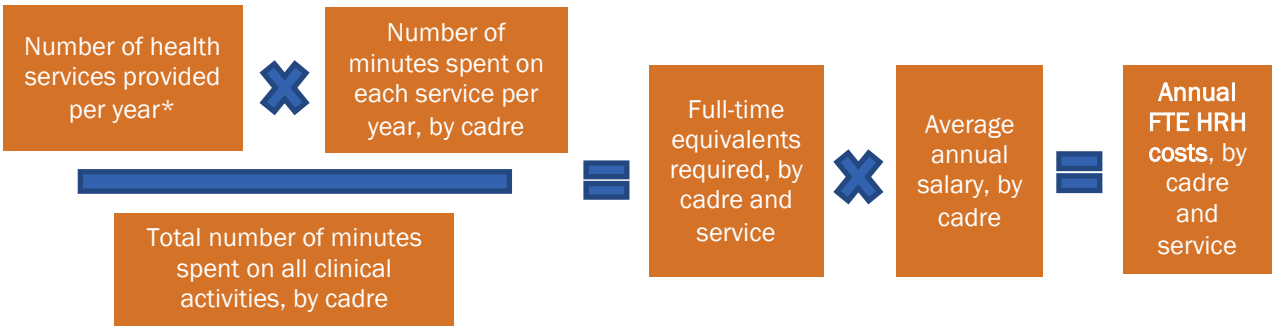
The OHT cost analysis estimates the costs to the public sector and CHAM, except for commodity costs, which reflect service provision in all facilities in Malawi. Costs were collected in Malawi kwacha and converted to U.S. dollars using an exchange rate of 714 kwacha to 1 U.S. dollar. Costs are presented in constant U.S. dollars and do not account for inflation. The costing was conducted in the OHT for calendar years 2017 through 2022; FY cost estimates are presented in the report for comparison with resources available and estimated by taking the average across two calendar years. The costing also assumes that an average commodity wastage rate of 20 percent stays constant throughout the HSSP II implementation period. This estimate is conservative, based on a drug leakage study conducted in 2013 and data from the Drug Theft Investigation Unit in the MOH (Sivertsen, 2013).

Full-Time Equivalent Analysis

A full-time equivalent (FTE) analysis was done to estimate the amount of HRH needed to reach HSSP II targets (see Figure 3). The OHT calculates the number of FTE health workers needed based on the number of services to be provided annually and the staff time requirements per service. If the costing team varied the types of interventions included or the intervention coverage targets, the number of services to be provided annually, and thus the number of FTE health workers needed annually, would change. Estimates of health worker time requirements for delivering interventions were based on estimates used in the previous OHT application and a literature review. The HSSP II costing team estimated the cost of HRH by multiplying the number of FTE health workers needed each year by the average annual salary by cadre. To check if there would be sufficient HRH to meet HSSP II targets, the team compared the FTE numbers

and costs to planned HRH scale-up and related salary costs from the HRH department within the MOH.

Figure 3. Full-Time Equivalent Analysis



*Number of health services provided per year depends on the scenario.

Validation and Prioritization Process

To ensure that the HSSP II is achievable and aligned with the country's top priorities, the HSSP II costing team led a validation and prioritization workshop that included MOH staff, development partners, and other key stakeholders, such as the Central Medical Stores Trust. The purpose was to prioritize targets and activities until the total HSSP II cost was within 25 percent of Malawi's projected resource envelope for health. The MOH selected the benchmark of 25 percent. Although the HSSP II should be realistic and operational, it should also reflect the sector's ambitions and be used to mobilize additional financial resources for health. The projected resource envelope was based on the health sector resource mapping exercise for FY 2014/15 to FY 2018/19, conducted by the MOH with technical assistance from Clinton Health Access Initiative (GOM, 2017c). This exercise involved collecting financial projections from more than 165 organizations.

The validation and prioritization workshop primarily consisted of four parts:

1. *Validating costing assumptions:* Working in small groups, workshop participants reviewed assumptions and targets to make sure they were accurate and reasonable. The small groups recommended changes to the HSSP II document and cost assumptions.
2. *Understanding resource requirements:* Through presentations and discussion sessions, participants gained a deep understanding of what is required from the health system to deliver the EHP and the largest cost drivers in the HSSP II. For example, participants analyzed the HRH requirements to achieve specific intervention targets.
3. *Comparing costs of different scenarios to available financial resources:* Workshop participants were guided through a process of reviewing four different scenarios defined by the MOH and making further adjustments to targets and activities so the HSSP II was achievable, given projections of available resources. Because the revised EHP was an important component of the HSSP II and already reflected prioritization of interventions in the health sector, HSSP II scenario development and prioritization focused primarily on how to lower costs to deliver the EHP (see Box 3).
4. *Selecting a final set of cost assumptions:* After reviewing the scenarios and the FTE analysis, participants discussed and decided on the final cost assumptions and results for inclusion in the HSSP II.

Box 3. EHP Considerations in HSSP II Prioritization

- HSSP II was developed alongside a revision of the EHP
- The EHP already reflects a prioritized set of interventions for the health sector
- Therefore, HSSP II prioritization focused on the following:
  - EHP intervention coverage
  - Program management costs
  - Cross-cutting health system costs

The MOH identified four scenarios to guide discussion at the validation and prioritization workshop (see Table 4). The scenarios had different assumptions and costs for commodities, HRH, and infrastructure; all other costs remained constant across scenarios. The final scenario selected for inclusion in the HSSP II was a slight modification of the "scale up EHP" scenario.

Table 4. HSSP II Prioritization Scenario Assumptions

Scenario	Description	Interventions included	Intervention coverage targets	HRH costs	Infrastructure costs	Ambition level
Full expression of demand	Costs as provided to costing team, by programs	165 interventions, as specified by programs	Scale-up, as specified by HSSP II and programs	FTE analysis (costs = demand)	Full Capital Investment Plan (CIP) costs	Most ambitious
100 percent EHP	Resource requirements for universal coverage of the EHP	66 interventions (EHP only)	100% coverage of EHP interventions for all years	FTE analysis (costs = demand)	Full CIP costs	Very ambitious
Scale up EHP	Gradual scale-up of EHP interventions	66 interventions (EHP only)	Scale-up of coverage of EHP interventions, as specified by HSSP II and programs	FTE analysis (costs = demand)	Prioritized CIP costs	Moderately ambitious
Status quo	Costs fit within fiscal space	66 interventions (EHP only)	Constant baseline coverage from 2017 to 2022	FTE analysis (costs = demand)	No facility construction or increase in ambulances; prioritized CIP renovation and equipment costs	Least ambitious
Final scenario for inclusion in HSSP II	Slight modification of the scale up EHP scenario for inclusion in the HSSP II	66 interventions (EHP only)	Scale-up of coverage of EHP interventions, as specified by HSSP II and programs	Based on government HRH targets (90% absorption rate)	Prioritized CIP costs	Moderately ambitious

Given the HSSP II focus on the EHP, all scenarios except for the most ambitious—the full expression of demand scenario—examined the costs for EHP interventions only. The rate of

scale-up of EHP services varied for the other three scenarios. Under the 100 percent EHP scenario, the assumption is that everyone in need of an EHP intervention each year would receive it. The MOH is interested in this scenario because the government must be able to cover the cost of all those potentially seeking EHP services—even if current coverage levels are low—if it aims to guarantee delivery of these interventions free of charge to all citizens. Under the scale up EHP scenario, intervention coverage gradually scales up from baseline levels to reach HSSP II coverage targets. The status quo scenario assumes constant coverage rates across all years.

Each scenario's HRH costs were based on an FTE analysis of how many health workers would be needed (demand) rather than the MOH's HRH targets (supply). The number of FTE health workers varied by scenario, depending on the types of interventions included and the coverage targets.

Infrastructure costs across scenarios were based on the Capital Investment Plan (CIP). The CIP activities, targets, and costs were derived from a census of all public and CHAM facilities in Malawi. Due to rapid scale-up of service provision under the full expression of demand and 100 percent EHP scenarios, the costing team assumed that all activities and costs in the CIP were required under these scenarios. For the scale up EHP scenario, the team assumed a prioritized CIP cost based on identification of the most critical new construction, rehabilitation, and medical equipment requirements by the MOH and stakeholders involved in creating the CIP. The status quo scenario assumed the same infrastructure costs as for the scale up EHP scenario, but without any costs for new construction.

3. Resources Available for the HSSP II

Budgeted health sector spending totaled US$607 million for FY 2015/16. This total reflects a 5 percent decline in resources available for the health sector from FY 2014/15, mostly due to reductions in funding from the Global Fund and the U.S. Agency for International Development. The majority (73%) of the funding available in FY 2015/16 was from development partners. However, the Government of Malawi has increased contributions to the health sector in nominal terms over the past three years as donor funding has declined, leading to domestic resources accounting for a larger proportion of overall health sector funding each year (GOM, 2017c). Even though the Government of Malawi has been increasing funding for health, a recent analysis indicates the government has limited capacity to increase fiscal space for health, primarily due to an unfavorable macroeconomic environment (World Bank, 2017; Chansa, unpublished; Health Policy Project, 2016b) (see Box 4).

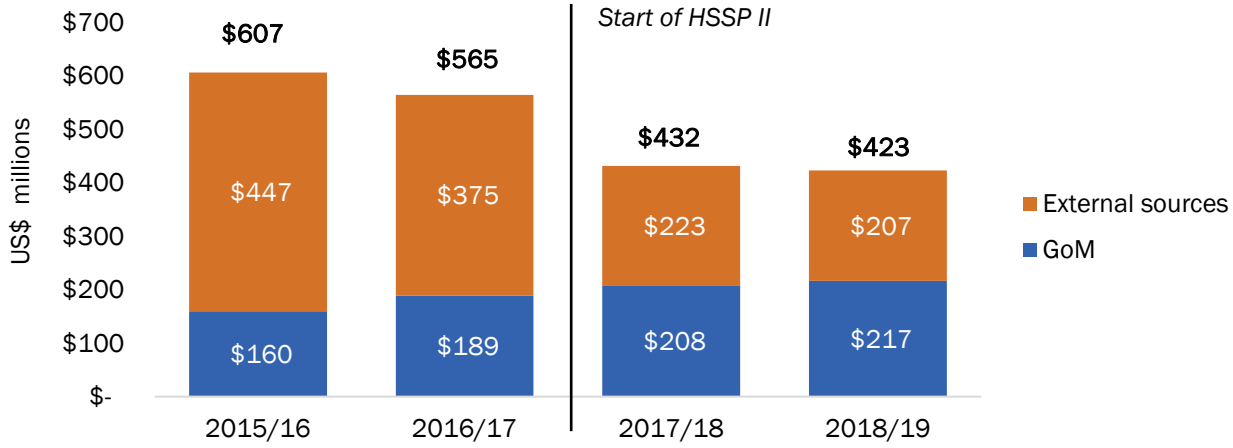
Box 4. Limited Fiscal Space for Health in Malawi

- **Macroeconomic outlook:** High fiscal deficit (4.3% of GDP) and total public debt (52% of GDP) make it difficult to increase social sector spending, even with moderate economic growth projected.
- **Prioritization of health:** Domestic financing for health as a percentage of GDP is higher than peer countries, suggesting there is limited room to increase health spending through re-prioritization of the budget.
- **Innovative financing:** Revenue generated annually from proposed earmarked taxes for health is estimated to equal just 10 percent of 2014/15 government health expenditure, meaning it is not a significant new source of funds for health (World Bank, 2017).

The total financial resources available to the health sector are projected to decline at the onset of HSSP II implementation (see Figure 4). These reductions are likely overestimated, as some development partners lack funding forecasts (GOM, 2017c). Still, the MOH and other stakeholders anticipate the trend of declining donor funding to continue. Therefore, the MOH decided to assume that fewer financial resources would be available during HSSP II implementation than in recent years. The HSSP II extends beyond the period of the resource mapping exercise; therefore, the HSSP II costing team, in agreement with the MOH, assumed constant funding levels from FY 2018/19 to 2021/22 for comparison purposes.

It is important to note that a significant portion of the budgeted resources are earmarked for specific health areas. For example, 63 percent of the US$162 million budgeted for commodity purchases in FY 2015/16 was earmarked for just four programs: HIV, TB, malaria, and immunization. These commodity earmarks represented 17 percent of the overall resource envelope for FY 2015/16. Given such earmarks, there may be limited capacity to reallocate funding to support aspects of HSSP II implementation.

Figure 4. Resources Available for the Health Sector, FY 2015/16–2018/19



Note: For FY 2017/18 and 2018/19, estimates of Global Fund contributions are included based on indicative allocations. These amounts are not confirmed or a part of the MOH resource mapping results.
Source: GOM, 2017c.

4. Scenario-Based Prioritization

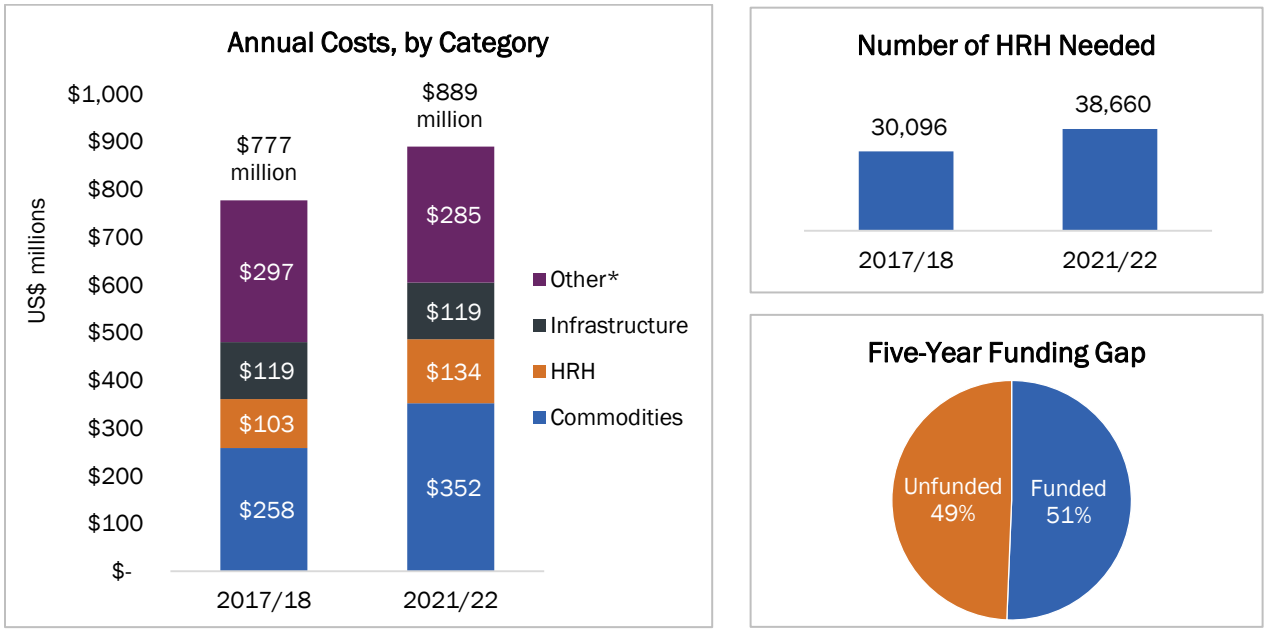
This section of the report describes the results for each of the four scenarios considered during the validation and prioritization workshop.

Full Expression of Demand Scenario

The full expression of demand scenario—the only scenario that includes interventions outside of the EHP—is the highest-cost scenario, requiring $4,197 million across all five years. Costs increase by 15 percent from FY 2017/18 to FY 2021/22 due to rapid scale-up of programmatic coverage of non-EHP interventions. For example, coverage of diabetes treatment, a non-EHP intervention, is expected to increase from just 22 percent in 2017 to 55 percent by 2022 under this scenario. Commodity costs are the largest cost driver, representing 40 percent of the total FY 2021/22 costs.

HRH and infrastructure costs are also significant, totaling $134 million and $119 million, respectively, in FY 2021/22 (see Figure 5). HRH costs are based on an FTE analysis of how many clinical health workers are needed to meet intervention targets. Under this scenario, 38,660 facility-based clinical health workers will be needed by the end of the HSSP II to meet service delivery targets. This number represents a significant increase over baseline numbers of clinical health workers employed in public and CHAM facilities. Infrastructure costs reflect the full cost of new construction, renovations, medical equipment, and other investments in the CIP.

Figure 5. Full Expression of Demand Scenario Costs, HRH Needs, and Funding Gap



* Other includes program management, health information systems, supply chain, health financing, and governance costs, which are the same across all scenarios.
Source: Costing estimates; GOM, 2017c.

Total five-year costs under the full expression of demand scenario are nearly double the projected resources available for the health sector. By analyzing funding gaps by strategic objective or health area, even larger gaps emerge. For instance, infrastructure costs under this scenario are nearly five times as much as the estimated resources available for infrastructure.

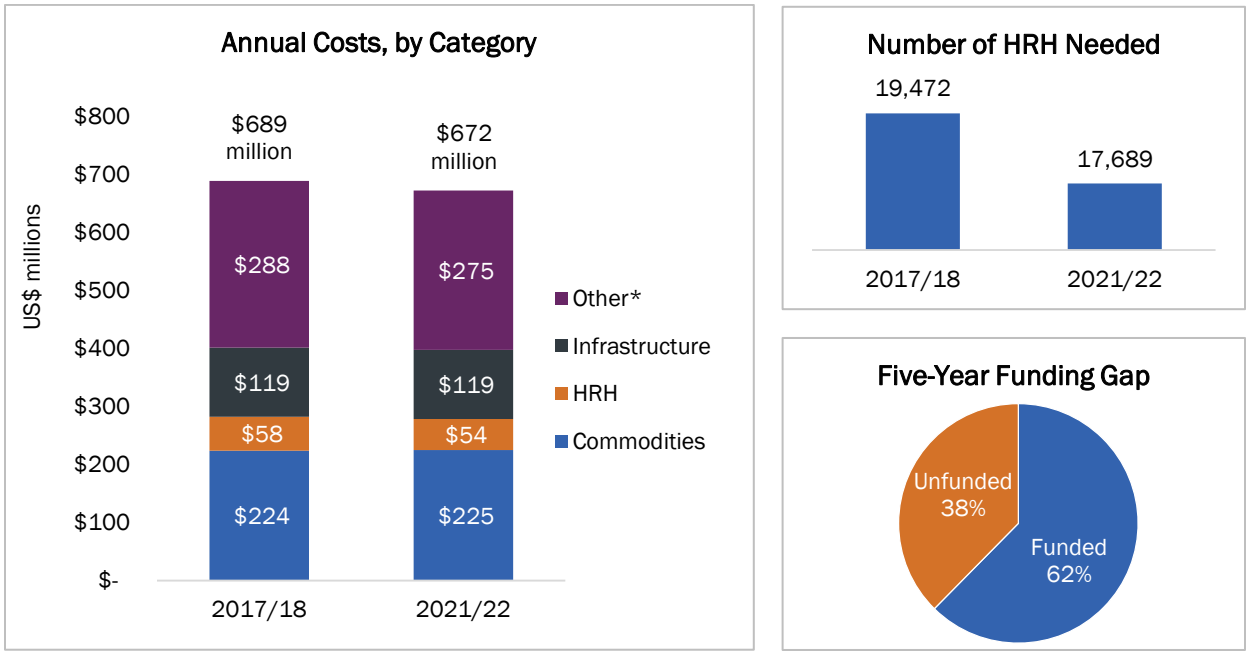
Stakeholders decided this scenario was not feasible financially and further justified the MOH decision to focus on delivering the EHP during HSSP II implementation.

100 Percent EHP Scenario

The 100 percent EHP scenario assumes that everyone in need of an EHP intervention will receive it each year, starting at the onset of the HSSP II. This scenario requires $3,407 million across all five years of the HSSP II, with costs decreasing over time from $689 million in FY 2017/18 to $672 million in FY 2021/22. Costs decrease over time since future need for EHP interventions goes down if the current need is met. For instance, the EHP scenario assumes the modern contraceptive prevalence rate will be 60 percent at the onset of the HSSP II, thereby reducing the number of pregnancies and need for maternal and newborn health interventions in the future.

Under this scenario, commodities account for a third of total costs (see Figure 6). Infrastructure costs are the second-highest cost area, representing approximately 18 percent of total costs, as full implementation of the CIP is assumed to be necessary to support rapid scale-up to 100 percent coverage of the EHP at the onset of the HSSP II. An estimated $54 million is needed for HRH in FY 2021/22 under this scenario, reflecting the need for 17,689 facility-based clinical health workers to provide EHP services for all those in need.

Figure 6. 100 Percent EHP Scenario Costs, HRH Needs, and Funding Gap



* Other includes program management, health information systems, supply chain, health financing, and governance costs, which are the same across all scenarios.
Source: Costing estimates; GOM, 2017c.

Based on projections of the resources available, about 38 percent of the total five-year costs under the 100 percent EHP scenario would be unfunded. Although it is unlikely that Malawi would be able to achieve 100 percent coverage of every intervention in the package, this scenario illustrates how guaranteeing free delivery of the EHP to all of those in need may be unobtainable in Malawi due to financial constraints. Improvements in efficiency, further prioritization of

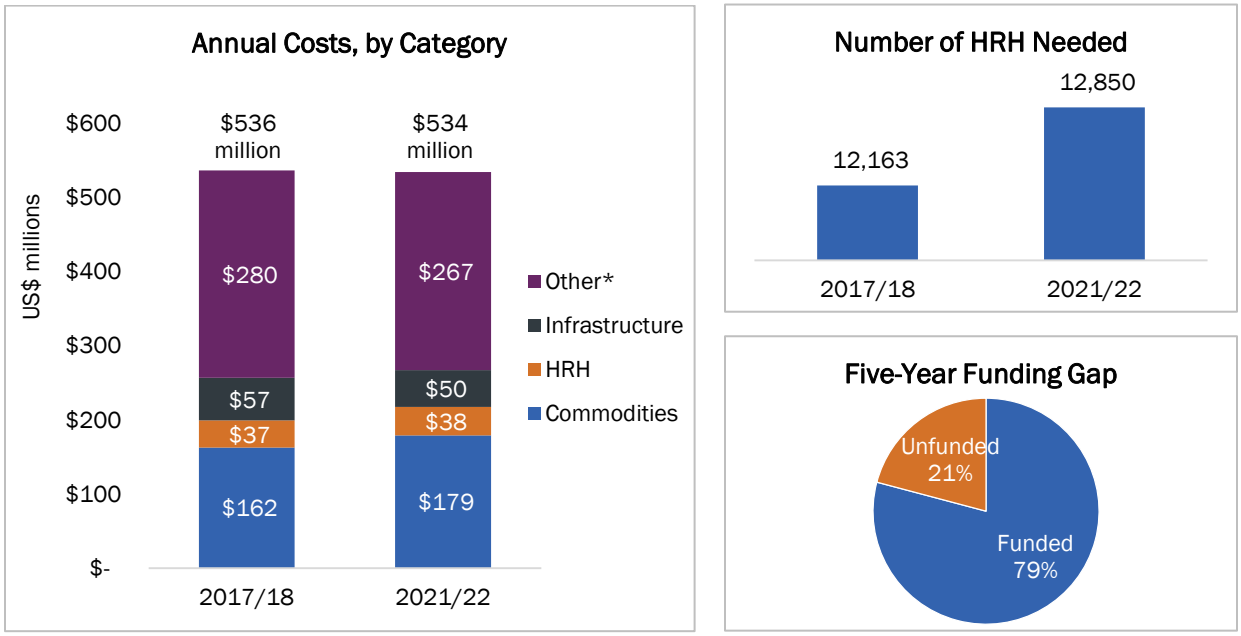
existing resources, and/or additional resources would need to be mobilized to implement this scenario.

Scale Up EHP Scenario

The scale up EHP scenario is another scenario that examines the costs of delivering only the EHP, but assumes gradual scale-up in coverage of each EHP intervention from baseline coverage rates to HSSP II targets for 2022. This scenario requires $2,527 million from FY 2017/18 to FY 2021/22. Costs stay relatively constant each year, but peak in FY 2018/19 due to planned infrastructure investments that year.

Commodity costs represent about one-third of total costs under this scenario, increasing from $162 million in FY 2017/18 to $179 million in FY 2021/22 (Figure 7). Infrastructure costs are the second-highest cost area, requiring $259 million across all years of the HSSP II. These costs are based on prioritization of the CIP, which reduces costs by more than half (56%) compared with full implementation of the CIP. HRH requirements under this scenario increase gradually over time due to presumed increases in EHP intervention coverage, resulting in the need for 12,850 clinical, facility-based health workers by 2022 and $38 million in HRH investment in FY 2021/22 to meet HSSP II EHP targets.

Figure 7. Scale Up EHP Scenario Costs, HRH Needs, and Funding Gap



* Other includes program management, health information systems, supply chain, health financing, and governance costs, which are the same across all scenarios.
Source: Authors' estimates; Government of Malawi, 2017c.

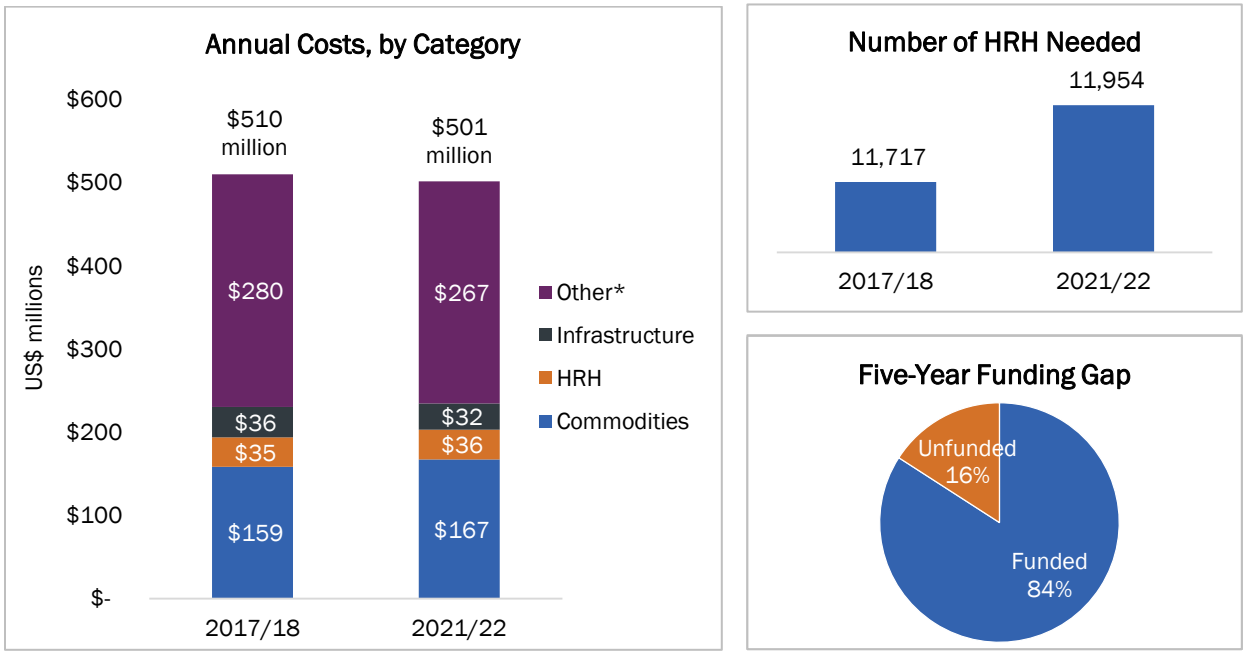
Under this scenario, just 21 percent of the costs are estimated to be unfunded according to resource availability projections. This figure is within the MOH target of 25 percent, meaning the MOH may be able to implement activities under this scenario if additional resources are mobilized and efficiency gains made.

Status Quo Scenario

The status quo scenario—the least ambitious and lowest-cost scenario—examines the costs of delivering the EHP at current coverage levels for all five years of the HSSP II. The total cost of this scenario is $2,125 million from FY 2017/18 to FY 2021/22. Costs are the highest in FY 2017/18 under this scenario, due to planned program management activities during the first year of the HSSP II. From FY 2018/19 to FY 2021/22, costs stay relatively constant.

Commodities account for approximately one-third of the total costs and increase slightly from $159 million in FY 2017/18 to $167 million in FY 2021/22 (see Figure 8). Commodity costs increase slightly under this scenario due to underlying increases in population size, particularly as the modern contraceptive prevalence rate stays at current levels throughout HSSP II implementation under this scenario. This scenario requires the fewest number of health workers (11,954 facility-based clinical workers in 2022) and HRH resources (at $36 million in FY 2021/22). Infrastructure costs are about $32 million by the end of the HSSP II under this scenario, as it assumes no investment in new construction.

Figure 8. Status Quo Scenario Costs, HRH Needs, and Funding Gap



* Other includes program management, health information systems, supply chain, health financing, and governance costs, which are the same across all scenarios.
Source: Costing estimates; GOM, 2017c.

The status quo scenario is the most affordable option, with a projected financing gap of just 16 percent across all five years, assuming overall health sector funding levels during HSSP II implementation will be lower than in recent years. However, stakeholders agreed the status quo scenario does not reflect sufficient ambition for the HSSP II, particularly as it would not lead to improved service quality or health outcomes.

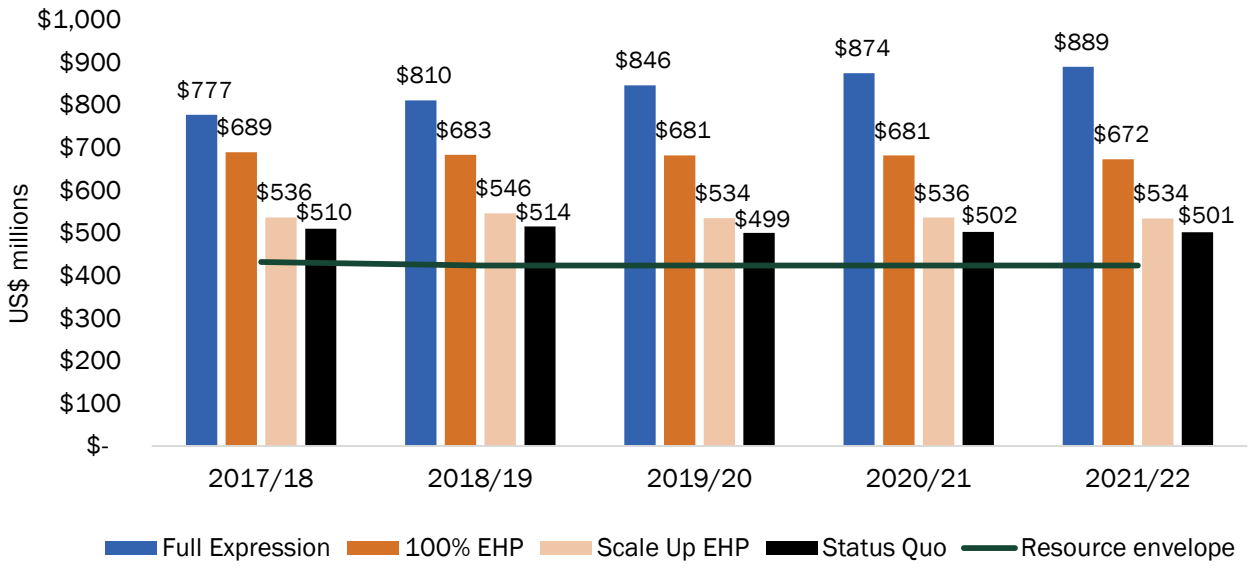
Cross-Scenario Comparisons

Total costs vary widely across scenarios. The full expression of demand scenario costs much more than all of the others, as it is the only one that estimates the costs of interventions outside

of the EHP. Commodity costs for this scenario are nearly double the cost, or $185 million more, than the status quo scenario due to non-EHP interventions being included. Differences in HRH and infrastructure costs across scenarios are even larger, with the full expression of demand scenario requiring 3.7 and 3.8 times as much as the status quo scenario for HRH and infrastructure, respectively.

HSSP II costs exceed the resources available for the health sector across all four scenarios developed for HSSP II prioritization (see Figure 9). Even under the status quo scenario, which reflects minimal new investments and constant coverage of EHP interventions, HSSP II costs in FY 2021/22 are 18 percent higher than the projected resources available for that year due to presumed decreases in external financing during the HSSP II compared with more recent years.

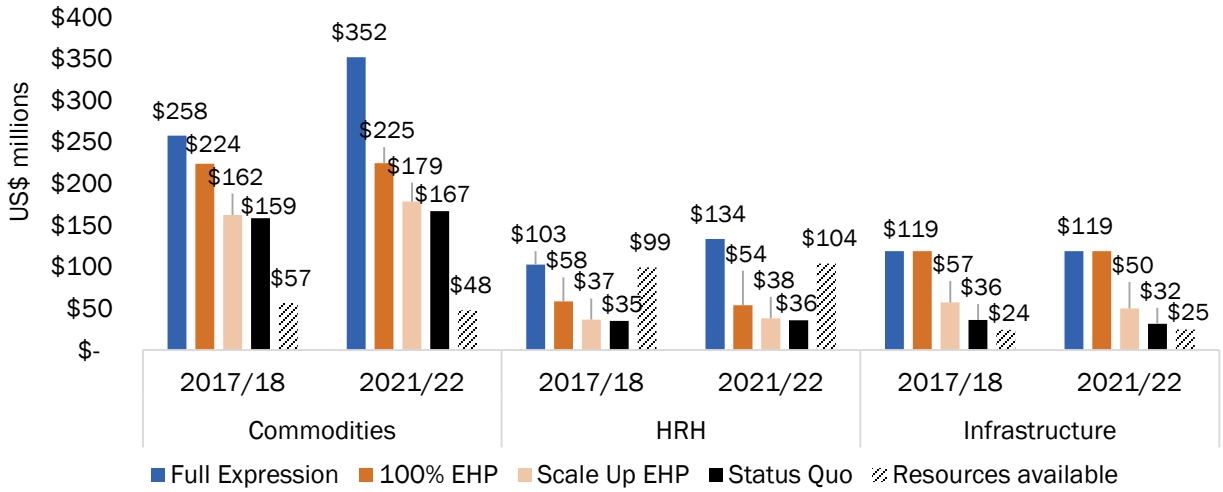
Figure 9. HSSP II Prioritization Scenarios versus Resources Available, FY 2017/18–2021/22



Source: Costing estimates; GOM, 2017c.

Funding gaps by cost scenario for the three highest-cost areas—commodities, HRH, and infrastructure—are shown in Figure 10. Commodity costs exceed the resources available across all scenarios. However, the projected funding available for commodities in FY 2017/18 is just one-third of the resources available in FY 2015/16. If commodity funding is maintained at FY 2015/16 levels, there would be sufficient commodity funding to reach coverage targets under the scale up EHP and status quo scenarios. HRH funding projections are adequate to cover demand for HRH under the 100 percent EHP, scale up EHP, and status quo scenarios. However, it was estimated that there is insufficient HRH funding to reach service delivery targets under the full expression of demand scenario. Funding available for infrastructure has decreased each year since FY 2013/14, primarily due to decreases in donor funding. In FY 2013/14, donors allocated $37 million for infrastructure projects; just $17 million was allocated in FY 2015/16 (GOM, 2017c). Projections of infrastructure spending, inclusive of medical equipment, reveal a funding gap ranging from 48 percent to 388 percent, depending on the scenario.

Figure 10. Commodity, HRH, and Infrastructure Costs by Scenario versus Resources Available, FY 2017/18–2021/22



Source: Costing estimates; GOM, 2017c.

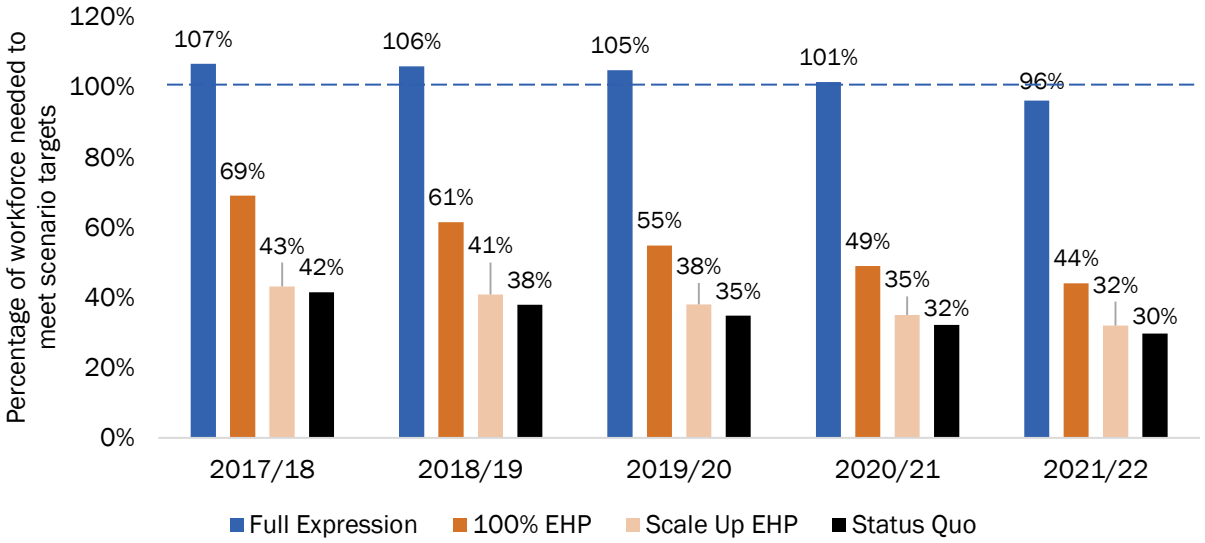
To check whether there is a sufficient number and mix of HRH to meet service delivery targets under each scenario, the costing team compared the number of FTE direct service providers needed annually by cadre and scenario to the projected supply. The projected supply is based on targets set by the HRH department in the MOH. These targets are based on current staffing levels, attrition trends, projected outputs from pre-service education institutions, and a targeted absorption rate of 90 percent. Under this scale-up plan, Malawi aims to increase the number of public HRH by 34 percent from FY 2017/18 to FY 2021/22 (GOM, 2017a).

A clear HRH gap exists for implementing the full expression of demand scenario, with more than 100 percent of the planned HRH needed to deliver services under that scenario across all years except FY 2021/22 (see Figure 11). This finding means the service delivery targets under this scenario may not be achievable, given HRH production and absorption constraints. Although the overall number of HRH planned to be employed in the public sector and CHAM in Malawi may be sufficient to meet targets under the other three scenarios, there are two issues to consider:

1. **Gaps remain for specific cadres.** The FTE analysis estimates the number of health workers needed by cadre based on who can safely and effectively provide specific interventions. This analysis reveals a mismatch in the demand for and planned supply of specific cadres. For instance, there is a shortage of medical officers required to meet service delivery targets across all scenarios.

2. **HRH in Malawi will still continue to deliver services outside of the EHP.** Since the 100 percent EHP, scale up EHP, and status quo scenarios estimate HRH requirements only for delivering the EHP, there should be an excess of health workers available under these scenarios to continue provision of services outside of the EHP. Significant proportions of the health workforce, ranging from 30 percent to 69 percent, depending on the scenario and year, are needed just for EHP service delivery, meaning Malawi may face HRH constraints for delivering the EHP, particularly at the onset of the HSSP II.

Figure 11. Percentage of Planned Clinical, Facility-Based HRH Needed to Meet Targets under Each Scenario, FY 2017/18–2021/22



Note: More than 100 percent means scenario may not be feasible. Less than 100 percent means scenario may be feasible, but there is a need to consider demand for other services not accounted for in the scenario.
Source: Costing estimates; GOM, 2017a.

After reviewing HSSP II health sector needs, cost assumptions, and financial and health system constraints, the MOH and other health sector stakeholders chose the scale up EHP scenario as the most realistic one that also reflects HSSP II priorities (see Box 5 for assumptions). During the HSSP II prioritization workshop, the MOH further refined the assumptions and targets under this scenario. The MOH reduced some of the costs by identifying and removing duplication of activities. For instance, disease-specific training for health surveillance assistants were removed because the HSSP II costs included an integrated training for all such assistants under objective 2. The integrated training is not only more efficient, but also less expensive than having multiple disease-specific trainings. Significant cost savings were also achieved by revising assumptions for or eliminating non-priority activities. For example, program management costs for HIV were reduced by half when the costing team removed activities that directly supported interventions outside the scope of the EHP, such as health worker training for voluntary medical male circumcision. No changes were made to program coverage targets for EHP interventions; targets from the HSSP II were deemed reasonable, given past trends and funding available. Similarly, the team used existing HRH scale-up plans in the final HSSP II costing because these HRH targets were deemed both feasible and sufficient to deliver the EHP under the scale up EHP scenario.

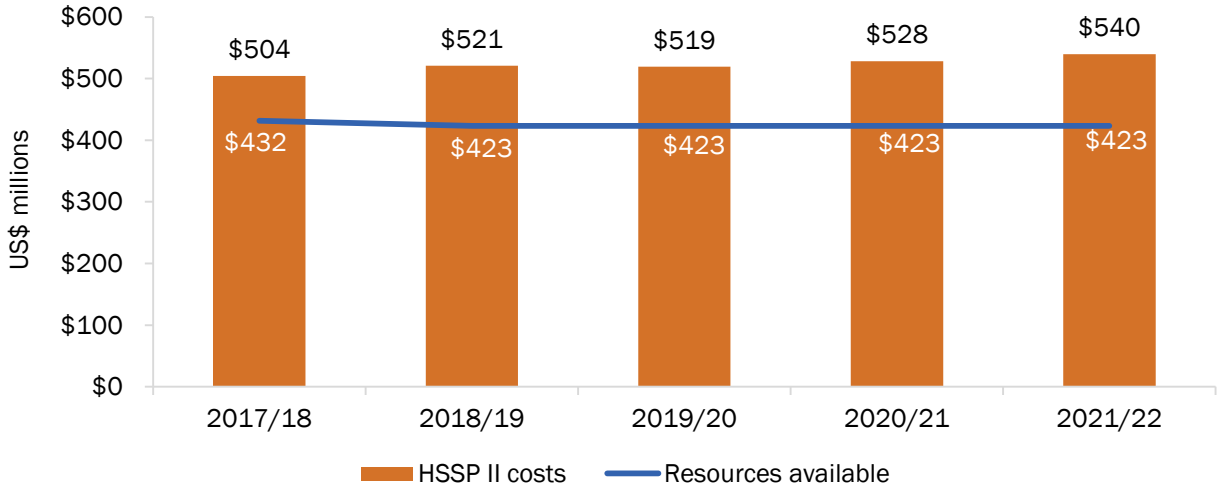
Box 5. Final HSSP II Cost Assumptions

- **EHP:** Only EHP interventions included; assumed gradual scale-up in coverage.
- **HRH:** Based on MOH HRH projections and a targeted 90 percent absorption rate by the end of the HSSP II.
- **Infrastructure:** Prioritized investments in construction, rehabilitation, and medical equipment according to greatest needs in the CIP.

5. Final HSSP II Resource Requirements

The final, prioritized HSSP II cost scenario focuses on delivering the EHP and reflects the prioritized CIP, scale-up of HRH in line with MOH targets, and the costs of other activities needed to achieve the eight HSSP II strategic objectives. This scenario requires $2,613 million across all five years, with costs increasing from $504 million to $540 million from FY 2017/18 to FY 2021/22. Given projections of overall resources available for the health sector, the costing team estimates an overall funding gap of about $488 million, or 19 percent of the HSSP II resource requirements (see Figure 12). This gap is within the MOH target of 25 percent. Further mapping of the HSSP II costs and the resources available annually is needed to estimate the funding gap by health area and activity, which can be used to inform resource allocation decisions.

Figure 12. Annual HSSP II Resource Requirements versus Funding Available



Source: Costing estimates; GOM, 2017c.

HSSP II costs by objective are shown in Table 5. A majority (58%) of total five-year HSSP II costs is for EHP commodities and program-specific management costs under HSSP II objective 1. HRH costs under objective 4 and infrastructure costs under objective 3 account for another quarter and 10 percent of total HSSP II resource requirements, respectively. The remaining objectives account for 3 percent or less of the total HSSP II resource requirements. Due to the significant costs of EHP service delivery, HRH, and infrastructure, the following sections further detail the cost assumptions and results for these three areas.

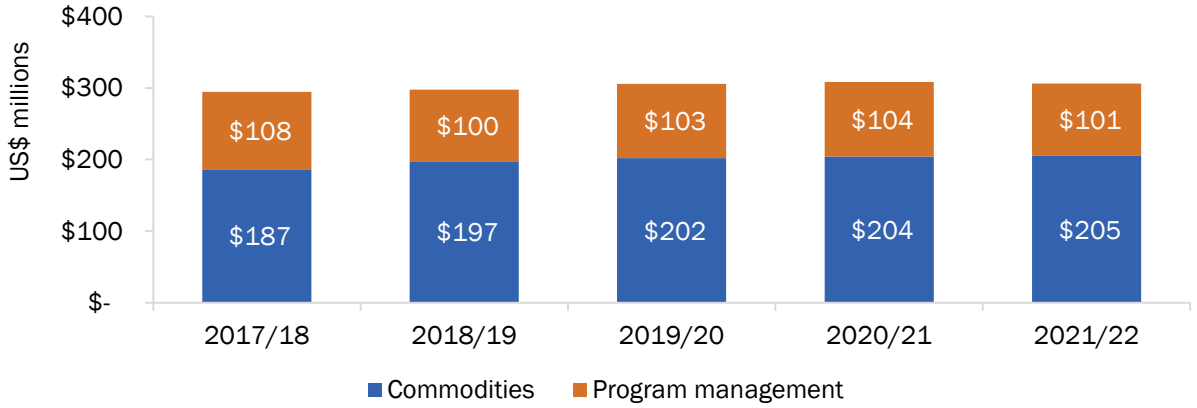
Table 5. Annual HSSP II Costs, by Strategic Objective

Strategic objective	Included in cost	2017/18	2018/19	2019/20	2020/21	2021/22
1. EHP	EHP commodities (including wastage) and program management activities, such as program-specific in-service training, supervision, monitoring and evaluation, etc.)	$294,352,308	$297,448,601	$305,397,705	$308,073,133	$306,074,548
2. Social determinants of health	Strategies to address social risk factors and environmental health, including investments in supplies for community-based health workers	$13,513,103	$14,913,209	$16,344,148	$17,864,932	$19,391,192
3. Infrastructure	Facility construction and rehabilitation and medical equipment under the CIP, and infrastructure support activities (e.g., planned preventive maintenance)	$58,028,263	$62,932,476	$45,587,308	$44,497,885	$50,280,432
4. HRH	HRH salaries, pre-service training, and administrative costs to meet government HRH targets, including costs for recruitment activities	$115,118,437	$124,189,837	$131,690,679	$139,674,718	$148,298,405
5. Medicines/supply chain	Activities related to improving regulation, procurement, warehousing, distribution, and rational use of medicines from the Pharmaceutical Strategic Plan	$5,667,415	$5,305,178	$5,108,467	$2,995,237	$646,396
6. Health information systems	Activities related to sector-wide routine data management and use, monitoring and evaluation, reporting, research, and information and communications technology	$15,361,159	$14,947,812	$14,714,758	$14,573,791	$14,595,331
7. Leadership and governance	Activities related to organization and management, coordination, financial management, health reform implementation, regulation, and public-private partnerships	$2,220,287	$1,307,180	$644,491	$644,491	$638,869
8. Health financing	Activities related to improving health financing functions, including establishing new mechanisms (e.g., health fund) or generating evidence (e.g., National Health Accounts)	$44,822	$18,198	$10,198	$10,198	$10,198

Costs in Support of EHP Service Delivery

Objective 1 costs stay relatively constant each year, increasing slightly from $294 million in FY 2017/18 to $306 million in FY 2017/18 (see Figure 13). Commodity costs, including wastage, gradually increase each year due to scale-up in coverage of EHP interventions. The programs with the largest growth in commodity resource needs from 2017/18 to 2021/22 are oral health (111% increase), mental health (79%), and TB (20%). Overall, commodity wastage across all programs and years of the HSSP II is estimated to cost $148 million. Program management costs are the highest in the first year of HSSP II implementation, reflecting investment in activities such as monitoring and evaluation ($12 million in FY 2017/18) and in-service training ($11 million) at the onset of the strategic plan. For program management, the highest-cost programs are HIV ($238 million from 2017/18 to 2021/22), TB ($71 million), and reproductive, maternal, newborn, and child health (RMNCH) ($61 million).

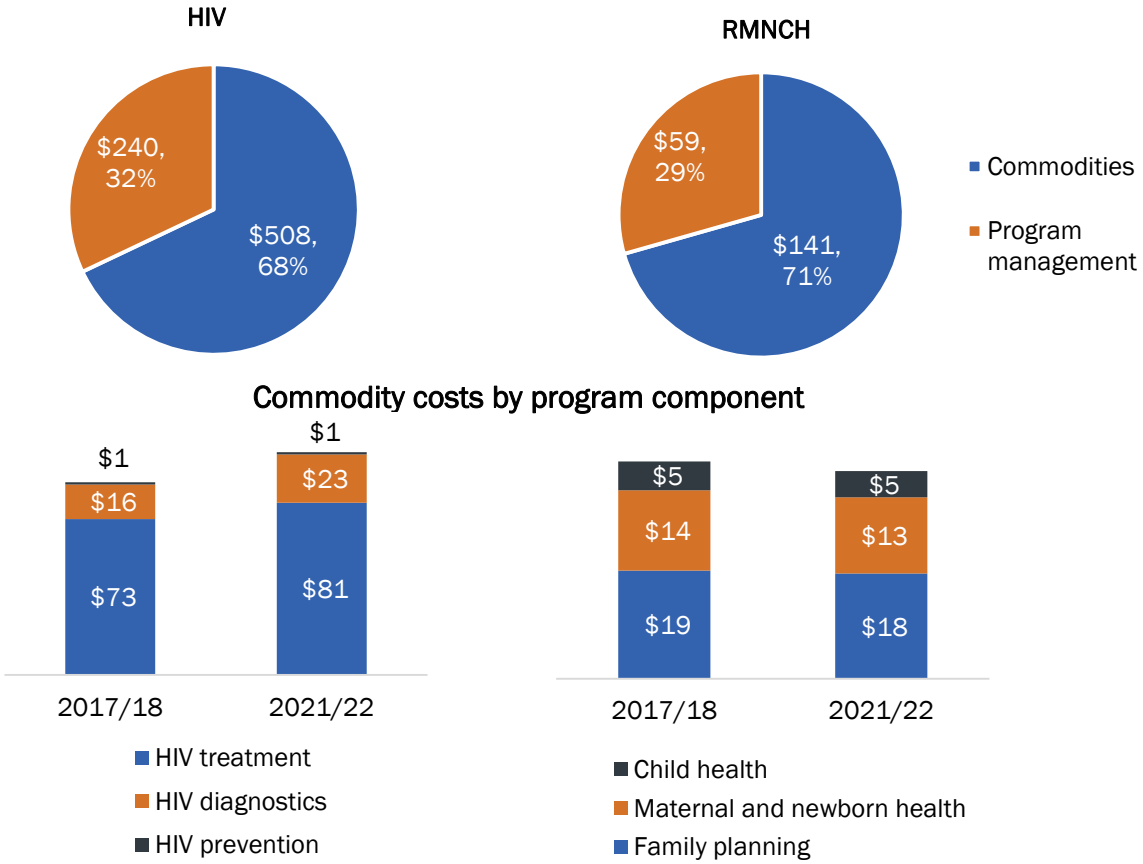
Figure 13. Commodity and Program Management Costs, FY 2017/18–2021/22



Note: Commodity costs include wastage.
Source: Costing estimates.

HIV is the highest-cost program, requiring $748 million across all five years of the HSSP II and accounting for 49 percent of objective 1 costs. HIV costs increase from $92 million in FY 2017/18 to $106 million in FY 2021/22, primarily due to increases in antiretroviral therapy coverage over time. RMNCH, the second highest-cost program, requires $200 million across all five years, with costs decreasing slightly over time due to a more cost-efficient family planning method mix and reduced need for maternal and newborn health interventions as family planning is scaled up. For instance, even though total family planning costs decrease slightly over time, the estimated number of family planning users increases from 4.1 to 4.5 million. Figure 14 shows the costs for these two programs in more detail.

Figure 14. HIV and RMNCH Costs (US$ Millions), FY 2017/18–2021/22

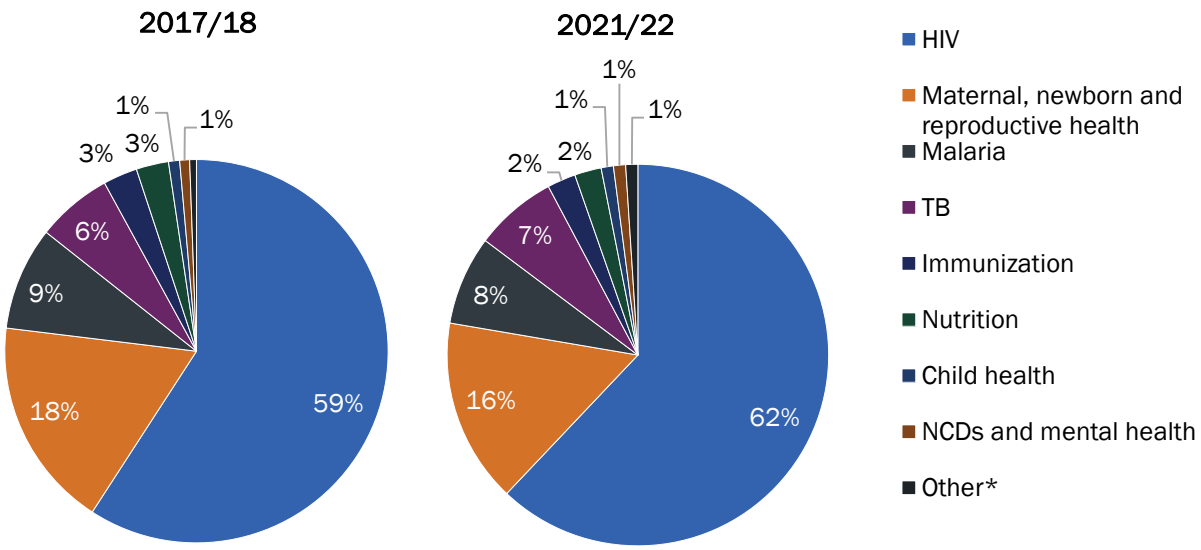


Source: Costing estimates.

EHP Commodity Costs

Four health programs account for 92 percent of total HSSP II commodity costs: HIV, RMNCH, malaria, and TB (see Figure 15). HIV and TB commodity costs increase by 15 percent and 20 percent, respectively, from FY 2017/18 to FY 2021/22. For the HIV program, this increase is driven by planned scale-up of antiretroviral therapy coverage for all people living with HIV from 69 percent to 81 percent from 2016 to 2022. Antiretroviral therapy accounts for 78 percent of overall HIV commodity costs; commodities for HIV counseling and testing account for another 19 percent. For TB, the cost increase is a result of increased resource needs for diagnostic testing; the commodity costs for conducting TB laboratory tests are estimated to increase by 22 percent from 2017/18 to 2021/22. The great majority (85%) of TB laboratory test costs are for microscopy tests.

Figure 15. EHP Commodity Costs by Health Program, FY 2017/18 and FY 2021/22



* Other includes interventions for oral health, neglected tropical diseases, and respiratory conditions.
NCDs = noncommunicable diseases.
Source: Costing estimates.

Commodity costs are projected to decline slightly for the malaria and RMNCH programs. Commodity costs for malaria decline due to presumed decreases in malaria incidence among adults as Malawi scales up preventive interventions, such as the use of long-lasting insecticide-treated bed nets and indoor residual spraying. However, these assumptions may be optimistic as only one preventive intervention—intermittent preventive therapy for pregnant women—is included in the EHP, meaning there may be insufficient funds to cover the cost of other preventive interventions unless donor funding and out-of-pocket payments cover them. Costs decrease for RMNCH programs over time due to an increase in the modern contraceptive prevalence rate among women ages 15 to 49 from 43.2 percent to 60 percent from 2016 to 2020, which results in declines in the number of pregnancies and births each year and thus the need for maternal and newborn interventions. Even though the projected need for these interventions declines over time, Malawi plans to scale up coverage of them. In fact, it has set ambitious maternal and newborn health coverage targets, with some interventions targeting 100 percent coverage of all those in need of the intervention by the end of the HSSP II. For instance, the number of newborns receiving treatment for newborn sepsis is estimated to decrease from 58,088 in 2017 to 54,108 in 2022; this decrease is driven by a projected decrease in the number of newborns each year, but the numbers receiving treatment are based on a presumed increase in treatment coverage from 81 percent to 100 percent in the same timeframe.

Although programs have different rates of scale-up and there are projected changes to underlying population size and disease burden each year that affect cost projections, the proportion of EHP commodity costs distributed across programs stays relatively constant across all years of the HSSP II (see Figure 13 previously). There is not a significant shift in costs across programs due to the types of interventions included in the EHP. For instance, interventions related to treating cardiovascular disease, diabetes, and cancer—conditions on the rise in Malawi—are excluded from the EHP due to the high costs of noncommunicable disease curative interventions and financing constraints. Given that Malawi is experiencing a rise in noncommunicable disease prevalence and current treatment coverage is low, inclusion of these

interventions in the EHP costing would have had a significant impact on the overall HSSP II costs and distribution of resource requirements across health programs over time.

Commodity cost assumptions and results for the top 10 highest-cost EHP interventions are shown in Table 6. Antiretroviral therapy, the highest cost intervention, accounts for nearly half of the total five-year commodity costs, primarily due to the relatively high unit cost of treatment per person per year. Overall antiretroviral therapy costs increase over time as the cost analysis assumes that Malawi will meet the 90-90-90 target of 81 percent of all people living with HIV on treatment by 2022. The second highest-cost intervention in the HSSP II is HIV counseling and testing; costs increase by about 50 percent across the HSSP II period due to the program's ambitious plan to identify 90 percent of all people living with HIV by 2020 through increased provider-initiated counseling and testing, targeted outreach testing for vulnerable and key populations, and a focus on scaling up pediatric and confirmatory testing.

Table 6. Commodity Costs for Top 10 Highest-Cost EHP Interventions

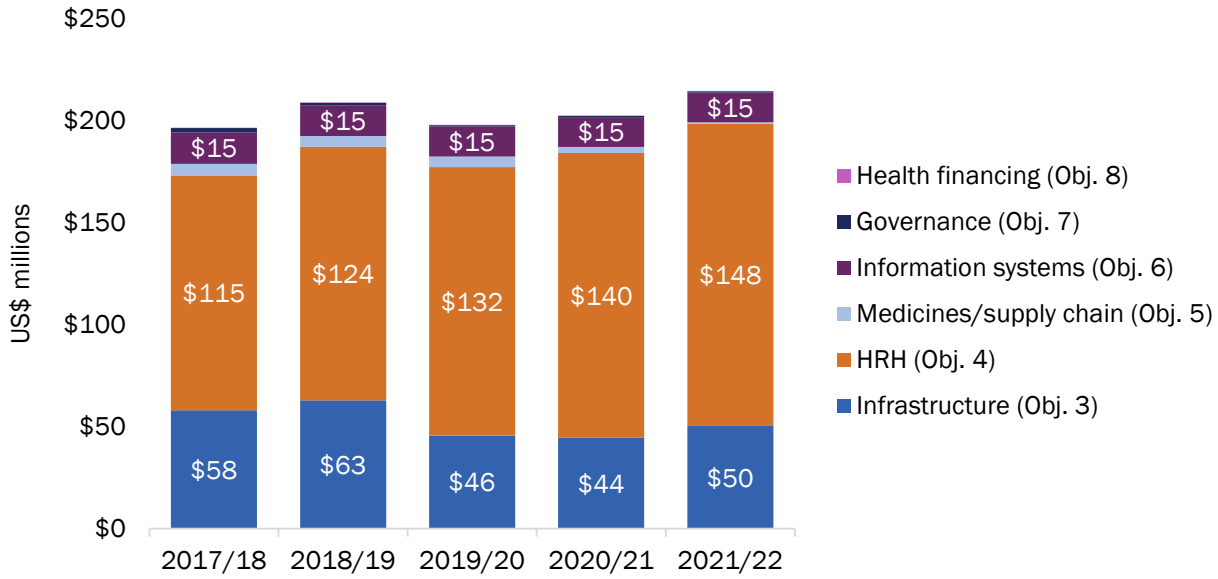
Intervention	Number reached		Unit cost (US$)	Total costs (US$)	
	2017	2022		FY 2017/18	FY 2021/22
Antiretroviral therapy	724,545	797,323	$97–$102*	$73,468,555	$81,068,135
HIV counseling and testing	2,641,390	4,428,512	$5	$14,784,847	$21,278,424
Female sterilization	847,740	769,516	$20	$16,131,224	$15,074,357
Microscopy test for TB diagnosis	450,888	650,383	$14	$7,257,546	$9,006,596
Uncomplicated malaria treatment (children < 15 kg)	173,469	198,821	$23	$4,125,010	$4,637,255
Uncomplicated malaria treatment (children > 15 kg)	120,546	138,164	$24	$2,972,399	$3,341,512
Uncomplicated malaria treatment (adults > 36 kg)	1,658,481	1,084,748	$2	$3,238,618	$2,179,673
Viral load testing	338,867	357,680	$8	$2,659,371	$2,694,513
Vaginal delivery, skilled attendance	586,843	518,440	$4	$2,487,930	$2,228,228
Maternal sepsis case management	45,161	43,219	$52	$2,310,228	$2,206,388

* Antiretroviral therapy costs include drug costs for adult, pediatric, and prevention of mother-to-child transmission patients. Average antiretroviral therapy unit costs vary each year due to changes in regimen mix over time.

Health System Resource Requirements

Health system costs, which include the cost of HRH, infrastructure, logistics, health information systems, health financing interventions, and governance activities under HSSP II objectives 3 to 8, represent 39 percent of the five-year HSSP II resource requirements. Health system resource requirements are approximately the same for each year of the HSSP II, totaling $196 million in 2017/18 and $214 million in 2021/22 (see Figure 16). HRH costs are the only health system costs estimated to increase over time.

Figure 16. HSSP II Health System Costs

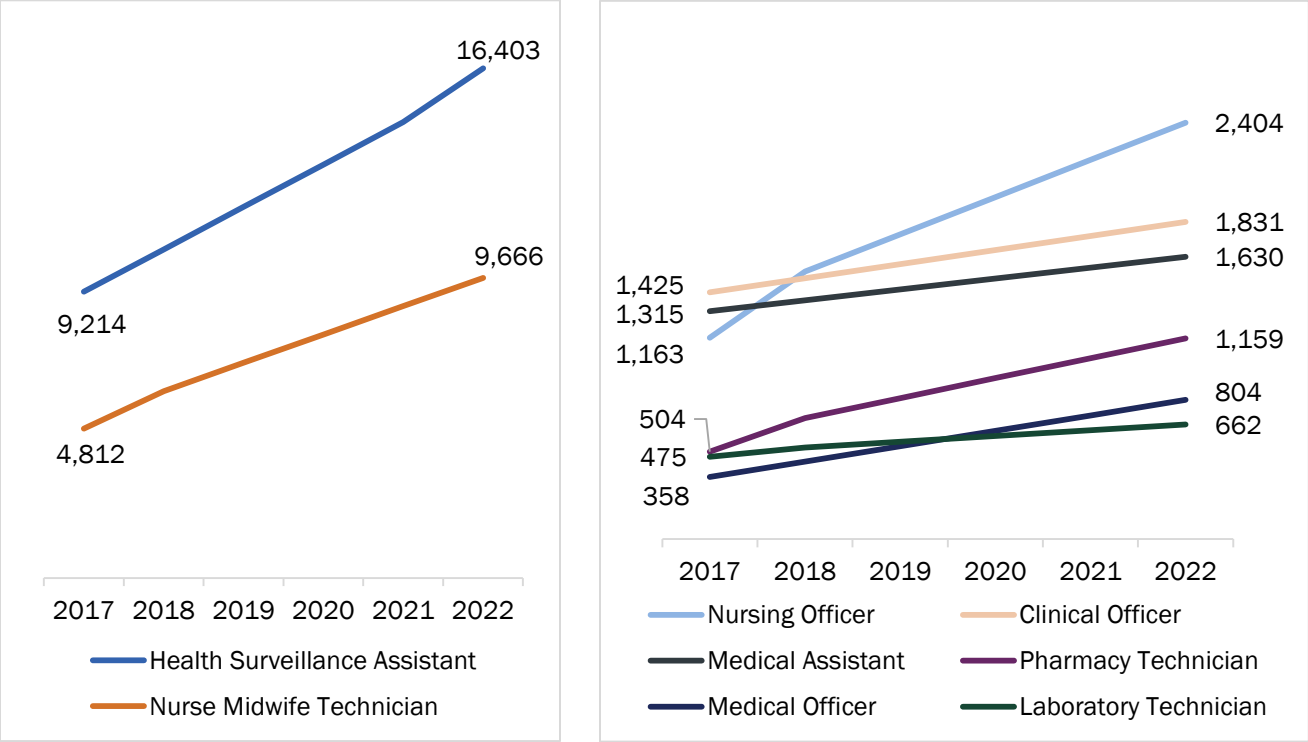


Source: Costing estimates.

Human Resources for Health

HRH is the highest-cost health system component in the HSSP II. These costs represent a quarter of total HSSP II resource requirements, increasing from $115 million in FY 2017/18 to $148 million in FY 2021/22. About 64 percent of HRH costs are for HRH salaries; this reflects scale-up in recruitment of key service providers in the community and public and CHAM facilities, and assumes that average real salaries remain constant during HSSP II implementation (see Figure 17). The remaining HRH costs under HSSP II objective 4 are for pre-service training (7% of total HRH costs) and HRH administrative costs (29%), including costs associated with recruiting health workers, conducting integrated supportive supervision visits, conducting annual performance review appraisals, and holding quarterly review meetings.

Figure 17. HSSP II HRH Targets for Select Cadres



Source: GOM, 2017a.

Overall, the HSSP II aims to increase the number of HRH from 33,387 in 2017 (baseline estimate based on iHRIS software and personnel emoluments data) to 48,678 in 2022. This increase is only for select cadres; the HSSP II assumes the number of HRH in other cadres not specified in Figure 17, including non-clinical cadres, will remain constant from 2017 to 2022. The largest planned increase in absolute numbers of HRH is for health surveillance assistants; the MOH plans to hire an additional 7,189 assistants from 2017 to 2022 under the National Community Health Strategy to work toward meeting the target of having one health surveillance assistant for every 1,000 population in Malawi (GOM, 2017b). If the MOH meets its HSSP II recruitment target for health surveillance assistants, that cadre will account for approximately 34 percent of the health workforce and 23 percent of the estimated total HRH salary cost by the end of the HSSP II.

For select facility-based cadres, Malawi is targeting absorption of 90 percent of the projected output from health training colleges by 2022, which means the number of medical officers, nursing officers, nurse midwife technicians, and pharmacy technicians working in public or CHAM facilities would more than double from 2017 to 2022. After health surveillance assistants, nursing officers and enrolled nurses/nurse technicians are projected to account for the largest shares of projected HSSP II salary costs from 2017/18 to 2021/22 at approximately 16 percent each.

The increased recruitment of these facility-based cadres translates into a significant increase in the number of doctors, nurses, and midwives per 10,000 population, from 3.08 in 2017 to 5.7 in 2022. Although these recruitment targets are ambitious, the planned increase falls short of the HSSP II target of 6.4 doctors and nurses per 10,000 people by 2022, and is still significantly below the World Health Organization-recommended minimum threshold of 23 doctors, nurses, and midwives per 10,000. Further, even if Malawi meets its recruitment targets, there are

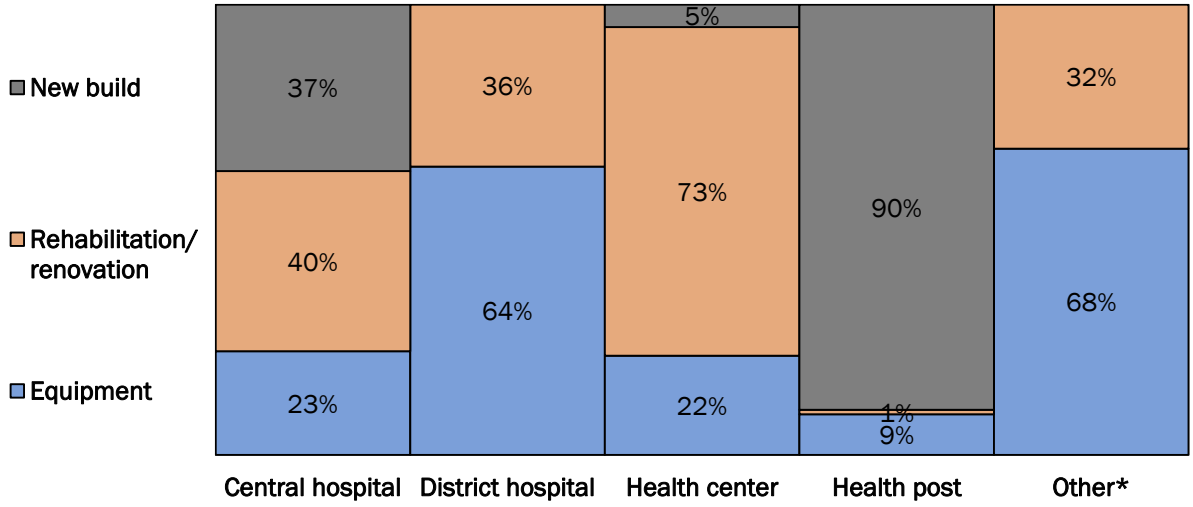
projected shortages of specific cadres, including medical officers and laboratory technicians (56% gap for each in 2022), in meeting EHP service delivery targets. Other analyses indicate that the overall HRH gap to meet demand for all health services, including services outside of the EHP, could range from 0 to 47 percent in 2022 (GOM, 2017a). There is considerable variance in demand estimates across studies, leading to a large range in estimates of the HRH gap.

Infrastructure

Infrastructure costs, captured under HSSP II objective 3, include the costs of prioritized investments related to new construction, renovations, and equipment from the CIP, and the costs of conducting infrastructure-related activities throughout HSSP II implementation, including training biomedical engineers and other equipment users on how to use equipment properly. As discussed previously, the CIP was based on a facility census that revealed gaps and needs in public sector and CHAM infrastructure investments. To address all of the issues identified in the facility census, an estimated $750 million would be needed across five years. However, the resource mapping exercise suggests 80 percent of this amount may be unfunded (GOM, 2017c). Due to these funding constraints and competing priorities, the MOH and other stakeholders selected the top infrastructure priorities to reduce the costs of infrastructure for the HSSP II.

HSSP II infrastructure costs across all five years are estimated to be $261 million. Although this amount still exceeds projections of the resources available, it is approximately one-third of the original CIP resource requirements. Infrastructure costs are highest within the first two years of HSSP II implementation—totaling $58 million and $63 million in 2017/18 and 2018/19, respectively—primarily due to up-front investment in equipment. Overall, the prioritized CIP calls for near-equal investment across construction, renovation, and equipment. However, the focus is on investments in renovation and equipment for all facility types other than health posts (see Figure 18).

Figure 18. Prioritized CIP Costs by Facility Type and Cost Category, 2017/18–2021/22



* Other includes clinics, dispensaries, hospitals other than central and district hospitals (e.g., mental hospital), and training centers.
Source: GOM, unpublished.

Planned investments in health posts exceed investments in any other facility type; they represent 31 percent of the total infrastructure resource requirements. Approximately $73 million, or 90 percent of health post resource requirements, is needed from 2017/18 to 2021/22 to construct new health posts and community health worker housing units to meet the Community Health Strategy target of having 900 health posts supporting integrated community health service delivery in hard-to-reach areas.

Renovation of facilities from 2017/18 to 2021/22 is estimated at about $80 million. The largest proportion of renovation investments is for health centers, totaling $30 million from 2017/18 to 2021/22. Malawi plans to spend approximately $85 million during HSSP II implementation on equipment. District hospitals account for the largest proportion of equipment investments, at $32 million across all five years of the HSSP II.

6. Discussion

The OHT costing exercise provided an evidence base for revising the EHP and developing HSSP II targets and activities. Through an inclusive and comprehensive process, the MOH and other stakeholders identified the most essential interventions and activities for reaching the country's health goals, and prioritized the rate of scale-up in EHP intervention coverage and the types of health system investments required for inclusion in the HSSP II. Stakeholders analyzed cost drivers, intervention cost-effectiveness, and financing and health system constraints to derive the final HSSP II strategies and related financial resource requirement projections.

An estimated $2,613 million is needed from 2017/18 to 2021/22 to achieve the eight HSSP II objectives; the majority (58%) of these resource requirements are for commodity and program costs in support of delivering the EHP. The highest-cost individual programs include HIV (49% of five-year total costs), RMNCH (13%), TB (8%), and malaria (6%). Human resources for health and infrastructure constitute the second and third highest-cost areas for HSSP II implementation, respectively, due to planned investments in increasing the number of health workers (90% targeted absorption rate) and fully functional health facilities in the country in accordance with prioritized investments identified in the CIP.

Although the final HSSP II cost estimates are significantly lower than the ambitious full expression of demand scenario generated for the cost-informed prioritization exercise, it was estimated that the HSSP II faces a $488 million funding gap from 2017/18 to 2021/22 based on projections of the resources available. This gap may be filled through out-of-pocket expenditure as it is unlikely that additional resources could be mobilized from domestic and external sources. Even with projections of moderate economic growth of more than 3 percent per year, Malawi has a large fiscal deficit and public debt, making it difficult to increase spending on health. Further, recent analyses suggest that little new revenue could be generated through introduction of proposed earmarked taxes for health, and that Malawi may not be ready to introduce schemes such as social health insurance because large proportions of the population are poor (71% earn less than US$1.90 per day) and work in the informal sector (89%).

Limitations

This analysis is limited by data availability and quality issues. The DHIS2 does not include service delivery statistics for all interventions included in the EHP, particularly for services related to mental health, oral health, and other noncommunicable diseases. The OHT costing team extrapolated data from MOH reports from specific facilities or geographical areas and relied on expert opinion to help estimate baseline coverage for these interventions. Further, the iHRIS was used in the team's HRH cost analysis, but this source is considered unreliable because districts inconsistently report data into the system. Also, estimates of how much time health workers spend in delivering services used in the FTE analysis were outdated and missing for some interventions.

Recommendations

Given fiscal space constraints and projected declines in donor funding, Malawi will need to focus on minimizing the costs of implementing the HSSP II, securing predictable donor funding, and continuing to generate evidence of resource gaps and projected health impacts. Specifically, the following steps are recommended:

- **Identify and address health sector inefficiencies to further reduce costs.** The government may be able to mobilize additional resources for health through efficiency

gains, particularly as the country strives to reduce out-of-pocket payments for improved financial protection as it moves toward universal health coverage. Two areas in which the MOH could focus regarding efficiency include the following:

  - *High rates of commodity wastage*. A study found that as much as 70 percent of commodities dispensed from medicines stores at health centers and hospitals cannot be accounted for. Reducing commodity wastage would amount in significant cost savings; these costs are estimated to be $148 million (6% of total HSSP II costs) across all five years of the HSSP II, assuming the commodity wastage rates stay constant.
  - *Relatively large program management costs for individual disease programs*. Individual disease programs have high program management costs, accounting for one-fifth of total HSSP II costs. Program management activities often are not integrated (e.g., each program plans separate in-service training, monitoring and evaluation systems, supervision visits, and other activities), which leads to higher costs. Programs should analyze their program management costs to determine whether activities could be implemented in a more efficient manner (e.g., integrated training) and to identify low-priority activities that may not have a direct impact on supporting EHP service delivery and achieving HSSP II targets that could be scaled back or not implemented in order to reduce costs.

- **Work with donors to secure predictable, adequate funding for the health sector.** Malawi will remain dependent on external financing in the medium to long term due to macroeconomic constraints. However, recent declines in donor funding and discontinued use of pooled funding mechanisms due to a lack of confidence in the government have put the health sector in jeopardy. Also, donors tend to make short-term and earmarked funding commitments, which makes it difficult to reallocate based on need or plan for how services will be funded in the long term. As a result, Malawi should work closely with donors to secure adequate funding for priority activities in the HSSP II, including EHP service delivery, and better coordinate and predict trends in external health funding going forward. The largest donor, the Global Fund, indicates its funding levels over a three-year grant period, but other donors, including the U.K. Department of International Development, the U.S. Agency for International Development, the U.S. Centers for Disease Control and Prevention, and others, are unable to provide accurate projections of future funding levels. Therefore, these donors should work with the newly established Aid Coordination Unit within the MOH to ensure there is no overlap or gaps in annual spending across donors and indicate early and often any potential changes in future funding levels and priority areas for the donor.
- **Institutionalize use of the OHT for evidence-based decision making.** The HSSP II cost analysis is the second application of the OHT in Malawi. The OHT costing team recommends continued use of the tool to inform the HSSP II mid-term review and development of sub-sector strategic plans. The OHT could be institutionalized within the MOH so results can be used to make evidence-based decisions routinely, particularly for decisions related to resource allocation and policy, and budget development. To facilitate greater institutionalization of the OHT, the team recommends annual refresher training for MOH staff and routine updates to the OHT file, including updating price, epidemiological, and programmatic data inputs as new data become available.

References

Barker, C., A. Dutta, and the OneHealth study team. 2015. *Sustainability Implications for Tanzania's Fourth Health Sector Strategic Plan, 2015/16–2019/20*. Washington, DC: Futures Group, Health Policy Project.

Chansa, C. Unpublished. *Fiscal Space for Health in Malawi and Revenue Potential of "Innovative Financing*." Lilongwe, Malawi: SSDI-Systems/Abt Associates.

Government of Malawi (GOM). 2015. *Malawi Costed Implementation Plan for Family Planning, 2016–2020*. Lilongwe, Malawi: Government of Malawi.

GOM. 2017a. *Health Sector Strategic Plan II*. Lilongwe, Malawi: Ministry of Health.

GOM. 2017b. *National Community Health Strategy 2017–2022*. Lilongwe, Malawi: Ministry of Health.

GOM. 2017c. *Health Sector Resource Mapping FY 2014/15–FY 2018/19*. Lilongwe, Malawi: Ministry of Health.

GOM. Unpublished. *Capital Investment Plan 2017–2022*. Lilongwe, Malawi: Ministry of Health.

Health Policy Project. 2016a. *Health Financing Profile: Malawi*. Washington, DC: Palladium, Health Policy Project.

Health Policy Project. 2016b. *Macro-Fiscal Profile: Malawi*. Washington, DC: Palladium, Health Policy Project.

Ministry of Health (MOH). 2015. *Tuberculosis Control Programme National Strategic Plan 2015 to 2020*. Lilongwe, Malawi: Ministry of Health, Tuberculosis Control Programme.

MOH. 2016. *Malawi National Health Accounts Report for Fiscal Years 2012/13, 2013/14 and 2014/15*. Lilongwe, Malawi: Ministry of Health, Department of Planning and Policy Development.

MOH and ICF International. 2014. *Malawi Service Provision Assessment (MSPA) 2013-14*. Lilongwe, Malawi, and Rockville, Maryland, USA: MOH and ICF International.

National AIDS Commission (NAC). 2014. *National Strategic Plan for HIV and AIDS, 2015–2020*. Lilongwe, Malawi: NAC.

National Statistical Office (NSO) [Malawi] and ICF. 2017. *Malawi Demographic and Health Survey 2015–16*. Zomba, Malawi, and Rockville, MD, USA: NSO and ICF.

Perales, N., A. Dutta, and T. Maina. 2015. *Resource Needs for the Kenya Health Sector Strategic and Investment Plan: Analysis Using the OneHealth Tool*. Washington, DC: Futures Group, Health Policy Project.

Sivertsen, B.F. 2013. *How a Leakage Study Can Teach How Effectively Aid is Transformed into Services*. Oslo, Norway: Office of the Auditor General of Norway.

Stenberg, K. and Chisholm, D. 2012. "Resource Needs for Addressing Noncommunicable Disease in Low-and Middle-Income Countries: Current and Future Developments." *Global Heart* 7(1), 53–60.

World Bank Group. 2017. *Fiscal Space for Health in Malawi and Revenue Potential of 'Innovative Financing.'* Washington, DC: World Bank.

Annex A. Essential Health Package Interventions

Reproductive, maternal, neonatal, and child health interventions:

- Antenatal care package
  - Tetanus toxoid (pregnant women)
  - Deworming (pregnant women)
  - Daily iron and folic acid supplementation (pregnant women)
  - Syphilis detection and treatment (pregnant women)
  - Intermittent preventive treatment of malaria (pregnant women)
  - Insecticide-treated net distribution to pregnant women
  - Urinalysis (four per pregnant woman)
- Modern family planning
  - Injectable
  - Intrauterine device
  - Implant
  - Pill
  - Female sterilization
  - Male condom
- Delivery package
  - Clean practices and immediate essential newborn care (in facility)
  - Active management of the third stage of labor
  - Management of eclampsia/pre-eclampsia
  - Neonatal resuscitation (institutional)
  - Caesarean section with indication
  - Caesarean section with indication (with complication)
  - Vaginal delivery, skilled attendance
  - Newborn sepsis—full supportive care
  - Antenatal corticosteroids for pre-term labor
  - Maternal sepsis case management
  - Cord care using chlorhexidine
  - Hysterectomy
  - Treatment of antepartum hemorrhage
  - Treatment of postpartum hemorrhage
  - Antibiotics for premature rupture of membranes

Vaccine preventable diseases interventions

- Essential vaccines package
  - Rotavirus vaccine
  - Measles rubella vaccine
  - Pneumococcal vaccine
  - BCG vaccine
  - Polio vaccine
  - DPT-Heb-Hib/Pentavalent vaccine
  - HPV vaccine

Malaria interventions

- First-line uncomplicated malaria treatment
  - Uncomplicated (adult, < 36 kg)
  - Uncomplicated (adult, > 36 kg)
  - Uncomplicated (children, < 15 kg)
  - Uncomplicated (children, > 15 kg)
- Complicated malaria treatment
  - Complicated (adults, injectable artesunate)

  - Complicated (children, injectable artesunate)
- Malaria diagnosis
  - Rapid diagnostic tests
  - Microscopy for malaria

Integrated management of childhood illnesses interventions

- Acute respiratory infections
  - Pneumonia treatment (children)
  - Treatment of severe pneumonia (oxygen)
- Diarrheal disease
  - Oral rehydration salts
  - Zinc
  - Treatment of severe diarrhea (IV fluids)
- Nutrition
  - Community management of nutrition in children under five—Plumpy'Nut
  - Community management of nutrition in children under five—micronutrient powder
  - Community management of nutrition in children under five—vitamin A
- Malaria diagnosis
  - Rapid diagnostic tests for children under five

Community health interventions

- Community health package
  - Growth monitoring
  - Vermin and vector control and promotion
  - Disease surveillance
  - Community health promotion and engagement
  - Village inspections
  - Promotion of hygiene (hand washing with soap)
  - Promotion of sanitation (latrine refuse, drop hole covers, solid waste disposal, hygienic disposal of children's stools)
  - Occupational health promotion
  - Household water quality testing and treatment
  - Home-based care of chronically ill patients
  - Child protection

Neglected tropical diseases interventions

- Treatment and mass drug administration
  - Schistosomiasis mass drug administration
  - Case finding and treatment of trypanosomiasis
  - Trachoma mass drug administration

HIV interventions

- HIV prevention
  - Cotrimoxazole for children
  - Prevention of mother-to-child transmission
- HIV testing
  - HIV testing services
- HIV treatment
  - HIV treatment for all ages—antiretroviral therapy and viral load

Nutrition interventions

- Nutrition

  - Vitamin A supplementation in pregnant women
  - Management of severe malnutrition (children)
  - Deworming (children)
  - Vitamin A supplementation in infants and children 6–59 months

Tuberculosis interventions

- Tuberculosis treatment
  - Isonized preventive therapy for children in contact with tuberculosis patients
  - First-line treatment for new tuberculosis cases for adults
  - First-line treatment for retreatment of tuberculosis cases for adults
  - First-line treatment for new tuberculosis cases for children
  - First-line treatment for retreatment of tuberculosis cases for children
  - Case management of multi-drug resistant cases
- Tuberculosis testing
  - LED test
  - Xpert test
  - MGIT test
  - LJ test

Non-communicable diseases interventions

- Injuries
  - Treatment of injuries
- Mental health treatment
  - Basic psychosocial support, advice, and follow-up
  - Anti-epileptic medication
  - Treatment of depression (first line)
- Cancer
  - Testing of pre-cancerous cells (vinegar)
- Diabetes treatment
  - Diabetes Type I
  - Diabetes Type II
- Cardiovascular
  - Hypertension

Oral health interventions

- Tooth pain treatment
  - Management of severe tooth pain, tooth extraction
  - Management of mild tooth pain, tooth filling

For more information, contact:

Health Policy Plus
Palladium
1331 Pennsylvania Ave NW, Suite 600
Washington, DC 20004
Tel: (202) 775-9680
Fax: (202) 775-9694
Email: policyinfo@thepalladiumgroup.com
www.healthpolicyplus.com