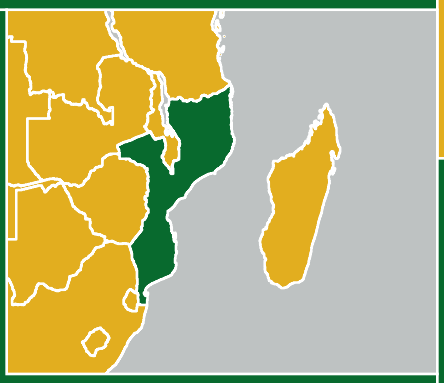
policy

April 2014

ESTIMATED RESOURCE NEEDS AND IMPACT OF MOZAMBIQUE'S PLANO ESTRATÉGICO DO SECTOR SAÚDE, 2014–2019



Results from the OneHealth Model

This publication was prepared by Arin Dutta, Nicole Perales, and Ricardo Silva of the Health Policy Project and Laia Cirera i Crivillé da Direcção de Planificação e Cooperação of the Ministério da Saúde de Moçambique.

USAID FROM THE AMERICAN PEOPLE
PEPFAR
HEALTH POLICY PROJECT

Suggested citation: Dutta, A., N. Perales, R. Silva, and L. Crivillé. 2014. *Estimated Resource Needs and Impact of Mozambique's Plano Estratégico do Sector Saúde, 2014–2019*. Washington, DC: Futures Group, Health Policy Project.

ISBN: 978-1-59560-048-6

The Health Policy Project is a five-year cooperative agreement funded by the U.S. Agency for International Development under Agreement No. AID-OAA-A-10-00067, beginning September 30, 2010. The project's HIV activities are supported by the U.S. President's Emergency Plan for AIDS Relief (PEPFAR). It is implemented by Futures Group, in collaboration with Plan International USA, Futures Institute, Partners in Population and Development, Africa Regional Office (PPD ARO), Population Reference Bureau (PRB), RTI International, and the White Ribbon Alliance for Safe Motherhood (WRA).

Estimated Resource Needs and Impact of Mozambique's *Plano Estratégico do Sector Saúde*, 2014–2019

APRIL 2014

This publication was prepared by Arin Dutta, Nicole Perales, and Ricardo Silva of the Health Policy Project and Laia Cirera i Crivillé da Direcção de Planificação e Cooperação of the Ministério da Saúde de Moçambique.

CONTENTS

FOREWORD

The Ministry of Health, in preparing its third strategic plan, did so with the aim of ensuring that all healthcare stakeholders, guidelines for the development and operation of programs, and projects across all levels bring about “improving the health status of the population.”

This *Plano Estratégico do Sector da Saúde* (PESS) is an instrument of critical value to the sector, as it is a comprehensive and deep analysis of the major achievements of the last 10 years and takes into account the major challenges and strategic directions of the different components of the health sector.

In addition to costing the PESS, as described below, this report helps the ministry analyze the financial resources needed to implement health programs and achieve the desired goals. The guidelines in costing the PESS provide a framework for all partners, especially referring to support for the implementation of health services. The ministry appreciates all organizations and development partners that have contributed to the success of these health programs, both financially and at the programmatic level.

We look forward to the same spirit of cooperation and collaboration in implementing the *Plano Estratégico do Sector da Saúde*.

Dr. Célia Gonçalves
DPC Chief
MISAU

ACKNOWLEDGMENTS

The technical team implementing the OneHealth model, including all members of the Health Policy Project (HPP) team, would like to acknowledge the essential contributions of the following people during the entire process, from data collection to OneHealth analysis to the preparation of this report.

We gratefully acknowledge the continuous guidance, encouragement, and insights provided by Dr. Elias Cuambe of USAID/Mozambique, including detailed comments on this report. From the government, Dr. Daniel Simone (DPC/MISAU) provided leadership for the entire process and facilitated the participation of key MISAU stakeholders at various stages. His insights and opinions helped to improve the analysis and are gratefully acknowledged. Karin Turner (USAID/Mozambique) acted as the technical monitor for HPP's involvement in this analysis. She provided critical support at an early stage to launch this activity and encouragement thereafter. Her comments on an earlier draft of this report are gratefully acknowledged. We are very grateful to Emily Sonneveldt (Futures Institute), who initially trained the MISAU staff on the OneHealth model under WHO support. She was significantly involved in giving direction and shape to the implementation of the OneHealth model in Mozambique. She collected and analyzed large portions of the data at the beginning and provided technical inputs and clarifications throughout the process.

The following individuals provided leadership and significant support to implement the analysis, and are gratefully acknowledged: Dra. Célia Gonçalves (National Director of DPC/MISAU), Dr. Martinho DgeDge (Head of DRH/MISAU), Dr. António Assane (Deputy Director of DNAM/MISAU), Dr. Moisés Mazivila (Deputy Director of DPC/MISAU), and Dra. Aleny Couto (HIV program manager, DNAM/MISAU).

Some individuals made significant contributions of their time to procure data and to clarify technical issues, without which this report and the OneHealth analysis could never have been completed: Dr. Gael Claquin (National TB program officer, WHO), Dra. Vania Tembe (Deloitte/FORSSAS project), Dra. Vânia Macome (HIV progam, DNAM/MISAU), Robert McKinnon (Futures Institute), Dra. Marcelle Claquin (DRH/MISAU), Dra. Silvia Bignamini (DPC/MISAU), Dr. Eduardo Celades (WHO), and Maria Pahigiannis (Deloitte/FORSSAS project).

The following individuals from MISAU are gratefully acknowledged for the help provided throughout the process, including with data and clarifications: Dr. Nazir Ibraimo, Dra. Hortência Faira Ribeiro, Dra. Lucy Simbine, Dra. Luísa Panguene, Dr. Victor Sitao, Dra. Estela Mangueze, Dra. Cynthia Dias, Dra. Olga Amiel, Dra. Lídia Gouveia, Dr. Ivan Manhiça, Dra. Graça Matsinhe, Dra. Edna Possolo, Dra. Benigna Matsinhe, Enga Ana Paula Cardoso, Dra. Laura Mavota, Dra. Lorna Gujral, Dra. Adelia Ndeve, Dra. Marta Mapengo Domingos, Dra. Olga Novela, Dra. Otilia Neves, Dra. Eulalia da Costa, Dr. Morais da Cunha, Dra. Aisha Issufo, Dra. Avone Pedro, Dra. Edma Sulemane, Dr. Abubacar Sumalgy, Dr. Virgilio Ceia, Dra. Emilia Jeque, Dra. Cesaltina Ferreira, Dra. Rosel Salomão, Dr. Manuel Simão, Dr. Assis da Costa, Dr. Pedro Machava, Dra. Dina Ibrahimo, Dra. Isabel Ruas, Dr. Antonio Bugalho, Dra. Yolanda Azambujo, Dra. Fatima Uachaque, Dra. Isabel Tavares, Dr. Felipe Mahaluça, Dra. Isabel Pinto, Dr. Ridwaan Ismael, Dra. Tania Sitóe, Dra. Virginia Guibunda, Dr. Manuel Macassa, Dra. Hafiza Ismael, Arqo João Alexandre, and Arqo Mendoça.

The technical team would also like to acknowledge many other staff at MISAU, Futures Institute, FORSSAS, USAID, UNAIDS, UNICEF, WHO, and CDC for all of their assistance during the work leading to this report.

EXECUTIVE SUMMARY

The *Plano Estratégico do Sector da Saúde* (PESS)—the Health Sector Strategic Plan—is the overall expression of the priorities, implementation approaches, and resource commitments for health from the Government of the Republic of Mozambique (GRM). The current PESS for the period 2014–2019 replaces the previous PESS for the period 2007–2012.

In July 2012, the *Ministério da Saúde* (MISAU) established a technical working group (TWG) to develop the new PESS. The TWG worked directly under the supervision of the MISAU Planning Department, or DPC (*Direcção de Planificação e Cooperação*). In the same year, the OneHealth model was chosen by MISAU to analyze the costs of the PESS. A group was formed, led by DPC, to implement the OneHealth analysis, with support from various technical partners. The OneHealth model is a tool for medium-term (three to 10 years) strategic planning in the health sector at the national level; it is ideally suited for public sector planners. OneHealth is integrated with the Spectrum suite of models, which includes demographic and epidemiological projections. The model estimates the costs by disease program as well as the implications of utilizing the health system building blocks in delivering the PESS targets. By utilizing specific impact assessment modules, it also estimates the overall health outcomes and impact achieved. Financial resources available to finance the PESS were also estimated by DPC and compared to the need. Along with a gap analysis for human resources, this helps to provide an understanding of the sustainability of the PESS.

Process and Methodology

Data on targets, implementation design, and unit cost of drugs and commodities were sought from key respondents within MISAU, and from documents. Primary documents were recent costed health program and health system department strategies and their associated costing files, as well as recent proposals to the Global Fund. For HIV/AIDS, the cost analysis of the recent *Plano de Aceleração*, 2013–2015 was a major source of data. For all disease programs, especially those without a recent costed plan or equivalent, customized data collection sheets were designed around the OneHealth model, which covered all costs of delivering health interventions as well as costs of in-service training, supervision, monitoring and evaluation (M&E), and other aspects of program management. Costs of interventions were based on the demographics, epidemiology, and percentage of coverage desired by health programs. All cost inputs were validated with stakeholders, and initial results were shared with the program managers before finalization.

Prioritization: Based on the preliminary results and estimate of the financial resources available, the technical team identified a financing gap of $1.2–$3 billion over the period 2013–2017 (the initial PESS period, later extended to 2019). Given this financing gap, MISAU stakeholders were engaged in a prioritization process aimed at eliminating inefficiencies and duplication, rationalizing targets, and aligning scale-up with health system resources. The prioritization process involved additional analyses and high-level meetings with MISAU decisionmakers to stimulate choices for reducing the resource requirements. Overall, prioritization helped to rationalize costs by $655 million in 2013 USD.

Results: resources required

The implementation of the PESS over 2014–2019 is projected to require **$7,856 million** in constant 2013 USD. The total need by year is shown in Table ES1.

Table ES1. Total PESS Costs by Year, 2014–2019, in 2013 USD Millions

	2014	2015	2016	2017	2018	2019	Total
Total PESS Cost	**1,254**	**1,301**	**1,307**	**1,307**	**1,321**	**1,366**	**7,856**

Source: Authors' analysis.

The *Direcção Nacional de Saúde Pública* (DNSP) and *Direcção Nacional de Assistência Médica* (DNAM) health programs contribute more than half of the total cost of the PESS, while the health system components make up the remaining 47 percent (Table ES2). MISAU human resources for health will be the largest driver of the health system components, followed by infrastructure and logistics. It is significant that human resource costs will increase from 21 percent to 33 percent of all costs over time.

Table ES2. Total PESS Costs by Major Component, 2014–2019

	USD Millions, and % of PESS Costs						
	2014	2015	2016	2017	2018	2019	Total
Direcção Nacional de Saúde Pública (DNSP)	198	227	249	243	244	244	1,404
	16%	*17%*	*19%*	*19%*	*18%*	*18%*	*18%*
Direcção Nacional de Assistência Médica (DNAM)	457	487	479	436	421	430	2,710
	36%	*37%*	*37%*	*33%*	*32%*	*31%*	*35%*
Logistics, Including Wastage	100	106	110	103	101	101	621
	8%	*8%*	*8%*	*8%*	*8%*	*7%*	*8%*
Health Infrastructure	228	166	119	123	125	126	887
	18%	*13%*	*9%*	*9%*	*9%*	*9%*	*11%*
Human Resources for Health	259	294	331	380	413	449	2,127
	21%	*23%*	*25%*	*29%*	*31%*	*33%*	*27%*
Governance, Leadership, and Information Systems	12	22	19	21	16	16	106
	1%	*2%*	*1%*	*2%*	*1%*	*1%*	*1%*
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Source: Authors' analysis.

Costs of DNSP: The costs of the public health directorate over 2014–2019 are dominated by the programs for malaria, at 22 percent; maternal and child health, at 20 percent; nutrition, at 16 percent; and immunization, at 15 percent of the total. Other DNSP programs, such as tuberculosis (TB), neglected tropical diseases (NTDs), and health promotion, are significant contributors to the remaining costs.

Costs of DNAM: The costs of the medical assistance directorate are dominated by the HIV program (excluding prevention of mother-to-child transmission [PMTCT] and male circumcision), which accounts for 50 percent of all costs; internal medicine (one of several hospital-based curative health programs), with 18 percent; and voluntary male medical circumcision, contributing 6 percent. The HIV program alone contributes 17 percent of all PESS costs across health programs and health system departments. The most expensive intervention within the program is antiretroviral (ARV) treatment, which will scale up rapidly under the *Plano de Aceleração*.

Costs of logistics: This health system component includes all costs of warehouses, the supply chain, and programmatic management of the central drugs and medical stores (*Central de Medicamentos e Artigos Médicos*, or CMAM). Certain costs of the *Centro de Abastecimentos* (CA) are also included. The bulk of the costs under this component are assigned to wastage of drugs and equipment, estimated at 15 percent for each item. This wastage rate is an estimate agreed upon with CMAM and accounts for losses due to expiry, pilferage, irrational use, and spoilage.

Costs of infrastructure: The infrastructure unit within the DPC organizes major construction and rehabilitation projects for the health sector. Under the PESS, much of the new construction, such as 38 new health centers of type II, four district hospitals, and a new central hospital, will occur in the early years, with the pace slowing over time. The costs of this component also include equipment and operating costs for health facilities as well as the purchase of different types of vehicles.

Costs of human resources for health: The costs for this component are based on information provided by the human resources directorate, the *Direcção dos Recursos Humanos* (DRH). The costs include salaries and benefits for all MISAU personnel, pre-service training costs, and costs of programmatic management at DRH. The directorate estimated the number of personnel for each year for the 2014–2019 time period by 48 major types of health providers and 18 types of managerial, administrative, and support staff. Salaries and benefits increase every year based on increments seen historically, e.g., 8 percent annually for salaries, varying by staff type. These constitute 91 percent of all human resources costs, with the rest distributed across pre-service training and program management.

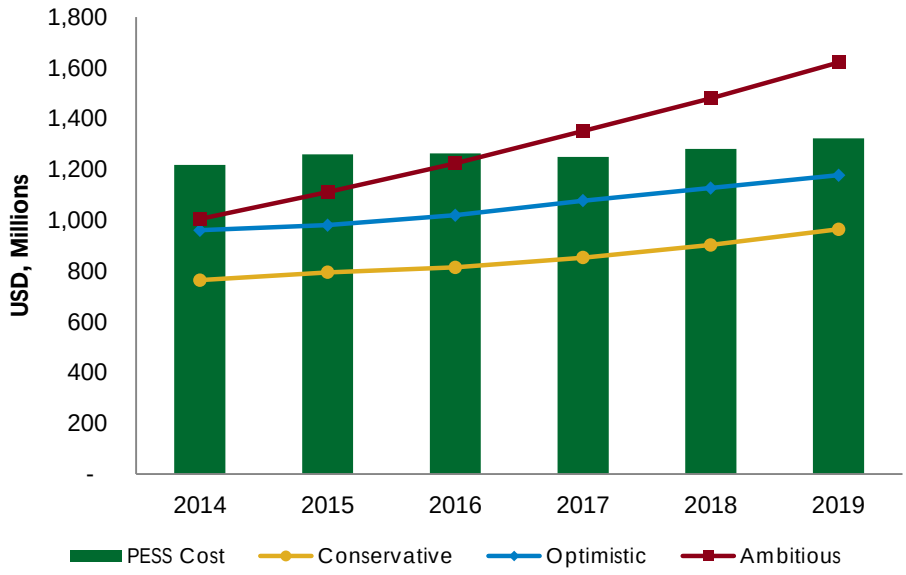
Costs of governance, leadership, and health information systems (HIS): This component involves the programmatic costs of several national-level departments and affiliated autonomous institutions. The majority of the costs refer to the operations of DPC. The directorate will require $21 million over the PESS period.

Results: financial sustainability

Three resource availability scenarios were calculated, based on different assumptions about GRM and external funding for the public health sector. External funds on and off budget were included. These three scenarios are shown in Figure ES1, with the most optimistic scenario (“ambitious”) projecting $1,600 million in funding by 2019 under very favorable assumptions. It is more likely that the resources available will be significantly lower, which suggests that in every year of the PESS, there will be a financing shortfall. The overall funding shortfall across the two less optimistic scenarios ranges from $1,250–$2,500 million, summed over the entire period.

Certain data on funding commitments are difficult to obtain. This financial sustainability analysis will be revisited once data on both costs and funding are updated. The PESS targets are likely to be revised in the future, when a mid-term review of the strategy is conducted. The funding shortfall shown in Figure ES1 suggests that Mozambique should consider maximizing the commitments from government and development partners while also increasing efforts to reduce resource needs by prioritizing and eliminating inefficiencies and waste.

Figure ES1. Cost of the PESS vs. Three Resource Availability Scenarios, 2014–2019



Source: DPC, authors using the OneHealth model.

Estimated health impact

The technical team used the Lives Saved Tool (LiST), an internationally accepted modeling tool that has been used in peer-reviewed journal articles to analyze the impact on key health indicators from the PESS-related scale-up of various health interventions. LiST was integrated with OneHealth model estimates of intervention coverage and Spectrum-based demographic data. Table ES3 shows the results of this analysis. According to the projections based on the PESS scale-up of interventions and their efficacy, Mozambique will not meet the Millennium Development Goal (MDG) for maternal mortality, though there will be significant progress compared to past years. The MDG for under-five child mortality was met ahead of schedule—there will be further reductions in this rate. Neonatal and infant mortality will also decline, with a possibility of significant reduction in the latter. Malnutrition among children will also decline—with stunting rates declining from 43 percent in 2011 to an estimated 37 percent by 2019, and wasting from 5.9 percent to 3.2 percent by 2019. These estimates are subject to significant uncertainty. They depend on successful execution of currently planned strategies, which requires assured resources.

Table ES3. Key Health Indicators

Indicator	2011	2013	2014	2015		2016	2017	2018	2019
				MDG	Est.				
Maternal mortality ratio (per 100,000 live births)	408	400	391	*250*	381	369	35	349	340
Neonatal mortality rate (per 1,000 live births)	30	29	28	-	27	26	25	24	24
Infant mortality rate (per 1,000 live births)	64	55	52	-	49	47	45	44	43
Under-five mortality rate (per 1,000 live births)	97	83	77	*108*	**72**	67	63	62	61

Source: Authors' analysis using the LiST model.

Overall conclusions and next steps

The analysis in this report suggests that Mozambique's health system is on the cusp of profound changes. The PESS defines an inflexion point at which the stagnation in key health indices can be arrested, and the health system put on a track toward greater equity, access, utilization, and quality of service.

The consultations and analyses around the OneHealth model have led to certain conclusions regarding the planning and budgeting process at MISAU. If the OneHealth model and its results are to be effectively used and implemented with MISAU health programs and health system departments, some changes would be needed. The technical team suggests a roadmap for capacity development among MISAU staff involved in strategic planning and budgeting processes, and outlines some recommended steps for the institutionalization of the OneHealth model.

While the process of analyzing the resource needs and impacts of the PESS was rigorous, given the constraints of data, several key cross-cutting limitations should be addressed in the mid-term review of the PESS. For example, better targets are needed for many DNAM programs based on the hospital sector. Well-informed studies on human resource gaps and unit costs are also required. At the end of this report, the technical team also summarizes some avenues for further research, such as research on a minimum primary healthcare benefit package and a roadmap for universal health coverage in Mozambique.

ABBREVIATIONS

ACT	artemisinin-based combination therapy regimen
AIM	AIDS Impact Model
ANC	antenatal care
APE	Agentes Polivalentes Elementares
ART	antiretroviral treatment
ARV	antiretroviral
BEmOC	basic emergency obstetric care
CA	Centro de Abastecimentos
CCL	Central Clinical Laboratories
CEmOC	comprehensive emergency obstetric care
CHW	community health worker
CMAM	Central de Medicamentos e Artigos Médicos
CNCS	Conselho Nacional Coordenador de Saúde
CPR	contraceptive prevalence rate
DAF	Direcção de Administração e Finanças
DHS	Demographic and Health Survey
DI	Departamento de Infra-estrutura
DIS	Departamento de Informação para Saúde
DNAM	Direcção Nacional de Assistência Médica
DNSP	Direcção Nacional de Saúde Pública
DOTS	*d*irectly observed treatment
DP	Projects Department
DPC	Direcção de Planificação e Cooperação
DPES	Departamento de Planificaçao e Economia Sanitaria
DRH	Direcção dos Recursos Humanos
EMTCT	elimination of mother-to-child transmission
EPI	Expanded Program for Immunization
FP	family planning
FTE	full-time equivalent
GRM	Government of the Republic of Mozambique
HAP	HIV/AIDS Acceleration Plan
HCM	Hospital Central Maputo
HepB3	hepatitis-B
HiB	hemophilius influenza type B
HIS	health information systems
HPP	Health Policy Project
HPV	human papilloma virus
HR	human resources
ICU	intermediate care unit
IEC	information, education, and communication
IFE	Inquérito de Fundos Externos do Sector Saúde
IGS	Inspectorate General of Health
IMCI	integrated management of childhood illnesses
INS	Instituto Nacional de Saúde
IPTp	intermittent preventive treatment for pregnant women
IRS	indoor residual spraying
JANS	Joint Assessment of National Strategies
LiST	Lives Saved Tool

LLIN	long-lasting insecticide-treated nets
M&E	monitoring and evaluation
MCHIP	Maternal and Child Health Integrated Program
MDG	Millennium Development Goal
MDR-TB	multi-drug resistant TB
MgSO4	magnesium sulphate for eclampsia
MICS	Multi Indicator Cluster Survey
MISAU	Ministério da Saúde
MNCH	maternal, newborn, and child health
MTEF	Medium-Term Expenditure Framework
NGO	nongovernmental organization
NPO	national program officer
NTDs	neglected tropical diseases
Ob/Gyn	obstetrics/gynecology
ORS	oral rehydration solution
PAV	program for immunization
PCV-10	pneumococcal conjugate vaccine
PELF	Plano Estratégico de Logística Farmacêutica
PES	Plano Económico e Social
PESS	Plano Estratégico do Sector da Saúde
PMDT	National Strategy for Programmatic Management of Drug-resistant TB (Estratégia PMDT)
PMTCT	prevention of mother-to-child transmission
PNCT	National Program for the Control of Tuberculosis
PNDRHS	Plano Nacional de Desenvolvimento de Recursos Humanos de Saúde
PTV	prevention of mother-to-child transmission (Portuguese acronym)
RDT	rapid diagnostic test
RED	Reaching Every District
SAAJ	Serviços Amigos dos Adolescents e Jovens
SCH	schistosomiasis
SISMA	Information System
SMI	Saúde Materno-Infantil
STH	soil-transmitted helminthiasis
STI	sexually transmitted infection
TA	technical assistance
TB	tuberculosis
TBA	traditional birth attendant
TFR	total fertility rate
TWG	technical working group
UN	United Nations
UNFPA	United Nations Population Fund
USAID	United States Agency for International Development
VMMC	voluntary male medical circumcision
WHO	World Health Organization
XDR-TB	extensively drug-resistant TB

1. BACKGROUND

The *Plano Estratégico do Sector da Saúde* (PESS), or the Health Sector Strategic Plan, is the overall expression of the priorities, implementation approaches, and resource commitments for health from the Government of the Republic of Mozambique (GRM). As a strategic plan, it provides a bridge from the Ministry of Health's (*Ministério da Saúde*, MISAU) overall long-term vision to its annual plans for the health sector (*Plano Económico e Social*, PES). The current PESS for the period 2014–2019 replaces the previous PESS for the period 2007–2012. The PESS for the period 2014–2019 (from here forward "PESS") comes at a time of renewed GRM efforts to reduce poverty, create wealth, and reform the public sector.

This chapter provides an overview of the PESS, the context for the resource estimation exercise, and key steps taken in the implementation of the OneHealth approach for the analysis of resources needed.

A. Resource Needs Estimation for the PESS 2014–2019

Background to the development of the PESS

In July 2012, MISAU established a technical working group (TWG) to develop the next PESS. The TWG worked directly under the supervision of the MISAU Planning Department, or DPC (*Direcção de Planificação e Cooperação*). The TWG was composed of individuals with multidisciplinary backgrounds, including representatives from MISAU and the development partners. The TWG conducted a situation analysis of the health sector and worked with MISAU departments to define priorities and select overall strategies. In addition, the TWG was given the task of coordinating with an external team conducting the Joint Assessment of National Strategies (JANS) review of the PESS process and document.

The TWG reviewed documents and new data; these included policy documentation, strategies of disease programs, and technical reports from the WHO, MISAU, and other sources. In addition, the TWG interviewed heads of programs and health system departments, and key experts from technical partners. Stakeholders drawn from development partners, the private sector, nongovernmental organizations (NGOs), and civil society were consulted. Within MISAU, focal persons were appointed who acted as a link between the TWG and the disease programs, collecting data over the year for developing the PESS and for the resource needs estimation exercise. A detailed outline of the PESS, which identified strategies, directions, and key themes, was completed in November 2012.

The PESS outline and initial draft were evaluated during a first visit by the JANS team in March 2013, which allowed for changes and improvements. During the first half of 2013, the PESS document was fully drafted, and reviewed and validated. Over this period, the resource estimation exercise for the PESS was ongoing—for both the resources needed and those available. The second visit by the JANS team occurred in July 2013. The second visit involved a review of the PESS narrative as well as the resource estimation process. The comments from the JANS team were used in the preparation of the final draft of the narrative as well as the resource estimation results. Up to July 2013, the PESS period was 2013–2017, which was modified in August 2013 to 2014–2019. As a result, many targets originally estimated only for the period 2013–2017 had to be extended.

The final draft of the PESS was approved by the National Coordinating Council for Health (*Conselho Nacional Coordenador de Saúde*, or CNCS) and the Health Partners Group in October 2013, and presented for final approval to the Interministerial Committee of Public Sector Reforms (*Comité Interministerial das Reformas do Sector Público*).

The PESS focuses on accelerated health impact and greater sustainability for the public health sector. The PESS has a focus on primary healthcare, especially related to achieving the Millennium Development Goals (MDGs) and broad health sector reforms. The PESS recognizes that there is a need to increase access to health services, improve the delivery mechanisms, and provide for greater overall equity and quality in health. Seven strategic objectives aim to drive two main pillars of change, as shown in Figure 1.

Figure 1. PESS Conceptual Framework

Objectives	Pillars / Principal Strategies
1. Increase access and utilization of health services 2. Improve the quality of health services 3. Reduce inequalities between population groups and geographic areas in the use of services 4. Improve the efficiency of service delivery and resource utilization 5. Strengthen partnerships for health on the basis of mutual respect 6. Increase transparency and accountability in how public sector resources are used 7. Strengthen the Mozambican health system	I. More and better-quality services for accelerating progress in health II. Reforms within the health sector to improve health system performance

Process and timeline leading to resource need estimation

The OneHealth tool was chosen by MISAU in 2012 to analyze the costs of the PESS. A group was formed, led by the DPC, to implement the OneHealth analysis, with support from various technical partners.[1] The process of estimating resources began shortly after training for the TWG and MISAU staff on the OneHealth tool. A group was trained on the use of OneHealth by an international consultant funded by the World Health Organization (WHO), and initial data collection was started. Those trained included staff from the human resources department (*Direcção dos Recursos Humanos*, or DRH), finance and administration (*Direcção de Administração e Finanças*, or DAF), infrastructure department (*Departamento de Infra-estrutura*, or DI), central medical stores (*Central de Medicamentos e Artigos Médicos*, or CMAM), and health programs.

Given the complexity of the task of using the OneHealth tool to estimate the costs of the PESS, MISAU made a request for technical assistance (TA), to which the United States Agency for International Development (USAID) responded. In late November 2012, USAID contacted the Health Policy Project (HPP) to provide the TA.[2] The TA also involved support to the HIV/AIDS program at MISAU to estimate the costs of the *Plano de Aceleraçao da Prevençao, Diagnostico e Tratamento de HIV/SIDA* 2013–2015, and for the long-term institutionalization of the OneHealth tool at MISAU. During December 2012–June 2013, HPP team members traveled to Maputo on several occasions to provide support to the MISAU team. Analysis of financial resources for health available over the duration of the PESS was directly undertaken by DPC in concert with other technical partners. The HPP team, along with key staff at DPC and members of the TWG who developed the PESS, are referred to as the "technical team" throughout this report.

[1] An Overseas Development Institute (ODI) fellow placed at DPC provided significant support to the analysis.

[2] The HPP team comprised a health economist, a public health specialist, and a research associate. All team members were trained on the OneHealth tool and had relevant experience from applying the tool in Kenya. Initially, the team also included the senior health researcher who provided the WHO training on OneHealth.

B. Prioritization Process

Based on the preliminary costing results and estimate of the financial resources available, the technical team identified a financing gap of $1.2–$3 billion over the entire period 2013–2017. Given this financing gap, the technical team engaged MISAU stakeholders in a prioritization process aimed at reducing the financing gap by eliminating inefficiencies and duplication, rationalizing targets, and aligning scale-up with health system resources.

The prioritization process was based on additional analysis of the preliminary cost results to identify cost drivers and inefficiencies, and a process of engagement in high-level meetings (Box 1) with decisionmakers to stimulate a discussion leading to difficult choices in reducing the resource requirements. At the final meeting, which involved the national directors of MISAU institutions and heads of departments, the gap before and after prioritization was discussed and changes approved.

Box 1. Sequence of Prioritization Meetings

Validation and prioritization meetings:

- Logistics
- Human Resources
- Infrastructure and Governance
- Public Health (DNSP)
- Secondary Health and HIV (DNAM)
- Senior Leadership Prioritization Meeting

The following key ideas guided the prioritization process:

1. **Reduce waste:** Increase the efficient use of resources. The additional analyses identified high-cost drugs and commodities that needed a critical review, especially on dosage. In their prioritization meetings, many programs focused on national-level management costs, especially rationalizing in-service trainings and supervision visits.
2. **Eliminate duplication:** Similar actions were often found across programs and health system departments, especially for infrastructure. Even within programs, similar activities were found repeated in the detailed program management plans. These were identified, and choices to eliminate duplications were presented to the leadership at the prioritization meetings.
3. **Rationalize goals:** Programs were encouraged to review their scale-up targets to see if very rapid acceleration was feasible, and whether the maximum coverage could be achieved in a more realistic timeframe. Some programs took this opportunity to revise their coverage targets. Other programs revised their intervention costs by adjusting them to account for lower-level facilities unable to provide the full spectrum of drugs or interventions.

The prioritization meetings were first organized by key health programs and then at the level of the National Directorate of Medical Assistance (*Direcção Nacional de Assistência Médica,* or DNAM) and the National Directorate for Public Health (*Direcção Nacional de Saúde Pública,* or DNSP). The meetings also included representatives of the health system support departments, allowing their points of view on constraints in the system to be incorporated. Multiple scenarios of the need for health workers across the system were generated to guide the analysis of sustainability in the health workforce. This was led by the DRH. Overall, prioritization helped to rationalize costs over 2013–2017 (the initial PESS period) by **$655 million** in 2013 USD.

C. Outline of this Report

Chapter 2 introduces the OneHealth tool, describes the overall methodology for the cost analysis, and provides a summary of other analytical methods, such as the impact analysis. Chapters 3–5 provide the specific methodologies and the results of the cost analyses for public health and medical assistance (hospital sector and other) programs, beginning with an overview of the key cost trends for the entire PESS. Chapter 6 is devoted to issues related to human resources for health, beginning with the OneHealth-related methodology used to estimate total salary and benefit costs over the PESS years, and

then the methods and results for a gap analysis based on health workers needed for service delivery versus those available. Chapters 7−9 discuss the financial resources required to fund other health system components, such as the HIS, logistics, infrastructure, and MISAU's governance and leadership function. Chapter 10 discusses the methodology used to estimate the financial resources available and provides the results of the financial sustainability analysis. Chapter 11 presents the results of the impact analysis for the PESS. Chapter 12 concludes with a discussion of key next steps to institute strategic budgeting and costing analysis at MISAU, using models such as OneHealth.

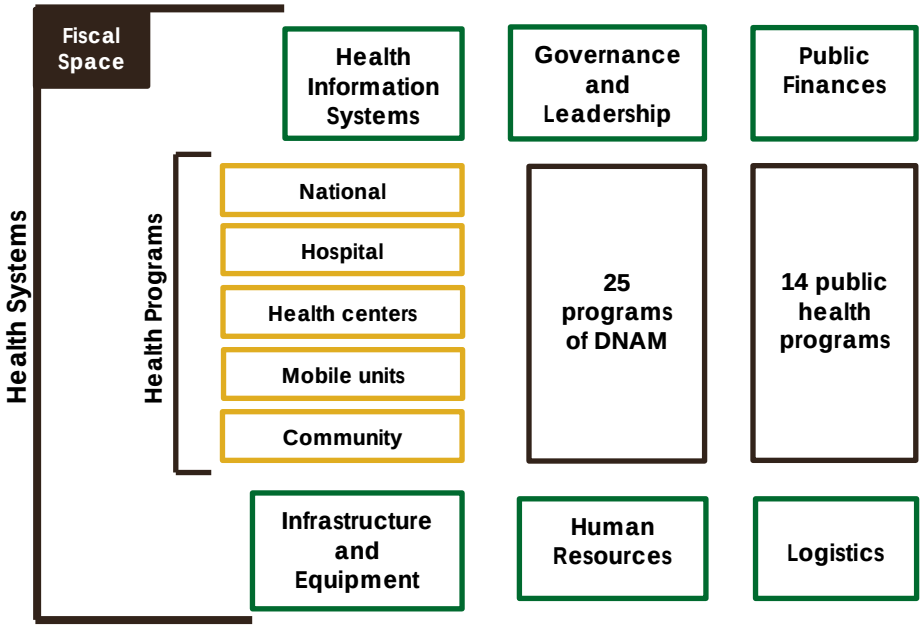
2. METHODOLOGY

This chapter provides an overview of the OneHealth tool methodology used to estimate the resources required for the PESS and for the impact analysis of the scale-up of key interventions (also see Annex C). The methodology used to estimate the financial resources available is discussed in Chapter 10. Specific methodologies used for estimating resources for key health programs and health system departments are described alongside the related results in later chapters.

A. Overview of the OneHealth Methodology

The OneHealth tool is designed for medium-term (3–10 years) strategic planning in the health sector at the national level, ideally suited for public sector planners. OneHealth is integrated within the well-known Spectrum suite of models, which includes demographic projections derived from United Nations (UN) Population Division estimates. It estimates the costs by disease program as well as the implications of utilizing the health system building blocks in delivering the targets of the programs. By utilizing specific impact assessment "modules," it also estimates the overall health outcomes and impact achieved. Hence, it is a unified tool in two ways. It unifies planning, costing, budgeting, impact, and financial space analysis. It also unifies analysis of disease programs with the needs placed on the health system. Figure 2 is an overview of the tool, showing the health system components as well as the main service delivery analysis core.

Figure 2. Schematic View of the OneHealth Tool as Adapted to Mozambique

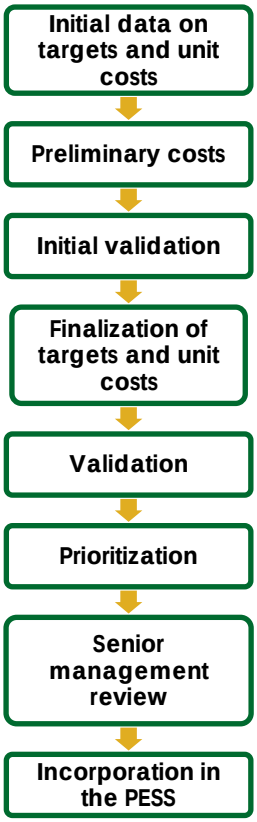


Source: Authors.

OneHealth incorporates pre-existing costing tools and is linked to the other models included in the Spectrum suite. These include the Marginal Budgeting for Bottleneck tool, AIDS Impact Model, LiST (the Lives Saved Tool for child and maternal health, used in Chapter 11), and other impact tools for tuberculosis, HIV/AIDS, and reproductive health. A full list of modules that can be linked with OneHealth as a part of the Spectrum suite is provided in Annex C.

Data collection: Data on targets, implementation design, and unit cost of drugs and commodities were sought from several sources. Primary sources comprised recent costed disease strategies, their associated costing files, and recent costed proposals to the Global Fund. For HIV/AIDS, the cost analysis of the recent *Plano de Aceleraçao* 2013–2015 was a major source for targets and unit costs. For all disease programs, especially those without a recent costed plan or equivalent, customized data collection sheets were designed around the OneHealth input process, which covered all communicable and non-communicable diseases and interventions. These customized data collection sheets were fielded with key respondents from the disease programs by the technical team and supplemented as necessary with a literature review. The process is outlined in Figure 3.

Figure 3. OneHealth Costing Process



Standardization of certain unit costs: During the costing process, the technical team identified varying costs for similar activities, such as national-to-district supervision visits of the same duration and distance, or per diem for offsite training events. Wherever possible, the technical team discussed these unit costs with the programs and used standardized costs. For multilevel supervision (national to district, district to facility, etc.), a standard template was created and used in discussions with the programs. Certain commonly used drugs that featured in the interventions of multiple programs were also given a standard price, based on the CMAM price list and discussion with technical staff. Most important, the fact that the same technical team worked across all programs to incorporate the total costs into the PESS ensured standardized ingredients-based costing, even if a disease-specific strategy had been costed previously.

Currency and inflation: All costs were estimated in 2013 USD. Due to a lack of data on potential inflation in the price of medical goods and commodities, unit costs were fixed over the period of the cost analysis. Salaries and benefits increase every year. Values in meticais were converted to US dollars using the average exchange rate for January–May 2013 (1 USD: 30 MZN).

Cost analysis of health programs: Detailed methodological details on OneHealth are available online, covering the definitions of cost types and the ingredients-based approach to cost analysis [1]. Specific details on the costing of health programs are provided alongside the cost results in Chapters 4 and 5. For the PESS, all 14 disease programs of DNSP were costed, and all of the interventions were included and defined in discussion with the programs' staff. The approach to generate the estimated costs for the representative public health programs belonging to DNSP differed from the approach for hospital sector and curative programs belonging to DNAM. For DNAM, 25 programs were included. A full list of programs for both DNSP and DNAM, along with persons contacted, is provided in Annex A. Though HIV/AIDS is considered a medical assistance health program, in that it belongs to DNAM except for prevention of mother-to-child transmission (PMTCT), the approach used for its interventions is similar to that for DNSP. Certain DNSP and DNAM programs do not have service delivery interventions at the health facility or community level—they are primarily national programs that conduct supervision and training (e.g., *Medicina Desportiva*, or Sports Medicine). For such programs, only program management costs were estimated. Generally, these program management costs include items such as monitoring and evaluation (M&E), supervision, seminars, etc., and exclude salary costs.

For programs with service delivery interventions, for each included intervention, only non-labor costs of service delivery were estimated. In costing approaches applying an economic principle, all costs would be

included. The OneHealth approach differs because precise allocation of service delivery staff to specific programs is rarely possible. Instead, salary and benefits costs across the sector for government staff are usually calculated in the OneHealth approach at the national level, not at the level of each health program or intervention. This approach was confirmed with MISAU at the beginning of the process. More details on estimating human resource needs and availability, including salary costs, are provided in Chapter 6.

Cost analysis of health system components: The OneHealth tool includes a separate set of modules to cost each health system component. The health system components included are based on the WHO definition of the "six building blocks" of the health system. The components and the broad types of costs needed under each are shown in Figure 4. The "health financing" component was not developed for the PESS cost analysis, as the technical team did not find any specific units or schemes of MISAU running health financing activities, such as social health insurance, etc., that required costing. The functions of MISAU related to public financial management and coordinating certain health financing-related studies and pilots (e.g., National Health Accounts, output-based financing, etc.) are included under Governance and Leadership.

Figure 4. Health System Components and the Data Required to Cost Them

Infrastructure

- Health facilities: Types, actual and target numbers, new construction and rehabilitation, operating costs
- Medical equipment
- Furniture and vehicles
- ICT equipment

Human Resources

- Types of personnel
- Salaries and benefits
- Use of staff time
- Turnover
- Training: Initial training and continuing education
- Recruitment

Logistics

- Medicines, medical supplies and consumables
- Warehouses
- Cars

Information Systems

- Knowledge management
- Provision of statistical data
- Clinical files, etc.

Governance and Leadership

- Strategic plan
- View
- Institutional reforms
- Decentralization
- Transparency, etc.

Health Financing

- In addition to government funds for health, without other special costs

Management costs of health systems: Training; supervision visits; coordination meetings; consultancy work; office equipment; information, education, and communication (IEC) materials, etc.

Impact analysis of the scale-up under PESS: The health impact of scaling up interventions is estimated through "impact modules" connected with the service delivery targets entered for the DNSP and DNAM programs. Three modules were used for estimating the impact of the PESS: the Lives Saved Tool (LiST), the AIDS Impact Model (AIM), and the Family Planning (FamPlan) model. These are described in further detail in Annex C. All impact modules connect with the demographic projection module within the Spectrum suite that houses the OneHealth tool. In summary:

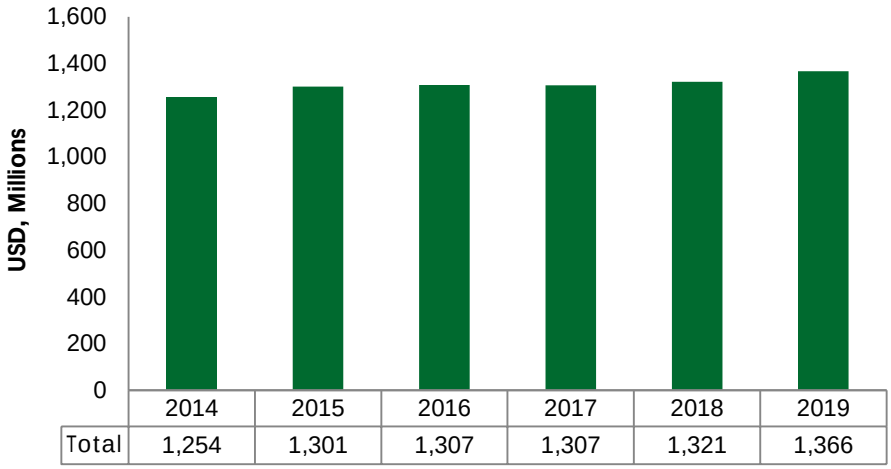
- **LiST** estimates the impact for interventions with a child and maternal health focus, especially the interventions contained in DNSP's Maternal and Infant Health (*Saúde Materno-Infantil*, or SMI) and Nutrition (*Nutrição*) programs. It incorporates the effect of increasing usage of modern methods of contraception.
- **AIM** estimates the impact of antiretroviral treatment (ART) and PMTCT on new HIV infections. It also estimates the impact on AIDS-related mortality.
- **FamPlan** further analyzes the data on the use of contraceptives and estimates future total fertility rates, which are used in estimating births and other demographic indicators in future years.

3. RESULTS: OVERALL FINANCIAL RESOURCES REQUIRED

A. Total Costs of the PESS, 2014–2019

The implementation of the PESS over 2014–2019 is projected to require **$7,856 million** in constant 2013 dollars. The costs will increase, on average, 1.7 percent annually. The costs are shown in Figure 5.

Figure 5. Total PESS Costs by Year, 2014–2019

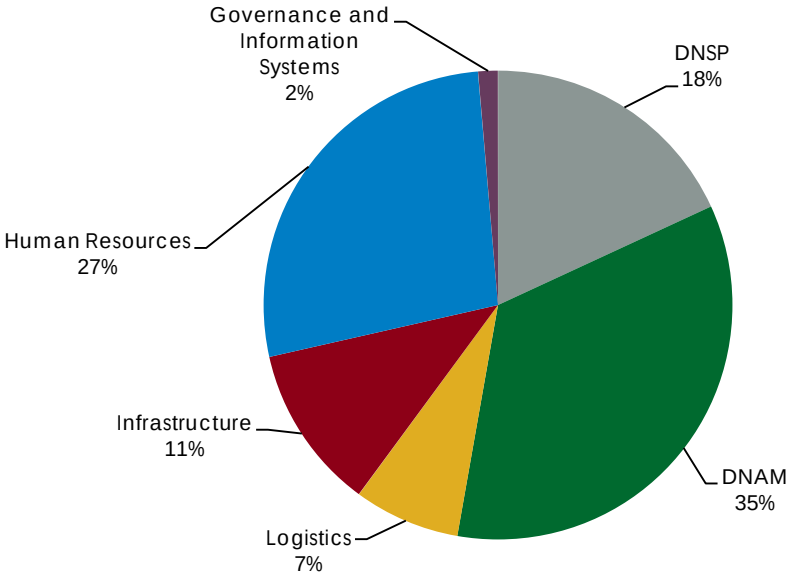


	2014	2015	2016	2017	2018	2019
Total	1,254	1,301	1,307	1,307	1,321	1,366

The source of all figures and tables in this chapter is the authors, using the OneHealth tool.

Overview of costs by department and program

Figure 6. Composition of Overall Public Health Sector Costs, 2014–2019



The DNSP and DNAM programs contribute more than half of the total cost of the PESS, while the health system components make up the remaining 47 percent (Figure 6). The public sector human resources for health will be the largest driver of health system components, followed by infrastructure and logistics.

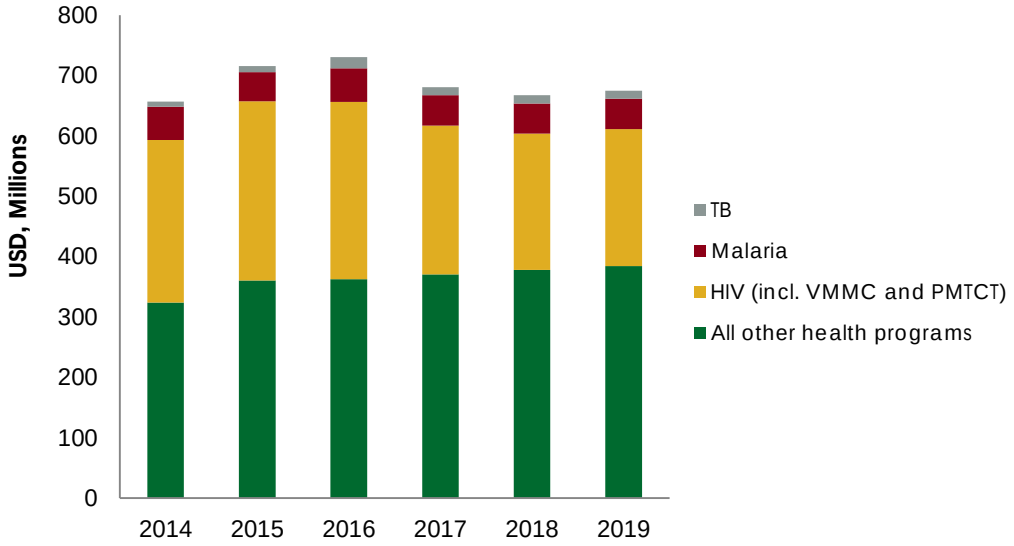
The share of human resources for health will increase from 21 to 33 percent from 2014 to 2019 due to the projected increase in salary and benefits, and increased recruitment. Concurrently, the cost of health infrastructure in the overall costs will decrease from 18 to 9 percent. Most of the infrastructure costs are front-loaded, especially with immediate construction and rehabilitation activities in the next few years. A suggested rationale is that these facilities are required to support the overall rapid scale-up of activities. A new MISAU Infrastructure Development Plan is expected in 2014.

There are 40 health programs across DNSP and DNAM. Under DNAM (35% of all PESS costs), the major share belongs to HIV/AIDS, which also contributes to DNAM being larger than DNSP (also see Figure 7). The total annual cost of DNAM and DNSP health programs will increase from $657 million to $730 million over 2014–2016. This total annual cost falls below $700 million per year over 2017–2019. This does not reflect a slowdown in service delivery. There is rapid scale-up of non-clinical activities in the initial years of the PESS, which decline or stabilize in later years, even as clinical activities continue to increase due to raised targets or the increasing population. In many cases, program management activities, especially training, are front-loaded to the first few years of the PESS to build health system capacity to implement ambitious service delivery targets in distal years.

The technical team notes that all targets beyond a three- to five-year timeframe are prone to extensive uncertainty. During the mid-term review of the PESS, program managers will have the opportunity to revise and reset the management-related activities for the period 2016–2019, as well as service delivery targets.

The reinvigoration of certain initiatives, such as for gender mainstreaming, and the revitalization of existing health programs, such as health promotion and primary maternal health, indicate a trend to address bedrock issues in the health sector. Despite this emphasis, certain priority vertical disease programs will require half of the resources for health programs under the PESS up to 2016 (Figure 7). Among these, HIV generates the largest resource requirement, followed by malaria.

Figure 7. Relative Contribution to Costs of HIV, TB, and Malaria, vs. Other Health Programs



It is hard to determine whether the relative share of the HIV program costs in Mozambique is appropriate to the proportion of the burden of disease generated. The technical team notes that for these three vertical programs, 10 to 22 percent of the total cost over the six years is devoted to certain non-service delivery-related activities. These activities comprise investments for M&E, supervision, mass media and outreach,

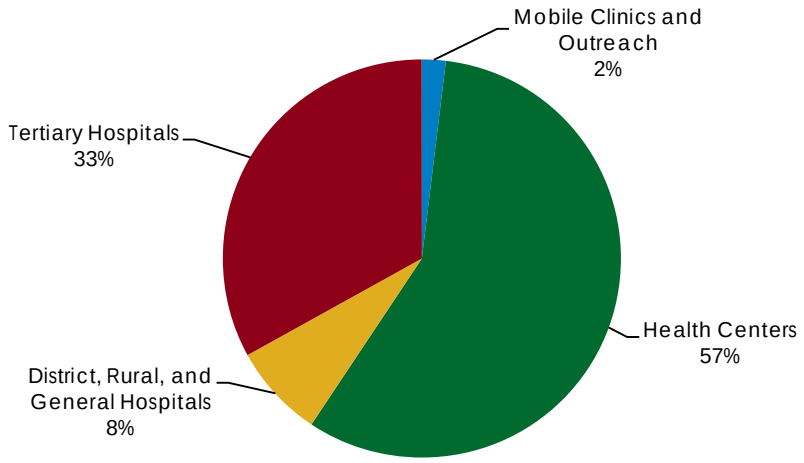
and general program management. Given that these three programs account for a large proportion of overall health program costs, there may be potential for rationalization in the non-service delivery costs; this needs to be carefully evaluated.

Overview of costs by level of health system

The technical team estimates the distribution of the costs of health infrastructure, drugs, and commodities under the PESS by levels of healthcare. These are the types of costs the technical team can disaggregate by level. Costs that cannot be disaggregated by level in this analysis include those for health system support functions, such as the costs of overall logistics and distribution, wastage, governance, and leadership. The technical team also lacked an accurate count of health workers by cadre and type of health facility; hence, these costs could not be disaggregated by levels of healthcare for the present analysis.

About 2 percent of resources are targeted to the mobile and outreach level, which is ambitious. This reflects one of the overall priorities of the PESS—to decentralize healthcare. An estimated 67 percent of resources are targeted to the community, primary, and secondary levels of care, while 33 percent are focused on the tertiary level (Figure 8). This may reflect an aim to expand primary and first referral levels of healthcare while strengthening the existing hospital-based sector for priority interventions. Greater resources are currently expended at the higher-level hospitals (provincial and central), compared to the more numerous district and rural hospitals. About 33 percent of resources are targeted to the 10 provincial and central hospitals, while 8 percent of resources are targeted to the 45 district, rural, and general hospitals. This may be due to several reasons. First, the higher-level facilities cater to more specialties, which have a higher per patient cost, on average. Second, the higher-level hospitals see a larger patient load per hospital, compared to the district, rural, and general hospitals. Data on service delivery in the hospital sector are not precise and the cost analysis had several limitations. These results should therefore be considered as indicative. More details on the cost analysis of hospital-level healthcare under DNAM programs are provided in Chapter 5.

Figure 8. Total Facility-level Costs* by Level of Healthcare, 2014–2019



* Includes drugs, commodities, construction, rehabilitation, and operating costs. Excludes all other costs.

4. RESULTS: FINANCIAL RESOURCES REQUIRED FOR PUBLIC HEALTH PROGRAMS

A. Methodology for *Saúde Pública* Programs

For programs with service delivery interventions, for each included intervention, only non-labor costs of service delivery were estimated. For each health program:

Total cost by disease program = Total direct costs of all interventions + Other program-specific costs (M&E, training, meetings, etc.)

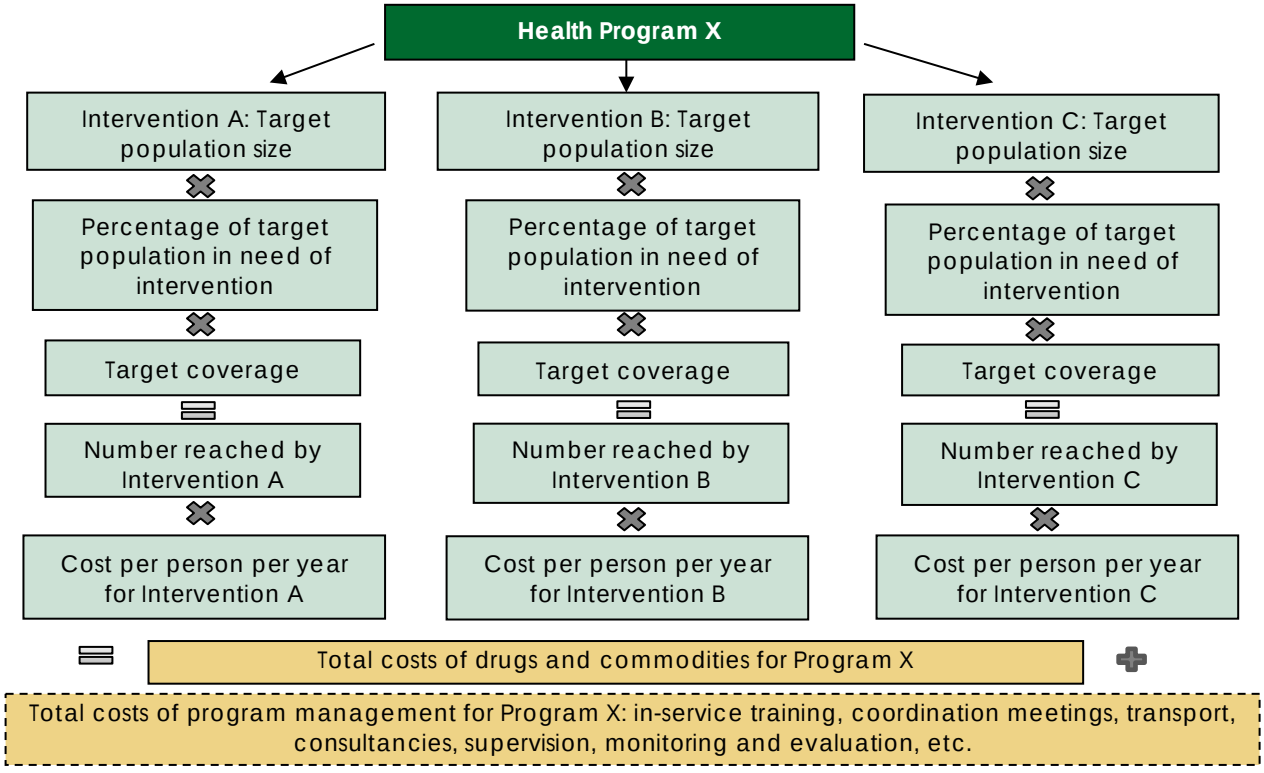
Here, the total direct costs reflect the costs of service delivery for interventions, i.e., the non-labor inputs. The direct costs above can be disaggregated by the type of delivery channel, e.g., health centers and health posts, hospitals, and the mobile/community level. For this disaggregation, it is necessary to provide a percentage of the intervention that is delivered through each channel (channels are shown in Figure 8).

Total direct costs by intervention = Cost per case per year (drugs & commodities) x Number of cases;

Number of cases = Size of target population x % of population in need x Coverage (%)

The "percentage of the target population in need" of an intervention, used to generate the final number of cases/individuals reached, was based on epidemiological data from Mozambique and information generated from the demographic and health impact modules linked to OneHealth. In certain cases, the program had already done a similar calculation, and provided the technical team with multiyear estimates of the number of persons it would reach with a specific intervention. In these cases, the number of cases per year per intervention was entered directly. Figure 9 shows a graphical depiction, using an example.

Figure 9. Approach to Estimate Total Costs of Certain Primary Health Programs, by Year



B. Overall Results for *Saúde Pública*

Table 1 shows the results of the cost analysis of the programs of DNSP, with the total costs of the seven largest programs highlighted. These programs contribute 88 percent of DNSP costs over 2014–2019 and are examined in more detail in this chapter. Prevention of mother-to-child transmission, or PTV (Portuguese acronym), is an important program, and the resources needed for it have been discussed in greater detail in the final document of the *Plano de Aceleraçao*. In addition to the highlighted programs in Table 1 and PTV, there are eight other programs that contribute 8 percent of total DNSP costs. These include some national programs without service delivery interventions at the facility or community levels. The costs for these programs are presented in summary form in Table 1.

Table 1. Total Cost of All DNSP Programs, 2014–2019, USD Millions*

Program	2014	2015	2016	2017	2018	2019	Total
Malaria	**55**	**48**	**56**	**50**	**50**	**50**	**309**
Maternal and Child Health (SMI)	**33**	**46**	**47**	**52**	**51**	**51**	**280**
Nutrition	**32**	**36**	**40**	**41**	**41**	**40**	**229**
Expanded Program on Immunization (PAV)	**25**	**37**	**36**	**35**	**35**	**35**	**204**
Tuberculosis (TB)	**19**	**13**	**15**	**20**	**16**	**16**	**78**
Neglected Tropical Diseases	**10**	**12**	**13**	**13**	**14**	**14**	**76**
Health Promotion	**9**	**9**	**11**	**11**	**12**	**12**	**64**
Prevention of Mother-to-child Transmission (PTV)	7	9	9	9	9	9	**50**
Mental Health	7	7	7	5	6	5	**36**
School Health	5	5	5	5	5	5	**30**
Non-communicable Disease	2	3	3	3	4	5	**20**
Adolescent Health	3	3	3	3	3	3	**19**
Epidemiology	0.46	0.52	0.54	0.53	0.54	0.54	**3.1**
Environmental Health	0.51	0.5	0.5	0.5	0.51	0.51	**3.0**
National Laboratory for Water & Food Hygiene	0.4	0.46	0.45	0.38	0.3	0.3	**2.3**
Sports Medicine	0.05	0.07	0.07	0.07	0.07	0.07	**0.4**
Total DNSP costs	**198**	**227**	**249**	**243**	**244**	**244**	**1,404**

* Values have been rounded to integers. Totals may not be exact.

This chapter on the resource needs for DNSP programs is meant to be read in conjunction with the main PESS document. Brief summaries of recent health indicators for each program, areas of achievement, and recommended approaches in the context of the PESS are presented here for easy reference. The issues highlighted have critical significance for interpreting the patterns of costs and the health system resources required, and in judging the adequacy of the modeled health impact over the period of the PESS.

All unit costs shown in boxes in the following sections are for a patient year unless otherwise indicated. They are based on the cost of drugs and commodities provided to the patient, and the use of laboratory reagents for tests. The sources of all figures and tables are the authors, using the OneHealth tool.

C. Malaria

PESS result area*: Reduce morbidity and mortality from malaria by half in 2016 compared to 2009.*

Situation analysis

Malaria has been the leading cause of death for children under age five [2]. In at least 21 of Mozambique's 148 districts, the reported malaria incidence in 2010 was more than 300 cases per 1,000 persons in the population, mostly in districts drawn from the center and northeast [3]. This is a reduced level of malaria intensity compared to 2009 or 2008. The estimated annual number of malaria cases declined from 6.3 million 2006 to below 4 million 2011 with the adoption of major vector control interventions. Still, coverage, quality, and efficiency of these control programs remain weak. In some areas, 90 percent of children under age five are infected with the malaria parasite (*p. falciparum* is the most common variant). About 45 percent of outpatient cases and 56 percent of inpatient admissions in pediatric wards are related to malaria [3]. Intermittent preventive treatment for pregnant women (IPTp) has not reached the desired coverage—the level was 36 percent in 2012.

Strategic objectives

The *Plano Estratégico da Malária 2012–2016* (Strategic Plan for Malaria) defines key targets for malaria. To prevent infections, the malaria program has been engaged in the massive distribution of long-lasting insecticide-treated nets (LLINs), with the aim of providing one net for every two persons. Improving the management and effectiveness of vector control will require enhanced intersectoral collaboration, e.g., among the health, agriculture, and public works ministries. The key objectives are as follows:

- **Improve management capacity,** including mechanisms for intersectoral coordination of vector control activities and appointment of technical support at the central, provincial, and district levels.
- **Expand prevention and access to at least one prevention method** across LLINs, indoor residual spraying (IRS), and IPTp.
- **Expand diagnosis and treatment,** especially microscopy and rapid diagnostic tests (RDTs) in health facilities, RDTs and malaria treatment in the community, and strengthening of severe malaria treatment.
- **Improve knowledge of malaria transmission, prevention, and treatment** through schools, media, opinion leaders, service providers, multipurpose community health agents (*Agentes Polivalentes Elementares*, or APEs), campaigns, and volunteers.
- **Strengthen surveillance systems and M&E in all districts** through appointment of focal points, integration of malaria indicators into the health information systems (HIS), and monitoring of commodity use.

Data sources for the cost analysis

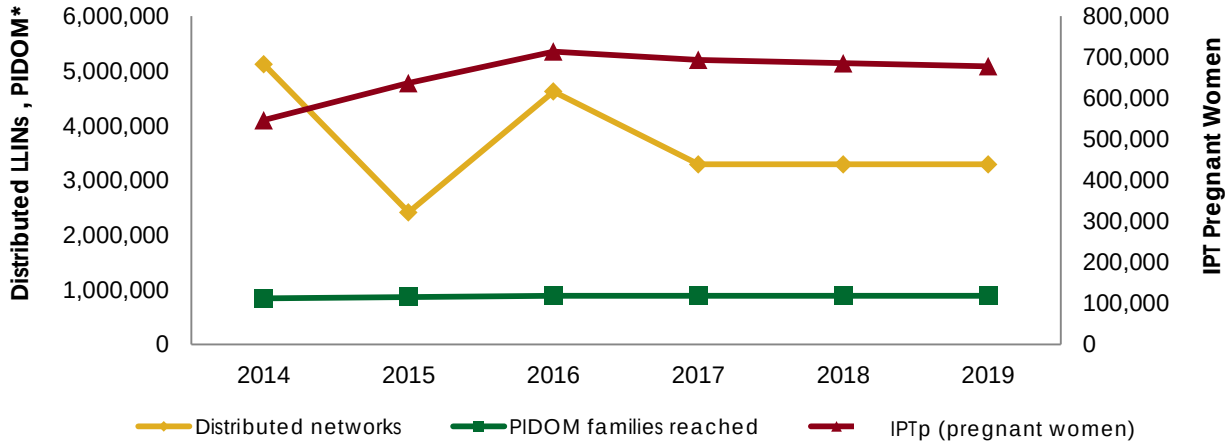
Targets: Data sources and methodology for the malaria program's cost analysis differs from the methodology shown in section 4.A above and in Figure 8. The malaria program provided the technical team with the targeted numbers of LLINs, households for IRS, cases for malaria diagnosis, patients for ACT, and number of liters for larvacide, by year, over 2014–2017, with the targets for 2017 continued over 2018−2019. The numbers to be achieved, by intervention, were entered directly into OneHealth.

Unit costs: Unit costs for the key interventions across malaria prevention, diagnosis, and treatment were based on the Global Fund Round 9 Phase 2 grant renewal submission. Malaria program management costs were based on inputs from the program manager and the *Plano Estratégico da Malária.*

Scale-up of interventions

The malaria program has ambitious prevention-related targets. The LLIN campaign is the main method of prevention, targeted at 60 percent of the 148 districts in the country, with IRS targeted for 40 percent of districts. Desired coverage of LLINs is defined as one net per two persons, based on LLINs distributed in the past three years. The program targets 100 percent coverage of LLINs within the general population, with new LLINs provided to 90 percent of pregnant women attending antenatal clinics. The number of future LLINs needed up to 2017, after accounting for prior stocks and ongoing distribution efforts, was re-estimated by the malaria program in June 2013 (Figure 10). It was assumed that the 2017 levels of LLINs would continue to be distributed over 2018–2019.

Figure 10. Total Reach of Key Malaria Prevention Interventions, 2013–2019

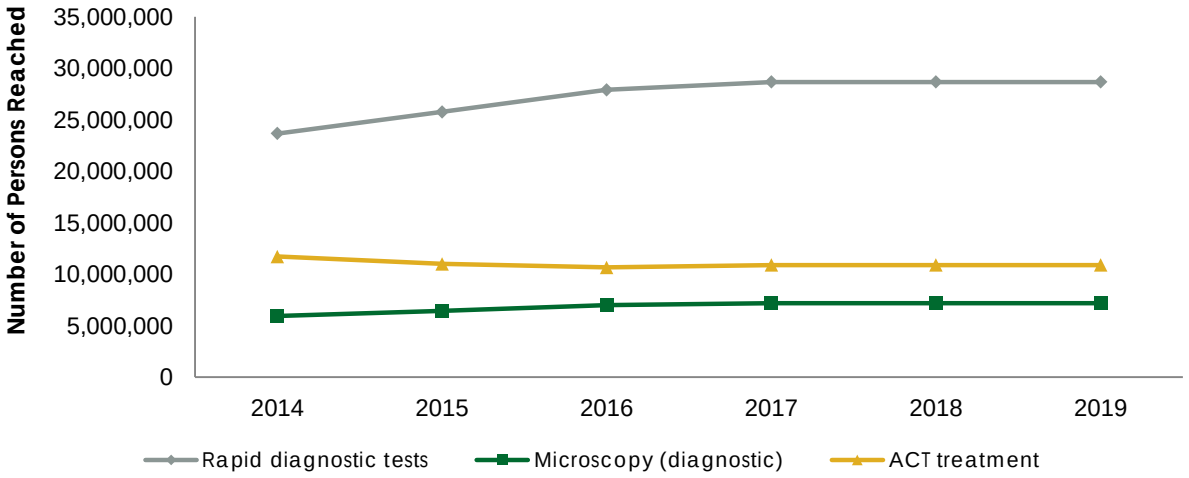


*PIDOM is the Home Spraying Program.
Source: Malaria program.

Other methods target particular districts or at-risk groups. The IRS campaigns focus on 60 hyper-endemic districts and will cover approximately 880,000 households annually over 2014–2019, with a major campaign in 2013, prior to the PESS. IPTp will be provided to 80 percent of HIV-negative pregnant women attending antenatal clinics by 2017, and this coverage will be continued over 2018–2019. The estimated numbers reached are based on the expected pregnancies. Larvacide is used in high-priority areas to disrupt mosquito breeding, and about 1,500−3,000 liters of larvacide per year will be needed over the period.

There are two mechanisms for malaria diagnosis: RDTs and microscopy. Expansion of RDTs to the community level through APEs aims to increase access to diagnostic services. As a result, the malaria program expects to perform four times as many RDTs as microscopy over 2014–2019 (Figure 11). Non-severe malaria is treated in Mozambique with four tablets of artesunate plus amodiaquine, an artemisinin-based combination therapy regimen (ACT). The program will provide more than 10 million people per year with access to ACT treatment to reduce malaria-related mortality.

Figure 11. Numbers Reached by Malaria Diagnosis and Treatment, 2014–2019



Source: Malaria program.

Cost results

Unit costs: Although larvacide, LLIN, and IRS have the highest unit costs in the malaria program, all three prevention methods yield prevention benefits for more than one person (Box 2). The larvacide unit cost is per pond and is the highest. It yields population-level impacts by disrupting malaria breeding habitats. If a pond is treated, multiple households or communities in near proximity may benefit, so the cost per person actually benefited could be lower than the cost per pond. This type of unit cost was not estimated. Similarly, IRS provides protection to a household, and each LLIN serves at least two persons.

Box 2. Largest Malaria Unit Costs, USD

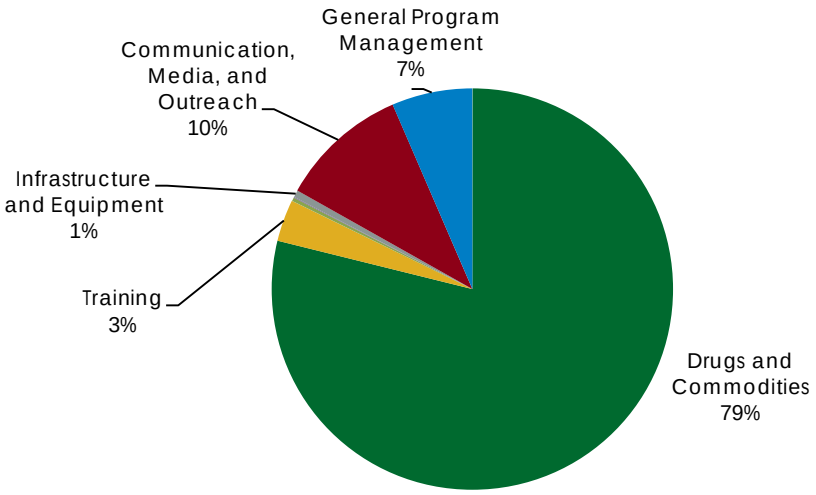
Intervention	*Unit Cost*
Larvacide	$19 (per pond)
LLIN	$3 (per net)
IRS	$2 (per house)

Total costs: The malaria program is the highest-cost DNSP program under the PESS. Total costs by year are shown in Table 1. Costs show an alternating peak-trough pattern over 2014–2017, based on the pattern of the LLIN campaigns. Costs are flat over 2018–2019, given the assumptions of constant coverage for interventions over those years as used in this cost analysis.

Total 2014–2019 malaria costs: **$309,420,226**

About 79 percent of total malaria program costs derive from drugs and commodities (Figure 12). Communications, media, and outreach costs contribute 10 percent to the total. These activities include information, education, and communication (IEC) at the community level and provision of manuals and guides for health providers. This supports the need for implementation of standards and improved awareness, as outlined in the PESS.

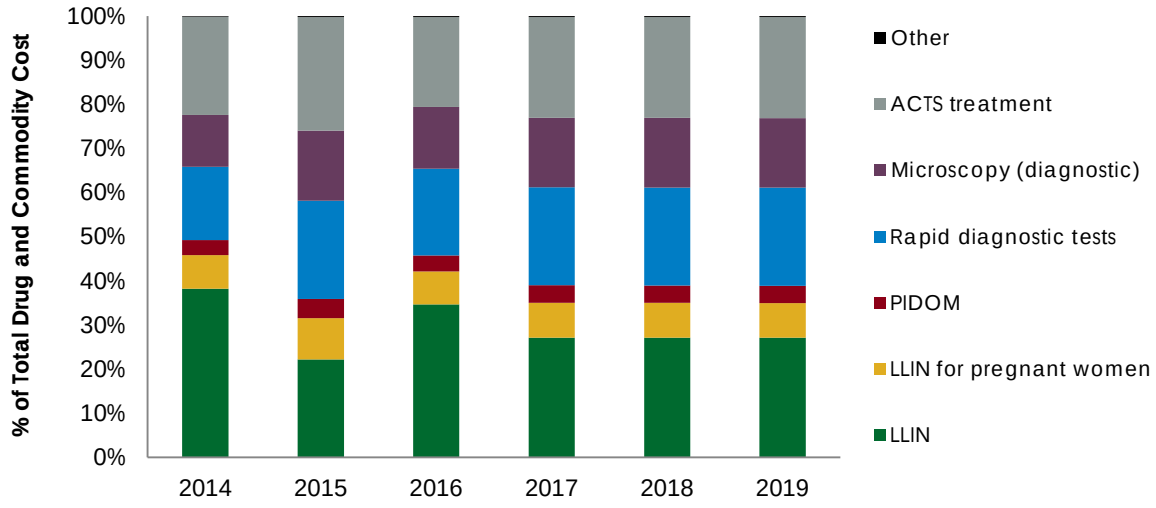
Figure 12. Composition of Total Malaria Costs, 2014–2019



In-service training planned by the malaria program includes training on laboratory skills as well as M&E. More than half of training resources are targeted at district-level clinical staff. Together, the program management activities represent 10 percent of the total malaria costs. General program management includes operational costs of IRS and coordination meetings at the national and provincial levels.

The bulk of malaria drugs and commodity costs over 2014–2019 are derived from LLINs (Figure 13). This intervention will be supported by the Global Fund and other donors. If LLIN coverage targets are met, the PESS will meet its overall goal to provide access to at least one malaria prevention method for every person in Mozambique. Treatment and diagnosis cost less than $1 per person at the subsidized prices of the commodities. However, with LLINs, these interventions represent the three largest cost drivers.

Figure 13. Composition of Malaria Drug and Commodity Costs, 2014–2019



Other: Sum of interventions that, on average, contribute less than 3% to the annual cost of drugs and commodities.

Key issues and areas for further analysis

Quality of data: Data quality for inputs used in the cost analysis was generally high. The malaria program provided the specific targets. The technical team did not observe all of the percentage coverage figures used in developing the targets or assess whether the population-level goals were met (e.g., number of nets per person). The previous malaria indicator survey in Mozambique was conducted in 2007, though the 2011 Demographic and Health Survey (DHS) also provides malaria-related information. These programmatic targets may need to be revisited as malaria incidence is reassessed and hyper-endemic districts requiring IRS are confirmed.

Areas for further analysis: The program and technical partners should conduct an impact analysis for the malaria prevention, diagnostic, and treatment interventions, especially to understand the cost-effectiveness of various interventions and find a subset of these to prioritize, hence rationalizing overall resource needs. During this costing exercise, it was difficult to judge whether the current allocation of LLIN and IRS-related resources across the districts of the country was efficient and effective. A malaria impact model that estimates the number of infections prevented and the morbidity and mortality averted from prevention and treatment should be developed, or an existing approach [4, 5] modified and applied in Mozambique. Such a model is not currently integrated with OneHealth. Such a modeling analysis would help to assess whether the PESS health impact goals for malaria are likely to be met.

A malaria-specific financial gap analysis was conducted in the context of the Global Fund Round 9 renewal. This should be updated in the near future, as targets are reassessed and funding commitments from donors are clarified. The health system components impacted by the scale-up of malaria interventions should also be assessed for long-term sustainability (for human resources, see Chapter 6).

D. *Saúde materno-infantil* (SMI)

PESS result areas: *Reduce maternal mortality and morbidity by expanding and improving the quality of care in maternal health services. Expand and improve the quality of care and services for sexual and reproductive health. Reduce mortality among children under age five.*

Situation analysis

Maternal health: Closely linked with high fertility and poor quality of obstetric care, maternal mortality has remained high in Mozambique, at an estimated 408 deaths per 100,000 live births. Progress in reducing the mortality rate has slowed alarmingly (Table 2). The proportion of births in the past three years at a health facility increased from 44 percent in 1997 to 49 percent in 2003, and then to 55 percent in 2011[3] [6, 7]. In rural areas, only 45 percent of women give birth at a facility. According to the DHS, overall, 14 percent of the deaths among women of childbearing age were due to maternal complications. As per WHO, the prevalence of syphilis among pregnant women in Mozambique is among the highest in the world.

[3] Values based on live births in the last three years preceding the survey.

Table 2. Key Indicators – Maternal and Child Health

Indicator*	1997	2003	2011
Maternal mortality rate per 100,000 live births	690	408	408
Neonatal mortality rate per 1,000 live births	54	37	30
Infant mortality rate per 1,000 live births	135	101	64
Under-5 child mortality rate per 1,000 live births	201	152	97
Percentage of children underweight (below -2 SD from median weight for age)	-	19.7	14.9
Percentage of children stunted (below -2 SD from median height for age)	-	47	43
Percentage of children wasted (below -2 SD from median weight for height)	-	5.2	5.9

* All mortality rates are for the five-year periods of analysis from the DHS. SD: standard deviation. Source: [8].

Sexual and reproductive health: The total fertility rate (TFR) is high and has been increasing in recent years. The rate in 2011 was 5.9, compared to 5.5 in 2003 [2, 3]. There was a significant decline in the contraceptive prevalence rate (CPR) for modern methods among currently married women between 2003 and 2011 (Table 3). Trends have especially worsened in rural areas, further increasing the disparity with urban areas. Long-acting and permanent methods as a proportion of all modern methods increased over 2003−2011, from 28 to 48 percent, even as overall CPR decreased.

Table 3. Key Indicators – Family Planning (FP) and Reproductive Health

Indicator	1997	2003	2011
Total fertility rate (children per woman)	5.2	5.5	5.9
Percentage of married women currently using any method of FP	5.6	25.5	11.6
Percentage of married women currently using any modern method of FP	5.1	20.8	11.3
Percentage of married women with an unmet need for FP	24.9	18.9	28.5
Percentage of all women of reproductive age currently using any method of FP	6	25.6	12.3
Percentage of all women of reproductive age currently using any modern method	5.4	21.6	12.1
Percentage of live births delivered at a health facility (past three years)	43.7	49.1	55

Source: [8].

Child health: Neonatal mortality has declined, but the rate of decline has slowed. Among neonates, prematurity, asphyxia, and sepsis contribute about 76 percent of the total mortality in the group. The mortality rate in children under age five has declined (Table 2). There is a mixed record of changes in the nutritional status of children under five. The proportion of children who are wasted has increased. In contrast, the proportions of children underweight or stunted have declined. The nutritional indicators are worse in rural areas—stunting is 1.3 times, wasting levels are 1.8 times, and underweight levels are 1.7 times the levels in urban areas. The poorest households, measured on a wealth index, have twice the levels of stunting and wasting as the wealthiest households [7].

According to the ACA 2011 report, 90 percent of health facilities offered the Integrated Management of Childhood Illnesses (IMCI) package [9]. This indicator is based on the availability of trained health workers. It does not take into account the availability of required equipment and medicines. Greater integration is needed between IMCI and programs for school health, nutrition, malaria, and immunization.

Strategic objectives

Maternal health: The PESS aims to significantly reduce maternal mortality and morbidity in Mozambique by expanding critical interventions and improving their quality. The key strategies are as follows:

- **Increase the quality and continuity of antenatal care**, especially to ensure a first antenatal care (ANC) visit before the 16th week of pregnancy and the achievement of at least four ANC visits. The program will construct special maternity rooms for expectant mothers in health facilities. This involves strengthening community involvement in prenatal care via engaging leaders, as well as local health activists and others. The approach also includes scaled up, high-quality IPTp, syphilis prevention and treatment, and nutrition for pregnant women.
- **Implement higher obstetric standards to improve the diagnosis and treatment of obstetric complications:** The PESS aims to increase the number of health facilities with maternity wards that implement the Model Motherhood initiative and can offer Basic Emergency Obstetric Care (BEmOC). The number of hospitals offering Comprehensive Emergency Obstetric Care (CEmOC) will also increase. Other high-impact interventions for scale-up are shown in Box 3.

Box 3. PESS Approach to Obstetric Care

- Misoprostol to prevent postpartum hemorrhage
- Improved monitoring of labor and delivery
- Improved surveillance of maternal deaths
- Improved timing and quality of postpartum consultation
- An integrated package of services across a continuum of care
- Expanded treatment of obstetric fistulas

- **Strengthen the referral system** by developing and implementing standards based on the availability of CEmOC-capable facilities; improve and provide for communications and transportation of mothers, and strengthened involvement of communities around health facilities, including outreach workers.

Family planning and reproductive health

- **Strengthen the multisectoral response to sexual and reproductive health**, with a focus on adolescents and youth, in coordination with youth organizations and the National Partnership for Maternal, Newborn, and Child Health (MNCH). In this context, update and implement the National Strategy on Adolescent Health and the Youth, with a focus on the *Serviços Amigos dos Adolescents e Jovens* (SAAJ),[4] to deliver family planning, counseling, and testing for HIV/sexually transmitted infections (STIs) and integrated services.
- **Implement a voluntary family planning strategy** with increased service provider capacity to counsel and deliver long-acting and permanent methods. FP strategies should be integrated with other services, such as PMTCT. The approach includes voluntary family planning at the community level using community health workers (CHWs), mobile units, and NGOs. A communication strategy for family planning will be developed and implemented. The scale-up of family planning requires health system strengthening, especially in logistics.
- **Improve screening and treatment of STIs and HIV** as a part of sexual and reproductive health.
- **Develop advocacy actions for the decriminalization of abortion** to prevent maternal deaths caused by unsafe abortion, as well as ensure the provision of safe services and postabortion care.

[4] *Serviços Amigos dos Adolescents e Jovens* (Friendly Services for Adolescents and Youth) is an initiative in Mozambique to provide youth-friendly services at health centers and hospitals.

- **Implement interventions to reduce gender-based violence and mitigate its effects**, including clinical and psychosocial support, emergency contraception, and post-exposure prophylaxis for HIV.
- **Implement strategies for the prevention and treatment of cervical cancer**. Recognizing the link of human papilloma virus (HPV) infection with the risk of cervical cancer, sexual health–related education and counseling should be expanded, along with vaccination against HPV infection.

Child health

- **Expand access to essential newborn care using current standards**, especially newborn resuscitation and follow-up in the first week of life, and reduce inequities in the availability of these services.
- **Promote essential newborn care in the community** using CHWs and traditional birth attendants (TBAs).
- **Expand and improve the quality of services for child health in health facilities**, including growth monitoring up to age five and nurseries with qualified staff and appropriate equipment to care for preterm infants with critical needs. Health facilities will be equipped with essential equipment and medicine for the care of children under age five based on the IMCI—this requires the accelerated implementation of IMCI standards in facilities as well as training for health workers.
- **Other:** Improve integration of consultations to ensure follow-up and to reduce the loss of cases. Improve the monitoring of neonatal and infant health interventions nationally.

Data sources for the cost analysis

Targets: Targets for the SMI program's cost analysis are based on the methodology in section 4.A and as shown in Figure 8. The SMI program provided the technical team with the desired percentage coverage for different interventions over time. The DemProj (demographic projection) and FamPlan modules of Spectrum, both linked with OneHealth, provided the expected number of pregnancies, births, women of reproductive age, children under age five years, and other demographic inputs. In discussion with the SMI program and the obstetrics/gynecology (Ob/Gyn) program of DNAM, the number of births occurring at the primary level (health centers) versus in hospitals was determined. Assumptions for the rate of obstetric complications, such as pre-eclampsia, eclampsia, and postpartum hemorrhage, were also provided by clinicians from SMI or the Ob/Gyn program of DNAM. The SMI program also provided the current and projected method mix for family planning (see Annex B).

Unit costs: Unit costs were developed based on the ingredients-based approach in OneHealth, i.e., accounting for every drug, medical product, and non-pharmaceutical commodity used per person for each intervention, with the intensity of use (dosage and proportion of patients receiving a particular regimen) provided by SMI clinicians. The prices for commodities were based on up-to-date CMAM price lists.

Scale-up of interventions

Reducing maternal and infant mortality rates is one of the key health priorities identified by the PESS. The SMI program delivers maternal, reproductive, and child health services at the primary healthcare level, and has primary responsibility to address these health priorities. The program plans a multifaceted response, from addressing the quality of basic labor and delivery care to reducing high fertility rates.

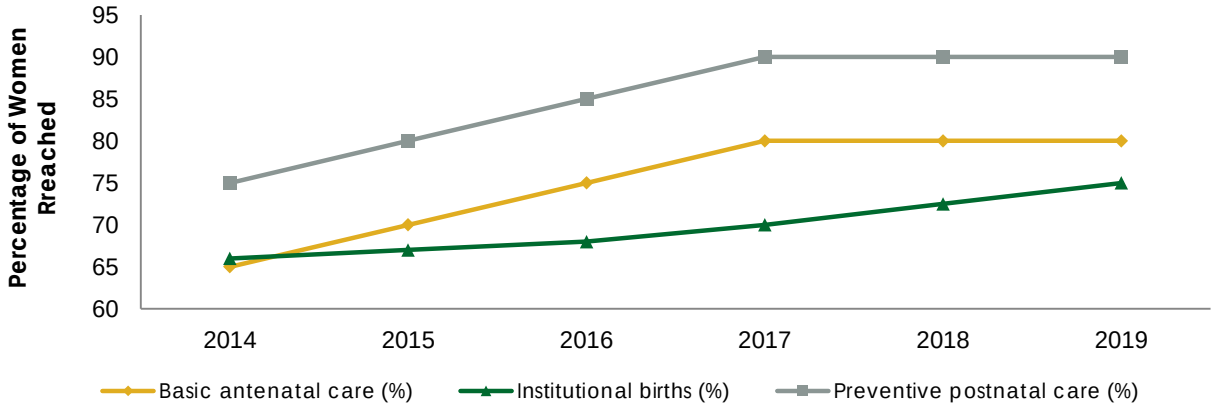
Maternal health: The SMI program aims to increase the institutionalized birth rate from an estimated 65 percent in 2013 to 75 percent by 2019. Labor and delivery management is delivered at all facility levels where births occur. For the purpose of this costing analysis, resources required for normal births at the community and primary levels (e.g., at home, health centers, and health posts) were included in SMI,

whereas all births in the hospital sector were included in the cost analysis of the Ob/Gyn program of DNAM.

Based on the data for 2012, it was assumed that births at the primary health facility level will constitute an average of 57 percent of institutionalized births over 2014–2019. This amounts to approximately 350,000 births annually in the beginning of the period, declining to about 320,000 by 2019 with the impact of the increased use of contraception. For these births, in addition to basic labor management and hygienic delivery services, primary-level facilities can manage a few complications related to BEmOC. Further details on obstetric care are provided in the context of the impact analysis in Chapter 11. Approximately 50,000 births annually are assisted by TBAs at the mother's home, for which the *Unidades Gestoras Executoras das Aquisições* procures a basic kit. These costs are also allocated to SMI.

Antenatal and postnatal consultations provide access to critical preventive interventions, and allow diagnosis of and referral for certain pregnancy complications. The SMI program plans to increase the coverage of women attending at least four antenatal care visits from 65 percent in 2014 to 80 percent in 2017 (Figure 14). It was assumed that this level of coverage would be maintained until 2019. The coverage of women utilizing at least one postnatal care visit will be scaled up as well, as shown below.

Figure 14. Scale-up of Maternal Health Interventions under the SMI Program, 2014–2019



Source: SMI program.

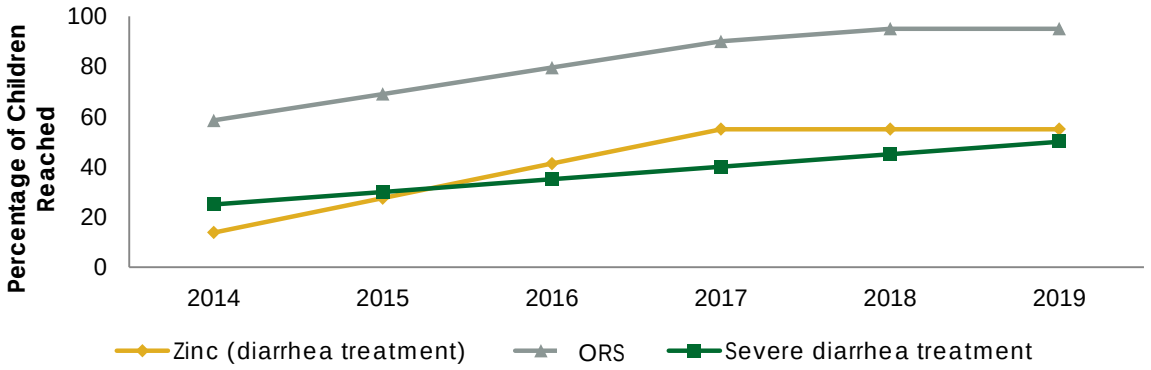
Reproductive health: The SMI program aims to promote the use of modern contraceptive methods, targeting all women of reproductive age in a union. The CPR for modern methods among married women was 11.3 percent in 2011, whereas the MDG for Mozambique originally aimed to reach 34 percent by 2015. In January 2013, representatives of DNSP met with the WHO, the United Nations Population Fund (UNFPA), and USAID's Maternal and Child Health Integrated Program (MCHIP) to discuss the feasibility of reaching the MDG by 2015, which would require the CPR to nearly triple in just four years. The group agreed to revised targets, wherein Mozambique would reach the MDG by 2020, with an interim goal of 27 percent for 2017. To promote voluntary use, the SMI program will produce standards, guidelines, and posters; and aim to integrate family planning with HIV services. The program aims to increase the relative share of long-acting and permanent methods, such as the intrauterine device (IUD), implants, and sterilization (see Annex B).

The program is adopting the Strategy for Prevention and Treatment of Cervical and Breast Cancer. The plan is twofold, emphasizing implementation of national guidelines in health facilities and cancer awareness-raising and health promotion at the community level. The SMI program is responsible for cervical and breast cancer screening. In line with WHO recommendations, women ages 30–55 with no prior cancer history should undergo breast cancer screening every three years and cervical cancer

screening every five years. Current coverage for both screening interventions is low (1%). The program plans to increase coverage to 15 percent by 2019. To increase demand for cancer screenings, the program will work closely with the non-communicable disease program.

Child health: Treatment of childhood diarrhea will be scaled up under the PESS (Figure 15). Based on household surveys, it was estimated that the average child under age five suffers from four episodes of mild or moderate diarrhea per year, and 4 percent of this group suffers from one case of severe diarrhea. Up to 2013, the treatment for mild or moderate diarrhea offered is oral rehydration solution (ORS). Under the PESS, the SMI program plans to introduce zinc in 2014 and scale up both ORS and zinc over 2014–2019.

Figure 15. Scale-up of Diarrhea Treatment Interventions under SMI Program, 2014–2019



Source: SMI program.

Cost results

Unit costs: The highest unit costs among SMI interventions relate to pregnancy complications managed at the primary care level. Pre-eclampsia is the most costly treatment per case and the most common pregnancy complication manageable under BEmOC (Box 4). Its high unit cost is explained by a regimen of three antihypertensive drugs from the 20th week of pregnancy. Postpartum hemorrhage is less common and less costly per case.

Box 4. Highest SMI unit costs, USD

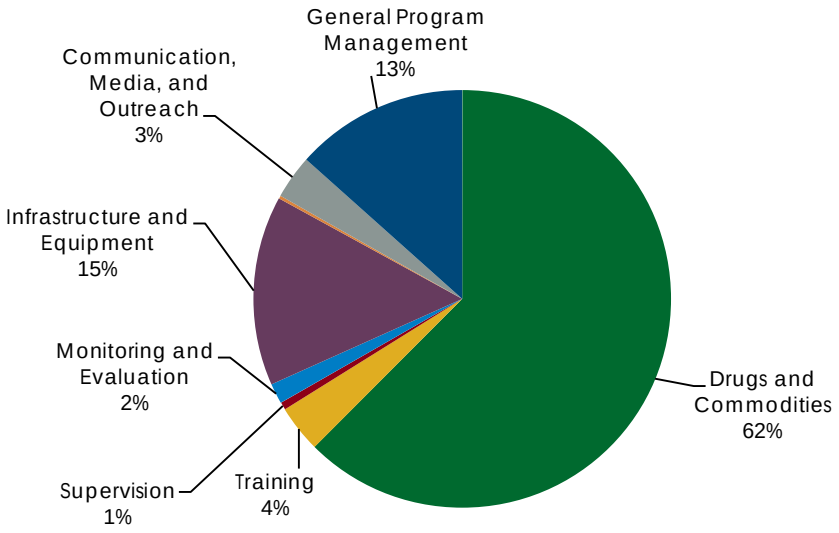
Intervention	*Unit Cost*
Pre-eclampsia (per case)	$78
Treatment of postpartum hemorrhage (per case)	$37
Implants (per year)	$19
Treatment of severe diarrhea (per case)	$11
Condoms (per year of protection)	$9

Total costs: The SMI program will be the second largest program after malaria within DNSP, by total six-year costs, contributing 21 percent of the total over 2014–2019. Drugs and commodities comprise the bulk of the program's costs (62%). General program management and infrastructure costs make up nearly one-third of total SMI costs (Figure 16).

Total 2014–2019 SMI cost, USD: **$280,074,142**

The contribution of infrastructure to costs can be explained by the program's plan to construct about 140 *casas de mãe espera* (rooms for pregnant women) at health facilities annually, beginning in 2015. This is aimed at equipping rural health facilities possessing maternity wards with additional space for expectant mothers. These and other strengthening costs have been budgeted to ensure the capacity of the health system to absorb the scale-up in SMI service delivery. Almost all of the cost of general program management is attributed to the National Health Week ($6.3 million annually). During this week, the SMI program organizes various maternal and child health–related activities aimed at raising demand for interventions, such as institutionalized birth, family planning, and immunization.

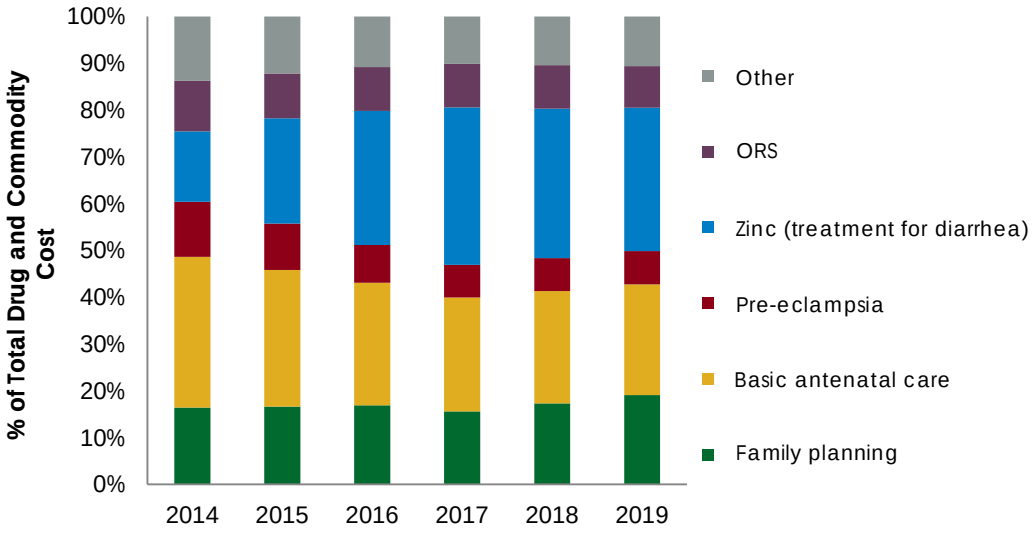
Figure 16. Composition of Total SMI Costs, 2014–2019



The largest cost drivers within SMI drugs and commodities are zinc treatment, basic ANC, postnatal care, and family planning (Figure 17). The scale-up of zinc treatment for mild or moderate diarrhea is resource intensive, though the cost per case is only $1.44. The intervention will be introduced in 2014, initially contributing less than 14 percent to total SMI commodity costs. By 2017, it will account for 32 percent, due to the number of cases of diarrhea per year (12.4–15.7 million) declining over time.

Over 2017–2019, there is little further change in the composition of drug and commodity costs, as targets are assumed to stay flat, with the exception of family planning. This increases based on the scale-up to the CPR for modern methods target by 2020. The shift in the method mix toward long-acting and permanent methods contributes partially to the shifts in costs of family planning, though these methods last longer.

Figure 17. Composition of SMI Program Drug and Commodity Costs, 2014–2019



Other: Sum of interventions that, on average, contribute less than 3% to annual cost of drugs and commodities.

Key issues and areas for further analysis

Quality of data: Data quality for inputs used in the cost analysis was moderate. For coverage, the major demographic inputs were of high quality, as they were calculated within the model and reflected the dynamic impact of family planning on future pregnancies, births, and number of infants and children. After this, some data were subject to uncertainty, especially the split of births occurring between the primary and hospital levels of care. For this aspect, assumptions based on 2012 data and reports (central, provincial, and district) were used for the entire period, given a lack of any other basis for estimation.

Percentage coverage for interventions was provided by the program. However, the various percentages of the target population in need of critical interventions were based on population-level data from past surveys and are only assumptions for the future, when trends may change. This is especially true for obstetric complications of mothers and diarrheal diseases for children.

Areas for further analysis: Updated data are needed on the types of obstetric complications managed in primary healthcare facilities as of 2013. The 2008 Needs Availability Assessment provides inputs that are out of date [10]. An impact analysis related to maternal and reproductive health was conducted for the PESS, and results are discussed in Chapter 11. The analysis considers the impact on maternal and child mortality due to scale-up of interventions under various programs: SMI, nutrition, immunization, malaria, and HIV/AIDS. This analysis should be updated as SMI program targets are revised in the future.

An SMI-specific financial gap analysis was not conducted in the context of the PESS. This should be conducted in the near future, as targets are reassessed and funding commitments from donors are clarified. The human resources for health needs impacted by the scale-up of SMI and other DNSP programs are assessed in this report (see Chapter 6). Other health system components affected by SMI scale-up should also be rigorously assessed for long-term sustainability.

E. Nutrition

PESS result area: *Reduce poor nutrition.*

Situation analysis

In 2010, the GRM launched the Multisectoral Action Plan for the Reduction of Chronic Malnutrition 2011–2015 (*Plano de Acção Multissetorial para a Redução da Desnutrição Crónica em Moçambique*), given the persistent challenges in this area. This plan was recently revised with updated targets. As per the PESS, malnutrition is the underlying cause of 30 percent of mortality among children under age five. Malnutrition in this age group is high, although it declined slightly between 2003 and 2011. Malnutrition is more pronounced in the provinces of the north, such as Nampula and Cabo Delgado, and in rural areas of the country. Chronic malnutrition, both moderate and severe, affected 45.5 percent of children in rural areas and 35 percent in urban areas in 2008 [11, 12]. The health impact of malnutrition can be significant, with low birth weight babies more likely to die in infancy. Chapter 11 provides an overview of the levels of stunting and wasting among children in Mozambique. Malnutrition, especially iron deficiency anemia, also affects many women of reproductive age. An estimated 54 percent suffer from anemia.

Integrated nutrition interventions exist at the primary healthcare level, but there is a shortage of trained health workers to implement them. For acute malnutrition, both the availability and quality of secondary care are marred by high dropout rates and mortality, the latter stemming from a lack of critical therapeutic inputs. Identifying and financing these inputs, as was done for this costing exercise, is a critical step.

Strategic objectives

The PESS recognizes that achieving nutrition-related objectives requires a multisectoral approach, e.g., for food fortification. Specific interventions are the responsibility of the health sector. Several strategies

and plans exist but have not been fully implemented. The PESS calls for these to be implemented in the next five years. The PESS also calls for nutrition-related communication and IEC initiatives, including healthier food practices; diet; physical activity; and reduced consumption of sugar, sodium, and fats, and aims to strengthen the nutrition-related parts of the health system. The following are strategic objectives:

- Reduce chronic malnutrition
- Maintain acute malnutrition at low levels
- Reduce micronutrient deficiencies
- Promote proper infant feeding in the first year of life
- Reduce rates of obesity in adults and adolescents
- Integrate nutrition into HIV and TB programs
- Improve nutrition action planning for emergencies

Data sources for the cost analysis

Targets: The nutrition program is responsible for all nutrition interventions, including supplementation, treatment of malnutrition, deworming, and breastfeeding. All coverage targets were based on the *Plano de Necessidades 2013–2017* and the revised *Plano de Acçao* (*Revisto*). The numbers of persons reached for the nutrition program's cost analysis are based on the *Saúde Pública* methodology. The program provided the technical team with the desired percentage coverage for different interventions over time. For many interventions, coverage targets were available for 2013 and 2017. A linear scale-up path was assumed over the intervening years. Spectrum modules provided the number of pregnancies, births, women of reproductive age, children in various age groups, and other demographic inputs. Needs for different interventions were identified from population-based surveys. In Mozambique, pregnant women have high levels of moderately acute and severe acute malnutrition. Based on the 2011 DHS, it was estimated that 2 percent of children ages 1–4 years and adolescents ages 5–15 years suffer from severe acute malnutrition, while expert opinion estimates that 10 percent of pregnant women suffer from these conditions [7]. Similarly, the technical team estimated that nearly 4 percent of children ages 1–4 years and adolescents ages 5–15 years suffer from moderate acute malnutrition, while 30 percent of pregnant women are affected.

Unit costs: Unit costs were developed based on the ingredients-based approach in OneHealth, i.e., accounting for every nutritional supplement and the length of treatment or supplementation per person across the various nutrition interventions. The prices for commodities were based on data from program staff.

Scale-up of interventions

Deworming is a preventive intervention targeted at pregnant women and children ages 12–59 months, in combination with vitamin A supplementation. The nutrition program plans to achieve and maintain full coverage of children ages 12–59 months with both interventions during the PESS period. For pregnant women, the deworming and vitamin A interventions are delivered during ANC visits and postnatal visits, respectively. Therefore, overall access to these nutrition interventions will scale up alongside the appropriate SMI coverage targets for antenatal care and institutionalized delivery. The scale-up from zero for the supplementation of micronutrients in children ages 6–24 months is particularly striking.

Therapeutic nutrition for moderate and severe acute malnutrition will be provided to children ages 1−4 years, adolescents ages 5–15 years, and pregnant women in need (Table 4). Pregnant women will have access to therapeutic nutrition if they attend antenatal clinics. The program plans an ambitious scale-up of the treatment of malnutrition across patient groups, reaching 80 percent coverage by 2017 (Table 4).

Table 4. Nutrition Interventions with the Largest Increase in Coverage (%), 2013–2017

Intervention	2013*	2015	2017
Vitamin A supplementation (children 6–59 months)	85	100	100
Vitamin A supplementation (postnatal women)	70	80	90
Supplementation of ferrous salt and folic acid (adolescents)	20	60	80
Supplementation of ferrous salt and folic acid (pregnant and postnatal women)	70	80	90
Supplementation of micronutrients (children ages 6–24 months)	**0**	20	80
Treatment of severe acute malnutrition (children ages 6–59 months)	50	70	80
Treatment of severe acute malnutrition (children ages 6–15 years)	50	70	80
Treatment of severe acute malnutrition (pregnant women)	60	70	80
Treatment of moderate acute malnutrition (children ages 6–59 months)	50	70	80
Treatment of moderate acute malnutrition (children ages 6–15 years)	50	70	80
Treatment of moderate acute malnutrition (pregnant women)	60	70	80

* Starting point prior to PESS. Targets assumed to be constant after 2017 (for 2018–2019).

Micronutrient supplementation based on ferrous sulphate and folic acid is targeted to adolescent girls ages 9–11 years and pregnant women. For pregnant women, the supplementation is linked to postnatal and antenatal services. The nutrition program aims to scale up coverage from 75 percent in 2014 to 90 percent in 2017. For adolescent girls, the program plans to double its coverage from 2014 to 2016.

Additionally, micronutrient supplementation for all children ages 6–24 months will be implemented beginning in 2014. This new intervention uses a sachet of powdered micronutrients containing vitamins and minerals. In its first year of implementation, the program will introduce the intervention in at least one high-priority district per province, and in the second year it will expand the intervention to all districts. As a result, the coverage rate will increase rapidly, from 9 percent in 2014 to 80 percent in 2017.

Box 5. Largest Nutrition Unit Costs, USD

Intervention	*Unit Cost*
Severe acute malnutrition treatment (pregnant women)	$61
Severe acute malnutrition treatment (children 6–59 months)	$57
Severe acute malnutrition treatment (children 5–15 years)	$57
Moderate acute malnutrition treatment	$36

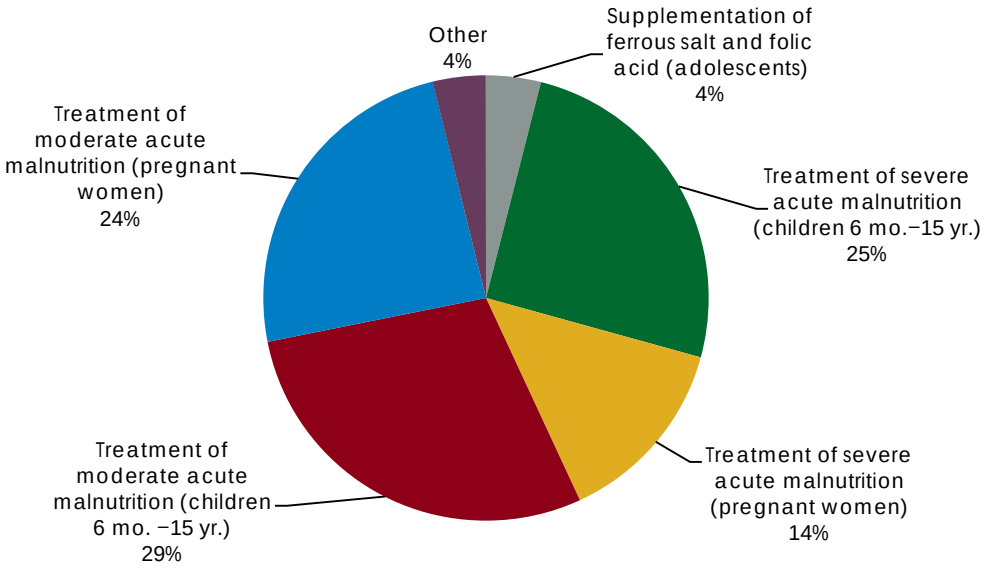
Cost results

Unit costs: As expected, treatment of severe acute malnutrition is more costly than moderate acute malnutrition in all target populations (Box 5). This derives from both the greater length of the therapeutic nutrition required and the inputs. As a result, the treatment of severe acute malnutrition is a large cost driver in the nutrition program, totaling 39 percent of the cost of drugs and commodities (Figure 18).

Total costs: The nutrition program constitutes 16 percent of total DNSP costs over 2014–2019. This can be attributed largely to the large need and the rapid scale-up of interventions, as discussed above. For example, about 250,000 pregnant women per year will be treated for moderate malnutrition. The total program costs will increase by 25 percent over the six-year period of the PESS. About 95 percent of this cost is derived from drugs and commodities, as disaggregated in Figure 18.

Total 2014–2019 nutrition cost: **$228,976,655**

Figure 18. Composition of Nutrition Program Drug and Commodity Costs, 2014–2019



Other: Interventions that contribute less than 3% to annual cost of drugs and commodities (e.g., micronutrients).

All preventive (micronutrient) nutrition interventions are very low cost and together contribute only 8 percent of the total of drugs and commodities for the program. Despite its relatively low unit cost per case treated (Box 5), treatment of moderate malnutrition is the largest cost driver, given the high burden of moderate malnutrition in the country and the scale-up of coverage. Given the coverage rates across age groups of children, the number treated for moderate malnutrition will total, on average, about 290,000 per year over 2014–2019. This is an ambitious target, given that recent registrations for severe acute and moderate malnutrition cases among children have averaged fewer than 40,000 per year.

The cost of the nutrition program's M&E contributes 2 percent to the overall cost, while training, communication, and general program management jointly contribute 3 percent. (This breakdown has not been shown graphically.) The bulk of resources for the program's M&E will be for routine reporting to address the need for better stock taking of therapeutic inputs, also highlighted in the PESS. Reoccurring training costs are distributed among six types of in-service trainings, aiming to strengthen the supply of health workers trained in implementing nutrition services.

Key issues and areas for further analysis

Quality of data: Data quality for inputs used in the cost analysis was moderate. Major demographic inputs were of high quality, calculated within the model. Some data are uncertain, especially those related to the need for interventions. The levels of moderate, acute, and micronutrient-related malnutrition among various age groups used for the cost calculations are based on past data, drawing either from the Multi Indicator Cluster Survey (MICS) of 2008 or the DHS from 2011. There is limited information on how background levels of malnutrition will change in the future, given population-level changes to income and socioeconomic status, and the impact of other factors affecting food security.

Areas for further analysis: It may be several years before the next DHS or a MICS is conducted. To refine the estimates of costs of the nutrition interventions, the year-to-year need for therapeutic feeding and micronutrient supplementation should be based on updated estimates. These can be derived from periodic sample studies conducted across the country, adjusted with appropriate factors to yield national estimates.

F. Expanded Program for Immunization (PAV)

PESS result area*: Reduce the prevalence of and mortality due to vaccine-preventable diseases.*

Situation analysis

Full and early immunization for children has not yet reached high levels of coverage in Mozambique, and there is a slowdown in the growth of this achievement. The percentage of children immunized against major vaccine-preventable diseases increased from 47 in 1997 to 63 in 2003, and then marginally to 64 in 2011 [6, 7]. The coverage is not uniform across the country, with rural areas and a few provinces being particularly disadvantaged, e.g., Zambézia. Dropout rates (i.e., children missing booster shots) were high—estimated at above 10 percent [13]. According to WHO, disaggregated coverage levels for DTP3, hepatitis-B (HepB3), and polio (Pol3) have all fallen below 80 percent in recent years [14].

The Expanded Program for Immunization, or EPI (Portuguese acronym PAV) currently manages measles, polio, tetanus, pertussis, HiB (hemophilius influenza type B), diphtheria, hepatitis B, tuberculosis, and pneumonia-related immunization. It also procures vaccines to protect mothers against tetanus. Since 2009, a pentavalent vaccine for children has been in use, combining vaccine doses for diphtheria, pertussis, tetanus, hepatitis-B, and HiB (DPT-HepB-HiB). In 2011, neonatal tetanus was officially eliminated. Measles and polio are targeted for elimination. Given that pneumonia remains a serious childhood disease, in 2013 PAV introduced the pneumococcal conjugate vaccine (PCV-10, two doses per vial). There will be other innovations. A demonstration project for HPV vaccination is slated to begin in 2014 with support from Gavi, the Vaccine Alliance (Gavi); a rotavirus vaccination will be introduced in 2015.

While the EPI has been in operation for a significant period of time, there are still problems in the logistics chain that lead to stockouts and wastage of vaccines (e.g., for BCG). Based on data reported by the program, it reduced the rate of vaccine vial breakage and other wastage from 23 percent in 2010 to 8 percent in 2012. Vaccine delivery systems are still a challenge. Vaccines are received centrally in Maputo and then sent to provinces by air for the northern and central provinces, and by land to the southern provinces. Seven out of 11 provinces would require additional cold-chain storage capacity to be built to manage the shipments of such freeze-sensitive vaccines as PCV-10/13 as the program scales up coverage of the related interventions [15].

Strategic objectives

- **Increase coverage of vaccinations** by using mobile clinics in hard-to-reach areas through the RED program (Reaching Every District), introducing new vaccines into routine childhood vaccinations, increasing the number of permanent vaccination posts, and implementing social mobilization.
- **Improve logistics management and capacity** by training provincial staff in data quality, increasing technical support at peripheral levels, and introducing new refrigeration technology.
- **Improve the quality and efficiency of PAV services** by training health workers in cold-chain management, inventory management, and the RED strategy.

Data sources for the cost analysis

Targets: The numbers of children to be immunized per year for the purposes of the cost analysis are based on the *Saúde Pública* methodology. The program provided the technical team with the desired percentage coverage for different vaccine interventions over time. Annual coverage targets are derived from PAV's multiyear plan for 2012–2016; these also have been used for Gavi submissions. Spectrum

modules provided the annual number of pregnancies, births, and 11-year-old girls (for the HPV intervention).

Unit costs: The PAV program provided unit costs and they are loaded with shipping costs to Mozambique. The total cost of a dose for various vaccines is similar to the values in published pricing schedules from the Gavi Secretariat. Within Mozambique, the distribution and warehousing costs for all commodities are included for purposes of PESS cost analysis under the logistics component of the health system, discussed later. The costs of injectable vaccines (BCG, HPV, PCV-10, etc.) include the cost of an auto-disposable syringe ($0.05) and the proportional use of a safety box for disposal of the syringes (one box for 100 syringes).

Scale-up of interventions

The primary role of the PAV is to provide routine chilldhood vaccinations. In 2014, routine childhood vaccination in Mozambique will consist of the measles, pentavalent, pneumococcal, and polio vaccines. The program aims to achieve 85 percent coverage of routine childhood vaccination in 2014, scaling up to 90 percent by 2017 (Table 5). From 2016, measles vaccination will be based on two doses, as recommended by the WHO, at six and nine months of age. This will double the cost. The program will aim for 90 percent coverage for the BCG vaccine in 2014 and 95 percent coverage by 2017. In contast, tetanus vaccination among pregnant women will be slow to increase. Scale-up of this vaccine depends on increasing the proportion of pregnant women presenting at antenatal clinics. The program plans to scale up coverage of the tetanus vaccine for pregnant women from 69 percent in 2014 to 75 percent in 2017.

The HPV vaccine will be introduced in 2014, with a targeted 63 percent coverage among 11-year-old girls in its first year of implementation. The introduction of the rotavirus and HPV vaccines responds to the PESS strategic objective of maximizing reductions in the prevalence of and mortality due to vaccine-preventable diseases. Table 5 summarizes the key increases in coverage of the vaccines.

Table 5. Coverage Increases for Key PAV Interventions (%), 2013–2017

Intervention	2013*	2015	2017
Rotavirus	**0**	87.5	90
Measles	85	90	95
Pneumococcal (PCV-10)	85	87.5	90
Poliomyelitis	85	87.5	90
BCG	90	92.5	95
HPV	**0**	68	75
Pentavalent (DPT-HepB-HiB)	85	87.5	90
Tetanus vaccine for pregnant women	67	71	75

* Starting point prior to PESS. Targets assumed to be constant after 2017 (for 2018–2019).

Cost results

Unit costs: Rotavirus vaccination requires two doses, each costing $7.50 in 2012, making it the second most costly intervention and the most costly routine vaccine (Box 6). Price declines in rotavirus vaccines are expected. These declines were not confirmed for this analysis. Therefore, the cost of $7.50 was used for all years. Pneumococcal vaccine PCV-10, three doses at $3.50 per dose, is the second most expensive routine vaccine

Box 6. Largest PAV Unit Costs, USD

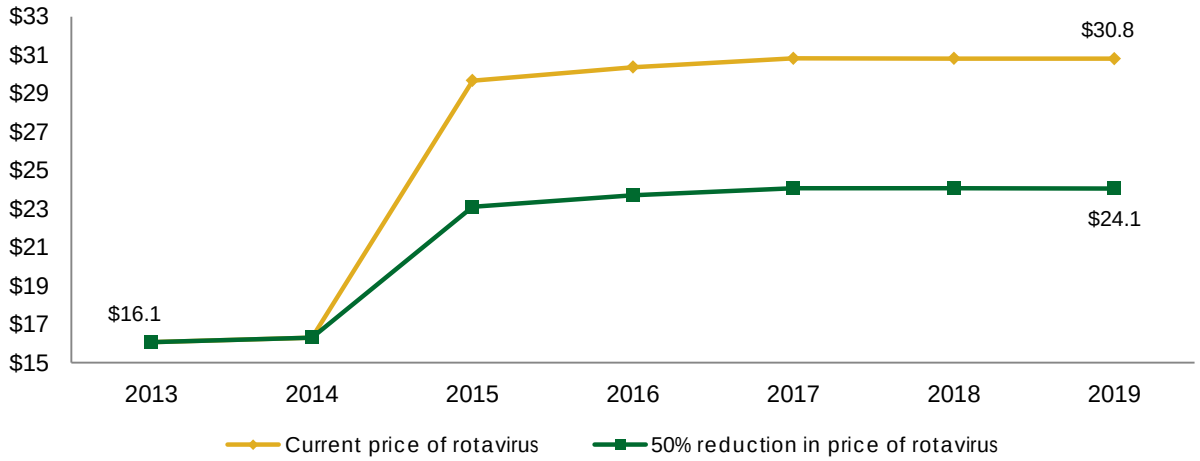
Vaccine	*Unit Cost*
HPV	$39
Rotavirus	$15
Pneumococcal (PCV-10)	$11
Pentavalent	$7
Tetanus vaccine for pregnant women	$1

and is the largest cost driver before the introduction of the rotavirus vaccine.

Total 2014–2019 PAV cost: **$203,784,330**

Total costs: As expected, PAV costs are dominated by vaccine and commodity costs—96 percent of the total—estimated at $34.3 million per year in 2019. On average, 812,268 births will occur annually over 2014–2019, and the average cost per child of essential immunizations will continue to rise with the inclusion of new vaccines and changes to dosing (Figure 19). At the currently programmed price of rotavirus doses, the cost will increase to $31 per child, which is in line with other estimates [16].

Figure 19. Increasing Cost of Routine Vaccinations per Child in Mozambique, 2014–2019



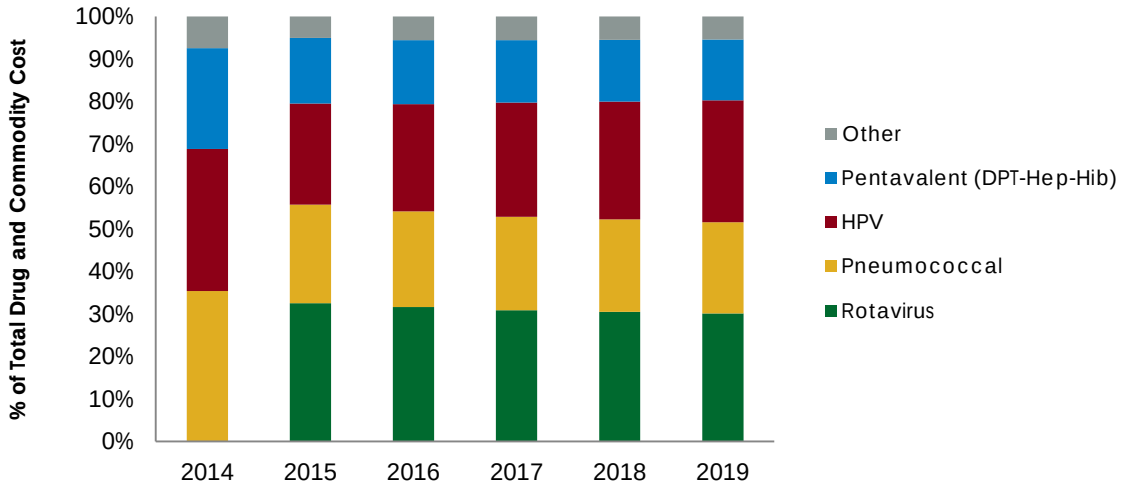
Source: PAV program and authors' analysis. Values depend on projected number of births per year.

When rotavirus is introduced into routine childhood vaccinations in 2015, it will become the largest cost driver among vaccines (Figure 20). As discussed above, the final price per dose of this vaccine is uncertain, and it may contribute less to total costs if price declines occur. If the price per dose of rotavirus were to decline by 50 percent, overall PAV costs would be reduced by $26.8 million for the period 2014–2019. In 2014, the pneumococcal vaccine was the largest cost driver. However, as the coverage for HPV vaccination increases, given its high unit cost, it rapidly takes a larger share of total vaccination costs and becomes the second highest cost driver over 2015–2019. Over 2017–2019, constant vaccine coverage targets result in relatively stable trends among cost drivers, with the exception of HPV vaccination. Over this period, the population of 11-year-old girls is projected to grow more rapidly than births, due to the projected effects of increases in contraception prevalence on total fertility. Therefore, the share of HPV vaccination in total drug and commodity costs of PAV will increase from 27 to 29 percent over 2017–2019. In Figure 20, the effect of the introduction of the second dose for the measles vaccine in 2016 cannot be discerned, as it has a relatively low cost impact; it is incorporated into "Other" vaccines.

The costs exclude wastage, which has been high in the past, accounting for as much as 23 percent of vaccines delivered to Mozambique. In OneHealth, the cost of wastage is included in the logistics section. The remaining costs derive mainly from training, communication, and outreach, which together cost $0.5 million to $2.6 million annually. The variation in these non-service delivery–related costs relates to support for the introduction of new vaccines, such as training for service providers and IEC. The IEC campaigns will cost $1.37 million per year. Along with the in-service training, these are planned for 2014 and 2015, when the HPV and rotavirus vaccines are introduced. Outreach costs relate to support for mobile clinics in remote areas. This is a critical component of the strategy to increase the rate of fully vaccinated children. Other investments in training reflect the need to improve the logistics chain, as

emphasized in the PESS. These focus on refrigeration maintenance, logistics, and data quality self-assessments. The cold chain will be supported by acquisition and replacement of refrigerators.

Figure 20. Composition of PAV Drug and Commodity Costs, 2014–2019



Other: Sum of interventions that, on average, contribute less than 3% to annual cost of drugs and commodities.

Key issues and areas for further analysis

Quality of data: Data quality for inputs used in the cost analysis was good, except for the uncertainty around vaccine prices per dose, especially rotavirus. Rotavirus vaccine prices per dose may decline by as much as 51 percent from the price used in this analysis ($7.50) due to various factors—licensing of a generic variant currently being tested, price reductions from the original innovators based on volume guarantees being met, and overall financing for measures undertaken by Gavi. This analysis should be revisited in the future, when the cost for rotavirus vaccine is known with greater certainty.

Areas for further analysis: The impact of vaccination in overall reductions in infant and under-five child mortality have been considered as a part of the analysis in Chapter 11. Stakeholders in Mozambique should also consider a cost-effectiveness analysis focused specifically on the revised schedule of essential childhood immunization, given the country's epidemiological and service delivery contexts. Further analysis is needed of the vaccine delivery supply chain in the country. This cost analysis did not assess whether the resources requested for strengthening the cold chain for vaccine storage and delivery will be adequate, given the additional demands placed on the system during the PESS scale-up. A revised, thorough needs-based analysis of the costs to strengthen the vaccine logistics system is necessary, building on the issues reported in recent submissions by Mozambique to Gavi [17, 18].

G. Tuberculosis

PESS result area*: Reduce the incidence of and mortality from tuberculosis as per the MDGs.*

Situation analysis

Mozambique is one of the 22 high-burden TB countries in the world. The incidence rate has increased over the past decade and was estimated to be 548 cases per 100,000 persons in 2011. Based on the WHO's published TB profile for Mozambique, the new caseload (incidence) in 2011 was estimated to be around 132,000 (low/high range of 91,000/180,000). Of these, about 47,452 persons were notified across new and retreatment/relapse cases. HIV infection continues to be a cause for increased risk of developing TB. The percentage of TB patients who are HIV positive increased from 47 percent in 2007 to 63 percent in 2011 [19].

Multidrug-resistant TB (MDR-TB) is also on the rise. The drug resistance survey done in 2007 suggested that 3.5 percent of new cases and 11.2 percent of retreatment cases were MDR-TB, the second highest rate in the southern African region [20]. In 2012, the MDR-TB caseload was estimated to be 1,810 cases, not all of which were detected [21]. TB diagnostic and treatment services still offer low coverage. Only 22 percent of health facilities can currently offer TB diagnosis through sputum testing. Barriers, related to cultural factors and stigma, have prevented an increase in utilization. The low quality of TB services has meant lower TB detection rates, dropout, and higher mortality.

Box 7. Key TB objectives

- Reduce TB incidence by 20 percent from its 2011 level, to 437 per 100,000 by 2017.
- Reduce mortality from TB to 37 per 100,000 by 2017 (21% reduction).
- Increase the notification rate to 242 per 100,000 persons by 2015, and 253 per 100,000 by 2017.
- Increase the DOTS treatment success rate from 85 percent (2011) to 87 percent (2017).
- Maintain relapse rate at or below 4 percent.
- Increase the diagnosis and treatment of MDR-TB, with the treatment success rate raised to 60 percent by 2017.

Strategic Objectives

The PESS references the *Plano Estratégico e Operacional 2013–2017* of the National Program for the Control of Tuberculosis (PNCT), which is initiating a multi-pronged effort to achieve ambitious goals (Box 7), via seven strategic result areas:

i. Advocacy, Communication, and Social Mobilization (ACSM)
ii. Directly observed treatment (short course) (DOTS) in facilities and communities
iii. Diagnostic services
iv. TB/HIV co-infection
v. Resistant tuberculosis—especially MDR-TB and XDR-TB
vi. Health system strengthening
vii. Research, monitoring and evaluation

Data sources for the cost analysis

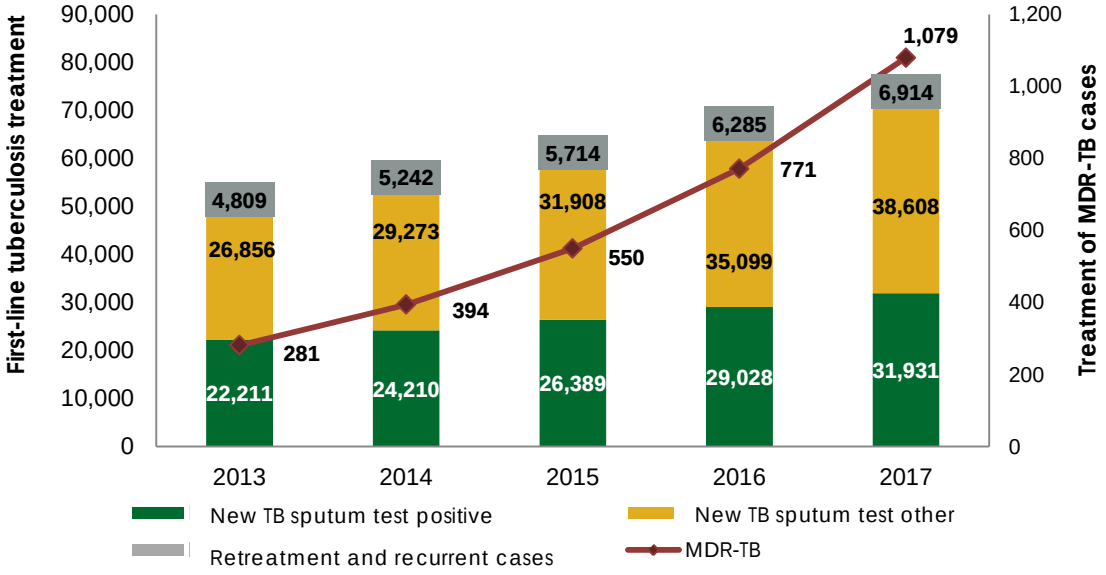
Targets: The numbers of persons reached per year for the purposes of the cost analysis were calculated in Microsoft Excel, in collaboration with the PNCT and the WHO National Program Officer (NPO). These values were entered directly into the OneHealth tool. The methodology thus differs from the process shown in section 4.A and Figure 9. The targets for diagnosis and first-line tuberculosis treatment were directly derived from Mozambique's recent proposal to the Global Fund for extension of its Round 7 grant under the transitional financing mechanism. For second-line treatment against MDR-TB, targets were based on the medium (conservative) scenario in the National Strategy for Programmatic Management of Drug-resistant TB (*Estratégia PMDT*), extended to 2017 after discussions with the WHO NPO. The technical team used information obtained from PNCT as well as recent Global Fund proposals to estimate the split of first-line treatment patients into new smear-positive cases versus retreatment/relapse cases. This split was important because the treatment regimen and diagnostic approach differ across these patient groups.

Unit costs: Costs per patient for diagnosis and treatment were derived from the ingredients-based approach in OneHealth, and dosage, frequency, and the specific drugs and commodities involved were confirmed with PNCT and the WHO NPO. The number of diagnostic tests performed for a confirmed case of TB masks the number of tests performed on suspected cases when the results are negative. For this cost analysis, adjustments were made to allow for diagnostic tests with negative results, given that the main analysis focuses only on confirmed cases of TB. The costs of test reagents, consumables, and the proportional use of laboratory equipment per test were based on inputs from the laboratory department of MISAU and other technical partners, such as CMAM.

Scale-up of interventions

The TB program must respond to the rising burden of MDR-TB and TB/HIV co-infection. First-line treatment for TB cases is provided through DOTS. Over 2013−2017, the number of MDR-TB patients is projected to nearly triple, while the number of first-line TB patients is projected to increase by 31 percent (Figure 21). Treatment scale-up for MDR-TB is based on the medium (conservative) scenario defined in the National Strategy for the PMDT. All other treatment targets are aligned with the most recent Global Fund proposal of the PNCT. Over 2014–2019, the TB program plans to scale up DOTS coverage for notified patients across new and retreatment cases from 96 to 98 percent. Over the same period, the program plans to raise treatment coverage of diagnosed MDR-TB cases from 82 to 90 percent by reducing lost cases.

Figure 21. Projected TB Treatment Case Load, First-line and MDR-TB, 2013–2017



Sources: WHO Mozambique, PNCT 2013.

For HIV-positive TB patients, the TB program plans to provide cotrimoxazole preventive therapy to prevent other opportunistic infections. By 2015, the program plans to achieve 100 percent cotrimoxazole coverage in co-infected patients. Voluntary HIV testing and counseling services will be offered to HIV-negative TB patients. The program will provide testing to all HIV-negative TB patients by 2016.

A major effort to increase TB case detection rates is an attempt at active case finding in the high-TB burden provinces of Mozambique: Maputo, Nampula, Sofala, and Zambézia. The target population groups are young children ages 0–5 years and adults ages 15–49 years, and the program aims for an increase from a low base of coverage. Based on 16 percent coverage, the TB program will test about 1.28 million susceptible individuals in 2014 for active case finding, scaling up to about 2.2 million people by 2017. However, the cost per person screened under this intervention is low.

The detailed operational targets of the *Plano Estratégico e Operacional* for TB were used to estimate the resource needs across advocacy and community mobilization, infection control, and system strengthening (e.g., for in-service training of health workers). In addition, new laboratory technologies (e.g., GeneXpert for the diagnosis of MDR-TB) will be adopted during the PESS and have been costed.

Cost results

Unit costs: The unit cost of $3,686 for managing an MDR-TB patient is greater than the sum of all other unit costs for TB because of the high prices of second-line treatment drugs (Box 8). While first-line treatment involves two to three drugs over nine months, MDR-TB treatment includes as many as seven drugs in different regimens over 24 months. The unit costs were computed for the entire course and applied in the year of treatment initiation. This cost of MDR-TB case management includes nearly $320 per year in food parcels and about $1,270 per case for the drug cycloserine.

Box 8 presents the unit costs for first-line treatment using the patient groups applied in OneHealth, based on WHO Stop TB program directives. "Non-drug-sensitive" patients have mono- or bi-drug resistance and require more expensive drug regimens. The cost per person screened under active case finding, not shown, is low, at $1.44.

Box 8. Largest TB unit costs, USD

Intervention	*Unit Cost*
Case management of MDR-TB	$3,686 per case
Treatment for new adult cases that are not drug sensitive	$121 per case
First-line treatment for retreatment patients	$120 per case
First-line treatment for non-drug-sensitive children	$80 per case
Cotrimoxazole preventive therapy for TB HIV+ patients	$46/year
First-line treatment for new drug-sensitive patients	$38 per case

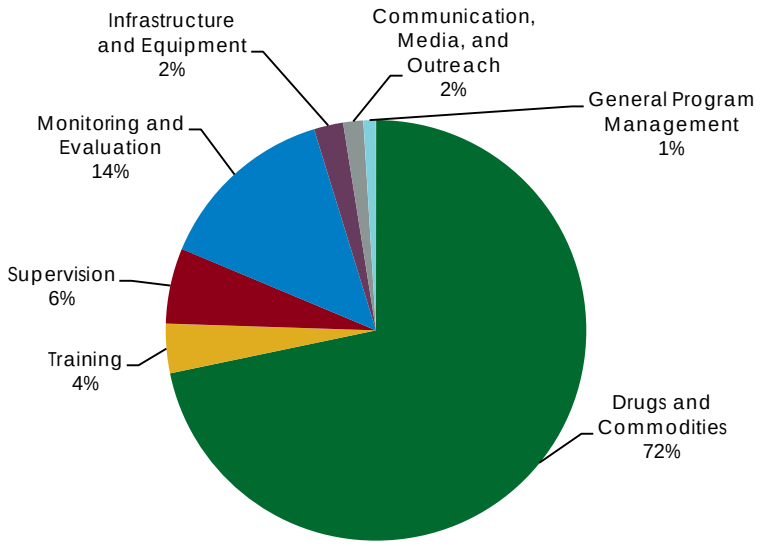
Total costs: The cost of the TB program makes up 5.5 percent of the total DNSP cost over 2014–2019. Nearly three-quarters of this cost derives from treatment and diagnostic services (Figure 22). The PESS states that the TB program experiences above-average levels of wastage in commodities. This wastage is factored into costs elsewhere, under the logistics health system component.

Total 2014–2019 TB cost: **$77,817,714**

The cost of M&E activities is the second largest cost driver in the TB program. The bulk of TB-related M&E and research costs under the PESS derive from a planned $6 million single-year study on TB prevalence in Mozambique. Other activities include monitoring of defaulting patients, developing a drug monitoring system, an active pharmacovigilance system, meetings for drug quantification, data quality verification, and other research. These activities, together with training and supervision of service providers, aim to prevent drug stockouts and ensure high-quality TB treatment.

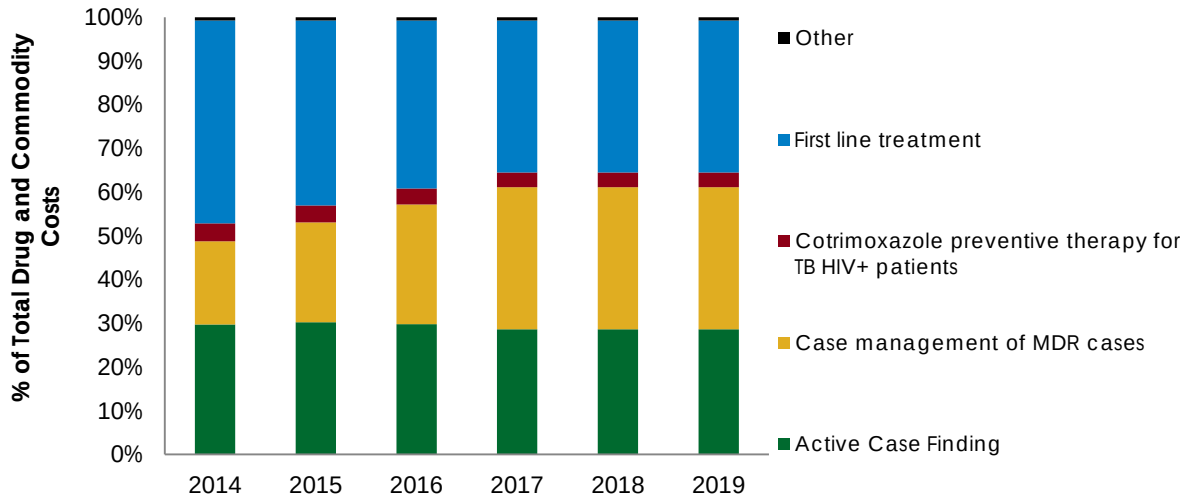
The costs of comprehensively strengthening TB diagnosis and the related laboratory network are reflected across the training, supervision, and equipment costs of the program. The investments for TB equipment are planned for 2014–2017 and are intended to strengthen diagnostics. Existing technologies, such as LED microscopy and X-rays, will be expanded, while new technologies, such as GeneXpert and line probe assays, will be introduced—the costs for the reagents and consumables for these are included under "Drugs and Commodities" in Figure 22. In-service training sessions will be conducted annually to update the skills of laboratory technicians in the new technologies. Laboratory training is one of 11 types of training. It makes up one-third of the total training resources needed, due to the emphasis placed on proper diagnosis and ongoing testing. The TB program will conduct supervision visits to provincial and district laboratories twice a year, in addition to extensive provincial, district, and facility-level supervision.

Figure 22. Composition of Total TB Costs, 2014–2019



Within drugs and commodities for the TB program, first-line treatment is the largest cost driver (Figure 23). Over 2014–2017, its share of total cost declines significantly as the share of costs related to MDR-TB treatment rises. The caseload of MDR-TB will increase five times faster than first-line TB treatment, though in 2017, MDR-TB cases still will make up only 1.4 percent of all TB caseload. Active case finding, despite its low unit cost, contributes significantly to total cost due to the high numbers of persons reached.

Figure 23. Composition of TB Drug and Commodity Costs, 2014–2019



Other: Sum of interventions that, on average, contribute less than 3% to annual cost of drugs and commodities.

Key issues and areas for further analysis

Quality of data: Data quality for inputs used in the cost analysis was moderate, given some uncertainty as to the prevalence of mono-, bi-, and multi-drug resistance cases. The last major drug resistance survey was conducted in 2007 [20]; hence, the background information used to develop the MDR-TB caseload under the "medium/conservative" scenario may need to be revisited. Results from the proposed prevalence survey should be available after 2014. Given a lack of data and ability to diagnose extensively drug resistant TB (XDR-TB), there were no targets developed for treatment. It is likely that some such

cases have developed, given the proximity to South Africa, where XDR-TB is occurring. The projected caseload for active case finding should be treated as approximate, and the actual numbers to be reached in the targeted provinces should be further analyzed based on within-province determinants of susceptibility.

Areas for further analysis: The impact of the scale-up of TB diagnosis and treatment on overall TB-related mortality was not estimated. The trends in such mortality, given the high levels of co-morbidity with HIV, should be assessed in the light of increasing prevention and antiretroviral treatment of HIV. Given the lack of an impact analysis, there is little information on whether the PESS TB objectives will be met. A TB impact module is integrated into OneHealth, though limitations of time and contradictions between its inputs and those provided by the TB program prevented its use. This module, or some other TB impact model, should be used independently of the current cost analysis in the future to estimate the potential mortality impact of the PESS scale-up. A national TB research agenda has been proposed, and there have been several recent improvements in the tracking of patients and use of drugs. The cost analysis conducted in this report should be updated with the use of the improved M&E data.

H. Neglected Tropical Diseases (NTDs)

PESS result area*: Reduce the incidence of and morbidity due to neglected tropical diseases.*

Situation analysis

Schistosomiasis (SCH), soil-transmitted helminthiasis (STH), trachoma, filariasis, rabies, and leprosy are collectively considered neglected tropical diseases (NTDs) in Mozambique. Mapping studies conducted in 2009 suggested that SCH and STH, which in most cases become chronic, were endemic in all 148 districts [22]. Children ages 5−14 years are most affected by SCH and STH, which increase their risk for anemia, diarrhea, and malnutrition. The prevalence of SCH and STH in this group in Mozambique was estimated at 47 and 54 percent, respectively [22]. Trachoma was prevalent in 20 percent of children above the age of six months, and filariasis was prevalent in 13 percent of children over age five [23].

Strategic objectives

Mozambique is adopting a strategy recommended by the WHO for the control of NTDs—massive administration of drugs, control of morbidity, improved environmental health, and expanded education and community mobilization. The impact is expected to be reduced school absenteeism, increased household income by reducing chronic care costs, and higher social welfare. General objectives include the following:

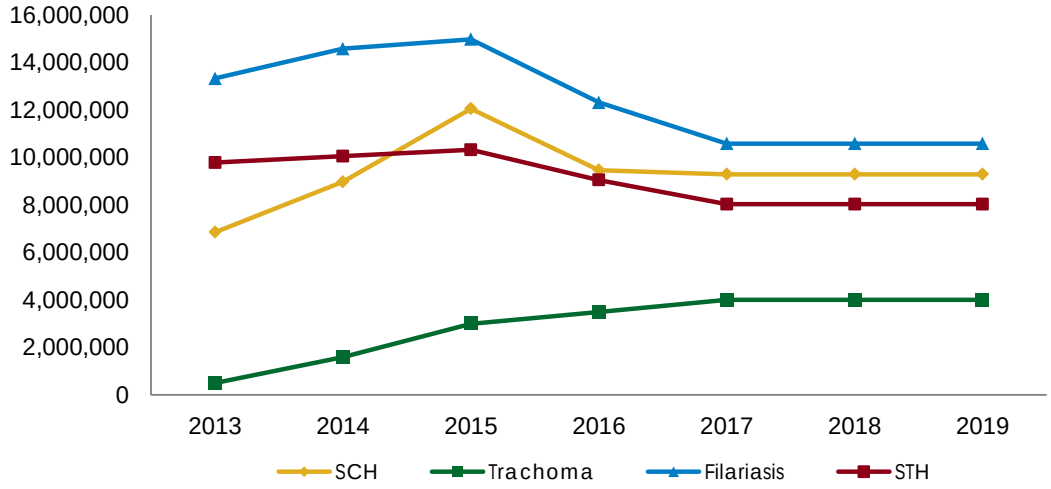
- Reduce the prevalence of NTDs in the community.
- Improve the quality of services at the primary level of care, including the expansion of diagnostic services within reference laboratories, training for service providers, and equipment provision.
- Increase access to mass treatment.
- Increase awareness of NTDs in the community.
- Study the prevalence and mode of transmission of less-studied NTDs.
- Strengthen epidemiological vigilance systems and M&E.

Data sources and scale-up of interventions

Data: The numbers of persons reached per year for different NTDs were based on the *Saúde Pública* methodology for only one intervention (leprosy), but otherwise derived from values provided by the program and directly entered into the OneHealth tool. For the NTDs other than leprosy, the targets were

based on a district-based implementation approach. All unit costs were estimated using ingredients-based analysis, with prices for drugs provided by the program or derived from CMAM price lists.

Figure 24. Projected Numbers of Persons Reached with Key NTD Control Interventions



Numbers reached are maintained at 2017 levels for the years 2018–2019. Source: [23].

Under the PESS, the NTD program will scale up treatment for diseases such as leprosy, SCH, trachoma, filariasis, rabies, and STH (Figure 24). The large scale-up of NTD activities is new in the public health sector in Mozambique, and the PESS strategy highlights the need to address foreseen challenges in mobilizing skilled health workers and all the necessary inputs.

Leprosy and rabies are the least common among the targeted diseases, affecting only 0.005 and 0.2 percent of the total population in Mozambique, respectively. Full treatment coverage of these conditions is expected throughout the PESS period. For more common diseases, which primarily affect children ages 5–14 years, full coverage is targeted for 2017. Treatment coverage for filariasis and other parasitic infections will begin at 77 percent in the baseline year (2014). Filariasis generates the most treatment cases, as shown in Figure 24. SCH coverage will begin at 69 percent in 2014. Trachoma is prevalent in children ages six months and older. Trachoma treatment will be introduced in 2014, scaling up to 75 percent coverage by 2017.

Cost results

Unit costs: The unit cost of treating a case of trachoma—$1.24—is higher than that of other common NTDs—SCH ($0.23) and filariasis ($0.16). The cost of treating STH is also extremely low, at $0.01 per case. Mobilizing resources for these low-cost but highly effective interventions should be a priority. The NTDs with the highest unit costs—rabies and leprosy—are also the least prevalent in Mozambique, and therefore are not significant cost drivers (Figure 25, Box 9).

Box 9. Largest NTD Unit Costs, USD

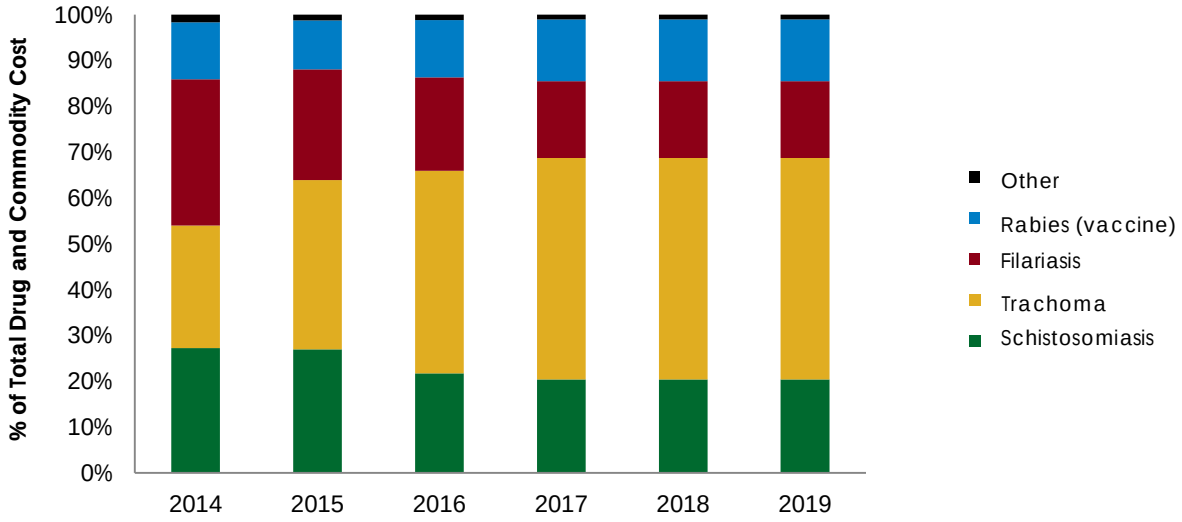
Intervention	*Unit Cost*
Rabies vaccine	$51 (5 doses)
Leprosy	$28/case
Trachoma	$1.24/case

Total costs: The scale-up of interventions for NTDs under the PESS indicates large costs, approximating those of the TB program. The bulk of resources go to SCH, trachoma, and filariasis (Figure 25). The introduction of trachoma treatment has a significant impact on NTD program costs. The share of total drug and commodity costs attributed to trachoma treatment will increase from 27 percent to 48 percent

Total 2014–2019 NTD cost: **$75,678,337**

between 2014 and 2017. The rapid scale-up of trachoma treatment makes it the largest cost driver of NTD program costs from 2015 on. The DNAM ophthalmology program will be supplementing this effort by performing large numbers of trachoma-related surgeries for individuals who require them for improvement in eye health.

Figure 25. Composition of NTD Program Drug and Commodity Costs, 2014–2019



Other: STH and leprosy, contributing less than 3% to annual cost of drugs and commodities.

Overall, NTD mass preventive treatment costs comprise 77 percent of the total, while 20 percent derive from IEC campaigns and materials. Such campaigns aim to raise awareness of NTDs in the community and will be critical in achieving the ambitious targets for numbers reached. Additional resources for training and M&E aim to strengthen the health system's capacity to absorb the new services. Together, these comprise 3 percent of total NTD program costs over 2014–2019. Clinical training will cover NTDs broadly. Some additional resources target the introduction of trachoma treatment.

Resources for M&E include sentinel sites to monitor filariasis and SCH annually, along with training in M&E every two years. The PESS strategy also aims to support the expansion of NTD diagnostic services at reference laboratories. NTD diagnostics will benefit from extensive investments planned by other programs, such as TB and HIV, to strengthen the laboratory network and capacity.

Key issues and areas for further analysis

Quality of data: Data quality for inputs used in the cost analysis of the NTD program was good. The program provided the targets for numbers reached under its mass preventive treatment interventions. As with other DNSP programs, the cost analysis should be revisited in the future as the estimates of the numbers to be reached per year are refined.

Areas for further analysis: Given that a mass preventive treatment program for the control of common NTDs is a new area for Mozambique, stakeholders should consider a cost-effectiveness analysis. This might focus on a highly endemic district and use a sample-based approach to look at the community-level incidence of common NTDs before and after a mass preventive treatment campaign. Furthermore, additional studies to identify the incidence rate for diseases such as rabies and leprosy are still needed.

I. Health Promotion

Situation analysis

Mozambique has a national strategy for health promotion, based on the three pillars of health education, health communication, and community involvement. The program still faces difficulties because activities have not been well defined or delineated across the levels of the health system. There is little coordination between various actors. In 2010, MISAU approved an enhanced program to recruit and deploy trained multipurpose community health agents (APEs) who are expected to help scale up implementation of health promotion programs to at least 20 percent of the population using pre-defined kits. By 2012, about 1,200 APEs had been trained, though the scale-up of their activities has been challenged by inadequate funding, training, and kits.

Strategic objectives

The PESS aims to revitalize the health promotion program and the role of the APEs. The following implementation strategies are proposed:

- **Employ innovative communication initiatives** using new and existing technologies, e.g., social networking, with the involvement of community and opinion leaders.
- **Improve sustainability of the APE program**, with financing secured—and increased quality and efficiency of APEs' activities to promote health alongside community involvement.
- **Train community health workers and traditional medicine practitioners on health education.**
- **Update training curricula** for health education across the educational system.
- **Integrate health education into the SAAJ program**, especially related to control of harmful drugs.
- **Improve collaboration between various health programs** on the production and use of IEC materials. A national repository of such materials from MISAU and partners will be created.

Data sources and scale-up of interventions

Data: The methodology used here was roughly based on the *Saúde Pública* process, in which the program provided the technical team with the number of APE kits to be distributed per year, which was multiplied by the unit cost per APE equipped ($116).

The primary responsibility of the health promotion program is to support the APE program launched in 2010. The program provides APEs with a set of comprehensive kits that they use for basic education, diagnostic services, and certain treatment services at the community level. Raising awareness and expanding intervention coverage at the community level is a focal strategy in achieving many of the PESS service delivery objectives. For example, to achieve the goal of reducing levels of malaria by half compared to 2009, the PESS aims to expand RDT coverage and related knowledge at the community level through the APE program. For this purpose, the kit type "C," which includes malaria-related and other materials, is provided on a monthly basis to the APEs to deliver these services. The availability of trained APEs with established community networks is pivotal to the success of such PESS goals and strategies.

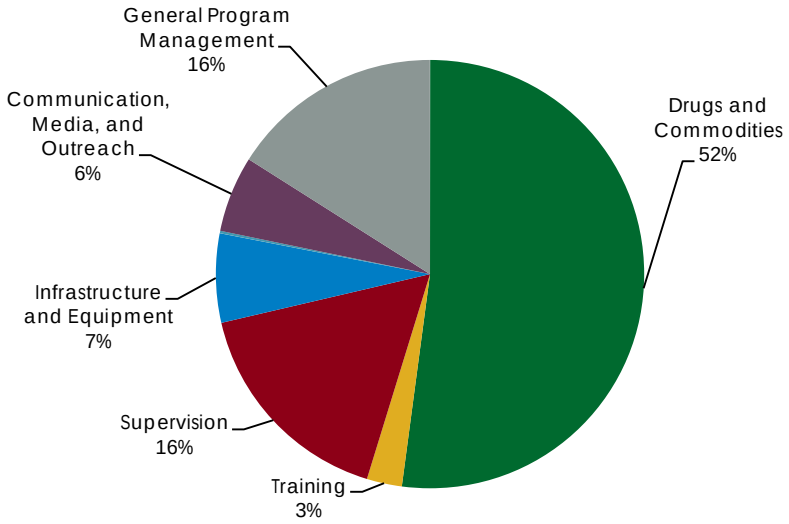
Cost results

Over 2014–2019, the health promotion program will cost $63 million and contribute 5 percent toward total DNSP costs. More than half of this cost will be for the procurement of APE kits and equipment; the rest will support the strengthening of community-level care (Figure 26). For this

Total 2014–2019 Health Promotion Cost:
$63,784,278

calculation, the monthly kits are considered commodities, while long-term work kits are considered equipment.

Figure 26. Composition of Total Health Promotion Costs, 2014–2019



Extensive supervision for the APE program will be conducted, involving the central, provincial, and district levels, in addition to ongoing refresher trainings for APEs. Together, these activities require 19 percent of total health promotion resources and address ongoing weaknesses in APE capacities. Communication, media, and outreach contribute 6 percent of total costs for the program, and include integrated health promotion messages that span various health issues. These activities are supplemented by the additional IEC activities planned by other disease programs.

Key issues and areas for further analysis

Quality of data: Data quality for inputs used in the cost analysis of the health promotion program was good. The program provided the targets for the numbers of APEs to be reached. As with other DNSP programs, the cost analysis should be revisited in the future as the estimates are refined. Duplications might also exist with other programs, as each program plans for its own IEC materials. Moreover, better coordination with other programs that work with and provide services through the APEs may be needed.

J. Prevention of Mother-to-Child Transmission of HIV (PTV)

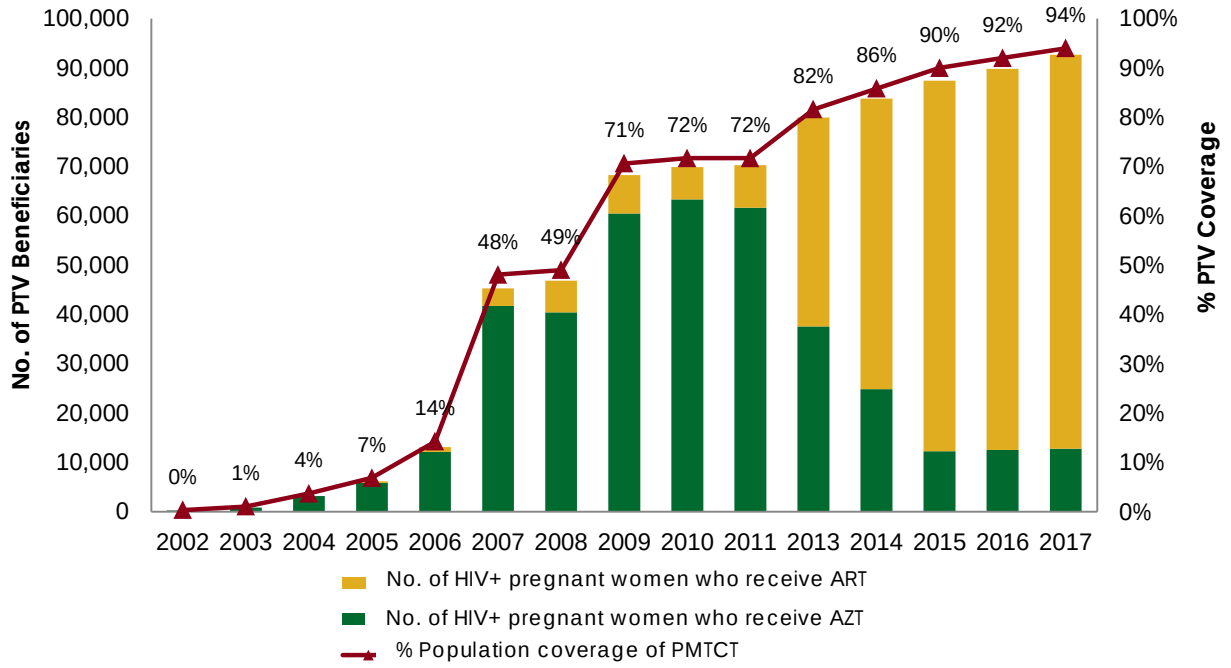
Strategic objectives: Mozambique's goal is to reduce mother-to-child transmission below 5 percent by 2015, which is the end of the period of the *Plano de Aceleraçao*. Mozambique developed a comprehensive strategy for the elimination of mother-to-child transmission of HIV (EMTCT) in 2012, which looked at the entire "cascade" of services required to bring potentially HIV-positive pregnant women to a health facility and enable them to access a comprehensive set of services. These services would include the provision of highly effective antiretroviral (ARV) drug regimens to prevent transmission of HIV to the infant, as well as treatment for the mother's own health, as needed.

The resources required to execute this EMTCT plan include interventions across DNSP programs, such as SMI, nutrition, and PTV. Therefore, the total resource estimation of the EMTCT plan can be seen as a "lens" across programs on an integrated set of services needed to achieve elimination. Since many of these resources have already been estimated for programs above, the total cost of the EMTCT plan over 2013–2015—about $226.1 million, based on a revised cost analysis—does not represent additional

resources. A rigorous crosswalk was conducted recently to compare the EMTCT plan provisions with the PESS (across all its programs) and the *Plano de Aceleraçao*.

The drugs and commodities required for the ARV prophylaxis and treatment component of the EMTCT plan, which is traditionally considered PTV, are additional resources beyond what has been considered above for the programs of *Saúde Pública*. These have been estimated for the PESS and are summarized here. Figure 27 summarizes the evolution of the program until 2011 and the proposed scale-up of PTV coverage from 2013, with increasing reliance on the WHO Option B+.[5] With the recent scale-up of adult ART and the increasing effect of Option B+ in the future, more HIV-positive pregnant women will present at ANC already receiving full ART. This was incorporated into the projection below. The projection shows a decline in the proportion of HIV-positive pregnant women offered Option A.[6]

Figure 27. Historical and Proposed Coverage of PTV in Mozambique, 2002–2017*



Source: Plano de Aceleraçao 2013–2015 PTV program. * Data for 2012 not available.

Costs: The unit cost of the Option A regimen is $53 for the drugs provided to the mother and less than a dollar for the infant. For Option B+, a tenofovir-based regimen of three ARV drugs costs $134 per woman per year, while a zidovudine-based regimen costs $138.30. Costs per woman also include rapid HIV tests for screening, confirmation, and tie-breaking. Given the change in regimens as shown in Figure 27, the weighted average cost per mother-infant pair per year, inclusive of all drugs and commodities, rises from $71.60 in 2013 to $92 in 2017. These final costs are continued for 2018–2019. Costs of pregnant women already on triple ART prior to the current pregnancy are assumed to belong to the adult ART intervention, which is under the HIV program of DNAM. Costs of opportunistic infection care, as

[5] In brief, for WHO's Option B+, pregnant women who present at ANC and are diagnosed as HIV positive are started on lifelong ART regardless of their CD4 count or disease stage.

[6] The Option A intervention is described under the WHO 2010 Guidelines for PMCT. It involves maternal prenatal AZT (zidovudine) from the 14th week of pregnancy, single-dose nevirapine during labor, and twice daily AZT plus lamivudine for a week postpartum. Exposed infants would be provided nevirapine until breastfeeding stops.

well as laboratory management of women on the Option B+ regimen, also are assumed to belong to the adult ART intervention.

Total costs of PTV drugs and commodities, given what is included, amount to $50.4 million over 2014–2019 and contribute to 4 percent of overall DNSP costs. Many of the costs for health system strengthening related to the "cascade" driving the successful implementation of PTV and for eventual elimination of mother-to-child transmission of HIV have been costed elsewhere in the programs of *Saúde Pública*. The costs of strengthening the adult ART program, which contributes to the success of scaling up Option B+, are costed under the HIV program, which is a part of DNAM.

Total 2014–2019 PTV cost: **$50,378,916**

Key issues and areas for further research: Based on discussions with MISAU staff, only one year of Option B+-related ARV costs were incorporated into the PTV intervention, after which these drug costs, as well as other costs of care and patient management, move to the adult ART area. However, there is no formal basis for this allocation. This is an aspect which should be further discussed. Also, with the increase in Option B+, it is essential that MISAU consider the process by which these patients will be connected with continuing treatment and care through the adult ART system and retained over time.

The long-term costs of the PTV intervention are difficult to predict, given the lack of an estimate of pregnant women presenting at ANC in the future who would already be on triple-drug ART and hence not needing to be started on Option B+. This is important since only Option B+ initiators involve a cost assessed for the PTV intervention. It was estimated that about 30 percent of all HIV-positive pregnant women who receive ARVs for their own health or for prophylaxis would fall in this category over 2013–2015, with the rest divided between Option A and Option B+. This estimate should be updated, as it is dependent on the actual scale-up path for adult ART in coming years, especially if Mozambique adopts a revised ART eligibility criterion based on a CD4 count of 500 cells/mm^3.

K. Other *Saúde Pública* Programs

Detailed situation analyses and results are not presented for these programs, which together account for 8 percent of DNSP costs. For the two largest programs from this group—as calculated in total costs over 2014−2019—an overview of the key strategies and results has been provided below.

Saúde Mental

Very few details were available on the public health interventions under the mental health program. A lump sum cost of $4.5 million per year was provided by the program for various drugs to be administered in health centers and other lower-level health facilities, totaling $27 million over the period of the PESS. In the future, an ingredients-based analysis should be conducted as per the methodology in section 4.A. In addition, about $9.5 million were estimated against various needs over 2014–2019 for health system strengthening, including in-service training, supervision, transport, and purchase of furniture and equipment. Small costs were also included to cover general program management.

Total 2014–2019 *Saúde Mental* cost: **$36,496,773**

Saúde Escolar

The school health program services 3,000 schools per year with a basic primary health kit ($50/kit), and provides tetanus vaccines ($0.09/dose) and deworming tablets ($0.05/tablet) for school children. For the latter two interventions, the program provided the technical team with the numbers to be reached in 2013, which were proportionately increased for each year over 2014–2019 based on population growth. The school health kits cost $900,000, the tetanus vaccination cost $689,750, and the deworming tablets totaled nearly $1.8 million over the PESS period. These intervention-related costs ($3.46 million)

Total 2014–2019 *Saúde Escolar* cost: **$30,431,903**

were a small proportion of the program's overall costs, which are dominated by annual IEC campaigns and costs of related materials totaling $4.18 million per year (a six-year total of $25 million). The remaining costs derived from national school health week, training, and supervision visits.

5. RESULTS: FINANCIAL RESOURCES REQUIRED FOR MEDICAL ASSISTANCE PROGRAMS

A. Methodology for *Medical Assistance* Programs

The HIV/AIDS program is part of DNAM, with the exception of the PTV intervention, which is under DNSP. Hospital sector curative and rehabilitative health programs, as well as various hospital and nursing management programs, fall under DNAM. The total number of programs is 25. Some of these programs do not have direct service delivery interventions (i.e., linking directly with patients). For such programs, the technical team estimated the program management costs only.

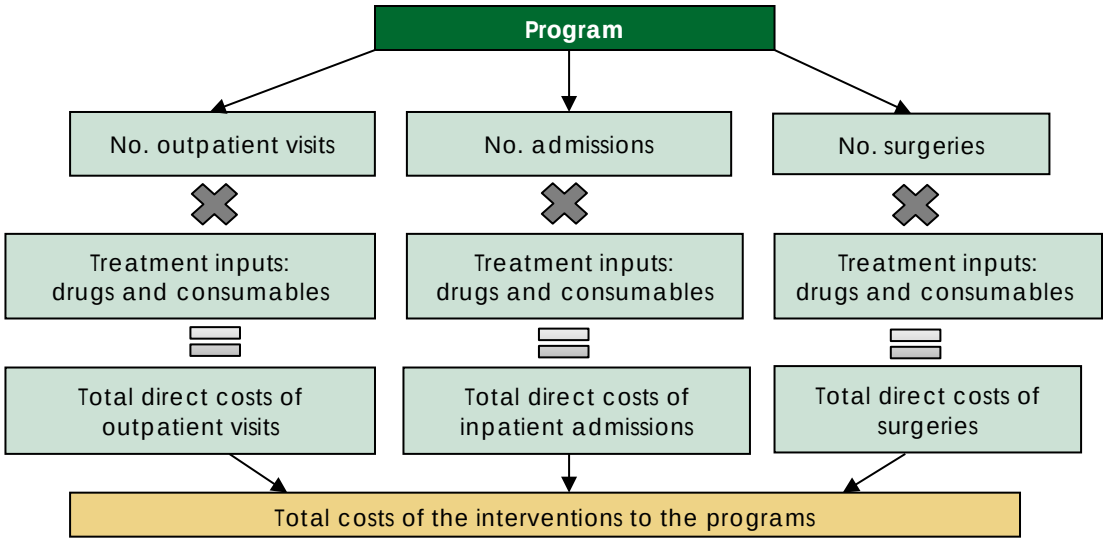
Box 10. DNAM programs Requiring a Special Approach

- Internal Medicine
- Surgery
- Pediatrics
- Orthopedics
- Ob/Gyn
- Ophthalmology
- Otorhinolaryngology
- Emergencies

Certain secondary health programs required a special approach (Box 10).

Except for certain interventions of the ophthalmology program (*Oftalmologia*), programs in Box 10 have not established multiyear, nationwide targets for service delivery. These programs deliver care at the hospital level, and national program managers can often be senior clinicians and administrators based at the tertiary hospital level, especially at the Hospital Central Maputo (HCM). Given a lack of multiyear targets and limited information on actual service delivery by specialty (and sub-specialty, in the case of internal medicine and surgery), recent service delivery records were analyzed to make estimates for costing the PESS. There is a wide gap in the types and intensity of curative and rehabilitative services available at higher-level hospitals versus rural and district hospitals. For example, it is not possible to use the workload or split of services at the HCM to estimate the workload of a rural hospital in Niassa province. This study's approach distinguished the services available at provincial and central hospitals from those at lower-level hospitals. There are 13 central, provincial, and general hospitals for which relatively detailed information was available for 2011 and 2012. In addition, there are at least 42 district and rural hospitals (including a specialist psychiatric hospital), for which detailed data on service delivery were not available.

Figure 28. Approach for Estimating Service Delivery Costs of Certain DNAM Programs



The technical team used all available data on individual hospitals reported by provinces to the MISAU M&E unit at DPC—specifically, the total outpatient consultations, births (including caesarians), and estimated total admissions. The reports were supplemented with data from the health information systems maintained at MISAU. For those specialties and services available at lower-level hospitals, the framework in Figure 28 was used and the workload disaggregated to estimate the number of outpatient consultations and inpatient admissions by sub-specialty in 2013.

This approach allowed the technical team to account for the distinct capabilities of the different levels of the hospital system, and variations by facility, for all 55 hospitals. The richest data were available from central and provincial hospitals' annual reports, which were used to generate proportions for splitting the workload at other levels. For the years 2014–2019, it was assumed that the workload across outpatient visits, admissions, and surgeries (large and small), all grew at the rate of population growth in Mozambique. This is a simplified assumption, since no information on specialty- or program-specific growth in workload is available nationwide, even if it were possible to speculate based on the change in workload at the few provincial hospitals for which multiyear data are available.

The drugs used to treat the same named condition at the tertiary hospital level (central and provincial) versus the secondary hospitals can be different, both because of the availability of inputs as well as the difference in patient characteristics. On average, for each intervention or condition, patients with more severe complications present at the higher-level hospitals. Wherever possible, in consultation with the clinicians, the technical team adjusted for this factor in the cost analysis by adjusting the mix of drugs and commodities used by level.

B. Overall Results for DNAM

Table 6 shows the results of the cost analysis of the programs of DNAM, with the seven largest programs highlighted as to their total costs. These programs will contribute 86 percent of DNAM costs over 2014–2019 and are examined in more detail in this chapter. Though not among the top seven, obstetrics and gynecology (Ob/Gyn) and pediatrics are important programs, and the resources needed for these are discussed in summary at the end of this chapter. The other 11 programs, contributing 11 percent of total costs, include some national programs without service delivery interventions at the facility level. The costs for these programs are presented in Table 6 only.

Table 6. Total DNAM Costs by Program, 2014–2109, USD Millions*

Programs	2014	2015	2016	2017	2018	2019	Total
HIV/AIDS (excluding PTV and VMMC)	**206**	**239**	**253**	**216**	**217**	**218**	**1,349**
Internal Medicine	**79**	**80.2**	**81.9**	**83.6**	**86**	**88**	**498**
Voluntary Medical Male Circumcision (VMMC)	**56**	**49.1**	**32.0**	**21.9**	**0**	**0**	**159**
Central Clinical Laboratories	**18**	**18**	**17**	**17**	**17**	**17**	**104**
Surgery	**16**	**15**	**15**	**15**	**16**	**16**	**92**
Emergency and Trauma	**8**	**8**	**8**	**8**	**12**	**16**	**61**
Blood Transfusion	**8**	**8**	**9**	**10**	**10**	**10**	**56**
Pediatrics	9	9	9	9	9	10	54
Imaging and Radiotherapy	6	13	8	8	8	8	49

Programs	2014	2015	2016	2017	2018	2019	Total
Programs without Interventions**	11	8	7	7	7	6	45
Physical Rehabilitation	7	7	7	7	7	7	42
Otorhinolaryngology	6	6	6	7	6	6	37
Obstetrics and Gynecology	7	7	6	6	6	6	37
Orthopedics	5	6	6	6	6	6	34
Ophthalmology	5	5	5	6	6	6	33
Oral Health	4	5	5	5	5	6	31
Anesthesiology	5	3	3	3	4	4	22
Anatomical Pathology	1.2	1.1	1.1	1.1	1	1	6.6
Forensic Medicine	0.5	0.4	0.4	0.4	0.3	0.4	2.3
Private Medicine	0.0	0.1	0.0	0.1	0.1	0.1	0.4
Total DNAM costs	**457**	**487**	**479**	**436**	**422**	**430**	**2,711**

* Values have been rounded to integers. Totals may not be exact. ** These are the following: Enfermagem, Farmácias Hospitaleres, Gênero, Gestão Hospitalar, 'Hotelaria, Higiene, e Limpeza Hospitalar,' Medicina Privada, Monitoria e Avalição, Qualidade e Humanização, Repartição Administração e Finanças, and Saúde Occupacional.

Similar to the DNSP programs, the resource needs for DNAM programs are meant to be read in conjunction with the main PESS document. For many of the DNAM programs, their connection to areas of achievement and recommended approaches in the PESS are not as clear as those for DNSP programs. Some programs, such as pediatrics, span multiple result areas, including reduction in under-five child mortality, poor nutrition, and malaria morbidity. Still, the issues summarized here give context to the projected cost patterns, modeled health impacts, and other implications for the health system.

C. HIV/AIDS (Excluding VMMC and PMTCT)

PESS result area: *Reduce the impact of HIV/AIDS.*

Situation analysis

According to the most recent AIDS Indicator Survey, conducted in 2009, the national HIV prevalence among adults ages 15–49 years was 11.5 percent, with marked differences across Mozambique's regions (geographic groupings of provinces). Analysis using region-specific prevalence and demographic projection suggests that the number of adults living with HIV/AIDS was about 1.18 million in 2012. The average adult HIV prevalence in the South region in 2009 was 17.7 percent, with the province of Gaza manifesting the highest prevalence in the country, at 25 percent. The epidemic in Mozambique is more severe among women—the prevalence among adult women was 13 percent, compared to 9 percent among men. Among women, who become infected at younger ages than men, the prevalence peaked in the age group 25–29 years, while among men it peaked in the age group 35–39 years.

Modeling using AIM suggests that the national prevalence level is showing signs of stabilization, with annual adult HIV incidence around 95,000−110,000 cases per year over the period 2012–2016. This is before considering the effect of scale-up of prevention services above the historical trend. However, in

adverse health impact, the related need for health services, and the impact on social and economic development, this rate of HIV incidence is unsustainable.

The estimated number of HIV-positive pregnant women was about 98,730 in 2013, with the largest number in the country's Center region. At least 90 percent were expected at ANC, where they could be tested and enrolled in care, including the provision of ARV drugs for preventing vertical transmission [24]. In the absence of effective prophylaxis, these pregnancies would result in a large number of HIV-exposed infants. In 2011, it was estimated that 20 percent of children born to HIV-positive mothers were infected through vertical transmission [25]. The PTV program was discussed in Chapter 4 under the DNSP, where it is housed.

Strategic objectives

For 2013−2015, the PESS continues the overall strategic direction from the *Plano de Aceleração da Prevençao, Diagnostico e Tratamento de HIV/SIDA* (HIV/AIDS Acceleration Plan, or HAP). The HAP operationalizes a commitment made by the GRM to provide universal access to HIV prevention, treatment, care, and support services. The HAP goals are broad and ambitious (Box 11). The PESS also relates to other critical strategic plans in the context of HIV/AIDS. This includes a new plan for 2 million voluntary male circumcisions over 2013−2017 and the plan for EMTCT. The latter plan includes extensive integration with activities across the health sector, especially in sexual and reproductive health and maternal health. From 2013, the PMTCT aspect of this plan will incorporate a rapid scale-up of the WHO "Option B+" intervention, as discussed in Chapter 4.

Box 11. Key HIV Goals for 2015

- Reduce HIV incidence by 50 percent compared to 2013.
- Reduce vertical transmission of HIV to less than 5 percent.
- Increase coverage of ART to 80 percent of those eligible
- Reduce HIV-related mortality by 30 percent.
- Reduce mortality in TB/HIV co-infected patients by 50 percent.
- Increase voluntary male medical circumcision (VMMC) to 80 percent coverage by 2017.
- Reduce self-reported stigma and discrimination related to HIV and TB by 50 percent.

Data sources for the cost analysis

Targets: The targets for the HIV program were developed with the DNSP methodology discussed in section 4.A. The 2014–2015 coverage targets were taken from the HAP, as described above. The treatment and prevention targets are the result of a collaborative strategic planning process between DNAM and its partners that began in 2012. Although only the national-level targets are included here, provincial-level targets were developed as well. At the time of data collection, most targets had not been finalized for the post-2015 years, so it was agreed with the program to keep 2015 targets constant over 2016–2019. The AIM provided the projected number of people in need of ART, the HIV-positive population, and the HIV-positive population co-infected with TB. The DemProj module of Spectrum, described in Annex C, provided the estimate of the total population.

Unit costs: The unit costs for non-ART interventions were developed using the ingredients-based approach in OneHealth. Commodity costs and regimens were provided by the program and cross-referenced with price lists provided by CMAM. These unit costs do not vary by year because of a lack of knowledge about future movements in the prices of drugs. For first- and second-line adult and pediatric ART regimens, the ARV drug prices were provided by the program and its partners, such as SCMS. The overall weighted unit costs of ART for each type of patient per year were based on the proportions receiving each regimen, which then were used to produce year-specific unit costs. Information on regimens was provided by the program. The unit cost estimates vary up to 2015 and thereafter were kept constant until 2019.

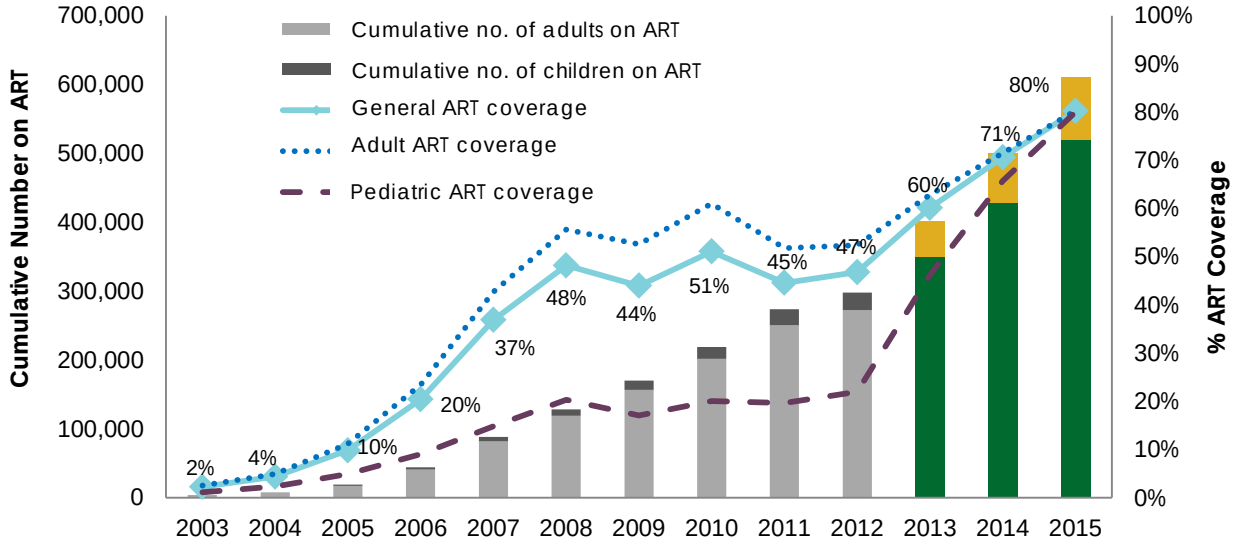
Scale-up of interventions

The PESS incorporates ambitious HIV/AIDS-related coverage targets for 2014−2015, which were defined by the HAP. For the years 2016–2019, the PESS maintains the high levels of coverage achieved in 2015. Note that, even though coverage is constant over these years, it is based on a higher overall population as well as a growing HIV-positive population. It is assumed that a mid-term evaluation of the PESS would revisit the coverage targets from 2016 onward.

The HIV program plans to achieve 80 percent coverage across adults and children eligible for ART by 2015 (Figure 29). This coverage will be maintained over 2016–2019. The total patients receiving treatment will continue to grow because the number of individuals eligible to initiate treatment is projected to increase—by 24 percent over 2014–2017, with growth thereafter. The number of patients needing second-line treatment is projected to grow six times as rapidly as the population in need of first-line ART.

Baseline coverage of first- and second-line ART as a percentage of those eligible is higher in adults than children. The coverage scales up linearly in both adults and children to reach the 2015 target of 80 percent, however. This implies much faster growth in pediatric ART than has been achieved in recent years.

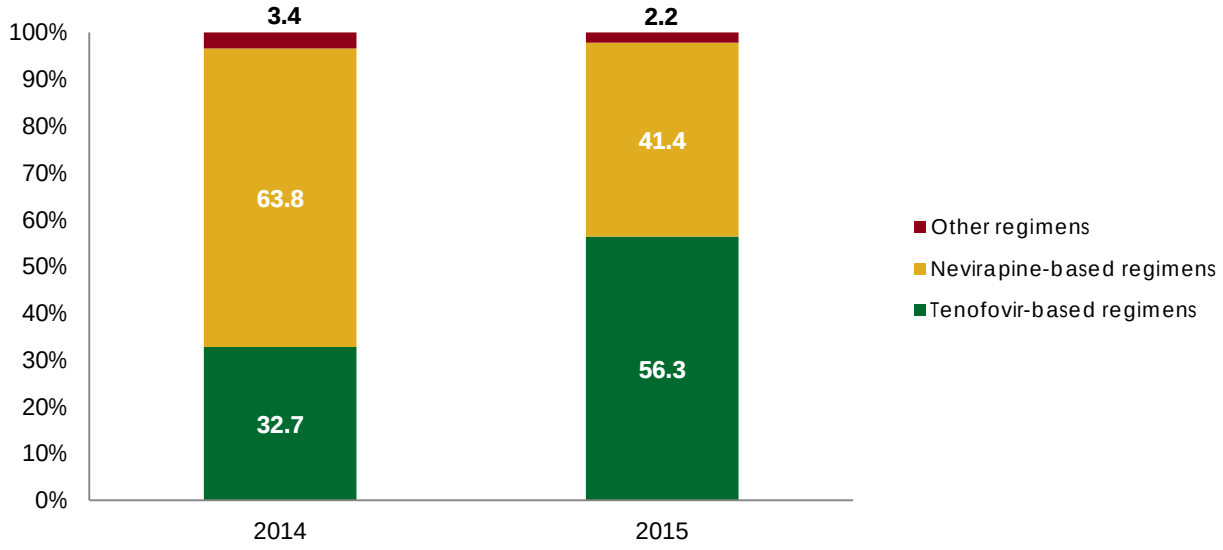
Figure 29. Evolution of ART Coverage in Mozambique, 2003–2015



Source: [26].

The regimens for first-line ART change over the years as more patients receive tenofovir-based regimens— from 33 percent in 2014 to 56 percent by 2015. The regimen proportions in 2015 are continued in the cost calculations until 2019. Nevirapine-based regimens decline as a proportion of all first-line patients in treatment (Figure 30). For second-line ART, the tenofovir/lamivudine/lopinavir combination dominates, with nearly half of patients on this regimen by 2017. Pediatric regimens were not varied across the period due to a lack of data, and the stavudine-based regimen dominates for the first-line treatment.

Figure 30. Change in Adult First-line ART Regimens, 2014–2015



Source: DNAM.

Laboratory monitoring is considered in the costs of ART. Table 7 shows the laboratory monitoring schedule that was defined based on consultations with the HIV program. During the PESS period, only 25 percent of patients are expected to receive a viral load test, scheduled to occur once a year. Three biochemistry (creatinine, ALT, and AST) tests and a hematology test will be performed for ART and pre-ART patients, each twice a year.

Table 7. Ongoing Laboratory Management of HIV-positive Patients in Care

Tests per Person per Year	ART	Pre-ART
Biochemistry (creatinine, ALT, e AST)	6	6
CD4 count	2	1
Viral load (for 25% of patients)	1	0
Hematology	2	2

Source: DNAM.

Additional services are provided to prevent and treat opportunistic infections. For patients receiving pediatric ART, Cotrimoxazole will be provided to 90 percent of the caseload in 2014 and to 95 percent by 2015 to prevent opportunistic infections. The program anticipates that 25 percent of patients on ART will be treated for an opportunistic infection other than TB in 2014, increasing to 30 percent in 2015, based on improved diagnosis of these conditions. To identify and prevent TB co-infection in HIV-positive individuals, the program will also screen for TB in 70 percent of HIV-positive patients presenting with TB-like symptoms and provide 33 percent of TB-negative HIV patients with isoniazid preventive therapy in 2014. TB screening will increase to 90 percent coverage in 2016, while coverage of isoniazid preventive therapy will reach 60 percent by 2017.

The implementing partners consulted during the costing of the HAP estimated the size of the pre-ART population **in care** to be 1.5 times that of total adults and children on ART in any year. These patients in

care will receive regular biochemistry and hematology tests, and one CD4 test per year, to monitor their health status and ART eligibility.

The HAP stresses the role of additional prevention interventions other than ART in reducing the incidence of HIV. In prevention, voluntary male medical circumcision (VMMC) and PTV will be delivered as stand-alone programs. Under the HIV program in DNAM, other prevention activities include condom distribution to the general population. Under the PESS, the analysis budgeted for four condoms per person per year, following on values decided during the HAP costing process. The number of people being tested across all modes (provider-initiated testing, voluntary facility-based testing, and community-based testing) is expected to increase from 4.41 million in 2013 to 4.95 million in 2014 during the HAP, and then further scale up to 5.6 million by 2017 under the PESS. This level of testing is maintained over the years 2018–2019.

Cost results

Unit costs: First-line ART treatment for adults has an average cost of $169 annually (Box 12), which is low compared to the region. Second-line treatment for adults will cost nearly four times as much. Adults and children on ART incur an additional $25 annually for ongoing laboratory tests. Every child on ART will also receive daily Cotrimoxazole to prevent opportunistic infections, which will cost an additional $46 annually.

Box 12. Largest HIV Unit Costs, USD

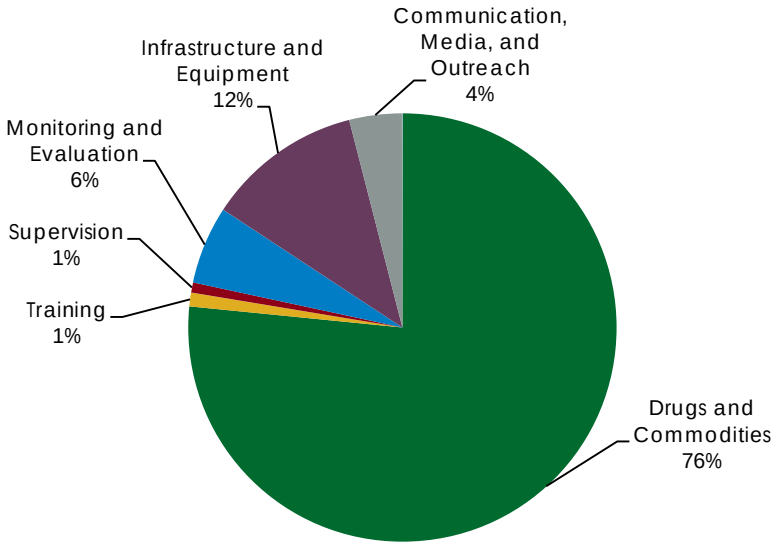
Intervention	*Unit Cost*
Second-line ART for adults	$619
First-line ART for adults	$169
Pediatric ART	$106
Cotrimoxazole for children	$46
Diagnostic and laboratory costs for adults or children on ART	$25

Total 2014–2019 HIV/AIDS (excluding VMMC and PMTCT) costs: **$1,349,147,093**

Total costs: Excluding the costs of VMMC and PTV, the HIV program still accounts for 50 percent of all DNAM program costs. Three-quarters of these costs are driven by drugs and commodities (Figure 31). As it is a chronic disease, scale-up of long-term treatment to more HIV-positive individuals will stress the capacity of the health system infrastructure, which implies that a comprehensive approach to service delivery is required. These constraints will be most impacted by the extensive resources required for HIV diagnostic services. Almost 12 percent of total HIV resources will be targeted to procurement of additional infrastructure and equipment. The program plans to rehabilitate and expand pharmacies, laboratories, and consultation rooms, in addition to the construction of 67 health centers, one depository, and two buildings for staff housing. These plans are considered to be in addition to rehabilitation and construction planned by the DPC under the PESS.

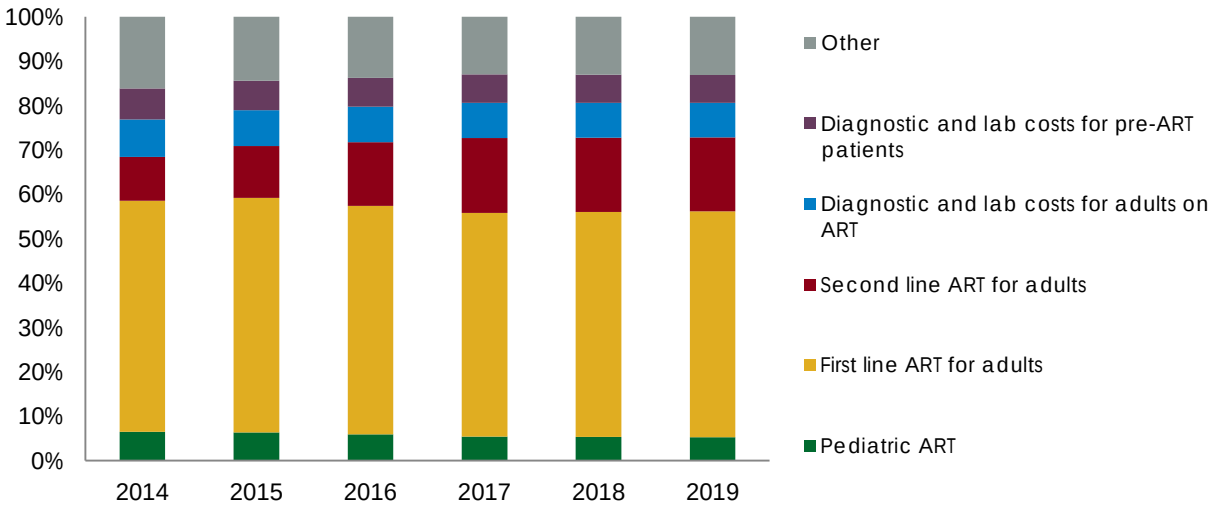
On average, first-line ART contributes 50 percent of HIV-related drug and commodity costs (Figure 32). At 80 percent ART coverage, first-line treatment will reach more than 560,000 adults in 2017, while second-line treatment will reach 52,000 adults. The total costs of second-line ART require 10 percent of

Figure 31. Composition of Total HIV Program Costs, 2014–2019



total HIV resources related to drugs and commodities in 2014. With increased drug resistance and need for second-line treatment, this will increase to 17 percent by 2017. All interventions related to HIV counseling and treatment and the treatment of opportunistic infections together make up about 6 percent, as shown in Figure 32.

Figure 32. Composition of HIV Drug and Commodity Costs, 2014–2019



Other: Sum of interventions that, on average, contribute less than 5% to annual cost of drugs and commodities.

Key issues and areas for further analysis

Quality of data: The quality of data inputs used in this HIV cost analysis was high up to 2015. Allocation of patients to ARV regimens and drug and commodity costs reflect the most recent data available from 2012. Although aggressive scale-up targets are planned, they reflect a consensus based on broad stakeholder engagement and are responsive to the geographic distribution of sub-epidemics. However, there is uncertainty surrounding some data inputs. The laboratory monitoring schedules for ART and pre-ART patients used in the HAP costing, and maintained in the same form for the PESS cost analysis, differ from those used by certain implementing partners. The HAP assumptions incur a lower

cost. Overall, the main weakness of the HIV inputs at the time of data collection was the lack of knowledge of post-2015 coverage targets. The input across the years for the number of persons in need of ART was based on the national, aggregated AIM projection. This can be revisited based on the estimate of the effect of prevention interventions on future HIV incidence, and hence future HIV prevalence.

Areas for further analysis: The impact analysis of HIV treatment and prevention under the PESS is limited. The AIM analysis (AIM is described in Annex C) used to develop the estimates of the HIV-positive population and the need for ART incorporates effects on mortality and HIV incidence reduction from HIV treatment. However, the AIM analysis did not extend to modeling the other reasons for a reduction in incidence, such as behavioral interventions and circumcision. It therefore is possible that the projected HIV-positive population derived purely from AIM for future years is overstated. The PESS analysis does not show whether the PESS will reach the goal to reduce HIV incidence by 50 percent. This issue is discussed in further detail in Chapter 11. Technical partners of DNAM are conducting a region-based analysis of prevention, using the Goals model to address these research needs. The results were unavailable when this report was prepared. A mid-term review of HIV coverage targets is critical for the program, given that the current cost analysis is based on flat coverage over 2016–2019 for many interventions. This review will be an opportunity to evaluate the extent to which ambitious 2013–2015 targets were reached under the HAP and incorporate lessons learned.

D. Internal Medicine

Situation analysis

The DNAM program of Internal Medicine (*Medicina Interna*) includes the sub-specialties listed in Box 13, including that of internal medicine. Given the multitude of sub-specialties, it is the most complex hospital-based health program. Like other hospital-based healthcare departments, the program has suffered generally from a lack of specialist doctors and imprecise treatment protocols. Access and quality of services are limited due to poor availability of critical drugs and supplies and inadequate equipment. Current equipment, which is disproportionately found in the larger provincial and central hospitals, is overutilized and in need of replacement. Generally, the availability of many of the sub-specialties from Box 13 is extremely limited below the provincial hospital level.

Box 13. *Medicina Interna* Sub-specialties

- Cardiology
- Dermatology
- Endocrinology
- Gastroenterology
- Hematology
- Internal medicine
- Neurology
- Oncology
- Pulmonology
- Occupational
- Intermediate care units

Data sources for the cost analysis

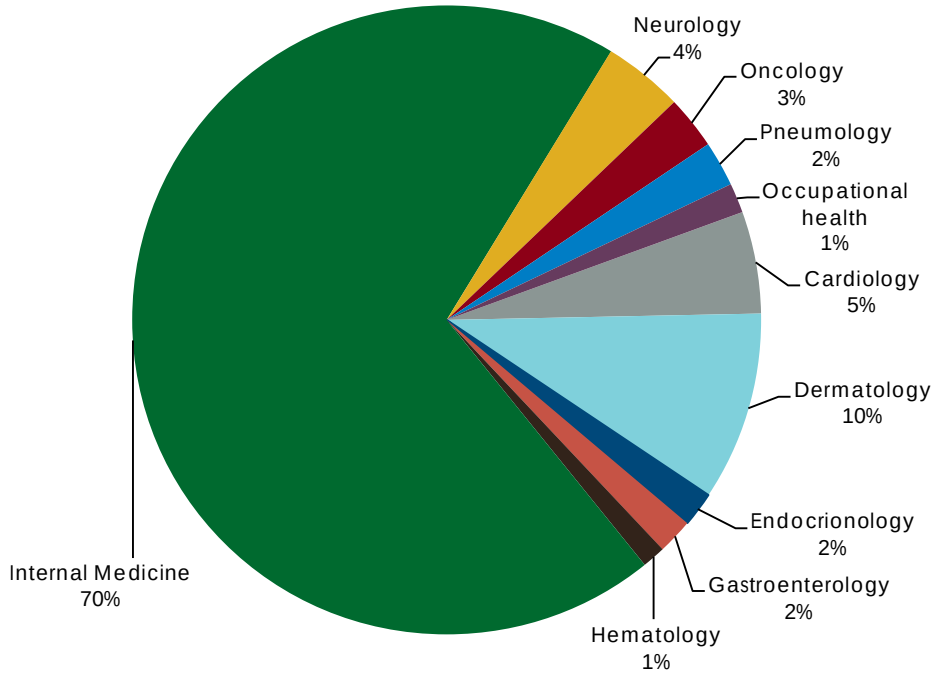
Targets: The methodology used to estimate the split of the *Medicina Interna* outpatient and inpatient load across the sub-specialties in Box 13, by level of hospital, is as shown in section 5.A.

Unit costs: The cost per inpatient day was calculated directly by the *Medicina Interna* program. This cost includes the daily requirement of food. This unit cost was multiplied by the average length of stay within each sub-specialty to determine the final inpatient unit cost. The average length of stay was based on actual data from central and provincial hospitals. The unit cost of outpatient care, which is mainly based on drugs and commodities, was determined using the OneHealth ingredients-based approach. The drugs and commodities needed were defined in consultation with clinicians specializing in the sub-specialties and other service providers at the HCM. The outpatient cost represents the average cost of ambulatory care for one year based on the types of conditions seen under each sub-specialty.

Scale-up of interventions

The *Medicina Interna* program provides services across its sub-specialties at all levels of secondary and tertiary care. National hospital reports reveal that the sub-specialties are concentrated in general, provincial, and central hospitals. In rural hospitals, only the internal medicine and psychiatry sub-specialties are available. In district hospitals, only the psychiatry and psychology sub-specialties are typically available, with some facilities acting as exceptions. Psychiatry services do not contribute to the drugs and commodities cost of the program, as drug procurement for those services at all levels of care is handled by the mental health program of DNSP, which was discussed in Chapter 4. Figure 33 shows the details of the estimated distribution of outpatient visits of the program across sub-specialties.

Figure 33. Outpatient Visits by *Medicina Interna* Sub-specialty, 2013



Excluding psychological and psychiatric health services, *Medicina Interna* outpatient consultations at the national level are estimated to be most commonly distributed across the following sub-specialties: internal medicine, dermatology, cardiology, and neurology. The outpatients from the remaining sub-specialties make up less than 3 percent of the total. Inpatient admissions are generally not registered by sub-specialty in the data, and hence are hard to disaggregate. Costs for admissions were based on a "most commonly used drugs" approach. In the hospital reports, all inpatient admissions are registered under the internal medicine sub-specialty.

Cost results

Unit costs: The four highest-costing interventions within the Internal Medicine program are various outpatient visits. This is explained by the fact that the outpatient unit cost measures the annual cost per patient; therefore, sub-specialties that treat chronic patients with daily treatment doses incur large costs, even if the individual drugs are generic or otherwise low cost. The cost of inpatient admission for the internal medicine sub-specialty was provided by the program as a cost per inpatient day ($70), which was multiplied by the average length of stay (8 days).

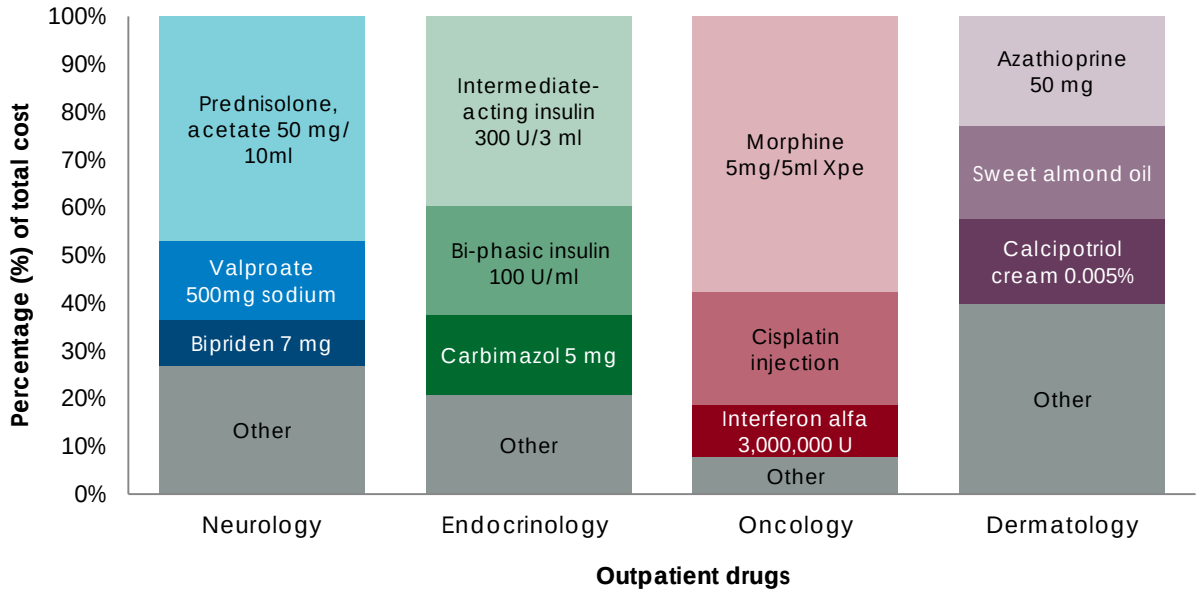
The average annual cost per outpatient with a neurological condition is the largest within the Internal Medicine program, followed by outpatients with endocrinology, oncology, and dermatologic conditions (Box 14). For these sub-specialties, the average cost reflects the most common conditions seen by the service providers the technical team consulted. Due to a lack of epidemiologic data for many non-communicable diseases, this information was used as a proxy for actual prevalence.

Box 14. Largest *Medicina Interna* Unit Costs

Intervention	*Unit Cost*
Neurology outpatient	$1,400/year
Endocrinology outpatient	$927/year
Oncology outpatient	$843/year
Dermatology outpatient	$612/year
Internal Medicine inpatient	$560/admission

Across the four highest-cost outpatient sub-specialties, 91 drugs and commodities were costed. For each of these four sub-specialties, three drugs contribute more than 50 percent of the total drug costs (Figure 34). For these, the high cost is driven either by high frequency (i.e., a daily regimen) or high drug prices.

Figure 34. Key Drugs as Cost Drivers within the Four Largest Internal Medicine Interventions



More than half of the cost of treatment for oncology outpatients is generated by liquid morphine alone. Provision of morphine is an example of a cost that is driven by both a daily regimen and high price.

Table 8. Some Neurology, Endocrinology, Oncology, and Dermatology Outpatient Drugs

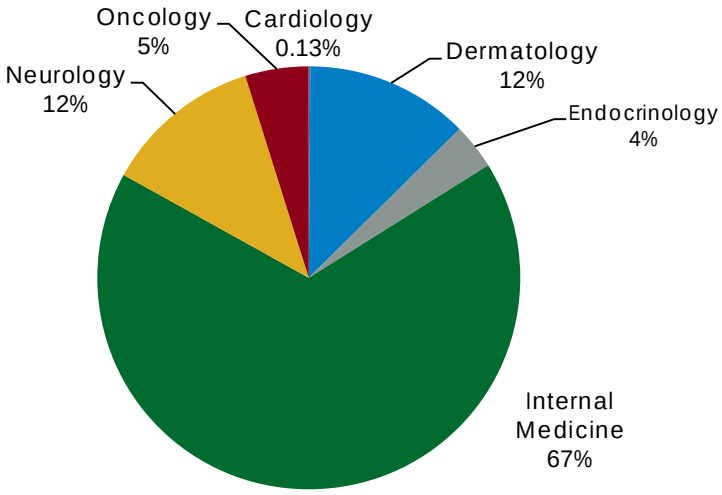
Commodity	Patients Receiving Commodity	Dosage	Regimen	Cost per Pill or Liquid Dosage
Prednisolone acetate -inj 50 mg/10ml	All neurology outpatients	6 pills	Daily	$0.30
Intermediate-acting insulin 300 U/3 ml	70% of endocrinology outpatients	40 UI	Daily	$1.44
Morphine 5mg/5ml Xpe	90% of oncology patients	5–15 ml	Daily	$1.48
Azatioprine cp 50 mg	50% of dermatology outpatients	3 pills	Daily	$0.26

Total cost: The *Medicina Interna* hospital-based care program is the second largest in DNAM, contributing 18 percent of all DNAM costs. The cost of drugs for psychological and psychiatric services is not included here for reasons previously described. Program management costs are low, amounting to less than 1 percent of total program costs. These non-service delivery-related activities include multidisciplinary training, supervision visits, national meetings, and the development of therapeutic protocols.

Total 2014–2019 *Medicina Interna* cost: **$497,584,187**

Although the average annual cost per outpatient with a neurological condition is the largest within the *Medicina Interna* program, neurological outpatients are not common. Therefore the sub-specialty only contributes 12 percent of overall program costs. The majority of the drug and commodity costs of the program derive from the internal medicine sub-specialty (67%), in which outpatient services are relatively less expensive yet more common (Figure 35). Over 2014–2019, there will be an estimated total of 726,050 internal medicine outpatients, compared with about 42,900 neurology outpatients. The methodology used to estimate these figures is as per the process described in section 5.A.

Figure 35. Composition of Total *Medicina Interna* Drug and Commodity Costs, 2014–2019



Key issues and areas for further analysis

Quality of data: The data quality for the cost analysis of Internal Medicine was low to moderate across sub-specialties. While the overall targets are based on the methodology in section 5.A, deriving from data in the annual hospital service delivery reports, several assumptions were required to disaggregate the inpatients and outpatients by sub-specialties available at lower-level hospitals. Further, little is known about the plans for expansion and scale-up of services in the program, and what effect new hospital-based equipment purchases will have on the ability to manage a larger national-level patient volume. Finally, little is known about how much of the country's need for hospital-based internal medicine services are being met currently.

The analysis of unit costs that the technical team was able to conduct is also subject to limitations. They derive from thorough consultation with clinicians and service providers. However, since all service providers consulted were currently employed at the HCM, the treatment protocols reported are biased toward the conditions seen at that facility and the higher availability of inputs at this premier hospital. It is prudent to assume that higher-level hospitals see more complicated cases, partially due to the concentration of specialists there. This would suggest that the unit costs included in this costing analysis may overestimate the true cost of service delivery at lower-level hospitals.

The total annual outpatient cost was determined by sub-specialty by applying the treatment cost per patient per year to the total outpatient load. This assumes that each patient makes the required number of visits under the treatment protocol. This may overestimate true costs, since many patients drop out or cease treatment before the course is complete for various reasons. Given a lack of data on drop-out rates, the technical team had no basis for adjustments. Therefore, the results should be taken to represent the cost of providing patients with the *Medicina Interna* program's standard across the sub-specialties.

Areas for further analysis: As with other secondary care departments, *Medicina Interna* needs to invest in expanding the availability of services across the hospital sector. Less than 1 percent of the program's cost derives from programmatic management activities, such as integrated training, supervision visits, and coordination meetings. The PESS identified the lack of skilled specialists as the main constraint of the program. The number of specialists is limited by the output of the pre-service and resident schemes, managed by DRH. A joint analysis and planning exercise with the DRH is critical for the *Medicina Interna* program to expand its scale. In addition, better reporting mechanisms from lower-level hospitals would help to improve the understanding of the annual inpatient and outpatient volume while strengthening the program's planning and resource allocation functions.

E. Voluntary Male Medical Circumcision (VMMC)

Strategic objectives

The VMMC program recently was separated from the broader HIV program in response to a five-year male circumcision scale-up strategy. This scale-up is also referenced in the HAP. The HAP identified certain provinces as having a high priority for circumcision, given their historically low prevalence of male circumcision. Male circumcision has a proven benefit for uninfected men in reducing their risk of HIV infection. During the five-year scale-up of VMMC, resources will be initially concentrated in these high-priority provinces. The plan calls for the government and its partners to offer voluntary circumcision to 2 million males ages 15−49 years over the five years 2013–2017.

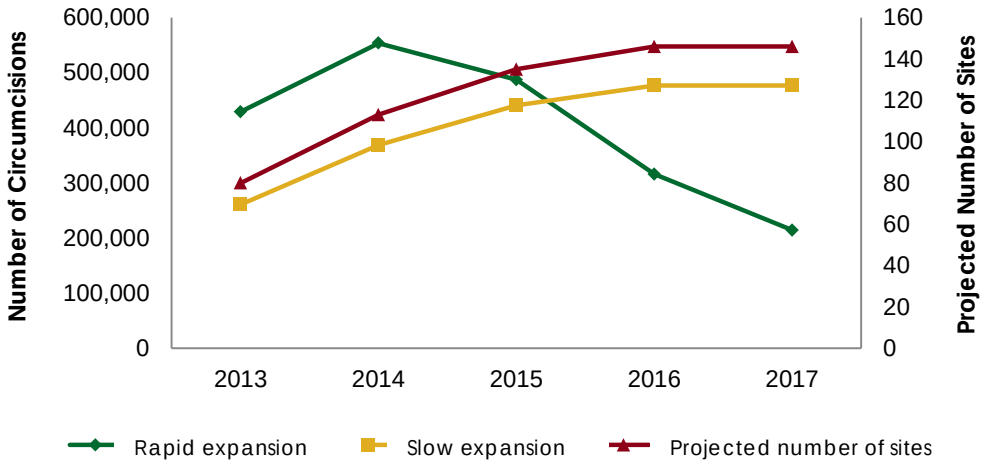
Data sources for the analysis

Targets and approach: For the 2 million circumcisions targeted for the years 2013–2017, there is some uncertainty as to when the targets will be achieved. The government and its partners have planned for a rapid start to the program, which requires health system strengthening, including training for health workers, new health facility infrastructure, logistics, and procurement of commodities and equipment. There is also some uncertainty over the exact modality of the intervention. The technical team did not know at the time when this report was prepared whether the VMMC scale-up will be primarily achieved through periodic high-volume campaigns, utilizing mobile sites with local demand creation, then supplemented with facility-based, routine on-demand circumcision to allow for year-round services. An alternative strategy would focus only on facility-based delivery, with resources spent on refurbishing public facilities to prepare dedicated surgical bays so health workers can cater to multiple clients at the same time. Under this approach, demand creation would occur in the health facility's local area. There are cost differences between the two alternatives and, potentially, differences in achievement. A major uncertainty is whether the expected demand across age groups—required to meet the overall target of 2 million circumcisions—will actually materialize. Even with low demand and thus low achievement, the up-front costs of health system strengthening, equipment purchase, and commodity pre-orders would still need to be met. In this situation, the effect of low demand would be higher unit costs per circumcision.

It was assumed that a surgical approach would dominate, since no decision has been taken on other methods of voluntary circumcision (e.g., devices). Given this uncertainty, two possible scale-up paths are shown in Figure 36 below. The slower scale-up path traces the availability of sites, also shown, and assumes an average of 68 VMMC procedures per site per week over the period, where 68 is the value that produces the overall target of 2 million, given assumptions about sites' operation. The technical team

noted that the total costs between the two scale-up paths are equivalent, since the total achievement is 2 million. The rapid scale-up path was assumed to apply to the PESS, based on discussions with the program. The years from 2014 onward fall under the PESS, up to 2019. Therefore, a total of 1,570,843 circumcisions are included, subtracting the volume expected for 2013 (prior to the PESS). At the time of preparation of this report, there were no known VMMC targets for the years 2018–2019. Given that the pace of anticipated scale-up is very rapid, and that the scale-up of sites is less rapid, it is very likely that VMMC targets for the years up to 2017 will not be achieved. These will then need to be rolled over to 2018–2019. Given a lack of certainty either way, it was assumed that the years 2018–2019 have no targets at this time. No costs are assessed for the VMMC program in these years.

Figure 36. Potential Scale-up Paths for VMMC, 2013–2017



Source: DNAM, and authors' assumptions.

Cost results

Unit costs: Initially, the technical team estimated the costs of a facility-based approach to VMMC, with costs calculated for all inputs required for the forceps-guided surgical technique. These included pain-relieving and antibiotic drugs, kit-based surgical consumables, cleaning and hygiene, food for patients and their families, reusable instruments, and major equipment for cauterization and sterilization. In addition, costs of health worker training and facility-based refurbishment, furniture, and other overhead costs were also included. These costs were generated based on the information provided by the national VMMC program manager. The overall framework for this cost analysis was derived from the essential requirements defined in the WHO Models for Optimizing the Volume and Efficiency of Male Circumcision Services (MOVE). This cost analysis considered both routine VMMC procedures and cases that required emergency care due to unforeseen complications (2 percent of cases, on average).

Though the results of the analysis are well in line with previous estimates [27], subsequent discussion with stakeholders in Mozambique led to the conclusion that the cost estimate may not fully account for the structure of the Mozambican VMMC program in terms of funding sources and other operational arrangements. For example, implementing partners who had previously piloted VMMC in Mozambique at several sites faced additional costs related to their overhead, short-term TA, and programmatic management. Based on input from development partners, and confirmation from the VMMC program, a higher estimate of $98 per routine surgical circumcision was adopted. This estimate was provided directly by the partners and the program and does not reflect any calculations by the technical team. The cost for a case requiring emergency treatment was stated to be $191 (Box 15).

When the PESS was being finalized, the VMMC strategy was not fully developed, so the detailed communication, mass media, and material costs required for the implementation of the entire five-year campaign were not known. In discussions with the VMMC program manager, a campaign costing $500,000 per year was included to cater for the need to generate demand.

Box 15. VMMC Unit Costs

Male Circumcision	*Unit Cost*
Routine surgery	$98
Surgery with adverse event	$191

Total costs: The total cost of the five-year campaign will be nearly $200 million. Excluding the costs for 2013 as outside of the PESS scope, the total cost will be approximately $159 million. Of this, 98 percent relates to the unit costs of $98 and $191 for routine and complicated VMMC procedures, respectively, which are assumed to include drugs, commodities, equipment, training, infrastructure, and implementer overheads and management costs. The remaining 2 percent relates to demand creation campaigns.

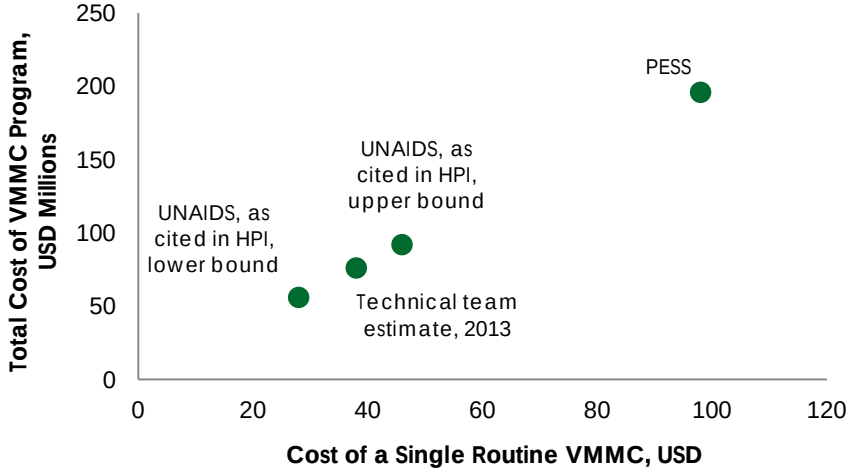
Total 2014–2019 VMMC costs:
$158,864,382

Key issues and areas for further analysis

Quality of data: The data quality for the cost analysis was hard to judge, as the base unit costs were externally estimated and provided to the technical team for its use. Figure 37 provides a comparison of various estimates, including the estimate of $38 per routine surgical VMMC derived by the technical team earlier in the process. The vertical axis shows the total costs of the plan to achieve 2 million circumcisions, while the horizontal axis shows the variance in unit cost of a routine surgical VMMC. Given the clustering of estimated "efficient" values in the range of $30–45, there is reason to believe that costs for the scale-up program of VMMC as included in the PESS may be overestimated.

Areas for further analysis: A more detailed cost analysis is urgently needed, based on the particulars of the VMMC strategy and the process of implementation. It is important to distinguish a cost analysis to achieve future VMMC scale-up from the analysis of past expenditure for a pilot VMMC implementation at a limited number of sites. Large-scale implementation may benefit from differences in approach and economies of scale, which may help to reduce unit costs. However, future facility-based services may face lower average demand for VMMC, which would raise unit costs, given fixed initial spending.

Figure 37. Estimates of the Cost of a Routine Surgical VMMC Procedure



Sources: [27], authors' estimates.

F. Central Clinical Laboratories

Background: The Central Clinical Laboratories (CCL) provides national-level coordination for the laboratory network of the public health sector. The technical team received limited information on the current situation and strategic objectives of this institution. The costs here relate primarily to procuring reagents and consumables for various laboratory tests performed in the hospital sector and national laboratories; these costs were provided directly by CCL. Based on discussions with CCL, these costs exclude those reagents and laboratory consumables that are procured separately and have been incorporated in the costs of service delivery under the tuberculosis, HIV, forensic medicine, anatomical pathology, x-ray, and environmental health and blood transfusion programs across DNAM and DNSP.

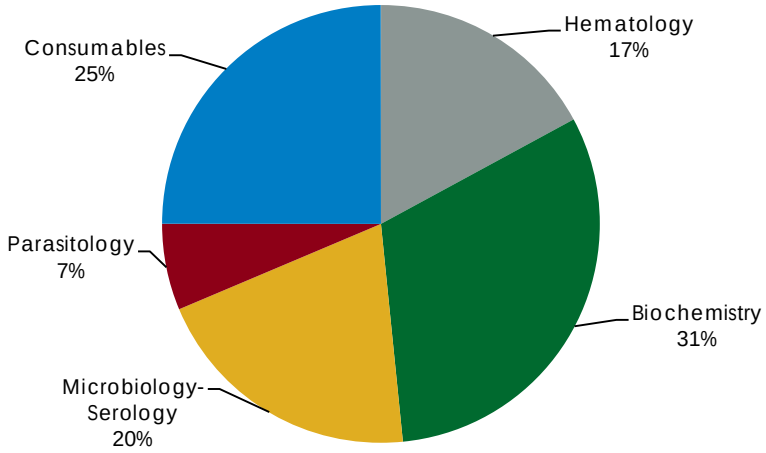
Cost results

Total 2014–2019 CCL cost:
$104,286,353

Total cost: The total cost of reagents, excluding the tests for certain programs, will be $14.4 million per year, summing to $86 million under the PESS. An additional $18 million (across the whole PESS period) will be invested by the department in various support activities, such as M&E for the laboratory network, maintenance of laboratory equipment, supervision visits, training, and other aspects of program management. Specifically, $683,600 will be spent over six years to develop a laboratory information system. From the $18 million over this period, maintenance of laboratory equipment will account for $1.3 million every year.

Reagents for hematology, biochemistry, micro-serology, and parasitology comprise 75 percent of all the drug and commodity costs (Figure 38).

Figure 38. Composition of CCL Reagents and Commodity Costs,* 2014–2019



Source: CCL. * Excludes reagents for HIV, TB, anatomical pathology, blood transfusion services, and forensic medicine.

Key issues and areas for further analysis

Quality of data: The data quality for the cost analysis was hard to judge, as the costs of the reagents and consumables needed were provided directly by CCL. The technical team is not aware of any analytical studies of the national-level needs for the laboratory sector across hospitals, higher health centers, and the national reference laboratories. Such a study, if conducted, would provide a reference for the annual needs.

G. Surgery

Background: The DNAM surgery (*cirurgia*) program extends across all hospital levels in the public health sector. The technical team had limited information on the situation in the surgical program and its strategic objectives. There were no national reference documents. In addition to general surgery, the department includes pediatric, plastic, and neurosurgery sub-specialties (Box 16). General surgery is the only sub-specialty offered at all hospital levels. Other specialties are offered only at certain central and provincial hospitals.

Data sources for the cost analysis

Targets: The methodology used to estimate the split of the surgery program's outpatient and inpatient load across the sub-specialties (shown in Box 16), by level of hospital, is based on section 5.A.

Box 16. Surgery Sub-specialties

1. General surgery
2. Pediatric surgery
3. Plastic surgery
4. Neurosurgery
5. Thoracic surgery

Unit costs: The cost per inpatient day was calculated directly by the surgery program. This cost includes the daily requirement of food. This unit cost was multiplied by the average length of stay within each sub-specialty to determine the final inpatient unit cost. The average length of stay was based on actual data from central and provincial hospitals. The unit cost of outpatient surgeries, which is mostly based on drugs and commodities, was determined using the OneHealth ingredients-based approach. The drugs and commodities needed were defined in consultation with surgeons specializing in the sub-specialties and other service providers at the HCM. The outpatient cost represents the average cost of ambulatory care for a period up to one year if required, though most surgical pre-consultation and follow-up care requires a shorter duration of visits.

Cost results

The technical team estimated that there will be an average of 47,100 surgeries performed annually across the public health sector during the period of the PESS. General surgeries make up 94 percent of this total, since most surgeries performed at rural and district hospitals are classified as such in the technical team's methodology, due to a lack of specific data. This is not a major source of bias, because lower-level hospitals do not have the specialists or inputs required to perform surgeries more complicated or specialized than general surgery and caesarian sections.

Box 17. Largest Surgery Unit Costs, USD

Intervention	*Unit Cost*
Neurosurgery inpatient	$304/admission
General surgery inpatient	$211/admission
Neurosurgery outpatient	$47/patient year
General surgery outpatient	$22/patient year
Plastic surgery outpatient	$21/patient year

Box 17 shows the highest unit costs within the program; inpatient admissions are the highest. The cost of inpatient admissions is relatively lower than the average cost of a *Medicina Interna* admission. While the cost of inpatient admissions by surgery sub-specialties was estimated based on an ingredients-based approach, listing each input, multiplied by daily dosage and the average length of stay, the cost of inpatient admission per day for *Medicina Interna* was provided directly by that program.

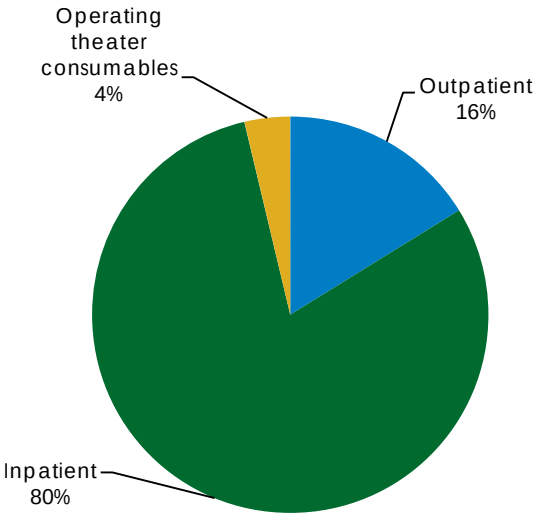
Costs of operating theater consumables for the program are small and not shown in Box 17. As a total, these consumables across minor and large surgical procedures make up only 4 percent of the total drug and commodity resources for the surgery program (Figure 39). Note that all anesthetic costs are included within the costs of the DNAM anesthesiology program.

In addition to surgical procedures, for each patient, the department provides pre-surgical and post-surgical care through outpatient and inpatient care, as required, based on the procedure. Neurosurgery outpatients require the most expensive drugs and inputs (Box 17). This sub-specialty sees a lower volume of patients.

Total costs: Over the period of the PESS, the surgery program will require nearly $92 million and contribute to 3 percent of total DNAM costs. The cost of drug and commodities used in surgical procedures, inpatient care, and outpatient care represent 87 percent of the total program cost. The program will also train surgical technicians across different surgical specialties and for trauma care. Equipment worth more than $3.3 million will be procured in 2014 to strengthen various surgical specialties at key hospitals (e.g., maxillofacial surgery). This procurement will continue at a level of $1.4 million per year over the period 2015–2019.

Total 2014–2019 surgery cost: **$92,358,783**

Figure 39. Composition of Surgery Program Drug and Commodity Costs, 2014–2019



Key issues and areas for further analysis

Data quality: The overall quality of data available for the cost analysis was moderate. Most costs were built up from the basic ingredients of the service, whether it is the surgical procedure, the inpatient care, or the outpatient pre-consultation and follow-up. The uncertainty in service provision across the levels of hospitals is less severe, as it is well known that lower-level and rural hospitals do not provide more than general surgical services. Therefore, unlike with *Medicina Interna* sub-specialties, the technical team's consultation with senior surgeons and surgery program managers suggests that the preponderance of general surgery at lower levels reflects the reality of service provision, not poor or under-reporting.

Areas for further analysis: As with other secondary care departments, the surgery program needs to invest in expanding the availability of services across the hospital sector. The PESS identified the lack of skilled specialists as the main constraint of the program. A joint analysis and planning exercise with the DRH is critical. In addition, better reporting mechanisms from lower-level hospitals would help to improve the understanding of the annual inpatient and outpatient volume while strengthening the program's planning and resource allocation functions.

H. Emergency and Trauma

Background: The emergency and trauma (*Emergência e Trauma*) program extends across all hospital levels and manages an estimated 3 million outpatient visits per year across all hospitals, including minor

injuries as well as more severe cases of trauma. This estimate was derived using the methodology described in section 5.A. Actual data from higher-level hospitals were used, along with data available on outpatient consultations at rural hospitals.

The HCM alone recorded 185,018 adult emergency and trauma visits in 2012 [28]. This figure excludes the emergency cases first recorded in other clinics, such as pediatrics, gynecology, labor and delivery, and the special clinic. Including those emergencies, for which drugs and commodities are estimated under other DNAM programs, the total emergency visits to the HCM were nearly 300,000 in 2012. The more complicated care provided through an Intermediate Care Unit (ICU) was recorded by that name only in the data from the HCM. Other central and even provincial hospitals may have such a unit, but the technical team could not distinguish its patient load in the data available in annual reports of those hospitals. Hence, the ICU was costed only for the HCM.

Methods: Excluding patients who are served at the emergency counter and do not require further care, the rest require some treatment and hence consume inputs. Of these patients, nearly 40 percent have traumatic injuries (22 percent of all adult and trauma outpatients). Unit costs were calculated by type of service within the emergency department at the HCM (treatment room, observation room, small surgery, and trauma center), based on actual commodity consumption and cost data, along with the patient load. Data on exact drugs and amounts consumed per week at the emergency unit were obtained from the Deposito de Medicamentos at the HCM. From those, the technical team could estimate the average unit cost per person treated within the emergency department. The weighted average cost per patient across these various services within the HCM emergency department was used as the average cost per emergency and trauma outpatient nationally. The value to be used for the national estimate was reviewed with the clinicians at the HCM emergency department and the program. Based on the program's direction, the cost of one urine strip for all outpatients and a pregnancy test (if requested) for all female outpatients of the emergency departments were also included, estimated as half of all outpatients.

Cost results

Unit costs: The weighted average cost per emergency and trauma outpatient visit applicable nationally is $1.90 per patient. The cost per ICU patient is significantly higher, at $264. The latter cost was also estimated based on the data on commodities, costs, and patient load from the HCM ICU unit.

Total costs: The total cost of emergency and trauma care under the PESS will be nearly $61 million for the six years. Treatment for emergency and trauma outpatients will make up 95 percent of the total cost of drugs and commodities, with ICU patients at central hospitals accounting for the rest. Six percent of the total cost of the program is allotted to cover investments in training for emergency and trauma department health workers on basic to advanced emergency care. Some costs cover the procurement and maintenance of ambulances. This is in addition to the procurements under the Department of Infrastructure of DPC, discussed in Chapter 7. A small proportion of the resources required are for the rehabilitation of emergency rooms in high-priority hospitals, such as the HCM.

Total 2014–2019 emergency and trauma cost:
$60,909,231

Key issues and areas for further analysis

Data quality: The overall quality of data for the cost analysis was low. The unit costs are based on the services offered at the HCM, since other data were unavailable. The mix of services offered at a rural hospital may differ significantly. There are no studies available on the volume and type of emergency and trauma services requested and offered at rural hospitals. Therefore, the technical team's estimate of the total volume of emergency outpatient care per year is uncertain and may be either an over- or under-estimate.

Areas for further analysis: There is an urgent need to investigate the type and volume of emergency services offered in the hospital sector and to classify them by severity. Unit cost calculations should be made based on broad classifications of the types of patients or the severity of the injuries/need. These can be useful for future strategic cost analysis.

I. Blood Transfusion

Background: A situation analysis was not conducted for the blood transfusion program at DNAM. General information is available, which suggests that the program raises awareness about blood donation in the general population; recruits blood donors; and then collects, screens, and produces blood components for transfusion and use across the health sector.

Data and methods: In 2014, an estimated 147,089 units of blood will be collected and screened, and components produced for transfusion. In discussion with the program, it was decided that blood collection would scale up by 10 percent annually, reaching 195,775 units by 2017. Over 2018–2019, the targets were not discussed with the program, as these years were added to the PESS later. It was decided that for these two years, blood units collected will rise from the previous year at the rate of growth of the population.

In discussion with the program, previous unit costing studies from Mozambique were reviewed. A study conducted for HCM by the AABB Advancing Transfusion and Cellular Therapies Worldwide network in 2012 also produced a worksheet for calculating the cost per unit of safe blood. This worksheet, along with other sources, was utilized for the final unit cost analysis. The unit cost is split into two main sections: blood collection and blood screening and component production. The first is further divided across the need for the extraction of blood, specimen tubes and other storage materials, forms and paperwork, and the average recruitment cost per blood donor. The latter cost involves various screening tests and the costs of producing various blood components for the screened safe blood units.

Cost results

Unit costs: The collection of blood from donors is the most costly stage of the blood transfusion process. Collecting one unit of blood costs approximately $26, including $15.50 for specimen tubes and storage media, and just $0.74 for donor recruitment (Box 18). Blood collection makes up 55 percent of the program cost of drugs and commodities (Figure 40).

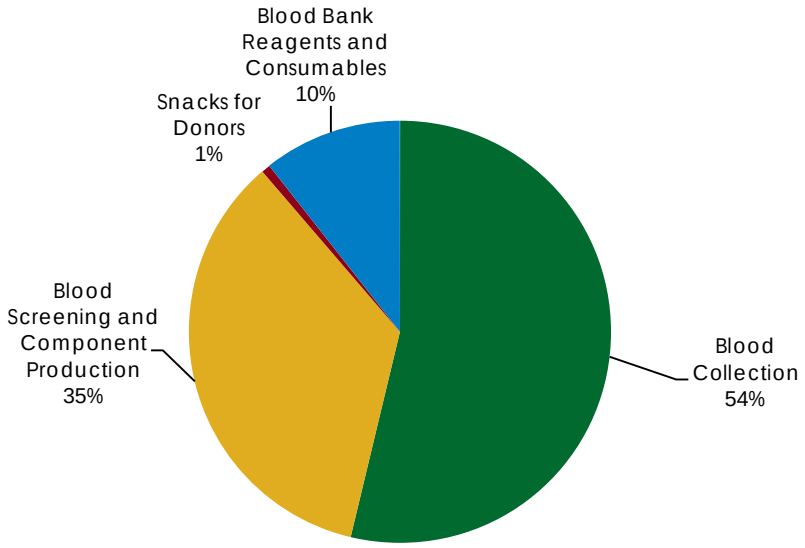
Box 18. Blood Transfusion Unit Costs, USD

Intervention	*Unit Cost*
Blood collection	$26
Blood screening and component production	$17

Total costs: The total costs amount to about $55.6 million over 2014–2019. Four percent of this cost will support program management activities. Under this heading, the main activities planned include $921,431 for new equipment purchases over 2015–2018 and seven types of training, including one workshop for clinicans on the rational use of blood.

Total 2014–2019 blood transfusion cost: **$55,562,846**

Figure 40. Composition of Total Blood Transfusion Drug and Commodity Costs, 2014–2019



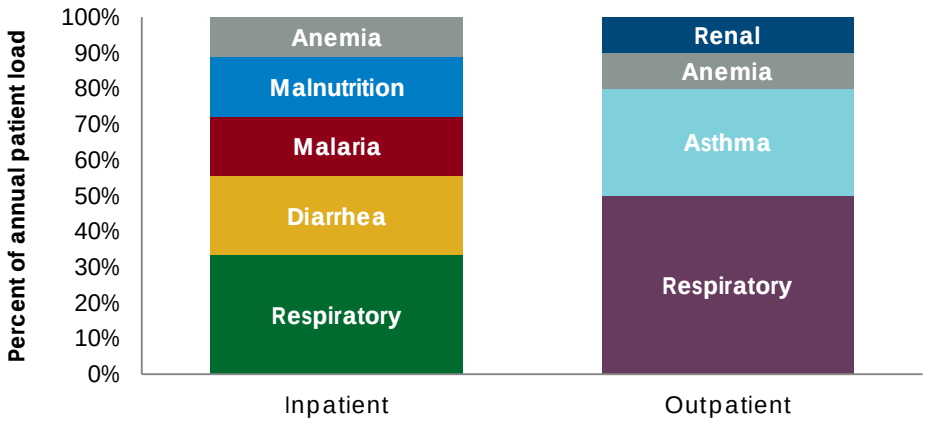
J. Other Key Medical Assistance Programs

Pediatrics

Background: The DNAM pediatrics program serves the hospital-based healthcare needs of children up to age 15. Recent trends in under-five and neonatal mortality are outlined in section 4.D. The pediatric inpatient load (Figure 41) reflects severe cases of many of the principal causes of under-five and neonatal mortality. The outpatient load suggests the burden of disease among older youth, and is highly skewed toward respiratory disease and asthma. These conditions make up about 80 percent of the total outpatient load. The other commonly treated outpatient conditions include renal disease and severe anemia.

The national strategic objectives for the health of children under age five were summarized in section 4.D and focus on neonatal mortality and integrated childhood services. Strategic objectives for adolescents and youth overlap with other health areas, especially non-communicable diseases and nutrition.

Figure 41. Common Conditions Managed by the Pediatric Program



Data sources for cost analysis: Based on the 2011 levels of service delivery, and using the methodology described in section 5.A, given annual population growth, it is estimated there will be 128,170 pediatric outpatient visits and 88,180 pediatric inpatients per year by 2019.

The unit costs for inpatient and outpatient care were developed using the ingredients-based approach. Through consultation with the program, the most common conditions and their relative frequencies were determined. Next, the inputs for each condition were defined. Using the breakdown of the patient load, the costs per condition treated were used to develop an average cost per patient treated.

Unit costs: The average cost per outpatient visit ($11) is significantly less than that of an inpatient admission ($65). The inpatient cost assumes the average length of stay is five days and includes the cost of daily food intake, as in other DNAM programs. As a result, 89 percent of the cost to treat pediatric conditions at the secondary through tertiary levels of care derives from inpatient admissions. The remaining 11 percent of drug commodity costs derives from outpatients.

Total cost: The total costs of the pediatrics program under the PESS will generate 2 percent of total DNAM costs. Drugs and commodities make up 98 percent of pediatrics costs. The program will also construct a neonatology service unit at the HCM and conduct training for doctors and nurses in pediatric care.

Total 2014–2019 Pediatrics costs:
$54,275,902

Key issues and areas for further analysis: The quality of data for the cost analysis was moderate. The technical team consulted with program managers for the common unit costs, and hence the pediatric care areas reflect the national-level patient load. The costing uses the OneHealth ingredients-based approach, which ensures accuracy in reflecting the needs of service delivery. However, the 2014–2019 targets used do not take into account the impact of the new neonatology service unit at the HCM on the future composition or size of the pediatric patient population or other plans for scale-up of services beyond population growth.

Pediatric asthma contributes less than 10 percent of total costs, yet the number of patients seeking treatment is growing, and the program has stressed its concern about this epidemic. Research is needed to determine the true asthma burden at the national level and explore options to expand treatment at the primary care level. This also should be harmonized with efforts to treat adults.

Obstetrics and gynecology

PESS result areas*: Reduce maternal mortality and morbidity by expanding and improving the quality of care in maternal health services.*

Background: Although the Ob/Gyn program ranks 13th among DNAM programs in total cost, it is critically important to saving maternal lives and available at almost all levels of hospitals. The principal causes of maternal mortality and morbidity are discussed in Chapter 11.

Obstetric services include normal delivery services, management of pregnancy complications, and caesarians, among others. Based on clinician feedback, the most common complications are induced labor, preterm labor, and maternal hypertension (Box 19). Services provided to obstetric outpatients consist largely of antenatal and postnatal care. These are included in the costing of the SMI program, based on national targets and discussion across both programs. Therefore, obstetric outpatient costs will not be included here.

Box 19. Ob/Gyn: Pregnant Women Presenting with Complications

Complication	*% of births*
Induced labor	13
Preterm labor	9
Hypertensive	9
Postpartum hemorrhage	6
Premature rupture of membranes (PROM)	6
Maternal sepsis	5
Ectopic	4
Obstructed labor	3
Eclampsia	3
Pre-eclampsia	3

Gynecological services primarily include infertility, ovarian tubal abscess, ovarian tumors, myomectomies, endoscopies, and related procedures.

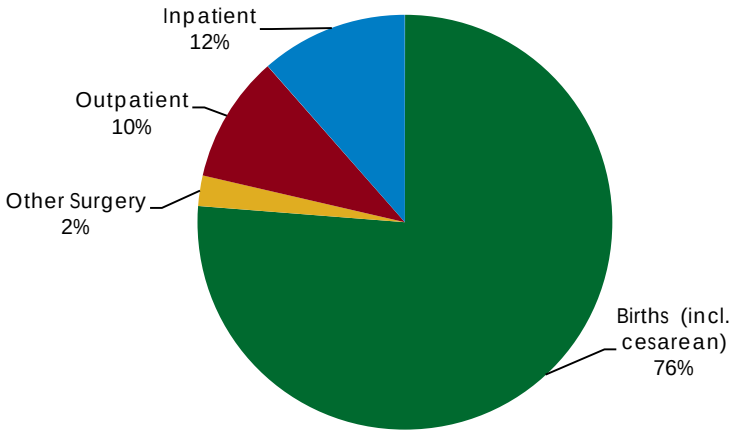
The strategic objectives for maternal and reproductive health are discussed in detail in section 4.D. Antenatal care, obstetric complications, cervical cancer, and STIs are stressed, among other service delivery elements.

Data sources for cost analysis: The number of births occurring in hospitals was projected for future years based on 2011 levels and population growth. The prevalence of various pregnancy complications (not mutually exclusive) is based on feedback from clinicians (Box 19). In hospitals where obstetric services are offered, all pregnancy complications will be treated, although the quality of services will likely vary significantly. The availability of BEmOC and CEmOC is discussed more thoroughly in Chapter 11. All other targets were developed using the methodology in 5.A.

Clinicians at the HCM provided the information necessary to use the OneHealth ingredients-based approach for unit costing of Ob/Gyn service delivery.

Cost results: The average cost of drugs and commodities used for vaginal delivery—accounting for the management of births with complications in a small proportion of women, which are considerably more costly—is $15. The cost of all drugs and commodities used in a caesarian procedure is approximately $13. Hospital births in total account for three-quarters of all drugs and commodities for the program (Figure 42). For patients with gynecological complications, the technical team calculated both inpatient and outpatient costs. The cost of treating gynecological inpatients is higher than any other patient within Ob/Gyn and will contribute 12 percent of total drug costs for the program. There are three times as many gynecological outpatients as inpatients annually.

Figure 42. Composition of Total Ob/Gyn Drug and Commodity Costs, 2014–2019



Total cost: The Ob/Gyn program will require $36.5 million over 2014–2019. It accounts for less than 2 percent of total DNAM program costs. A quarter of the program's total cost will support the strengthening of its infrastructure and clinical staff. More than $2.5 million of equipment will be procured in 2014–2015 to allow for high quality treatment and diagnostic services. Trainings will target gynecologists and nurses, and ensure proper use of the new technology, such as endoscopic surgery, ultra-scenography, hysteroscopy, laparoscopy, and fetal monitoring.

Total 2014–2019 obstetrics and gynecology costs: **$36,532,817**

Key issues and areas for further analysis: The quality of data used for costing the Ob/Gyn program was moderate. Births in hospitals were scaled up according to population growth, which does not account for any increased scale-up due to the increased targets for institutional delivery. The prevalence of various pregnancy complications is also biased due to the data from the HCM. Since the levels of these complications also affect the weighted average cost per vaginal delivery, this has an overall effect on the cost calculations. Other Ob/Gyn unit costs were subject to multiple rounds of validation with program managers and should be considered of higher quality.

Better coordination is needed during the planning process between the DNSP SMI program and the DNAM Ob/Gyn program to ensure alignment of national maternal health targets. Accurate recording of pregnancy complications at all levels of hospitals would also contribute to more accurate unit costs.

6. HEALTH SYSTEM DEPARTMENTS: HUMAN RESOURCES

This chapter provides the results of the cost analysis for the Department of Human Resources (DRH), i.e., for all salaries and benefits paid to MISAU staff and for the programmatic activities of DRH. It also discusses the methodology and results of a gap analysis of human resources in the health sector.

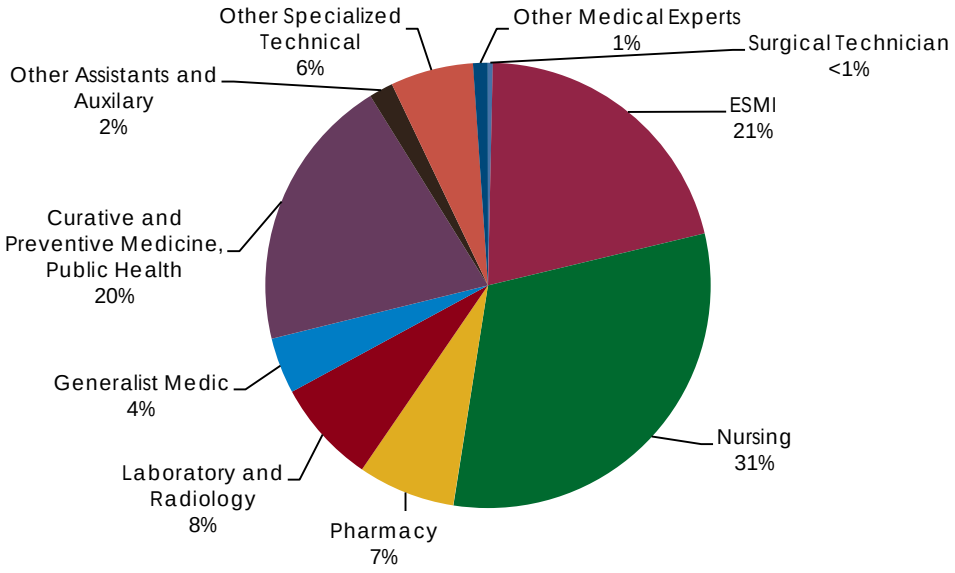
A. Background

Situation analysis

The PESS references several strategies related to the DRH, including the *Plano Nacional de Desenvolvimento de Recursos Humanos de Saúde* (PNDRHS) 2008–2015 (i.e., the National Human Resources Development Plan for Health and the Accelerated Institutional Reforms of MISAU). The mid-term evaluation of the PNDRHS in December 2012 suggested that implementation of the plan was incomplete and behind schedule, with a lack of staff in the department and insufficient funding stated as some of the problems. The human resources issues in the health sector include the following:

- Chronic shortages of skilled staff, stemming from limited production of new graduates of desirable quality, as well as limited absorption of those into the public health sector;
- Inequities in the distribution of staff across and within provinces, based on location;
- Low productivity and quality of work, which also stem from poor working conditions; and
- A limited human resource information system that cannot provide information on the labor market, performance, workplace conditions, job satisfaction, and staff mobility.

Figure 43. MISAU Health Service Provider Workforce by High-level Categories, 2012



Source: DRH 2013.

Strategic objectives

For the PESS, the DRH has provided a plan for scale-up of the health workforce, beginning from the base of clinical health service providers in 2012. The 2012 distribution is shown in Figure 43, corresponding to a service provider workforce of approximately 21,000 personnel, with an additional 16,900

administrative, managerial, and support staff. At an overall level, PESS objectives related to human resources for health cover the following strategic objectives:

1. **Ensure adequate staffing of health facilities:** This requires a reduction of geographical inequities by redistribution based on norms such as the ratio of health workers per 100,000 inhabitants. One of the recommended actions is to prepare a staffing norm by level of care, based on workload (e.g., using the Workload Indicators of Staffing Need methodology). This process will need functional analyses of the clinical work at different levels and account for the financial resources.
2. **Improve the performance of health managers:** This involves new training methods, new health and human resource information systems, performance standards, and assignment of personnel to initial courses on management and hospital administration. In this context, the action plan related to HR management from the Accelerated Institutional Reforms will be implemented.
3. **Improve productivity and motivation:** Better data on staff productivity are needed, which can help evaluate the effect of changes to the attraction and retention of staff in the public health system. In this context, a new strategy for incentives for health workers (*Estratégia de Atraçao e Retençao*) is being finalized, focusing on mid-level staff, especially health technicians and health technical specialists. This will be adopted in the near term.
4. **Improve initial training:** The pre-service training institutions will be strengthened to provide an adequate number and quality of staff needed for the public health system. This will involve implementing the previously approved Training Plan 2011–2015 and then updating this plan at the end of 2015.
5. **Improve continuing/in-service training:** Ongoing career development with high-quality in-service training is urgently needed. To implement this training, the PESS envisages defining and rolling out accreditation standards for health workers and coordination of all program-specific in-service training. Coordination will improve the use of standardized methodologies and special software (SiFo).

B. Cost Analysis

As discussed in Chapter 2, all salary and benefits costs for the personnel employed by MISAU have been calculated and presented in this chapter.

Data and methodology for the cost analysis

Current and projected staff strength: There are more than 200 specific sub-types of health personnel in Mozambique, based on cadre, specialization, and seniority. The current number of personnel in some of these sub-types is very small. At the beginning of the costing exercise for the PESS, these 200-plus types were aggregated into 48 major types of health service providers and 18 types of managerial, administrative, and support staff. This was done to ease the calculation of total salary and benefits costs, apply annual increments and year-to-year changes to total numbers based on high-level policies, and enable an HR health gap analysis against the numbers of health workers needed.

For these 66 major types of health personnel, the technical team worked with the DRH to establish a baseline number of staff in 2011 and 2012, and then analyze the MISAU recruitment plan over time, given new graduates, absorption into MISAU, and the recruitment of graduates from previous years.

The salary and benefits for each type of health worker were generated in 2012 U.S. dollars. If required, these were computed as a weighted average of the current pay scale of all included sub-types. The increment to salary was based on the average increases over the last three years (2010–2013), which was 8 percent per year for most health worker types. In 2013, a higher increment for doctors was approved (15 percent) up to 2015. The annual increment for benefits varied across types, and ranged from 1 to 8 percent

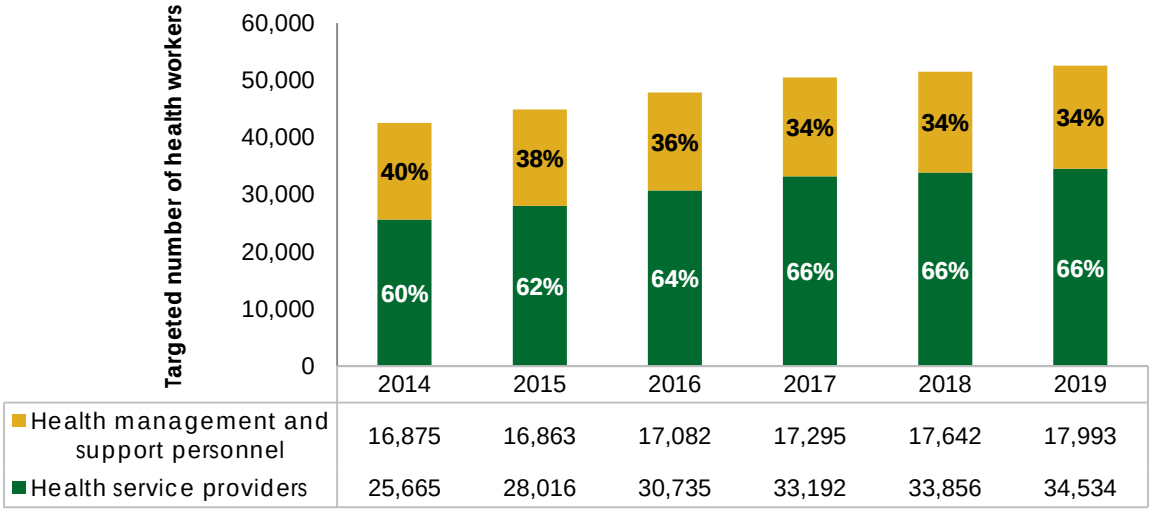
per year, again as an average of previous years. These values for increments to salary and benefits were set in consultation with DRH or were directly supplied by DRH. They were not incorporated, as they were yet to be implemented when these results were computed. The team also accounted separately for the cost of recruitment of certain foreign clinical staff.

Pre-service enrollment and graduation: The DRH provided the targeted intake of new enrollees into technical training institutions, by year, for the period 2013–2017. Using these values, and given the level of 2012 enrollment and the length of the program (years), the technical team calculated the number of graduates enrolled in any given year in the future, by cadre. This set of values was sufficient to calculate the costs of pre-service training per year. Costs of pre-service training were based on the number of years of training and an average cost per enrolled student per year in U.S. dollars. Though it is not used in the analysis, for discussion purposes, the technical team also calculated the projected annual number of new graduates. Note that the increases in staff strength at MISAU, discussed next, were not based on this analysis of enrollment and graduation. These were targets set by DRH, which incorporated both recruitment and attrition of staff.

Scale-up in MISAU personnel strength

Targets for 2014–2017 were defined by the DRH based on the 66 major cadres. The years 2018 and 2019 were added to the PESS at a late stage. Staffing targets for these years were not available at the time of finalizing this cost analysis. Therefore, the staffing numbers for these years were extrapolated from the 2017 targets, increasing staff strength at a rate approximating population growth (2 percent). This keeps constant the overall ratios of health workers to population. This assumption can be defended if the rapid scale-up in health worker numbers seen over the initial period of the PESS cannot be indefinitely sustained; also, growth in staffing is front-loaded (i.e., increased staffing is achieved earlier in the strategy to enable the delivery of scaled-up health programs).

Figure 44. Public Sector Health Workers, by General Category, 2014–2019



Source: DRH (2014–2017). Values for 2018–2019 are estimated.

Based on DRH targets for 2014–2017, the average annual staffing growth rate will be nearly 6 percent. The health workforce can be split between those involved in direct health service delivery (e.g., nurses, doctors, laboratory technicians, pharmacists, and CHWs) and those involved in management and support functions. Given this distinction, the proportion of health service providers will increase relative to health management and support personnel (Figure 44). This implies more workers focused on service delivery (i.e., the service delivery system carries a smaller overhead). This is one of the factors affecting the

efficiency of public sector service delivery that should be tracked. As shown in Figure 44, in 2014, 60 percent of total staff will be service providers, scaling up to 66 percent in 2017. The majority of this growth will occur within the category of general health technicians.

Pre-service targets: Based on analysis using the methodology discussed above, the total numbers of students enrolled in training to become health service providers, administrators, or support staff are projected to peak in 2014, with 10,953 students enrolled. The number of students graduating from training institutes is expected to peak in the same year, at 4,424.

Cost results

The DRH contributes one-quarter of the public health sector's costs under the PESS and is the largest health system component (Table 9). The costs of DRH will scale up faster than any other health system component, or DNAM and DNSP. Salaries and benefits for clinical, administrative, and support staff comprise 91 percent of DRH costs under the PESS. The remaining costs derive from pre-service training, management of national training institutes for health workers, the human resources information system, compensation for foreign doctors, lunch subsidies, and other program management activities to support human resources for health.

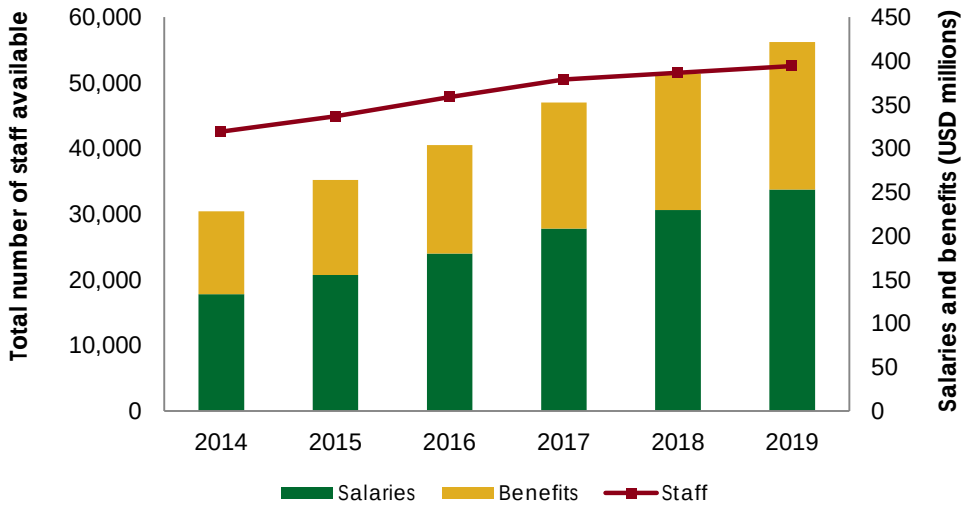
Table 9. Total Costs of the DRH, 2014–2019, USD Millions

Cost Type	2014	2015	2016	2017	2018	2019	Total
Salaries and benefits	228	264	304	352	385	421	**1,955**
Pre-service training	11	10	8	9	9	9	**56**
Program management	20	20	19	19	19	19	**116**
Total DRH costs	**259**	**294**	**331**	**380**	**413**	**449**	**2,127**

Source: Authors' analysis with DRH data.

The total cost of salaries and benefits for MISAU health workers will increase by 85 percent over 2014–2019. This is due to the expected 8 percent annual salary increase across all cadres, as well as the 1−8 percent annual benefit increases. Hence, even if the number of staff was stable over 2018–2019, the total cost of salaries and benefits would still increase by 10 percent per year over these two years. By 2019, staff compensation costs will total $421 million—60 percent due to salaries. Figure 45 shows this relationship over time, superimposing the projected staff strength over the period on the total wage bill.

Figure 45. Total Salaries and Benefits, and Staff Available, 2014–2019



Source: DRH (2014–2017) and authors' calculations.

Key issues in the cost analysis

Quality of data: Data quality for the estimates used in the cost analysis was moderate. The targets for staff strength by cadre were provided by DRH for the period 2013–2017 and were kept constant for 2018–2019 except for factoring in population growth. The targets can be refined in the future by utilizing estimated changes to personnel numbers driven by cadre-specific absorption rates of new graduates into MISAU, as well as attrition due to various factors. Specific estimates of past annual absorption or attrition rates by cadre were not available for recent years. Increments to salary and benefits were based on the experience of recent years and are subject to uncertainty in the future.

Areas for further analysis: Based on this analysis, by 2017 the number of new graduates emerging from training institutions is projected to drop below 4,000, compared to about 4,400 in 2013. Any reduction in graduation levels suggests a need for an analysis of the possibilities of enrolling and retaining more students in training institutes, especially considering the ambitious scale-up of service delivery in coming years. The future costs of MISAU salaries and benefits should be re-estimated once the Attraction and Retention Strategy (*Estratégia de Atraçao e Retençao*) is finalized and adopted. The policy for increments, especially for mid-level staff, may be different in this strategy compared to the past values used in this report.

C. Human Resources for Health Gap Analysis

The achievement of ambitious service delivery targets requires the availability of adequate health system inputs and support functions. For example, scale-up of labor-intensive interventions will not occur without a scale-up of trained health worker numbers.

The number of health workers needed for the publicly funded health sector can be compared to the numbers available using a quantitative methodology, described below. The intention is to assess whether the service delivery scale-up plan is sustainable from a health system perspective.

Data and methodology for the gap analysis

The methodology used here is based on the calculation of **full-time equivalents** (FTEs), which represents, at the individual level, the equivalent of the total working hours (or minutes) for one full-time

employee for one fixed year, given the norms of the country (e.g., number of working days after subtracting holidays and off-work days). This methodology is commonly used by the WHO [29] as well as researchers to estimate the number of health workers needed, given a knowledge of the volume of work to be performed. The ability to estimate FTEs needed by certain aggregate staff types is built into the OneHealth tool.

The FTE analysis involves a division of two numbers. The data required for the *numerator* estimate are as follows:

- For each intervention, the technical team needs to define the health workers involved, using some basic staff types drawn from across the 48 types of health providers for which *available* staff numbers have been entered (e.g., nurses, midwives, doctors, specialists, clinical technicians, etc.). For each type of staff involved, the total number of minutes per patient per year are needed. This can be calculated based on the number of encounters per year and the average length of each encounter. Given this information, OneHealth will estimate the total minutes per staff type per year per patient.
- From OneHealth, using the calculations described in Chapter 4 (section A) and Chapter 5 (section A), the number of persons reached by interventions per year are known.
- OneHealth will multiply the two values above across interventions, which leads to the total number of minutes of time of that staff type needed in the health sector per year.

The denominator is the total number of minutes available for health service provision (or clinical work), per year by staff type. This is estimated for each type of staff involved in the numerator estimate. The total number of minutes available is based on the number of working days multiplied by the number of working hours at 60 minutes per hour. This is usually reduced by a certain percentage, to account for the proportion of a day spent on administrative and personal tasks. This proportion varies for different workers, given their mix of clinical and administrative duties. For this analysis, the technical team obtained these percentages from the DRH at MISAU.

Dividing the numerator and denominator yields the FTEs of that particular staff type required. This analytical method accounts for the fact that health providers have multiple duties and also take time off; calculating the working days per year can account for these factors. It bases the total need on both the intensity of labor input by intervention as well as the mix of staff types involved in different interventions.

Data: All inputs for the FTE analysis were provided by the DRH. The inputs included the following:

- The total working time per year, in terms of days (210) and length of the work day (8 hours);
- The proportion of time spent on clinical activities relative to administrative and personal tasks, by type of service provider. These parameters are significant. If service providers spend more time on clinical activities, fewer FTEs will be needed to achieve the same output. Conversely, if less time is spent on clinical activities, more FTEs will be needed. Based on the technical team's data, generalists and specialists spend more than 30 percent of their time on non-clinical activities, while SMI nurses, surgical technicians, and curative medical technicians spend less than 30 percent of their time on non-clinical activities; and
- Details of labor inputs (length of encounters in minutes and number of encounters per patient year, by intervention) were originally provided by technical staff from the disease programs. After review, the DRH decided to revise these inputs, as the results were not realistic. Therefore, the approach taken here is to use **actual** labor inputs, rather than an idealized standard of care. Staff from DRH, working with the PESS costing technical team, developed two scenarios with a

revised set of labor inputs. These inputs are based on consultation within the DRH, and between the DRH and disease program managers. The primary difference between the two DRH scenarios is discussed below.

Scenarios for the gap analysis

The number of health workers required is subject to some uncertainty, given the lack of precise data due to the absence of extensive time-motion studies on the time taken to perform tasks related to service delivery. To account for this uncertainty, different scenarios can be used. Each scenario is based on different assumptions about skill mix (types of health workers assigned to certain tasks and interventions, e.g., nurses vs. doctors) and labor intensity in minutes per task. For example, an *ideal* scenario may use the number of minutes per encounter based on the recommended standard of care. A *pragmatic* scenario may use the estimated length of encounters based on the actual length (i.e., a time-motion study or expert opinion).

Two scenarios were analyzed for the PESS and developed in consultation with the DRH.

The PESS-costing technical team entered all of the data for each scenario into the OneHealth tool and in additional analysis sheets created in Microsoft Excel. The team presented the results of the analysis over two rounds to the DRH leadership, which discussed and revised the data inputs based on their implications: were the inputs sufficiently realistic, did they reflect real service delivery in Mozambique given the level at which the interventions are delivered, and other criteria.

After these revisions, both scenarios were finalized. The scenarios cover the same staff types and differ only in specific labor inputs (i.e., the inputs of nurses and certain health technicians). **Scenario 1** assumes a highly efficient work force that achieves high productivity based on the use of clinical equipment and high skill levels. **Scenario 2** assumes higher labor inputs in the length of encounters, especially among the "basic" nurse cadres (e.g., *ESMI básico*) and mid-level staff. The technical team considers that **Scenario 2** reflects actual service delivery conditions more closely.

Gap analysis results

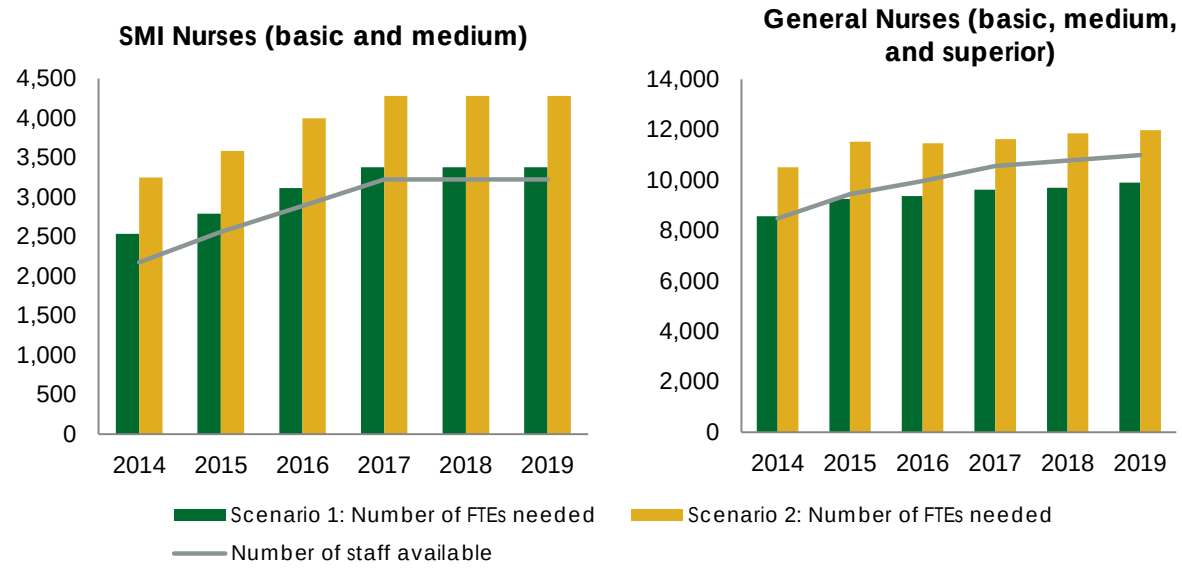
The two scenarios can be interpreted as an upper and lower bound on estimates of human resources needed, with the actuality somewhere in between. For certain health worker types, the two scenarios are equivalent. The results show large gaps—and hence a lack of sustainability—for medical doctors (generalists), specialist doctors, obstetricians, and gynecologists. The lack of trained specialized staff at the secondary and tertiary levels has been stressed in the PESS and in consultations with DNAM program managers. To meet the ambitious service delivery targets in the PESS, the system will require, on average, 1.7 times the number of generalists currently available. For specialists, obstetricians, gynecologists, and *ESMI superior*, the need is two times the numbers available. If the system functions with such a severe gap in specialists, it may be due to some of their duties being taken up by mid-level staff.

The two scenarios differ in their prediction for gaps in the categories of other nurses and mid-level health technicians.

SMI nurses (Enfermeira SMI or ESMI): It is reported that nurses in Mozambique are severely overburdened. Figure 46 (left panel) shows the analysis for the *ESMI básico* and *médio* categories of health workers. By 2017, the needs will be approximately met by their availability under **Scenario 1**. There is a consistent gap under **Scenario 2**. Overall, the results suggest a shortage of SMI nurses, although not as severe as for specialist doctors.

General nurses: Scenario 1 suggests that there will be adequate numbers of general nurses after 2014. In contrast, **Scenario 2** shows a shortage of such nurses in 2014, with demand exceeding supply by 24 percent. The number of general nurses available then increases. Under the same scenario, the gap will decline to 9 percent by 2019. If it is assumed that the actual need lies in between the lower and upper bounds set by **Scenarios 1 and 2**, the results demonstrate an initial deficit of workers in 2014, which will be greatly reduced by 2019—assuming that scale-up of staffing will be as per the plans discussed earlier in this chapter.

Figure 46. *ESMI básico and médio* and General Nurses (*básico*, *médio*, and *superior*)



From other results across these scenarios, the gap analysis suggests that the number of surgical technicians, curative medical technicians, and other health technicians is adequate for the projected needs. For these cadres, it is possible that the data inputs collected so far do not adequately reflect the labor intensity of these staff types; for example, they do not account for whether these staff have taken over extra duties due to task sharing or task shifting from specialists and generalists.

Key issues and areas of future research for the gap analysis

Quality of data: Data quality for the estimates used in the gap analysis was moderate. In the future, time-motion analyses and/or interviews at the facility level may be needed to capture the inputs for this type of analysis. The current analysis has the limitation that it assumes homogenous distribution of staff across facilities wherever the intervention is to be delivered. However, geographical and cultural factors may limit staff availability, which distort the labor inputs (fewer staff at certain facilities may spend less time on an intervention, or more, if task shifting is made impossible). Given that not all of these aspects of human resources for the health system can be factored in, the results here are indicative of general trends in the relationship between health workers needed and available.

Areas for further analysis: Reducing maternal and infant mortality through the PESS is one of the key health priorities. The SMI program, in collaboration with other health programs, plans to achieve these goals through an ambitious scale-up of interventions. However, there will be a lack of adequate numbers of *ESMI básico* and *médio* over 2014–2019 to achieve this scale-up. This is a gap in the sustainability of scale-up that can impact the health status of the country. Further analysis is needed to examine this issue, after accommodating the issues in data quality raised above. The estimated deficit in the availability of

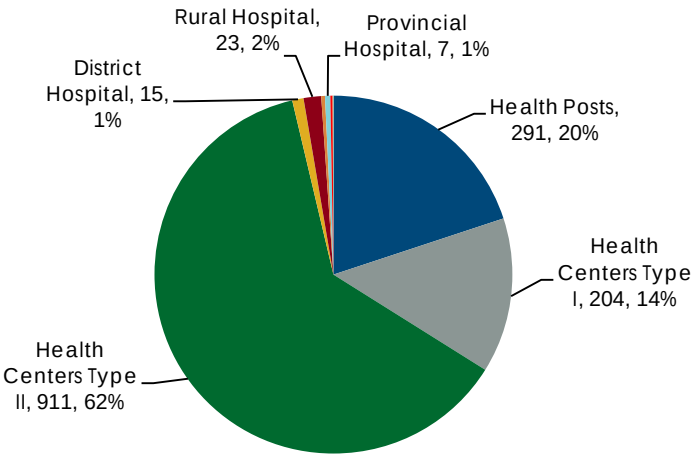
certain types of staff generally highlights the need for better coordination between health system components and health programs in planning for scale-up. This is discussed further in Chapter 12.

Under its strategic plan, DRH may need to consider such analyses as a more routine exercise, updating the perceived gap based on revised projections of staff availability and changes to the labor inputs of interventions. The technical team has not considered all possible responses to the issue of gaps for types of health workers, but these can be taken up by the technical working groups devoted to this issue, especially regarding the proposed strategy for attracting and retaining mid-level staff.

7. HEALTH SYSTEM DEPARTMENTS: INFRASTRUCTURE

As of 2013, there were at least 1,460 health facilities owned and operated by MISAU. More than 75 percent of all facilities were health centers of type I and II, and 20 percent were health posts. Four percent of facilities were hospitals. Figure 47 summarizes the 2013 distribution of facilities.

Figure 47. Distribution of MISAU Health Facilities, 2013*



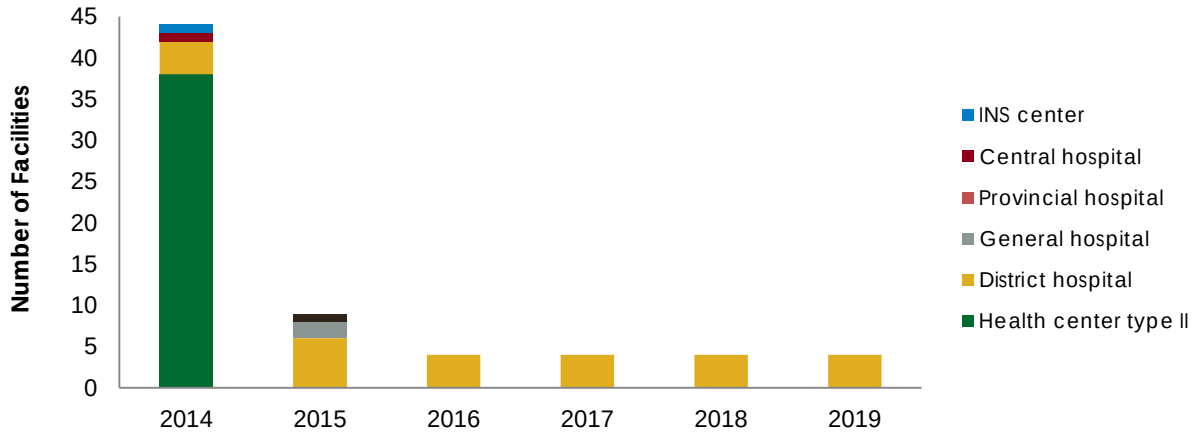
Source: DPC infrastructure department. * Specialized hospitals (1) and central hospitals (3) constitute <1% of facilities.

A comprehensive assessment of the public health infrastructure has not yet been undertaken. The PESS summarizes what currently is known. The northern provinces suffer the most severe lack of health facilities, and it is estimated that, overall, 60 percent of health facilities lack adequate energy and water supplies [11].

A. Targets

Since 2010, MISAU has been increasing the physical infrastructure under successive annual plans. The PESS targets involve construction immediately in 2014 and 2015 (Figure 48). In 2014, 38 health centers (type II), a building for the *Instituto Nacional de Saúde*, and a central hospital will be constructed.

Figure 48. Facility Construction Targets, 2014–2019



Source: DPC.

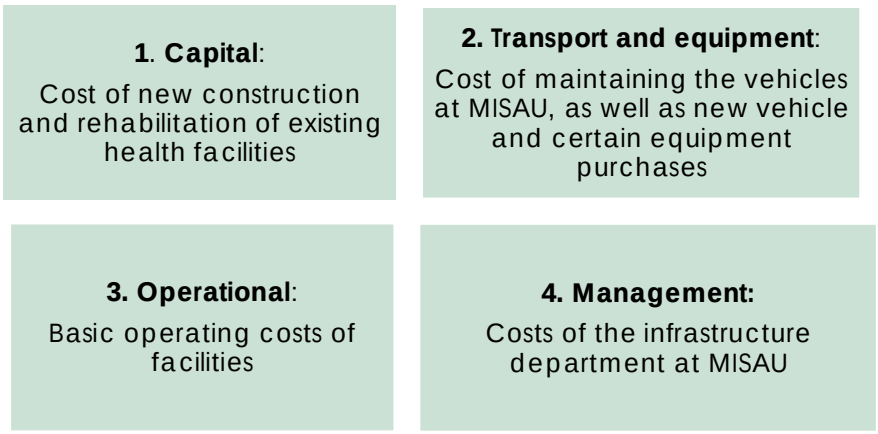
In 2014, MISAU will prepare a new Infrastructure Development Plan. The year 2015 will see the addition of two general hospitals, one provincial hospital, and six district hospitals. After 2015, the pace of new construction will slow, with four district hospitals targeted for construction annually. The rehabilitation program has a similar initial scale-up. Rehabilitation of existing facilities is concentrated in the first year of the PESS. The health system plans to rehabilitate 22 health centers of type II in 2014 and one training center.

B. Methodology for the Cost Analysis

The technical team worked with the infrastructure department of DPC to define the costs to be included under the health infrastructure component. Figure 49 shows the four main types of costs included in the cost analysis. The cost of new construction and rehabilitation excludes that for warehouses and other facilities related to drug and commodity logistics, which are costed under that separate component.

The infrastructure unit provided the cost of maintaining and running some specific types of vehicles operated by MISAU, as well as anticipated future purchase of vehicles and certain health-related equipment. The equipment for purchase by the infrastructure department was identified very specifically—radios for ambulances—since most health programs and the laboratory department purchase equipment separately. Operating costs of health facilities include payments for utilities such as water and electricity, as well as cleaning and security, and certain other routine costs. These operating costs account for non-labor recurring items, such as utilities and overhead, security, and certain non-pharmaceutical commodities, such as fuel used at the facility, cleaning supplies, etc. The infrastructure department also incurs costs for program management at the national level, which were included in this analysis.

Figure 49. Types of Costs Included under the Health Infrastructure Component



Source: OneHealth and the infrastructure department of DPC.

Data: The technical team worked with the infrastructure unit of DPC to gather targets for construction and rehabilitation by type of facility, and to estimate the average operating cost, again by type of facility. The latter was provided in most cases as a percentage of the original construction cost. Based on this estimation process, hospitals have the highest operating costs. Program management costs of the department involve 56 provincial supervision visits annually. The annual cost for supervision is $42,050.

Certain health programs have made provisions to rehabilitate or expand health facilities for the scale-up needs they anticipate. For example, the HIV/AIDS program has estimated a need of $158 million over 2013–2015 for the rehabilitation of pharmacy and laboratory infrastructure at health centers. These disease-specific targets are not necessarily in alignment with the plans of the national infrastructure unit.

The disease-specific infrastructure projects therefore were kept as part of the total costs of those disease programs and not incorporated into the costs of the health system infrastructure component. Since many disease programs had also included the cost of their dedicated vehicles and running costs, the team ensured that no costs were being duplicated in the overall infrastructure program.

C. Costs

Under the PESS, infrastructure costs will add up to $887.1 million over the period and represent the second largest cost driver within the health system components.

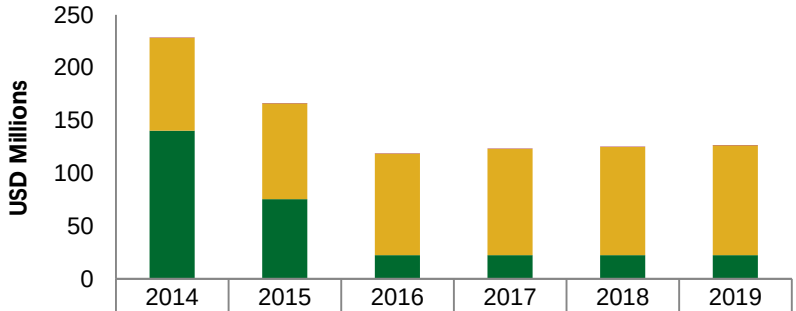
Table 10. Total Health Infrastructure Costs, 2014–2019, USD Millions*

	2014	2015	2016	2017	2018	2019	Total
Health infrastructure	228	166	119	123	125	126	887

Source: OneHealth tool, authors' calculations. Values have been rounded up to integers.

The cost of facility construction and rehabilitation, equipment, and vehicles declines over 2014 to 2016 from 61 percent to 18 percent of total infrastructure costs (Figure 50). This is due to the slowdown in construction and rehabilitation. Over 2016–2019, such costs (capital and equipment) are sustained by the construction of district hospitals as well as annual acquisition of 22 ambulances, 16 pick-ups, seven trucks, and 266 radios. Operational costs increase annually, mostly due to the increase in the number of facilities.

Figure 50. Total Health Infrastructure Costs, 2014–2019, USD Millions



	2014	2015	2016	2017	2018	2019
Program management	0.04	0.04	0.04	0.04	0.04	0.04
Operating costs	88	90	96	101	102	104
Capital and equipment	140	76	22	22	22	22

Sources: DPC and authors' calculations.

Key issues

Given the front-loading of health infrastructure construction and rehabilitation activities, financial and human resources may need to be constrained to enable the actual implementation of these targets in just the two years of 2014 and 2015. Yet achieving these targets may be necessary to meet service delivery scale-up targets elsewhere. The fact that infrastructure projects have also been planned by health programs independently of the infrastructure department of DPC may cause coordination challenges in the future. It is not clear if the financing for these infrastructure projects planned by the programs will come from programmatic budgets or from the overall MISAU infrastructure program budget. Therefore, greater coordination and co-planning may be required. This topic will be touched upon again in Chapter 12.

Further analysis is required as to whether the geographical distribution of health infrastructure by type of facility is adequate, given the variability of population density and health needs across the country. Such a mapping analysis should guide choices in the long term on facility construction and emplacement. Also, standard equipment lists and facility standards should be developed across all types of health facilities.

8. HEALTH SYSTEM DEPARTMENTS: LOGISTICS

A. Background

Situation analysis

Several different units and departments within MISAU are responsible for logistics and procurement, and some of the work is defined based on drugs/commodities vs. medico-surgical equipment. The logistics system is managed by the *Central de Medicamentos e Artigos Médicos* (CMAM), i.e., Central Drugs and Medical Supplies, which plans, imports, stores, and distributes most medicines and medical supplies. Other departments have specific responsibilities, such as the *Centro de Abastecimentos* (CA) (warehousing of medical materials, equipment, furniture, vehicles, printed items, etc.) and the *Departmento Farmacêutico* (Pharmaceutical Department), which regulates drugs and conducts quality assurance inspections.

The multiplicity of institutions involved in the logistics system has led to some lack of coordination. The system is partially decentralized. While the relevant central agencies provide essential products to the provinces, the provincial depots and other actors that distribute items to districts are subordinate to the Provincial Health Departments in administrative and financial terms. A similar structure then repeats itself at the district level before reaching the health facilities. A poor commodity information system and multiple lines of control have meant that institutional capacity to manage the procurement and logistics system is weak. Assessments across the entire health system have not been conducted or released publicly. In the part of the system related to vaccine delivery, the wastage rate in 2011 was assessed at nearly 18 percent, and even more for individual vaccines [17, 30]. Anecdotally, there are reports of complications related to drug stockouts, wastage and leakages, irrational prescriptions, and use of drugs not guided by the National Drug Formulary. Mozambique needs to control the circulation of spurious drugs and the frequent need to make emergency procurements to meet ongoing needs.

An **Essential (or Priority) Medicines List** is urgently needed. This can be used to advocate for greater government funding, planning, and overall management of the system. It is important to note that MISAU currently funds only 75 percent of the health sector's total logistics needs, and only 44 percent for essential drugs and supplies. There is a heavy reliance on external development partners, especially for key vertical programs such as HIV, malaria, TB, reproductive health, and vaccines.

Strategic objectives

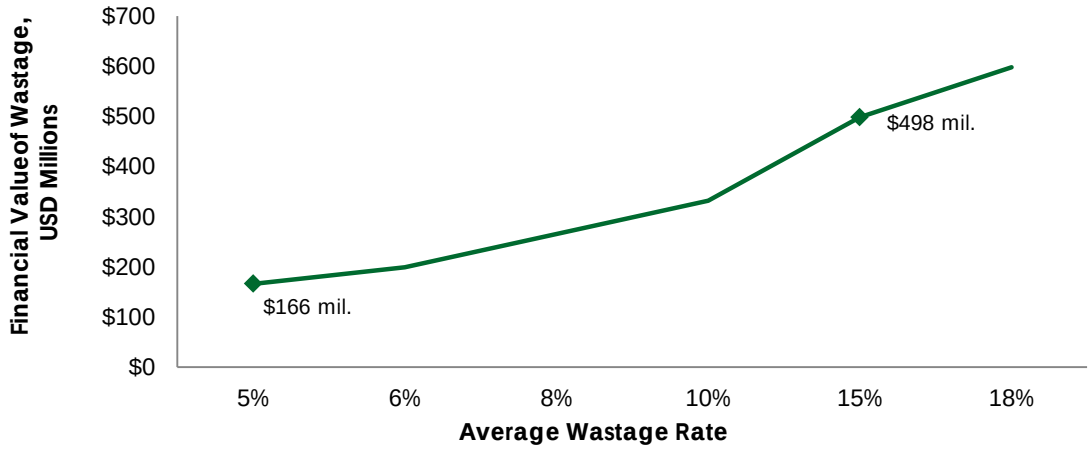
The PESS aligns its proposed strategies with MISAU's Strategic Plan for Pharmaceutical Logistics (*Plano Estratégico de Logística Farmacêutica*, or PELF), which was in the finalization stage as of mid-2013. One of the key reforms is to address the multiplicity of actors. Vertical integration has been proposed to bring the supply chain under a single manager. Other reforms to address the identified problems will be coordinated with all of the actors in the logistics system, mostly through revised policies. Main areas of reform include the pharmaceutical planning and regulatory system, the warehousing and logistics system, and hospital pharmacies. For the former, new training initiatives will be rolled out, which will improve capacity for pharmaco-vigilance, drug registration, and quality assurance. To increase storage capacity, new warehouse construction is planned.

B. Methodology and Results

Wastage rate: Logistics costs make up 8 percent of the public health sector's cost under the PESS. The most significant cost driver is the financial value of wasted drugs and commodities. As discussed with CMAM, it was assumed that **15 percent** of drugs and commodities are wasted due to expiry, damage, etc. and must be replaced at full value. This rate was not changed for commodities, which have

historically experienced even higher wastage rates in Mozambique, such as certain vaccines and TB drugs. Other drugs and commodities, especially a few bulkier items, may experience lower wastage rates, though there are no formal estimates. In the consultations with CMAM and health program managers, there was an expressed desire to lower the wastage rate from 15 percent to 5 percent. This was considered a priority, though there was no consensus on when such a rate could be achieved. Hence, for this cost analysis, the rate of 15 percent was retained, which implies significant costs. A wastage rate of 5 percent would imply savings of $332 million over the period of the PESS, and the total annual costs would decrease by 4 percent in each year. Figure 51 shows the impact of the wastage rate on the overall financial costs of wastage.

Figure 51. Total Financial Cost of Wastage in Drugs and Commodities, 2014–2019, as a Function of Wastage Rate



Source: Authors' analysis.

Over 2014−2016, high costs will be incurred to construct or rehabilitate warehouses for the CA and CMAM. The cost of constructing each warehouse is estimated to be $5.6 million. Other costs include program management and other charges, and recurring costs for logistics. In comparison with other health system support components (e.g., the infrastructure department of DPC), higher annual costs are incurred for CA and CMAM planning and administration functions (Table 11). However, these costs include the payment of more than $2 million in import taxes per year.

Table 11. Total logistics costs, 2014–2019, USD millions

Area	2014	2015	2016	2017	2018	2019	Total
Warehouse	14	11	11	2	2	2	40
Vehicles	3	5	4	5	5	4	26
Drugs and commodity wastage	75	82	85	87	85	85	498
Third-party logistics contracts	1.2	1.2	1.2	1.2	1.2	1.2	7
Administration and planning	8	7	7	7	8	8	50
Total logistics costs	**94**	**97**	**101**	**93**	**91**	**91**	**621**

Key issues and areas of future research for the gap analysis

Quality of data: Despite the importance of this area, the data quality for the estimates used above was poor. Formal drug-specific or commodity-specific wastage rates were not available in Mozambique,

except for a small percentage of items related to the immunization program. Even these parameters have not been updated in recent years. The use of a flat wastage rate across all drugs and commodities may either overstate or understate the true amount of wastage due to all causes (expiry, pilferage, spoilage, irrational prescriptions, etc.). There is no current evidence to judge the direction of bias in the results above, which may represent a best estimate.

Areas for further analysis: The procurement processes, and thus the prices settled by CMAM for drugs and commodities, have an impact across the sector. Hence, the focus here is on CMAM. The challenges of the CA, which has a smaller role, have been identified in the PESS document.

Any reforms to procurement and management processes at CMAM are critically important if these will enable CMAM to function more efficiently and get the lowest possible price for the highest possible quality drugs and commodities. In general, CMAM should engage with health programs earlier in their strategic planning processes, rather than at the end, to ensure that issues related to procurement and cost are included in target setting and resource mobilization. Though the following issues are not reflected in cost estimates, discussions with CMAM and other actors in the logistics and supply chain sector suggested some high-priority areas for future analysis, as follows:

- Identification of methods to reduce the tendering and procurement processes to shorten the lead time before drugs and commodities are delivered to delivery points. The costs of drug procurement processes, including import taxes on essential drugs, and commodity quantification, etc., should be analyzed for avenues leading to reductions;
- Comprehensive assessment of the human resources, management, information technology, and physical infrastructure needs of CMAM, especially given the issues discussed in Chapters 4 and 5, such as an increased cold chain, enabled warehousing, and distribution for new PAV products. This assessment should be cognizant of the overall scale-up in service delivery anticipated or planned under the PESS; and
- Accurate analysis of the wastage rate by drug/commodity type and by cause. Stakeholders are aware of a variety of major causes, such as the irrational use of medicines, high expiry rates, pilferage, lack of updates to the National Formulary, lack of staff training on new products, and lack of therapeutic guidelines for many interventions. However, there are no studies that would allow the analysis to go deeper and disaggregate by different types of commodities. This is a need to reduce wastage rates across the sector, including assessment by each health program of elements that cause wastage.

9. HEALTH SYSTEM DEPARTMENTS: GOVERNANCE, LEADERSHIP, AND HEALTH INFORMATION SYSTEMS (HIS)

A. Background

Situation analysis: governance and leadership

In 2002, the GRM launched public sector reforms to improve social service delivery, including such initiatives as decentralization. These impacted the health system as well, through changes to the organization of MISAU, though the ministry remains highly centralized and manages many services across the country directly. Since MISAU combines the roles of procurer, supplier, and inspector of health services, an accumulation of functions occurs, and hence a potential loss of accountability. In this context, the Inspectorate General of Health (IGS) has weak institutional capacity, insufficient staff, and is constrained by a legal framework that does not enable an active role for it. The PESS notes other problems in planning (strategic and operational) and budgeting. More information from a detailed functional analysis is urgently needed, which may help define other shortcomings in the public financial management, planning, regulatory, and monitoring functions of the central ministry.

The gender strategy approved in 2009 is meant to implement gender issue mainstreaming in planning, budgeting, human resources, and the measurement and improvement of the quality of health services. This strategy involved gender focal points at various levels of the health sector and related training and awareness-raising activities. Despite this strategy, real inclusion of gender issues in decision making still seems to be lagging, as per the assessment in the PESS.

Coordination across the health sector is weak, especially in crucial initiatives such as disaster mitigation, and in such new areas as climate change and health. Participation of civil society and the private sector in decision making is still limited—most policies are developed in non-transparent ways that remain centralized at the Maputo level.

MISAU also has a responsibility to set the agenda for research and generation of scientific evidence for public health. This effort has improved, and the *Instituto Nacional de Saúde* (INS) has a good capacity for several forms of operational and basic research. However, it is still limited by a lack of resources and a dependence on external funders.

Situation analysis: HIS

The current system is composed of various parts: routine information reporting (also known as the “basic module”); aggregated hospital service delivery data (SIS-H); and the registration of vital events, mostly from hospital-based births and deaths (SIS-ROH). Of these, the basic module is the most developed, since it receives data from all facilities. The SIS-ROH is available only in urban areas and a small sample of rural hospitals. HIS systems for certain vertical programs are present, but their quality and spread depends on the program. From this description, an apparent fragmentation of HIS and the lack of an overall architecture can be discerned. These are exacerbated by the lack of trained HIS staff, equipment, and prioritization of this health system component.

Beyond the development of the HIS, the process to draw data from the system and use it for decision making is extremely weak. The HIS and its subsystems do not produce comprehensive, timely, or quality data for policymakers. Reforms and improvements to this component are planned; these need to take into account the other areas of change, including decentralization of health service delivery and decision making as well as the cross-cutting area of M&E and research.

Strategic objectives

Governance and leadership: From 2014 on, a new reform agenda will take shape at MISAU, which will address many systemic issues. These reforms are at the core of the actions under the PESS for this component and are aimed at a revised organizational and functional structure attuned to future challenges. While all of the reform strategies for governance and leadership cannot be fully summarized here, some key objectives have been highlighted in Box 20.

Box 20. Key Governance and Leadership Objectives in the PESS

- Strengthened multisectoral communications
- Improved planning processes
- Gender issues effectively integrated in the formulation and implementation of health policies
- Research capacity increased, with evidence used in the formulation and roll-out of policies
- Partnerships strengthened
- Supervision and monitoring capacity at MISAU strengthened, alongside a stronger legal framework
- More transparent decision-making processes and greater accountability

Health information systems: The PESS proposes a set of defined strategies that can help reform the HIS and align it to the health sector's needs. These include policy frameworks, greater coordination, and provision of training for staff at all levels. Other strategies involve new systems and equipment, such as building a consolidated Information System (SISMA), a data warehouse, new reports for different MISAU users, and open publication of consolidated data on a periodic basis. The PESS proposes a culture of use of data—facilitated by the other changes—that links users with data and creates awareness of evidence-based decision making. Currently, the lack of data from lower-level hospitals hampers analysis of performance or refined cost analysis. Therefore, the SIS-H and SIS-ROH will be expanded to more health facilities. This expansion and other new systems will require many new technicians for operating and maintaining the systems. The PESS reforms require the GRM to increase the priority given to HIS and its benefits.

B. Methodology and Results

Costs of governance, leadership, and the health information systems

Data: This overall health system component involved the program management costs of several national-level departments and affiliated research institutes, as well as the health information systems. Each department provided its costs based on a standardized template, covering costs of in-service training, supervision, and any programmatic activities, such as major meetings or reports from consultancies. The affiliated institutes, *Instituto de Medicina Tradicional*, *Instituto Nacional de Saúde*, etc., provided their costs based on their proposed activities for the period 2013–2017. For the years 2018–2019 (the extension years added later), the costs were assumed to be constant from 2017. There was overlap at DPC in some of the functions related to the Health Information Systems department and those of the M&E department.

Direcção de Planificação e Cooperação (DPC): The DPC comprises sub-departments, which together serve to coordinate planning processes and provide essential governance functions related to health information systems and M&E (Table 12). Under the PESS, the directorate will require resources of about $21 million in total across the six years.

One of the key departments within the DPC is the *Departamento de Planificaçao e Economia Sanitaria* (DPES), or Department of Planning and Health Economics. The DPES has the highest cost within DPC. It plays the principal role in planning, with approximately $145,930 spent each year on the annual planning exercise. DPES will also strengthen national planning processes through the Public Expenditure Tracking (PETS) survey, development of equity and resource allocation criteria, the Medium-Term Expenditure Framework (MTEF) analysis, and new National Health Accounts (NHA).

The other departments include the Department of Health Information (*Departamento de Informação para Saúde*, or DIS) and the Projects Department (DP). Ongoing DP activities are focused on results-based management in the public health sector.

The DIS has the main responsibility for HIS. As discussed above, the HIS system is centered on existing software systems, such as the SIS-H, SISMA, SISROH, and other hospital-based systems. The costs of M&E and data collection are not tallied in this department (e.g., printing of registers for facility records). Under the PESS, the DIS will make crucial investments in the capacity building of HIS-related staff at all levels, further development of the SIS-H system described in Chapter 1, development of the information system in the form of manuals and data dictionaries, and certain purchases of equipment and vehicles over and above the normal costs of supervision.

In addition to engaging with international partners, such as development partners and NGOs, the DPC's *Departamento de Cooperação Internacional* plays a pivotal role in supporting multisectoral coordination. A coordination council is planned to be held annually, at a cost of $300,000. The fifth department has functions related to stronger M&E mechanisms. Though this function is supported in some form by health programs in DNAM and DNSP as well as other DPC departments, it is primarily overseen by the *Departamento de Monitoria e Avaliação*. Although little sub-national supervision is implemented (<$15,000 per year), the department budgets $100,000 for joint annual evaluations.

Table 12. Costs of the *Direcção de Planificação e Cooperação*, 2014–2019, USD Millions

	2014	2015	2016	2017	2018	2019
Departamento de Projectos (DP)	0.5	0.5	0.5	0.5	0.5	0.5
Departamento de Cooperação Internacional	0.6	0.6	0.6	0.6	0.6	0.6
Monitoria e Avaliação (MEA)	0.2	0.3	0.3	0.3	0.3	0.3
Departamento de Informação para a Saúde (DIS)	0.5	1.6	1.2	1.2	0.7	0.7
Departamento de Planificaçao e Economia Sanitaria	0.9	1.0	1.0	1.2	1.2	1.2
Total DPC Cost	**2.6**	**4.0**	**3.6**	**3.8**	**3.3**	**3.3**

***Instituto Nacional de Saúde* (INS):** Under the PESS, the INS will carry out research to inform and support the national agenda for health-related operational research and primary analysis. The total costs of INS will be about $35 million over the six years of the PESS (Table 13). They constitute one-third of the overall costs of the combined governance, leadership, and HIS component. The detailed costs are shown below. In addition to implementing national studies such as the 2009 National Survey on Prevalence, Behavioral Risks and Information about HIV and AIDS in Mozambique (INSIDA) in collaboration with other government institutes, the institute supports the National Health Research Program, which costs $1.6 million annually. Other cost drivers include the accreditation of national laboratories and subsidizing employees to pursue graduate degrees. Such investments will have long-term implications for the capacity of health governance at MISAU.

Table 13. Total Cost of *Instituto Nacional de Saúde* (INS), 2014–2019, USD Millions

	2014	2015	2016	2017	2018	2019
Core activities	4.0	5.8	5.0	7.0	3.4	3.4
Training	0.8	1.3	1.3	1.3	1.1	1.1
Total INS Cost	**4.8**	**7.1**	**6.2**	**8.3**	**4.5**	**4.5**

***Departamento Farmacêutico*:** The pharmaceutical department (*Departamento Farmacêutico*) is responsible for coordinating the drug supply and ensuring drug quality, in close partnership with CMAM. Under the PESS, the department will require resources of $10 million (Table 14). The bulk of the departments' resources under the PESS will be invested in establishing a drug regulatory authority through partnering with an autonomous entity. Resources will fund the creation of a national laboratory drug quality control body. Internal supervision and training will be relatively small drivers of total cost.

Table 14. Total Cost of *Departamento Farmacêutico*, 2014–2019, USD Millions

	2014	2015	2016	2017	2018	2019
Core activities	1.08	1.54	1.42	1.54	1.69	1.69
Training	0.01	0.01	0.01	0.01	0.01	0.01
Supervision	0.15	0.17	0.19	0.20	0.24	0.24
Total Pharmaceutical Department costs	**1.24**	**1.72**	**1.61**	**1.75**	**1.93**	**1.93**

Key issues and areas of future research for the gap analysis

Quality of data: Resources required for this combined health system component were primarily based on values provided by the departments and institutes concerned and not estimated by the technical team. For example, any high costs for annual meetings or for annual evaluations were retained as provided.

Areas for further analysis: As a proportion of overall PESS costs (i.e., the overall costs of the public health sector), this component represents a very small proportion (1%). A key issue of concern is that the M&E function within DPC, based in the *Departamento de Monitoria e Avaliação*, is not more widely coordinated with the other directorates and specific health programs. Its budget remains small. The relationship between the HIS unit and the M&E department is not strongly built, though the major issue relates to how both interact with the health programs. Many programs seek their own routine data and conduct independent periodic surveys of epidemiology and behavior. Greater coordination within this overall health system component and the health programs of DNAM and DNSP should be encouraged and is an area for further analysis.

There are certain other challenges and areas for analysis that apply specifically to the HIS unit, as follows:

- The HIS unit collects a large amount of data every year across a defined set of indicators; these indicators should be more routinely connected with strategic budgeting and costing exercises;
- The HIS data should be used to assess ongoing efficiency or efficacy of health service delivery and used for decision making—for example, bed occupancy rates in the hospital sector, the average length of stay, and the bed turnover rate, etc.; and
- Increased capacity in the provinces and districts to effectively collect, analyze, and disseminate the indicators reported via the HIS.

10. FINANCIAL RESOURCES AVAILABLE AND SUSTAINABILITY ANALYSIS

A. Methodology to Estimate the Financial Resources Available

Financial resources available were estimated in a parallel process to the costing of the PESS. The estimate was generated using Microsoft Excel and employing various sources of data on GRM and development partner contributions to the health sector.

Financial resources available for health in Mozambique have been increasing in recent years. The dependence on external resources remains, exacerbated by uncertainties and concerns related to the government's fiscal space. The resources projected from development partners are also uncertain, as fixed financing commitments are seldom known beyond a year from the current time of analysis. Due to these uncertainties, the technical team adopted an approach of **alternative fiscal space scenarios** for health over 2014–2019, using assumptions related to optimistic or conservative views on funding sources. The assumptions form the core of the methodology and are discussed in more detail alongside the scenarios below.

Data sources: The technical team used data on currently available funds from various sources and, based on consultation with development partners and the GRM, projected these funds into the future using different scenarios. Certain data sources included projections of funds for part of the period of the PESS, though no data source projected funds for the entire period. The sources included were as follows:

- **Government of the Republic of Mozambique:** The MTEF was available, covering the period 2014–2016.
- **Development partners providing on-budget support:** Most of these funds refer to the pooled fund known as Prosaúde. Some information on funds entering Prosaúde in 2013 was available from the 2012 Survey of External Funds for the Health Sector (*Inquérito de Fundos Externos do Sector Saúde*, or IFE). Certain vertical programs receive on-budget support. For current grants, projected resources were known based on signed agreement amounts. Some funders are expected to leave Prosaúde (e.g., the European Commission in 2014) and others have a stated intention to set funding levels to pre-2012 values (Canada). If known, these changes were taken into account. There was very little additional information, including from the ODAMOZ database,[7] as many funders have not made long-term projections of their commitments.
- **Development partners providing off-budget support:** Funds in this area relate to the United States government and, to some extent, the UN family of organizations. The technical team used available information on 2012 levels of funding and made projections based on scenarios. Though in some ways the grants from the Global Fund are "on budget," they are managed very differently from Prosaúde. Therefore, these were also included under vertical programs as off-budget support. The Global Fund grants with a civil society principal recipient can be considered as funds applied in the service of the public health sector's objectives and targets. These grants (e.g., the HIV grant managed by the *Fundação para o Desenvolvimento da Comunidade*, or FDC) were included.

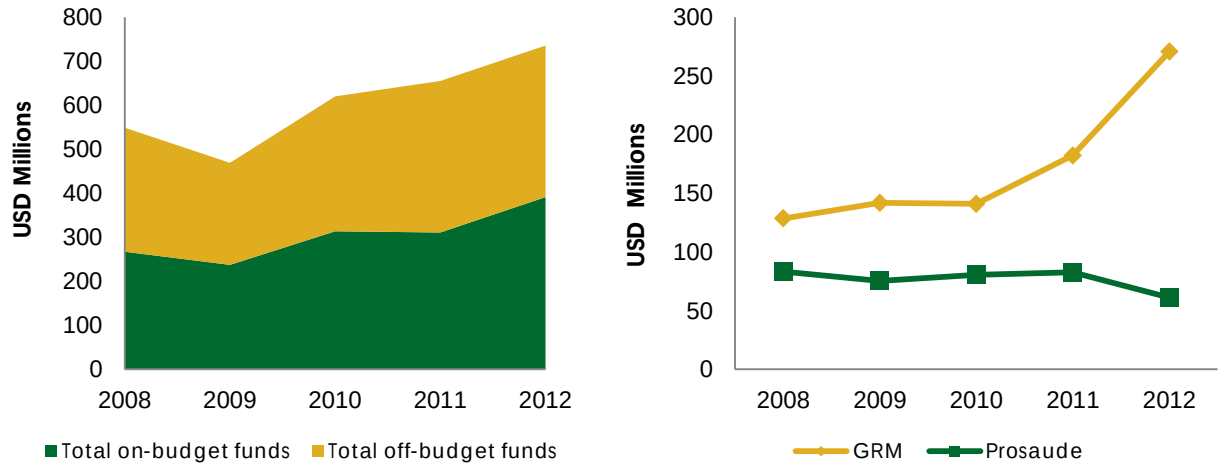
[7] ODAMOZ, "Official Development Assistance to Mozambique," is a database tracking external assistance across sectors. It has a website: www.odamoz.org.mz.

B. Recent Trends

Financial resources available to the Mozambican health sector come from different public and private sources. Of the total institutional health expenditure in 2012, the contribution of the GRM, and the total contribution of development partners—including the Prosaúde pooled fund and the off-budget funds—were 36 percent and 64 percent, respectively [31, 32]. There is limited recent information available on the health spending by households (out-of-pocket) as well as the spending by other private actors. Several forthcoming analyses, such as a study funded by the Department for International Development of the UK government and the MISAU-led National Health Accounts study, are in process. These will help to analyze the state of health financing in the country.

Figure 52 shows the trend in financing over the past five years. The public health sector has experienced an important increase in the overall resources available, from $462 million to $735 million between 2007 and 2012. The total on-budget funds, which include funds from the GRM, Prosaúde, and any on-budget financing for vertical disease programs, has been relatively stable. Off-budget funds have grown over the most recent years, at an average annual growth rate of 35 percent. The panel on the right demonstrates that GRM funding for the public health sector has risen rapidly. The share of health as a proportion of all government expenditure has declined. The related value of 7.7 percent in 2011 was the lowest in the five years 2007–2011 [33]. Public health expenditure was 2.7 percent of GDP in the same year.

Figure 52. Recent Trends in Financing for the Public Health Sector, 2008–2012



Sources: [31, 32]. GRM estimates in the right panel are estimates for years 2010–2012.

C. Scenarios for Financial Resources Available

As discussed above, there are some important uncertainties and concerns about the future financial resources available to the public health sector. Therefore, the technical team analyzed different financial scenarios for the years 2014–2019, deriving these from recent trends, as above, GRM planning and budgeting documents [31, 32, 34], macroeconomic data, certain indicators of the current economic context in Mozambique, and likely movements in funding from external donors.

There are three financing scenarios, which vary based on different views of the evolution of key funding sources: GRM, Prosaúde, and **on-budget** and **off-budget** vertical disease funds. These scenarios are **conservative**, **optimistic**, and **ambitious**. The results of the scenario analysis are presented next, along with the main assumptions used. In all three scenarios, the baseline external resources in 2012 were

estimated based on data provided by the development partners, as reflected in the IFE. In addition, known facts for Prosaúde related to the expected withdrawal of a few donors are applied.

Global Fund commitments expected for Phase 2 renewals of existing grants and the value of the pilot grant under the New Funding Model were assessed in collaboration with the Global Fund unit of MISAU and other partners. Commitments for approved and unapproved grants, after the subtraction of 10 percent for efficiency adjustments required by the Global Fund, totaled approximately $285 million over 2013–2016. Information on Global Fund resources after 2016 was not available, so assumptions were made. If the resources over 2013–2016 are disbursed equally across time, this implies $71.2 million per year.

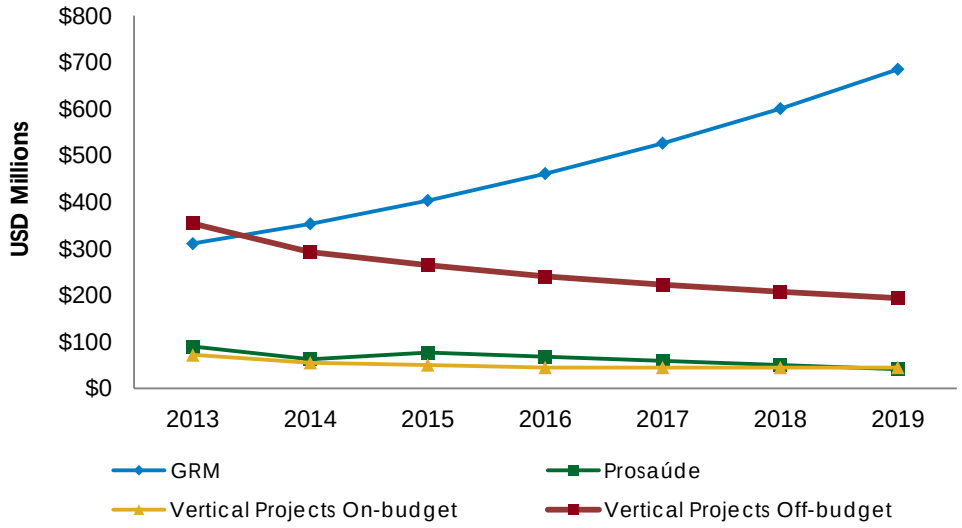
Conservative Scenario

Scenario assumptions: GRM expenditures on health are based on the projections of figures in the MTEF 2014–2016. From 2016–2019, the funds increase based on historical growth rates from the last three years. For those partners with no disbursements in the last years, it was assumed that they will leave Prosaúde. Regarding the vertical disease programs, on- and off-budget values are estimated based on funds disbursed in recent years. For on-budget funding, it was assumed that development partners with regular disbursements in the last two years (i.e., DANIDA, DFID, Flanders, Ireland, Sweden, UNFPA, UNICEF, etc.) will maintain their funding levels. The technical team considered the fact that the U.S. government has diminished its assistance by 12 percent on average per year since 2010, and assumed this trend will continue for the period of 2014–2019, beginning from the value in 2013.

Global Fund: Under the conservative scenario, it was assumed that only 80 percent of the initially committed value would be disbursed, which implies $57 million per year for 2014–2016. This level of funding was assumed to continue for 2017–2019.

The results of this scenario show an increase in overall available funds for the health sector, from $763 million in 2014 to $964 million in 2019, a modest annual average increase of 5 percent per year based on the estimated values. The main driver of the trend is the increase in GRM health expenditure, which is expected to more than double in value in this scenario, based on MTEF projections. Also, GRM expenditure on health will represent 67 percent of overall resources in 2019. All the other sources are expected to decrease, especially Prosaúde. Figure 53 shows these results.

Figure 53. Financing for the Public Health Sector, C*onservative* Scenario, 2014–2019



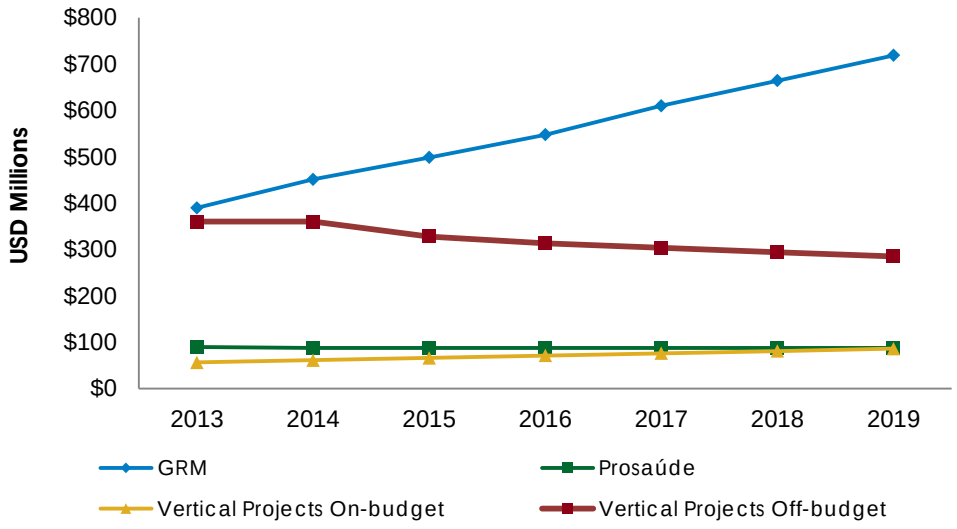
Source: DPC.

Optimistic Scenario

Scenario assumptions: This scenario takes into consideration the latest macroeconomic indicators from the International Monetary Fund (IMF). Based on these data, the Mozambican economy is expected to grow at an average rate of 7.6 percent over the period 2014–2019. This is based on new foreign direct investments, which will induce an expansion of the revenue base for the government and hence increase the fiscal space for health. Again, based on IMF projections, it was estimated that government health expenditure will increase at the same rate as real GDP growth, beginning from the baseline year of 2012. For Prosaúde, no change was assumed from 2012 levels except for the few donors who will exit the fund by 2014. For the vertical disease programs, it was assumed that the total of on- and off-budget funding will decline only slightly, though there will be an increase for on-budget funds (assuming the average annual growth rate of the last six years). The technical team also assumed that the negative trend in U.S. Government assistance would be reversed, and this funding would decline at a slower pace, at an average annual rate of 5 percent. Figure 54 shows the results.

Global Fund: Under the optimistic scenario, it was assumed that the committed value would be disbursed, which implies $71.2 million per year, 2014–2016. This level was assumed to continue for 2017–2019.

Figure 54. Financing for the Public Health Sector, O*ptimistic* Scenario, 2014–2019



Source: DPC.

Ambitious Scenario

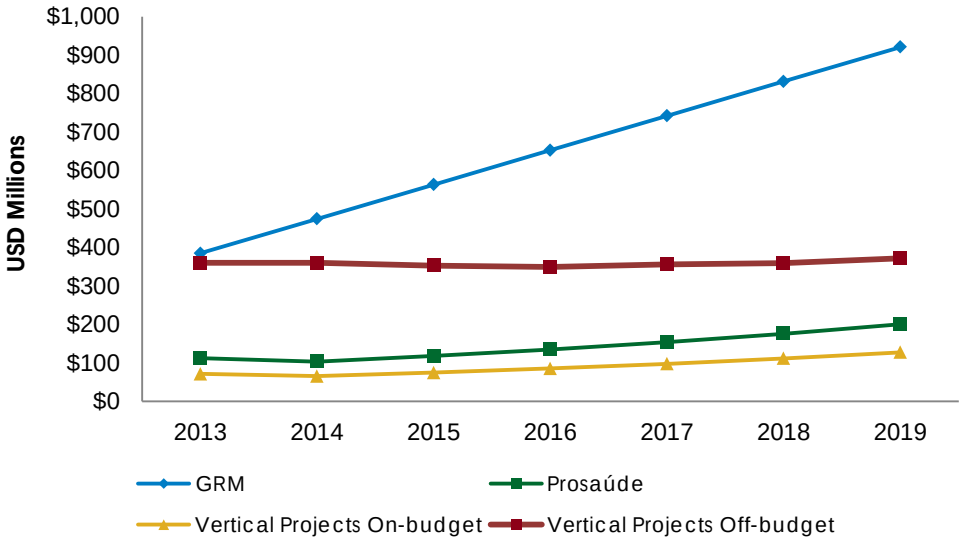
Scenario assumptions: This scenario extrapolates the different financial sources until 2019 based on very optimistic assumptions. First, for internal sources, it was assumed that the GRM will meet the Abuja Declaration commitment and allocate 15 percent of its overall public sector expenditure to health by 2015. This implies a doubling of the current proportion. From 2016–2019, the expenditure will continue to increase, based on the trend of the last three years.

Again, the external sources are projected based on the baseline of 2012, derived from information directly provided by the partners [32]. Instead of a decline, it was assumed that the remaining actors involved in vertical disease programs with on-budget funding, as well as the Prosaúde pooled fund, will maintain or increase their contributions. The Prosaúde contribution will increase sufficiently to keep its share as a proportion of overall public sector health funding at 12 percent, both in 2014 and 2019.

Under this scenario, it was assumed that off-budget funding will not decrease as in both previous scenarios, and in fact will have a modest increase of 3 percent by the end of the period (compared to 2013). Specifically, the scenario assumed the entry of **two new donors** in 2014, two in 2016, and two in 2018, with similar contributions as in the past by donors such as the Netherlands. Figure 55 shows the results.

Global Fund: Under the ambitious scenario, the technical team assumed that disbursements could increase by 5 percent per year over 2014–2016 from currently committed amounts, which implies $71.2–78.5 million per year. This slow increase in disbursed amounts was assumed to continue for 2017–2019.

Figure 55. Financing for the Public Health Sector, A*mbitious* Scenario, 2014–2019

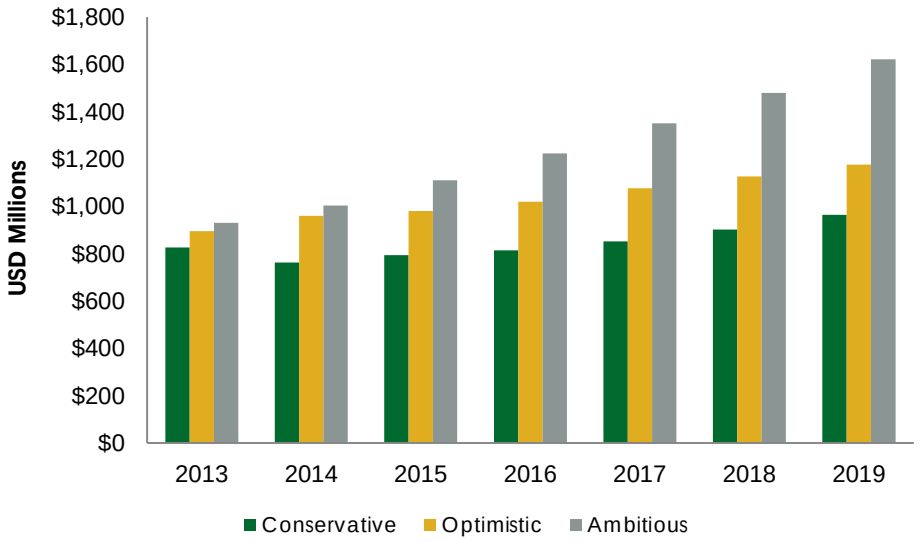


Source: DPC.

D. Summary of Scenarios

The three scenarios are shown together in Figure 56. From the same base in 2013, the scenarios diverge. The difference between the ambitious and the conservative scenarios equals $2.7 billion for the period of the PESS, 2014–2019. In 2019, the difference between these two scenarios is $657 million. Under the optimistic scenario, the total funding available for the period is nearly $6.3 billion.

Figure 56. Financing for the Public Health Sector: Summary of Three Scenarios, 2013–2019



Source: DPC.

It is likely that Mozambique will see actual health funding that differs from all of these scenarios. The technical team believes that these scenarios describe a broad range of possibilities to consider when judging the sustainability of the sector and the likelihood of financing the scale-up envisaged under the PESS.

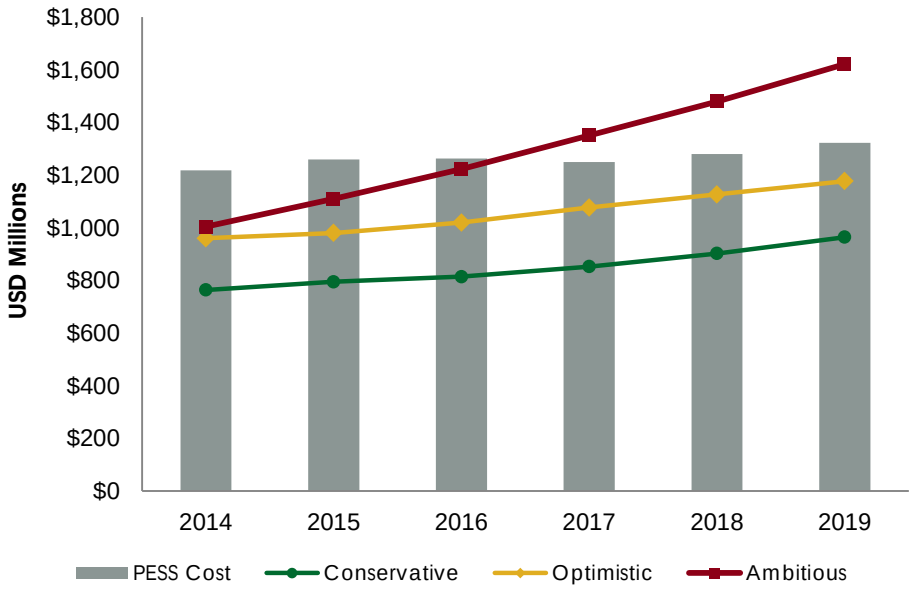
E. Financial Sustainability of the PESS

Resources required vs. available, 2014–2019

Figure 57 compares the three financing scenarios with the total cost of the PESS over 2014–2019. This analysis suggests that the total cost of the PESS will not be fully financed under the **conservative** or **optimistic** funding scenarios. Under the conservative scenario, the annual financing shortfalls are the largest, though they decline from $454 million in 2014 to $358 million by 2019. The analogous decline for the optimistic scenario is $258 to $145 million.

If Mozambique can access the financing described by the **ambitious** scenario, there will be more than sufficient resources to fully finance the PESS after 2015. A more likely future is that financial resources available will fall between the highest and lowest scenarios. If funding is an average of the optimistic and ambitious scenarios, there is the possibility of eliminating the annual shortfall by the end of the PESS.

Figure 57. Cost of the PESS vs. Three Resource Availability Scenarios, 2014–2019



Source: DPC, authors using the OneHealth tool.

Table 15. Financing Shortfalls by Resource Availability Scenarios, 2014–2019, USD Millions

Scenario	2014	2015	2016	2017	2018	2019	Total
Conservative	-454	-465	-449	-397	-378	-358	-2,502
Optimistic	-258	-279	-243	-173	-154	-145	-1,252
Ambitious	-214	-149	-40	*102**	*199**	*299**	*197**

Negative values suggest a shortfall. Source: DPC, authors using the OneHealth tool.
* Surplus.

F. Discussion

Options to increase financial sustainability

Financial sustainability of the PESS is possible only through efforts of all partners regarding cost-efficiency, making data-driven choices, and prioritization in target setting, as discussed throughout this report. Sustainability is possible if the need for resources is rationalized. There is an urgent need to define a critical set of primary and secondary health interventions that will be supported. In addition, given Mozambique's health indicators, an increase in funding may be needed. This would involve unprecedented efforts in resource mobilization, including an overarching national health financing strategy, as is being discussed.

This type of effort is a priority, because the financial gap analysis above demonstrates that even in the **ambitious** scenario for future available financial resources, funds will fall short of fully financing the annual needs of the PESS until 2016, though there is a surplus thereafter. The more likely scenario shows funding shortfalls throughout the period. The **optimistic** scenario suggests that there will be a funding shortfall of 11 percent in 2019. By the end of the period, with increased cost-efficiency, prioritization, and some increase in resources, it will be possible to reduce the annual shortfall. The government and partners should adhere to their funding commitments to achieve the maximum resources for the health sector.

Toward a comprehensive health financing strategy

As of November 2013, a Technical Working Group (TWG) for Financing has been set up under the leadership of DPC, with the participation of various development partners. The objective of this TWG is to prepare a draft health financing strategy that can be discussed in country and then incorporate those comments and prepare an implementation plan. The health financing strategy will identify the guidelines, indicators, targets, and milestones that define an overall, evidence-based policy for financing health in Mozambique.

In its initial discussions, the TWG has defined some key priorities that guide the financing strategy, as follows [35]:

- Identify a diverse and sustainable mechanism for funding health (i.e., the fiscal space);
- Finance universal access to a minimum package of quality health services; and
- Promote operational efficiency in the health sector, including performance-based incentives for service providers.

The need to define a minimum package of services is also a recommendation made in the current report. The TWG identifies the key components of the health financing strategy as mobilizing, aggregating, and allocating resources, and identifying clear mechanisms to pay for health services.

Achieving universal health coverage: The health financing strategy will serve a goal of universal health coverage, though achieving this goal will require more than financial resources. Universal health coverage can be defined as "ensured access to and use of high-quality healthcare services by all citizens and protection for all individuals from any catastrophic financial effects of ill health" [36]. Barriers to access for certain types of services, both financial and non-financial, must be reduced over time. User fees that prevent utilization by the poorest sections of the population should also be removed or reduced substantially.

The development of the health financing strategy and the work of the TWG are at an early stage at the time of writing this report. Over the next year, a series of stakeholder workshops will be held to discuss each of the key areas, beginning from a situation analysis and then focusing on mobilization, aggregation, and allocation of resources. From some of the ideas discussed already, it appears that the sector must consider the possibility of some new taxes that can fund increased needs, such as to finance the PESS. These taxes can be imposed on airline travel, alcohol, tobacco, and fuel. Since mechanisms for risk pooling through the insurance sector may take time to fully develop in Mozambique, the government must act as the mechanism for a longer period of time, using general tax revenue to fund an essential package of better quality health services. Policies to incentivize formal-sector employers to offer contributions for voluntary health insurance and the encouragement of a health insurance market to serve such contributors would help to reduce the burden on the public health system of having to offer certain types of healthcare to certain socioeconomic classes of the population.

A set of next steps and formative research areas have been identified by the TWG, which will be undertaken over the next year, with responsibilities spread among all of the stakeholders. The research areas include analyzing the overall fiscal space for health, especially the possibility for increased government contributions, as in the financial scenarios in this chapter. In addition, resource tracking and feasibility studies for various types of risk pooling (including health insurance) will be carried out. As per the current timeline, a final health financing strategy is expected in 2014.

From the perspectives of the cost analyses in this report and the financing scenarios included in this chapter, the technical team next identified several additional needs for analysis.

Key issues from this chapter and areas for future analysis

Quality of data: Data on funding commitments are difficult to acquire and present significant uncertainty. It is unclear if the overheads of donor agencies in Mozambique and the overheads and headquarters costs of their implementers should be subtracted before the funds are compared to the financial resources needed for the PESS. Such subtractions may make the analysis more realistic. Overall, the financial sustainability analysis in this report should be repeated as more information becomes available on the funding commitments of the Global Fund and other development partners.

Other areas for further analysis: The scenarios in this chapter concentrated on the funding side of the sustainability analysis. Financial sustainability may also be increased by reducing resource needs. Since Mozambique needs to improve the health status of its population significantly, and the PESS has set necessarily ambitious goals, it is not easy to reduce targets. Yet it is possible to use the increased resources more efficiently and effectively. More cost-effective interventions should be identified. Throughout this report, the technical team has suggested areas for further analysis, when this identification can be done for many health programs. Specifically, modeling and cost-effectiveness studies are needed to identify these interventions and align the mix of interventions by level of care more closely with evidence and the burden of disease. More comprehensive unit cost studies are also needed, such that budgeting and strategic costing analyses can request resources based on actual needs.

The process of prioritization that was used during the costing of the PESS needs to be repeated in greater depth to eliminate other inefficiencies, potential duplications, and irrational uses of resources, especially in drugs and commodities. If health programs and health system components coordinate in planning and budgeting, as suggested in Chapter 12, and different disease programs rigorously attempt to identify synergies and harmonization, it is possible that service delivery costs may be reduced substantially. Partners in Mozambique should commission focused analyses to identify the potential for these synergies and related savings.

11. IMPACT OF THE PESS ON KEY HEALTH INDICATORS

In a report from 2010, the GRM reviewed the likelihood of achieving the MDGs by 2015 [37]. Several of the goals relate to health: nutrition, child and maternal mortality, reproductive health services, and HIV/AIDS. The report stated that the health sector environment was strongly supportive of achieving child health goals and "reasonable" for maternal and reproductive health goals. The most recent DHS suggests that Mozambique may have achieved MDG 4 (reduced child mortality) below the target (Table 16). Targets for 2015 are shown in the shaded column. Overall, the achievement of goals related to maternal mortality is lagging and, in fact, achievement is stagnant.

Table 16. Trends in Key MDG 4 and 5 Indicators, and Targets for 2015

	1997[1]	2003[2]	2007[3]	2008[4]	2011[5]	2015
Goal 4: Reduce Child Mortality						
Under-five mortality rate per 1,000 live births	201	153	147.2	138	**97**	108
Infant mortality rate per 1,000 live births	135	101	95.5	93	**64**	67
Goal 5: Improve Maternal Health						
Maternal mortality rate per 100,000 live births	690	408	500	-	408	250
CPR, any modern method, all women in union	5.1	20.8	-	-	11.3	34
Proportion of births attended by skilled health personnel (%)	44.2	49.1	-	55.3	56.1	66
Antenatal care: at least one visit (% of mothers)	64	84.3	-	92.4	90	95

All mortality rates are for five years previous from the MICS or DHS. ANC visits are for births in the three years prior to the survey.
Sources: [1][38] [2][6] [3][12] [4][37] [5][7].

In this chapter, modeling techniques are used to estimate the likely impact of the scale-up in various maternal, child health, and HIV/AIDS interventions. The scale-up under the PESS is both quantitatively and qualitatively different from previous years, and innovations are being tried in service delivery that have the potential to have a significant impact (e.g., misoprostol to treat postpartum hemorrhage, using cheap urine test strips to identify pre-eclampsia/eclampsia, etc.). In addition, the creation of new facility infrastructure under the PESS should mean greater access for mothers to BEmOC and CEmOC.

A. Impact on Maternal Health and Mortality

Access to contraception, reproductive health, and antenatal services

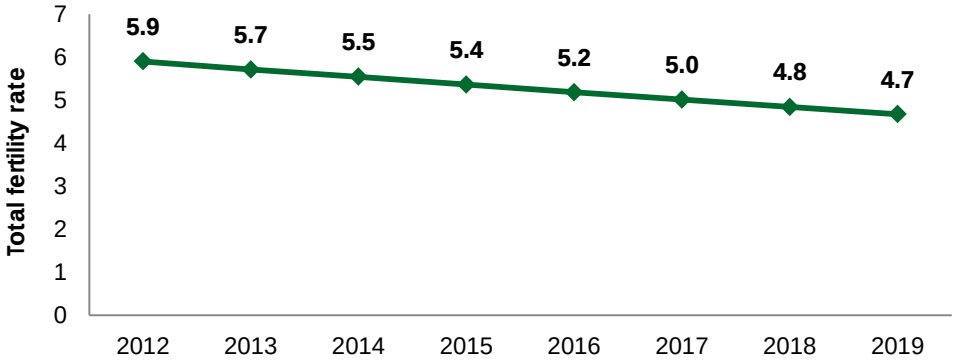
As discussed in Chapter 5, the SMI program plans a scale-up of access to voluntary family planning, such that unmet need is reduced and the CPR increases. The current plan is to reach the MDG target for CPR from Table 13 by 2020. For estimating costs and results, a linear escalation from the estimated 2013 value was assumed (Box 21). The effect of this ambitious scale-up of contraception on the TFR can be significant. The technical team projects a TFR for women ages 15–49 of 4.7 by 2019 (Figure 58). This value represents a decline compared to 2011. This reverses a trend in which TFR increased from an estimate of 5.5 in 2003 to 5.9 in 2011 [6, 7]. The crude birth rate (births per 1,000 persons) would decline from 44.2 in 2012 to 34.7 by 2019.

Box 21. Targeted CPR, All Women in Union, Any Modern Method

2013: 14.1%
2014: 17.0%
2015: 19.8%
2016: 22.7%
2017: 25.5%
2018: 28.3%
2019: 31.2%
2020: 34.0%

In 2011, only 50 percent of pregnant women completed the recommended four or more antenatal visits. The SMI program aims to increase this from a base of 60 percent in 2014 to 80 percent by the end of the PESS period. At ANC, based on the need, interventions will be scaled up by the DNSP nutrition program to address malnourishment with nutritional supplements and micronutrients (ferrous sulphate, folic acid, and vitamin A).

Figure 58. Predicted Total Fertility Rate (TFR), by Year, 2012–2019



Source: Authors, using DemProj and FamPlan.

Access to labor and delivery, obstetric services

In 2011, as per the DHS, 55 percent of births occurred at a health facility, up from 49 percent in 2003 [6, 7]. The MICS estimated that the institutional delivery rate was closer to 58 percent in 2008 [12]. Under the PESS, the DNSP SMI program estimates that it can achieve an institutional delivery rate of 66 percent by 2014, with efforts to raise it to 75 percent by 2019. In addition, a program to provide TBAs with kits to conduct assisted deliveries at home will be scaled up to reach 5–6 percent of all births. Given these initiatives, there will also be a rise in the proportion of women receiving basic labor and delivery-related care, as well as BEmOC (Box 22) and CEmOC, according to their needs. Based on analysis of the DHS 2011 data, 39 percent of all births in public health facilities occurred in government hospitals; the rest occurred in health centers, with a small percentage at health posts [7]. Births at the hospital level were dominated by births at lower-level hospitals (rural). The proportion of women delivering at hospitals is expected to have increased up to the present, based on aggregate statistics, with the increase driven by births at lower-level hospitals, especially in rural areas.

Box 22. Expected Services for BEmOC

Assessment and stimulation

- Shock management
- Pain relief
- Injected antibiotics
- IV fluids

Essential care

Clean birth practices

- Instrumental delivery

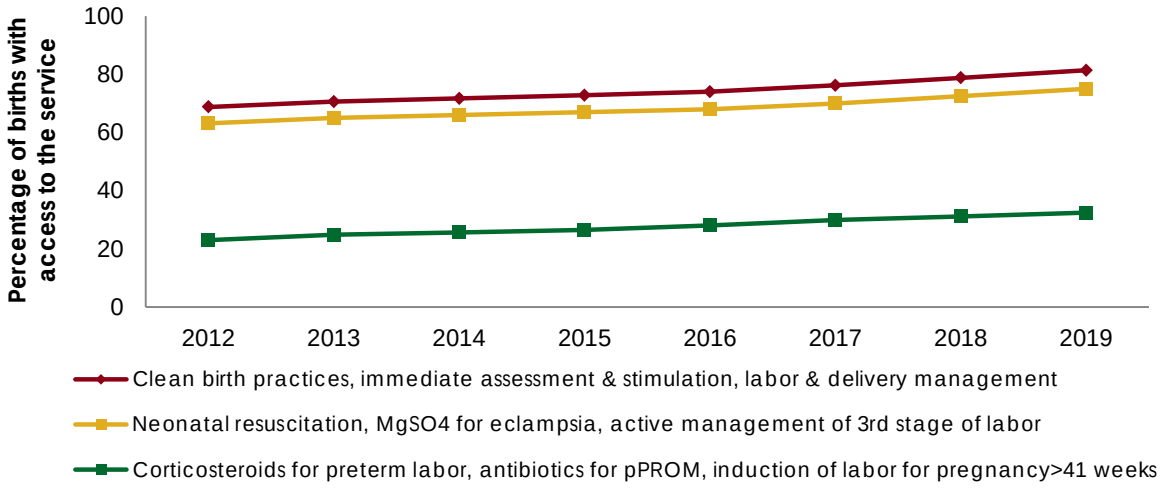
Box 23. Expected Services for CEmOC

- All BEmOC services
- Caesarian section
- Corticosteroids for preterm labor
- Mag. sulphate for eclampsia (MgSO4)
- Active management of 3rd stage of labor
- Induction of labor for pregnancy >41 weeks

As per the 2008 Needs Availability Assessment, only 11 percent of CEmOC needs were satisfied, and 17 percent of births occurred in a facility equipped to offer CEmOC services [10, 37]. In other words, the proportion of women with access to CEmOC if they needed it for pregnancy and labor-related complications was only 17 percent. A dramatic improvement planned for the period of the PESS is to equip health centers to provide some of the interventions from the CEmOC list, especially treatment for hypertensive disease of pregnancy—pre-eclampsia and eclampsia—and prevent postpartum hemorrhage with active management of the third stage of labor and oxytocin. Resource

needs were estimated in Chapter 4. In addition, under the DNAM program, more lower-level hospitals will be equipped to provide all CEmOC services (Box 23), at a cost of $4.3 million over the PESS period. Estimating overall coverage of interventions is still difficult. Under the PESS, the technical team estimated the level of access by the individual interventions associated with BEmOC and CEmOC, rather than either as an entire category. Results of the coverage analysis are shown in Figure 59. Access to interventions improves over time with more institutionalized births, generally holding constant the split of births between the primary health and secondary health levels.

Figure 59. Estimated Access to Key Obstetric Services, by Year, 2012–2019



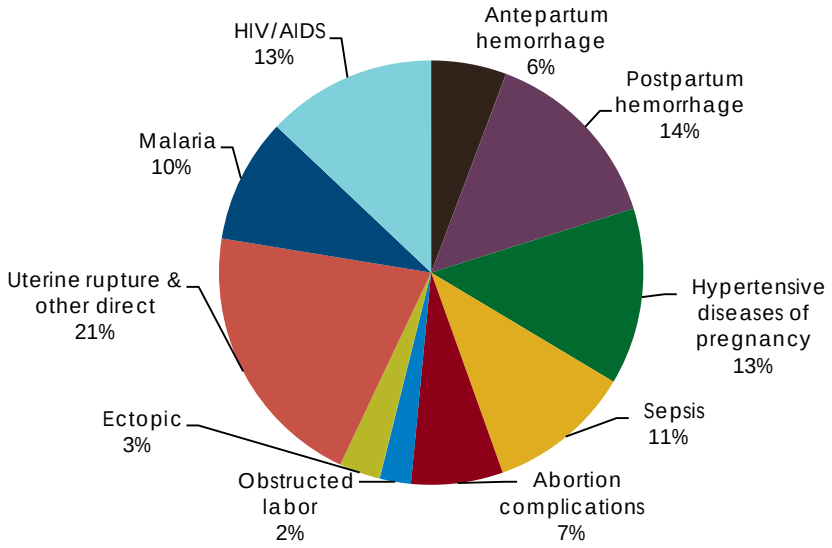
Source: Estimated based on coverage of key interventions and institutionalized delivery.

The increase in access to critical interventions, such as magnesium sulphate for eclampsia, is dependent on other interventions not shown in Figure 59, such as the SMI (DNSP) and DNAM programs' increasing use of inexpensive urine test strips to detect pre-eclampsia/eclampsia.

Estimated impact on maternal mortality

The technical team utilized LiST, an internationally accepted modeling tool that has been used in peer-reviewed journal articles, to analyze the impact of interventions on maternal and child mortality [39–41]. Annex C provides an overview of the model. The effects of interventions on maternal mortality are based on an updated literature review [42]. For this current use, the model was calibrated with Mozambique-specific epidemiological data and causes of maternal death, as shown in Figure 60. The underlying demographic trends are consistent with the rest of the OneHealth tool. The LiST model was linked to the PESS targets incorporated in the OneHealth tool, such as those shown above for access to labor and delivery; BEmOC and CEmOC services; and HIV/AIDS treatment, malaria treatment, nutrition, and the use of contraception to prevent unwanted pregnancies.

Figure 60. Direct and Indirect Causes of Maternal Mortality in Mozambique, 2009

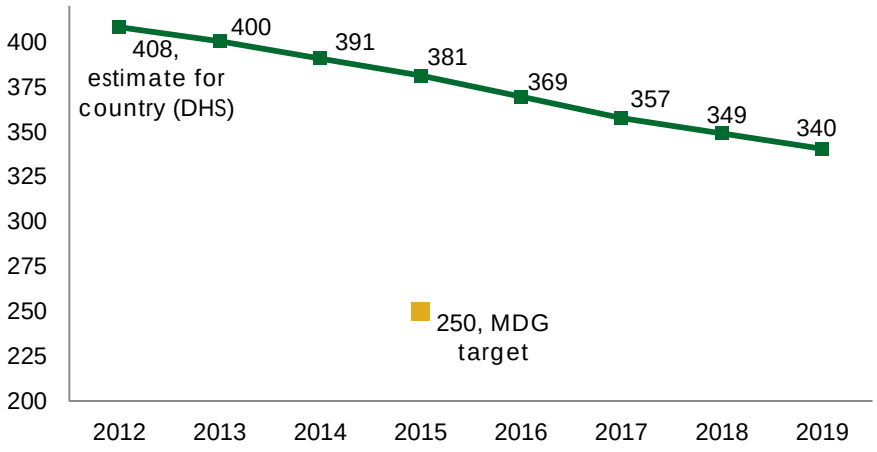


Source: [10].

Among the principal proximate (direct) causes of maternal death are uterine rupture (29 percent), obstetric hemorrhage (24 percent), puerperal sepsis (17 percent), and lack of post-abortion care. Among all indirect causes, the proportional split is HIV/AIDS (54 percent) and malaria (40 percent). Anemia is also an indirect cause of maternal complications.

Based on the modeled results, Mozambique will reduce maternal mortality and reverse the stagnation seen in the indicator over the previous decade (Figure 61). The reduction equals 17 percent over the seven years from 2012 to 2019. The estimated annual number of maternal deaths was 3,360 in 2013, reduced to approximately 2,700 by 2019. These results suggest that current efforts will be insufficient to meet the MDG target, even with a delay. Access to critical interventions should be scaled up even further, especially CEmOC and BEmOC.

Figure 61. Estimated Maternal Mortality Rate per 100,000 Live Births



Sources: [7] and estimates by authors using LiST.

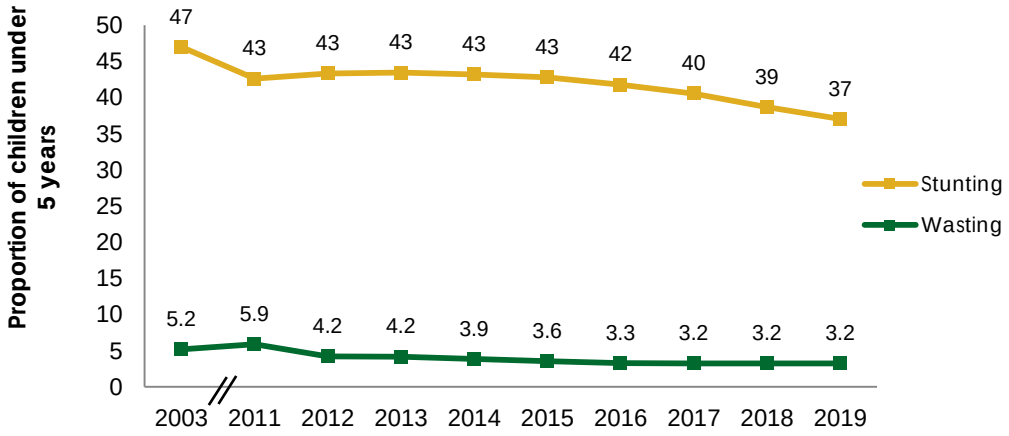
B. Impact on Child Health and Mortality

Early childhood nutrition

There has been improvement in the proportions of children under five who are stunted and underweight for their age, based on data from the two recent DHS. For wasting—acute malnutrition (weight for height below two standard deviations of the median by age)—the evidence is mixed. The MICS 2008 suggested that the proportion of wasting had declined compared to the 2003 DHS, to 4.2 percent [12]. The proportion of infants exclusively breastfed in the first six months of life has also increased over the last two DHS, from 30 percent to 43 percent [6, 7]. Population-based surveys are subject to biases [43]. The conclusions here should not be taken as final.

The LiST model was used to calculate the changes in stunting and wasting proportions over time, given scale-up of interventions for maternal health and increased likelihood of exclusive and partial breastfeeding. Figure 62 shows the results.

Figure 62. Projected Trends of Stunting and Wasting among Children under 5 Years



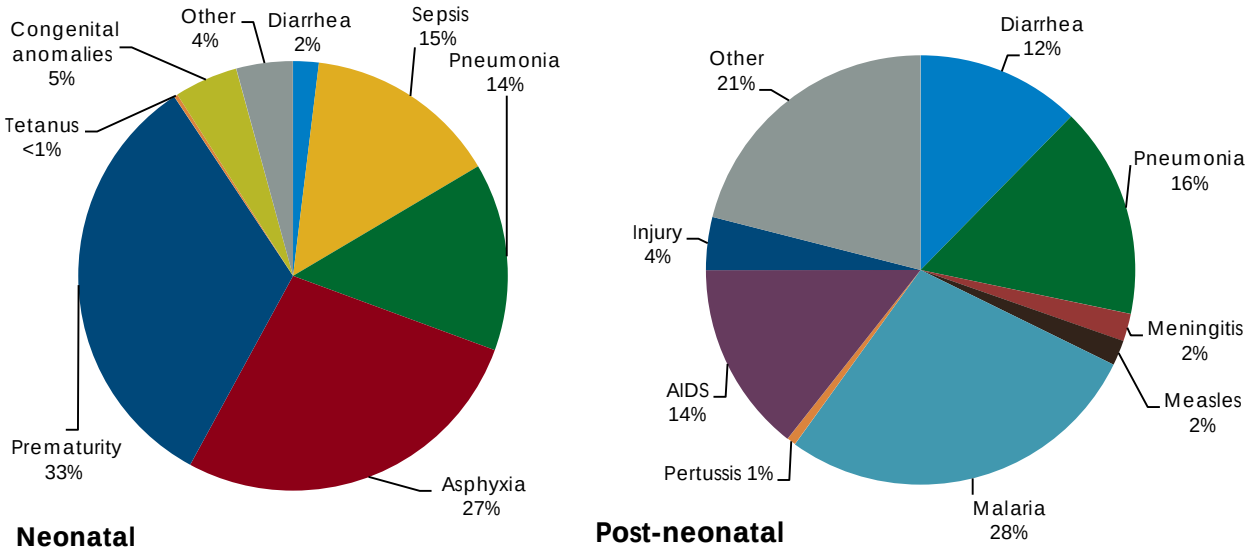
Values from DHS are shown in bold. Sources: [6, 7], estimates by authors using LiST.

Malnourished children require an intervention to improve their long-term health outcomes. As discussed in Chapter 4, therapeutic feeding for moderately and acutely malnourished children below five will be scaled up from 50 percent of children in need in 2013 to 80 percent by 2016, and maintained at that level. Given the slow progress in the change in stunting levels, the primary causes of poor nutrition may need to be addressed, including a wider set of socioeconomic interventions and providing information to mothers.

Estimated impact on neonatal, infant, and under-five mortality

Mozambique has achieved impressive reductions in infant and under-five child mortality (Table 16) and achieved its MDG targets. However, the recent mortality rates are still extremely high compared to global averages, and higher than in neighboring countries such as Tanzania and Zimbabwe. The technical team used the LiST model, integrated with the coverage data from the OneHealth tool, to estimate potential changes to infant, neonatal, and under-five mortality rates over the period of the PESS. The model was calibrated with Mozambique-specific epidemiological data and prevalence of early childhood diseases.

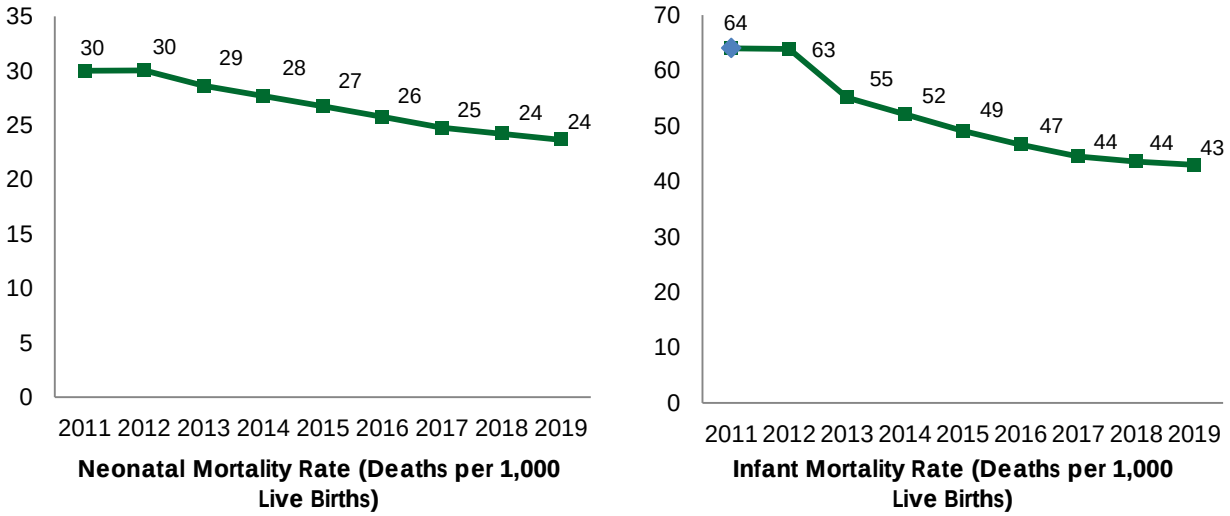
Figure 63. Causes of Neonatal and Post-neonatal Child Mortality in Mozambique, 2010



Source: [44].

The technical team used the most recent country-specific data available on the causes of neonatal and post-neonatal deaths (Figure 63). The effectiveness of various antenatal, postnatal, and early childhood interventions in reducing these mortality rates was based on internationally accepted values defined by the Child Health Epidemiology Reference Group (http://cherg.org), which generates them based on a rigorous literature review and has used them in various peer-reviewed papers. Figure 64 shows the results from the modeling analysis. Mozambique will continue to reduce neonatal and infant mortality. In 2015, the infant mortality rate is projected to be 49 per 1,000 live births, which is well below the MDG target of 67. It is important that MISAU and partners continue to stress further reduction in these rates, with continued scale-up and increases in the quality of postnatal and early childhood services.

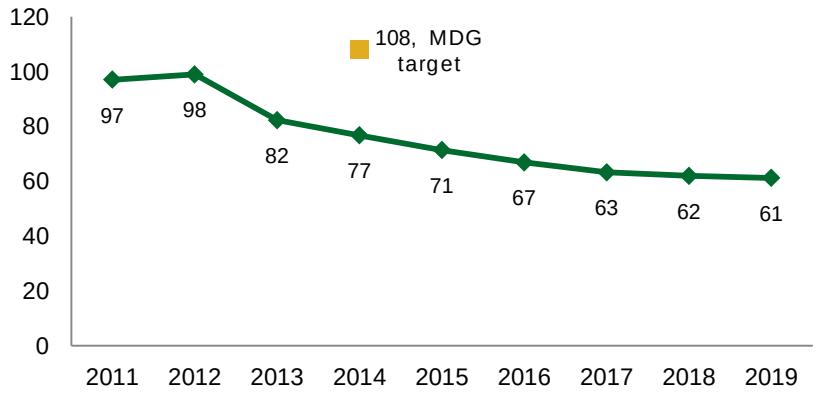
Figure 64. Estimated Neonatal and Infant Mortality Rates per 1,000 Live Births, 2011–2019



Sources: [7], estimates by authors using LiST.

Chapter 5 discussed the scale-up in immunization coverage and the introduction of some new vaccines over the PESS period, such as for rotavirus. A vaccine against the pneumococcal virus was introduced in 2013 and will also be scaled up over 2014–2019. With the expansion of the vaccination program, as well as the other interventions for nutrition and malaria treatment, continued improvement in the under-five child mortality indicator is expected. Figure 65 confirms this expectation with its projected trend. There is potential for a further 37 percent reduction in the under-five mortality indicator over 2012–2019.

Figure 65. Estimated Under-five Child Mortality Rate per 1,000 Live Births, 2011–2019



Sources: [7], estimates by authors using LiST.

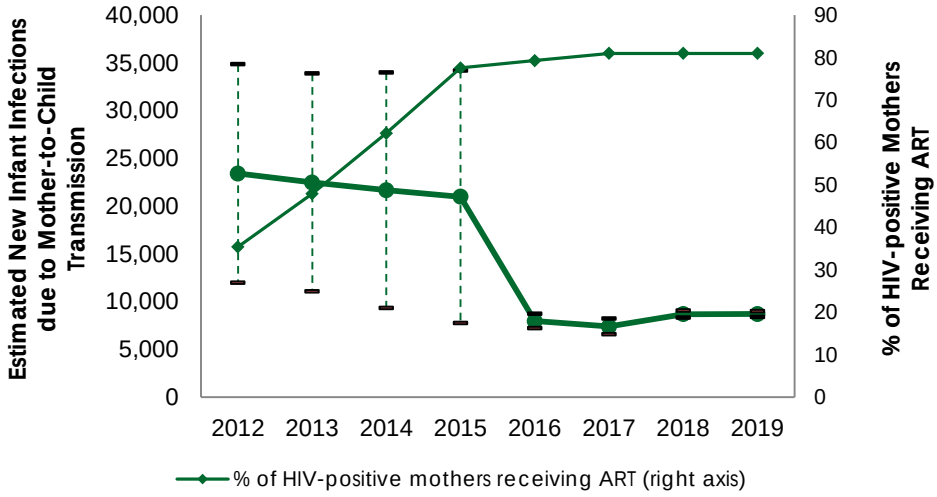
C. Impact on HIV/AIDS Indicators

Mother-to-child transmission of HIV

Estimating the number of child infections due to mother-to-child transmission is difficult, given the combined impacts of the scale-up of contraception (reduced number of unwanted pregnancies among HIV-positive women), the reduction in new adult infections due to the scale-up of HIV treatment and prevention, and the changes in the PMTCT intervention itself over time. In Mozambique, AIM has been institutionalized to generate the size of the epidemic by geographical region. The use of AIM by region results in three epidemic "projection files," which can be aggregated to the national level for total estimates. Separately, AIM is one of the several health impact modules linked with OneHealth. AIM was utilized during the current costing exercise to generate new overall HIV epidemic estimates, especially the number of HIV-positive mothers. Given the impact of scale-up of other interventions under the PESS, the OneHealth/AIM estimates differ from the stand-alone AIM projection.

In Figure 66, the estimated range for new vertical infections is shown, where the lower bound is the value from the OneHealth/AIM projection and the higher bound is from the stand-alone aggregated AIM file. An average of the two values is also shown (circles). The proportion of HIV-positive pregnant women who receive ART is shown on the right axis, based on increased adult treatment and Option B+. As the number of HIV-positive women on ART increases over time, the confidence in the estimate of new vertical infections also increases.

Figure 66. Estimated Range of New Infant Infections Due to Vertical Transmission



Source: Authors' estimates using AIM.

Across 2013–2019, the estimated vertical transmission rate nationally reduces substantially. The target from the *Plano de Aceleraçao* was to reduce the vertical transmission rate to 5 percent by 2015. The technical team's estimates suggest that this will not be achieved. Instead, it is likely that Mozambique may achieve a vertical transmission rate, including in the breastfeeding period, in the range of 8 to 9 percent by 2017.

Note: The estimated national incidence of HIV among adults is subject to the modeled impact of various prevention, care, and treatment interventions. This requires the use of a different mathematical model, known as the **Goals** model. The HIV program at MISAU, in collaboration with CDC and HPP, is conducting this analysis, and the analysis was completed in 2014.

12. CONCLUSIONS ON THE OneHealth PROCESS AND THE WAY FORWARD

The process to estimate the resources required for the *Plano Estratégico do Sector da Saúde* (PESS) with the use of the OneHealth tool, inclusive of all of the intermediate consultations and calculations, has been the most rigorous possible, given limitations of data, time, planning capacity within MISAU, and resources. The conclusions from the OneHealth analysis, especially on the sustainability of the PESS regarding funding and health system constraints, can lead to change only if they are used to inform MISAU operational plans and implementation decisions. This chapter discusses what will be required to bridge the gap between a strategic resource estimation process such as for the PESS, other multiyear strategies, and annual operational decision making at MISAU, and how the OneHealth process could help.

Related to this discussion, the use of the OneHealth tool and the six months of consultations and analyses have led to some conclusions on the planning and budgeting process at MISAU. As of October 2013, MISAU had informally decided to institutionalize the OneHealth tool. In this regard, some recommended steps are outlined. If the OneHealth tool and its results are to be effectively used within MISAU programs and health system departments, some changes are needed. In this chapter, the technical team recommends a related roadmap for capacity development among MISAU staff involved in strategic planning and budgeting processes.

The limitations of the OneHealth-based analysis of resource needs and possible cross-cutting avenues for future research are discussed at the end of this chapter.

A. Conclusions from the PESS Resource Needs Estimation Exercise

Weak coordination in strategic planning and budgeting

Vertical multiyear strategies: In the process of costing the PESS, the technical team reviewed many disease-specific strategic plans and related resource mobilization documents, such as Global Fund grant proposals. Many of these were the primary source of targets for all or many of the years included in the PESS, as well as unit costs. Incorporation of these strategies into an overall health sector strategy is crucial, but until the current PESS, this has not been the case, and the total resource needs of past health sector strategies do not necessarily reflect the total costs of all disease-specific strategies they incorporate. Other problems exist, as discovered during the recent process:

Box 24. Key Recommendations for Coordination of Strategic Planning for Vertical Programs

1. Coordinate vertical disease strategy development with overall health sector strategy
2. Greater coordination between various vertical disease strategies
3. Coordination in the annual operational planning for the sector and vertical strategies
4. Greater role for the DPC in vertical disease strategy development for overall coordination and facilitation

- Vertical disease program strategies were developed mostly separately from other programs, even in closely allied domains such as TB and HIV/AIDS;
- Vertical strategies have adopted time periods and scale-up plans out of alignment with the national health sector strategy or with the strategies developed by health system departments; and
- Resource estimates and mobilization strategies of vertical disease programs bear no relation to those of the overall health sector strategy, which reduces the legitimacy of the latter and the sustainability of the former.

There are several reasons why vertical strategies should be developed in conjunction with the overall health sector strategy. First, the health system resources that the vertical strategies require are shared. Evaluating each vertical strategy in isolation makes it difficult to understand the total requirements for health system resources, such as human resources; the logistics supply chain; and cross-cutting elements such as M&E, HIS, etc. Second, if strategic planning for vertical disease programs is aligned with a sectoral planning process, synergies will be easier in the scale-up of interventions across domains and in the economies of scale inherent in coordinated supervision, in-service training, and operational research (e.g., surveys, special studies). This is obvious if it is considered that many of the recipients of trainings (health workers, community members) and services and studies are the same across public health programs. Third, the financial resource needs estimated by vertical disease programs should factor into the decision making at the sectoral level, especially decisions related to general on-budget support from partners and the GRM's overall health financing strategy. Alignment of the resource requests from various programs should follow a sector-wide prioritization and rationalization process, so that the country can target scarce resources to critical needs and prevent inefficient use of funds.

Box 25. Key Recommendations for Coordination of Strategic Planning for Health Systems

1. Inclusion of health system department staff in the process of development of vertical disease strategies
2. Reference health system component strategies (e.g., HRH) in vertical programs as to constraints and limits
3. Evaluation of health system needs and impacts from the scale-up of interventions in vertical disease programs
4. DPC to play a role in coordination of strategic planning across health system departments and disease programs

Health system departments and the disease programs: The technical team saw limited evidence of coordinated planning across the disease programs and health system departments. This is necessary if many activities included in vertical disease program strategies and operational plans, such as in-service training, monitoring and supervision, HIS strengthening, etc., are ostensibly led by specific MISAU health system departments.

The lack of coordination can have poor consequences, such as service delivery staff overburdened with training initiatives, duplication of activities, lack of consideration for systemic constraints in the vertical strategies, and mismatch in overall targets. There were instances where critical multiyear targets set by the health system support department (e.g., for the rehabilitation of health centers) did not harmonize with plans for the disease-specific refurbishment and rehabilitation planned by a vertical strategy. Specific recommendations on coordination of strategic planning are made in Boxes 24 and 25.

Lack of analyses related to prioritization or cost-efficiency in strategies

Many of the disease-specific strategies did not analyze the relative contribution of different planned activities and intervention scale-up plans to ultimate health objectives (e.g., mortality, morbidity, or infections prevented). Given the lack of such evidence, it was often not clear whether the resource request could be lower or if the interventions/activities selected represented the most efficient mix. Therefore, there was less confidence that the health sector was making the best use of current or future resources. The technical team recommends that prospective health impact models, such as those included in the OneHealth suite of modules, be used proactively to make a case for the interventions and the desired scale-up. Aggregated across the disease programs, this will also assist in analyzing whether the Mozambican health system as a whole is serving its citizens and moving toward reducing preventable illness and death.

Lack of standard benefits packages, intervention protocols, and facility norms and standards

As the PESS mentions, the sector lacks an Essential Medicines List, a standard primary healthcare benefits package, and a facility-based staffing standard (e.g., related to population ratios). In addition, many disease programs had not defined a standard protocol for many interventions, let alone created variants based on the level of the health system and their differing constraints. Many secondary healthcare programs provided intervention designs (i.e., drugs, commodities, and health personnel inputs) based on the standards observed at the central hospitals, which are less relevant to lower-level facilities. Many public health programs also lacked standard intervention designs. The technical team recommends an urgent effort to design and implement these protocols, alongside the Essential Medicines List and other standards.

Lack of multiyear targets for certain programs and lack of standard unit costs

Any strategic planning and budgeting exercise requires multiyear targets that have been defined by technical experts and policymakers based on need and keeping in mind the available resources. While public health programs at MISAU had developed these targets, they were generally lacking for the secondary health programs of DNAM. During the PESS costing process, the TA team developed these targets based on recent actual service delivery figures and validated them with the programs. In the future, a planning exercise is recommended to update these targets. Similarly, standard unit costs for activities such as supervision and in-service training are urgently needed. The team initially found differing costs in use across disease programs. During the PESS costing exercise, these were standardized. However, to ensure that such standard costs continue to be used, DPC should coordinate with the disease programs to update and circulate the costs approved for travel and per diem.

B. Role of the OneHealth Process in Strategic Planning and Costing at MISAU

The OneHealth tool is one of the instruments that can be used to generate more realistic and feasible overall costs and scale-up targets for a strategic planning and budgeting exercise. It can also be used to produce ongoing estimates of health impact related to changes in coverage and service delivery initiatives. As MISAU and its partners update coverage targets, OneHealth can be used to produce updated estimates of cost and impact, allowing true evidence-based planning. The model also incentivizes coordination in planning and budgeting, which can help to address the concerns raised above.

In concert with implementation of the recommendations in section A, the OneHealth tool can help to strengthen the strategic planning process at MISAU. Even if this is strengthened, without alignment to an annual operational planning process and onward, to implementation, the strategic planning will have limited practical utility.

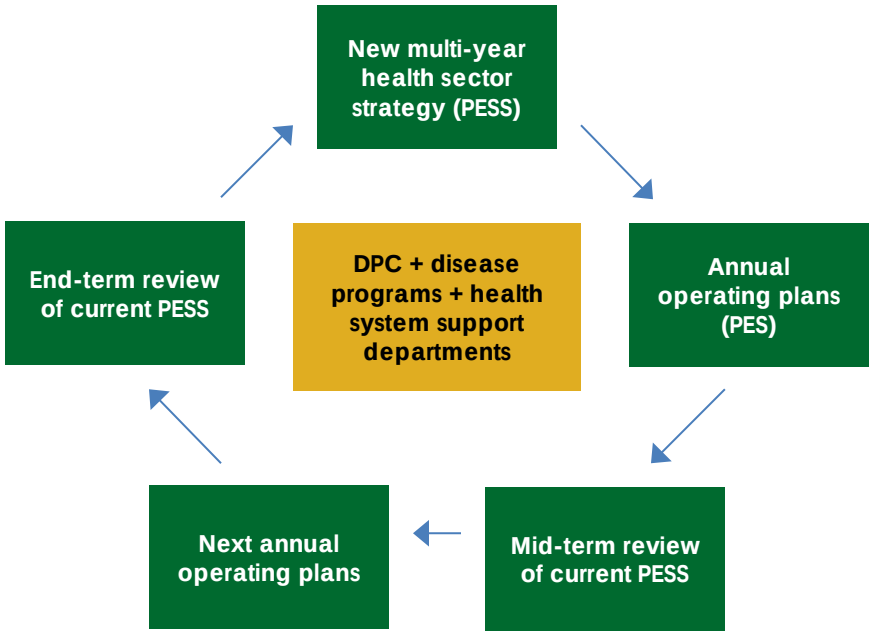
Figure 67 suggests a possible linked process across different planning activities, beginning from a strategic plan such as the current PESS 2014–2019. The coordinator and centerpiece of the overall planning system is the DPC, i.e., the Department of Planning and Cooperation. The key aspects of the process are the following:

- **Annual operational plans** (PES) of different health programs and departments—which must be completed by a certain date, with technical assistance from DPC—will align their annual targets as much as possible with the multiyear health sector strategy, using the OneHealth tool; this in turn aligns the various vertical disease programs and health system support departments within MISAU.
- The **PES may change and realign the annual targets** based on context-specific decisions, financial resources available, and other changed circumstances. These changes will be incorporated

into the mid-term review of the ongoing multiyear strategy (the PESS), and the OneHealth tool itself will be updated. The mid-term review of the PESS will yield revised future targets and financing scenarios, which will then be used for the next set of annual operating plans.

- **End-term review** of the PESS will take into account the performance against the previous sequence of PES and identify lessons learned and key systemic challenges and constraints. These will be taken into account in the OneHealth tool dataset and incorporated into the development of the next multiyear strategy. Thereafter, the process can continue.

Figure 67. Proposed Linkages for Strategic Planning



The process above is simplified, and obscures the need for learning from M&E, research (e.g., through public expenditure tracking surveys, population surveys, national health accounts), and engagement with all levels of the health sector. The process in Figure 67 also does not show the need for frequent and deep engagement with provincial and local health stakeholders, civil society, and development partners. These steps are necessary and will be a part of each step, though at differing levels of intensity.

Capacity development and institutionalization for the OneHealth tool

During the resource estimation process for the PESS, technical experts from HPP and a WHO consultant helped build the capacity of technical staff from DPC, other departments, and various health programs at MISAU. This involved ongoing hands-on training as well as remote mentoring on the use of OneHealth and its role in a broader costing process. The capacity development used mixed approaches, including group sessions, briefs, and other materials. For senior leaders at DPC and MISAU, the technical team sensitized key persons to the principles of cost-driven prioritization and methods to align service delivery scale-up with health system capacity using the OneHealth tool.

The longer-term implementation of OneHealth for strategic planning and budgeting, and its effective use in a process, such as the one sketched in Figure 67, requires further steps toward capacity development and institutionalization.

The OneHealth tool represents an analytical tool as well as a consultative, reasoned process for arriving at an ideal mix of interventions, scale-up plans, and estimates of the resource needs and likely health

impacts. Once the OneHealth tool has been populated with the targets and unit costs, as well as the background demographic and epidemiological data, it should be periodically updated in a consultative process led by a coordinating unit such as DPES (the Department of Planning and Health Economics of the DPC). A manual related to the OneHealth process and other guidance documents should be developed for MISAU use. Some other recommendations for the institutionalization of its use at MISAU are discussed below and summarized in Box 26.

Box 26. Recommendations Related to Institutionalizing the Use of the OneHealth Model

1. Train a core group of staff at DPES/DPC on OneHealth
2. Institute a regular process to update the model inputs and read outputs
3. Create demand and maintain ongoing awareness among strategic planners at the sector and disease program levels regarding the model's outputs and process of updating results
4. Disseminate results from updated OneHealth analyses in various forms
5. Link the use of OneHealth with engagement of civil society and partners, especially on the ongoing projection of health impact and total costs

1. *Strengthen the national OneHealth tool TWG*

The technical team recommends the strengthening of the national TWG, composed of staff from different health programs, health system departments, and DPC, continuing from the group trained in the model in late 2012/early 2013. Members of this team do not require prior OneHealth experience. At the start, they should be aware of the model and its key outputs. This working group will comment and review on OneHealth tool data needs and outputs, and coordinate the technical use of the results in various ways, including for the process shown in Figure 67. To build the capacity of this team, a formal training curriculum on the OneHealth tool should be developed, covering data needs, outputs, and use of the model, without requiring extensive knowledge of the model mechanics.

2. *Fully train a core group at DPES/DPC on the use of the OneHealth tool*

A core group of staff at DPES/DPC (three to four people) should be identified and fully trained on the use of the OneHealth model. This group will be tasked with coordinating the use of the model and liaising with the TWG above, and will serve as the focal point for collecting and inserting data into the model, running key analyses, providing updated results to users, and linking with the developers updating the software outside of Mozambique. This step requires one member of the core group to be designated as the owner of the updated OneHealth file, who will coordinate the updating and maintenance of all input data. Given potential turnover in staff, the core group should institute a handover policy and ensure that in the case of a change in staff, a new member can be designated as the owner of the OneHealth files.

3. *Create demand and maintain ongoing awareness on the use of the OneHealth tool*

Together, the core group at DPES/DPC and the TWG will be responsible for keeping MISAU health programs and departments up to date on developments with the OneHealth tool, previous results, potential benefits of the data, and new uses of the analyses. Toward this end, the core group at DPES/DPC, in coordination with other MISAU staff, should establish a process to conduct periodic meetings on the model results, updates, and upcoming uses, and include other technical partners working in Mozambique. For the model to remain useful, DPES/DPC should assess all of the data needs and ensure that results are disseminated.

4. *Disseminate results from updated OneHealth analyses in various forms*

This current report is hopefully a first in a series of analytical reports that can be developed with the OneHealth data. Many areas for further analysis have been identified in this report. The core group trained on OneHealth, working with members of the TWG and other interested parties, should generate

such analyses or enable analysis by others. MISAU and development partners should provide resources to allow these results to be generated and disseminated. Reports from these analyses should be widely disseminated within Mozambique, with copies available on the Internet and in print form so that they can be used for decision making at all levels of the health system.

5. *Link the use of OneHealth with the effective engagement of civil society and partners*

The OneHealth tool results represent an opportunity to engage other actors in the health system around the achievement of national health targets and the resources required. As suggested in this report, Mozambique has ambitious targets that will require substantial resources, potentially above what can be easily funded. The engagement of the entire health sector and all types of funding sources will be required. The results from the OneHealth analysis can be used to generate scenarios with varying targets. This process is well suited for dialogue at multisectoral forums and to gather various points of view.

C. Cross-Cutting Limitations of the Current Analysis and Future Research

The exercise described in this report—analysis of the financial and structural implications of the scale-up of programs under the PESS, and the impact on health indicators—suggests that Mozambique's health system is poised on the cusp of profound changes. The PESS defines an inflexion point at which the stagnation in key health indices can be arrested and the health system put on a track toward greater equity, access, utilization, and quality of service.

While the process to analyze the resource needs and health impacts of the PESS was as rigorous as possible, given limitations of data, the technical team identified several key cross-cutting limitations that should be addressed at the mid-term review of the PESS, or even earlier:

1. Data on multiyear targets and standardized intervention protocols were lacking for DNAM programs related to curative services. These affected the rigor of the resource need estimates for certain DNAM programs. Better data on service delivery and resource use at lower-level hospitals are urgently needed from across the country to supplement the good-quality data from higher levels.
2. Data on the labor intensity of different health interventions were based on a mix of expert opinion and actual observational studies. Observational studies with a wide and representative sample of facilities are needed, which would improve the validity of the human resources gap analysis.
3. Targets for many interventions for years 2018–2019 were not rigorously set and were kept constant from 2017. This occurred due to a late change to the years covered by the PESS. In many cases, the interventions had already scaled up to high or maximum coverage by 2017, so maintaining the coverage at this high level over 2018–2019 only requires an assumption that resources and system constraints will be accommodating.
4. Future prices of drugs and commodities could be different from their levels in 2013 due to exchange rate movements, technological change, or different procurement practices. This could affect the validity of using constant 2013 prices.
5. Other areas of uncertainty and lack of precision exist, which means that the resource need estimates provided in this report should be taken only as defining a point in a range of possible estimates. However, scenario analyses using different cost, demographic, epidemiological inputs, etc., were not conducted to estimate this range. Given the size of the overall model, generating multiple scenarios would be complex. However, the technical team did consider multiple

scenarios related to the human resources gap analysis, the financial gap analysis (given different resource availability scenarios), and certain disease-specific scenarios for coverage.

Cross-cutting research needed: Throughout this report, the technical team identified areas for further analysis related to specific health programs or health system departments. Beyond these, some cross-cutting needs have also been identified. During presentation of the PESS costing results and other OneHealth-related analyses, stakeholders and reviewers made suggestions for multiple additional analyses and possible primary data collection exercises. Only some of these are listed here.

- **Studies of the impact of different sector-wide human resources policies** on the number of clinical staff and other health service providers. For example, task-shifting or task-sharing policies adopted for several disease programs can affect the overall health system as more activities require the time of certain staff types;
- **Research on the various minimum primary healthcare benefits packages** that could be considered by the GRM and how they relate to hospital-sector care in a referral system;
- **Detailed studies of the hospital-based healthcare sector, especially on the cost of upgrading lower-level hospitals** to enable them to provide a wider range of secondary health services; and
- **Analysis of the roadmap for the Mozambican health system to reach universal coverage**, which will build on household health utilization and expenditure studies and involve long-term cost and epidemiological projections using models like OneHealth. The areas of focus include the following: breadth of coverage (populations receiving primary and secondary healthcare), depth of coverage (the quality and intensity of the services received, based on defined standards), and the height of coverage (related to the proportion of those costs covered by systems that reduce out-of-pocket payment at the point of service).

ANNEX A. PERSONS CONTACTED AND MISAU DEPARTMENTS

Department	Names	Function
INS	Dr. Ilesh Jani	Director of INS
	Casimiro Sitoe	Focal point of INS
	M. Bofana	Focal point of INS
Medicina Tradicional	Dra. Felisbela Gaspar	Director of IMT
	Dra. Marta Maluleque	Focal point of IMT
	Dra. Graça	IMT Tecnical
Centro de Abastecimentos	Dr. Acácio C. Cuambe	Director of CA
	Abdul Marino	Focal point of CA
CMAM	Dr. Paulo F. Nhaducue	Director of CMAM
	Dr. Joao Grachane	Focal point of CMAM
	Amelia	Focal point of CMAM
	Tomas	Technical
	Marilene	Technical
Infra-estrutura	Dr. Mazivila	National Deputy Director of DPC
IGS	Dr. Francisco Candido	Inspector General of Health
IGS	Baltazar Tamele	IGS Technical
DNSP	**Names**	**Function**
Saúde Pública	Dr. Mouzinho Saide	National Director, Saúde Pública
Saúde Pública	Dra. Marlene Cuco	National Deputy Director, Saúde Pública
Saúde Pública	Dra. Lidia Chongo	National Deputy Director, Saúde Pública
Saúde Materna e da Criança	Dr. Nazir Ibraimo	Head of the Department of Women and Children
Saúde Escolar	Dr. Victor Sitao	Head of Nutrition Dep.
Saúde do Adolescente	Dra. Estela Mangueze	Chief of Adolescent Program
Doenças Nao Transmissíveis	Dra. Carla Matos	Former Chief
Doenças Nao Transmissíveis	Dra. Cynthia	Chief
Doenças Tropicais Negligenciada	Dra. Olga Amiel	Chief of Infectious Diseases
Doenças Tropicais Negligenciada	Dra. Tania	NTD technical
Saúde Mental	Dra. Lídia Gouveia	Chief of Mental Health Department
Saúde Mental	Sr. Paulo	Focal point mental health
TB	Dr. Egídio Langa	Chief of TB Control Program
TB	Sr. Patricio	Focal point TB
Malaria	Dra. Graça Matsinhe	Chief of Malaria Control Program
Malaria	Dra. Rosalia Mutemba	Malaria technical
Nutrição	Dra. Edna Possolo	Chief of Nutrition
Nutrição	Sr. Gabriel	Focal point for nutrition
PAV	Dra. Benigna Matsinhe	Chief of PAV

Department	Names	Function
Saúde Ambiental	Enga Ana Paula Cardoso	Chief of *Saúde Ambiental*
Promoção da Saúde	Dra. Laura Mavota	Chief (DEPROS)
Promoção da Saúde	Inusso / Humberto Rodrigues	Health promotion technical
Epidemiologia	Dra. Lorna Gujral	Chief of Epidemiology
Epidemiologia	Dr. Jeremias Micas Mate	Focal point epidemiology
DPC	**Names**	**Function**
DPC	Dra. Leopoldinha Massingue	Chief of M&E
DPC	Dra. Geraldina Langa	Head of International Cooperation
DPC	Dr. Daniel F. Simone	Chief of Econ. San.
DPC	Dra. Ma da C. Cuambe	Chief of Projects Dto.
DPC	Dr. Mazivila	National Deputy Director DPC
DPC	Dra. Cidalia	Chief of dto. of *Sist. Saúde*
DRH	**Names**	**Function**
RH	Dr. Martinho Dgedge	National Director, DRH
	Dra. Hortencia Faira	National Deputy Director, DRH
	Dra. Luisa Panguene	Director in training
	Dra. Adelaide Mbebe	Focal point, DRH
	Ilda Martins	
	Vidal	Technical
	Maria	Technical
Dep. Farmacéutico	Orlando Penicela	Focal point, Dep. Farm
DAF	Dr. Mulhovo	National Director DAF
	Dr. Henario	Finance Director
	Ligia	-
	Timoteo	-
Gabinete Jurídico	Dalmazia	-
	Dalmazia	-
	Malaica	-
Genero	Francelina	-
Gabinete do Ministro	Edina	-
Imagiologia	Sr. Ridwaan	Head of program
DNAM	**Names**	**Function**
Assistência Médica	Dr. Antonio Mujovo	National Director of Medical Assistance (DNAM)
Assistência Médica	Dr. António Assane	National Deputy Director DNAM
Saude Oral	Dra. Marta	Program head
	Dra. Amalia	Focal point

Department	Names	Function
Departamento Enfermagem	Dra. Olga	Program head
Emergencias Medicas e Trauma	Dra. Otilia	Program head
Saúde Ocupacional	Dra. Eulalia	Program head
Qualidade e Harmonizacao	Dra. Ana de Lurdes	Program head
	Dr. Morais	Focal point
Gestão e Administracao Hopitalar/Arguivos Clinicos	Dra. Aisha	Program head
	Dr. Piloto	Focal point
Hotelaria Hospitalar	Dr. Titosse	Focal point
	Dra. Avone Pedro	Program head
Medicina Desportiva	Dra. Adelia	Program head
Medicina Fisica e Reabilitaçao	Dra. Edma	Program head
	Dr. Paulino Rocha	Focal point
Dep. Logistica e Manutençao	Dr. Sumalgy	Program head
Medicina Legal	Dr. Virgilio	Program head
Programa de Anestesiologia e Reanimaçao	Dra. Emilia	Program head
Anatomia Patologica	Dra. Cesaltina	Program head
Medicina Interna	Dra. Rosel	Program head
Cirurgia	Dr. Simao	Program head
Ortopedia e Traumatologia	Dr. Assis	Program head
Otorrinolaringologia	Dr. Machava	Program head
Programa Nacional de Transfusao de Sangue	Dra. Dina	Program head
Medicina Legal	Dr. Virgilio	Program head
Pediatria	Dra. Isabel Ruas	Program head
Ginecologia /Obstetricia	Dr. Bugalho	Program head
Programa de Oftalmologia	Dra. Yolanda	Program head
Circuncisão Masculina	Dr. Jotamo Come	Program head
Dep. Estatística Sanitaria do HCM	Dr. Dimbe	Program head
	Nico	Technical
	Severiana	Technical
Dep. Farmacia Hospitalar	Tania	Technical
	Sergio	Program head
Medicina Privada	Fatima	Program head
Rep. De Administraçao e Finanças da DNAM	Dra. Isabel	Program head
	Dr. Mario	Program head
Depósito Medicamento HCM	Dra. Adelia	-
Departamento de Laboratorios Clínicos	-	Chefe do programa
DNAM (sub-specialties)	**Names**	**Function**
Banco de Socorros	Dr. Cossa	Director
Reanimção	Dra. Farida	Director
Cardiologia	Dr. Algustinho (Nico)	Program head
Dermatologia	Dr. Rui Bastos	Program head

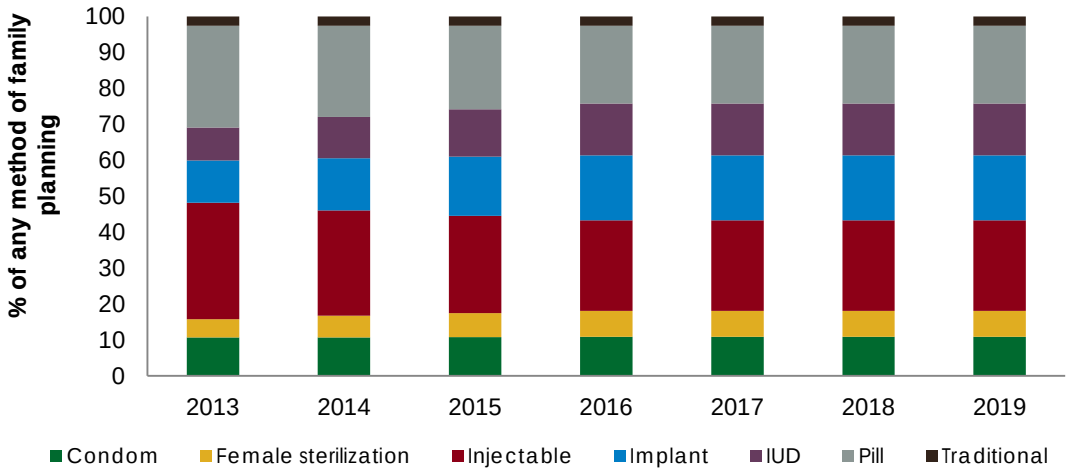
Department	Names	Function
Endocrinologia	Dr. Gilberto Manhiça	Program head
Gastroenterologia	-	Program head
Medicina Interna	Dra. Catarina	Program head
Neurologia	Dr. Benjamin Moiane	Program head
Oncologia	Dra. Joaquina	Program head
Pneumologia	Dra. Elisabet	Program head
Neufrologia	Dr. Roberto Ronda	Program head
Psiquiatria	Dra. Rosel	Program head
Psicologia	Dra. Rosel	Program head
Urologia	Dr. Bomba	Program head
	Dr. Igor Vas	Technical
	Dr. Ladino	Technical
Cirurgia de Mama e Tiroides	Dr. Mapasse	Program head
Cirurgia Plastica	Dra. Selma	Program head
Cirurgia Pediatrica	Dr. Atanasio	Program head
Cirurgia Maxilo-facial	Dr. Fortes	Program head
Cirurgia Geral	-	Program head
Cirurgia Cardiovascular	Dr. Atilio	Program head

ANNEX B. KEY INPUTS AND DEMOGRAPHIC RESULTS

A. Family Planning

Method mix: This section provides additional details on some of the key inputs into the cost analysis of the family planning intervention within the SMI program of MISAU, as discussed in Chapter 4. Figure B.1 shows the contraceptive method mix expected over time, given the targets selected by the SMI program. Over the period of the PESS 2014–2019, with 2013 as the base year, the share of modern methods versus traditional methods will remain stable. Within modern methods, long-active and permanent methods—injectables, IUDs, implants, and sterilization—will marginally increase their share overall, with the main decline occurring in the share of contraceptive pills. Within the long-acting methods, injectables will decline, while implants and IUDs will increase.

Figure B.1 Projected Method Mix among Women in Union, All Methods, 2013–2019



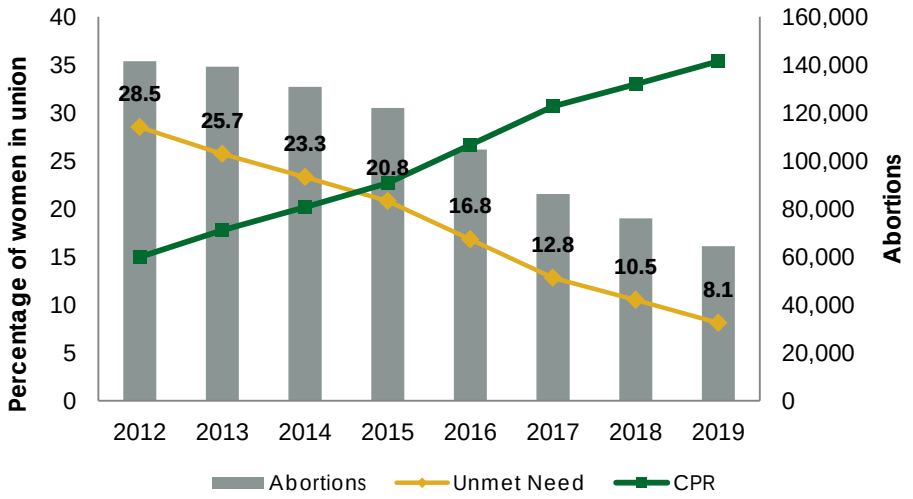
Sources: [7], MISAU/SMI.

Effects of the scale-up of family planning on fertility-related indicators: This section provides additional details on the linkage between family planning, unmet need, abortions, and the effects on maternal mortality. As discussed in Chapter 11, the technical team estimated the overall change in the maternal mortality ratio in Mozambique during the PESS period when many related interventions had been scaled up, including family planning. In summary, the increase in family planning will lead to a decrease in the number of unintended pregnancies, which also will lead to a decreased number of abortions. Unsafe abortions are a cause of maternal mortality. Therefore, maternal deaths can decrease as family planning increases through the effect on abortions, among other types of effects.

Figure B.2 shows the change in unmet need as modeled in Mozambique, with the increase in the CPR over time, as targeted under the SMI program in Mozambique. The two years prior to the PESS period, (i.e., 2012–2013) are also shown. The relationship between CPR and unmet need in Mozambique is assumed to be linear, as shown in the figure. An alternative relationship shows unmet need *increasing* over time, especially in countries where CPR is rising from a low level (5–15%) to moderate levels (20–30%). In such cases, the base hypothesis for some items of evidence is that unmet need will increase rather than decrease, reaching some maximum value before it finally begins to fall. In such cases, paradoxically, the number of abortions would actually also increase, even as family planning increases.

Continuing this logic, the number of maternal deaths would also increase with the increase in family planning. A high proportion of ineffective methods in family planning (e.g., traditional methods) would also generate unwanted pregnancies, and hence abortions. Mozambique has a relatively small proportion of traditional methods in its method mix (Figure B.1). For the LiST analysis, it was assumed that this paradoxical case does not apply where unmet need and abortions (and maternal deaths) increase with the CPR. Results are shown in Figure B.2.

Figure B.2 Projected CPR and Unmet Need,* and Predicted Abortions, 2012–2019



* Assumes one-to-one reduction in unmet need with the increase in CPR. The alternative is a relationship defined by a parabolic curve, where unmet need would increase before declining. In the latter case, the number of abortions may initially rise.

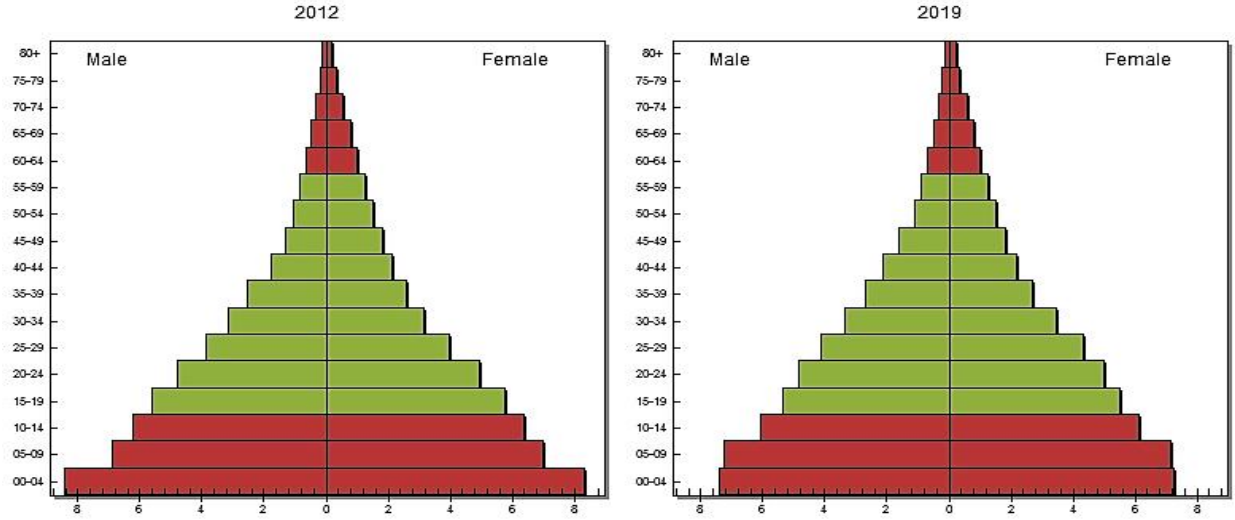
Sources: CPR from [7], MISAU/SMI; unmet need and abortions predicted from FamPlan.

B. Demographics under the PESS

Given the scale-up of key interventions and CPR, overall demographic implications were examined.

From the beginning of the PESS in 2014 until 2019, there are some projected changes in the overall demographics, driven by the increase in CPR and reduced mortality in the adult population as an effect of the scale-up of various health programs, especially the effects through the AIM and LiST models. These projected changes are shown in Figure B.3, comparing the year 2012 with 2019. The population pyramid shows the increase across both genders in the middle age groups and a reduction in the youngest age groups. Therefore, the dependency ratio declines, from an estimated 0.87 in 2012 to 0.79 in 2019.

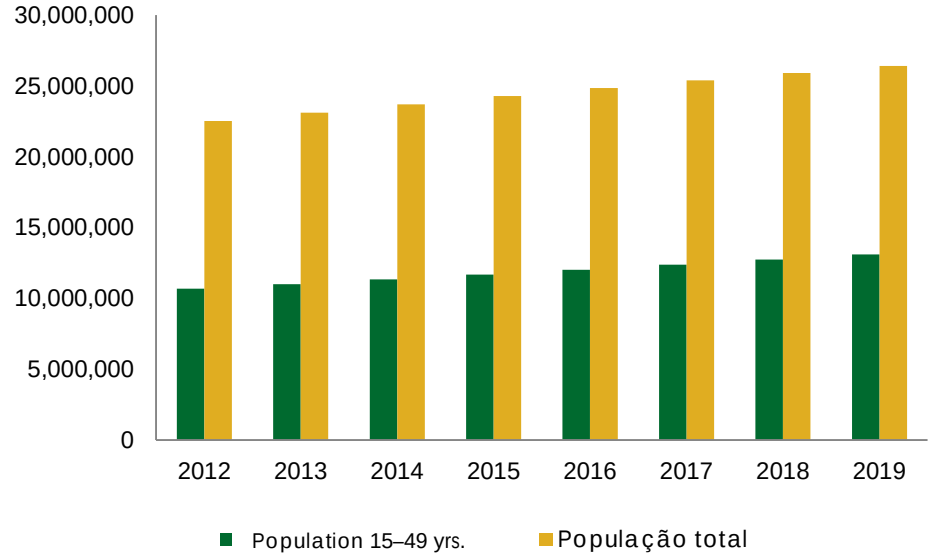
Figure B.3 Demographic Structure of Mozambique, All Age Groups, in Percentages



Source: DemProj.

The overall projected population size is shown in Figure B.4 below. These calculations are estimates and subject to significant uncertainty. These values underlie most of the calculations in the report. Regardless of the uncertainty, these estimates are valuable as additional information alongside the census estimates because they incorporate the simultaneous projected effects of increased contraception and decreased mortality on population projections. This is one of the advantages of using the OneHealth model.

Figure B.4. Projected Population Size in Mozambique, 2012–2019



Source: DemProj.

ANNEX C. DESCRIPTION OF KEY HEALTH IMPACT MODELS

A. Spectrum Suite of Policy Models

Spectrum is a Windows-based software system that incorporates different modules used to analyze health policy issues for a variety of national contexts. The software and its modules have been described in previous peer-reviewed journal articles, which were referenced to develop the descriptions here [45]. Detailed guides and technical manuals are available online at www.futuresinstitute.org. A summary description of the three models used in this report is provided immediately below.

The Spectrum Policy Modeling System consolidates previous models into an integrated package. The key components of interest in the context of OneHealth are the following:

- **DemProj** – A program to make population projections based on (1) the current population and (2) fertility, mortality, and migration rates for a country or region.
- **FamPlan** – A program to project FP requirements to achieve national goals for meeting couples' fertility intentions.
- **AIDS Impact Model (AIM)** – A program to project the consequences of the AIDS epidemic including the following: the number of people infected with HIV, AIDS deaths, the number of people needing treatment, and the number of orphans.
- **Lives Saved Tool (LiST)** – A program to estimate the effects of scaling up maternal health and child survival interventions on the deaths among mothers and children under the age of five. LiST is described in greater detail below.
- **Goals** estimates the cost of behavioral and biomedical HIV prevention interventions and their impact on new HIV infections, and hence on prevalence over a period of years.

DemProj is a full-featured cohort component demographic projection model. The inputs are the population by age and sex in the base year and, for all years in the projection, the TFR, the age distribution of fertility, the sex ratio at birth, the life expectancy at birth in the absence of AIDS, the age pattern of mortality, and the number and distribution by age and sex of international migrants. A standard demographic projection with DemProj includes a model life table that provides information on mortality by single age for any value of life expectancy at birth.

FamPlan projects FP requirements needed to reach national goals for addressing unmet need or achieving desired fertility. It can be used to set realistic FP goals, plan for the service expansion required to meet program objectives, and evaluate alternative ways of achieving goals. The program uses assumptions about the proximate determinants of fertility and the characteristics of the FP program (method mix, source mix, discontinuation rates, etc.) to calculate the number of users and acceptors of different methods by service delivery source [46]. The OneHealth costing module—in the case of Mozambique, the cost analysis for SMI—supplants the simple costing feature that currently exists in FamPlan. For FamPlan, the manual is available online.[8]

AIDS Impact Model (AIM) is based on HIV prevalence and other epidemiological parameters. AIM projects the consequences of the HIV epidemic, including the number of people living with HIV, new

[8] Manual available online at http://futuresinstitute.org/Download/Spectrum/Manuals/FampmanE.pdf.

infections, and AIDS deaths by age and sex. It also calculates the impact of PMTCT, ART, and Cotrimoxazole on child deaths for the LiST module, and the impacts of ART on adult mortality.[9]

B. Lives Saved Tool (LiST)

The following section closely follows the description in Stover et al. (2010) and the details in the LiST manual [47]. LiST is a program consisting of two potential variants: EasyLiST and full LiST. For the analysis in this report, the full version of LiST was used. The software can be downloaded along with the Spectrum suite from www.futuresinstitute.org or www.healthpolicyinitiative.com. EasyLiST allows the user to apply previously generated child and maternal health intervention coverage values to rapidly generate results. In comparison, for the full LiST module, detailed inputs are required, inserted directly. LiST is able to communicate directly with the OneHealth model to read in coverage for various key maternal health interventions. For all other interventions, the user operating both LiST and OneHealth will insert the correct coverage as used in the latter into the former for the years of the projection.

LiST can be used independent of OneHealth and has been the basis of a variety of international studies of child and maternal health mortality. The following section is based on Stover et al. (2010).

DemProj and LiST are interlinked. DemProj calculates the life expectancy at birth based on the infant and under-five mortality rates in the model life table. At the beginning of each projection year, DemProj provides LiST with the deaths from the demographic life tables for each age: <one, one, two, three, and four years. LiST disaggregates these deaths into five age bands by month: 0–1 month, 1–5 months, 6–11 months, 12–23 months, and 24–59 months. This is accomplished using a double log function fitted to the neonatal, infant, and under-five mortality rates. Thereafter, LiST calculates the impact of interventions on the child mortality rates, converting these back to deaths for the ages understood by DemProj. These are communicated back to DemProj, which uses them to determine the children who will survive to the following year. The process then continues.

DemProj calculates the births per year based on fertility among women of reproductive age. New births are subject to the estimated mortality rates. For the number of maternal deaths, the number of births is multiplied by the maternal mortality ratio from LiST. Annex B provides additional details related to the specific issue of the linkage between family planning and maternal mortality.

Impact of interventions on maternal and child mortality: Various interventions reduce mortality among mothers and children. By reducing the number of births, use of family planning affects the number of maternal deaths. For the five age bands by month described above, LiST estimates reductions in cause-specific mortality after applying known effects of interventions, weighted by the increase in coverage of those interventions from the baseline. There are eight causes of deaths for neonates that can be affected and nine causes of deaths for children under the age of five years. Interventions have an effect on maternal mortality in the sequence in which they occur in practice: periconceptual, antenatal, and childbirth. These include various nutritional interventions, labor, delivery and obstetric care, HIV and malaria prevention, etc.

After childbirth, various preventive interventions and, thereafter, curative interventions, have an effect on the remaining levels of mortality. Children can die subsequently of other causes as they age. The interventions with effects on neonatal, infant, and under-five child mortality include the following:

- Breastfeeding: exclusive, predominant, and partial breastfeeding vs. not breastfeeding;

[9] Manual available online at http://futuresinstitute.org/Download/Spectrum/Manuals/AimmanE.pdf.

- Preventive: Preventive postnatal care, feeding and supplements (nutrition), water and sanitation/ hygiene, malaria prevention;
- Vaccination: all routine and additional vaccinations; and
- Curative: neonatal sepsis management, other neonatal infections treated with antibiotics, diarrhea case management, and other infectious diseases, including prophylaxis of HIV and provision of Cotrimoxazole.

ANNEX D. PROGRAM MANAGEMENT COSTS

DNAM Program Management Costs

DNAM Programs	Costs
Pathology	***Training**:* Train health professionals in technical pathology abroad, Implement the National Seminar of Pathology; Perform technical internships in pathology
	***Supervision**:* Undertake supervision visits and technical support
	***Infrastructure and Equipment**:* Create cytology units; Equipment for Department of Pathology
	***General Program Management**:* Participate in the Congress of the International Academy of Pathology; Plan and distribute standards of organization and operation manual
Anesthesiology	***Training**:* Conduct courses on pain; Update guides in anesthesia; Participate in regional and local capacity-building meetings on local anesthesia
	***Supervision**:* Undertake supervision visits and technical support
	Infrastructure and Equipment: Equipment
	General Program Management: Host National Meeting of Anesthesiology; Participate in African Congress of Anesthesia; Participate in the South African Congress of anesthesia; Participate in the 60th Brazilian Congress of anesthesia
Central Clinic Laboratories	***Training***: Train technicians in microbiology, biochemistry, and hematology (4 months); Conduct ongoing training to improve reagent stock management, quality assurance, and microbiology laboratory; Training at the central level
	Supervision: Undertake supervision visits, monitoring, and technical support to provinces; Establish a formal and regular system of laboratory supervision
	Monitoring and Evaluation: Initiate preparation of provincial hospital laboratories for the process of accreditation; Develop information system able to provide data for efficient management of the laboratory network; Improve the quality of laboratory results through the implementation of a program of quality management, M&E
	Infrastructure and Equipment: Handymen, laboratories' equipment
	General Program Management: Hold National Meeting of Clinical Laboratories; Develop draft plan model of clinical laboratories; Disclose the Strategic Plan; Standards and protocols; Design, implement, and supervise the Development Plan Network; Support the HRD to provide a network of laboratories with the necessary and qualified personnel to meet the demand for services; Document on architectural standards; Elaborate various plans; Implement the management control system of consumption that minimizes stock breakage
Surgery	***Training***: Train surgery technicians (different specialties); Train surgery technicians in polytrauma care (medical graduates and experts); Train surgery technicians in polytrauma care (surgical technicians)
	Supervision: Undertake supervision visits
	Infrastructure and Equipment: Micro-surgeon equipment; Ward equipment and queries; Maxillofacial Surgery equipment; Neurosurgery equipment; Intermediate care surgery equipment; Urology equipment; Plastic surgery equipment
	General Program Management: Develop specific protocols for each surgical specialty; Hold National Meeting of Surgery; Perform campaign operation for orofacial clefts
Emergencies and Trauma	***Training***: Training in first aid; Training in advanced life support; Advanced support training in trauma; Training in pediatric emergencies; Training in multivictim

DNAM Programs	Costs
	management situations; Equipment training SIV/SAV; Mannequins for training (training material); Personal training, ambulance; Personnel training center for radio communications
	Transportation: Car maintenance
	Communication, Media, and Outreach: Central radio communications; Communications
	Infrastructure and Equipment: Rehabilitation and Fitness Equipment Emergency HCM; Rehabilitation Health Center Bagamoio; Rehabilitation Health Center Xipamanine; Rehabilitation SU Jose Macamo; Equipment Mavalane SU (includes emergency room); Rehabilitation Hospital Emergency Room Jose Macamo; Hospital Emergency Room Equipment Mavalane; Ambulance Transportation, inter-hospital (2); Pre-hospital ambulance (6)
	General Program Management: Strengthen multisectoral action and institutional intervention to create a legal platform to provide emergency care and trauma; Uniforms
HIV/AIDS	***Training***: Training for medical staff; Training for SMI medium; Training for baseline SMI; Training for general nursing; Training for trainers; Program development and training materials; Support activities
	Supervision: Supervision visits
	Monitoring and Evaluation: Surveillance Epi, IT equipment, & data entry; Instrument, Creating Online M&A course; Annual rounds, WFD; Quality control/quality assurance
	Infrastructure and Equipment: Infrastructure
	Communication, Media, and Outreach: IEC via the U.S. media
	General Program Management: Design and review of the country strategy, development; review of the annual work plan; Situation analysis
Imaging and Radiology	***Training***: Training in imaging; Training in radiotherapy; Physical training, technical training for imaging equipment; Training for technical and medical radiology
	Supervision: Supervision visits and technical support
	Monitoring and Evaluation: Procurement of quality control equipment
	Infrastructure and Equipment: Expand the services of conventional imaging for the NHS at the provincial and district levels (cost of equipment); Construction of the new Radiotherapy Unit in HCM; Equip the new Radiotherapy Unit HCM
	General Program Management: Acquire bibliographic manuals
Physical Medicine and Rehabilitation	***Training***: Training in physiotherapy; Training in orthopedics; Investments in international trainings (workshops)
	Supervision: Undertake supervision visits and technical support to provinces
	Infrastructure and Equipment: Doctor of Physical Therapy Equipment; Medical equipment, orthotics; Accessories for MFR equipment
	Transportation: Purchase of circulating medium for the CBR program (10 motorcycles per year)
	Communication, Media, and Outreach: Prepare training material, education, and communication activities in physical medicine and rehabilitation
	General Program Management: Conduct National Meeting of Physical Medicine and Rehabilitation; Acquire technical specialty books for physical medicine and rehabilitation; meeting with provincial leaders
Internal Medicine	***Training***: Conduct training courses in endocrinology, cardiology, neurology, pulmonology, internal medicine, oncology, gastroenterology, hematology, and dermatology

DNAM Programs	Costs
	Supervision: Undertake supervision visits
	General Program Management: Hold the Annual Meeting of Internal Medicine; Develop therapeutic protocols (protocols to conduct meetings)
Forensic Medicine	***Training***: Conduct trainings in casual examination
	Supervision: Undertake supervision visits and technical support
	Transportation: Acquire 4x4 double-cabin car for services
	Infrastructure and Equipment: Equip Department of Forensic Medicine with office equipment (computers, desks, chairs); Equipment for Department of Forensic Medicine
	General Program Management: Create National Council of Forensic Medicine; Participate in international conferences on forensic sciences and training; Hold National Meeting of Forensic Medicine
Obstetrics and Gynecology	***Training***: Train gynecologists regarding endoscopic/laparoscopic surgery; Participate in international conferences and workshops (Malaysia); Train gynecologists/obstetricians in fetal medicine and gynecologic oncology (in Portugal or Brazil); Train health professionals in the field of fetal monitoring; Empower gynecologists in the field of laparoscopy; Train health professionals in the field of ultra-scenography; Train health professionals in the field of monitoring histroscopia
	Supervision: Undertake supervision visits and technical support
	Infrastructure and Equipment: Medical equipment
	General Program Management: Develop and disseminate cancer pathology in gynecology protocols (protocols 5)
Ophthalmology	***Training***: Train doctors in diabetic retinopathy; Build technical capacity in new cataract surgery techniques (central level with Portuguese doctors); Build technical capacity in new cataract surgery techniques (uniform technical trachoma surgery); Perform error-correcting refractive tests in schools
	Supervision: Supervision visits to the central provinces; Supervision visits of the provinces to the districts
	Monitoring and Evaluation: Conduct studies on the prevalence of blindness from trachoma and other diseases
	Infrastructure and Equipment: Create surgical center treatment of diabetic retinopathy; Rehabilitation of the OR HCM; Building of the Ophthalmology Service in Sofala and Nampula; Ophthalmology equipment
	Communication, Media, and Outreach: Perform surgical interventions for cataract and trachoma and other diseases campaigns; Conduct campaigns on surgical interventions for glaucoma blindness; Conduct working visits in enterprises to assess blindness by accidents
	General Program Management: Annual Meeting of Ophthalmology
Orthopedics	***Training***: Continue training for medical specialists; Conduct training course in orthopedics and traumatology; Conduct training course in spinal surgery; Conduct courses of treatment of clubfoot with methods PONSTI
	Supervision: Undertake supervision visits and technical support
	Infrastructure and Equipment: Orthopedic equipment
	General Program Management: Develop clinical protocols of the most common orthopedic diseases; Hold National Meeting of Orthopedics and Traumatology; Participate in the Portuguese- Speaking Orthopedic Society Annual Meeting; Participate in meetings of Orthopedics Associations abroad; Participate in the Annual

DNAM Programs	Costs
	Meeting of the College of Surgeons of Central Africa, East and Southern (COSECSA ASEA)
Otorhinolaryngology	***Training***: Train specialists in the field of otorhinolaryngology
	Supervision: Undertake supervision visits and technical support to provinces
	Communication, Media, and Outreach: Conduct National Campaign for Hearing Aids
	Infrastructure and Equipment: Surgical medical equipment, central hospitals
	General Program Management: Acquire texts on otorhinolaryngology; Acquire manuals on otorhinolaryngology; Develop clinical protocols for external otitis; Participate in conferences in South Africa; Hold National Meeting of Ent; 2-person medical training in Valencia (6 months); have 2 teachers from Valencia stay in Maputo for 10 days (passage + stay, 2 times a year); 1 medical training in Valencia for 6 months in speech therapy (to HCM)
Pediatrics	***Training***: Train doctors and nurses in pediatric care
	Supervision: Undertake supervision visits and technical support
	Infrastructure and Equipment: Create neonatology services
	General Program Management: Pediatric standards/guidelines; Participate in International Congress of Pediatrics; Conduct Pediatrics National Conference
Oral Health	***Training***: Training for emergencies in the office/TRA/Sedation/multiple trauma and major surgery/PCI; Training of APEs, teachers, and educators
	Supervision: Undertake supervision visits and technical support
	Monitoring and Evaluation: Develop pocket biosafety manual in oral health; Epidemiological survey at the central level; Scientific research (folder fluoride in water)/NOMA/Slots/Frenectomies; Update the data collection forms
	Infrastructure and Equipment: Medical equipment; Medical surgery materials
	Communication, Media, and Outreach: Perform oral health in Primary Schools Complete campaign; Produce IEC material
	General Program Management: Hold National Meeting of Oral Health; Produce strategic plan; Produce oral manifestations manual; Produce oral health strategy in schools; Participate in congresses
Blood Transfusion	***Training***: Undertake a course for mobilization and recruitment of donors; Conduct a course for caregivers; Conduct a course on blood-producing components; Conduct a course on immunohematology; Conduct a course on infectious diseases; Conduct workshop on rational use of blood; Training for testing with ELISA system
	Supervision: Undertake supervision visits and technical support to all provinces of the country
	Communication, Media, and Outreach: Celebrate the World Day and the national blood donor; Create and distribute posters and leaflets on blood donation (100,000 leaflets)
	Infrastructure and Equipment: Equipment
	General Program Management: National Meeting of Blood Banks; Participation in the Congress of the African Society of Blood Transfusion; Participation at the Annual Meeting of the AABB (Advancing Transfusion and Cellular Therapies Worldwide)
Circumcision	***Communication, Media, and Outreach***: Male circumcision campaign
Hospital Pharmacies	***Training***: Train pharmacists in the management of hospital pharmacies
	Supervision: Create the Therapeutic Committees, provincial level (visits + Supervision); Create pharmacy models

DNAM Programs	Costs
	General Program Management: Produce treatment manual protocols for 12 diseases; prepare and produce good practices waiver manual; Prepare and produce good practices manual on handling of medicines; Participate in International Congresses on hospital pharmacy and safe use of medicines
Hospital Management	***Training***: Train on-site health service technicians in acceptance services
	Supervision: Undertake supervision visits and technical support to hospitals
	Monitoring and Evaluation: Conduct study to define criteria for the classification of health facilities
	General Program Management: Hold Hospital Council IX
Gender	***Training***: Train teachers of the IDFs (institutions training) to improve the implementation of training activities and the inclusion of matters of gender in curricula for healthcare providers; Form Employee Health Committees to improve the implementation of the activities of treatment and prophylaxis for victims of violence (sexual, physical, and psychological); Familiarize the cooperation partners of the MOH in gender politics and new instruments for recording activities; Conduct business exchanges of experience in providing services to victims of violence
	Supervision: Conduct supervision and technical support in provinces; Visit periodically to check the processing of sexual violence cases (supported by the U.S.)
	Monitoring and Evaluation: Develop testing instruments for recorded incidents of violence in health facilities; Create recording instruments of clinical care to victims of violence.
	Communication, Media, and Outreach: Develop materials for InTraining, Education, and Communication on Violence; Develop InTraining, Education, and Communication materials on violence
	General Program Management: Produce manuals (4 kinds of manuals – 2,000 units of each type of manual annually) and guides (1 kind of screenplay per year, 3,000) on gender and gender violence
Private Medicine	***Training***: Formations in matters of standards and procedures for licensing and registration of professionals basing themselves in current law; Management of training database of private medicine; Training in standards of fill sheets supervision in private sanitary units; Exchange of experience within the private medical sector
	Supervision: Undertake supervision visits and technical support; Conduct supervision visits on basic standards and procedures in clinics (integrated with IGS)
	Communication, Media, and Outreach: Produce IEC materials for private medicine.
	General Program Management: National meetings; *Guiao* pocket (approval, reproduction, diffusion).
Administration and Finance Bureau	***Training***: Continued training on post-laboral English in the workplace; Continued training onfinancial management in the workplace
	Supervision: Supervision visits to collect evidence
	Transportation: Acquire vehicles for services
	Infrastructure and Equipment: Purchase (DNAM-MOH computers; acquiring network printers (DNAM-MOH); Acquire data show (DNAM-MOH); Acquire chairs (DNAM-MOH); Acquire desks (DNAM-MOH); Purchase (DNAM-MOH) camera , photocopiers (DNAM-MOH); Acquire laptops (DNAM-MOH); Computers (for clinical programs), printers (for clinical programs); Cabinets for clinical processes (for clinical programs), camera (for clinical programs); Laptop (for clinical programs)
	General Program Management: Operating funds for directors; Funds for travel for directors.
Logistics and	***Training***: Formations training, training in English; formations outside the country

DNAM Programs	Costs
Maintenance	***Supervision***: Undertake supervision visits and technical support
	Infrastructure and Equipment: Equip health facilities with medical supplies and equipment; Acquire cars
Hospitality, Hygiene, and Cleaning Hospital	***Training***: Conduct training in managing diet therapy and food handling; Conduct training regarding laundries; Train technicians in higher standards of biosecurity, washing hospital linen, equipment and utensils
	Supervision: Undertake supervision visits and technical support
	Infrastructure and Equipment: Acquire Basic Kits Equipment queries Clinical Nutrition and Dietetics; Acquire uniform/uniforms and equipment specific for protection SAND`s Laundry
Occupational Health	***Training***: Training overseas doctors working in Mozambique (long term); Training overseas doctors working in Mozambique (short term); Training of nurses in the field of occupational health
	Supervision: Supervision visits on the results of the training of nurses; Supervision visits (routine activities)
	Infrastructure and Equipment: Infrastructure
	Transportation: Acquisition of dual cabinet 4x4 car
Quality and Humanization	***Training***: Conduct semi-annual regional training meetings in quality and humanization for members of provincial committees (South, Central, and North); 1 Conduct national training course/update trainers and supervisors in quality improvement and humanization, including management methodology and Recognition of Services-Based Performance standards (GRBP/SBM-R) aspects on deontology and ethics; Conduct 11 courses in provinces on training / update target TS approaches in quality improvement and humanization, including the methodology of management and Recognition Services-Based Performance standards (GRBP/SBM-R) and on ethics and ethical aspects; Hold regional formations update on ethics and service bodies to morgue staff of the South, Central, and North hospitals
	Supervision: Undertake supervision visits and technical support to provinces
	Monitoring and Evaluation: Conduct a workshop on M&E for discussion and consensus on the indicators of quality and humanization, along with those responsible for programs and M&A; Drive along with the DPS/DDS/facility teams and committees QH quarterly performance assessments (specific areas) target health facilities; hold one-day meetings for submission and agreement on results of studies on quality and humanization of healthcare (30–50 participants each); Organize and conduct public events of recognition and awards for top committees, U.S. teams, and health workers (according to the criteria for this purpose)
	General Program Management: Hold regional meetings (South, Central, and North) on balance and sharing of experiences in quality and humanization − biannual (participants − 80/region); Participate in 2 international meetings on Quality and Humanization for Learning and Sharing of Experiences in Quality and Humanization (2−3 participants/session); Update and disseminate the national strategy for quality improvement and humanization of healthcare; Develop/update and play back standards, protocols, and tools for performance measurement and IEC materials on MNCH, malaria, TB, PMTCT PF/CACUM, PCI, iN, training etc.; Hold 1 National Meeting on Balance and Sharing of Experiences in Quality and Humanization − biannual (participants − 200, Maputo)
Monitoring and Evaluation	***Monitoring and Evaluation***: Conduct M&E visits to the provinces; Conduct survey timeout in health facilities; Conduct studies on the quality of services rendered; Create database for internal management of the National Directorate of Medical Assistance

DNAM Programs	Costs
	General Program Management: Conduct workshop for elaboration of the Economic and Social Plan 2014
Department of Nursing	***Training***: Train personnel in health unit hygiene, cleaning, and hospital waste management; Technical Empowerment of health workers in Biosafety; Empower nurses; Sterilization and management of CSSD; Nurse training in the management of cholera patients; Empower nurses to implement the nursing process
	Supervision: Undertake supervision visits and technical support in nursing; Conduct Nursing Supervision and Support Model visits
	Monitoring and Evaluation: Perform evaluation visits, external PCI; Make requests for external review of the Ward Model; Perform visit to survey the situation of Blocks Operative in health facilities
	Infrastructure and Equipment: Outpatient/emergencies; Create new model wards; Equipment, medical and surgical
	General Program Management: Integrating new health units into the Program for Prevention and Control of Infections; Play distribute Procedures Manual of Basic Nursing, Nursing Festivities

DNSP Program Management Costs

DNSP Programs	Costs
Adolescent Health	***Training***: Form guidelines regarding care of sexual/reproductive health for adolescents, care and psychosocial support for minors and adolescent victims of violence and sexual abuse, and care for adolescents living with HIV/AIDS
	Supervision: Supervision visits
	Infrastructure and Equipment: Construction of the new YFS's, office equipment (computers, etc.)
	Communication, Media, and Outreach: Adolescent Week
Environmental Health	***Training***: Training in environmental health; Internships in microbiology, chemistry, toxicology, and entomology in Brazil or Portugal
	Supervision: Supervision visits
	Monitoring and Evaluation: Perform the monitoring of the activities for U.S. biometric trash
	Transportation: Motorcycles for medical technicians; Maintenance of bikes (fuel)
	Infrastructure and Equipment: Purchase of personal protective equipment (masks, gloves, boots); Desktop computers
	General Program Management: Disseminate and implement the National Strategy for Safe Food National Coordination Meeting in Maputo, National Coordination Meeting in the provinces
Epidemiology	***Training***: Train managers of databases; Training (short course) Field Epidemiology and Laboratory Training (FELTP); Form 2 year clinical/Province training effort to improve detection of PFA, prioritizing districts with low performance (low detection rate); Training in diagnostic matters and case management of PFA, measles, diarrhea, cholera, and others
	Supervision: Perform 1 visit for supervision and technical support to provinces with high proportion of silent districts; Perform 2 visits for supervision of Hib surveillance in sentinel (HC Beira, Nampula and Maputo*); Supervise monitoring activities at 60 days with PFA

DNSP Programs	Costs
	Monitoring and Evaluation: Research and technical support in case of outbreaks of diseases with an impact on public health or presenting an emergency; Hold biannual meeting with the leaders of the provincial VE for performance analysis
	Infrastructure and Equipment: Replace obsolete computers; Update/acquire antivirus programs
	Communication, Media, and Outreach: Produce Epidemiological Bulletins quarterly; retrain Training; Create and distribute instruments EV AFP Measles/TNN (Sheet investigating cases)
	General Program Management: Prepare and produce the Annual Report of Progress on eradication of Acute Flaccid Paralysis (Polio) and Measles
School Health	***Training***: National Meeting of School Health; Training for teachers; Material for training
	Supervision: Supervision visits
	Infrastructure and Equipment: Equipment (2 laptops + copy machine)
	Transportation: Fuel
	Communication, Media, and Outreach: Printed materials (posters, brochures, educational manual)
	General Program Management: Writing materials
Malaria	***Training***: Short courses (central level); Training lab; New Standards for Treatment of Malaria (AL) – National Level; New Standards for Treatment of Malaria (AL) – District Level; Training of trainers in M&A; Training in M&E training for distribution of IRS; distribution of LLIN
	Supervision: Integrated supervision visits
	Monitoring and Evaluation: Product quality control for malaria
	Infrastructure and Equipment: Office equipment, equipment for IRS; Diagnostic equipment
	Communication, Media, and Outreach: Production and distribution of manuals and guidelines; IEC, advocacy and communication, production and dissemination of manuals; Study scholarships
	General Program Management: Operating costs for IRS; Annual National Coordination Meeting, Malaria; Annual Meeting Regional / Provincial Coordination of Malaria
Mental Health	***Training***: Training in Cognitive Behavioral Therapy, Training in psychometrics; Training in collection tools, training and management of EEG; Training of mental health professionals on addiction; Training in sexology; Formations of short duration outside the country; Masters in Psychiatry and Mental Health (medical); Masters in Psychiatry and Mental Health (health professionals, Ph.D.
	Supervision: Supervision visits
	Monitoring and Evaluation: Epidemiological investigation
	Infrastructure and Equipment: Create 2 Regional Centers, Drug Rehabilitation (Maputo and Beira); Create Psychological Rehabilitation Center, Children and Youth (CERPIJ) in Zambezia and Manica; Create Organizational Psychology Services, Recruitment, and Selection (Spors) CEPAEP) in Sofala and Nampula; Acquire psychological tests; Acquire material for play therapy and occupational therapy, CERPIJ; Acquire computer equipment and other consumables for DPS; Acquire 3 electroencephalograms (EEG) and 3 ECTs (ElectrocombulsoTerapia); Acquire psychomotor instruments
	Transportation: Acquire 12 motorcycles for DPS / DDS; Acquire car
	Communication, Media, and Outreach: Printed materials
	General Program Management: National meetings and conferences

DNSP Programs	Costs
Neglected Tropical Diseases	***Training***: Training of trainers at the central level; Training in M&E Training for neglected diseases (microplanning); Training of technicians in ophthalmology
	Supervision: Supervision visits
	Monitoring and Evaluation: Sentinel posts on filariasis and schistosomiasis
	Infrastructure and Equipment: Acquire altimeters
	Communication, Media, and Outreach: Trachoma material; IEC material; Trachoma campaign; schistosomiasis and filariasis campaign
	General Program Management: Conduct National Meeting of the NTD
Nutrition	***Training***: Empower health professionals for the Implementation of Hospital Initiative; Friendly (BFHI) in the Central and Provincial hospitals; Training Packages in Community Counseling, Infant Feeding (AI); Training in supplementation for adolescent girls in and out of schools , Vol.2 C. Clinical Training PRN, PRN Training Vol. 2 M&A; Develop training and support materials on PRN II
	Supervision: Supervision visits
	Monitoring and Evaluation: Produce tab pages for the Nutrition Program; Expand sentinel nutritional surveillance, system nutritional surveillance, M&E; Conduct a pre-assessment on BFHI in implementing hospitals; Conduct a baseline study on supplementation of ferrous sulphate and folic acid in adolescent girls in schools and YFS; Conduct a study on the introduction of multimicronutrient supplementation in pregnant women; Conduct a study on the introduction of supplemental multimicronutrient powder in children ages 6–24 months; finalize and submit the Protocol for the Treatment of Acute Malnutrition in Adults for adoption
	Infrastructure and Equipment: Acquire and distribute materials for nutritional screening
	Communication, Media, and Outreach: Implement the Strategy on Social Mobilization Program, Food Fortification; Develop a communication strategy for behavior change on good nutrition practices; IEC materials, training and support on nutrition guidelines in the context of HIV/AIDS and TB
	General Program Management: Prepare the Plan for Operationalizing the PAMRDC Health Sector; Develop a plan for implementing the NRP II; Develop and implement the Comprehensive Plan to Promote Healthy Eating, Physical Activity, and Health
Expanded Program on Immunization (EPI)	***Training***: Formations for the introduction of PCV (pneumococcal vaccine); Formations for rotavirus vaccine introduction; Training in DQS (self-assessment of data quality); Training logistics, EPI; Training in maintenance of refrigerators
	Supervision: Supervision visits
	Infrastructure and Equipment: Freezers; Replace 10 gas-powered freezers that do not work; Replace gas powered, old free
	Transportation: Dispense pneumococcal vaccines (+ other vaccines)
	Communication, Media, and Outreach: Mobile units; Enter pneumococcus vaccine in the National Health Service; Enter rotavirus vaccine
Health Promotion	***Training***: Interpersonal communication; Refresher courses; Update training materials for APEs
	Supervision: Supervision visits (district, provincial, and central levels)
	Infrastructure and Equipment: Working kit
	Monitoring and Evaluation: M&E materials
	Communication, Media, and Outreach: Reproduction of scripts, manuals, and strategies; IEC material; Days of Health; Journalism Award in Health

DNSP Programs	Costs
	General Program Management: Subsidies, National Workshop on Health Promotion
Non-communicable Diseases	***Training***: Train health professionals in the field of NCDs and epidemiological surveillance of trauma and violence prevention
	Supervision: Supervision visits
	Infrastructure and Equipment: Medical equipment for hypertension, diabetes, and asthma
	Monitoring and Evaluation: Perform evaluation study of cardiovascular risk factors in the Mozambican population (stepwise Approach – WHO)
	Communication, Media, and Outreach: IEC material for cancer
	General Program Management: Participate in national and international meetings to exchange experience
Maternal and Child Health	***Training***: Train professionals in the field of health screening and treatment of breast cancer and cervical cancer; Empowering Professionals Integrated Packages – regional courses, Empowering Professionals Integrated Packages; Provincial Travel, Training of Trainers of Traditional Midwives at the provincial level; Training in IMCI; Training in TATE; Training in management; Training at CERN; ESMI training in rules for tracking children in CCR; Training traditional health providers in the new strategy of referral and participation of institutional childbirth midwives; Empowering advice from community leaders (CLCs) to promote the benefits of aT during pregnancy and strengthen institutional delivery; Conduct trainings on recycling of PMTCT providers in M & A advisory and HIV testing
	Supervision: Integrated supervision visits (including follow-up and recording appropriate prescription of ARVs); Verification of data – Exercise fast scan data (PTV) evaluation of the impact of PMTCT activities
	Monitoring and Evaluation: Assess the completeness of the new log books 6 months after implementation (PMTCT); Perform cycles of checking the quality of the data, by district, quarterly, semiannually, and annually by province in MOH; Produce record books for pilot (PMTCT); Conduct an annual review (PMTCT); Sheets and record books – daily and monthly summary
	Infrastructure and Equipment: Expand CCR for all PMTCT sites and equip with the proper CCR material, as well as the material for SMI care; Construction of maternity rooms
	Transportation: Acquisition of new cars
	Communication, Media and Outreach: Printed materials, furniture for brigades
	General Program Management: Meeting on the National Week; Produce and disseminate standards, guidelines, and roles on the provision of FP services in the context of HIV; Implement mechanisms for coordination between PMTCT / SRH / SI and NPCs / CDCS to increase the use of the new standards on PTV in the community; Promote quarterly coordination meetings between DPS and NPCs / CDCS for strengthening messages and actions for the prevention of PMTCT; treatment of fistula; normalize the daily implementation of the CRC in all U.S. PTV with and implement the flowchart
Tuberculosis (TB)	***Training***: Sensitizing and training health staff in participatory methods and adult education, using specially designed equipment; Empowering TB staff in CIPA on rights / duties of the patient; Update clinical and technical personnel in the management of TB in line with the agreement empowering staff for technical and clinical enterprises in DOTS; Train clinicians at district level in tuberculosis in children; Train personnel in the military health DOTS; Organize training modules for work on drug management (part of supervision); Train or update technical laboratories of those in U.S. TB sputum test; sensitize providers to use infection control plan; Inform workers about health risks of TB-

DNSP Programs	Costs
	R and TB-MDR/XDR (as part of the IC plan); Train provincial supervisors in analyzing data, presentation, and interpretation of inTraining
	Supervision: Develop components of ACSM in regular supervision; semiannual visits (central-level NTP to provinces); semiannual visits (provincial-level NTCP to districts); quarterly visits (district-level to U.S.); In line with the MoU, ensuring regular supervision of clinical enterprises and receiving progress reports of these; Making biannual supervision visits to prisons with clinics that make DOTS; semiannual supervision visits to reference laboratories, including the provincial laboratories EQA; semiannual supervision visits to provincial laboratories in128 districts, including laboratories EQA
	Monitoring and Evaluation: Conduct a KAP survey (qualitative and sociocultural studies and gender sensitive) seeking barriers that inhibit the patient from coming in time with symptoms of TB; Conduct a study of the prevalence of TB in Mozambique; Operating activities; Produce communication materials directed to priority problems and social mobilization group s– EPAs are actively seeking defaulting TB patients; Develop a system of monitoring stocks of medicines and reagents; Organize regular meetings of subgroups for quantification of drugs; Implement the active drug surveillance system; establish the RDQA use to check data quality once a year for 5 product indicators
	Infrastructure and Equipment: Equip those laboratories with gaps with necessary materials (microscopes / LED light, reagents and items for TB sputum test); Equip the 8 provincial hospitals (except Maputo city laboratories, Beira, and Nampula) with means for doing MTB and TSA culture;
	Communication, Media and Outreach: Create mutual support groups for patients and ex-patients (GAAC); Encourage community dialogues, using videotaped experiences, followed by debate – ACS and other activists of NGOs / CBOs are actively seeking defaulting TB patients
	General Program Management: Update guides and community DOTS tools; Implement the strategy of one stop (One Stop); Extend the plan of infection control to all providers; Define and adopt a regulation to establish a system for tracking workers; Make mid-term and final evaluation
Sports Medicine	***Training:*** In-service training of focal points (100 people in the period 2013–2017 covering the PESS)
	Supervision: Undertake supervision visits and technical support in 4 provinces
	General Program Management: Hold meetings with provincial Directors of Youth and Sports for monitoring and evaluation of activities
LNHAA	***Monitoring and Evaluation:*** Supervision visits for the control of water quality at the district level (hits M & A); Making inter-laboratory analysis (proficiency testing of laboratories) (LNHHA)
	Infrastructure and Equipment: Construction and equipping of provincial laboratories Gaza, Inhambane, Manhica, Tete, Zambezia, Niassa and Cabo Delgado; construction of lab rooms, reagents, and equipment LNHAA Maputo; Equipping (with equipment) of provincial laboratories; Reagents for provincial laboratories; culture media to provincial laboratories; glassware for laboratories

REFERENCES

1. Futures Institute. 2012. “OneHealth Tool: Technical Notes.” Glastonbury, CT: Futures Institute. Retrieved from http://www.futuresinstitute.org/onehealth.aspx.

2. INS. 2009. “Mozambique: National Child Mortality Study 2009 (Summary).” Maputo: Instituto Nacional de Saúde, Ministério da Saúde, República de Moçambique; UNICEF, London School of Hygiene and Tropical Medicine.

3. PNCM. 2012. “Plano Estratégico da Malária 2012–2016.” Programa Nacional de Controlo da Malária, Ministério da Saúde, República de Moçambique.

4. Eisele, T.P., D.A. Larsen, N. Walker, R.E. Cibulskis, J.O. Yukich, C.M. Zikusooka, *et al.* 2012. “Estimates of Child Deaths Prevented from Malaria Prevention Scale-up in Africa 2001–2010.” *Malaria Journal* 11: 93.

5. Korenromp, E.L. “Lives Saved from Malaria Prevention in Africa–Evidence to Sustain Cost-effective Gains.” *Malaria Journal* 11: 94.

6. MISAU. 2005. “Moçambique Inquérito Demográfico e de Saúde, 2003.” Calverton, Maryland, USA: Ministerio da Saude (MISAU), Institute Nacional de Estatística (INE) e ORC Macro.

7. MISAU. 2013. “Moçambique Inquérito Demográfico e de Saúde, 2011.” Calverton, Maryland, USA: Ministério da Saúde (MISAU), Institute Nacional de Estatística (INE) e ICF International (ICFI).

8. ICF International. 2012. “MEASURE DHS STATcompiler.” Retrieved from http://www.statcompiler.com.

9. MISAU. 2012. “Avaliação Conjunta Anual do Desempenho do Sector de Saúde – 2012.” Maputo, Moçambique: Ministério da Saúde, República de Moçambique.

10. DNSP. 2009. “Avaliação Nacional das Necessidades de Saúde Materna e Neonatal.” Maputo: Direcçao Nacional de Saúde Pública, Ministério da Saúde, República de Moçambique; UNFPA, WHO.

11. DPC. 2013. “Plano Estratégico do Sector da Saúde (PESS) 2014–2019.” Maputo: Direcção de Planificação e Cooperação (DPC), Ministério da Saúde, República de Moçambique.

12. INE. 2008. “Final Report on the Multiple Indicator Cluster Surveys, 2008.” Maputo: Instituto Nacional de Estatistica (INE), República de Moçambique.

13. WHO. 2007. “Expanded Program of Immunization – Situation Analysis.” Geneva: World Health Organization (WHO).

14. WHO. 2012. “Mozambique: WHO and UNICEF Estimates of Immunization Coverage: 2012 Revision.” Geneva: World Health Organization (WHO) and UNICEF.

15. GRM. 2011. “Application for Support to New and Under-used Vaccines 2012–2016.” Submitted to Gavi Alliance. Maputo: Governo da República de Moçambique.

16. Madsen, L.B., M. Ustrup, T.K. Fischer, I.C. Bygbjerg, F. Konradsen. 2012. "Reduced Price on Rotavirus Vaccines: Enough to Facilitate Access Where Most Needed?" *Bulletin of the World Health Organization* 90: 554–556.

17. MISAU. 2012. "Mozambique EVM Assessment: Finding and Recommendations of the Assessment Team." Ministério da Saúde, República de Moçambique.

18. MISAU. 2012. "Technical Report on the Post Introduction Evaluation of Pentavalent Vaccine in Mozambique." Maputo: Ministério da Saúde, República de Moçambique; World Health Organization; UNICEF.

19. PNCT. 2013. "Plano Estratégico e Operacional 2013–2017." Maputo: Programa Nacional de Controlo da Tuberculose (PNCT), Ministério da Saúde, República de Moçambique.

20. Gudo, P.S., Z. Cuna, E. Coelho, S. Maungate, E. Borroni, P. Miotto, *et al.* 2011. "Is Multidrug-resistant Tuberculosis on the Rise in Mozambique? Results of a National Drug Resistance Survey." *European Respiratory Journal* 38.

21. PNCT. 2013. "National Strategy for Programmatic Management of Drug Resistant TB." Maputo: Programa Nacional de Controlo da Tuberculose (PNCT), Ministério da Saúde, República de Moçambique.

22. Augusto, G., R. Nalá, V. Casmo, A. Sabonete, L. Mapaco, and J. Monteiro. 2009. "Geographic Distribution and Prevalence of Schistosomiasis and Soil-transmitted Helminths Among Schoolchildren in Mozambique." *American Journal of Tropical Medicine and Hygiene* 81: 799.

23. DNSP. 2013. "Estimativas de Metas e Carga de Doença, para Doenças Tropicais Negligenciadas (para o exercício OneHealth)." Maputo: Direcção Nacional da Saúde Pública, Ministério da Saude, República de Moçambique 2013.

24. MISAU. 2013. "Estimates by PMTCT Technical Working Group." Maputo: Ministério da Saúde, República de Moçambique.

25. CNCS. 2012. "2012 Global AIDS Response Progress Report." Maputo: Conselho Nacional de Combate ao SIDA, República de Moçambique.

26. MISAU. 2012. "Plano de Aceleração da Prevenção, Diagnostico e Tratamento de HIV/SIDA (2013–2015)." Maputo: Ministério da Saúde, República de Moçambique.

27. HPI. 2009. "The Potential Cost and Impact of Expanding Male Circumcision in Mozambique." Washington, DC: Health Policy Initiative (HPI) Task Order I.

28. HCM. 2013. "Relatório Anual 2012." Maputo: Hospital Central de Maputo (HCM), Ministério da Saúde, República de Moçambique.

29. Bruckner, T.A., R.M. Scheffler, G. Shen, J. Yoon, D. Chisholm, J. Morris, *et al.* 2011. "The Mental Health Workforce Gap in Low- and Middle-income Countries: A Needs-based Approach." *Bulletin of the World Health Organization* 89: 184–194.

30. GRM. 2012. "Annual Progress Report 2011 to the Gavi Alliance." Maputo, Moçambique: Government of the Republic of Moçambique.

31. MISAU. 2012. “Relatórios de Actividades e Execução Orçamental.” Maputo: Ministério da Saúde, República de Moçambique.

32. MISAU. 2012. “Inquérito dos Fundos Externos (IFE).” Maputo: Ministério da Saúde, República de Moçambique.

33. World Bank. 2013. “World Development Indicators: Online Database.” Washington, DC: The World Bank.

34. GRM. 2012. “Medium-Term Expenditure Framework.” Maputo: Government of the Republic of Mozambique.

35. DPC. 2013. “Grupo de Trabalho é Elaborar Uma Estratégia de Financiamento do Sector da Saúde (Apresentação do PowerPoint).” Maputo, Moçambique: Direcção de Planificação e Cooperação (DPC), Ministério da Saúde, República de Moçambique;.

36. Dutta, A., and C. Hongoro. 2013. “Scaling Up National Health Insurance in Nigeria: Learning from Case Studies of India, Colombia, and Thailand.” Washington, DC: Futures Group, Health Policy Project.

37. MOPD. 2010. “Report on the Millennium Development Goals – Mozambique 2010.” Maputo: Ministry of Planning and Development, Republic of Mozambique; UNDP.

38. INE. 1997. “Censo 1997.” Maputo: Instituto Nacional de Estatistica (INE), República de Moçambique.

39. Walker, C.L.F., I.K. Friberg, N. Binkin, M. Young, N. Walker, O. Fontaine, *et al.* 2011. “Scaling Up Diarrhea Prevention and Treatment Interventions: A Lives Saved Tool Analysis.” *PLoS Medicine* 8: e1000428.

40. Fox, M., R. Martorell, N. van den Broek, and N. Walker. 2011. “Assumptions and Methods in the Lives Saved Tool (LiST).” *BMC Public Health* 11: I1.

41. Steinglass, R., T. Cherian, J. Vandelaer, R.D. Klemm, and J. Sequeira. 2011. “Development and Use of the Lives Saved Tool (LiST): A Model to Estimate the Impact of Scaling Up Proven Interventions on Maternal, Neonatal and Child Mortality.” *International Journal of Epidemiology* 40: 519–520.

42. Fox, M., R. Martorell, N. van den Broek, and N. Walker. 2011. “Technical Inputs, Enhancements and Applications of the Lives Saved Tool (collection).” *BMC Public Health* 11, Supplement 3.

43. Bryce, J., F. Arnold, A. Blanc, A. Hancioglu, H. Newby, J. Requejo, *et al.* 2013. “Measuring Coverage in MNCH: New Findings, New Strategies, and Recommendations for Action.” *PLoS Medicine* 10: e1001423.

44. Liu, L., Johnson, H.L., Cousens, S., Perin, J., Scott, S., Lawn, J.E., *et al.* 2012. “Global, Regional, and National Causes of Child Mortality: An Updated Systematic Analysis for 2010 with Time Trends Since 2000.” *The Lancet* 379: 2151–2161.

45. Stover, J., R. McKinnon, and B. Winfrey. 2010. “Spectrum: A Model Platform for Linking Maternal and Child Survival Interventions with AIDS, Family Planning and Demographic Projections.” *International Journal of Epidemiology* 39: i7–i10.

46. Stover, J. 2008. "DemProj: A Computer Program for Making Population." Washington, DC: Futures Group International, Health Policy Initiative, Task Order 1.

47. Plosky, W.D., J. Stover, and B. Winfrey. 2011. "The Lives Saved Tool – A Computer Program for Making Child Survival Projections." Glastonbury, CT: Futures Institute.

For more information, contact:

Health Policy Project
Futures Group
1331 Pennsylvania Ave NW, Suite 600
Washington, DC 20004
Tel: (202) 775-9680
Fax: (202) 775-9694
Email: policyinfo@futuresgroup.com
www.healthpolicyproject.com