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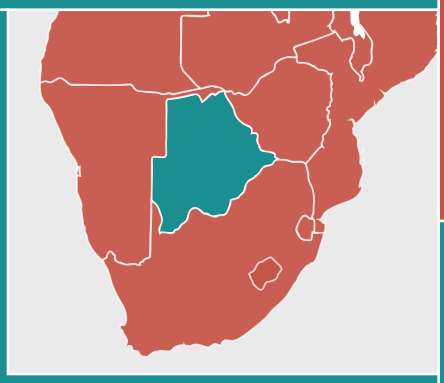
ESTIMATED RESOURCE NEEDS FOR KEY HEALTH INTERVENTIONS OFFERED UNDER BOTSWANA'S ESSENTIAL HEALTH SERVICES PLAN 2013–2017



This publication was prepared by Veena Menon, Priya Iyer, and Wame Mosime of the Health Policy Project.

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Estimated Resource Needs for Key Health Interventions Offered under Botswana's Essential Health Services Plan 2013–2017

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This publication was prepared by Veena Menon,[1] Priya Iyer,[1] and Wame Mosime[2] of the Health Policy Project.

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EXECUTIVE SUMMARY

As the Government of Botswana (GOB) moves forward with a plan to expand coverage of health services, increasing the "value for money" of current health service delivery and identifying new financing sources will be critical. As part of the 2010 Integrated Health Service Plan, a 10-year strategic plan for the entire health sector, the Ministry of Health (MOH) will introduce the Essential Health Services Package (EHSP). The EHSP defines the health interventions that GOB is committed to providing and making accessible to the entire population. While understanding the costs of delivering health interventions and the major cost drivers is critical to expanding the health sector, current knowledge of these costs is limited. This study aims to shed light on the overall costs of key interventions that address the major disease burden in Botswana.

The study comprised two parts. In Part I, the Health Policy Project (HPP) technical team assessed the unit costs of providing specific HIV interventions at two levels of service delivery. In Part II, the team used the OneHealth tool (WHO PMNCH, n.d.) to project (between 2013 and 2017) the overall resource requirements for providing EHSP services, based on normative inputs.

Part I: Unit Costs for HIV Interventions

With an HIV prevalence of 25 percent among those 15 to 49 years old, Botswana is one of the most highly affected countries in the world. HIV/AIDS accounts for half of all disability-adjusted life years in the country (WHO, 2010). The country's life expectancy decreased from 67 in 1990 to 62 in 2012 (WHO, 2012) in large part due to HIV; life expectancy in Botswana would be significantly lower if not for early access to antiretroviral treatment (ART). For Part I of the analysis, the HPP technical team focused on obtaining facility-level costs for HIV-related interventions. Given Botswana's high HIV prevalence, maximum resources in the health sector are directed toward delivering HIV interventions.

The technical team assessed direct and indirect costs of delivering HIV-related interventions at two facilities. In turn, costs were collected for six interventions from these two facilities: (1) additional ART for tuberculosis (TB)/HIV patients, (2) safe male circumcision, (3) co-trimoxazole for TB/HIV patients, (4) postexposure prophylaxis (PEP), (5) screening people living with HIV for TB, and (6) condoms. Direct costs included personnel, drugs, and supplies, and indirect costs included management and support staff, utilities, supply chain, equipment, and building and vehicle operational costs.

For prevention of mother-to-child HIV transmission, HIV testing and counseling, and ART, costing studies have been completed within the past two years; hence the team, in consultation with USAID/Botswana, concentrated on assessing costs for interventions that lacked any cost data.

Table 1. Unit Cost of HIV Services Per Patient Per Year at Bontleng Clinic in US$

HIV Intervention	Direct Cost	Indirect Cost	Total Cost
Additional ART for HIV+ TB Patients	$87.6	$30.4	$117.9
Co-Trimoxazole for HIV+TB Patients	$178.8	$31.0	$209.8
Male circumcision	$136.3	$18.4	$154.7
PEP	$518.7	$492.4	$1011.1
Screening HIV Patients for TB	$28.5	$29.0	$57.5

Table 2. Unit Cost of HIV Services Per Patient Per Year at Goodhope Primary Hospital in US$

HIV Intervention	Direct Cost	Indirect Cost	Total Cost
Additional ART for HIV+ TB Patients	$87.6	$119.3	$206.9
Co-Trimoxazole for HIV+TB Patients	$759.2	$166.8	$926.0
Male circumcision	$69.7	$19.6	$89.3
PEP	$597.2	$176.7	$773.9
Screening HIV Patients for TB	$17.8	$64.5	$82.3

The unit cost for condoms was calculated on a per condom basis. The team assessed it as US$0.11 at Bontleng Clinic and US$0.09 at Goodhope Primary Hospital. This includes the cost of the supply chain for condom distribution.

Overall, across both facilities, the primary drivers of the direct unit cost were drugs and supplies and personnel. For indirect costs, building and vehicle and facility management costs contributed the least to total costs across both facilities. Poor record keeping led to difficulties assessing patient volume data. In some cases, the technical team had to annualize figures based on available data to support cost calculations. Another limitation encountered was that the application of intervention guidelines was not standard across facilities. This could be attributed to a lack of skills, varying guideline interpretation, or a shortage in staff delivering services.

Part II: Normative Costing Using the OneHealth Tool

In Part II of this study, normative costing of the EHSP was conducted using the OneHealth tool (Futures Institute, n.d.). The OneHealth tool was designed to help countries develop estimates of future financial requirements under various assumptions. OneHealth provides a framework for planning, costing, impact analysis, and financial scenario analysis. The tool is split into two sections: health services and health systems.

In the case of health services, the HPP team focused on eight disease areas: maternal health, child health, immunization, malaria, TB, HIV, non-communicable diseases (NCDs), and mental, neurological, and substance abuse disorders (MNSADs). Data on information such as targets, implementation, and costs of drugs and commodities were obtained from MOH program managers and from documents. For all disease areas, the team created customized data collection sheets designed around the OneHealth input process. These customized data collection sheets were fielded with key respondents from the disease programs and supplemented as necessary with national and international guidelines. All cost inputs were validated with program managers. Health systems include costs for infrastructure, human resources, logistics, health information systems, governance, and health financing. Data available for health systems costs were either missing or not robust, and since the costs of the health services were the focus of this work, the health system costs were not included.

The results of the analysis of the eight disease areas covered under EHSP using OneHealth show that, at a minimum, US$2,360.8 million will be required to provide coverage for these diseases over five years (2013 to 2017). The totals reflected in Table 3 are costs that will be incurred over a period of five years. Per the EHSP plan, this burden will be shared across public and private sector actors. These costs include drugs/supplies and program costs (nonservice delivery staff and training when available). At 41 percent, HIV makes up the largest portion of costs; NCDs (26%) and TB (16%) make up the second and third largest costs.

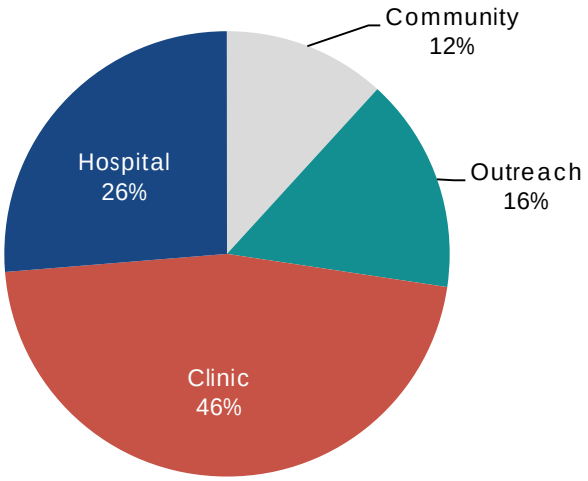
Table 3. Costs Disaggregated by Program Area for 2013–2017 in 2013 US$ millions*

Disease Areas	2013	2014	2015	2016	2017	Total
Maternal/newborn and reproductive health	$26.4	$26.7	$26.5	$25.8	$ 24.7	$130.2
Child health	$0.8	$0.9	$1.1	$1.2	$1.2	$6.1
Immunization	$12.7	$13.6	$13.8	$14.1	$14.3	$68.4
Malaria	$41.8	$42.8	$44.2	$45.9	$46.6	$221.4
TB	$94.3	$87.4	$80.7	$74.5	$75.8	$412.7
HIV/AIDS	$181.1	$200.9	$206.6	$215.9	$232.2	$1,036.7
NCDs	$104.9	$117.7	$133.5	$150.4	$168.4	$674.9
MNSADs	$0.9	$1.5	$2.1	$2.7	$3.9	$11.2
Total costs (all program areas)	$456.2	$484.8	$501.8	$523.9	$560.5	$2,527.2

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

The OneHealth calculations show that the highest percentage of costs (46%) is incurred at the district hospital level. District hospitals (which include primary and district hospitals) provide a wide range of services that are delivered by generalists and specialists (MOH, 2010c); higher-level interventions (e.g., for multidrug-resistant TB) are often offered only at this level.

Figure 1. Percentage of Total Cost by Program Area, 2013–2017



Challenges

For this iteration of the OneHealth application, the technical team focused on the costs of implementing individual disease interventions. Program costs include nonservice delivery human resources and some training costs. Program costs are under-represented due to the difficulty in sourcing data on monitoring and evaluation, infrastructure and equipment, communication media and outreach, and advocacy. While several program areas had strategic documents aimed at achieving the Millennium Development Goals (not recently updated in some cases), the technical team had difficulty relating the stated goals with quantifiable and achievable targets.

Next Steps

While the technical team conducted a training session on the OneHealth model for MOH officials before beginning this study, the MOH should plan to undertake additional capacity-building measures for program staff in strategic planning and budgeting processes as well as data systems strengthening to increase the availability of reliable and accurate data. Capacity development should include training additional MOH staff on the OneHealth model so program staff can undertake periodic updates of the populated model to revisit targets and assess resource needs and likely health impacts as EHSP implementation unfolds. This will allow for a more accurate projection of expected costs. As such, the populated tool needs to be updated with robust data on program and health systems costs to get a fuller picture of EHSP resource needs. The MOH should also consider investing in a stronger system to track financial expenditures and, in an effort to decentralize expenditure tracking, create a tracking system at the District Health Management Team level to support oversight at the district level. As part of the second phase of this study, the technical team will train MOH staff on costing methodologies, data gathering techniques, and assessment of unit costs. This will enable program managers to better plan and allocate scarce resources.

In terms of service implementation, the MOH should reconsider its current plan to offer all services at all facilities and consider targeting specific facilities for specialized services. This would help reduce waste due to low patient volumes, which results in high costs. For example, the government could designate a few select facilities as focal points for low-frequented services (such as PEP) to improve cost efficiency ratios.

ABBREVIATIONS

AIDS	Acquired Immuno-Deficiency Syndrome
AHO	African Health Observatory
ART	Antiretroviral Therapy
ARV	Antiretroviral
BNTP	Botswana National Tuberculosis Program
BUP	Botswana- UPenn Partnership
CHBC	Community Home Based Care
CMS	Central Medical Stores
CTO	Central Transport Organization
DHAPC	Department of HIV/AIDS Prevention and Care
DHMT	District Health Management Team
DPH	Department of Public Health
EHSP	Essential Health Services Package
EMTCT	Elimination of Mother to Child Transmission
FP	Family Planning
GOB	Government of Botswana
GPH	Goodhope Primary Hospital
HCW	Health Care Workers
HIV	Human Immunodeficiency Virus
HPP	Health Policy Project
HPDME	Health Policy Development and Monitoring & Evaluation
HR	Human Resources
HRDC	Health Research Division Committee
HTC	HIV Testing and Counselling
IHSP	Integrated Health Service Plan
IRS	Indoor residual spraying
LLIN	Long-lasting insecticide-treated nets
M&E	Monitoring and evaluation
MCH	Maternal and Child Health
MDR-TB	Multi-drug resistant TB
MNR	Maternal, newborn and reproductive
MOH	Ministry of Health
NASA	National AIDS Spending Assessment
NCD	Non-communicable Diseases
NGO	Non-governmental Organization
ORS	Oral Rehydration Solution
PEP	Post Exposure Prophylaxis
PITC	Provider Initiated Testing and Counselling
PLHIV	People Living with HIV
PMTCT	Prevention of Mother to Child Transmission
SMC	Safe Male Circumcision
SRH	Sexual and Reproductive Health
STI	Sexually transmitted infection
TB	Tuberculosis
USAID	United States Agency for International Development
VCT	Voluntary Counselling Testing
VMMC	Voluntary Male Medical Circumcision
WHO	World Health Organization
XDR-TB	Extensively drug resistant TB

INTRODUCTION

Overview of Botswana's Health System

After gaining independence in 1965, the Government of Botswana (GOB) made considerable efforts to ensure an equitable distribution of health facilities throughout the country to promote greater access to health services. Currently 84 percent of the population live within a 5-km radius of a health facility, and an additional 11 percent live between 5 and 8 km from a facility.

Botswana's healthcare system consists of public, private for-profit, and private nonprofit healthcare facilities, distributed over 29 health districts ranging from urban settings to rural and hard-to-reach areas of the country. The public sector facilities, however, dominate the health system, operating 98 percent of the facilities. The draft revised National Health Policy (MOH, 2011e) identifies the following five levels of care for Botswana as part of standardizing the healthcare service delivery:

1. Mobile stops and health posts (collectively representing 52%)
2. Clinics with beds and without beds (43%)
3. Primary hospitals (3%)
4. District hospitals (2%)
5. Tertiary hospitals (0.5%) (WHO/African Health Observatory–Botswana Healthcare System)

According to the 2012 Norwegian evaluation report, the number of beds per 1,000 population in 2004 to 2006 fluctuated between 2.2 and 2.4/1,000 population. The ratio is typically 3/1,000 in developed economies like the United States and the United Kingdom.

According to the World Health Organization (WHO) and the African Health Observatory, although most of the population has access to health facilities and services, this does not always translate into utilization of high-impact interventions. A study that was undertaken to assess the utilization and efficiencies of 33 hospitals in Botswana showed some inequities in access to beds and quality of hospital services and differences in utilization patterns of services. The report suggests that these factors could be attributed to the shortage of staff, lack of equipment, inadequate management, ineffective referral system, care-seeking behavior, and preferences of the general population accessing services.

Public health services in Botswana are regulated by the Public Health Act of 2002. Services offered across the five levels of care listed above are shown in the following chart.

Facility Level	Services
Health Posts and Clinics	***Primary Health Care Services*** • Immunizations and child care services • Sexual reproductive services • HIV and AIDS services • Mental health and rehabilitation • Health education and advice ***Medical Services*** • Minor curative treatment and care services • Laboratory and diagnostic services • Pharmacy services • Dental services

Facility Level	Services
Hospitals (Primary, District, Tertiary)	***Primary and District Hospitals*** Primary hospitals are general hospitals that are equipped to deal with most diseases, injuries, and immediate threats to health. District hospitals are major district health facilities equipped with a larger number of beds and capable of dealing with intensive and long-term care. These services include • Outpatient services and pediatrics care • Emergency and urgent care, surgery and intensive care • Pharmacy and laboratory services • X-ray and diagnosis, dental care services • Eye care services, orthopedic services ***Tertiary Hospitals*** These are specialized hospitals and health facilities equipped to deal with specialized diseases, medical needs, and care. Some of these services include • Psychiatric care • Rehabilitation services • Oncology and cancer services • Audiology services • *Obstetrics and gynecology*

Source: Ministry of Health, http://www.moh.gov.bw/

Spending on healthcare in Botswana is higher than in most countries in sub-Saharan Africa, and a large share of this is financed domestically. In 2010, the government spent roughly 18 percent of its budget on health—more than the 15 percent target recommended by the Abuja Declaration (MOH, 2012d). While this level of expenditure on health is laudable, the government's ability to sustain or increase financing is threatened by donor restructuring and macroeconomic changes in Botswana; a high burden of infectious diseases, including HIV, lower respiratory disease, and tuberculosis (TB); a growing burden of non-communicable diseases (NCDs); diarrheal disease and malnutrition; and a shift toward decentralized service delivery within the Ministry of Health (MOH) (WHO, 2010). In the face of these challenges, however, the GOB remains committed to providing high-quality, accessible, and affordable health services. In fact, in its Revised National Health Policy (2011), the MOH has articulated a goal of attaining universal coverage of a high-quality package of essential health services for the entire population.

Policy Environment

As the government moves forward with a plan to expand coverage of health services, increasing the "value for money" of current health service delivery and identifying new financing sources will be critical. In 2010, Botswana developed the Integrated Health Service Plan (IHSP), a 10-year strategic plan for the entire health sector, including public and private actors as well as NGOs (MOH, 2010c). As part of this plan, the MOH will introduce the Essential Health Services Package (EHSP). The primary purpose of the EHSP is to encourage the allocation of scarce resources to the most cost-effective interventions that address the disease burden in Botswana while considering available financial resources and the need for equity in health service delivery (MOH, 2010b). The overall goal is attainment of universal coverage of a high-quality package of essential health services. As such, EHSP has two key purposes:

1. To provide a standardized package of basic services that forms the core of service delivery in all primary healthcare facilities.
2. To promote redistribution of health services by providing equitable access, especially in underserved areas.

While the design of the scheme is still being considered by the MOH, the private sector, and regulatory authorities, it is envisioned that formal sector employers will be required to provide health insurance for their employees. This will distribute the cost burden of providing universal access to EHSP. To prepare for implementation of the EHSP, a substantial amount of planning is essential. To achieve expanded health coverage through stronger decentralized service delivery and a health scheme, it is necessary to understand the cost implications. Understanding the costs of delivering health interventions and the major cost drivers is critical to expanding access to health services. This information allows countries to understand resource needs and determine areas for efficiency gains. Current knowledge of costs to deliver health services is limited, and exercises like this one will help bridge this gap.

Study Objectives

This study comprised two parts:

1. In Part I, the technical team assessed the facility-level unit costs of providing five HIV interventions plus condoms at two different levels of service delivery.
2. In Part II, the technical team projected the overall normative costs of covering eight disease areas within the EHSP over five years.

PART I: ASSESSING UNIT COSTS OF PROVIDING HIV INTERVENTIONS AT THE FACILITY LEVEL

1.1 Background

Botswana has one of the highest HIV prevalence rates in the world: 25 percent of adults 15 to 49 years old have HIV, contributing to 50 percent of the disability-adjusted life years in the country (WHO, 2010). The country's life expectancy has decreased from 67 in 1990 to 62 in 2012 (WHO, 2012), in large part due to HIV. As a result of the epidemic, the country's response has evolved into one of the world's model HIV programs. Unlike many other developing countries, the GOB has committed a large portion of its domestic resources to HIV programs and services.

From 2006 to 2011, HIV expenditure was 35 percent of all government health expenditure (Amico et al., 2010). The public sector contributed 66 percent of total HIV funding, the private sector contributed 2 percent, and external funders contributed 32 percent (National AIDS Spending Assessment, 09/10–11/12). There are some concerns about the accuracy of this breakdown, but the larger picture holds true.

To address the disease burden in Botswana, the MOH, in conjunction with partners, has developed the IHSP, a 10-year strategic plan. The purpose of the plan is to extend an EHSP to the entire population through public, private, or a combination of the two service delivery types. The EHSP will include cost-effective interventions that address disease areas in Botswana such as HIV. Health coverage will be extended to a larger portion of the population, including the most vulnerable and hard to reach. Accordingly, the government is planning to implement health financing reforms and decentralization to better deliver the EHSP. Botswana's healthcare system has five distinct health service levels, including health posts (the lowest level of service), clinics with and without beds, primary hospitals, district hospitals, and tertiary hospitals. Decentralizing services will allow for additional services to be delivered at the lower levels of healthcare.

For this initial analysis, the HPP technical team focused on obtaining facility-level costs for HIV-related interventions. Given Botswana's high HIV prevalence, a gross majority of the resources in the health sector are directed at HIV interventions and associated commodities. The technical team plans to assess additional unit costs for other interventions covered under the EHSP in a subsequent exercise.

During a February 2014 trip to Botswana, HPP held fruitful discussions with USAID colleagues and other stakeholders to outline the scope of this part of the study. Following the consultative process, participants collectively agreed to focus on the five interventions listed below as being the ones most in need of cost information and data. The rationale for the selection on these five HIV/AIDS interventions (plus condoms) was based on the need to cost interventions that had not recently been costed; this rationale excluded antiretroviral therapy (ART), HIV testing and counseling (HTC), and prevention of mother-to-child transmission (PMTCT), all of which have been recently assessed. Additionally, since youth-focused prevention is not a stand-alone intervention in Botswana (it is delivered as part of general prevention programs such as safe male circumcision [SMC] and condoms), the technical team did not include this as a separate intervention to calculate unit costs.

The team assessed unit costs of delivering HIV-related interventions at two levels: primary hospital and clinic (without bed). HPP derived unit costs per patient per year for five interventions:

1. Additional ART for TB patients
2. SMC
3. Co-trimoxazole for TB/HIV patients

4. Postexposure prophylaxis (PEP)
5. Screening people living with HIV (PLHIV) for TB

The team also derived unit costs per condom (not per patient as in case of other interventions), which includes commodities costs and the supply chain costs of condom distribution.

1.2 Background on Available ART, PMTCT, and HTC Data

The ART and PMTCT studies give a detailed overview of resource needs to continue providing high-quality care. The *Botswana Investment Case* analysis, which is currently in progress, assesses the normative unit costs to deliver ART and PMTCT. The HTC costing study provides a better understanding of the current unit costs of delivering HTC services at the facility level.

An overview of four existing HIV/AIDS costing studies is provided below.

ART

The Cost and Impact of ART Guideline Changes and HIV Prevention Efforts in Botswana (Government of Botswana, 2012b) report was published in March 2012. The study assessed the cost-effectiveness of potential changes in the treatment guidelines and prevention strategies in Botswana. The study compared increasing treatment eligibility to CD4 less than 350 rather than less than 250; treatment as prevention; high-impact prevention interventions in combination with current treatment guidelines; high-impact prevention interventions in combination with CD4 less than 350 as the treatment eligibility guideline; universal treatment access; the test and treat strategy (to employ regular testing to identify HIV-positive individuals), and SMC alone. The following summary table describes projected costs for each of these scenarios, deaths averted, cost per death averted, infections averted, and cost per infection averted.

Table 4. ART Guideline Change and HIV Prevention Effort Scenarios (all costs US$)

	First-Year Costs	Five-Year Costs	Deaths Averted	Cost per Death Averted	Infections averted	Cost per Infection Averted
***ARV C4D<350**	$440m	$2,430m	7400 (24%)	$34,800	12,700 (20%)	$20,200
****Treatment as prevention**	$2.4m	$11m	40(2.5%)	$230,000	530(20%)	$17,600
***High impact + CD4 250**	$410m	$2,270m	230(1%)	$450,000	16,100(25%)	$6,300
***High impact + CD4 350**	$460m	$2,530	7500(27%)	$48K	25,500(40%)	$14,000
***Universal access**	$470m	$2,750m	7500(33%)	$76K	31,300(49%)	$18,300
***Test and treat**	$740m	$3,640m	15,100(50%)	$99,500	44,700(70%)	$35,500
*****SMC**	$4.6m–$15m	$25.3m–$67.5m	80−260 (0.3%-0.85%)	$300K–$250K	9%–28%	$4000–$3600

* Estimates based on total cost: the cost of treatment, all other interventions (behavioral and SMC) and program support functions (e.g., administration, human resources, M&E, policy & research)
** Estimates based on costs within the PMTCT program
*** Estimates based on SMC costs

The study did not recommend any one of the scenarios detailed above. Rather, it assessed all these scenarios and suggested that implementing a practical approach such as increasing treatment eligibility to CD4 less than 350 and implementing prevention guidelines would require more resources than what is currently available.

The *Botswana Investment Case* (NACA, 2014) study outlines normative unit costs for ART. The study is a GOB (National AIDS Coordinating Agency) activity supported by the Joint United Nations Program on HIV/AIDS (UNAIDS) and undertaken to actualize the investment approach in Botswana. It establishes the "optimal" HIV/AIDS programs and, as much as possible, looks at the critical enablers to support program implementation. This study is the basis for developing Botswana's concept note for the new Global Fund funding mechanism. The modelling for the Investment Case involved revising existing Spectrum files with the most up-to-date information available from HIV/AIDS programs, the Botswana AIDS Impact Survey (BAIS), and the national census. A baseline projection was created as a counterfactual scenario and normative costs of individual interventions were modelled for the period 2014 to 2030. Below, we have detailed unit costs for several ART interventions for 2013 to 2017 because that aligns with our current study's time period.

ART Unit Costs for HIV Patients (US$)	2013	2014	2015	2016	2017
Adults (costs per patient per year)					
First-line ART drugs	$155	$155	$155	$155	$155
Second-line ART drugs	$464	$464	$464	$464	$464
Lab costs for ART treatment	$151	$151	$151	$151	$151
Drug and lab costs for opportunistic infections	$378	$378	$378	$378	$378
Co-trimoxazole prophylaxis	$10	$10	$10	$10	$10
Children (costs per patient per year)					
ARV drugs	$235	$235	$235	$235	$235
Lab costs for ART treatment	$155	$157	$159	$161	$163

PMTCT

More than 90 percent of women in Botswana receive antenatal care at a health facility, highlighting that the provision of PMTCT at the facility level is a service within EHSP. Currently, more than 95 percent of women who test HIV positive receive antiretrovirals (ARVs), and fewer than 3 percent of HIV-exposed babies are born HIV positive. *The Costing of EMTCT Botswana 2012–2015* study was completed in 2013. The costing assessed the resources needed to eliminate maternal-child transmission in Botswana by 2015 as per the Strategic Plan Towards Elimination of Mother-to-Child Transmission (EMTCT) of HIV and Keeping Their Mothers Alive 2012–2015 (MOH, 2011d). Results show that US$77.3 million is required to achieve elimination and improve maternal, newborn, and child survival and health in the stated years. The following table summarizes the costs by strategic area.

Summary Budget by Strategic Area	Total 4 Years 2012–2015 (US$)
Strategic Area 1: Primary prevention of HIV infection among women of childbearing age	1,793,428
Strategic Area 2: Prevention of unintended pregnancies among women living with HIV	859, 354
Strategic Area 3: Prevention of HIV transmission from a woman living with HIV to her infant	59,089,384
Strategic Area 4: Appropriate treatment, care and support to mothers living with HIV and their children and families.	9,857,928
Strategic Area 5: PMTCT response management and coordination	2,860,684
Strategic Area 6: PMTCT program monitoring, evaluation and research	2,835,159
TOTAL	**$77,295,939**

To achieve elimination, the largest portion of costs, US$59,089,384 (76%), needs to be invested in Strategic Area 3, Prevention of HIV transmission for a woman living with HIV to her infant. The second largest investment, US$9,857,928 (13%), would be Strategic Area 4, Appropriate treatment, care, and support to mothers living with HIV and their children and families.

Botswana's Investment Case Study (described above) also outlines normative unit costs for PMTCT, as seen below.

PMTCT Unit Costs (US$)	2013	2014	2015	2016	2017
Counseling (per mother)					
Pretest	$2	$2	$2	$2	$2
Posttest for HIV+	$2	$2	$2	$2	$2
Postnatal (including breastfeeding)	$14	$14	$14	$14	$14
HIV testing (per test)					
Mother	$2	$2	$2	$2	$2
PCR test for infant after birth	$19	$19	$19	$19	$19
Infant after cessation of breastfeeding	$2	$2	$2	$2	$2
ARVs (cost per person per day)					
Nevirapine, 200mg for mother	$0.04	$0.04	$0.04	$0.04	$0.04
Nevirapine, for infant	$0.04	$0.04	$0.04	$0.04	$0.04
AZT	$0.11	$0.11	$0.11	$0.11	$0.11
3TC	$0.11	$0.11	$0.11	$0.11	$0.11
Triple treatment (AZT+3TC+NVP/EVF)	$0.42	$0.42	$0.42	$0.42	$0.42
Triple prophylaxis	$0.42	$0.42	$0.42	$0.42	$0.42
Service delivery (per mother)	$2	$2	$2	$2	$2
Formula (per child)	$536	$536	$536	$536	$536

HTC

The Costs of HIV Testing and Counselling Services in Botswana (Stegman, 2013) study was completed in 2013. Study results detail unit costs for delivering HTC services through a variety of modalities (outreach, facility based, integrated, campaign), at different levels of the healthcare system and in different locations throughout the country. This analysis also assists with explaining the components of HTC that drive the unit costs, as well as providing information about the number of HIV-positive individuals identified through each of the service delivery modalities.

The unit cost was calculated by level of facility, type of service delivery, type of facility, and the geographical location of facility. HTC has four models of service delivery:

- Integrated testing offered through adjacent HIV programs such as PMTCT, TB, provider-initiated testing and counseling (PITC)
- Stand-alone voluntary counseling and testing (VCT) offered at NGO sites and/or public health facilities on a walk-in basis
- Mobile testing offered during outreach activities conducted by healthcare workers (HCWs) within communities
- Campaign testing offered during national campaign drives such as "Know Your Status"

A review of the study's HTC costing data by service delivery modality in public facilities indicates that HTC delivered via mobile sites (US$8 per client) and VCT (US$32 per client) were the least expensive. HTC delivered at TB clinics was the most expensive (US$371 per client). This wide discrepancy in costs is due to variation in testing volumes between service delivery modalities, and direct costs, the largest of which was for human resources (HR). This was especially true for integrated service delivery (i.e., HTC delivered through other programs, such as the TB program, where human resource costs are relatively high).

VCT at NGO facilities (US$67 per client) was more expensive than at public sector facilities (US$32 per client). However, the unit cost of mobile HTC tended to be quite comparable between NGO programs (US$7 per client) and government programs (US$8 per client). Within the study sample, 49,221 HIV tests were performed in 2012. This represented 5 percent of all tests performed in the public sector and by NGOs. The largest proportion of tests (41%) was performed at VCT facilities run by NGOs (this is consistent with national estimates that indicate that about 46 percent of all HIV tests are performed by NGOs). This was followed by PITC (31%) and PMTCT (16%) modalities. Compared to many of the other unit costs, VCT appears to be a quite efficient way to deliver HTC services. However, the number of clients seen at public sites was much lower than in the NGO facilities, which appears to suggest that clients prefer the NGO facilities. In terms of maximizing impact while spending the least amount of money per client, Botswana may wish to emphasize VCT services offered at NGO facilities (and may wish to give a greater emphasis to mobile testing).

In terms of effectiveness at identifying HIV-positive clients, the TB program was, not surprisingly, the most effective (49 percent of all clients were HIV positive). The second highest prevalence among HTC clients (36%) was at NGO VCT facilities, and the third highest prevalence (14%) was at government VCT facilities. The lowest prevalence rates of HIV were at PITC (3%), campaign events (4%), and government mobile testing sites (6%).

1.3 Methodology

The team used an ingredients-based costing approach to derive unit costs per patient per year for each of five HIV interventions and the cost of condoms. Data were collected on service delivery personnel, drugs and supplies, utilities, building and vehicle, equipment, management, and supply chain costs to derive the unit costs per service. Data were collected at facility, District Health Management Team (DHMT), district, and central levels (MOH, Central Transport Organization [CTO], Department of Building and Engineering Services [DBES], and other relevant ministries/departments supporting operations at public health facilities).

The team employed various methods to allocate costs based on the level at which data were collected and ingredients of the service. At the district level, costs were either recorded per facility or aggregated as universal bills for all facilities within the district. If the costs were aggregated, the technical team would proportionally allocate a cost to each facility in that district and then further allocate a cost to each HIV intervention based on patient volumes. Costs such as staff salaries and drugs costs were collected at the central level. While no further allocation was necessary for drug costs, an allocation method was needed for other costs. For example, salary allocation varied depending on the type of personnel (i.e., management or service delivery). These allocation methods are described in further detail below.

Study Period

The costing study period during which costs and other data for the five interventions and condoms were considered was from April 2013 to March 2014. This period is defined as one fiscal year.

Study Perspective

Costing studies are ideally conducted from the perspective of the primary party affected by the outcome. In this scenario, the unit costing analysis was conducted taking into account all costs incurred by the service provider. Opportunity costs incurred by clients (e.g., clients' travel costs, clients' travel time, etc.) were excluded from this analysis.

Facility Sampling

The MOH has rolled out extensive HIV service provision across its public health facilities. The rationale for selection of the sample facilities was the following:

1. **Availability of HIV treatment and prevention interventions at facility:** It is important to note that the study sought to cost HIV services that were rendered in full at the facility. Some health facilities refer their clients to other facilities for services due to low demand or absence of HCWs. These facilities were not considered for selection. As an example, there are only 15 public health facilities offering dedicated SMC services. Other facilities either refer their clients to sites that provide only SMC or offer SMC services based on scheduled outreach plans using mobile teams.
2. **Ensuring cost variation across public health facility levels:** The cost of service delivery varies across the five levels of healthcare. For example, in higher-level health facilities like tertiary hospitals, specialized personnel may be delivering the same service that a general healthcare worker may be providing at a lower-level facility like health posts. This discrepancy is usually due to a restricted number of specialized staff in country, leading to higher cost of service delivery at higher levels of health. In order to capture these potential differences in cost across facility levels, we sampled facilities from two different health levels.
3. **Ensuring geographic variation:** The selection of sample facilities also took into account cost variations based on geographic location (i.e., rural or urban settings). For example, cost inputs such as supply chain can vary by geography based on the cost differential to transport supplies and commodities from Central Medical Stores (CMS) to different facilities.

Given the team's limited resources, it was not possible to get a statistically representative sample. However, the team did determine that choosing two sites would assist in testing the data collection process in order to inform the larger scope of the planned unit cost data collection for other EHSP interventions. In light of the criteria above, two public health facilities were selected to derive the unit cost of HIV services: Bontleng Clinic, a clinic without beds, and Goodhope Primary Hospital (GPH). Each will be described in further detail in the Findings section.

Data Collection and Management

Development of survey instruments

To derive the unit cost of HIV services, data forms were developed to capture both cost information and information on the way a service was delivered. An example of a cost input includes the cost of drugs or supplies. Information on the way a service is delivered includes the typical number of units of a drug given to a patient for an HIV intervention per year.

The team developed four types of forms: (1) a general facility form, (2) service-specific forms, (3) a central MOH and CMS form, and (4) a development partner form. Copies of all data collection instruments are included in *Annex B.* Data were collected for all HIV services and condoms for the period April 2013 to March 2014 to mirror the GOB fiscal year and ensure availability of nonarchived data.

The technical team used the *general facility form* to capture information at the two selected facilities. Information was collected on the total number of inpatients and outpatients accessing the facility. This tool also yielded data on the number and type of services offered at each facility and the number and type of administration and support staff assisting service delivery staff. Where possible, the team used the facility form to capture information on the utilities, building maintenance and operations, waste management, supply chain, and vehicle costs. When information was not available at the facility, information was sourced from the DHMT or district level. All this information was collected by facility, not by intervention.

The team used *six customized HIV service forms* to capture information on the amount, type, and percentage of time spent by cadres delivering a particular service; the amount, type and percentage of time spent by service managers on a particular service; the number of clients accessing services; the number of times clients access a service during one year; the type and quantity of drugs and commodities given to clients; and the type of equipment used to render the service. There were six forms, one for each of the five interventions and one for condoms. All of this information was collected by intervention in both facilities. The HPP team assessed costs for the following:

1. **Condoms:** Male and female condoms are either placed in the condom dispensers or packaged for distribution to patients accessing prevention-based services such as SMC or HTC. Any patient visiting the health facility can retrieve condoms, when available.
2. **Co-trimoxazole for HIV-positive TB patients:** Treatment is issued to TB/HIV patients daily for two weeks at the facility. If the client appropriately adheres to treatment, he or she is transferred to the community TB care program to complete the six-month treatment regimen. The client presents at the facility three times (on initiation, month 2, and month 6) to provide a sputum sample.
3. **Screening HIV-positive patients for TB:** All HIV-positive patients are screened for TB as part of the intensified case finding approach. HCWs conduct a physical assessment to screen clients for signs of persistent cough, fever, weight loss, failure to thrive, night sweat, etc. If there are indications that the client may have TB from the initial assessment, sputum is sampled in addition to a CD4 count, full blood test, and chest X-ray. If the client is TB negative, he or she is treated for pneumonia or common cold, and if positive is enrolled on treatment for six months.

4. **Additional ART for HIV-positive TB patients:** Additional ART treatment is issued to HIV-positive patients who have TB. The client is prescribed an additional bottle of Alluvia for six months. This service is typically accessed seven times by a client during a year.
5. **PEP:** Treatment is issued to HCWs and rape victims after potential exposure to HIV. Patients typically access this service only once after initial contact.
6. **SMC:** The minor surgical procedure is provided to circumcise males. Three randomized controlled trials showed that male circumcision can reduce the risk of heterosexually acquired HIV infection in men by up to 60 percent. Patients typically access this service only once, and then return for follow-up postoperative care on the second and seventh days and six weeks after surgery.

Data collected at the DHMT were used to verify and confirm data captured at the facility level. Also, data missing at the facility level were collected at the DHMTs. For example, to capture information on the utilities, building maintenance and operations, waste management, supply chain, and vehicle costs, it was necessary to access data at the level of the DHMT.

Two data sheets were developed to capture data at the central level: an *MOH and CMS central form* and a *development partner form*. The form for central level was subdivided into three sections: one section captured data including personnel salaries; a second section focused on drugs, commodities, and equipment pricing; and the third section focused on supply chain costs.

Health Research Division Committee clearance to undertake study

The data collection tools and project plan were submitted to the MOH Health Research Division Committee for an in-country institutional review board exemption permit, which was issued in April 2014.

Data collection team

The data were collected by a team of three data collectors and one lead consultant. Data collectors were trained on the data collection forms and term definitions.

Data collection timeline

In April 2014, the data collection team pilot tested the tools. Boseja II Clinic, located in a peri-urban setting, was selected as the pilot facility. To facilitate a smooth data collection process, the lead consultant met and oriented the heads of the sample facilities and DHMT with the objectives of the study and discussed the data collection tools a week before the official data collection process commenced. The team conducted the data collection at the facility and central levels in April/May 2014.

Data analysis

Excel Databases: The technical team designed Excel-based databases to derive unit costs for each of the HIV interventions. Data were first captured by the data collectors through the forms described above and validated with facility coordinators before being entered into the respective databases. Databases were created by HIV service, with customized calculations to derive the unit costs. The Excel databases captured unit cost per client per service per year by capturing data on the following categories:

- *Direct costs:* Personnel, drugs, and supplies
- *Indirect costs:* Utilities, building and vehicle, equipment, management, and supply chain

Cost Analysis for HIV Interventions: This section articulates the cost calculations employed to derive the unit cost per patient per year per service. Unit costs per patient per year for each of the five interventions were calculated in the same manner. The cost of a condom was calculated based on the cost of

commodities and the supply chain costs only. A description of each data point entered into the Excel databases, the associated calculation and assumptions, the source of information, and the data form used to collect that piece of data is outlined in Annex A. A more general description of calculations by cost category is described below.

Facility-level and above-facility-level costs

The objective of the analysis was to collect both facility-level and above-facility-level costs. The definition used to distinguish these costs was based on the location where the activity was being conducted, regardless of where the payment for the service was made. If an activity was being conducted predominantly within the gates of the facility, they were considered to be facility-level costs, whereas activities predominantly conducted outside the facility gates were considered to be above-facility-level costs. Thus waste management and supply chain management were included in the analysis and were considered to be above-facility-level costs, since they were conducted predominantly outside the gates of the facility.

Waste management and supply chain management costs were allocated to each of the two facilities in a somewhat different way. In the case of waste management, an ideal way of allocating these costs would have involved assessing the volume of waste produced at each facility and then allocating the waste management costs based on the proportion of waste produced by each facility. In reality, no data were available on the volume of waste produced per facility. Instead each facility is charged a fixed amount to cover the costs required to collect and dispose of waste products. These charges were therefore used in this costing exercise.

As for supply chain, these costs were obtained from the MOH Central (including CMS, Ministry Management, and CTO). The GOB uses a per kilometer rate of US$0.23 as a reimbursable charge for mileage and wear and tear of the vehicle. The technical team used this fixed rate to calculate the delivery of all materials and supplies from CMS to the facility. Using information about the number of visits made to each facility per month, the distance covered from a CMS warehouse to facility and return, the type of vehicle delivering goods, and the personnel involved in transportation of goods, it was then possible to calculate the supply chain costs per facility.

While every effort was made to conduct a comprehensive costing of services at these two facilities, some above-facility-level costs could not be included in the estimation of unit costs for two reasons. First, the above-facility-level costs were not directly related to the volume of patients receiving the service and therefore would not be appropriate to include in the unit cost. For example, training costs generally do not vary in proportion to the volume of patients receiving a service. Second, certain above-facility-level costs could not be directly allocated to the specific facilities. Thus supervisory visits from the district or national levels were excluded from the costing because these costs could not be attributed to specific services and specific facilities. As a result, training and supervision costs were not included in the unit costs for services at these two facilities, although they should be considered in any national budgeting effort.

General Facility Information

At the facility level, the team calculated the number of outpatients and inpatients by intervention per facility and the total number of outpatients and inpatients by facility. The team also calculated the weighted version of both these data points. This was to ensure that the additional resources consumed by inpatients as compared to outpatients are accounted for when allocating cost to a particular intervention.

Personnel

Personnel costs were allocated based on the self-reported amount of time each cadre spent on an intervention. The steps to calculate personnel cost for each service delivery cadre and each cadre managing service delivery personnel are below.

- *Step 1:* Staff salary (US$) × proportion of time personnel spends on intervention
- *Step 2:* Step 1 ÷ Nonweighted number of inpatients and outpatients per year
- *Step 3:* Sum values of Step 2 for each cadre to derive a unit cost per patient per year for personnel

Drugs and supplies

Drugs and supplies costs were allocated based on the quantity used per patient per year as reported by facility service delivery personnel. Calculate Step 1 to Step 2 for each nondrug consumable and Step 1 to Step 3 for each drug.

- *Step 1:* Divide the cost per pack (US$) by the quantity per pack
- *Step 2:* Step 1 × Quantity per patient per year
- *Step 3:* Step 2 × (% of patients using the drug ÷100) only if drug
- *Step 4:* Step 2 or Step 3 ÷ Nonweighted number of inpatients and outpatients per year
- St*ep 5:* Sum values of Step 4 to derive a unit cost per patient per year for drugs and supplies

Utilities

Utilities were allocated based on the proportion of cost allocated to an HIV intervention. This proportion was determined by the weighted number of patients for an intervention at a facility divided by the weighted number of total patients at the facility. Calculate Step 1 and Step 2 for each utility: fuel, water, electricity, telephone, waste management, and building maintenance.

- *Step 1:* Cost of utility per year × proportion of cost allocated to HIV intervention
- *Step 2:* Step 1 ÷ Nonweighted number of inpatients and outpatients per year
- *Step 3:* Sum of Step 2 values for each utility

Building

Building costs were also allocated based on the proportion of cost allocated to an HIV intervention.

- *Step 1:* Construction value (US$) × (1 + % supply chain costs based on geographic location ÷ 100)
- *Step 2:* Step 1 × Proportion of cost allocated to HIV intervention
- *Step 3:* Step 2 ÷ Replacement period
- *Step 4:* Step 3 ÷ Nonweighted number of inpatients and outpatients per year

Vehicle

Vehicle costs were also allocated based on the proportion of cost allocated to an HIV intervention.

- *Step 1:* Vehicle value (US$) × Proportion of cost allocated to HIV intervention
- *Step 2:* Step 1 ÷ Replacement period
- *Step 3:* Step 2 ÷ Nonweighted number of inpatients and outpatients per year

- *Step 4:* Sum Step 3 values

Equipment

Equipment costs were allocated based on the proportion of cost allocated to an HIV intervention.

- *Step 1:* Cost of equipment (US$) × Number of equipment × Proportion of cost allocated to HIV intervention
- *Step 2:* Step 1 ÷ Replacement period
- *Step 3:* Step 2 ÷ Nonweighted number of inpatients and outpatients per year
- *Step 4:* Sum Step 3 values

Management

Management costs were allocated based on the proportion of cost allocated to an HIV intervention. Calculate Step 1 and Step 2 for each management cadre.

- *Step 1:* Staff salary × Number of staff × proportion of cost allocated to HIV intervention
- *Step 2*: Step 1 ÷ Nonweighted number of inpatients and outpatients per year
- *Step 3:* Sum Step 2 values

All supply chain costs were allocated to a particular facility. The team assumed each service provided by the facility incurred equal supply chain costs. The facility supply chain costs were divided by the number of interventions to allocate costs to each HIV intervention and to condoms.

Supply Chain–Fuel Cost

- *Step 1:* Round-trip distance in km × Number of round-trips × Fuel charge per km
- *Step 2:* Step 1 ÷ Number of services offered at facility
- *Step 3*: Step 2 ÷ Nonweighted number of inpatients and outpatients per year

Supply Chain–Driver Cost

- *Step 1:* Salary (US$) × Proportion of time spent driving to this facility
- *Step 2:* Step 1 ÷ Number of services offered at facility
- *Step 3:* Step 2 ÷ Nonweighted number of inpatients and outpatients per year

Supply Chain–Vehicle Costs

- *Step 1:* Vehicle value ÷ number of services offered at facility
- *Step 2:* Step 1 ÷ Replacement value
- *Step 3:* Step 2 ÷ Nonweighted number of inpatients and outpatients per year

Overall Unit Cost Calculation

- *Personnel + drugs/supplies + utilities + building + vehicle + equipment + management + supply chain costs = Total unit cost per patient per service per year*

Cost Analysis for Condoms

The cost of condoms was calculated by adding the cost of a condom to the supply chain costs. Supply chain costs were calculated in the same way as mentioned above, with supply chain costs being determined by the distance traveled to the facility. However, to calculate the number of people using condoms per year, several assumptions were made.

While there were data available about the number of condoms distributed, there were no data on the number of people who received condoms. According to BAIS IV, 63 percent of Botswana's population is

15 to 64 years old; about 65 percent of people ages 15 to 24 reported using a condom consistently, and about 30 percent of people ages 25 to 64 use condoms consistently (Statistics Botswana, 2013). The average of the latter two statistics is about 48 percent. Given this, the team calculated the number of patients using condoms based on the following:

- *Step 1:* Total number of patients at facility × .63
- *Step 2:* Step 1 × .48

This sequence of calculations yielded an estimated total number of patients receiving condoms.

Missing Data

In a few specific instances, data were not available. The table below shows some of the specific information that was missing, and the action taken to fill this gap by the team.

Missing Data	Action Taken
Building construction value	This information was extrapolated from the HTC data, as they are current data from DBES and relevant to this costing exercise.
Utilities at Bontleng Clinic	Utility data for Bontleng Clinic were not available; no bills had been issued to the facility in a number of years. In light of the missing data, Princess Marina Hospital Corporate Service Department accordingly provided the team with data on utilities, using bills from a similar facility to that of Bontleng.
Waste management for Bontleng Clinic	The cost of waste management for the district was available; as such this cost was divided by the number of facilities in the district to yield a cost for Bontleng clinic.

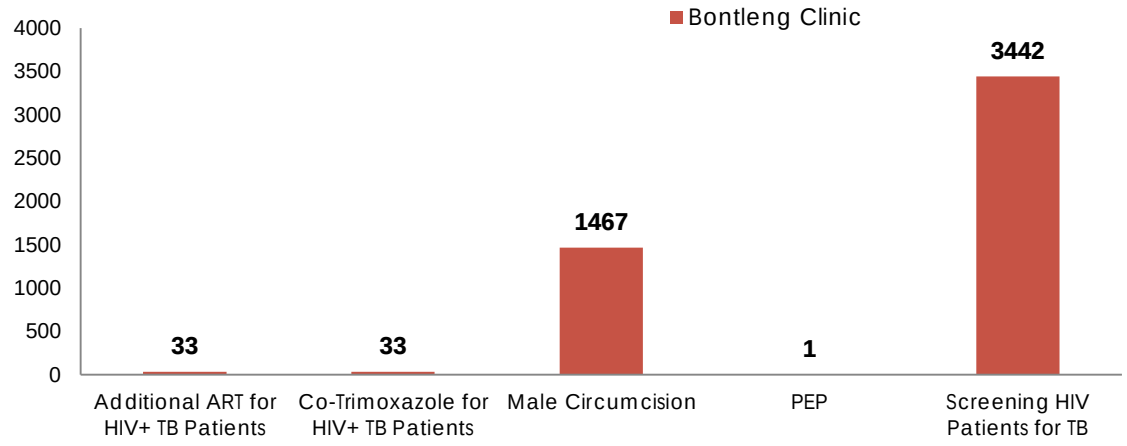
1.4 Findings

Site Profiles

Bontleng Clinic

Bontleng Clinic is classified as a clinic without beds in an urban setting (Gaborone). It falls under the jurisdiction of the Greater Gaborone DHMT. Bontleng Clinic offers a total of 14 direct health services and primarily refers clients to Princess Marina Hospital for management of complicated cases. Figure 2 below shows the number of patients at Bontleng Clinic from April 2013 to March 2014 who received each of the five HIV interventions.

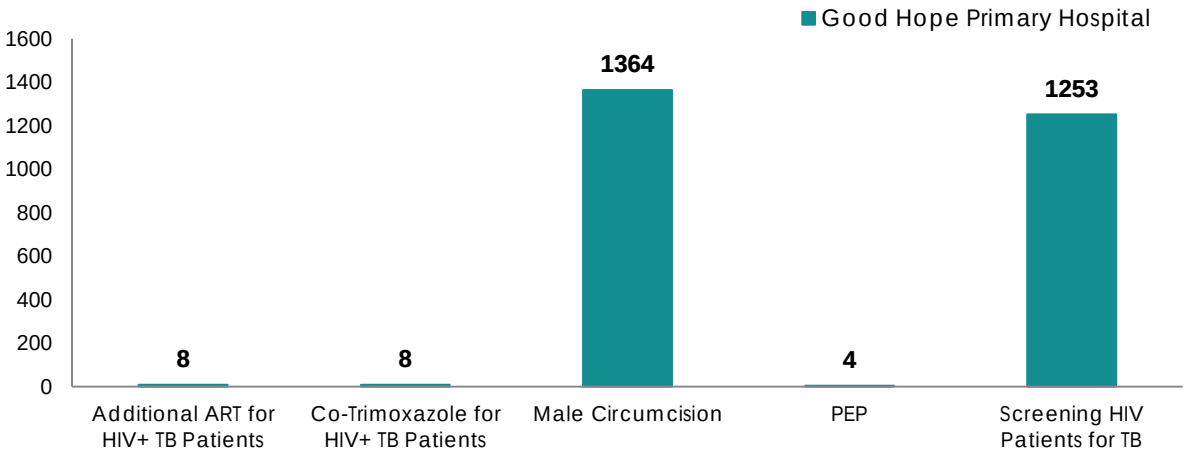
Figure 2. Total Number of Patients at Bontleng Clinic



Goodhope Primary Hospital (GPH)

GPH is classified as a primary hospital in a rural setting. GPH falls under the jurisdiction of the Goodhope DHMT. GPH offers a total of 16 direct health services. Figure 3 below shows the number of patients at GPH from April 2013 to March 2014 who received each of the five HIV interventions plus condoms.

Figure 3. Total Number of Patients at Goodhope Primary Hospital



Unit Cost Analysis of HIV Services

Unit cost analysis was conducted for five HIV interventions plus condoms. The costs for all services include direct costs (personnel, drugs, and supplies) and indirect costs (utilities, building, vehicle, equipment, management, and supply chain costs excluding storage and warehouse staff). The cost per condom was also calculated. The calculation for condoms includes commodity and supply chain costs.

Unit cost of HIV service at Bontleng Clinic and Goodhope Primary Hospital

Unit costs for the five HIV interventions plus condoms at Bontleng Clinic ranged from US$57 for screening HIV patients for TB to US$1,011 for PEP per patient per year, as denoted in figure 4 below. Unit costs for the six HIV interventions at Goodhope Primary Hospital ranged from US$82 for screening HIV patients for TB to US$926 for co-trimoxazole for HIV-positive TB patients, as denoted in the same figure below.

There does not appear to be a clear trend when assessing costs at the clinic level when compared with the primary hospital level. For example, additional ART for TB patients costs US$118 per patient per year at the clinic level and US$207 at the primary hospital level. On the other hand, SMC cost US$155 per patient per year at the clinic level and US$89 at the primary hospital level. Further discussion of these costs will be included in the cost drivers analysis section.

Figure 4. Unit Cost of HIV Services at Bontleng Clinic and Goodhope Primary Hospital

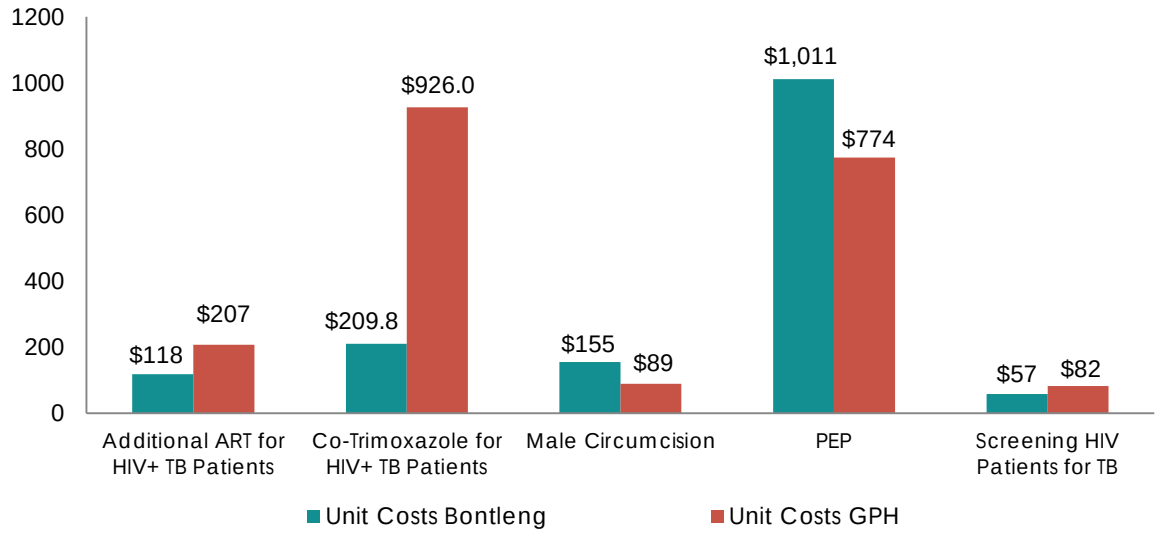


Table 5 below shows a breakdown of all unit costs by direct and indirect costs for each of the five HIV interventions delivered at Bontleng Clinic, and Table 6 shows the same for GPH.

Table 5. Unit Cost of HIV Services at Bontleng Clinic by Direct and Indirect Costs

HIV Intervention	Direct Cost	Indirect Cost	Total Unit Cost	Total Cost (Unit Cost × # Patients)
Additional ART for HIV+ TB patients	$87.56	$30.35	$117.91	$3891
Co-trimoxazole for HIV+TB patients	$178.78	$31.01	$209.80	$6923
SMC	$136.34	$18.38	$154.72	$226,974

HIV Intervention	Direct Cost	Indirect Cost	Total Unit Cost	Total Cost (Unit Cost × # Patients)
PEP	$518.70	$492.36	$1011.07	$1011
Screening HIV patients for TB	$28.48	$28.99	$57.47	$197,811

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

Table 6. Unit Cost of HIV Services at GPH by Direct and Indirect Costs

HIV Intervention	Direct Cost	Indirect Cost	Total Unit Cost	Total Cost (Unit Cost × # Patients)
Additional ART for HIV+ TB patients	$87.64	$119.29	$206.93	$1655
Co-trimoxazole for HIV+TB Patients	$759.18	$166.81	$925.99	$7407
SMC	$69.65	$19.64	$89.30	$121,805
PEP	$597.19	$176.74	$773.92	$3095
Screening HIV patients for TB	$17.80	$64.47	$82.27	$103,084

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

Cost Drivers Analysis of HIV Services

An analysis of cost drivers was done to shed light on the reasons for cost variations across interventions and levels of health, as well as high unit costs for some HIV services. Understanding cost drivers can help the MOH facilitate systems reform to improve efficiencies in select areas.

a. Direct and indirect costs

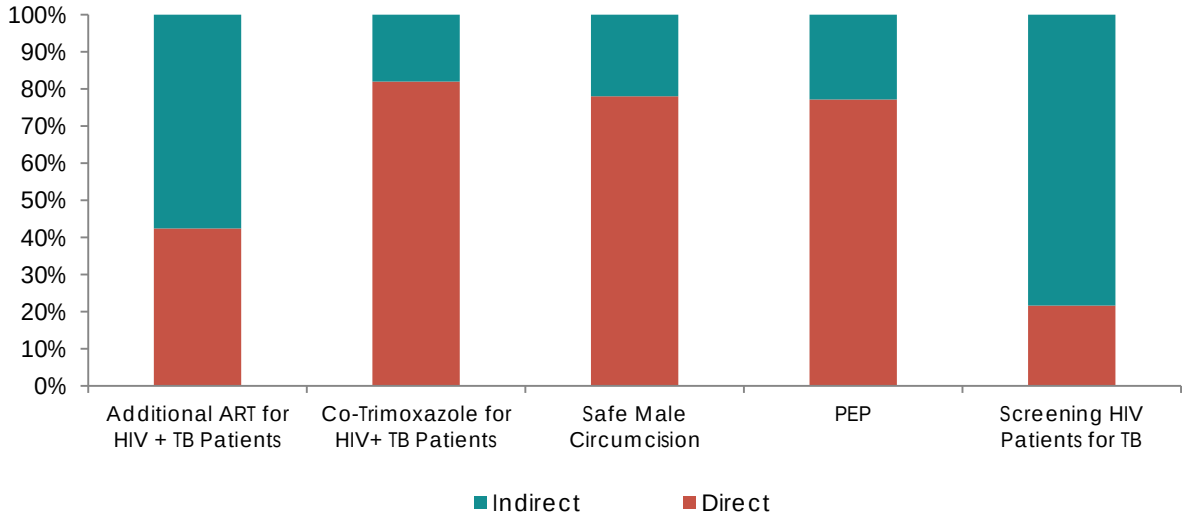
Figures 5 and 6 show the direct and indirect costs for each service by clinic and hospital, respectively. Direct costs included personnel, drugs, and supplies, whereas indirect costs included management and support staff, utilities, supply chain, equipment, and building and vehicle operational costs.

At Bontleng Clinic, the percentage of direct costs ranged from approximately 50 to 90 percent. PEP and screening for HIV patients yielded the lowest percentage of direct costs (50%). Seventy percent of costs for ART for HIV-positive TB patients were direct costs. Co-trimoxazole yielded a little more than 80 percent of costs. SMC yielded direct costs of approximately 90 percent.

Figure 5. % Direct and Indirect Costs at Bontleng Clinic

At GPH, the percentage of direct costs ranged from approximately 22 percent to about 80 percent. Screening HIV patients for TB required the lowest percentage of direct costs (22%). Additional ART for HIV-positive TB patients was 40 percent of direct costs. SMC, co-trimoxazole, and PEP had direct cost percentages of approximately 80 percent. All unit costs are further explained in the Results section.

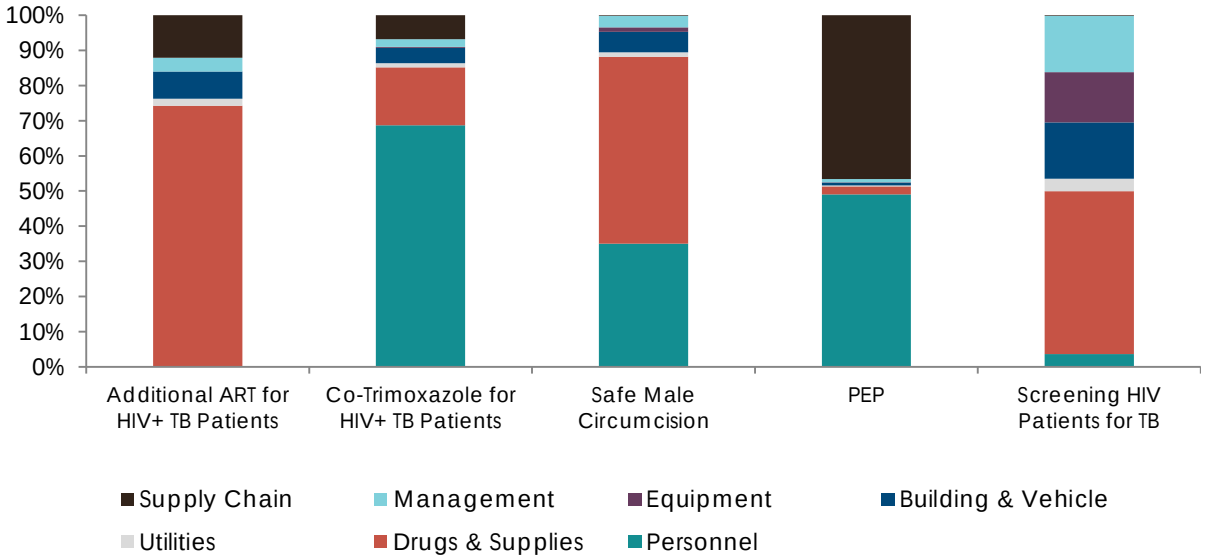
Figure 6. % Direct and Indirect Costs at Good Hope Primary Hospital



b. Detailed breakdown of costs

Figure 7 below provides a detailed breakdown of the unit cost for each HIV service at Bontleng Clinic. Categories are broken down into the percentages of costs for supply chain, management, equipment, building and vehicles, utilities, drugs and supplies, and personnel.

Figure 7. Cost Drivers by HIV Service at Bontleng Clinic



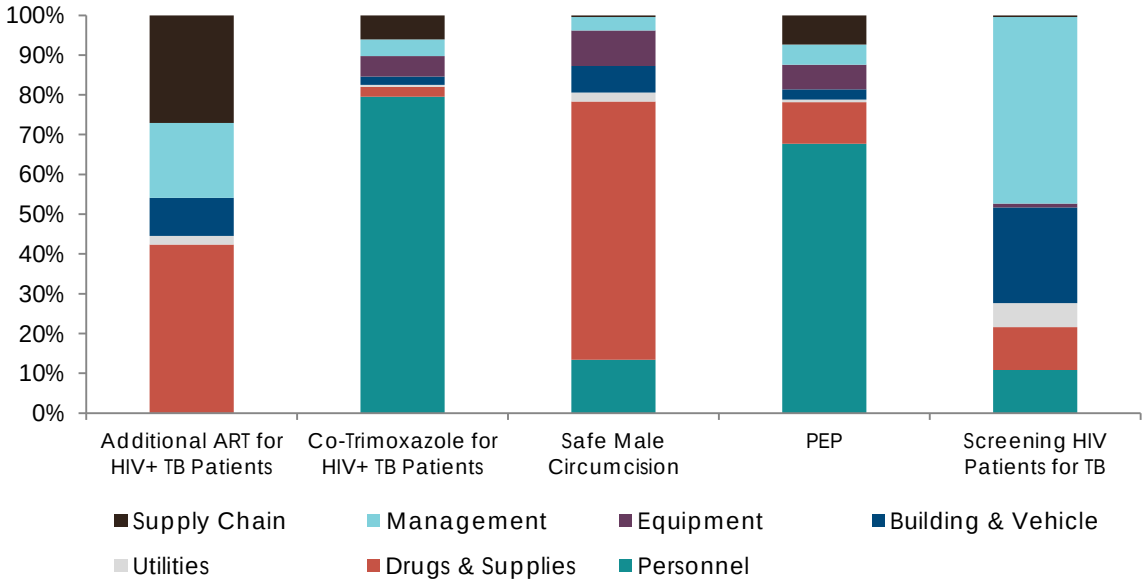
Primary and secondary cost drivers are identified for each HIV service in the Bontleng Clinic (see Table 7). The primary cost driver is the cost category that comprises the largest percentage of the overall cost for the HIV service, and the secondary cost driver is the cost category that comprises the second largest percentage of the overall cost for the HIV service. Drugs and supplies or personnel were the primary cost drivers for all five services. Secondary cost drivers included personnel, supply chain, drugs and supplies, or management.

Table 7. Primary and Secondary Cost Drivers by HIV Service for Bontleng Clinic

HIV Service	Primary Cost Driver	Secondary Cost Driver
Additional ART for HIV+ TB patients	Drugs and supplies	Supply chain
Co-trimoxazole for HIV+ TB patients	Personnel	Drugs and supplies
SMC	Drugs and supplies	Personnel
PEP	Personnel	Supply chain
Screening HIV patients for TB	Drugs and supplies	Management

Figure 8 provides a detailed breakdown of the unit cost for each HIV service at GPH.

Figure 8. Cost Drivers by HIV Service at Good Hope Primary Hospital



Again, primary and secondary cost drivers are listed in Table 8 for each of the five HIV interventions at GPH. Personnel, drugs and supplies, and management are all primary cost drivers. Secondary cost drivers include all categories except equipment and utilities.

Table 8. Primary and Secondary Cost Drivers by HIV Service for Goodhope Primary Hospital

HIV Service	Primary Cost Driver	Secondary Cost Driver
Additional ART for HIV+ TB patients	Drugs and supplies	Supply chain
Co-Trimoxazole for HIV+ TB patients	Personnel	Management
SMC	Drugs and supplies	Personnel
PEP	Personnel	Drugs and supplies
Screening HIV Patients for TB	Management	Building and vehicle

Condoms Cost Analysis

Condoms are a cross-cutting component of all HIV prevention services. Condoms can either be distributed as part-in-parcel of a minimum intervention package, e.g., SMC or HTC, or placed into condom dispensers in facility waiting areas. This structure of condom distribution complicates the facility's ability to adequately track and keep stock of number of patients accessing condoms. The facility is however able to account for the number of condoms ordered and received from CMS, as well as stockouts when the facility has run out of condoms. The team calculated the unit cost per condom distributed, based on two inputs: (1) the actual cost per condom and (2) the supply chain costs. Table 9 below shows the unit cost per condom distributed at Bontleng Clinic and GPH.

Table 9: Cost per Condom (US$)

	Supply Costs	Supply Chain Costs	Total Unit Cost per Condom
Bontleng Clinic	$.03	$.08	$.11
GPH	$.03	$.06	$.09

1.5 Discussion

This study was conducted as a broader effort to understand resource needs in Botswana as the country decentralizes services and implements health reforms to ensure the delivery of EHSP. Health coverage will be extended to a larger portion of the population, including the most vulnerable and hard to reach. As HIV expenditure accounts for a majority of government health expenditure, it is critical for the MOH to quantify the costs of service provision while maintaining high-quality standards for service delivery. Therefore, the study not only derived unit costs for five HIV interventions and the cost of condoms, but also determined cost drivers and potential reasons for these high costs.

Additional ART for HIV-Positive TB Patients

It costs US$118 at Bontleng Clinic and US$207 at GPH per patient per year to deliver additional ART for HIV-positive TB patients. At the clinic level, drugs and supplies were 70 percent of all service delivery costs, and supply chain costs were 12 percent. These were primary and secondary cost drivers. At the hospital level, the main cost drivers were drugs and supplies and supply chain costs. Drugs and supplies were 40 percent of total costs, and supply chain costs were 30 percent of total costs.

In comparing the two facilities, Bontleng Clinic had higher drugs and supplies costs than GPH as a result of having more HIV-positive TB patients (33 patients at Bontleng Clinic and eight patients at GPH). There is an expectation that GPH should have a higher number of HIV-positive patients accessing services than Bontleng Clinic, due to higher prevalence rates (20.3%) (Statistics Botswana, 2014c) in Borolong District, where GPH is located, than in Gaborone District (17%) (Statistics Botswana, 2014c), where Bontleng Clinic is located. Additionally, there is greater emphasis on HIV messaging and services in urban settings, which may have contributed to better health-seeking behavior among urban populations than rural populations. In Goodhope, the indication of fewer HIV-positive patients could be attributed to patients accessing HIV services closer to their work locations in urban/peri-urban settings or perhaps lower interest/urgency in accessing services.

Co-Trimoxazole for HIV-Positive TB Patients

The unit cost of co-trimoxazole provision is US$210 at the clinic level and US$926 per patient per year at the hospital level. Personnel accounted for 70 percent of the unit cost at the clinic level, and drugs and supplies accounted for about 15 percent of the total cost. Personnel accounted for 80 percent of the total unit cost at the hospital level, and management accounted for approximately 2 percent. The cost was higher at the hospital level than the clinic level because more personnel are involved in service delivery at the hospital. Another reason is that only eight patients received co-trimoxazole over the course of the year at the hospital, compared with 33 patients at the clinic.

The management staff involved in co-trimoxazole service delivery have higher relative costs than service delivery personnel. This is because the TB focal person and District TB Coordinator (management staff) only support TB services at facility levels. However, the service delivery personnel (e.g., medical doctor, nurse) support all services at the clinic and hospital in addition to TB, spreading their costs across all services.

Safe Male Circumcision

The unit cost of SMC is US$155 at the clinic and US$89 per patient per year at the hospital level. At the clinic level, more than 50 percent of costs were due to drugs and supplies, and approximately 35 percent were due to personnel. At the hospital level, drugs and supplies were 70 percent of the total unit costs, and personnel about 10 percent.

At the clinic level, 1,467 patients received SMC, and 1,364 patients received the same at the hospital level. However, the unit cost for service delivery at the clinic level is higher than the hospital level. This can be attributed to the SMC model employed at the facility. The SMC program at GPH at the time of data collection involved a regular team of one doctor and two nurses to render services.

During SMC school and outreach campaigns, staff are expanded at the donor-supported public health facilities to cope with the demand created. They typically expand the staff to one doctor and four nurses (modified MOVE model). At the time of data collection, this was the case at Bontleng Clinic., whereas GPH was operating in "regular/routine" mode of one doctor and two nurses. Most of the team at the clinic was dedicated to SMC only, while the team at the hospital split their time across other services. This could be one potential reason for the higher unit cost of service delivery at the clinic level. SMC teams at Bontleng Clinic were also beefed up by the relocation of SMC staff from Block 8 Clinic due to closure for the 2014 African Youth Games.

Ideally, the unit cost at Bontleng Clinic should have been lower than GPH because the campaign brings in more people. However, Bontleng only had 103 more clients than GPH. Therefore, higher costs at Bontleng Clinic can be attributed to larger HR costs. Commodities costs were also higher at Bontleng Clinic because additional commodities were being used there that were not being used at GPH.

Postexposure Prophylaxis

US$1,011 and US$774 are the unit costs per person per year for PEP at the clinic and hospital levels, respectively. Personnel accounted for almost 50 percent of PEP unit costs, and supply chain costs for about 50 percent. At the hospital level, personnel accounted for approximately 65 percent, and drugs and supplies accounted for about 10 percent of the total costs. Only one patient required PEP at the clinic level, leading to extremely high unit costs, particularly supply chain costs. There were four patients at the hospital level. This is the main reason for the unusually large unit costs.

Screening HIV Patients for TB

The unit cost of screening HIV patients for TB is US$58 and US$82 per patient per year at the clinic and hospital, respectively. Supplies account for almost 50 percent and management 15 percent of the total unit costs at the clinic level. At the hospital level, management is 50 percent of the total unit cost, and building and vehicle costs are about 20 percent. Actual management costs were not higher for screening HIV patients for TB compared with other HIV interventions. However, the percentage of costs attributed to management were higher because actual personnel costs and drugs and supplies costs were lower.

Condoms

The unit cost of condoms is US$0.11 at Bontleng Clinic and US$0.09 at GPH per patient per year. Condom costs are extremely low because they only include the cost of supplies and the supply chain costs. Supply chain costs slightly differ between the two facilities because we assumed GPH had more patients per year receiving condoms than Bontleng Clinic.

1.6 Limitations

Data Availability and Management

Availability of data on patient volumes was limited and was not collected in some cases. The data required to inform the unit cost—such as number of patients accessing service or total number of inpatients and outpatients at the facility level from the period April 2013 to March 2014—were difficult to gather during the data collection process. In some instances, routine monthly reports that facilities submitted to DHMT and MOH were missing or inconsistent. In other instances, poor record keeping led to lack of availability of data, thus HCWs had to recount the registers to provide patient numbers. These challenges in some instances greatly affected the technical team's ability to establish patient volumes for HIV services. The technical team calculated patient volume by year so that patient volumes were not subject to monthly fluctuations.

Another challenge during the data collection process was the lack of uniformity in the data per district. Data available at the DHMTs in Gaborone and Goodhope were not standard or harmonized to allow for cross comparisons. This finding was mainly attributed to the lack of capacity to create and maintain data systems. The loose-leaf paper-based system appeared to contribute to poor record keeping.

Service Delivery Variance

Some of the HIV services had slight differences in their operational delivery at the facility level. This could be attributed to the situational context of the facility, such as the number of personnel available to render services or other factors. For example, in the case of additional ART for TB patients, the facilities reported the number of times patients visit the service annually in a different manner. This slight variance had an impact on the unit costs compared across the two facilities.

Costing the Condom Service within the Facilities

The technical team faced several challenges when costing condoms. The distribution channels for condoms varied. In some cases, condoms are distributed across several programs such as family planning, other sexual and reproductive health services, HTC, PMTCT, SMC, etc., as part of an integrated minimum prevention package approach. In other instances, condoms are placed in facility dispensers. The team could not cost all variations of condom distribution. Rather, the cost of condoms and the supply chain costs alone were assessed. Facilities also did not have information on the number of people who received condoms and the number of condoms distributed per patient, as there were no registers available to track this data.

The costing team was able to obtain information on the number of condoms ordered and received by the facility. A key assumption made that all condoms procured by the facility were distributed and used. The costing team made several assumptions on the percentage of the age range of patients in need of condoms and the percentage of the general population who uses condoms.

Self-Report Bias

Since the technical team asked service delivery providers to self-report the amount of time they spent on each intervention, there is the potential that these may not be as accurate as operational research using time-motion study techniques.

Limited Sample Size

Due to resource constraints, the team was only able to derive unit costs at two facilities; therefore, data gathered should not be considered as statistically representative of all geographical or service levels. A statistically representative sample of facilities at each level of health should be used to determine unit costs for each level of health, pending availability of resources.

1.7 Recommendations

Data Systems

This costing exercise relied heavily on the availability of patient and general facility data in order to deduce the unit cost per patient per service. However, as the results and limitations section portrayed, there were several challenges associated with the availability and standards of the data across the facilities and DHMTs. Accordingly, consideration should be made to adopt the following recommendations in an effort to improve the data systems and inform future studies or policy decisions.

Upgrade and standardization of indicators and tools for recording general facility and patient data

There were vast differences in data systems across HIV services due to the level of resources invested in each service area. The more resources a program has, the better developed is the data system. HCWs routinely completed data services for some service areas, while for other services HCWs rarely completed data forms despite their availability.

Additionally, data systems show that data collection processes and indicators were not designed to be consistent across all sites that are delivering similar interventions. This has created inconsistency in data indicators. For example, the number of patients accessing a service was measured in different ways depending on the site's data systems, sometimes leading to double or triple counting.

Accordingly there is an urgent need to *upgrade* the current data systems within the health facilities and at DHMT levels to *create a universal monitoring and evaluation (M&E) platform for all services*. This platform should allow a range of data input from general facility patient statistics to service-specific indicators. The technical team also found that the data systems and indicators collected between districts differed. Additionally, data quality was greatly dependent on the presence of personnel involved in data management. Therefore, a universal data platform would also assist to standardize data indicators across districts.

Proper recording keeping and archiving of data forms

In cases where data were available within the facilities, the costing team noted poor record management of the data forms. The filing system was fragmented and did not provide a good source of data warehousing. As such, it is imperative that a systematic approach be taken to consolidate the data forms in a central location within each facility. The system must be routinely audited to ensure data forms for all months are available and complete. In lieu of a hard copy system, considerations could be made to institute simplified soft copy data forms, which can be completed in Microsoft Word to ensure user-friendliness.

Capacity building and data quality audits

In association with the upgrade of the data systems, there is an urgent need to capacitate and mentor the facility and DHMT personnel to manage and maintain these data systems. Data audits must also be conducted routinely to ensure the integrity of the data system and certify the data quality.

Use of data forms collected as management tools by the facility management/HCWs

Often data collected were not directly used by the facilities or respective HCWs to inform provision of services; therefore, its value is not seen by the HCWs who routinely provide the data. The dissemination of research findings generally do not get fed back to the health facilities on a large enough level for HCWs to appreciate the value of the data routinely collected. As such, consideration should be given to develop strategies for incorporation of data into service management processes. HCWs should own the data collected and ensure data are representative of their service delivery efforts at the facility level.

Restructuring Service Plan per Facility

The unit costing exercise uncovered a need for the MOH to reconsider the number of personnel involved in service delivery. Based on the findings of the costing study, there are a large number of personnel involved in delivery of some services. For example, the PEP program in Bontleng Clinic had only one case and Goodhope Primary Hospital four cases in the fiscal year of 2013/2014.

However, the cost of providing that service was the highest unit cost of all HIV services in the case of Bontleng Clinic and the third highest cost of all HIV services in GPH. This approach challenges the cost efficiency of having PEP offered across all health facilities. Therefore, consideration should be made to designate a few (one or two facilities) per district as focal point facilities for certain low-demand services to reduce high costs. The remaining facilities would refer their clients to the designated facilities.

Availability of Expenditure Data at DHMT Level

The technical team was informed that expenditure data were highly centralized. To obtain the unit costs for each cost line items, the costing team was tasked to source data from various line ministries and departments. Data were often not aggregated at the facility level when found, making it difficult to obtain facility-specific costs. For example, some of the utility costs (specifically waste management) were grouped by district as opposed to by facility cost. The technical team in a few instances had to derive "best case" assumptions to apply a cost value to the facility. To support a more robust system to track financial expenditures, an expenditure tracking system could be created at DHMT levels, and staff could be trained accordingly to have oversight over budgeting and expenditure analysis by district. This would greatly improve the fiscal budgeting and planning processes.

PART II: COSTS OF IMPLEMENTING INTERVENTIONS FOR KEY DISEASE AREAS COVERED UNDER EHSP

2.1 Background

As mentioned earlier, preparing for health financing reforms and decentralization that would allow for the implementation of EHSP requires a substantial amount of planning. Currently, information about the costs of health service delivery across the country is limited. The MOH in Botswana has asked HPP to help determine the costs of specific interventions under several program areas including child health, HIV, immunizations, malaria, maternal and child health, mental health, NCDs, and TB, as well as health systems costs as part of the EHSP. The technical team used the OneHealth tool to assess costs for major disease areas from 2013 to 2017.

The OneHealth tool was designed to help countries develop estimates of future financial requirements under various assumptions. OneHealth is the first tool that provides a framework for planning, costing, impact analysis, and financial scenario analysis. The tool accomplishes this by linking program-specific disease area costs to national health systems strengthening costs. An interagency working group on costing composed of the United Nations Population Fund (UNFPA), the United Nations Children's Fund (UNICEF), UNAIDS, the World Bank, WHO, the United Nations Development Program, and UN Women oversaw the development of the tool. Futures Institute developed the software for the tool and the related materials.

2.2 Process and Timeline Leading to Resource Need Estimation for EHSP

Botswana's 2010 IHSP incorporates goals from the country's Revised National Health Policy (2011) and identifies goals and priority areas for health service provision. While the Botswana government had exceeded the Abuja target of contributing 15 percent of total government expenditure for health (representing around 75 percent of total health expenditure), more recent estimates for the share of public health expenditure are lower and range between 11 percent and 14 percent. The IHSP outlines plans to redefine existing service delivery levels and the types of health services to be offered at each of these levels. In early 2010, the MOH in Botswana produced an EHSP as part of their 10-year IHSP, which forms the basis for aligning and rationalizing the entire health sector in Botswana. The EHSP is a set or collection of health interventions that seek to "address the main diseases, injuries and risk factors that affect the population" (EHSP 2010, pg. 9). The EHSP, while not comprehensive, will include a set of health interventions to address the main diseases that contribute to the bulk of the disease burden in Botswana, and the aim is to make these available universally through public and private facilities at different levels of healthcare.

The MOH expressed a need for new tools to cost the EHSP to provide evidence for budget requests and to feed into the design of social health insurance. Given the complexity of the task to estimate the costs of the EHSP, the MOH made a request for technical assistance, to which USAID responded. As part of the process of defining the scope of its support to the effort, HPP conducted a workshop on the OneHealth tool to allow MOH's Thematic Working Group for Costing the EHSP to become more familiar with it. Key participants included members of senior management and technocrats from MOH as well as representatives from the Economics Department at the University of Botswana. Participants reported that the tool was useful to assess the overall costs of the EHSP and the overall budget needed. The MOH decided to focus on disease areas that make up more than 80 percent of the disease burden in Botswana, and the HPP team used the OneHealth tool to provide normative costs of delivering EHSP from 2013 to 2017.

METHODOLOGY

OneHealth Tool: The OneHealth model is a tool for medium-term strategic planning in the health sector at the national level. OneHealth is integrated within the Spectrum suite of models, which includes demographic projections derived from UN Population Division estimates. It estimates the costs by disease program as well as the implications of utilizing the health system building blocks for delivery of planned targets. OneHealth incorporates pre-existing costing tools and is linked to the other models included in the Spectrum suite of models. These include the AIDS Impact Model, Lives Saved Tool for child and maternal health, and other impact tools for TB and reproductive health.

Costing Methodology: To populate the tool, the team used an ingredients-based approach. Data were collected for each intervention within disease areas for 2013 to 2017. There were six areas to be filled for each intervention, which are detailed as follows:

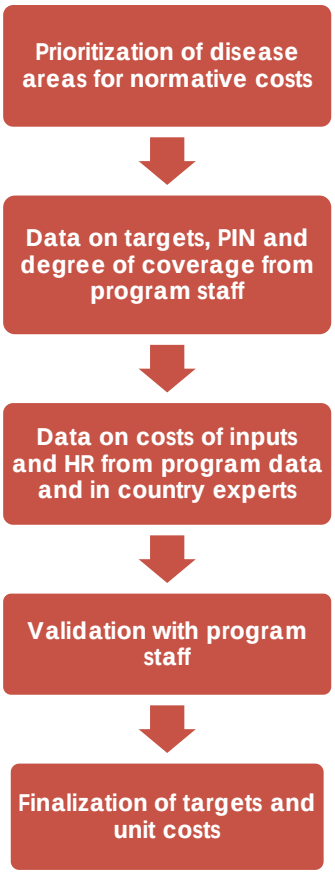
- Target Population: Who MOH will target for the specified intervention (e.g., children ages 0 to 59 months for oral rehydration salts).
- Population in Need (PIN): Percent of target population requiring intervention.
- Coverage: Percent of PIN receiving or projected to receive intervention.
- Treatment Inputs:
    - Drugs and supplies at four levels of health.
    - Medical personnel time at four levels of health.
    - Outpatient and inpatient days at four levels of health.
- Delivery Channels:
    - Percentage of patient volume at each of four levels of health by intervention at baseline and target years.
- Program Costs:
    - Nonmedical personnel staff types and salaries at national, regional, and district levels.
    - Number of staff required at national, regional, and district levels.
    - Office and equipment costs.
    - In-service and refresher training costs when available.

Throughout the report, the team will refer to two types of costs: intervention costs and program costs. Intervention costs include drugs and supplies costs as calculated by the OneHealth tool based on the target, PIN, coverage, and delivery channels specified. Program costs include the areas outlined above.

Data Collection: A team of data collectors gathered inputs from an MOH-led expert working group of managers and program heads. In-depth interviews with program staff and in-country experts yielded data on the aforementioned areas. The technical team conducted a desk review to determine availability of guidelines for EHSP disease areas. In situations where the expert working group was not able to provide data, data were collected from country guidelines. In situations where clear country-specific guidance on intervention delivery was not available, the team relied on international guidelines to determine inputs. The data collection process spanned from August to December 2013. For all disease programs, the team created customized data collection sheets that covered all communicable diseases, NCDs, and interventions. Designed around the OneHealth input process, these customized data collection sheets were

fielded with key respondents from the disease programs and supplemented as necessary with literature review and data from national and international guidelines.

For all disease programs, the team created customized data collection sheets designed around the OneHealth input process, which covered all communicable and NCDs and interventions. These customized data collection sheets were fielded with key respondents from the disease programs and supplemented as necessary with literature review.



Data Validation: Once data collection was complete, the technical team presented preliminary findings to experts and program heads within the MOH to ensure data accuracy. Experts highlighted several areas for revision and provided the technical team with more up-to-date information and sources when available. The figure to the left outlines the process.

Currency and Inflation: All costs have been estimated in 2013 US dollars. Due to a lack of data on the potential inflation in the price of drugs and supplies, costs were fixed over the period of the cost analysis. The team used the average exchange rate (US$1: 8.5 Pula) for 2013 as a constant throughout the projected time period.

Cost Analysis of Health Programs: Based on an extensive review of the MOH requirements and noting the limitations of available resources, a set of eight disease areas that constitute a majority of the disease burden in Botswana were prioritized – child health, HIV, immunizations, malaria, maternal health, mental health, NCDs, and TB. Each disease area includes several subinterventions (some with over 30), and the team gathered data from country guidelines outlined in strategic documents and program staff and international guidelines (depending on availability). Salary and benefits costs across the sector for HR were calculated at the various levels of health, not at the level of each intervention. Due to data limitations, the team had to make inferences and standardized assumptions about human resources needed across program areas.

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 "building blocks of the health system: (1) infrastructure (health facilities, medical equipment, furniture, vehicles); (2) HR (personnel, salaries, benefits, training); (3) logistics (medicines, medical supplies and consumables, warehouses, cars); (4) information systems (knowledge management, collection of statistical data); (5) governance and leadership (strategic plan, institutional reforms, decentralization); and (6) health financing (in addition to government funds for health) (WHO, n.d.a).

Management Costs of Health Systems (Training, supervision visits, etc.)

Due to ongoing plans to restructure, the MOH is still formulating strategic plans for several of the areas above. Data on these various health system components were difficult to obtain. A few pieces of information were available for each component. For example, facility furniture and equipment costs were available under infrastructure, but costs and number of new facilities and facilities needing rehabilitation were not available. Another example is health financing. Staff salaries were available; however, costs for health financing initiatives were not available because there is not yet a strategy for implementation. The

technical team discussed updating health systems projections pending availability of strategic plans and data on health systems components with the policy team at the MOH. Due to these challenges, only the costs for HR at the facility level are presented in the results.

RESULTS AND DISCUSSION: OVERALL FINANCIAL RESOURCES REQUIRED

Total Costs of the EHSP, 2013–2017

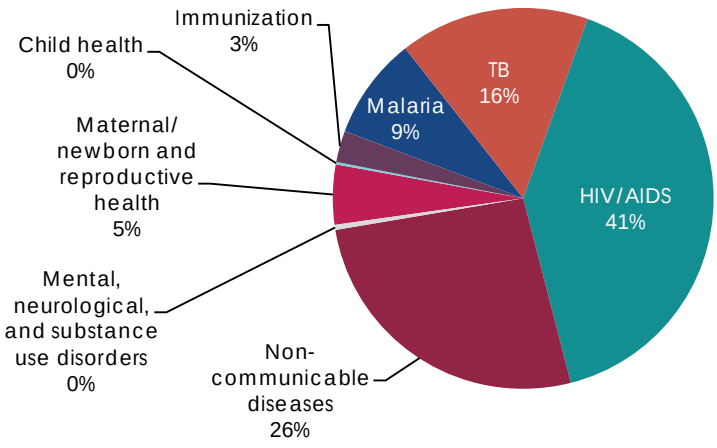
Table 10 shows the results of the analysis of eight disease areas—maternal health, child health, immunization, malaria, TB, HIV, NCDs, and mental, neurological, and substance abuse disorders (MNSADs) —that constitute a majority of the disease burden in Botswana. Coverage for these diseases is projected to require at least US$2,527.2 million for 2013 to 2017. This includes costs of drugs, supplies, and program costs (nonservice delivery staff and training if provided). HIV accounts for the largest percentage of total costs at US$1,036.7 million over five years. NCDs and TB make up the second and third largest costs under the EHSP. In sum, HIV, NCDs, and TB constitute around 41, 26, and 16 percent, respectively, of the total costs for these disease areas over the next five years. The sources for all figures and tables were derived by the authors, using the OneHealth model. Specific interventions under each disease area and data sources for all inputs are listed in Annex C.

Table 10. Costs Disaggregated by Program Area for 2013–2017, in 2013 US$ millions*

Disease Areas	2013	2014	2015	2016	2017	Total
Maternal/newborn and reproductive health	$26.4	$26.7	$26.5	$25.8	$ 24.7	$130.2
Child health	$0.8	$0.9	$1.1	$1.2	$1.2	$6.1
Immunization	$12.7	$13.6	$13.8	$14.1	$14.3	$68.4
Malaria	$41.8	$42.8	$44.2	$45.9	$46.6	$221.4
TB	$94.3	$87.4	$80.7	$74.5	$75.8	$412.7
HIV/AIDS	$181.1	$200.9	$206.6	$215.9	$232.2	$1,036.7
NCDs	$104.9	$117.7	$133.5	$150.4	$168.4	$674.9
MNSADs	$0.9	$1.5	$2.1	$2.7	$3.9	$11.2
Total costs (all program areas)	$456.2	$484.8	$501.8	$523.9	$560.5	$2,527.2

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

Figure 9. Percentage of Total Cost by Program Area, 2013–2017



Some targets as outlined for individual disease areas may be unrealistic, especially in situations where current coverage is low and program managers aim to reach 100 percent coverage within five years. As such, targets beyond a three- to five-year timeframe are prone to uncertainty. We recommend a periodic review of the service delivery targets for these disease areas to assess and revise as necessary based on progress made.

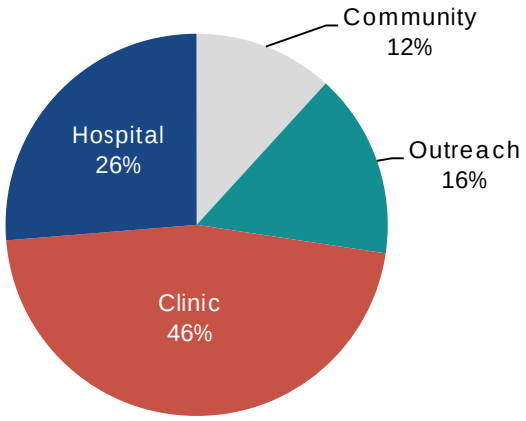
Table 11 and Figure 10 show costs of interventions (medicines, commodities, and supplies) by the various levels of health service delivery. The highest percentage of costs (46%) is incurred at the district hospital level. District hospitals (which include primary and district hospitals) provide a wide range of services that are delivered by generalists and specialists (MOH, 2010c), and, often, higher-level interventions (for multidrug-resistant TB [MDR-TB], for example) are only offered at this level. Also, recently some specialized services were decentralized to district hospitals from tertiary hospitals, for example, specialized eye care services are now available at Scottish Livingstone, which is a district hospital. Clinics are the first entry point for patients. Depending on clients' condition they are referred to a primary, district, or tertiary facility for further care. Community facilities (health posts and mobile stops) incur lower costs because services provided at this level are mostly preventative (i.e., screening, which are less costly than provision of treatment). Additionally, program staff at the MOH note that service delivery personnel at the community level have lower salaries than their counterparts at higher levels of service delivery.

Table 11. Costs by Levels of Healthcare Delivery, in US$ millions*

Levels of care	2013	2014	2015	2016	2017	Total
Community	$54.5	$56.6	$58.7	$61.2	$66.4	$297.5
Clinic	$68.6	$73.1	$78.2	$83.6	$91.0	$394.4
District and primary hospital	$213.9	$226	$232.5	$241.6	$256.6	$1,170.6
Tertiary hospital	$119.1	$129.1	$132.5	$137.5	$146.5	$664.7
Total	$456.2	$484.8	$501.8	$523.9	$560.5	$2,527.2

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

Figure 10. Percentage of Total Costs by Levels of Healthcare Delivery (2013–2017)



RESULTS AND DISCUSSION: RESOURCES BY DISEASE AREA

Maternal/Newborn and Reproductive Health

Strategic Objectives

The maternal mortality ratio (MMR) in Botswana decreased 21.7 percent from 188.9 to 147.9 per 100,000 live births between 2011 and 2012. Although HIV incidence is high, it is not the main cause of maternal deaths. The majority of maternal deaths are attributable to immediate postpartum hemorrhage followed by gestational pregnancy-induced hypertension (Statistics Botswana, 2014b). Botswana's National Roadmap for Accelerating the Reduction of Maternal and Newborn Mortality and Morbidity (2008) outlined some key objectives to reduce maternal mortality rates by 2013:

- Strengthen utilization of policy guidelines, protocols, and service standards in maternal and newborn healthcare by all service providers.
- Provide skilled attendance during pregnancy, childbirth, and the postnatal period at all levels of the healthcare system.
- Equip all health facilities with the required equipment and supplies in accordance with national health standards.
- Strengthen information, education, and communication/behavior change communication community-oriented strategies.
- Strengthen M&E activities at district and national levels.

Data Sources

Targets: The maternal and reproductive health program office provided the technical team with the baseline coverage for family planning, safe abortion, pregnancy and childbirth care, postpartum care, and sexual health, with targets to be achieved by 2017. The numbers to be achieved, by intervention, were entered directly into OneHealth.

Scale-up of Interventions

MOH program officers outlined some ambitious targets in the case of some interventions. The program aims to increase coverage of hypertensive disease management from a current baseline of 6.2 percent of PIN to 30 percent by 2017. Similarly ambitious targets have been laid out for management of pre-eclampsia (from 4.7% baseline to 50% by 2017) and other pregnancy complications (33.5% baseline to 70% by 2017). Given that the majority of maternal deaths are attributable to these complications, careful monitoring is essential to ensure scale-up is on track.

Cost Results

Total Costs: The maternal/newborn and reproductive (MNR) health program will likely cost a minimum of US$130.2 million over five years. Total costs by year are shown in Table 12.

Total 2013–2017 MNR health costs:

$130,171,449

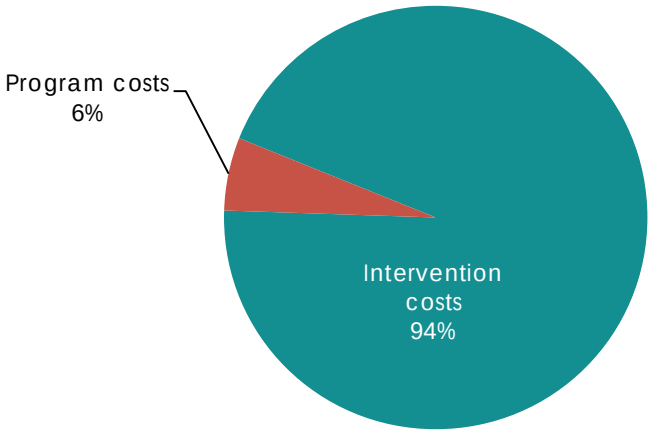
Table 12. Total Costs for Maternal/Newborn and Reproductive Health, in 2013 US$*

	2013	2014	2015	2016	2017	Total
Intervention costs	$ 24,973,591	$ 25,248,449	$ 25,036,671	$ 24,384,036	$ 23,261,748	$ 122,904,495
Program costs	$ 1,453,391	$ 1,453,391	$ 1,453,391	$ 1,453,391	$ 1,453,391	$ 7,266,954
Total costs	$ 26,426,981	$ 26,701,840	$ 26,490,062	$ 25,837,426	$ 24,715,139	$ 130,171,449

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

Intervention costs (as in other disease areas) include drugs and supplies. In this case (as in other disease areas), obtaining data on all program costs proved difficult. Program cost estimates below only include costs of MNR-specific HR who do not provide direct service delivery. Training costs were also included when available. These represent the minimum investment required. Estimates will likely be higher when costs of M&E, infrastructure, advocacy, communication, and community mobilization have been taken into account. In-service training and training of trainers are included in the program costs. This includes training workshops on emergency obstetric care, managing labor complications, managing pregnancy hypertension, and complications in newborns.

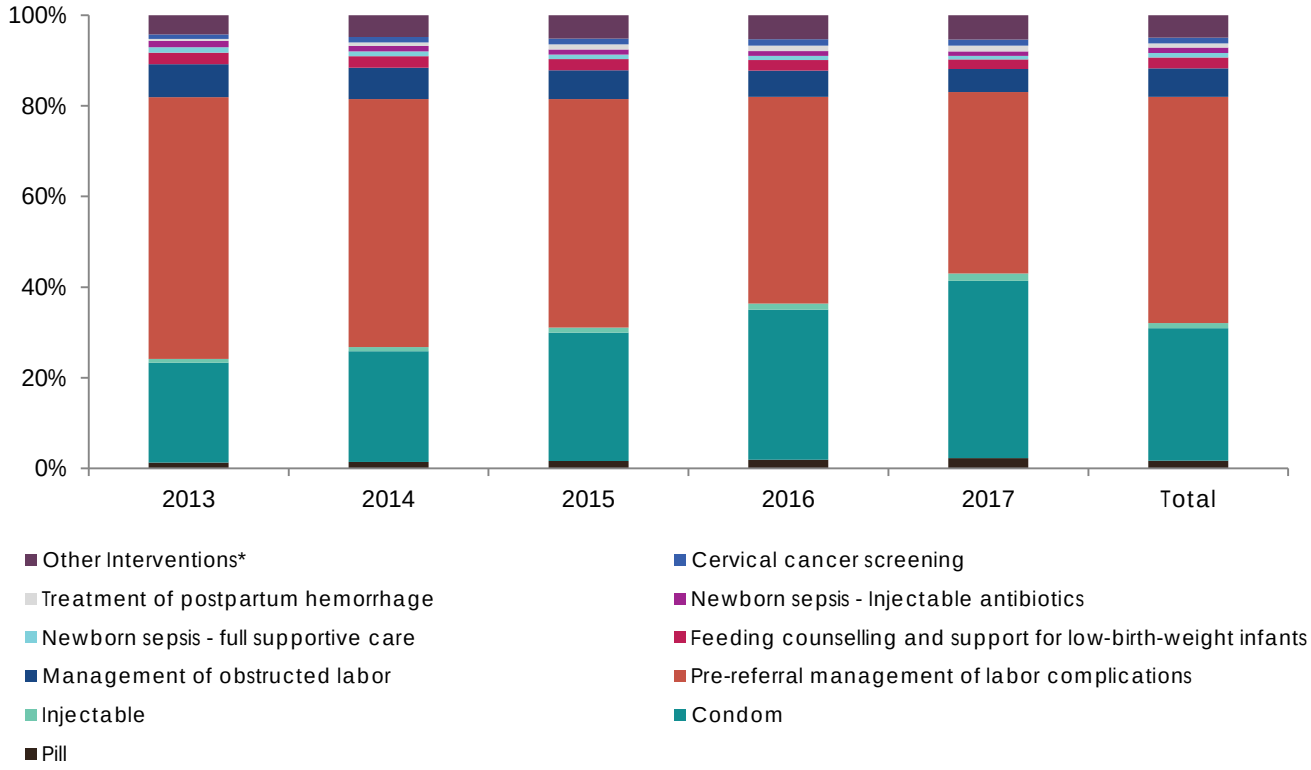
Figure 11. Contribution to MNR Costs, 2013–2017



Program costs (HR and training) are projected to be only 6 percent of the total MNR costs. This is very likely underestimated for the reasons mentioned earlier.

Of the 43 interventions covered under the MNR program, pre-referral management of labor complications and condoms are the main cost drivers, projected to account for 50 percent and 29 percent of the total costs over the five-year time frame (see figure below). Increasing focus on interventions targeted to postpartum care (like postpartum hemorrhage), which are estimated to account for 4 percent of the total costs in 2013, could have a greater impact on maternal mortality rates.

Figure 12. Composition of MNR drugs and supplies costs



*33 other interventions add 4.97% of the costs

Key Issues and Areas for Further Analysis

Quality of Data: While the technical team validated baseline coverage figures, PIN, and targets with the program staff at the MOH, these figures have not been assessed against population-level goals (i.e., actual numbers requiring coverage).

Areas for Further Analysis: A more detailed analysis of M&E, infrastructure, and communication costs could help program managers get a better estimate of program costs. An impact analysis that could help correlate reduction of the MMR with increases in spending on interventions could lead to a more efficient allocation of resources.

Child Health

Strategic Objectives

The *National Health Service Situation Analysis Report 2009* details the major causes of infant mortality, defined as the number of infants dying before reaching one year of age per 1,000 live births in a given year, and states it was around 41 in 2012 (World Bank, n.d.). Diarrhea and pneumonia account for a majority of the total child deaths (16.2% and 16.6%, respectively). The table below shows the percent attributable to the main illnesses. More than 40 percent of infant mortality occurs during the neonatal period and more than 90 percent is within one day of birth (MOH, 2009). The Accelerated Child Survival and Development Strategic Plan 2009 identifies the interventions that would significantly reduce the impact of these diseases: expanding oral rehydration therapy provision, improving access to effective pneumonia treatment, providing greater immunization coverage, and expanding the use of insecticide-treated bed nets (ITNs). The GOB followed through on strategies outlined in this document and

committed resources to introduce zinc to treat diarrhea, add Hib vaccine to the pentavalent vaccine, provide vitamin A supplementation, and provided free ITNs to children under five and pregnant women in malaria-endemic areas. According to the Revised National Health Policy (2011) the target is to reduce the infant mortality rate from 56 (per 1,000) between 2002 and 2006 to 16 by 2015 and the under-five mortality rate from 74 (per 1,000) in 2002 to 2006 to 21 by 2015.

Table 13. Major Causes of Childhood Mortality in 2006, as a Percentage of Total Deaths

Disease/Condition	2006
Pneumonia and other respiratory infections	16.5%
Diarrheal Diseases	27%
HIV	2%
Septicemia	4.9%

Source: National Health Service Situation Analysis Report (2009)

Scale-up of Interventions

Coverage for the diseases that contribute to child mortality—pneumonia and diarrhea—appears to be low. Currently around 37 percent of children needing pneumonia treatment are reached. Baseline coverage for oral rehydration therapy for diarrhea management is almost 43 percent and 32 percent for zinc used in diarrhea management. Coverage for Vitamin A administered to children—both for measles and xerophthalmia—appears to be high, at over 90 percent. In both cases, this is because vitamin A supplementation is offered to children between six months and five years and one to five years respectively as a prevention mechanism, not as a form of treatment. In all cases, program managers aim to reach 100 percent coverage by 2017. Given that the majority of child deaths are attributable to two diseases (diarrhea and pneumonia), careful monitoring is essential to ensure scale-up is on track.

Cost Results

Total Costs: The child health program will cost a minimum of US$5.3 million over five years. Total costs by year are shown in the table below. Costs of intervention implementation (drugs and supplies) once again make up the largest share of total costs. Program cost estimates only include HR and in-service refresher training for nurses, pharmaceutical technicians, and assistants. More robust estimates on M&E costs, infrastructure, advocacy and communication, and community mobilization will yield a closer estimate of program costs.

Total 2013–2017 Child health costs:

$5,280,573

Table 14. Total Costs for Child Health, in US$*

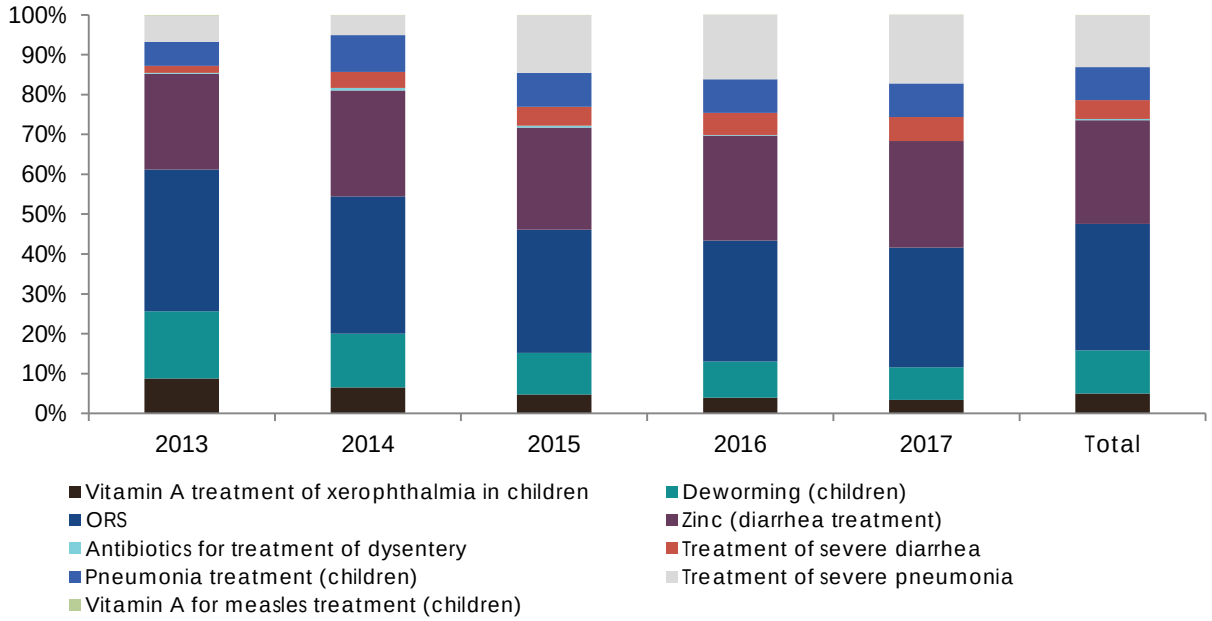
	2013	2014	2015	2016	2017	Total
Intervention costs	$ 498,786	$ 660,948	$ 871,331	$ 978,883	$ 1,014,550	$ 4,024,496
Program costs	$ 251,215	$ 251,215	$ 251,215	$ 251,215	$ 251,215	$ 1,256,076
Total costs	$ 750,001	$ 912,163	$ 1,122,546	$ 1,230,098	$ 1,265,765	$ 5,280,573

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

From Figure 13, it is clear that resources are being targeted toward the two biggest contributors to child mortality—pneumonia (21% of total costs) and diarrhea management (63%). Diarrhea management includes oral rehydration solution (ORS), zinc therapy, antibiotics for treatment of dysentery, and treatments for severe diarrhea. Costs for ORS (32% of total costs) and zinc therapy (26%) are the main

cost drivers within the child health program followed by treatment of severe pneumonia (13%) and deworming in children (11%). Continued focus on interventions targeted to diarrhea and pneumonia will have a greater impact on reducing child mortality rates.

Figure 13. Composition of Child Health Drugs and Supplies Costs



Key Issues and Areas for Further Analysis

Quality of Data: Data quality for some of the inputs in the child health program is not robust. The child health program provided the specific targets. These programmatic targets need to be reassessed especially when additional information on program costs and intervention coverage is available. As such, the technical team had difficulty assessing clear strategic objectives for achieving improved child health.

Areas for Further Analysis: The program and technical partners should conduct a thorough assessment of all coverage numbers for interventions listed under child health in the EHSP. Further clarity in actual number of children requiring treatment will help the program office better assess if diseases that contribute to a majority of mortality are being addressed aggressively.

Immunization

Strategic Objectives

Per the Revised National Health Policy (2011), measles immunizations rates were around 74 percent in 2002 to 2006, with a targeted rate of 100 percent coverage by 2015. In 2009, GOB estimates pegged the overall immunization rate at 90 percent for a full course of vaccines between 12 and 23 months of age (MOH, 2009). The main issue identified had to do with quality—too many doses being given too early or within short intervals.

The MOH's 2010 report on the EHSP for Botswana recommends the following:

- All clinics provide immunizations for at least five days a week.
- A child health coordinator monitor clinics' Expanded Program on Immunization (EPI) coverage, vaccine supplies, and cold chain every quarter.
- A senior EPI-trained member of staff act as a focal point for EPI programs.

Data Sources

Targets: Once again, the immunization program team provided the requisite inputs on current coverage levels of vaccines and targets to be achieved by 2017. The targets to be achieved were entered directly into OneHealth.

Scale-up of Interventions

Current coverage estimates range between 90 percent for the tetanus vaccine and 99 percent for the BCG vaccine. Overall, coverage levels for immunization among children are very high. Once again, in all cases program managers aim to achieve 100 percent by 2017.

Cost Results

Total Costs: The immunization program will cost a minimum of US$68 million over five years. Total costs by year are shown in Table 16. Intervention costs include 11 vaccines—measles, pentavalent, hepatitis B, polio, BCG, pneumococcal, HPV, yellow fever, rotavirus, tetanus, and diphtheria-pertussis-tetanus.

Total 2013–2017 Immunization Costs:

$68,445,323

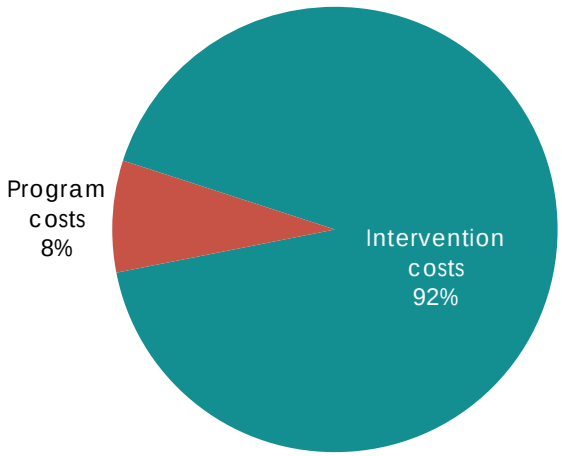
Table 15. Total Costs for Immunization, in US$*

	2013	2014	2015	2016	2017	Total
Intervention costs	$11,581,340	$12,469,835	$12,721,044	$12,961,482	$13,161,430	$62,895,131
Program costs	$1,110,039	$1,110,039	$1,110,039	$1,110,039	$1,110,039	$5,550,193
Total costs	$12,691,379	$13,579,873	$13,831,082	$14,071,521	$14,271,468	$68,445,323

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

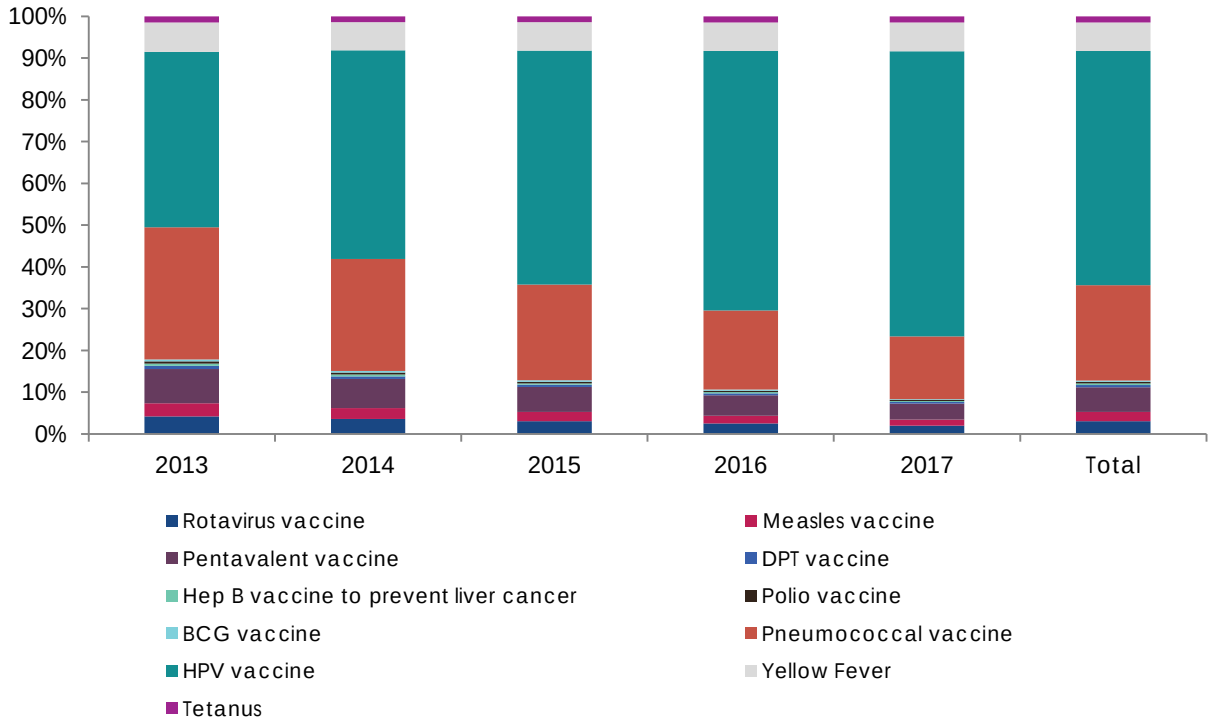
Program management accounts for around 8 percent of total costs (see Figure 14). This includes costs of HR—logistics experts, health education assistants, social workers, counselors, and nutrition officers. These costs will likely increase once estimates on M&E costs, infrastructure, advocacy and communication, and community mobilization are added.

Figure 14. Contribution to Immunization Costs, 2013–2017



Intervention costs for the HPV vaccine is the main cost driver. This is not surprising since the HPV vaccine is relatively new and more expensive and contributes to 56 percent of the total costs over five years. At 23 percent, the pneumococcal vaccine is the second most expensive intervention. Measles vaccine costs make up only 2 percent of the costs over five years (see Figure 15).

Figure 15. Composition of Immunization Drugs and Supplies Costs



Areas for Further Analysis

Data on immunization rates were obtained from the WHO Immunization Surveillance database (WHO, n.d.b) validated with program managers. Program managers could focus on reassessing targets to refocus attention on improving quality of administration (tackling invalid dosing). Scaling up interventions will require many resources and an increased coordination with logistics and HR to ensure that commodities and staff are available to undertake this increase in coverage.

Malaria

Strategic Objectives

Botswana's updated Malaria Strategic Plan 2010–2018 defines key objectives for reducing malaria incidence, namely, by 2015:

- Develop the requisite capacity in the program at all levels to achieve malaria elimination.
- Develop a robust information system for tracking of progress and decision making by 2015.
- Achieve total coverage of all appropriate vector control interventions in all transmission foci. Detect all malaria infection through appropriate diagnostic methods and provide effective treatment.
- Reach at least 90 percent of the population with appropriate information on malaria prevention to effect behavior change to scale up elimination interventions.

Data Sources for the Cost Analysis

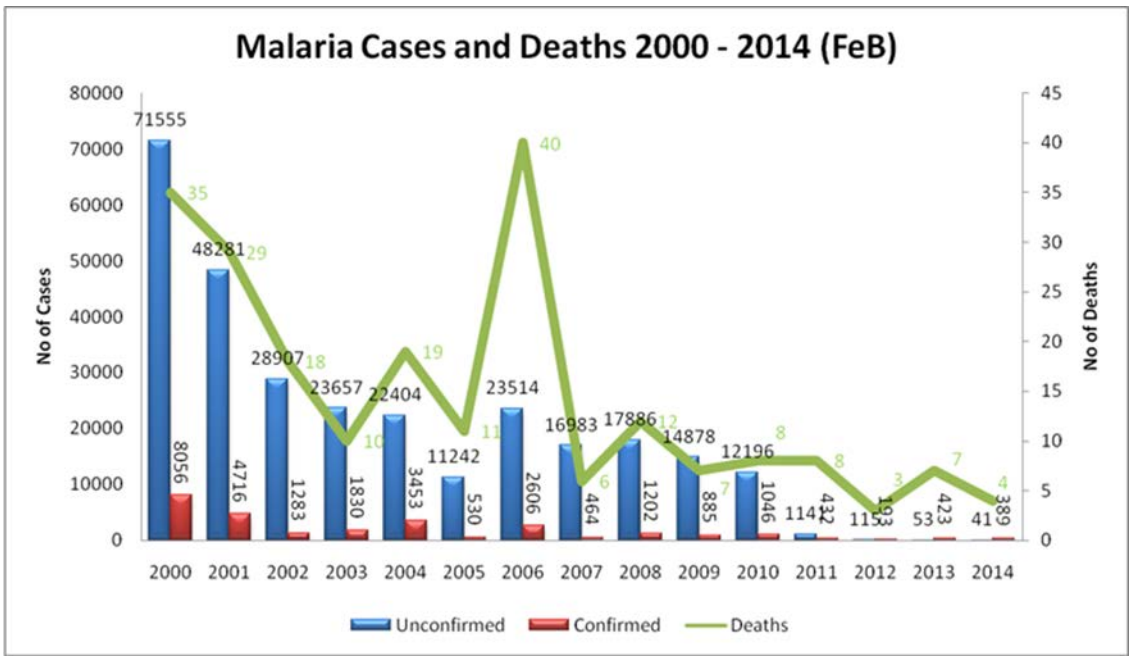
Targets: Data on baseline coverage and target numbers for insecticide-treated materials, pregnant women sleeping under an ITN, indoor residual spraying (IRS), surveillance, malaria treatment, larval control, and chemoprophylaxis were obtained from the program office, the *Botswana National Malaria Policy (2011)*, and the *Malaria Strategic Plan 2010–2018*. The numbers to be achieved, by intervention, were entered directly into OneHealth.

Scale-up of Interventions

Malaria interventions are provided in six endemic districts: Okavango, Ngami, Chobe, Boteti, Tutume and Bobirwa. Of note, malaria testing (in cases of fever) is provided nationally (endemic and nonendemic areas). To estimate the expected annual number of fever cases that would require testing, the malaria program office assesses the average number of malaria cases in the past five years (confirmed and unconfirmed) and adds an additional 20 percent as safety stock. The program implements active surveillance in all districts. When a case of malaria is reported, health workers screen all neighbors up to 100 meters surrounding the case. To calculate the number of tests needed for this surveillance, the program office multiplies the average number of positive cases in the past five years by 50, the average number of people expected to be screened against each case. The total number of tests required is the sum of tests required for screening fever cases and tests required for active surveillance. Only patients who test positive for malaria are being treated since the adoption of the malaria elimination campaign in 2010.

Figure 16 shows annual malaria cases since 2000. The number of cases has dropped dramatically since the early 2000s.

Figure 16. Malaria Cases and Deaths 2000–2014



Source: Botswana MOH Malaria Program

As with other program areas, the malaria program also has ambitious prevention-related targets. Three interventions in particular will require considerable resources to reach 100 percent implementation by 2017: surveillance (which is currently at 50%), insecticide-treated materials (70%) and larval control (75%). The two main vector control interventions are long-lasting insecticidal nets (LLINs) and IRS.

LLINs are currently distributed and IRS is done in the six endemic districts, while winter larviciding is currently done in three districts (Bobirwa, Boteti, and Tutume). All suspected malaria cases are confirmed with microscopy and/or rapid diagnostic test.

Cost Results

Total 2013–2017 Malaria costs: **$221,392,176**

Total Costs: The malaria program is expected to cost at least US$221 million over five years of the EHSP. Total costs by year are shown in the table below. Costs are relatively stable throughout this period. About 95 percent of total malaria program costs are drugs and commodities. Estimates on program costs were based on inputs from program managers, the *Malaria Strategic Plan (2010–2018)* and *Botswana National Malaria Policy (2011)*. Program costs include the costs of HR, in-service refresher training, and development of a communication strategy, mass media campaigns, and social outreach activities. Program management costs account for around 5 percent of total costs. This will likely increase when costs of M&E and advocacy planning are added.

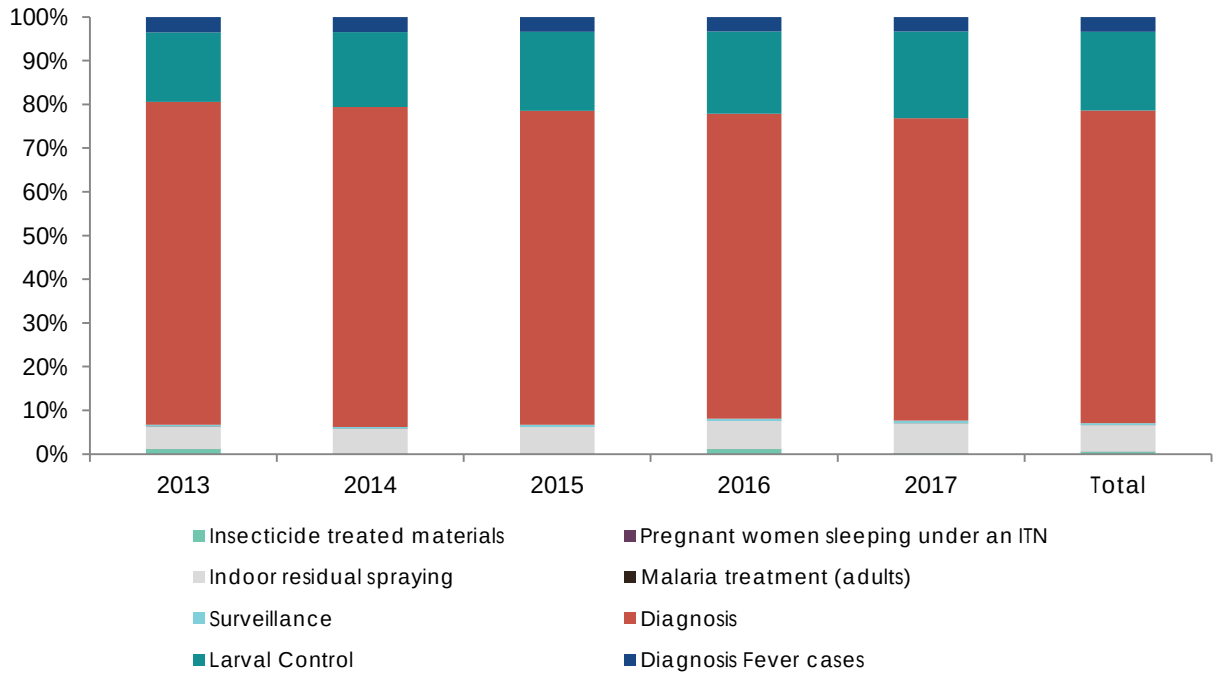
Table 16. Total Costs for Malaria Program, in US$*

Malaria	2013	2014	2015	2016	2017	Total
Intervention costs	$39,904,428	$40,916,941	$42,275,746	$43,971,504	$44,689,504	$211,758,123
Program costs	$1,926,811	$1,926,811	$1,926,811	$1,926,811	$1,926,811	$9,634,053
Total costs	$41,831,238	$42,843,752	$44,202,557	$45,898,315	$46,616,315	$221,392,176

The bulk of malaria drugs and commodity costs over 2013 to 2017 are attributable to costs of tests for diagnosis (71%) (see Figure 17), larval control at 18 percent, and around 6 percent of the total costs for IRS, which is provided yearly between October and December in endemic areas. IRS is provided in other areas in cases of malaria outbreak.

During winter, breeding sites become more localized and limited in number. Winter larviciding was introduced in 2012 with a pilot in Bobirwa and has since been rolled out to Boteti and Tutume (MOH, 2010a). Insecticide-treated materials, which include LLINs, make up only around 1 percent of the total costs of drugs and supplies. LLINs are currently distributed in the six endemic districts targeting transmission foci (MOH, 2010a). Current first-line treatment for malaria is artemisinin-based combination therapy, with quinine being the preferred second-line treatment.

Figure 17. Composition of Malaria Drugs and Supplies Costs



Key Issues and Areas for Further Analysis

The malaria program provided specific targets on intervention coverage. Passive surveillance to detect malaria cases is the detection method used (MOH, 2011c). A more active surveillance plan including malaria surveillance officers in districts (MOH, 2010a), robust data collection, and mapping at the district level would help early detection. Malaria treatment costs are almost negligible when compared with costs for diagnostics, given the protocol for testing within the endemic areas and outside as well. This could be a problem with the input numbers collected by the team or incorrect data compilation. The technical team recommends updating this model with correct treatment costs to get a more accurate estimate of resource needs. Further, an impact analysis of interventions would help better target resources to those that actually result in reductions in the incidence of malaria.

Tuberculosis

Strategic Objectives:

The National TB Strategic Plan 2008–2012 outlines specific targets:

- Detection of 70 percent of new smear-positive index cases
- Achieving bacteriologic coverage of 80 percent
- HIV testing rates of 90 percent among all TB patients
- 90 percent of HIV co-infected TB patients to start on ART
- To successfully treat 85 percent of all TB patients
- Reduce the death rate due to TB to less than 8 percent
- Treatment failure rate and defaulter rate to less than 1 and 5 percent, respectively

Data Sources for the Cost Analysis

Targets: Data sources for the inputs on the TB program include the TB program managers, the *2011 National Tuberculosis Programme Manual*, and the *Botswana Tuberculosis and Leprosy Programme*

Annual Report 2012. These sources yielded baseline and target coverage information on TB notification and treatment (including first-line treatment for children and adults, contact tracing, and extrapulmonary TB), MDR-TB, and collaborative TB plus HIV/AIDS interventions. The numbers to be achieved, by intervention, were entered directly into OneHealth.

Scale-up of Interventions

Despite a sustained decline in notification rates, TB incidence in Botswana is still high—408 per 100,000 people in 2012 (MOH, 2012a). Early diagnosis is done using sputum smear microscopy. Botswana's southwestern regions suffer the highest burden of the disease. Of the 6,829 cases of TB reported in 2012, 85 percent were new cases while the rest were retreatment cases; 55 percent were males, and 8 percent of the total TB cases were children under the age of 14 (MOH, 2012a). The program office provided a scale-up target of 70 percent by 2017 for first-line TB treatment for children (at 45% in 2013). The program also aims to raise TB contact tracing from a baseline of 80 percent to 100 percent coverage by 2017, and MDR-TB notification among new patients and previously treated patients from 10 percent to 35 percent by 2017. Botswana has been successful in implementing universal "directly observed therapy, short course," or DOTS, treatment.

Cost Results

Total 2013–2017 TB costs: **$412,672,334**

Total Costs: The TB program is the third most expensive under the EHSP program, accounting for 16 percent of the total costs. Total costs by year are shown in the table below. Once again costs for drugs and supplies make up a bulk of total costs. Estimates on program costs were based on inputs from program managers, the *TB/Leprosy Report 2011*, and *Botswana National Tuberculosis Program Annual Report 2010–2011*. Program costs include the costs of HR, specifically a TB focal person, physician, manager, laboratory technician, pharmacy technician, health education officer, and nurses. The costs also include some in-service refresher training. Estimates will likely be higher when costs of M&E, infrastructure, advocacy, communication and community mobilization have been taken into account.

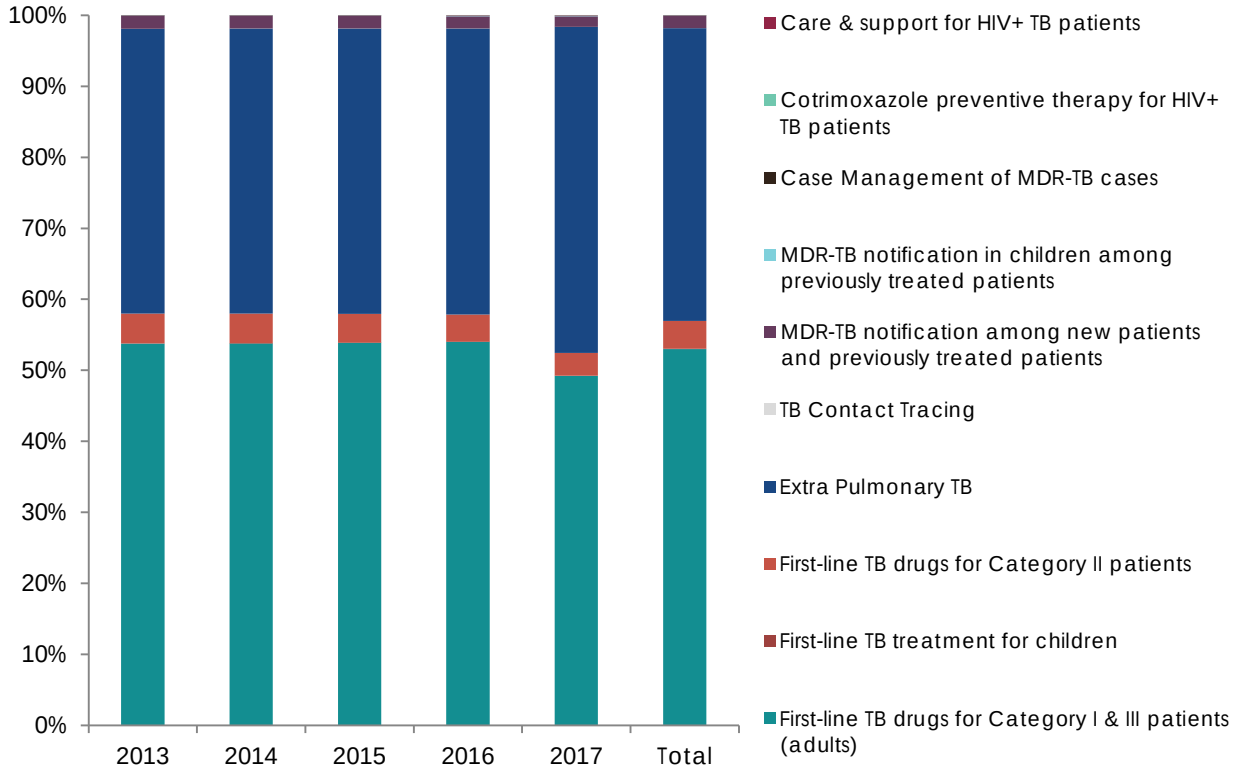
Table 17. Total Costs for TB, in US$*

	2013	2014	2015	2016	2017	Total
Intervention costs	$93,462,896	$86,584,465	$79,943,479	$73,755,595	$75,041,389	$408,787,824
Program costs	$788,123	$774,097	$774,097	$774,097	$774,097	$3,884,510
Total costs	$94,251,019	$87,358,562	$80,717,576	$74,529,692	$75,815,486	$420,057,618

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

The bulk of resources (96%) are used for TB notification and treatment interventions (see Figure 18). This includes first-line drug treatment for patients in categories I, II, and III; first-line treatment for children; treatment for extrapulmonary TB; and TB contact tracing. Only about 2 percent of the total intervention costs were devoted to MDR-TB. This is appropriate because of the low prevalence of MDR-TB. The main cost driver interventions are first-line TB drugs for Category I & III for adult patients and extra-pulmonary TB comprising 54% and 42% of the total costs respectively. Between 2006 and 2012, only 541 cases of MDR-TB were confirmed by the National Tuberculosis Reference Laboratory (MOH, 2012a).

Figure 18. Composition of TB Drugs and Supplies Costs



Areas for Further Analysis

Once again, as in the case of other disease programs, assessing the impact of interventions, particularly those for TB notification and treatment, could help hone focus on those that have the most impact. Additionally, in the case of some interventions, further study is required to assess diagnosis rates; for example, MDR-TB cases may be under-diagnosed since we see that 15 percent of total TB cases are coming in for retreatment. Increasing coverage for TB contact tracing (from 80 percent to 100 percent) will require much more investment, especially since achieving 100 percent will require considerable resources (logistics, infrastructure, and HR) to reach hard-to-reach cases in remote areas. As interventions are scaled up there is a greater need for more specialized staff (laboratory, physicians, etc.), more equipment (X-ray machines, laboratory equipment), and additional supplies to be transported. Better communication between the program and health systems is needed to ensure success of these interventions.

HIV

Strategic Objectives:

Reducing Botswana's high HIV/AIDS burden is a national priority. The BAIS IV Summary 2014 estimates a national prevalence rate of 18.5 percent among the population ages 18 months and over, an increase from 17.6 percent in 2008. HIV incidence rate is estimated at 1.35 percent compared with 1.45 percent in 2008. The prevalence rate among females is higher at 20.8 percent when compared with 15.6 percent for men. The National Strategic Framework for HIV and AIDS 2010–2016 outlines strategic objectives to be met by year 2016:

- Reduce the incidence of sexual transmission of HIV among females and males ages 10 to 49 years.

- Increase access to healthcare services for HIV prevention.
- Strengthen community and health systems capacity for universal access to quality, comprehensive, and sustainable HIV and AIDS services.
- Effectively coordinate, harmonize, and align stakeholder support to the national response at all levels.
- Strengthen and sustain political leadership and commitment on HIV and AIDS at all levels.
- Improve the ethical and legal environment to support the national response.
- Strengthen the information management system of the national response to enhance information sharing and utilization.
- Increase access to HIV and AIDS comprehensive quality treatment, care, and support services.

Data Sources for the Cost Analysis

Targets: Data sources for inputs on the HIV program include the *2012 Botswana National HIV & AIDS Treatment Guidelines*, BAIS III, BAIS 2014 Summary, AIDS experts in the country, and program managers. These sources yielded baseline and target coverage information on prevention interventions (PMTCT, male circumcision, VCT, condoms); care and treatment (adult and pediatric ART, nutrition supplements, management of opportunistic infections); and HIV plus TB interventions. The numbers to be achieved, by intervention, were entered directly into OneHealth.

Scale-up of Interventions

HIV prevalence rate is at its peak between ages 35 to 39 (43.7%) and ages 45 to 49 (41.8%). Male and female infections peak at different ages: prevalence is at 50 percent between the ages of 35 and 39 for women. In the case of men, prevalence peaks at 43.8 percent in the 40 to 44 age group. Prevalence is higher in urban areas (19.1%) than rural areas (17.4%). Scale-up targets for interventions were provided by the program office. Baseline coverage for care and treatment interventions is high—90 percent and above for adult and pediatric ART coverage and diagnostics—so achieving 100 percent by 2017 seems feasible. Coverage for some prevention interventions is low (e.g., male circumcision, currently at 26 percent with a target of 80 percent coverage by 2017).

Cost Results

Total Costs: Given that high incidence and prevalence of HIV are one of Botswana's key challenges, it is unsurprisingly the most expensive disease area covered under the EHSP. Total costs by year are shown in the table below.

Total 2013–2017 HIV costs:
$1,036,680,869

Program costs reflected in the table below do not capture the full gamut of service provision. They include costs of program staff that does not deliver services and in-service refresher training for doctors, nurses, and pharmacists on the fundamentals of HIV care, ART guidelines, medication adherence, and palliative care. Provision of care for HIV is more expensive when compared to these costs for other interventions, and therefore inclusion of infrastructure and equipment costs, transport, communication and advocacy, as well as M&E, and a fuller accounting of personnel involved will help program managers arrive at a more accurate estimate of program costs.

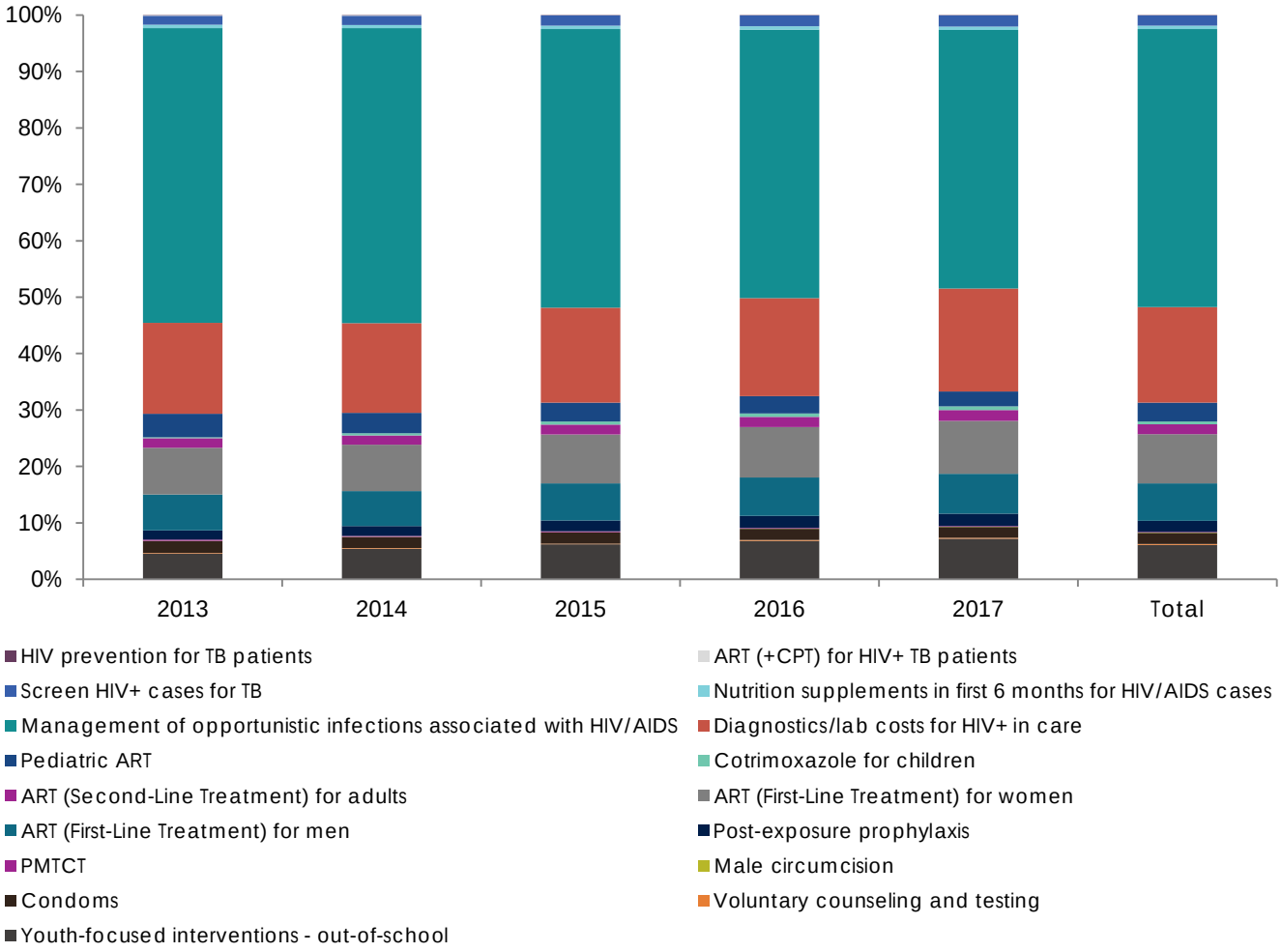
Table 18. Total Costs for HIV in US$*

	2013	2014	2015	2016	2017	Total
Intervention costs	$180,773,184	$200,523,913	$206,206,711	$215,540,004	$231,855,730	$1,034,899,542
Program costs	$356,265	$356,265	$356,265	$356,265	$356,265	$1,781,327
Total costs	$181,129,450	$200,880,178	$206,562,976	$215,896,269	$232,211,996	$1,036,680,869

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

As is evident from Figure 19, the bulk of expenditure is on care and treatment, which make up over 80 percent of the costs, while prevention interventions make up just around 10 percent. The National Strategic Framework 2008–2010 midterm review underscores the need to focus efforts on prevention as the solution that could alter the course of the epidemic. Care and treatment interventions include costs of ART for adults and children, management of opportunistic infections, diagnostics/laboratory costs for HIV detection, and nutrition supplements for HIV cases.

Figure 19. Composition of HIV Intervention Costs



Key Issues and Areas for Further Analysis

Quality of Data: As explained earlier in this report, due to lack of harmonization between indicators and reporting systems for various interventions, the technical team faced challenges in assessing details like total number of patients and numbers of patients accessing the different types of interventions. Specific targets were sourced from and validated with the HIV program team and *2012 Botswana National HIV & AIDS Treatment Guidelines*, BAIS IV, and the *Health Statistics Report 2012*.

Areas for Further Analysis: A robust assessment of program costs to yield closer expenditure results is essential for further planning. A more detailed overview of HR involved, data on expenditures related to M & E, and advocacy and communication will yield a truer estimate.

Non-Communicable Diseases

Strategic Objectives

While HIV/AIDS continues to be the major disease burden in Botswana, poor health due to NCDs like cardiovascular disease (CVD) is on the rise, especially in the last decade. According to Botswana's Revised National Health Policy (2011) in 2006, CVD was the fourth leading cause of mortality, corresponding to 11 percent of the total, falling behind other infectious diseases (22%), HIV (17%), and respiratory illnesses (13%). Cancers in 2006 corresponded to 5 percent of the total causes of mortality. The *National Health Service Situation Analysis Report (2009)* notes that Kaposi's sarcoma increased due to HIV infections, while cervical cancer has increased fourfold in the last 20 years. Cancer of the digestive tract and lymphatic/endocrine systems have increased several-fold in men over the same period.

To stem many of these daunting statistics, the following strategic objectives were outlined in the Revised National Health Policy (2011):

- Reduce the number of smokers.
- Prevent young adults from trying tobacco.
- Reduce smoking among pregnant women.
- Reduce obesity.
- Prevent obesity and malnutrition in children.
- Increase accessibility to affordable, healthy foodstuffs by all people, particularly in deprived and rural areas.
- Implement a physical exercise program along with the health and wellness week in all work places and schools.

Data Sources for the Cost Analysis

The technical team sourced requisite inputs on current coverage levels for each intervention and target from experts in country, the program team at MOH, and various documents. The targets to be achieved were entered directly into OneHealth. In addition, coverage rates were also derived from the following sources: Botswana Noncommunicable Disease Strategic Plan, the EHSP for Botswana (2010), and the *Botswana Health Statistics Report (2009).*

Scale-up of Interventions

The coverage for many of the interventions identified in this study was low (5%) at baseline (2013) and increased to 20 percent in the target year (2017). The interventions that fall under this category are screening for risk of CVD/diabetes, follow-up care for those at low risk of CVD/diabetes, treatment for those with very high cholesterol but low absolute risk of CVD/diabetes, treatment for those with high

blood pressure but low absolute risk of CVD/diabetes, and treatment for those with high absolute risk of CVD/diabetes. The coverage at baseline for treatment of cases with type I diabetes and type II diabetes were 80 and 60 percent respectively, reaching 100 percent and 80 percent respectively by the target year 2017.

Cost Results

Total 2013–2017 NCD costs: **$674,901,517**

Total Costs: The NCD program is the second most expensive under the EHSP program, accounting for 26 percent of the total costs. Total costs by year are shown in Table 19. Once again costs for drugs and supplies make up the bulk. Estimates on program costs were based on inputs from program managers and available reports. Additional staff (e.g., physicians, nurses) would certainly be required to provide NCD services; however, the program costs included in this study comprise only the human staff categories of clerical officers and social workers. Estimates will likely be higher when costs of other HR staff categories, M&E, infrastructure, advocacy, communication, and community mobilization have been taken into account.

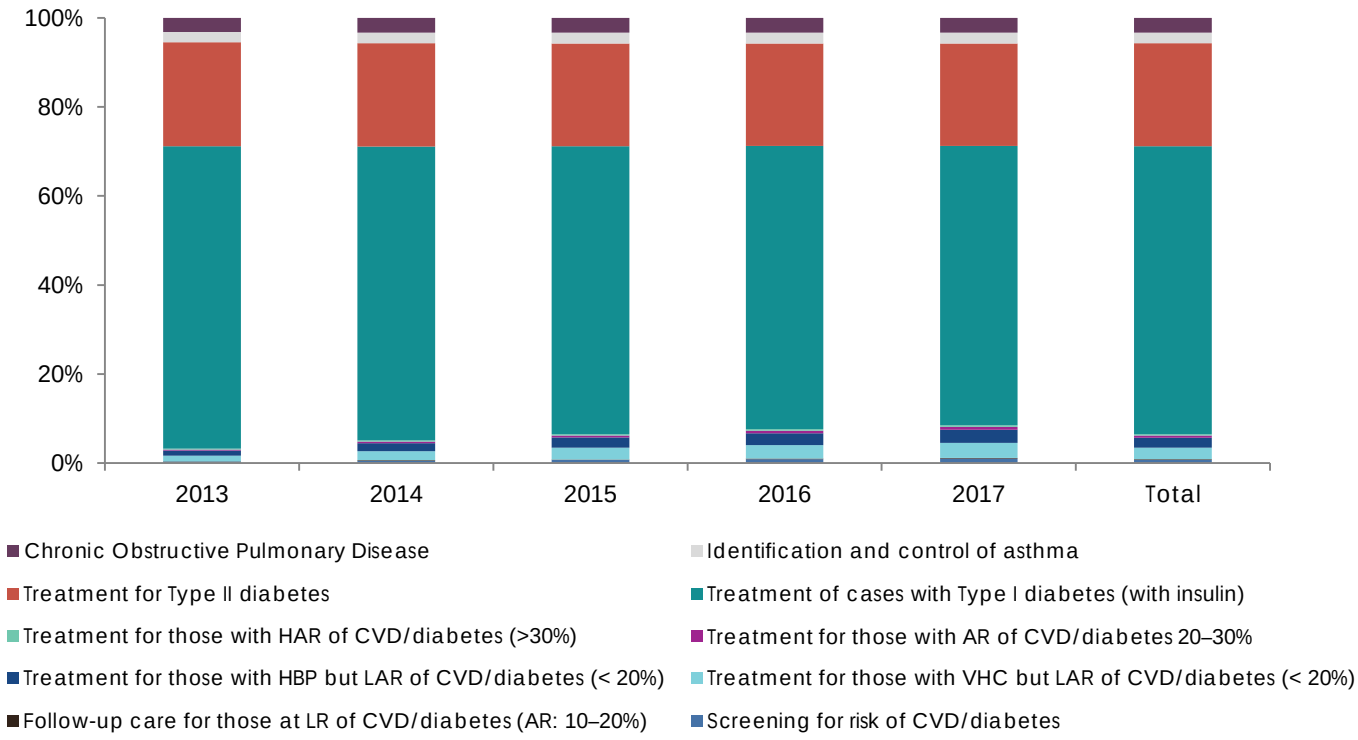
Table 19. Total Costs for NCDs, in US$*

	2013	2014	2015	2016	2017	Total
Intervention costs	$104,428,775	$117,236,346	$133,028,991	$149,922,827	$167,962,786	$672,579,724
Program costs	$464,358	$464,358	$464,358	$464,358	$464,358	$2,321,792
Total costs	$104,893,134	$117,700,704	$133,493,349	$150,387,186	$168,427,144	$674,901,517

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

Figure 20 shows that the majority of the expenditures have been incurred for treatment, specifically the treatment of all types of diabetes (88%). Within this category, treatment of cases with type I diabetes (with insulin) accounts for the majority of the costs (65%) and the treatment for type II diabetes amounts to 23 percent of the costs. CVD/diabetes follow-up and screening (for all risk levels) accounts for around 1 percent of the total costs.

Figure 20. Composition of NCD Intervention Costs



AR: Absolute risk, CVD: cardiovascular disease, HAR: High absolute risk, HBP: High blood pressure, LAR: Low absolute risk, and VHC: Very high cholesterol.

Key Issues and Areas for Further Analysis

The Revised National Health Policy (2011) recognizes the importance of increasing the availability of healthier food choices and increasing physical activity to improve health outcomes; however, to accomplish this task a holistic and multi-ministry approach will be needed. Increasing healthier food alternatives and improving physical activity will not only involve cooperation across MOH departments (nutrition, child health, etc.) but also require cooperation from different ministries (e.g., Ministry of Agriculture and Ministry of Urban Planning). Greater availability of healthier food alternatives will require increased cooperation between private and public food distributors while at the same time necessitating increased infrastructure to get the produce to the final consumers at reasonable prices. In addition, the development of safe and green areas would encourage more people to undertake leisure activity that can lead to health benefits. The complexities inherent with such an undertaking are certainly beyond the scope of this costing exercise; however, the examples illustrated above help to pave the way for more comprehensive discussions on this theme that can lead to positive health outcomes.

The allocation of resources alone will likely not solve many of the problems associated with the NCD burden, but some prioritization of resources and increase in coverage might be needed to ensure strategic objectives are being targeted. Interventions targeting smoking cessation might need to receive increased resources, given that respiratory diseases and screening of CVD/diabetes risk factors currently receive less than 6 percent of the total resources. Greater focus on screening and interventions focusing on healthier food choices and increased physical activity should help decrease the required resources for type II diabetes treatment. The fact that NCDs do not constitute the highest burden of morbidity and mortality

as yet presents a great opportunity for higher investments in prevention. Investments at this early stage will certainly increase early detection and thus prevent higher disease burdens that will cost more to treat.

Mental, Neurological, and Substance Abuse Disorders

Strategic Objectives

The epidemiological transition from communicable diseases to NCDs is beginning to take place in Botswana, although the full transition may still be a few years into the future. Several lifestyle behaviors have a huge impact on morbidity and mortality. Drug and alcohol abuse take a heavy toll in illness, accidents, antisocial behavior, and criminal acts of violence, including domestic violence. According to WHO's Botswana Country Profile, alcohol was the most common primary substance of abuse reported by patients, accounting for 84 percent of the 72 patients from four treatment centers in 2003. Per the *National Health Service Situation Analysis Report* (2009), the percentage in 2008 of current drinkers (those who drank alcohol in the past 30 days) was estimated at 18.7 percent (men, 30.3% and women, 8.8%). The percentage among current drinkers who binge drink was found to be 54.1 percent for men and 51.8 percent for women. Binge drinking was defined as men who had five or more drinks and women who had four or more drinks on any day in the last week.

The Revised National Health Policy (2011) outlines the following general objectives for this program area:

- Promote and monitor public education and awareness creation on the harmful effects of alcohol and substance abuse, and guide the management of alcohol- and substance-related harm.
- Strengthen the health sector response to alcohol and drug abuse through increased accessibility to user-friendly healthcare facilities.
- Regulate and monitor the formal and informal liquor sector/industry.
- Reduce the incidence of adults exceeding generally acceptable limits of alcohol consumption.
- Provide health education and mental health awareness.
- Support chronic patients.
- Provide holistic patient management including rehabilitation.

Data Sources for the Cost Analysis

The technical team had considerable difficulty assessing current coverage levels and targets to be achieved by 2017. Ultimately, inputs were based on available documents and validated with program staff.

Scale-up of Interventions

The coverage for many of the interventions identified in this study had different low ranges at baseline (2013) but most increased to 40 percent in the target year (2017). Of all of the interventions within this program, basic psychosocial treatment and antidepressant medication was the intervention with the highest baseline (2013) coverage, starting at 40 percent and the highest target year (2017) coverage at 100 percent. The three interventions under depression varied from 5 percent to 10 percent in 2013 up to 25 percent to 50 percent by 2017. Other interventions (11 in total) varied from 3 percent to 15 percent in 2013 with aims to reach a constant 40 percent by 2017.

Cost Results

Total 2013–2017 MNSAD costs: **$11,186,263**

Total Costs: Costs for this program are under-represented primarily because a number of interventions have not been fully developed and implemented. Total costs by year are shown in the table below. Once again costs for drugs and supplies make up the bulk of total costs. Estimates on program costs were based on inputs from program managers and available reports. Additional staff (e.g., psychologists, psychiatrists, nurses) would certainly be required to provide these services. However, the program costs included in this study comprise only the staff categories of administration officer, cleaner, and data clerk. Estimates will be higher when costs of other HR staff categories, M&E, infrastructure, advocacy, communication, and community mobilization have been taken into account.

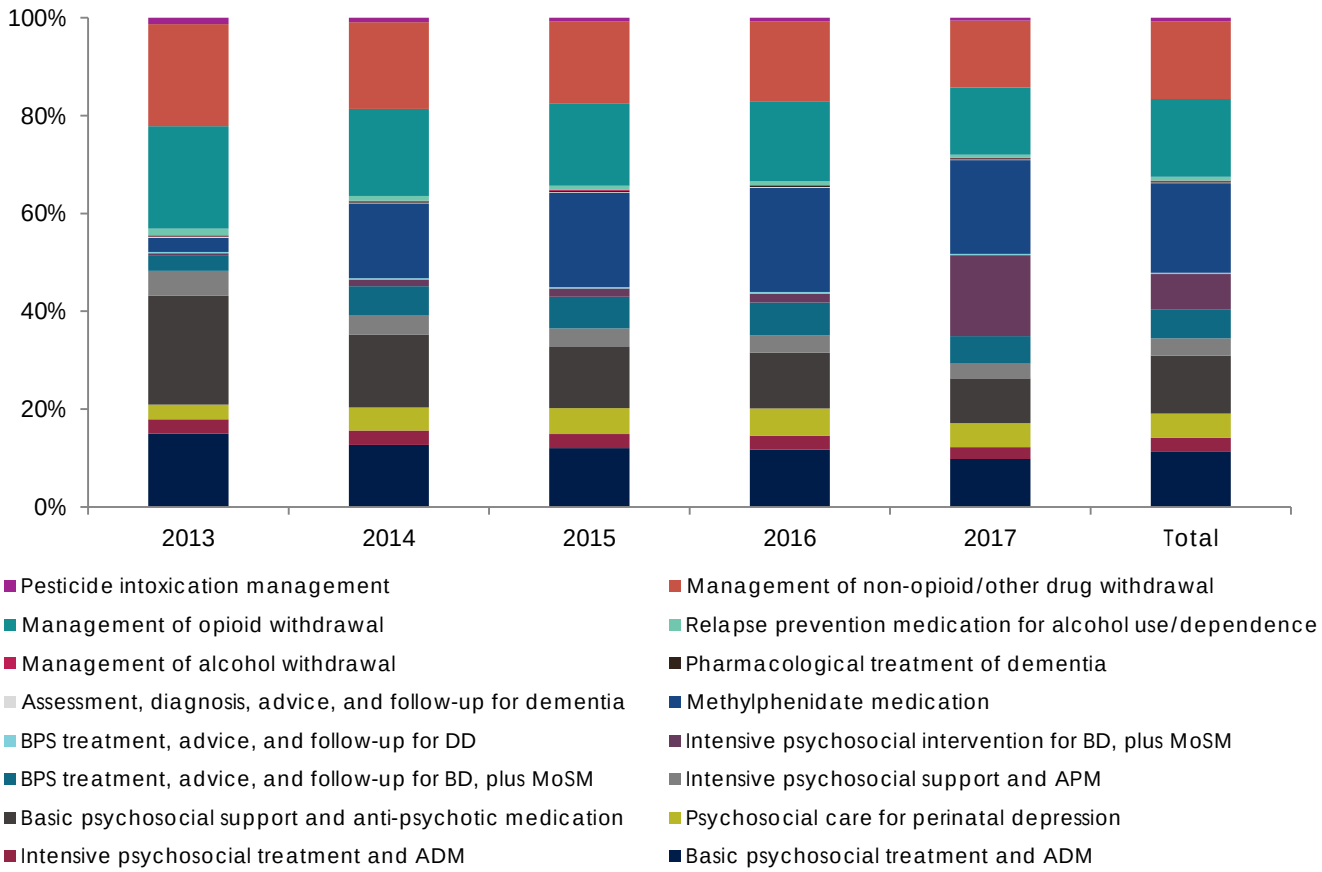
Table 20. Total Costs for MNSADs, in US$*

	2013	2014	2015	2016	2017	Total
Intervention costs	$547,410	$1,144,949	$1,753,012	$2,365,657	$3,498,637	$9,309,664
Program costs	$375,320	$375,320	$375,320	$375,320	$375,320	$1,876,599
Total costs	$922,729	$1,520,269	$2,128,332	$2,740,976	$3,873,956	$11,186,263

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

Figure 21 shows that the majority of the expenditures have been incurred for five interventions accounted for 73 percent of the total costs, which happen to be the main cost drivers within the MNSAD program. These interventions are the following: methylphenidate medication 18%, management of opioid withdrawal 16%, management of non-opioid/other drug withdrawal 16%, basic psychosocial support and anti-psychotic medication 12% and basic psychosocial treatment and anti-depressant medication.

Figure 21. Composition of MNSAD Intervention Costs



APM - anti-psychotic medication, ADM - anti-depressant medication, BP - bipolar disorders, BPS - basic psychosocial, DD - developmental disorders, MoSM - mood-stabilizing medications

Key Issues and Areas for Further Analysis

The Revised National Health Policy (2011) recognizes the importance of combating substance abuse and providing holistic services to those in need of treatment. From the data above, we can see that many of the resources are being allocated toward drug use and dependence interventions (32%). Alcohol use and dependence interventions account for 1 percent of the total costs. If this is the case, the resources for alcohol use and dependence need to be increased, given that it is a priority area for the country. On the other hand, it is very likely that some of the resources allocated toward drug use and dependence may also be used for interventions geared toward alcohol use/dependence; however, this is difficult to ascertain from this cost analysis study, and further discussions with the program managers will be necessary.

The MNSAD services seem to be part of the integrated primary healthcare services, and many preventive measures for mental disabilities are included in all services such as antenatal, infant, child, reproductive health, and curative care. The fact that these services are being provided via several health sectors implies that the costs included in this section may not represent the actual need for these services. The actual need may be higher, and the costs included here may be an underestimation. The other challenge faced during this analysis is the lack of specific prevalence rates for MNSADs listed here, thereby making it difficult to verify if the allocated costs correspond to the situation on the ground. Program staff were consulted to determine the rates used. However, further discussions between program staff and other department staff

are necessary to agree on these rates and develop a relevant strategy to ensure that the cost analysis replicates the actual need for these services.

Human Resources

Though available information on costs of HR is not complete, the team was able to calculate the total cost of salaries for medical personnel delivering services at the facility. The following table reflects these results.

Table 21: Costs for Medical Personnel at Facility Level, 2013–2017 in US$

	2013	2014	2015	2016	2017	Total
Salaries	171,988,443	177,148,096	182,462,539	187,936,415	193,574,507	913,109,999

RECOMMENDATIONS

Despite limitations around data and resources, the technical team was able to develop normative costs for the various disease areas identified. Below, we have detailed a few areas for further development that will enhance the resource estimation and planning process.

Operationalize strategic objectives; tie in resource allocation to achievement of quantifiable targets; update coverage numbers

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 several program areas had strategic documents aimed at achieving Millennium Development Goals (MDGs) (not recently updated in some cases), the technical team had difficulty relating the stated goals with quantifiable and achievable targets. The MOH should undertake operational planning to achieve program targets tied to MDGs. Updating current coverage numbers for disease programs that are missing this information is a first step, followed by a planning exercise to update targets and develop measurable metrics for yearly program achievement. The technical team developed targets based on inputs from program staff and available coverage numbers and subsequently validated them with program staff. Additionally, the team faced challenges in assessing costs for some programs (like NCDs and MNSADs) because a strategy for rollout has not been developed for all areas.

Most data were sourced at the central level, and information about coverage numbers and patient access data was not up to date. In some cases (NCDs, for example), the MOH is yet to develop a strategy for implementation. Similarly, some programs have not developed an active screening component, hence assessing the PIN was challenging. Additionally, reliable numbers on HR across facilities were hard to come by. The technical team recommends a concerted effort to standardize interventions and number of staff required as well as an assessment of attendant requirements for service provision—such as M&E, infrastructure, and logistics—that will help inform health systems costs.

Standardize implementation of intervention protocols

The technical team faced difficulty in assessing interventions due to the lack of standardization in the application of intervention guidelines across levels of health service delivery. Standard guidelines for service delivery are in existence—they are used to train HCWs, but delivery could differ between different health levels. The mismatch in application is either due to lack of skills, misinterpretation, or shortage of staff delivering the service. The variation in standard of service can range from slight to major, based on the HR situation at the facility and staff ability. In our view, these variations could be compounded by lack of follow-up mentorship and monitoring after training. For example: the Master Trainers program (for HIV services) is scaling down (it is in the last year of funding from PEPFAR). Therefore, going forward, this program will likely not be able to provide continuous assessment and mentorship to ensure close alignment between service guidelines and service delivery.

The other factor that would affect standard application of guidelines is patient treatment adherence. If patients adhere to treatment, then HCWs tend to follow the service guidelines more closely. For example, as standard practice, HIV-positive TB patients initiated into co-trimoxazole treatment need to make daily visits to the health facility for 30 days to receive treatment. They are then allowed to take home the medications for the remaining five-month course. Co-trimozaxole is a six-month treatment program, and patients are required to give sputum samples three times during the treatment process. However, depending on patient adherence and HCW discretion, the HCW may decide to administer medications for just two weeks at the health facility instead of the usual 30 days. The HCW may decide to give the rest of medications to a reliable caregiver to continue treating the patient. Alternatively, the HCW may transfer

the patient to a community TB care program where they receive treatment at home. Given this variation, assessing amount of staff time spent on the intervention and its attendant costs can be difficult.

Accordingly, the technical team recommends that the MOH take a systematic approach to routinely audit delivery of services at health facilities in order to (1) assess execution of services based on guidelines, (2) mentor and retrain HCWs on service guidelines, and (3) assess opportunities to improve service efficiency and subsequently inform revisions to service policy and guidelines.

Increase coordination between individual disease programs and central planning office

When establishing targets, coordination between the various disease programs and central strategy and planning departments that manage health systems (HR, infrastructure, M&E, logistics, etc.) is essential. Individual program targets should be decided based on realistic assumptions with regard to health systems capacity.

In cases of overlapping interventions between two or more disease areas, better coordination will help mitigate wasteful expenditure and allow accurate tracking of resources as required by the programs. For example, malaria interventions for children are partially covered under the malaria and child health programs. Better planning would help delineate which program incurs costs for specific interventions. In this instance the child health program could cover the costs of staff time for delivering malaria interventions, while the drugs and supplies could be covered under the malaria program.

Create a working group to update OneHealth projection on regular basis

In this iteration, the technical team focused on the costs of implementing individual disease interventions. Program staff provided data on HR that do not deliver services directly for all disease areas and training expenditures for some. The technical team had significant difficulty obtaining disaggregated costs for M&E, infrastructure and equipment, communication media and outreach, and advocacy, and hence these costs are under-represented in the total intervention costs. It was also challenging for the team to obtain information for emerging programs with unpublished strategies, such as NCDs and MNSADs. The team was also unable to source data for several pieces of the health systems components (governance, infrastructure operating costs, facility construction, rehabilitation and maintenance, parts of health financing, and parts of logistics). An MOH working group of program officers should plan to update the tool with data on program and health systems costs to get a fuller picture. Additionally, periodic updates to revisit targets and assess resource needs and likely health impacts as EHSP implementation unfolds will allow for a more accurate projection of expected costs. The OneHealth model 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 model 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.

Focus on most cost-effective interventions

Several interventions are offered under the various disease programs, but information on their cost effectiveness and impact is limited. The MOH should consider doing an analysis of the interventions that are most impactful, based on their ability to reduce incidence of diseases that contribute to a high cost burden. This would allow program officers to better align their strategies and get the most value for limited resources.

ANNEX A: ASSUMPTIONS FOR HIV UNIT COST ANALYSIS

Type Of Data	Calculation/ Assumption	Source Of Information	Form Used To Collect Data
General Info			
Inpatients for intervention	No calculation	Facility	General facility form
Outpatients for intervention	No calculation	Facility	General facility form
Total inpatients and outpatients for intervention not-weighted	Number of inpatients for intervention + number of outpatients for intervention	HPP team	HPP team
Total inpatients and outpatients for intervention weighted	(Number of inpatients for intervention * 4.6) + Number of outpatients for intervention	The WHO Choice Database suggested that inpatients use 4.6 times the resources as inpatients	Not applicable
Inpatients	No calculation	Facility	General facility form
Outpatients	No calculation	Facility	General facility form
Total inpatients and outpatients not-weighted	Number of inpatients + Number of outpatients	HPP team	General facility form
Total inpatients and outpatients weighted	(Number of inpatients * 4.6) + Number of outpatients	The WHO Choice Database suggested that inpatients use 4.6 times the resources as inpatients	Not applicable
Personnel			
Column A: Staff type	No calculation involved	Interviews with key personnel at two selected facilities	General facility form
Column B: % of total time staff spends on intervention	No calculation involved	Self-reported by key personnel interviewed at the facility	General facility form
Column C: Salary (Pula)	Salary band was provided for each cadre; average salary was used	Annual salaries obtained from MOH staffing and salary structures for the health service; external or contracted staff costs obtained through donor/partner records	MOH and CMS Central form
Column D: Salary (US$)	Exchange rate of 8.5 Pula = US$1	Oanda	Not applicable

Type Of Data	Calculation/ Assumption	Source Of Information	Form Used To Collect Data
Column E: Unit cost for personnel per patient per year	• Calculate unit cost for each cadre: [Column D * (Column B)/100)] / [total number of inpatients and outpatients] • Sum unit cost of each cadre	HPP team	Not applicable
Drugs & Nondrug Consumables			
Column B: Pack price (Pula)	No calculation involved	Central Medical Stores (CMS), development partners or private hospital suppliers	MOH and CMS Central form and development partners form
Column C: Pack price (US$)	Exchange Rate of 8.5 Pula = US$1	Oanda	Not applicable
Column D: Quantity per pack	No calculation involved	Central Medical Stores (CMS), development partners or private hospital suppliers	MOH and CMS Central form and development partners form
Column E: Quantity used per patient per year	No calculation involved	Interviews with key personnel at two selected facilities	General facility form
Column G: % of patients who use this drug	No calculation involved; only for drugs, and not for nondrug consumables	Interviews with key personnel at two selected facilities	General facility form
Column H: Unit cost drugs/ nondrug consumables per patient per year	(Column C / Column D) * (Column E) * (Column G for drugs only / 100)	HPP team	Not applicable
Utilities			
Column C: % Cost allocated to HIV intervention	(Weighted number of total patients by intervention ÷ weighted number of total patients in facility) ×100	HPP team	General facility form
Column D: Cost of utility per year (Pula)	• Waste Management: Each facility in a district receives an equal bill; charge not based on the volume of waste generated by each facility • Bontleng Clinic has not received a utility bills for telephone, electricity and water for a number of years, therefore Princess Marina Hospital used utilities bills from a facility, similar in level and patient volume to	DHMT and Stobech[1] – Waste management and building maintenance DHMT and Amenity Parastatals – Water, telephone, and electricity Central Transport Organization – Fuel	General facility form

[1] Stobech is a private sector company that has been given an outsourced service contract by the GOB to conduct maintenance for all health facilities.

Type Of Data	Calculation/ Assumption	Source Of Information	Form Used To Collect Data
	derive estimated values for Bontleng Clinic; costs were proportioned based on patient volumes per service • Goodhope Primary Hospital had actual bills for electricity, water and telephone bills; costs were proportioned based on patient volumes per service • Building maintenance costs were provided by Stobech for Bontleng Clinic and Goodhope Hospital. Stobech tallied the monthly maintenance bills for the facilities over period of April 2013 to March 2014; costs were proportioned based on patient volumes per service • Received license plate numbers for vehicles used by the facilities (Goodhope Primary Hospital and Bontleng Clinic); submitted to CTO to obtain the fuel bills of respective vehicles; costs were proportioned based on patient volumes per service		
Column E: Cost of utility per year (US$)	Exchange rate of 8.5 Pula = US$1	Oanda	Not applicable
Column F: Unit cost by utility per patient per year	[(Column C ÷ 100) ×(Column E)] ÷ total number of patients per intervention		
Building			
Column C: % Cost allocated to HIV intervention	(Weighted number of total patients by intervention ÷ weighted number of total patients in facility) ×100	HPP team	General facility form
Column D: Geographic Location %	Percentages for supply chain costs associated with construction value based on the geographic location of the facility and additional expenses (i.e. distance, availability of building goods and services, & accessibility to nearest tarred road/urban setting) associated with building in the type of location: • Urban 0% • Peri-urban – 10% • Rural – 15%	Department of Building, Engineering and Services (DBES)	General facility form

Type Of Data	Calculation/ Assumption	Source Of Information	Form Used To Collect Data
Column E: Construction value (Pula)	Estimates of construction values of the public health facilities as follows: • Referral Hospital = BWP 539 500 000.00 / US$ 72 029 372.50 • District Hospital = BWP 415 000 000.00 / US$ 55 407 209.61 • Primary Hospital = BWP 80 000 000.00 / US$ 10 680 907.88 • Clinic = BWP 30 000 000.00/ US$ 4 005 340.45 • Health Post = BWP 3 000 000.00 / US$ 400 534.05	Department of Building, Engineering and Services (DBES)	General facility form
Column F: Construction value accounting for geographic location (Pula)	(Column E) × (1 + (Column D ÷ 100))	HPP team	Not applicable
Column G: Construction value accounting for geographic location (US$)	Exchange rate of 8.5 Pula = US$1	Oanda	Not applicable
Column H: Replacement period	No calculation	Department of Building, Engineering and Services (DBES)	General facility form
Column I: Unit cost per patient per year for building	[[(Column F ÷ (Column C ÷ 100)] ÷ (Column H)] ÷ total number of patients per year for the HIV intervention	HPP team	Not applicable
Vehicle			
Column C: % Cost allocated to HIV intervention	(Weighted number of total patients by intervention ÷ weighted number of total patients in facility) ×100	HPP team	General facility form
Column D: Vehicle value (Pula)	No calculation	Central Transport Organization	General facility form
Column E: Vehicle value (US$)	Exchange rate of 8.5 Pula = US$1	Oanda	Not applicable
Column F: Replacement period	No calculation	WHO Choice Database	Not applicable
Column G: Unit cost per patient per year for vehicle	[((Column C ÷ 100) × Column E) ÷ Column F] ÷ total number of patients for HIV intervention	HPP team	Not applicable

Type Of Data	Calculation/ Assumption	Source Of Information	Form Used To Collect Data
Equipment			
Column C: % Cost allocated to HIV intervention	(Weighted number of total patients by intervention ÷ weighted number of total patients in facility) ×100	HPP team	General facility form
Column D: Cost of equipment (Pula)	No calculation	CMS, development partner, private hospital suppliers and furniture retailers	General facility form
Column E: Cost of equipment (US$)	Exchange rate of 8.5 Pula = $US1	Oanda	Not applicable
Column F: Number of units of equipment	No calculation	MOH	General facility forms
Column G: Cost of equipment allocated to this service	(Column C) × (Column E) × (Column F)	HPP team	Not applicable
Column H: Replacement period	No calculation	OneHealth tool	Not applicable
Column I: Unit cost per patient per year for equipment	[(Column G) ÷ (Column H)] ÷ total number of patients per intervention per year	HPP team	Not applicable
Management			
Column C: % Cost allocated to HIV intervention	(Weighted number of total patients by intervention ÷ weighted number of total patients in facility) ×100	HPP team	General facility form
Column D: Annual salary (Pula)	No calculation	MOH	MOH and CMS Central form
Column E: Annual salary (US$)	Exchange Rate of 8.5 Pula = US$1	Oanda	Not applicable
Column F: Number of staff	No calculation	Interviews with facility personnel	General facility form
Column G: Unit cost per patient per year for management	(Column C ÷ 100) × (Column E) × (Column F)	HPP team	Not applicable
Supply Chain—Fuel Cost			
Column B: Round-trip distance to and from warehouse	One way distance multiplied by 2	CMS and facility	MOH and CMS Central form
Column C: Number of round-trips	24 trips to a facility per year	CMS	MOH and CMS Central form

Type Of Data	Calculation/ Assumption	Source Of Information	Form Used To Collect Data
Column D: Fuel cost	(BWP 1.75 per KM / US$ O.23 per KM) × Column B × Column C	CMS	MOH and CMS Central form
Column E: Number of services	No calculation	Facility	General facility form
Column F: Unit cost per patient per year for fuel	[Column D ÷ Column E] ÷ total number of patients per service per year	HPP team	Not applicable
Supply Chain—Driver			
Column B: Annual salary for driver (Pula)	No calculation	MOH	MOH and CMS Central form
Column C: Annual salary for driver (US$)	Exchange Rate of 8.5 Pula = US$1	Oanda	Not applicable
Column D: % of time spent at this facility	Divided the driver's time equally across number of facilities in the district. In Gaborone District there are 29 public health facilities; and in Goodhope there are 39 public health facilities	CMS and HTC report	MOH and CMS Central form
Column E: # of services offered at facility	Interviewed the hospital superintendent or matron to list the number of services offered at facility	Matron or hospital superintendent	General facility form
Column F: Unit Cost per patient per Year for supply chain - driver	[(Column C × (Column D ÷ 100)) ÷ Column E] ÷ total number of patients per HIV intervention at facility	HPP team	Not applicable
Supply Chain—Vehicle Costs			
Column B: Vehicle value (Pula)	No calculation	Central Transport Organization	MOH and CMS Central form
Column C: Vehicle value (US$)	Exchange Rate of 8.5 Pula = US$1	Oanda	Not applicable
Column D: Average number of services at facility	Interviewed the hospital superintendent or matron to list the number of services offered at facility	Matron or hospital superintendent	General Facility form
Column E: Replacement period	No calculation	WHO Choice Database	Not applicable
Column F: Annual operating cost per vehicle per service	Column C ÷ (Column D × Column E)	HPP team	Not applicable
Column G: Unit cost per patient per year for vehicles	Column F ÷ Total number of patients per HIV intervention by facility	HPP team	Not applicable

ANNEX B: HIV UNIT COST ANALYSIS—DATA TOOLS

1. SERVICE/INTERVENTION LEVEL DATA FORM

The following survey is being conducted for the purpose of calculating the unit cost of services at the facility level. We are asking your assistance as one of selected sites where the cost of providing ART services for TB patients are being assessed. Your help with this survey is greatly appreciated. Please note that the information about the identification of this service will be kept confidential.

Name of Facility: _____

Type of facility *(circle applicable):* District Hospital / Clinic with Bed / Clinic without Bed

Other (specify): _____

Record Code: _____
(Data Collector initials _ Facility Name _Form number)

District: _____

Town/Village: _____

Date of Interviews:

Day	Month	Year	Name of Interviewer(s)

Persons Interviewed:

Name	
Title/Designation	
Telephone (Office)	
Telephone (Cell)	
Email Address	
Fax number	

Name	
Title/Designation	
Telephone (Office)	
Telephone (Cell)	
Email Address	
Fax number	

Name	
Title/Designation	
Telephone (Office)	
Telephone (Cell)	
Email Address	
Fax number	

General: Facility and Program

1. **Name of Service : _____ Additional ART for TB patients _____**
   Note: Notify the respondent, all the following questions and answers required, should only relate to this particular service.

2. **Number of clients who have received this service from April 2013 to March 2014: _____**

3. **On average, how many times does a patient access / visit this service in a year?_____**

Notes:

Recurrent Costs: Personnel

1. Number and type of **Program/Service Delivery Management staff** involved in the delivery of **this particular service** *(Notes: 1) please write staff position in the blank spaces provided 2) If there is more than 1 of the same cadre, please list them separately 3) Note across each of the cadre, what % of time is spent in the service. E.g., A Senior Registered Nurse spends 20% of her total time at facility on this particular service. 4) Indicate on notes column if any of the staff members are rotational to the program and the frequency of the rotation. 5) Indicate on notes column the official title of the cadre if different from facility title (e.g., official title of a Midwife is Senior Registered Nurse) 6) Note the range of hours or percentage of time spent during peak and off peak seasons per service (if applicable)*

Program / Service Delivery Management Cadre	**Number of hours spent on management & administration per week**	**Percentage of hours spent on management & administration per week**	**Number of hours spent on service delivery (*if applicable)* per week)**	**Percentage of hours spent on service delivery (*if applicable)* per week)**	**Total number of hours worked per week**
District TB Coordinator					
District ART Coordinator					
Matron					
Hospital Superintendent					
Other (specify below):					

Notes:

2. Number and type of **Permanent staff** involved in the delivery of **service per patient** *(Notes: 1) please write staff position in the blank spaces provided; list all staff members below delivering the service 2) If there is more than 1 of the same cadre, please list them separately 3) Note across each of the cadre, what % of time is spent in the service. E.g., A Senior Registered Nurse spends 20% of her total time at facility on this particular service. 4) Indicate on notes column if any of the staff members are rotational to the program and the frequency of the rotation. 5) Indicate on notes column the official title of the cadre if different from facility title (e.g., official title of a Midwife is Senior Registered Nurse) 6) Note the range of hours or percentage of time spent during peak and off peak seasons per service (if applicable)*

Permanent Cadre	Number of Cadre	Percentage of time spent on service	Total number of hours worked per week	Notes on cadre
Assistant Nursing Officer				
Chief Nursing Officer				
Chief Registered Nurse				
Health Care Auxiliary				
Lay Counselor				
Medical Officer				
Nurse Officer I				
Nurse Officer II				
Nurse Superintendent				
Principal Nursing Officer I				
Principal Nursing Officer II				

Permanent Cadre	Number of Cadre	Percentage of time spent on service	Total number of hours worked per week	Notes on cadre
Principal Registered Nurse				
Registered Nurse				
Senior Nursing Officer				
Senior Registered Nurse				
Other (specify below):				

Notes:

3. Contracted / External staff

Number and type of **Contract / External staff** involved in the delivery of **service per patient** *(Notes: 1) please write staff position in the blank spaces provided; list all staff members below delivering the service 2) If there is more than 1 of the same cadre, please list them separately 3) Note across each of the cadre, what % of time is spent in the service. E.g., A Senior Registered Nurse spends 20% of her total time at facility on this particular service. 4) Indicate on notes column if any of the staff members are rotational to the program and the frequency of the rotation. 5) Indicate on notes column the official title of the cadre if different from facility title (e.g., official title of a Midwife is Senior Registered Nurse) 6) Note the range of hours or percentage of time spent during peak and off peak seasons per service (if applicable)*

Contracted / External Cadre	Number of Cadre	Percentage of time spent on service	Total number of hours worked per week	Notes on cadre
Assistant Nursing Officer				
Chief Nursing Officer				
Chief Registered Nurse				
Health Care Auxiliary				
Lay Counselor				
Medical Officer				
Nurse Officer I				
Nurse Officer II				
Nurse Superintendent				
Principal Nursing Officer I				

Contracted / External Cadre	Number of Cadre	Percentage of time spent on service	Total number of hours worked per week	Notes on cadre
Principal Nursing Officer II				
Principal Registered Nurse				
Registered Nurse				
Senior Nursing Officer				
Senior Registered Nurse				
Tirelo Sechaba Participant				
Other (specify below):				

Notes:

Recurrent Costs: Drugs, Consumables & Supplies

1. **Type and quantities of <u>drugs</u> are used at this service per patient per year?** *Notes: 1)if there are other drugs being used that do not appear here, please write them in the blank spaces provided 2) quantities should be estimated at the lowest unit, i.e. 5 grams or 2 mls per patient 3) Where applicable, please denote the quantity or description of the drug*

Drug	**Portion / Quantity used per patient per year**	**Notes on drug** *(quantity or description)*
ART Drugs – Pediatrics (First Line)		
ART Drugs – Pediatrics (Second Line)		
ART Drugs – Adult (First Line)		
ART Drugs – Adult (Second Line)		
Atriplar		
CBV		
EFV		
Truvada		
Aluvia		
Nevirapine		
ABC		
3TC		
Other (specify below):		

Notes:

2. Type and quantities of <u>non-drug consumables</u> are used at this service per patient per year? *Notes: 1)if there are other supplies or consumables being used that do not appear here, please write them in the blank spaces provided 2) quantities should be estimated at the lowest unit, i.e. 5grams or 2mls per patient 3) Where applicable, please denote the quantity or description of the consumable*

Non-drug consumables	**Portion / Quantity used per patient per year**	**Notes on supply** *(quantity or description)*
Bags for drugs, plain (drug dispensing bags)		
Bandage (elastic)		
Biohazard trash bag (large)		
Biohazard trash bag (small)		
Bleach for soaking instruments		
Chlorine Powder		
Continental sheet (disposable)/Mackintosh rubber		
Cotton wool rolls		
Detergent soap (Sunlight or Omo) Bucket		
Dettol solution		
Drug bags labels		
EDTA Tubes		
Elastoplast/Dermaplast 25mm/9m		
Files		
Gauze pad, Inadine		
Gauze pad, Jelonet (paraffin Vaseline)		
Gauze pad, sterile, 12ply 100x100mm		
Gauze pad, sterile, 12ply 76x76mm		
Gauze pad, sterile, 8ply 100x100mm		
Gauze roll		
Gloves, examination, non-sterile, disposable, pair		
Gloves, surgeons, sterile disposable, pair		
Glucose 5% in water + set		
Heavy duty gloves		
Hibiscrub		
HIV TEST - Determine		
HIV TEST – KHB		
HIV TEST – UNIGOLD		
IV fluid (dextrose) 10%		

Non-drug consumables	**Portion / Quantity used per patient per year**	**Notes on supply** *(quantity or description)*
IV fluid (ringer lactate)		
Lancet		
Marker		
Methylated spirit 70%		
Micropore		
Needle 18 gauge		
Needle 21 gauge		
Pipets, plastic		
Plain Paper		
Povidone antiseptic solution (Iodine)		
Refuse bags, black, large		
Saline		
Savlon		
Soap bars		
Soap for scrubbing instruments (liquid soap)		
Sodium Chloride 0.9%		
Solu Cortef		
Specimen Bottle / Sputum		
Stationery		
Sterilization tapes		
Syringe, 10ml, disposable		
Syringe, 2ml, disposable		
Syringe, 5ml, disposable		
Tegaderm (3M) 1624		
Other (specify below):		

Notes:

3. Equipment

Enter the quantity of equipment, appliance and furniture used to deliver this service. *Note: 1) If there are any additional equipment not listed, please write them in blank spaces 2) enter quantity of equipment, appliance and furniture used per patient.*

	Quantity of equipment used per patient for the delivery of ART for TB patients	Notes on Equipment
B.P. machine		
Bed		
Chairs		
Clinical Dishes		
Clinical Thermometer		
Desk		
Refrigerator		
Scissors		
Sharps Container		
Standard Trolley with 2 shelves		
Stethoscope		
Stretcher		
Weighing machine /scale		
X-Ray		
Other (specify below):		

2. GENERAL FACILITY LEVEL DATA FORM

The following survey is being conducted for the purpose of calculating the unit cost of services at the facility level. We are asking your assistance as one of selected sites where the cost of providing services is being assessed. Your help with this survey is greatly appreciated. Please note that the information about the identification of this program will be kept confidential.

Name of Facility: _____

Type of facility *(circle applicable):* District Hospital / Clinic with Bed / Clinic without Bed

Other (specify): _____

Record Code: _____
(Data Collector initials _ Facility Name _Form number)

District: _____

Town/Village: _____

	Facility hours of operation (24-hour format)
Monday	
Tuesday	
Wednesday	
Thursday	
Friday	
Saturday	
Sunday	
Public holidays	

Date of Interviews:

Day	Month	Year	Name of Interviewer(s)

Persons Interviewed:

Name	
Title/Designation	
Telephone (Office)	
Telephone (Cell)	
Email Address	
Fax number	

Name	
Title/Designation	
Telephone (Office)	
Telephone (Cell)	
Email Address	
Fax number	

Name	
Title/Designation	
Telephone (Office)	
Telephone (Cell)	
Email Address	
Fax number	

General: Facility

1. **a) Total number of in-patient and out-patient clients per service from April 2013 to March 2014:** *Note: Enter the total number of patients that have received service. In-patient refers to clients that are admitted into a facility for services; Out-patient refers to clients who receive day-service.*

Service	# of in-patient	# of out-patients
Safe Male Circumcision		
Post-Exposure Prophylaxis		
Additional ART for TB patients		
Co-Trimox for TB HIV+ patients		
Screening HIV+ patients for TB		

b) Total number of in-patient and out-patient clients per service from April 2013 to March 2014: *Note: Enter the total number of patients that have received service. In-patient refers to clients that are admitted into a facility for services; Out-patient refers to clients who receive day-service.*

General Facility Service	# of in-patient	# of out-patients
General Outpatient services		
Paediatrics Care		
Emergency & Urgent Care & Intensive Care		
Surgery (Urology, General Theatre, ENT)		
X-Ray and Diagnosis		
General Medicine		
Dental Care Services		
Eye Care Services		
Orthopaedic Services		
Psychological/Psychiatric Care / Mental Health		
Rehabilitation Services		
Oncology & Cancer Services		
Audiology Services		
Obstetrics and Gynaecology (MCH, PMTCT)		
Immunizations & Child Care Services		
Sexual and Reproduction Services (FP, ANC, STI)		
HIV & AIDS Services / IDCC		
Nutrition		
Health Education and Advice		
Minor Curative treatment and care services		
Non-Communicable Diseases (Hypertension, Diabetes, et al)		
Routine HIV Testing / HIV Testing and Counselling		
Community Home Based Care		

Other (specify):		
Other (specify):		
Other (specify):		

2. Total number of in-patient clients at this facility from April 2013 to March 2014:_____

3. Total number of out-patient clients at this facility from April 2013 to March 2014:
_____

Notes:

_____
_____
_____
_____
_____
_____

Recurrent Costs: Personnel

4. Number and type of **Management staff** involved in managing facility and all services (Notes: 1) If there are additional cadre not listed, please write them in blank spaces 2) Indicate on notes column the official title of the cadre if different from facility title (e.g., official title of a Midwife is Senior Registered Nurse) 3) Enter the total number of hours worked by the cadre per week. Based on the total number of hours worked per week by cadre, denote the number of hours dedicated to management of facility services & administration, and service delivery (if applicable).

Management Cadre	Total number of hours worked per week	Percentage of hours spent on management & administration per week	Number of hours spent on management & administration per week	Percentage of hours spent on service delivery (*if applicable)* per week)	Number of hours spent on service delivery (*if applicable)* per week)
Hospital Superintendent / Manager					
Public Health Specialist					
Matron / Chief Registered Nurse					
Nurse Superintendent					
Senior Nursing Officer					
Principal Registered Nurse					
Other (specify below):					

Notes:

_____
_____
_____
_____
_____
_____

5. Number and type of Support and Administrative Staff

a. **Indicate the number and type of <u>Permanent staff</u> (entire facility)** *Notes: 1) Indicate on notes column if any of the staff members are rotational to the facility and the frequency of the rotation. 2) If there are additional cadre not listed please write them in blank spaces.3) Indicate on notes column the official title of the cadre if different from facility title (e.g., official title of a Midwife is Senior Registered Nurse)*

Cadre	Number Of Cadre	Total Number Of Hours Worked Per Week	Notes
Accountant / Revenue Collector			
Accounts clerk			
Assistant accountant			
Assistant Human Resource Officer			
Clerical assistant			
Data Clerk			
Data Manager			
Driver			
Health Education Assistant			
Housekeeping / Cleaner			
Human Resource Officer			
Lab scientist			
Lab technician			
Maintenance Officer			
Nurse Orderly			
Nutritionist / Dietician			
Pharmacy Technician / Pharmacist			
Porter			
Receptionist / Telephone Operator			
Social Worker			
Store Keeper			
Supplies Officer/Logistician			
Watchmen / Security Guard			
X-Ray technician			
Other (specify below):			

Notes:

_____
_____
_____
_____
_____
_____

b. **Indicate the number and type of <u>Contract / External Support Staff</u> (entire facility)** *Notes: 1) Indicate on notes column if any of the staff members are rotational to the facility and the frequency of the rotation.2) If there are additional cadre not listed, please write them in blank spaces.3) Indicate on notes column the official title of the cadre if different from facility title (e.g., official title of a Midwife is Senior Registered Nurse)*

Cadre	Number Of Cadre	Total Number Of Hours Worked Per Week	Notes
Accountant / Revenue Collector			
Accounts clerk			
Assistant accountant			
Assistant Human Resource Officer			
Clerical assistant			
Data Clerk			
Data Manager			
Driver			
Health Education Assistant			
Housekeeping / Cleaner			
Human Resource Officer			
Lab scientist			
Lab technician			
Maintenance Officer			
Nurse Orderly			
Nutritionist / Dietician			
Pharmacy Technician / Pharmacist			
Porter			
Receptionist / Telephone Operator			
Social Worker			
Store Keeper			
Supplies Officer/Logistician			
Tirelo Sechaba Participant			
Watchmen / Security Guard			
X-Ray technician			
Other (specify below):			

Notes:

_____
_____
_____
_____
_____

Recurrent Costs: Utilities

1. **Facility Building Operating cost** *Notes: 1) Enter the (actual or estimated) annual operating cost for the building. Include costs such as routine building maintenance (fixing lights, wall cracks, pipework, broken doors windows, paintings, etc.). Exclude building renovation costs or building extension costs. 3) List additional maintenance utilities and associated costs in the blank spaces.*

Building maintenance cost	Annual Operating Costs (local currency)	Notes on building maintenance
Building Operating / Maintenance Cost		
Other (specify):		

2. **Facility Waste Management cost** *Notes: 1) Enter the (actual or estimated) annual waste management cost for the facility. Enter the cost where applicable, either the facility has an Incinerator to dispose of clinical waste or Waste is collected routinely for disposal. 2) List additional waste management and associated costs in the blank spaces*

Waste Management	Annual Operating Costs (local currency)	Notes on Waste Management
Waste Management Cost		
Incinerator		
Other (specify):		

3. **Facility Utility costs** *Notes: 1) Enter the (actual or estimated) annual operating cost for each utility for the facility. 2) List additional utilities and associated costs in the blank spaces*

Utility	Annual Operating Cost (local currency)	Notes on Utility
Fuel		
Telephone		
Electricity		
Water		
Other (specify):		

4. **Facility Vehicle costs** *Notes: 1) Enter the (actual or estimated) cost of replacing the vehicle based on model and year. 2) Please list additional vehicles in the blank spaces*

Vehicle	Description / Model & Year	Number Purchased	Replacement Value	Notes on Vehicle
Car				
Car				
Car				
Car				
Trailer				
Trailer				
Ambulance				
Ambulance				
Ambulance				
4-Wheel Drive				
4-Wheel Drive				
4-Wheel Drive				
Bus				
Bus				
Bus				
Motorcycle				
Motorcycle				
Motorcycle				
Bicycle				
Bicycle				
Other 1: (Please Describe)				
Other 2: (Please Describe)				

3. CENTRAL & SUPPLY CHAIN LEVEL – MINISTRY OF HEALTH AND CENTRAL MEDICAL STORES DATA FORM

The following survey is being conducted for the purpose of calculating the cost of services. We are asking your assistance as one of many partners in the provision of services within public health facilities in Botswana. Your help with this survey is greatly appreciated. Please note that the information about the organization's support will be kept confidential.

Department / Unit: _____

Day	Month	Year	Name of Interviewer(s)

Persons Interviewed:

Name	
Title/Designation	
Telephone (Office)	
Telephone (Cell)	
Email Address	
Fax number	

Name	
Title/Designation	
Telephone (Office)	
Telephone (Cell)	
Email Address	
Fax number	

Name	
Title/Designation	
Telephone (Office)	
Telephone (Cell)	
Email Address	
Fax number	

Costs: Management & Service Delivery Personnel

1. **The following information is being collected based on staff who are employed in the selected study facilities. We would therefore like to determine the salaries (or range of salaries) which correspond to the cadres identified at these study facilities.** *Notes: 1) Fill in the list of cadre based on inputs from service and facility tools (managerial staff, as well as those working directly in the delivery of services) and insert annual salary per cadre, inclusive of benefits & gratuity? 2) If there is scale per cadre, insert the range (i.e. Band B BWP 5,000 to Band E BWP 20,000)*

Cadre ***(list based on staff from facility and service level)***	**Range of Annual Salary (including benefits and gratuity) (Local Currency)**
Assistant Nursing Officer	
Chief Nursing Officer	
Chief Registered Nurse	
District ART Coordinator	
District RHT / HTC Coordinator	
District SMC Focal Person / Coordinator	
District TB Coordinator	
Facility SMC Focal Person / Coordinator	
Family Nurse Practitioner	
Health Care Auxiliary	
Healthcare Auxiliary	
Hospital Superintendent	
Lay Counselor	
Matron	
Medical Officer	
Nurse Officer I	
Nurse Officer II	
Nurse Superintendent	
Principal Nursing Officer I	
Principal Nursing Officer II	
Principal Registered Nurse	
Registered Nurse	
Senior Nursing Officer	
Senior Registered Nurse	
SMC Medical Officer / Site Manager	
TB Focal Person / Coordinator	
Tirelo Sechaba Participant	
Other (specify below):	

Cadre ***(list based on staff from facility and service level)***	**Range of Annual Salary (including benefits and gratuity) (Local Currency)**

Notes:

_____
_____
_____
_____
_____
_____

Costs: Commodities

1. What is the **unit cost of drugs** that your organization procured to support service delivery from **April 2013 to March 2014**? *Note: 1) Refer to the notes on the quantity and description of the drugs (from service level data form) to get best estimate of the unit of cost*

Drugs	Price per pack (in local currency)	Units per Pack	Notes on estimated unit cost of drugs
3TC			
ABC			
Adrenaline			
Aluvia			
Amoxicillin			
ART Drugs – Adult (First Line)			
ART Drugs – Adult (Second Line)			
ART Drugs – Pediatrics (First Line)			
ART Drugs – Pediatrics (Second Line)			
Atriplar			
Atropine			
Betadine, ointment			
CBV			
Ciprofloxacin			
Cloxacillin			
Cotrimoxazole			
Diazepam			
Doxycycline			
EFV			
Erythomycin			
Hibitane			
Iboprufen, Brufen			
Ketamine			
Lignocaine			

Drugs	Price per pack (in local currency)	Units per Pack	Notes on estimated unit cost of drugs
Metronidazole			
Multivitamins			
Nevirapine			
Paracetamol, syrup			
Paracetamol, tablets			
Thiopenta			
Truvada			
Vitamin C			
Other (specify below):			

2. What is the **unit cost of non-drug consumables** that your organization procured to support service delivery from **April 2013 to March 2014**? *Notes: 1) If there are other commodities procured that do not appear on this list please write it in the blank spaces; 2) Refer to the notes on the quantity and description of the commodity (from service level data form) to get best estimate of the unit of cost*

Non-Drug Consumables	Price per pack (in local currency)	Units per Pack	Notes on estimated unit cost of commodity
Bags for drugs, plain (drug dispensing bags)			
Bandage (elastic)			
Biohazard trash bag (large)			
Biohazard trash bag (small)			
Bleach for soaking instruments			
Chlorine Powder			
Continental sheet (disposable)/Mackintosh rubber			
Cotton wool rolls			
Detergent soap (Sunlight or Omo) Bucket			
Dettol solution			
Drug bags labels			
EDTA Tubes			
Elastoplast/Dermaplast 25mm/9m			
Files			
Gauze pad, Inadine			
Gauze pad, Jelonet (paraffin Vaseline)			
Gauze pad, sterile, 12ply 100x100mm			
Gauze pad, sterile, 12ply 76x76mm			
Gauze pad, sterile, 8ply 100x100mm			
Gauze roll			
Gloves, examination, non-sterile, disposable, pair			
Gloves, surgeons, sterile disposable, pair			
Glucose 5% in water + set			
Goggles (for surgery)			

Non-Drug Consumables	Price per pack (in local currency)	Units per Pack	Notes on estimated unit cost of commodity
Heavy duty gloves			
Hibiscrub			
HIV TEST - Determine			
HIV TEST – KHB			
HIV TEST - UNIGOLD			
INDICATOR TAPES, steam			
IV fluid (dextrose) 10%			
IV fluid (ringer lactate)			
Lancet			
Marker			
Methylated spirit 70%			
Micropore			
Needle 18 gauge			
Needle 21 gauge			
Pipets, plastic			
Povidone antiseptic solution (Iodine)			
Refuse bags, black, large			
Saline			
Savlon			
SMC KIT (Needle Holder / Vacutainer Press Release (safety), Curved Mosquito Artery Forceps mall and Dissecting Forceps (toothed)			
Soap bars			
Soap for scrubbing instruments (liquid soap)			
Sodium Chloride 0.9%			
Solu Cortef			
Stationery			
Sterilization tapes			

Non-Drug Consumables	Price per pack (in local currency)	Units per Pack	Notes on estimated unit cost of commodity
Surgical Blade, Size 22, 23 or 24			
Surgical cap (disposable)			
Surgical Mask			
Surgical scrub Betadine			
Suture, catgut chromic 3/0, 150cm			
Suture, catgut chromic 4/0, 150cm			
Suture, catgut plain 2/0, 150cm			
Suture, silk, 2 x 0.75m			
Syringe, 10ml, disposable			
Syringe, 2ml, disposable			
Syringe, 5ml, disposable			
Tegaderm (3M) 1624			
Theater Caps			
Theatre Masks			

3. What is the **unit cost of equipment** that your organization procured to support service delivery from **April 2013 to March 2014**? *Notes: 1) If there are other equipment procured that do not appear on this list please write it in the blank spaces; 2) Refer to the notes on the quantity and description of the equipment (from service level data form) to get best estimate of the unit of cost*

Equipment	Price / Replacement value per item	Notes on Equipment
Adson fine non-toothed dissecting forceps		
Artery forceps large straight		
B.P. machine		
Bed		
Bistouri scalpel blade holder #4		
Chairs		
Clinical Dishes		
Clinical Thermometer		
Desk		
Dissecting tray and lid, small		
Emergency Tray		
Forceps needle-holding (mayo hager 14-16cm)		
Galli pot		
Incinerator		
IV canula (Jelo radiopaque) 18 gauge		
Kidney dishes		
Mayo scissors		
Needle, vacutainer, 21G		
Refrigerator		
Safety box/ sharps box		
Scalpel knife handle/Surgical handle		
Scissors		
Sharps Container		
Solution administration set		
Sponge holding forceps 18cm		
Standard Trolley with 2 shelves		
Stethoscope		
Straight mosquito artery forceps small		
Stretcher		
Surgical/Stitch scissors BL ST		
Velcro tourniquets		
Weighing machine /scale		
X-Ray		
Other (specify below):		

Equipment	Price / Replacement value per item	Notes on Equipment

Notes:

_____
_____
_____
_____
_____
_____

Costs: Supply Chain

1. **Number and type of employees involved in the supply chain (procurement, warehousing / storage, distribution, quality controls, etc.) of drugs and commodities.** *(Notes: 1) please write staff position in the blank spaces provided; list all staff members)*

Cadre	Number of Cadre	Total number of hours worked per week	Notes on cadre
Admin Assistant			
Ass. Scientific Officer			
Assistant Supplies Officer			
Chief Admin Officer I			
Chief Lab Technician			
Chief Pharmacist			
Chief Pharmacy Tech			
Chief Supplies Officer			
Deputy Manager			
Driver I			
Gatekeepers			
Groundsman			
Healthcare Auxiliary			
Manager			
Medical Lab Tech			
Messenger			
Office Cleaner L/H			
Pharmacy Tech			
Principal Lab Technician			
Principal pharmacist I			
Principal Pharmacist II			
Principal Systems Analyst			
Principal. Admin Officer			
Scientific Officer			

Cadre	Number of Cadre	Total number of hours worked per week	Notes on cadre
Scientific Officer II			
Senior Admin officer			
Senior Med. Lab Tech			
Senior pharm tech			
Senior Pharmacist			
Senior Supplies Officer			
Storekeeper I			
Storekeeper II			
Storekeeper III			
Sup. Medical Lab Tech			
Superintendent			
Superintendent			
Superintendent Workshop			
Supplies Officer			
Switchboard Operator			
Transport officer			
Turret Driver			

2. **Warehouse building operating cost** *Notes: 1) Enter the (actual or estimated) annual operating cost for the building. Include costs such as routine building maintenance (fixing lights, wall cracks, pipework, broken doors windows, paintings, etc.). Exclude building renovation costs or building extension costs. 3) List additional building maintenance utilities and associated costs in the blank spaces.*

Building maintenance cost	Annual Operating Costs (local currency)	Notes on building maintenance
Building Operating / Maintenance Cost		
Other (specify):		

3. **Warehouse waste management cost** *Notes: 1) Enter the (actual or estimated) annual waste management cost for the warehouse. Enter the cost where applicable, either the warehouse has an Incinerator to dispose of clinical products and drugs or the expired products are collected routinely for disposal. 2) List additional waste management and associated costs in the blank spaces*

Waste Management	Annual Operating Costs (local currency)	Notes on Waste Management
Waste Management Cost		
Incinerator		
Other (specify):		

4. **Warehouse utility costs** *Notes: 1) Enter the (actual or estimated) annual operating cost for each utility for the warehouse. 2) List additional utilities and associated costs in the blank spaces*

Utility	Annual Operating Cost (local currency)	Notes on Utility
Fuel		
Telephone		
Electricity		
Water		
Other (specify):		

5. Warehouse Vehicles Costs *Notes: 1) Enter the (actual or estimated) cost of replacing the vehicle based on model and year. 2) Please list additional vehicles in the blank spaces*

Vehicle	Description / Model & Year	Number Purchased	Replacement Value	Notes on Vehicle
Car				
Car				
Car				
Car				
Trailer				
Trailer				
Ambulance				
Ambulance				
Ambulance				
4-Wheel Drive				
4-Wheel Drive				
4-Wheel Drive				
Bus				
Bus				
Bus				
Motorcycle				
Motorcycle				
Motorcycle				
Bicycle				
Bicycle				
Other 1: (Please Describe)				
Other 2: (Please Describe)				

6. ***On average, how many times do supplies get delivered to public health facilities, from the your warehouse or the Central Medical Stores warehouse per month:*** _____

7. What is the mileage charge for per km travelled from depot to the facility? _____

Note: Government mileage charge for tarred roads is BWP 1.75 per km

ANNEX C: ONEHEALTH INTERVENTIONS BY DISEASE AREA AND DATA SOURCES BY DISEASE AREA

Interventions by Disease Area

Disease Area	Interventions
Maternal and Child Health	• Family Planning o Pill o Condom o Injectable o Implant o Female sterilization o Male sterilization o LAM o Vaginal barrier method o Vaginal tables o Other • Safe Abortion o Safe abortion • Management of abortion complications o Postabortion case management • Pregnancy care – ANC o Tetanus toxoid o Syphilis detection and treatment o Basic ANC • Pregnancy care – Treatment of pregnancy complications o Hypertensive disease case management o Management of pre-eclampsia o Management of other complications • Childbirth care – Facility births o Labor and delivery management o Active management of 3rd stage labor o Pre-referral management of labor complications o Management of eclampsia o Neonatal resuscitation o Management of obstructed labor o Treatment of local infections o Kangaroo mother care o Feeding and counseling low-birth weight infants • Childbirth care – Home births o Clean practices and immediate essential newborn care • Childbirth care – Other o Antenatal corticosteroids for preterm labor o Antibiotics for pPROM o Induction of labor • Postpartum care – Treatment of sepsis o Maternal sepsis case management • Postpartum care – Treatment of newborn sepsis o Newborn sepsis – full supportive care o Newborn sepsis – injectable antibiotics • Postpartum care – Other o Mastitis o Treatment of postpartum hemorrhage • Other sexual and reproductive health o Treatment of syphilis o Treatment of PID o Treatment of urinary tract infection o Cervical cancer screening o Treatment of vaginal discharge

Disease Area	Interventions
Child Health	• Vitamin A supplementation for xerophthalmia in children • Deworming • Diarrhea Management o ORS o Zinc o Antibiotics for treatment of dysentery o Treatment of diarrhea • Pneumonia o Pneumonia treatment o Treatment of severe pneumonia • Measles o Vitamin A for measles treatment
Immunizations	• Rotavirus • Measles • Pentavalent • DPT • Hep B • Polio • BCG • Pneumococcal • HPV • Yellow fever • Tetanus
Malaria	• Insecticide-treated materials • Pregnant women sleeping under an ITN • Indoor residual spraying • Malaria treatment (adults) • Surveillance • Diagnosis • Larval control • Diagnosis fever cases
TB	• TB notification & treatment o First-line TB drugs for Cat I & II o First-line TB treatment for children o First-line TB drugs for Cat II o Extrapulmonary TB o TB contact tracing • MDR notification & treatment o MDR-TB notification among new patients and previously treated patients o MDR-TB notification in children among previously treated patients o Case management of MDR-TB cases • Collaborative TB & HIV/AIDS interventions o Co-trimoxazole preventative therapy for TB HIV+ patients o Care & support for TB HIV+ patients
HIV	• Prevention – other o Youth focused interventions – out of school o Voluntary counseling and testing o Condoms o Male Circumcision o PMTCT o Post-exposure prophylaxis (PEP) • Care & treatment o ART (first-line for men) o ART (first-line for women) o Co-trimoxazole for children o Pediatric ART o Diagnostics/lab costs for HIV+ in care o Management of opportunistic infections associated

Disease Area	Interventions
	with HIV/AIDS o Nutrition supplements in first 6 months for HIV/AIDS cases • Collaborative HIV/AIDS and TB interventions o Screen HIV+ cases for TB o Co-trimoxazole for TB HIV+ patients o HIV Prevention for TB patients
NCDs	• CVD & diabetes o Screening for risk of CVD/diabetes o Follow-up care for those at low risk of CVD/diabetes o Treatment for those with very high cholesterol but low absolute risk of CVD/diabetes o Treatment for those with high blood pressure but low absolute risk o Treatment for those with absolute risk o Treatment for those with high absolute risk of CVD/diabetes o Treatment of cases with type I diabetes o Treatment for Type II diabetes • Respiratory Disease o Identification and control of asthma o Chronic obstructive pulmonary disease
Mental Health	• Depression o Basic psychosocial treatment and antidepressant medication o Intensive psychosocial treatment and antidepressant medication o Psychosocial care for perinatal depression • Psychosis o Basic psychosocial support and antipsychotic medication o Intensive psychosocial support and antipsychotic medication • Bipolar disorder o Basic psychosocial treatment, advice and follow-up for bipolar disorder plus mood-stabilizing medication o Intensive psychosocial intervention for bipolar disorder, plus mood-stabilizing medication • Developmental disorders o Basic psychosocial treatment, advice and follow-up o Intensive psychosocial intervention • Behavioral disorders o Basic psychosocial treatment, advice, and follow-up o Intensive psychosocial intervention o Methylphenidate medication • Dementia o Assessment, diagnosis and advice o Pharmacological treatment • Alcohol use/dependence o Identification and assessment of new cases of alcohol o Brief intervention and follow-up for alcohol use o Management of alcohol withdrawal o Relapse prevention medication for alcohol • Drug use/dependence o Identification and assessment of new cases of drug use o Brief interventions and follow-up for drugs use/dependence o Management of opioid/other drug withdrawal • Self- harm/suicide o Assess and care for person with self-harm

Data Sources

Disease Area	Data Source	Affiliation (if person)
Maternal and Child Health	Dr. Ava Avalos	Careena Centre
	Ms. Thipe	MCH Program, MOH
	Ms. Leburu	MCH Program, MOH
	Mr. Tshiamo Keakabetse	MCH Program, MOH
	Health Statistics Report 2007 (Botswana) - National	
	Guidelines for Antenatal Care and the Management of Obstetric Emergencies and Prevention of Mother-To-Child Transmission of HIV – National	
	Health Statistics Report 2009 (Botswana) – National	
	Operational Guidelines on Maternal and Newborn Health – National	
	Maternal and Child Health Service Guidelines – National	
	Essential Interventions, Commodities and Guidelines for Reproductive, Maternal, Newborn and Child Health (WHO)(International)	
	2012 Sexual Reproductive Health Standards & Guidelines – National	
	2012 White Paper: Salary Scales – National	
	2012 MHC Costing (waiting from HRU)	
	http://emedicine.medscape.com/ (International)	
	http://www.who.int/maternal_child_adolescent/documents/who_frh_msm_9624/en/ (International)	
	http://www.who.int (International)	
	http://www.cdc.gov/std/syphilis/treatment.htm (International)	
	Complete Listing of Drugs and Medical Supplies from Central Medical Stores 2011 – 2013 – National	
Child Health	Dr. Avalos Dr. Gobez	Careena Centre
	National Measles Supplementation Immunisation Activities, Mebendazole and Vitamin A Campaign (4th to 8th November 2013, Botswana) - National	
	Accelerated Child Survival And Development (ACSD) Strategy 2009/10 - 2015/16 (May 2009) - National	
	http://siteresources.worldbank.org/NUTRITION/Resources/281846-1271963823772/botswana1711screen.pdf	
	The Essential Health Service Package for Botswana 2010 – National	
	Health Statistics report 2009 – National	
	Ms. Lenna Fosagi	Child Health Program Officer, MOH
	Costing for eMTCT program 2012 - 2013 (Workshop Costs) (National)	
	Complete Listing of Drugs and Medical Supplies from Central Medical Stores 2011 – 2013 (National)	
	Integrated management of childhood illness	
	2012 White Paper: Salary Scales (National)	
Immunizations	http://apps.who.int/immunization_monitoring/globalsummary/timeseries/tswucoveragedtp3.html (International)	

Disease Area	Data Source	Affiliation (if person)
	http://www.cdc.gov/vaccines/programs/vfc/awardees/vaccine-management/price-list/ (International)	
Malaria	Dr. Chihanga Dr. Ntebele	Malaria, MOH Malaria, MOH
	Health Statistics Report 2009 (Botswana) – National	
	Malaria Strategic Plan 2010 – 2015 – National	
	Malaria Policy 2011 (National Malaria Program)- National	
	Guidelines for the Diagnosis and Treatment of Malaria in Botswana 2007 – National	
	Mrs. Mosweunyane Mrs. Motlaleng	
	Malaria Surveillance Guidelines 2011 – National	
	Complete Listing of Drugs and Medical Supplies from Central Medical Stores 2011 – 2013 – National	
	Malaria Strategic Plan 2010 – 2018 – National	
	2012 White Paper: Salary Scales – National	
TB	Dr. Agegnehu Diriba Dr. Mudiaya Dr. Ava Avalos Dr. Miriam Haverkamp Dr. Chowa Modongo	TB, MOH TB, MOH Careena Centre Botswana UPenn Partnership Botswana UPenn Partnership
	2011 National Tuberculosis Programme Manual – National	
	TB/Leprosy Report 2010-2011 – National	
	TB/Leprosy Program Annual Report 2012 – National	
	BNTP Annual Report 2010-2011 – National	
	2012 BNTP National Report – National	
	BNTP 2009 Annual Report – National	
	National Guideline for the Management of Drug-Resistant TB, 2009 Second Edition – National	
	Infection Control Guidelines, 1st Edition, February 2009 – National	
	National Tuberculosis Control Program – Strategic Plan 2013-2017 – National	
	Global Fund Application Program, 2012 – National	
	Mrs. Caiphus, BNTP nurse PMH-IDCC/TB Clinic	
HIV	Dr. Ava Avalos Dr. Miriam Haverkamp Dr. Tendani Gaolathe Dr. Mogomotsi Mashaba	Careena Centre Botswana-UPenn Partnership Botswana Harvard Partnership Botswana Baylor Centre of Excellence
	2009 National Guidelines HIV Testing and Counseling – National	
	2010 National Guidelines for Children & Adolescents – National	
	2011 Botswana National Guidelines PMTCT – National	
	2012 Botswana National HIV 7 AIDS Treatment Guidelines – National	
	2013 Adolescent Clinical Care Guidelines – National	

Disease Area	Data Source	Affiliation (if person)
	2012 Sexual and Reproductive Health Guidelines – National	
	2012 White Paper: Salary Scales – National	
	Botswana National Strategic Framework II (2010-2016)- National	
	Botswana National Policy on HIV and AIDS 2013 – National	
	2012 ART Guideline Change – National	
	2012 White Paper: Salary Scales – National	
	The Essential Health Service Package for Botswana 2010 – National	
	Health Statistics report 2009 – National	
	2012 Botswana National HIV & AIDS Treatment Guidelines – National	
	Botswana AIDS Impact Survey III – National	
	Costing for eMTCT program 2012 - 2013 (Workshop Costs)- National	
	Complete Listing of Drugs and Medical Supplies from Central Medical Stores 2011 – 2013 – National	
	BAIS 2014 Summary – National	
NCDs	Dr. Avalos Dr. Havercamp	Careena Centre and Botswana UPenn Partnership
	Botswana Non-Communicable Diseases Strategic plan – National	
	The Essential Health Service Package for Botswana 2010 - National	
	Health Statistics report 2009 – National	
	Costing for eMTCT program 2012 - 2013 (Workshop Costs) – National	
	Complete Listing of Drugs and Medical Supplies from Central Medical Stores 2011 – 2013 – National	
	Treatment Guidelines for Type II Diabetes – National	
	2012 White Paper: Salary Scales – National	
	UB/U Penn outpatient guidelines – National	
	WHO Guidelines (International)	
Mental Health	Mental Health Program	MOH
	2012 White Paper: Salary Scales – National	
	UB and U Penn guidelines – National	
Health Systems	2012 White Paper: Salary Scales – National	
	CMS Complete Costing 2011-2013 – National	
	EMTCT Costing – National	
	Internet prices online – International	

ANNEX D: NORMATIVE UNIT COSTS PER DISEASE PROGRAM AREA

MATERNAL/NEWBORN AND REPRODUCTIVE HEALTH	TOTAL NORMATIVE UNIT COST				
	Drugs/Consumables + HR + Other Direct and Indirect Costs (BWP)				
	Outpatient Visits			Inpatient Visits	
	Community/ Outreach	Clinic	Hospital	Clinic	Hospital
Family planning					
Pill	131.56	165.04	174.70	347.93	372.91
Condom	141.32	140.90	0.00	323.78	0.00
Injectable	105.51	101.94	111.59	284.82	309.81
IUD	236.13	232.56	252.78	415.45	450.99
Implant	1,472.64	1,469.07	1,489.29	1,651.95	1,687.50
Female sterilization	0.00	292.34	301.99	475.22	500.21
Male sterilization	0.00	259.37	269.03	442.26	467.24
LAM	0.00	0.00	0.00	0.00	0.00
Vaginal barrier method	186.96	228.78	0.00	411.66	0.00
Vaginal tablets	54.24	62.29	71.94	245.17	270.16
Other contraceptives	0.00	0.00	0.00	0.00	0.00
Safe abortion					
Safe abortion	0.00	238.02	247.67	420.90	445.89
Management of abortion complications					
Post-abortion case management	699.98	727.11	863.64	909.99	1,061.85
Management of ectopic pregnancy care					
Ectopic case management	0.00	1,459.49	2,293.47	1,642.37	2,491.68
Pregancy care - ANC					
Tetanus toxoid (pregnant women)	66.07	61.82	73.31	244.70	271.53

MATERNAL/NEWBORN AND REPRODUCTIVE HEALTH	TOTAL NORMATIVE UNIT COST				
	Drugs/Consumables + HR + Other Direct and Indirect Costs (BWP)				
	Outpatient Visits			Inpatient Visits	
	Community/ Outreach	Clinic	Hospital	Clinic	Hospital
Syphilis detection and treatment (pregnant women)	68.78	66.27	75.92	249.15	274.14
Basic ANC	57.60	54.03	0.00	236.91	0.00
Pregnancy care - Treatment of pregnancy complications					
Hypertensive disease case management	61.37	57.80	67.45	240.68	265.67
Management of pre-eclampsia (Magnesium sulphate)	0.00	275.83	285.49	458.71	483.70
Management of other pregnancy complications	52.56	62.55	0.00	245.44	0.00
Childbirth care - Facility births					
Labor and delivery management	311.76	308.19	317.85	491.08	516.06
Active management of the 3rd stage of labour	66.70	63.13	72.79	246.02	271.00
Pre-referal management of labor complications	0.00	3,001.25	3,010.90	3,184.13	3,209.12
Management of eclampsia (Magnesium sulphate)	1,363.65	1,360.09	1,369.74	1,542.97	1,567.95
Neonatal resuscitation (institutional)	496.45	492.88	502.54	675.76	700.75
Management of obstructed labor	0.00	21,326.44	21,336.10	21,509.32	21,534.31
Treatment of local infections (Newborn)	0.00	43.98	53.64	226.86	251.85
Kangaroo mother care	182.93	179.36	0.00	362.25	0.00
Feeding counselling and support for low-birth-weight infants	715.19	691.79	0.00	874.67	0.00
Childbirth care - Home births					
Clean practices and immediate essential newborn care (home)	216.36	0.00	0.00	0.00	0.00
Childbirth care - Other					
Antenatal corticosteroids for preterm labor	0.00	223.95	233.61	406.83	431.82
Antibiotics for pPRoM	59.86	56.29	65.95	239.17	264.16
Induction of labor (beyond 41 weeks)	0.00	107.64	117.30	290.52	315.51

MATERNAL/NEWBORN AND REPRODUCTIVE HEALTH	TOTAL NORMATIVE UNIT COST				
	Drugs/Consumables + HR + Other Direct and Indirect Costs (BWP)				
	Outpatient Visits			Inpatient Visits	
	Community/ Outreach	Clinic	Hospital	Clinic	Hospital
Postpartum care - Treatment of sepsis					
Maternal Sepsis case management	3,123.27	3,119.70	3,129.35	3,302.58	3,327.57
Postpartum care - Treatment of newborn sepsis					
Newborn sepsis - Full supportive care	2,180.72	2,177.15	2,186.81	2,360.04	2,385.02
Newborn sepsis - Injectable antibiotics	414.89	411.32	420.98	594.20	619.19
Postpartum care - Other					
Mastitis	46.46	42.89	52.55	225.78	250.76
Treatment of postpartum hemorrhage	0.00	985.29	994.95	1,168.18	1,193.16
Other sexual and reproductive health					
Treatment of syphilis	394.13	390.57	400.22	573.45	598.43
Treatment of PID (Pelvic Inflammatory Disease)	151.24	147.67	157.32	330.55	355.54
Treatment of urinary tract infection (UTI)	51.21	47.64	57.30	230.53	255.51
Cervical cancer screening	319.63	306.79	316.45	489.68	514.66
Treatment of vaginal discharge	0.00	0.00	0.00	0.00	0.00

Note: Drugs and Consumables Costs obtained from OneHealth Treatment Inputs; Direct and Indirect Costs obtained from LIST; HR Costs obtained from OneHealth Medical Personnel Treatment Inputs

CHILD HEALTH	TOTAL NORMATIVE UNIT COST				
	Drugs/Consumables + HR + Other Direct and Indirect Costs (BWP)				
	Outpatient Visits			Inpatient Visits	
	Community/ Outreach	Clinic	Hospital	Clinic	Hospital
Vitamin A supplementation for treatment of xerophthalmia in children	48.24	0.00	0.00	0.00	0.00
Deworming (children)	46.13	0.00	0.00	0.00	0.00
Diarrhea management					
ORS	56.23	0.00	0.00	0.00	0.00
Zinc (diarrhea treatment)	109.51	0.00	0.00	0.00	0.00
Antibiotics for treatment of dysentery	0.00	43.73	53.39	226.62	251.60
Treatment of severe diarrhea	0.00	203.58	213.24	386.46	411.45
Pneumonia					
Pneumonia treatment (children)	69.73	0.00	0.00	0.00	0.00
Treatment of severe pneumonia	0.00	1,547.05	1,556.71	1,729.94	1,754.92
Measles					
Vitamin A for measles treatment (children)	48.56	0.00	0.00	0.00	0.00

Note: Drugs and Consumables Costs obtained from OneHealth Treatment Inputs; Direct and Indirect Costs obtained from LIST; HR Costs obtained from OneHealth Medical Personnel Treatment Inputs

IMMUNIZATION	TOTAL NORMATIVE UNIT COST				
	Drugs/Consumables + HR + Other Direct and Indirect Costs (BWP)				
	Outpatient Visits			Inpatient Visits	
	Outreach	Clinic	Hospital	Clinic	Hospital
Rotavirus vaccine	109.31	104.42	0.00	287.30	0.00
Measles vaccine	94.22	88.00	0.00	270.89	0.00
Pentavalent vaccine	182.82	179.25	0.00	362.13	0.00
DPT vaccination	54.53	46.99	0.00	229.87	0.00
Hep B vaccine to prevent liver cancer	0.00	40.33	0.00	223.21	0.00
Polio vaccine	58.85	41.25	0.00	224.13	0.00
BCG vaccine	44.14	39.25	0.00	222.14	0.00
Pneumococcal vaccine	590.95	587.38	0.00	770.26	0.00
HPV vaccine	0.00	2,798.13	0.00	2,981.02	0.00
Yellow Fever	69.76	0.00	0.00	0.00	0.00
Tetanus	44.62	0.00	0.00	0.00	0.00

Note: Interventions not applicable at Community or Hospital levels; Drugs and Consumables Costs obtained from OneHealth Treatment Inputs; Direct and Indirect Costs obtained from LIST; HR Costs obtained from OneHealth Medical Personnel Treatment Inputs

MALARIA	TOTAL NORMATIVE UNIT COST				
	Drugs/Consumables + HR + Other Direct and Indirect Costs (BWP)				
	Outpatient Visits			Inpatient Visits	
	Community/ Outreach	Clinic	Hospital	Clinic	Hospital
Insecticide treated materials	122.02	0.00	0.00	0.00	0.00
Pregnant women sleeping under an ITN	145.54	0.00	0.00	0.00	0.00
Indoor residual spraying	369.29	0.00	0.00	0.00	0.00
Malaria treatment (adults)	98.18	94.61	104.27	277.50	302.48
Surveillance	53.84	50.27	59.93	233.15	258.14
Diagnosis	578.02	574.45	0.00	757.33	0.00
Larval Control	353.40	0.00	0.00	0.00	0.00
Diagnosis Fever cases	578.02	0.00	0.00	0.00	0.00

Note: Drugs and Consumables Costs obtained from OneHealth Treatment Inputs; Direct and Indirect Costs obtained from LIST; HR Costs obtained from OneHealth Medical Personnel Treatment Inputs

HIV/AIDS	TOTAL NORMATIVE UNIT COST				
	Drugs/Consumables + HR + Other Direct and Indirect Costs (BWP)				
	Outpatient Visits			Inpatient Visits	
	Community/ Outreach	Clinic	Hospital	Clinic	Hospital
Prevention - Other					
Youth focused interventions - Out-of-school	604.04	0.00	0.00	0.00	0.00
Voluntary counseling and testing	85.26	0.00	0.00	0.00	0.00
Condoms	94.83	85.70	0.00	274.15	0.00
Male circumcision	277.31	47.87	0.00	456.62	0.00
PMTCT	420.66	327.22	594.57	684.58	792.78
Post-exposure prophylaxis	0.00	3,681.14	3,758.10	3,931.33	3,956.31
Care and treatment					
ART (First-Line Treatment) for men	1,835.22	1,768.83	1,778.48	1,951.71	1,976.69
ART (First-Line Treatment) for women	1,857.97	1,791.57	1,790.67	1,974.46	1,988.88
ART (Second-Line Treatment) for adults	2,700.55	2,696.98	0.00	2,879.86	0.00
Cotrimoxazole for children	0.00	3,117.04	3,107.48	3,299.92	3,305.69
Pediatric ART	2,299.84	2,322.95	2,332.60	2,505.83	2,530.82
Diagnostics/lab costs for HIV+ in care	1,481.74	1,478.17	1,487.82	1,661.05	1,686.04
Management of opportunistic infections associated with HIV/AIDS	139.67	16,047.41	16,045.83	16,230.30	16,244.04
Nutrition supplements in first 6 months for HIV/AIDS cases	0.00	131.49	0.00	314.37	0.00
Collaborative HIV/AIDS and TB interventions					
Screen HIV+ cases for TB	137.86	185.28	194.94	368.16	393.15
ART (+CPT) for TB HIV+ patients	473.16	470.71	480.36	653.59	678.57
HIV prevention for TB patients	1,054.36	1,058.08	1,067.73	1,240.96	1,265.95

Note: Drugs and Consumables Costs obtained from OneHealth Treatment Inputs; Direct and Indirect Costs obtained from LIST; HR Costs obtained from OneHealth Medical Personnel Treatment Inputs

TB	TOTAL NORMATIVE UNIT COST				
	Drugs/Consumables + HR + Other Direct and Indirect Costs (BWP)				
	Outpatient Visits			Inpatient Visits	
	Community / Outreach	Clinic	Hospital	Clinic	Hospital
TB - notification and treatment					
First-line TB drugs for Category I & III patients (adults)	105,108.38	105,891.24	105,961.15	106,074.12	106,159.36
First-line TB treatment for children	4,048.05	4,044.48	4,054.13	4,227.36	4,252.35
First-line TB drugs for Category II patients	103,231.24	103,561.53	108,957.51	103,744.42	109,155.72
Extra Pulmonary TB	136,583.62	128,552.06	128,568.85	128,734.95	128,767.06
TB Contact Tracing	131.97	0.00	0.00	0.00	0.00
MDR - notification and treatment					
MDR-TB notification among new patients and previously treated patients	151,927.19	151,923.62	151,933.28	152,106.50	152,131.49
MDR-TB notification in children among previously treated patients	152,684.11	152,680.54	152,690.20	152,863.42	152,888.41
Case Management of MDR-TB cases	4,452.34	4,448.77	4,458.43	4,631.66	4,656.64
Collaborative TB and HIV/AIDS interventions					
Cotrimoxazole preventive therapy for TB HIV+ patients	6,085.47	6,081.90	6,091.55	6,264.78	6,289.77
Care & support for TB HIV+ patients	41.46	37.89	47.55	220.78	245.76

Note: Drugs and Consumables Costs obtained from OneHealth Treatment Inputs; Direct and Indirect Costs obtained from LIST; HR Costs obtained from OneHealth Medical Personnel Treatment Inputs

NON-COMMUNICABLE DISEASES	TOTAL NORMATIVE UNIT COST				
	Drugs/Consumables + HR + Other Direct and Indirect Costs (BWP)				
	Costs: Other Direct and Indirect (BWP)			Costs: Other Direct and Indirect (BWP)	
	Outpatient Visits			Inpatient Visits	
	Community/ Outreach	Clinic	Hospital	Clinic	Hospital
CVD & diabetes					
Screening for risk of CVD/diabetes	168.83	217.17	226.82	400.05	425.04
Follow-up care for those at low risk of CVD/diabetes (absolute risk: 10-20%)	168.83	165.26	174.92	348.15	373.13
Treatment for those with very high cholesterol but low absolute risk of CVD/diabetes (< 20%)	810.16	906.08	915.73	1,088.96	1,113.95
Treatment for those with high blood pressure but low absolute risk of CVD/diabetes (< 20%)	742.40	738.83	748.49	921.72	946.70
Treatment for those with absolute risk of CVD/diabetes 20-30%	1,231.44	1,227.87	1,237.53	1,410.75	1,435.74
Treatment for those with high absolute risk of CVD/diabetes (>30%)	1,231.44	1,227.87	1,237.53	1,410.75	1,435.74
Treatment of cases with type I diabetes (with insulin)	0.00	22,803.93	18,501.32	22,986.82	18,699.53
Treatment for Type II Diabetes	9,980.55	9,976.99	9,986.64	10,159.87	10,184.85
Respiratory disease					
Identification and control of asthma	393.39	389.83	0.00	572.71	0.00
Chronic Obstructive Pulmonary Disease	448.16	444.59	454.25	627.48	652.46

Note: Drugs and Consumables Costs obtained from OneHealth Treatment Inputs; Direct and Indirect Costs obtained from LIST; HR Costs obtained from OneHealth Medical Personnel Treatment Inputs

MENTAL, NEUROLOGICAL, AND SUBSTANCE USE DISORDERS	TOTAL NORMATIVE UNIT COST				
	Drugs/Consumables + HR + Other Direct and Indirect Costs (BWP)				
	Outpatient Visits			Inpatient Visits	
	Outreach	Clinic	Hospital	Clinic	Hospital
Depression					
Basic psychosocial treatment and anti-depressant medication	0.00	144.44	179.47	327.32	377.68
Intensive psychosocial treatment and anti-depressant medication	0.00	153.86	163.52	336.75	361.73
Psychosocial care for peri-natal depression	0.00	210.05	219.70	392.93	417.92
Psychosis					
Basic psychosocial support and anti-psychotic medication	0.00	246.55	256.20	429.43	454.42
Intensive psychosocial support and anti-psychotic medication	0.00	408.95	547.01	591.83	745.22
Bipolar disorder					
Basic psychosocial treatment, advice, and follow-up for bipolar disorder, plus mood-stabilizing medication	0.00	685.17	758.26	868.05	956.47
Intensive psychosocial intervention for bipolar disorder, plus mood-stabilizing medication	0.00	388.93	398.59	571.82	596.80
Developmental disorders					
Basic psychosocial treatment, advice, and follow-up for developmental disorders	0.00	57.07	73.66	239.95	271.87
Intensive psychosocial intervention for developmental disorders	0.00	426.69	436.34	609.57	634.55
Behavioural disorders					
Basic psychosocial treatment, advice, and follow-up for behavioural disorders	0.00	81.64	116.67	264.52	314.88
Intensive psychosocial intervention for behavioural disorders	0.00	360.59	370.25	543.48	568.46
Methylphenidate medication	0.00	1,793.05	1,802.71	1,975.93	2,000.92
Dementia					
Assessment, diagnosis, advice, and follow-up for dementia	0.00	104.49	139.52	287.37	337.73
Pharmacological treatment of dementia	0.00	228.00	237.66	410.88	435.87

Alcohol use/dependence					
Identification and assessment of new cases of alcohol use/dependence	0.00	33.43	43.09	216.31	241.30
Brief interventions and follow-up for alcohol use/dependence	0.00	61.81	96.84	244.69	295.05
Management of alcohol withdrawal	0.00	152.53	162.19	335.42	360.40
Relapse prevention medication for alcohol use/dependence	0.00	168.98	178.64	351.87	376.85
Drug use/dependence					
Identification and assessment of new cases of drug use/dependence	0.00	38.71	52.60	221.59	250.81
Brief interventions and follow-up for drug use/dependence	0.00	81.64	116.67	264.52	314.88
Management of opioid withdrawal	0.00	8,667.10	8,676.76	8,849.98	8,874.97
Management of non-opioid/other drug withdrawal	0.00	8,667.10	8,676.76	8,849.98	8,874.97
Self-harm/suicide					
Assess and care for person with self-harm	0.00	93.49	153.90	276.38	352.11
Basic psychosocial treatment, advice, and follow-up for self-harm/suicide	0.00	133.15	193.55	316.03	391.77
Pesticide intoxication management	0.00	237.69	247.34	420.57	445.55

Note: Interventions not applicable at Community or Hospital levels; Drugs and Consumables Costs obtained from OneHealth Treatment Inputs; Direct and Indirect Costs obtained from LIST; HR Costs obtained from OneHealth Medical Personnel Treatment Inputs

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