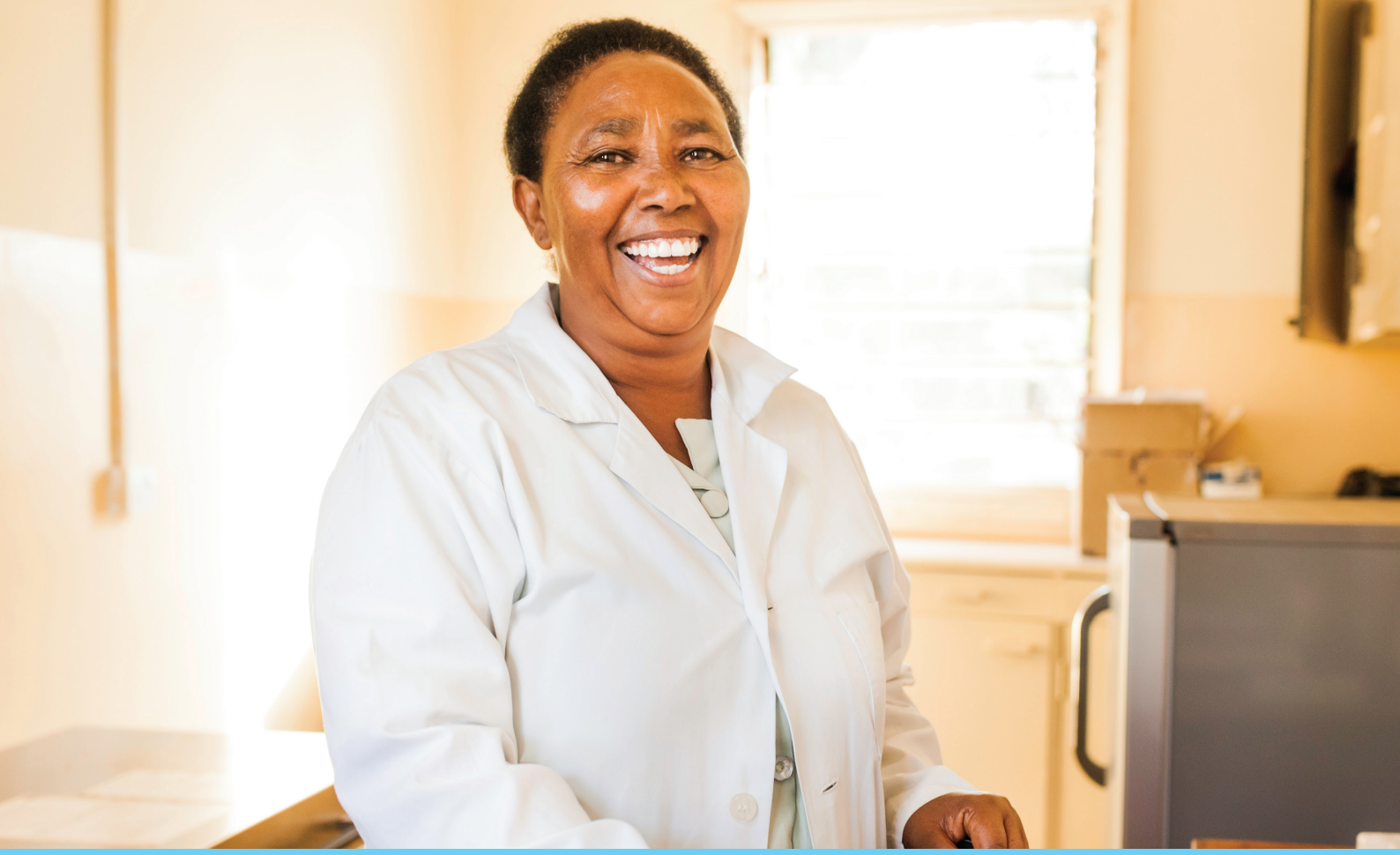

# Multi-country comparison of the costs of healthcare services at cross-border locations in Kenya, Rwanda, Uganda and Tanzania.

2017

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## ACRONYMS

| | |
|---|---|
| AIDS | Acquired Immune Deficiency Syndrome |
| ART | Antiretroviral Treatment |
| CB-HIPP | Cross-Border Health Integrated Partnership Project |
| COC | Combined Oral Contraceptive |
| EAC | East African Community |
| EMTCT | Elimination of Mother to Child Transmission |
| FP | Family Planning |
| FTE | Full Time Equivalent |
| GDP | Gross Domestic Product |
| HCT | HIV Counselling and Testing |
| HIV | Human Immunodeficiency Virus |
| IP | Inpatient |
| IUD | Intrauterine Device |
| MASH | Management Accounting System for Hospitals |
| MDG | Millennium Development Goal |
| MSH | Management Sciences for Health |
| NHA | National Health Accounts |
| OI | Opportunistic infection |
| OOP | Out of Pocket |
| OP | Outpatient |
| PEPFAR | President's Emergency Plan for AIDS Relief |
| PLHIV | People Living with HIV |
| PMTCT | Prevention of Mother to Child Transmission |
| PPP | Public Private Partnership |
| SDG | Sustainable Development Goal |
| STI | Sexually Transmitted Infection |
| TB | Tuberculosis |
| THE | Total Health Expenditure |
| UHC | Universal Health Coverage |
| USAID | U.S. Agency for International Development |
| USD | U.S. Dollar |

# EXECUTIVE SUMMARY

The East African Community (EAC) includes the six partner states of Burundi, Kenya, Rwanda, South Sudan, Tanzania and Uganda. The partner states are committed to enhancing economic, political and social integration among the six countries. This has facilitated trade and movement of people. However, this increases the threat of disease transmission and outbreaks. In addition, enhanced mobility within the EAC increases the complexity of providing access to healthcare for citizens across the region, and for non-citizens within a partner state.

## Achieving universal health coverage (UHC) will require political will and re-prioritization of healthcare

The EAC partner states have identified the need to increase social health protection of citizens and reduce out-of-pocket (OOP) expenditures on health. However, current healthcare financing is fragmented with various public and private financing mechanisms in place. In addition, there is low public expenditure on health and over-reliance on external sources for the health sector. Designing resilient social protection systems will require data on current service delivery, including variations in need, access to and use of healthcare services. This will also require cost data to understand firstly, the costs of providing healthcare services, and secondly, the cost drivers in service delivery and the reasons for variation across different levels of care, different ownership of facilities and different geographical regions. Extending social protection systems to allow for cross-border access within the EAC will require cross-country information on service delivery and costs from facilities within the region.

## The Cross-Border Health Integrated Partnership Project conducted a multi-country costing study to address the need for comparable multi-country data

The US Agency for International Development (USAID) funded the Cross-Border Health Integrated Partnership Project (CB-HIPP) to conduct a multi-country costing study within the EAC region between August 2015 and March 2017. The objective was to generate cost data for the design of a benefit package that allows access to care for beneficiaries across borders within the EAC region.

Using a provider perspective, the costing study covered financial and service delivery data for the 2014/2015 financial year from 45 public and private health facilities in six cross border areas of Kenya, Rwanda, Tanzania and Uganda. The cross border areas included Busia Kenya/Uganda, Malaba and Tororo (Kenya/ Uganda), Sio Port, Port Victoria and Majanji (Kenya/Uganda), Kasensero (Uganda), Gatuna and Katuna (Rwanda/ Uganda), and Taveta and Holili (Kenya/ Tanzania). The health facilities surveyed included hospitals, health centers and dispensaries within five kilometers of the cross-border area, or ten kilometers along the highway.

The study combined top down and bottom up costing approaches. Using the excel based Management Accounting System for Hospitals (MASH) tool, the top down approach generated average unit costs of an outpatient (OP) visit and an inpatient (IP) bed day. The bottom up approach generated service specific average unit costs using a different excel based tool. The services selected for costing were extracted from the EAC Minimum Package for HIV and AIDS and Other Health Services along the East African Community Land Transport Corridors and Wet Border Areas, and the CB-HIPP Standard Package of health services for Key, Vulnerable and Migrant Populations along East African Land Transport Corridors (Cross-border and in country hot spots).

## Costing results varied by country, level of care and ownership of facility

The total cost of running a health facility varied by level and increased with advancing levels of care. Dispensaries had the lowest operating costs, while health centers had higher operating costs than dispensaries, and hospitals had the highest operating costs. Kenyan facilities had higher operating costs than facilities in the other three countries due to the higher cost of staff in Kenya. In Rwanda and Uganda, drugs and medical supplies accounted for the highest proportion of total costs in public facilities (32% to 89%). Among private facilities, staff costs were the highest contributor to costs (30% to 68%).

The average OP visit cost varied between $0.75 and $23.70, and was lowest in public dispensaries and health centers. OP visit was highest at Kenyan public hospitals and private facilities in Kenya, Tanzania and Uganda. High utilization and the high ratio of OP visit to clinicians lowered the average OP visit cost in primary care facilities in Kenya and Uganda (dispensaries and health centers).

Service specific cost data was generated for HIV counselling and testing (HCT), Antiretroviral therapy (ART), Prevention of Mother-to Child Transmission (PMTCT) of HIV, Tuberculosis (TB), and short and long term family planning (FP) methods . These services were selected because clinician knowledge of national clinical protocols was most accurate and these services were widely offered in surveyed facilities, allowing for multi-country comparison.

Annual costs of first line ART varied between countries. In Kenya and Rwanda, average costs were higher than Uganda - first line ART in Kenya was $213.96 for an adult and $246.69 for a pediatric patient, while in Rwanda these figures were $242.80 (adult) and $246.88 (pediatric), and in Uganda, $175.03 (adult) and $135.02 (pediatric). The key cost driver was the cost of ART. The average proportion of medical consumables and drug costs to total cost of first line ART was highest in Uganda (adult 90%, pediatric 89%) compared to Kenya (adult 74 %, pediatric 79 %) and Rwanda (adult 62% , pediatric 73%). The differences between countries were also attributable to personnel costs, frequency and type of laboratory monitoring, and frequency of visits.

Annual average FP service costs were computed for four methods: combined oral contraceptives, injectable contraceptives, implants and intrauterine devices (IUDs). The study compared costs for short term methods (combined oral contraceptives and injectable contraceptives) and long term methods (implants and intrauterine devices). Average costs were generally higher for short term methods because of the multiple visits. These resulted in more medical personnel time, laboratory tests and overhead costs allocated over the year.

A cross-border analysis of first line adult and pediatric ART revealed that costs were lowest in Uganda compared to Kenya and Rwanda. This was due to lower departmental, laboratory monitoring and medical personnel costs in Uganda. The difference between public and private facilities arose from the different medical personnel and departmental costs. In Kenya and Uganda, public private partnerships (PPPs) have enabled distribution of ART drugs to private facilities. This allows the private sector to offer ART drugs at costs comparable to the public sector. This has increased access to ART and given people living with HIV (PLHIV) the choice to access ART at their preferred provider. Similar PPPs exist for HIV test kits, second line adult and pediatric ART, PMTCT/EMTCT and TB treatment in Kenya, Tanzania and Uganda. However, in Taveta Kenya/Holili Tanzania, only Kenyan public facilities offered first and second line adult and pediatric ART, presenting geographical barriers for PLHIV.

## Results can inform healthcare financing policy towards attainment of UHC

### *Domestic resource mobilization*

HIV services, TB treatment, and FP services costed in this study are currently funded through vertical programs and are heavily subsidized for patients. With increasing uncertainty of donor funding, EAC governments will need to mobilize domestic resources to support vertical programs. These costs provide the evidence needed to advocate for increased public resources to support the delivery of these services, as well as for planning and budgeting for their inclusion in existing social and private insurance schemes.

### *Benefit design*

CB-HIPP's objective for the costing study was to generate comparable average unit costs across the East Africa region to inform the design of new healthcare financing models, and/or improvement of existing models with health benefits that are accessible across borders. The costing data is also useful for actuarial analysis by new and existing social and private insurers seeking to understand the financial impact of including these services.

### *Cross-border provider payment*

The purchasing function of the health system aims for delivery of high quality care while containing cost and optimizing efficiency. The costing results by country and different levels and ownership are important for decisions about the choice of provider payment mechanism and the level of payment. For example, the results demonstrate that one reimbursement rate is not ideal because costs vary between countries and increase with advancing levels of care. In addition, reimbursement should vary by ownership because public and private facilities have different operational costs.

***Public private partnerships***

Contracting non-state facilities is a viable option to increase access to services for national insurance mechanisms. During this study, formal and informal PPP arrangements were operational in Kenya, Tanzania and Uganda. These facilitated the private sector to provide ART, FP and PMTCT at comparable costs to the public sector and increased access to services. The public sector should leverage these opportunities to expand access to more services through non-state facilities to increase utilization and improve health outcomes.

## Results provide insights for health management teams on how to improve service delivery

***Improving efficiency***

Understanding the elements that increase average costs in healthcare and how they impact on average costs can empower managers to maximize attainment of service delivery levels with the resources at their disposal. For public county or regional health teams, knowing their cost drivers can improve budgeting and planning decisions for different levels of health facilities. Evidence-based planning ensures that each facility has the right number of health workers and medical supplies for their catchment to avoid over- and under-staffing and reduce waste or stock-outs. For the private sector, cost data supports decisions on pricing of health services, identifying opportunities for maximizing revenue and service growth.

***Increasing cross border availability of services***

Availability of services offered in cross border areas varied significantly with unequal distribution in some areas and geographical barriers to accessing services for residents. This can delay access to treatment and pose additional financial barriers due to transport costs or lost time away from work. There is therefore need for clinician training at both sides of borders to improve provider knowledge and empower them to provide all the services in the benefit package.

## In conclusion, these study results are a first step to initiate policy dialogue on expanding UHC across the EAC region.

Understanding the differences in country health systems and the associated costs of delivering services is an initial step towards the design of portable healthcare products. These results respond to key questions about the cost of cross-border healthcare services, reasons for cross-border variation in costs, and opportunities for efficiency gains and leveraging PPPs. The following recommendations are for EAC partner states to move the discussion forward towards UHC within countries and across the region.

***Recommendation 1: Design reimbursement mechanisms that account for differences in facility cost structure***

Policy makers should evaluate current provider reimbursement mechanisms and review if they are incentivizing provision of high quality healthcare, containing cost and maximizing output. If not, policy makers should select a mechanism that is feasible in their context by identifying health system priorities and comparing ease of use, associated administration costs and efficiency between different reimbursement mechanisms. If policy makers choose to significantly alter their reimbursement mechanism - for example, transition from input based financing to output based reimbursement that is set prospectively - then a first step is developing a transition roadmap. This roadmap should identify other areas of the health system that need to be strengthened in tandem. For example, centralized systems in the EAC partner states can begin by increasing the autonomy of local health teams and facility administrators, holding them accountable for outputs at their level. As systems evolve to output based financing, setting the reimbursement rate should consider the average cost of services. This will provide the basis for negotiation with public and private providers on the actual amount paid for each unit of service.

***Recommendation 2: Use PPPs to expand access to services.***

For states that lack PPPs, an initial step is for national and regional health teams to map non-state actor numbers, geographic coverage, and services offered, and identify areas of comparative advantage to justify further engagement. With this information, the public sector can initiate dialogue with the private sector and establish a consultative forum for the public and private sectors. In addition, the public sector should establish a PPP policy that defines the framework for engagement with the private sector. An enabling framework and dialogue are the foundations for successful and mutually beneficial partnerships.

Where PPP arrangements already exist, the public sector can expand the range of commodities channeled through private facilities to increase access to services at affordable rates. In addition, the public sector can contract private providers for priority services or services where they can reduce duplication and/or achieve economies of scale, e.g., laboratory and imaging diagnostic services.

***Recommendation 3: Design portable pre-paid healthcare financing products that can reduce financial and geographic access barriers to healthcare.***

Cost data can be used in actuarial analysis to determine the additional premium required to offer healthcare across borders. When a viable product has been designed, or the existing one improved, this can be piloted in a cross-border area, and any lessons used to refine and improve the product and its administration. If the pilot is successful, there will be need for investment in raising public awareness about the benefit. Distribution channels or sales agents will need to be trained to explain the benefits of the additional premium to potential clients. On the supply side, health facilities will need to be recruited and accredited to provide services. Contracting should include reimbursement amounts, services to be offered, and mechanisms for monitoring and conflict resolution. Health providers will need training on beneficiary identification, the benefit package and claims procedures if any. After roll out, continuous monitoring is needed to identify areas for improvement, re-pricing premiums, and review of provider payments.

# 1. INTRODUCTION

## 1.1. Overview of the East African Community

The EAC is a regional intergovernmental organization founded by the 1999 EAC treaty between Kenya, Uganda and Tanzania. The EAC now comprises six partner states - Burundi, Kenya, Rwanda, South Sudan, Tanzania and Uganda. The EAC mission is to widen and deepen economic, political, social and cultural integration to improve the quality of life of the people of East Africa through increased competitiveness, value added production, trade and investments. Through the EAC, partner states have ratified common policies to achieve integration. These include: the EAC customs union signed in 2005 to harmonize trade tariffs among partner states; the common market protocol in 2010 to facilitate movement of goods, services, people and capital; and the EAC monetary union to be established by 2023.

*East Africa Community partner states*


Table 1 summarizes EAC partner states' economic, demographic and health indicators. The EAC has a combined population of 161 million people with a total Gross Domestic Product (GDP) of USD 157 billion. With the exception of Burundi and South Sudan, the partner states recorded GDP growth above 5% in 2015. Like other African countries, the EAC is well positioned to reap the benefits of a demographic dividend from their youthful populations. In addition, the mineral wealth and new-found oil and natural gas deposits present an opportunity for economic growth, while continuing to develop new and existing manufacturing sectors.

Despite these opportunities, the region struggles with political instability, poverty, inadequate job creation to address unemployment, and reliance on agriculture and extraction industries. GDP per capita ranges from $277.1 to $1,376.7; and five of the six states are classified as low income countries. These issues need to be tackled to achieve further economic growth and realize the region's potential.

## 1.2. East African Community Health Context

Partner states have seen gains in life expectancy and have made advances towards achieving the Millennium Development Goals (MDGs), particularly with declines in infant, under five, and maternal mortality. Significant resources have been mobilized for HIV, TB and malaria prevention and treatment. However, persistent challenges remain. For example, only Rwanda achieved the MDG goal to reduce maternal mortality by three quarters, and maternal mortality in the other partner states remains high at 362 to 789 per 100,000 live births.

**Table 1. Economic, demographic and health indicators of the EAC partner states**

| | Burundi | Kenya | Rwanda | South Sudan+ | Tanzania | Uganda |
|---|---|---|---|---|---|---|
| **GDP (current USD millions) [1]** | 3,097 | 63,398 | 8,096 | 9,015 | 45,628 | 27,529 |
| **GDP per capita (current USD) [1]** | 277.1 | 1,376.7 | 697.3 | 730.6 | 879.0 | 705.3 |
| **GDP growth[1]** | -3.9% | 5.6% | 6.9% | -6.3% | 7.0% | 5.1% |
| **Health expenditure as a percentage of GDP[2]** | 7.5% | 5.7% | 9.9% | 2.7% | 5.6% | 7.2% |
| **Health expenditure per capita (current USD) [2]** | 21.6 | 77.7 | 52.5 | 30.0 | 51.7 | 52.3 |
| **Public Health Expenditure as a percentage of Total Health Expenditure (THE)[3]** | 18% | 34% | 19% | No data | 26% | 15% |
| **Private health expenditure as percentage of THE[3]** | 20% | 40% | 28% | No data | 34% | 36% |
| **External sources of health expenditure as percentage of THE[3]** | 62% | 26% | 53% | No data | 40% | 49% |
| **OOP expenditure as percentage of Private Health Expenditure[3]** | 95% | 68% | 93% | No data | 94% | 90% |
| **Population (millions)[4]** | 10 | 44.2 | 11.2 | 12.3 | 48.8 | 34.6 |
| **Life expectancy at birth (years)[4]** | 52 | 59 | 65 | 55.7 | 62 | 63 |
| **Unemployment rate[4]** | 2.0% | 12.7% | 2.0% | No data | 10.3% | 9.4% |
| **Fertility rate[5]** | 5.7 | 3.9 | 4.2 | 7.5 | 5.2 | 5.8 |
| **Maternal mortality rate[5]** | 500 | 362 | 210 | 789 | 432 | 438 |
| **FP use[5]** | 28% | 58% | 53% | 4% | 32% | 35% |
| **HIV prevalence rate[6]** | 1% | 5.9% | 2.9% | 2.5% | 4.7% | 7.1% |
| **Number of PLHIV[6]** | 77,000 | 1,500,000 | 200,000 | 180,000 | 1,400,000 | 1,500,000 |
| **Number of PLHIV on ART[6]** | 42,169 | 897,644 | 158,728 | 19,553 | 740,078 | 834931 |
| **Coverage of PMTCT/ EMTCT[6]** | 89% | 74% | 93% | 41% | 86% | 97% |
| **TB incidence [7]** | 14,000 | 107,000 | 6,600 | No data | 164,000 | 79,000 |

[1] 2015 data from the World Bank Database World Development Indicators
[2] 2014 data from the World Bank Database World Development Indicators
[3] extracted from National Health Accounts (Burundi 2012/13, Kenya 2012/13, Rwanda 2006, Tanzania 2009/10, Uganda 2011/12 key messages)
[4] EAC Facts and Figures Report 2016
[5] Demographic and Health Surveys (Burundi 2010, Kenya 2014, Rwanda 2014-2015, Tanzania 2015-16, Uganda 2016 key findings report)
[6] UNAIDS database
[7] WHO Global Tuberculosis Report 2016
[+] South Sudan Population (2015), Life Expectancy (2014) from World Bank Database, FP use and fertility rate from South Sudan Household Health Survey 2010, Maternal mortality estimate from Trends in Maternal Mortality 1990-2015

HIV prevalence is between 1% and 7.1% in the EAC region, and there are an estimated 4.9 million PLHIV. This is 13%of the global PLHIV population. Only 55%of PLHIV in EAC are receiving life-saving ART compared to the UNAIDS target of 90% (see Box 1).

TB has resurged due to HIV/TB coinfection. The global TB annual mortality is estimated at 1.8 million. This is higher than malaria and HIV, and places TB among the top ten causes of mortality globally and in the EAC region (WHO 2016). Kenya and Tanzania are classified as high TB burden countries. TB incidence also remains high in the EAC region, with an estimated 370,600 infections annually (excluding South Sudan). TB management is complicated by multi-drug resistant TB strains, which are more difficult and more expensive to treat.

Fertility rate remains high in partner states at 3.9-7.5 children per woman. FP use is estimated to be as low as 4% in South Sudan compared to 58% in Kenya. A review of demographic and health surveys in developing countries has shown an increase in birth spacing results in reduced neonatal, infant, and under five mortality and undernutrition rates (Rutsein 2005). There is a direct relationship between FP uptake and increased birth spacing, reduced family size, and avoidance of unwanted pregnancies (Aizenman 1988). More needs to be done within EAC to expand use of FP and address the unmet need.

Box 1: UNAIDS 90-90-90 goal

*By 2020, 90% of all people living with HIV will know their HIV status.*

*By 2020, 90% of all people diagnosed with HIV infection will receive sustained ART.*

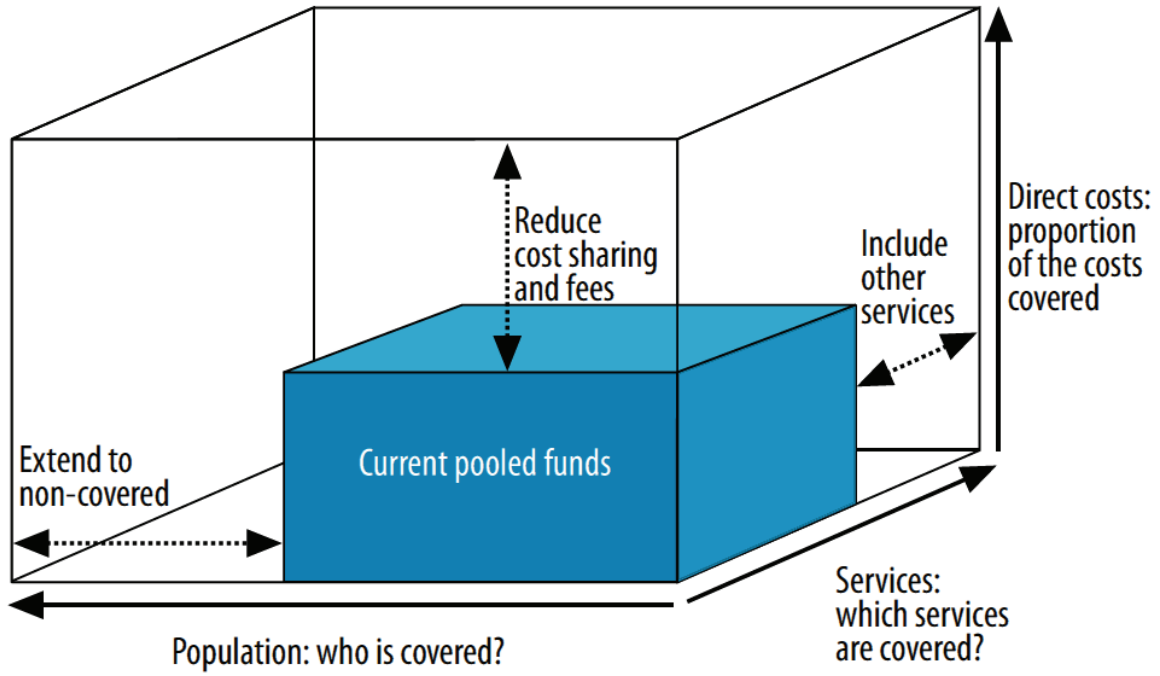
*By 2020, 90% of all people receiving ART will achieve viral suppression.*

In order to achieve their Sustainable Development Goals (SDGs), partner states will need to sustain current health gains while tackling persistent and emergent threats such as those highlighted. This is particularly the case for SDG 3, attaining good health and well-being of populations.

## 1.3. East Africa Community Health Policy Goals

The EAC Treaty outlines the areas of co-operation in health including management of health delivery systems and planning mechanisms. The EAC Vision 2050 calls for partner states to strengthen health systems through increased health financing, development and retention of the health workforce, and access to safe quality medicines and medical technologies (EAC 2015). The 2050 target is universal access to health services including acceptable modern methods of FP.

**Box 2: Three dimensions of UHC adopted from the WHO World Report 2010**



In 2016, partner states' health and finance ministers met for a high level policy dialogue. The forum recognized the reliance on external sources for health expenditure among partner states, and the need to raise domestic resources and reduce OOP expenditure. In a joint communique, the ministers proposed to adopt an EAC framework of action on sustainable healthcare financing and to pursue UHC to achieve SDG target 3.8 [1](EAC 2016).

Currently partner states are pursuing UHC through mixed systems including tax funded systems, social health insurance, private health insurance, community based health insurance and OOP. However, partner states will need to increase population coverage, increase breadth of services available, and reduce OOP. These are the three dimensions of UHC – see Box 2.

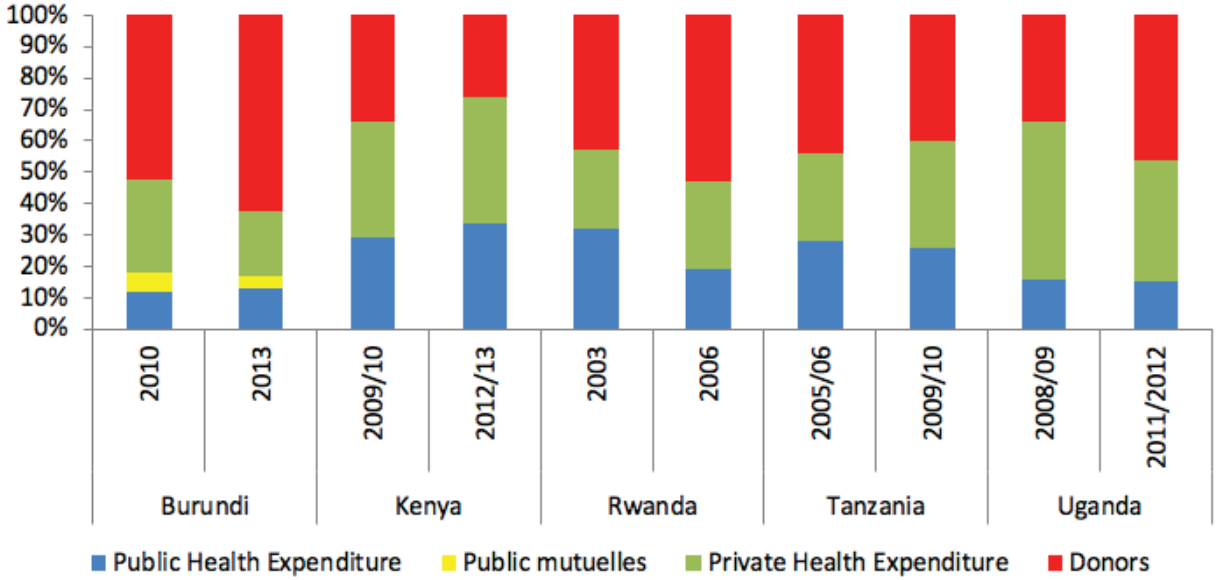
Design of health financing systems, that achieve the objectives of UHC, will require information on the cost of service delivery for planning and budgeting purposes, design of benefit packages, establishment of reasonable co-payments, and design of fair reimbursement mechanisms.

With the enhanced mobility of EAC citizens facilitated by the Common Market Protocol, existing private and public insurers will need to consider portability of health benefits across the region. Therefore, there will be a need for cost data from both within each country and from facilities across the region.

## 1.4. EAC partner states should increase domestic resources for health to achieve UHC

Figure 1 shows the sources of total health expenditure (THE) for five of the six partner states from their two most recent National Health Accounts (NHA)[2]. Comparison of these two NHAs reveals that public sector contributions reduced in four countries, while private sources of funding, largely representing OOP expenditure, increased in Kenya, Rwanda and Tanzania. External sources of funding increased for three partner states (Burundi, Rwanda and Uganda), while they declined in Kenya and Tanzania.

**Figure 1. Multi-country comparison of sources of THE for general health expenditure from the past two NHAs[3]**



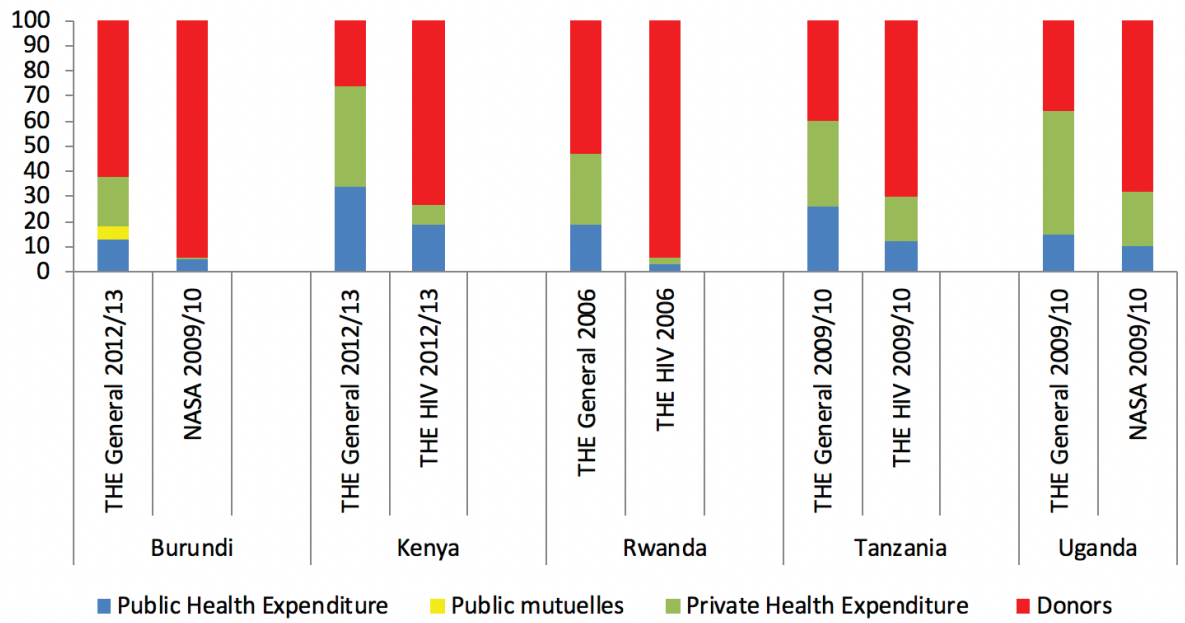

A number of public programs, including HIV prevention, care and treatment, FP, malaria prevention and treatment, TB treatment and vaccination programs, are currently funded vertically and are heavily subsidized or free to patients. These vertical programs are largely donor funded, as shown in Figure 2. While donors contribute 26% to 62% of THE for general health expenditure, they contribute a higher percentage for HIV - in some cases over 90% of HIV services are funded by donors. Similar trends are observed for vaccination, FP and TB services.

1 SDG 3, target 3.8 Achieve universal health coverage (UHC), including financial risk protection, access to quality essential health care services, and access to safe, effective, quality, and affordable essential medicines and vaccines for all.

2 National Health Accounts track expenditure, financial flows and use of healthcare resources. South Sudan has not had NHAs done.

3 Data sources: MSP 2013, MOHSW 2012, MOH 2008, MOH 2013, MOH 2015

**Figure 2. Sources of THE for general health expenditure compared with THE HIV subaccounts of NHAs or National AIDS Spending Accounts in the EAC partner states[4]**




In anticipation of a decline in external financing, the EAC convened a working group for sustainable financing of HIV and health services. The purpose of the group is to project future needs and provide options for decision makers on raising domestic resources through public and private channels. This proactive approach is needed to ensure continued access for EAC citizens to priority services necessary for reducing the spread of disease across the region.

Finally, encouraging participation in pre-payment mechanisms, such as public social programs and private healthcare financing products, can reduce financial barriers to accessing healthcare. This ensures EAC citizens are able to access care at the time of need, and reduces OOP expenditures at the point of care.

## 1.5. Rational for the EAC Multi-country Costing Study

The Cross-Border Health Integrated Partnership Project (CB-HIPP) is a regional project funded by the USAID Kenya and East Africa Mission and is implemented by a team of partners led by FHI 360. Project implementation dates are September 1, 2014 to August 31, 2019. It is designed to extend quality integrated health services in strategic land and wet cross-border areas and other transport corridor sites in East, Central and Southern Africa.

Recognizing the impetus towards UHC within the EAC region, and the challenges of access to quality health services raised by mobility, the project sought to provide comparable multi-country data that would inform the design and improvement of new and existing healthcare financing products. These healthcare financing products would enhance portability of benefits across the region and meet the healthcare needs of mobile key and vulnerable populations.

The objectives of the multi-country costing study were to:

1. Generate average unit costs of an OP visit and IP bed day.
2. Generate average unit costs for a specific list of services in the CB-HIPP Standard Package of services, including HCT, ART, PMTCT, FP, TB treatment, as well as other services.

The services costed in this study were based on the EAC Minimum Package for HIV and AIDS and Other Health Services along the East African Community Land Transport Corridors and Wet Border Areas, and the CB-HIPP Standard Package of health services for Key, Vulnerable and Migrant Populations along East African Land Transport Corridors (Cross-border and in country hot spots) (EAC 2015). The results of this study meet a gap for relevant and current cost data that is comparable across EAC partner states, and can be used for planning and budgeting, design of portable benefit packages, and design of reimbursement mechanisms.

4 Data is sourced from the THE for general health expenditure and THE for HIV subaccounts from the most recent NHA as listed for each country. For Burundi and Uganda, their most recent National AIDS Spending Assessment (NASA) is used as listed for each country.

This report details the methodology of the study in Section 2, followed by the results generated from the data analysis in Section 3. Section 4 discusses the results and policy implications. The report ends with conclusions and recommendations in Section 5.

# 2. COSTING STUDY METHODOLOGY

## 2.1. Study Sample

The study sample consisted of 45 public and private facilities located within five kilometers of the cross-border area or ten kilometers along the highway. These facilities were based on a 2015 mapping study conducted by the USAID-funded Roads to a Healthy Future II (ROADS II) project (EAC 2015). Six cross-border areas were prioritized for the costing study:

- Busia Kenya/Busia Uganda
- Malaba Kenya/ Tororo Uganda
- Sio Port and Port Victoria Kenya/ Majanji Uganda
- Kasensero Uganda
- Katuna Uganda/ Gatuna Rwanda
- Taveta Kenya/Holili Tanzania

Table 2 shows the distribution of surveyed facilities by cross-border area. A description of levels of care and a detailed list of the facilities are included in Annex A and B respectively.

**Table 2. Distribution of facilities by level and ownership**

| Country | Cross-border Site | Public Facilities | | | Private Facilities | | |
|---|---|---|---|---|---|---|---|
| | | Hospital | Health Center | Dispensary | Hospital | Health Center | Clinic |
| Kenya | Busia | 2 | 1 | 1 | 1 | 1 | 3 |
| | Malaba | 1 | 0 | 1 | 0 | 2 | 0 |
| | Sio Port/ Port Victoria | 2 | 1 | 3 | 0 | 0 | 0 |
| | Taveta | 1 | 1 | 1 | 0 | 0 | 3 |
| | | | | | | | |
| Uganda | | **Hospital** | **Health Center III** | **Health Center II** | **Hospital** | **Health Center** | **Clinic** |
| | Busia | 0 | 0 | 1 | 1 | 3 | 0 |
| | Malaba | 0 | 1 | 0 | 1 | 1 | 0 |
| | Majanji | 0 | 1 | 2 | 0 | 0 | 0 |
| | Kasensero | 0 | 0 | 1 | 0 | 0 | 0 |
| | Katuna | 0 | 1 | 0 | 0 | 1 | 1 |
| | | | | | | | |
| Tanzania | | **Hospital** | **Health Center** | **Dispensary** | **Hospital** | **Health Center** | **Clinic** |
| | Holili | 0 | 0 | 1 | 0 | 1 | 1 |
| | | | | | | | |
| Rwanda | | **Hospital** | **Health Center** | **Health Post** | **Hospital** | **Health Center** | **Clinic** |
| | Gatuna | 0 | 2 | 0 | 0 | 0 | 0 |

The inclusion criteria for health facilities surveyed were as follows:

- All public facilities within the study radius.
- Private facilities within the study radius and were registered and recognized by district or county health management.
- Facilities were operational for the full year during the financial year of interest.
- Facilities provided informed consent and were willing to provide the data required.

The study team consulted with the district or county health team about private facilities to identify facilities across levels of care with the aim of obtaining a representative sample. Private facilities were less likely to give informed consent than public facilities particularly in Kenya and Tanzania. Private drug shops, chemists and public health posts that provided very few services were excluded. Sio Port/ Port Victoria Kenya, Majanji Uganda, Kasensero Uganda and Gatuna Rwanda had no private facilities within the study radius.

## 2.2. Data Collection

The study was a retrospective analysis of data from July 2014 to June 2015. Data was collected by two data collection teams for Kenya and Uganda, and a data collection firm for Rwanda and Tanzania. Abt trained all the teams and supervised the data collection exercise. Data collected at each facility included:

- Service activity for the year.
- Expenditure information for the year or audited financial reports where they existed.
- Inventory of physical assets and equipment - where this was not available, data collectors gathered information about all assets and equipment found on site.
- Measurement of physical space of all buildings.
- The quantity of program drugs, commodities and supplies used or dispensed for the year: FP commodities, HIV test kits, ART drugs, anti-TB drugs, antimalarial drugs, malaria test kits, nutrition supplements, vaccines and any other medical supplies or pharmaceuticals that were provided by donor funded programs. Typically these donor funded drugs and commodities were not included in facility expenditure and therefore quantities dispensed for the year were collected separately and reference prices used to calculate their value. Reference prices were from the Global Fund, Management Sciences for Health (MSH) and the Global Drug Facility product catalogues.
- Data on the number of staff by cadre working at the facility and their allocation across departments.
- Use of intermediate medical departments by OP and IP departments, including pharmacy, laboratory, radiology, ultrasound, blood bank, mortuary, operating room, occupational therapy and physiotherapy departments.
- Treatment protocol used by the clinicians for costed services (see Annex C).

## 2.3. Overview of the Costing Study Analysis

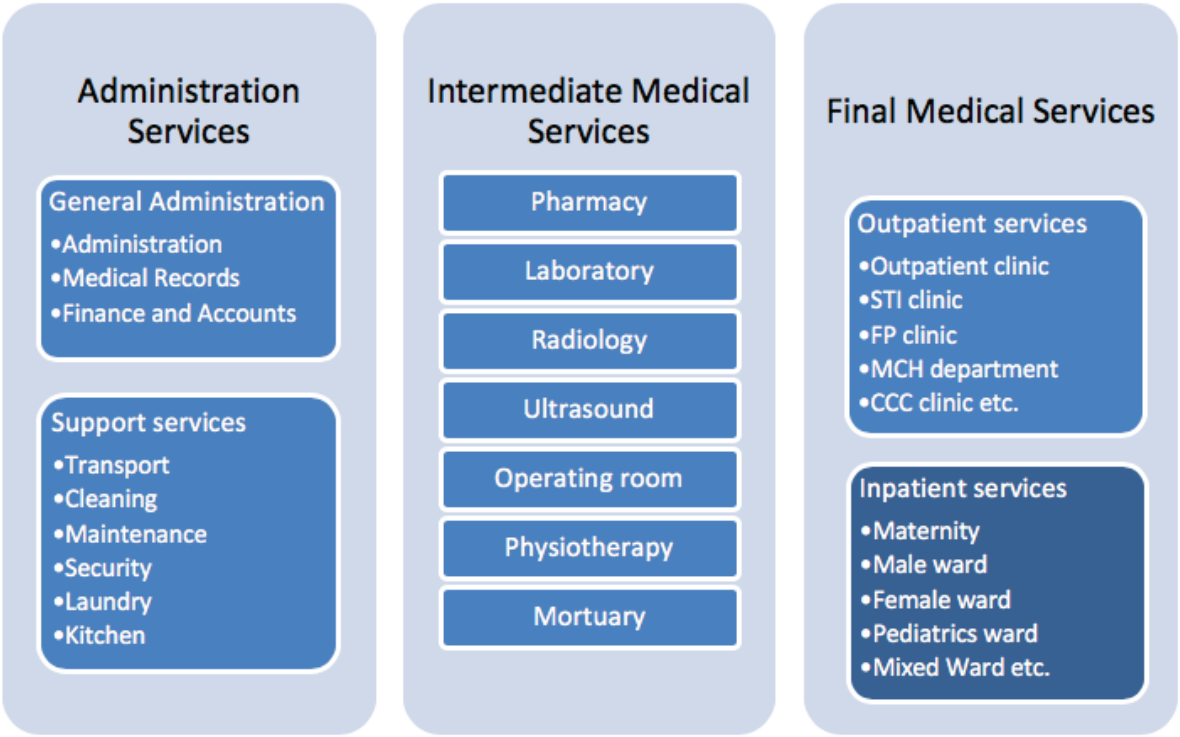
The costing study used both top-down and bottom-up methods for analysis. Top-down costing aggregates all the costs related to a department offering a service and computes an average cost by dividing the department cost with the number of services delivered. In comparison, bottom-up costing collects details on the inputs required for a service and sums the assigned cost of each input to generate the unit cost.

Bottom-up costing requires more detailed information on the inputs used to provide a service than top-down costing, as it measures direct resource use and can be used to compare utilization of resources across services. However, bottom-up costing is more likely to over- or under-estimate resource use due to reporting biases - this study relied on data reported by clinicians and not observed data. Bottom-up costing is more complex and time-consuming and does not account for economies of scale achieved in service delivery.

Top-down costing allocates all costs to departments, referred to as cost centers. The advantage of top-down costing is that it uses aggregate data and is less time consuming since it uses data regularly generated by accounts departments at facilities. However, it assumes that accounting departments are consistently and accurately collating and recording financial information. This can therefore affect the completeness of data. In addition, top-down costing does not take into account differences in case mix across facilities and their impact on costs, and relies on subjective cost allocation criteria.

Three main cost center categories were defined for this study: administration services, intermediate medical services and final medical services. See Figure 3 below. Below is a description of each approach used. Appendices D-F provide details about the treatment of data and assumptions made during analysis.

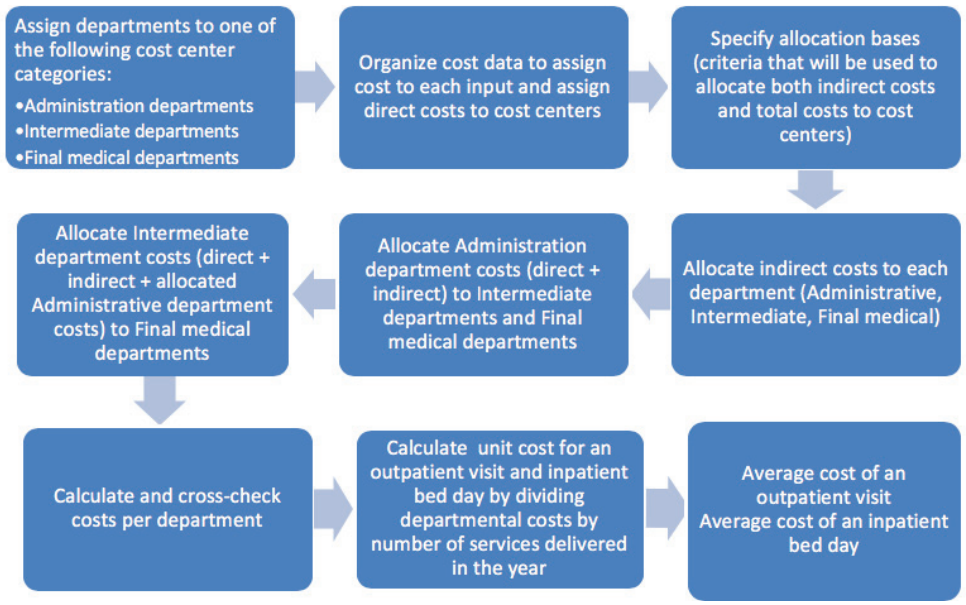
**Figure 3. List of departments/cost centers defined for the top-down costing approach**




### *2.3.1. Facility-Specific Unit Costs*

The study team used the top down approach to generate the facility specific unit costs using the Management Accounting System for Hospitals (MASH. This excel-based tool was developed by the USAID Partners for Health Reform plus project in 2004. The top down approach allocates all facility costs to departments, and then "steps-down" the costs of administration units and intermediate departments to the final medical services that provide direct services to patients. Annex G provides more details on the step-down process and Figure 4 below summarizes the process followed for this analysis.

**Figure 4. Top down costing approach**



### *2.3.2. Service-Specific Unit Costs*

The service specific costs were generated using a bottom-up approach. Bottom-up costing collects all inputs in the process of delivering a specific service and sums the costs to determine the service specific cost. Data collectors gathered information about treatment practice and resource use from clinicians at each site. A clinician was recruited in each country to review the data collected for accuracy and completeness, and to compare the data to national treatment protocols set by each Ministry of Health. Where there were discrepancies with national treatment protocols, the analysis team deferred to the latter. The analysis team assigned costs to each input and summed up the input costs to derive a service specific cost. The departmental costs reflect the operational costs of the department, including indirect costs and equipment depreciation costs for the department, but excluding staff costs, drugs and medical supplies. The departmental cost is divided by the number of services delivered to estimate a cost to allocate to each service provided by the department. Annex H provides details of tests and exams included for each service, while Annex I gives details of the bottom-up costing approach. Figure 5 below summarizes the bottom-up costing approach.

**Figure 5. Bottom-up costing approach**


## 2.4. Limitations of the Study

The study experienced the following challenges and limitations:

- The study radius resulted in some facilities being excluded, such as public hospitals in Rwanda, Tanzania and Uganda, all levels of private facilities in Rwanda and private hospitals in Tanzania. This will impact on the availability of the CB-HIPP Standard Package of services and may require extension of the radius for some sites. This also reduces the generalizability of our findings, particularly in Rwanda and Tanzania where the sample size was very small.
- Due to the extensive financial data requested by the team, facilities were hesitant and some refused to participate or withheld part of their financial data. This resulted in delays in data collection as replacements were sought or reduced the sample size. For example, in Malaba Kenya, the sample size was reduced as replacements were not possible.
- A number of facilities had good record keeping systems, but the majority did not. In some cases data was not available for indirect costs. Estimates were used in such cases, which affected the quality of the results. In addition, three facilities, two in Busia Kenya and one in Taveta, were eventually dropped because the quality of financial data was too poor to use.
- Lack of complete inventories led to a lengthy process of recording all assets and equipment at each facility. As purchase year and life-years were missing, a straight line depreciation method at a rate of 20%over five years was used.
- Prices were missing for donor funded drugs and commodities, physical assets and equipment. These were therefore estimated using reference prices from various databases including UNICEF, UNFPA, Global Fund, MSH product catalogue and the Global Drug Facility product catalogue.
- Due to the varying quality of data and variation from national treatment protocols, service costing inputs were standardized among facilities in the same country. Where there were discrepancies with national treatment guidelines, the analysis team used the guidelines to determine the inputs to cost. This was a challenge particularly for Sexually Transmitted Infection (STI) treatment where the drugs used often differed from what was prescribed in the national guidelines. However, standardization allowed the cost comparisons between facilities and across countries.
- This study did not assess the quality of care and does not compare the cost of a service to its quality. This was beyond the scope of this current study but is an area for future research as the results would provide the basis for discussion on provider reimbursement, rewarding and/ or incentivizing quality improvements.

# 3. COSTING STUDY RESULTS

This section presents the main results for average OP visit cost, average IP bed day cost, and average service specific costs for commonly offered services within the CB-HIPP Standard Package of services. Results are presented by individual facility. The section concludes with a cross-border comparison of ART service costs.

Average unit costs were generated in the local currency. However to allow for multi-country comparison, the local currency cost was converted to United States Dollars (USD) using the average exchange rates for the financial year July 2014-June 2015 (Table 1Table 3).

**Table 3. Local currency exchange rates to the US Dollar**

| | Local currency equivalent | Local currency |
|---|---|---|
| 1 USD | 91.89 | Kenya Shilling (KES) |
| 1 USD | 690.54 | Rwanda Franc (RWF) |
| 1 USD | 1753.34 | Tanzania Shilling (TZS) |
| 1 USD | 2598.00 | Uganda Shilling (UGX) |

Facility names have been coded in the results presented below. Table 4 below provides the facility codes and abbreviations used in this report.

**Table 4. Facility codes and abbreviations used in the report**

| Country | Ownership | Level | Facility code |
|---|---|---|---|
| **Kenya** | Public | Dispensary (Disp) | PuD1, PuD2, PuD3, PuD4, PuD5 |
| | | Health Centre (HC) | PuHC1, PuHC2, PuHC3 |
| | | Hospital (Hosp) | PuH1, PuH2, PuH3, PuH4, PuH5, PuH6 |
| | Private | Dispensary (Disp) | PrD1, PrD2, PrD3, PrD4, PrD5, PrD6 |
| | | Health Centre (HC) | PrHC1 |
| | | Hospital (Hosp) | PrH1 |
| **Rwanda** | Public | Health Centre (HC) | PuHC1, PuHC2 |
| **Tanzania** | Public | Dispensary (Disp) | PuD |
| | Private | Dispensary (Disp) | PrD |
| | | Health Centre (HC) | PrHC |
| **Uganda** | Public | Health Centre II (HCII) | PuHCII1, PuHCII2, PuHCII3, PuHCII4 |
| | | Health Centre III (HC III) | PuHCIII1, PuHCIII2, PuHCIII3 |
| | Private | Dispensary (Disp) | PrD1, PrD2, PrD3 |
| | | Health Centre (HC) | PrHC1, PrHC2, PrHC3 |
| | | Hospital (Hosp) | PrH1, PrH2 |

## 3.1. Total Facility Costs

Table 5 below displays the minimum, maximum and average cost of operating the facilities sampled by country, ownership and level. A comparison of similar levels of care shows that Kenyan facilities had the highest operational cost while Uganda facilities had the lowest operational costs. Generally, the operational costs were lowest for smaller dispensaries and clinics. The operational costs were lower for health centers compared to hospitals. This trend was due to larger numbers of staff, increasing complexity of services and departments, and additional medical commodities and supplies with advancing levels of care.

**Table 5. Total costs of operating the facility by country, ownership and level in US Dollars**

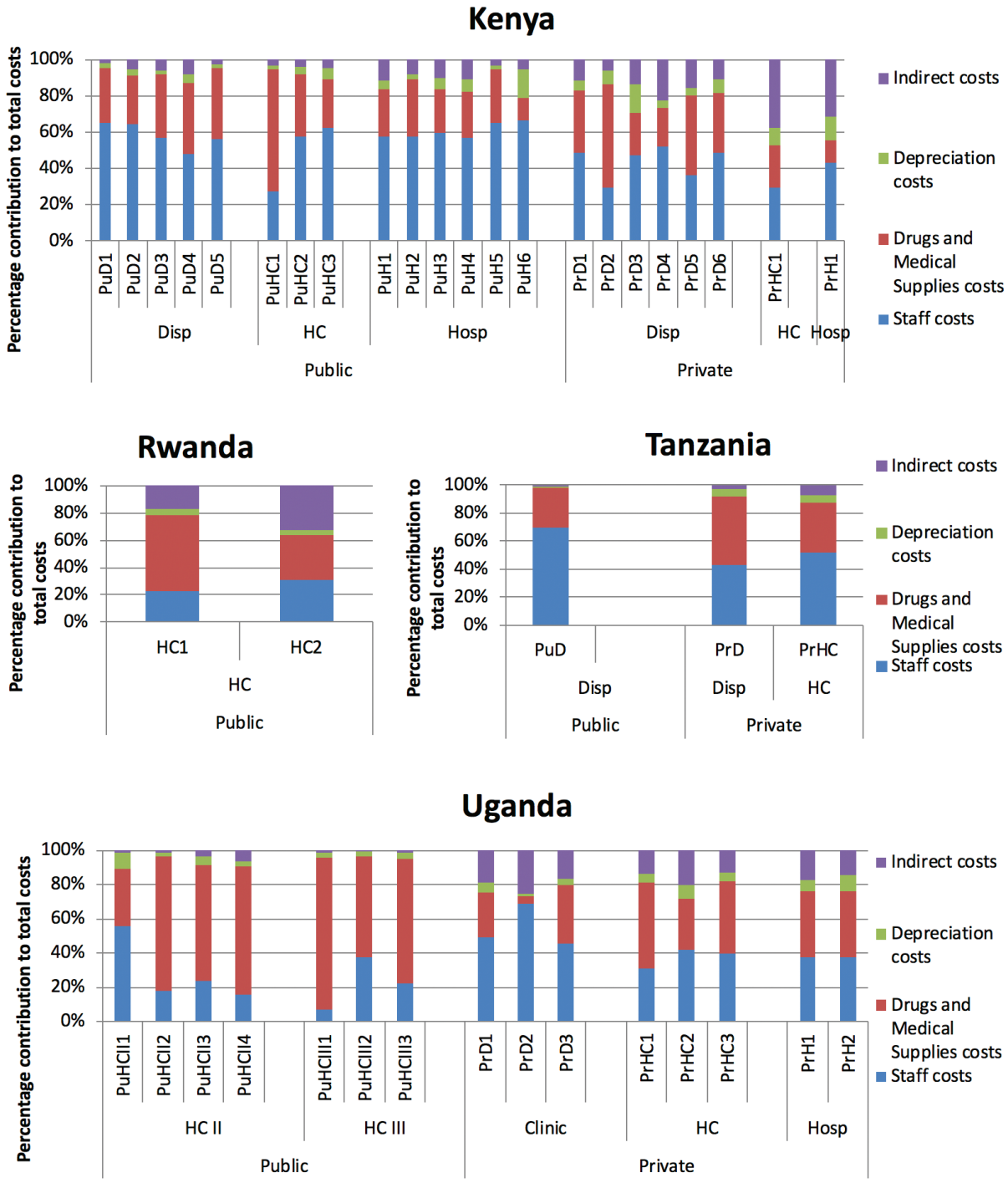
| Country | Ownership | Level | Number | Minimum (USD) | Maximum (USD) | Average (USD) |
|---|---|---|---|---|---|---|
| **Kenya** | Public | Disp | 5 | 37,229.49 | 182,548.78 | 82,337.85 |
| | | HC | 3 | 63,646.70 | 519,320.82 | 216,997.35 |
| | | Hosp | 6 | 474,485.91 | 4,092,538.07 | 1,695,764.72 |
| | Private | Disp | 6 | 9,642.67 | 61,529.59 | 25,060.17 |
| | | HC | 1 | 126,355.40 | | 126,355.40 |
| | | Hosp | 1 | 537,243.92 | | 537,243.92 |
| **Rwanda** | Public | HC | 2 | 178,739.79 | 250,605.70 | 214,672.75 |
| **Tanzania** | Public | Disp | 1 | 66,183.22 | | |
| | Private | Disp | 1 | 70,791.25 | | |
| | | HC | 1 | 198,560.61 | | |
| **Uganda** | Public | HC II | 4 | 15,014.31 | 54,481.50 | 29,852.65 |
| | | HC III | 3 | 123,042.11 | 208,135.76 | 168,711.65 |
| | Private | Disp | 3 | 12,651.66 | 50,773.74 | 25,699.36 |
| | | HC | 3 | 17,077.22 | 181,074.46 | 79,111.12 |
| | | Hosp | 2 | 223,379.67 | 369,690.11 | 296,534.89 |

Public facilities had higher operational expenses than private facilities at the same level of care in Kenya and Uganda. This was attributable to higher staff costs in public compared to private facilities in these two countries.

Figure 6 shows the contribution of staff, drugs and medical supplies, equipment depreciation and indirect costs to the total operational expenses by country and ownership. Staff accounted for the largest proportion of facility costs in Kenya due to higher salaries compared with Rwanda, Tanzania and Uganda. For example, a Kenyan nurse working at a dispensary or health center is paid up to three times more than their counterparts in Rwanda, Tanzania and Uganda. Ugandan health workers had the lowest salaries across the four countries.

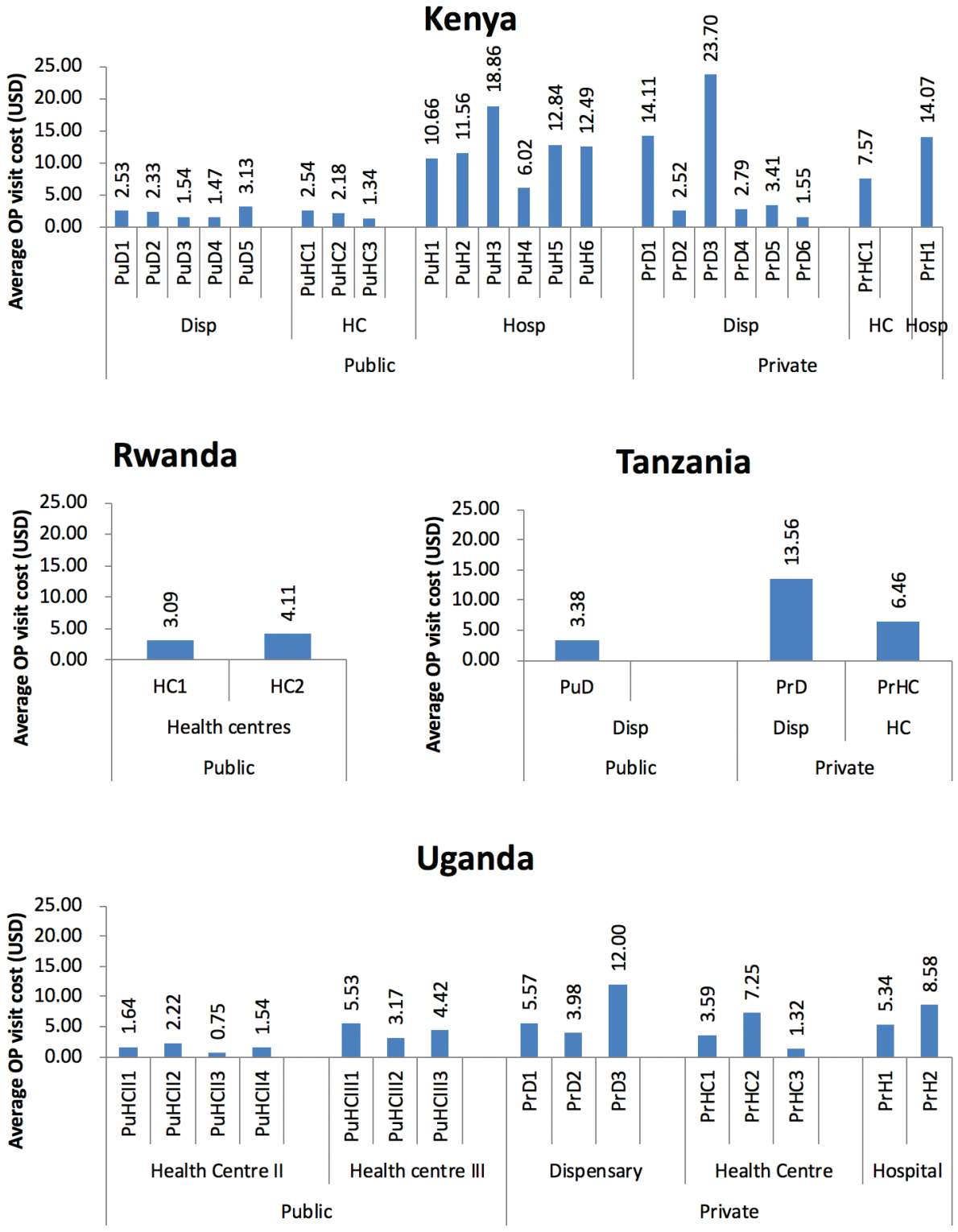
In Rwanda and Uganda, drug and medical supply costs constituted the highest proportion of costs in public facilities, although this was less significant for facilities in Kenya and Tanzania. Across public facilities in all countries, vertically funded commodities represented between 40% and 80% of total drug expenditures – these included HIV test kits, ART drugs, vaccines, FP commodities, nutritional supplements, TB drugs, malaria drugs and malaria test kits. Among private facilities in Kenya, Tanzania and Uganda, the highest proportion of costs were for staff (between 30%and 68%).

**Figure 6. Contribution of staff, drugs and medical supplies, equipment depreciation and indirect costs to total facility costs**



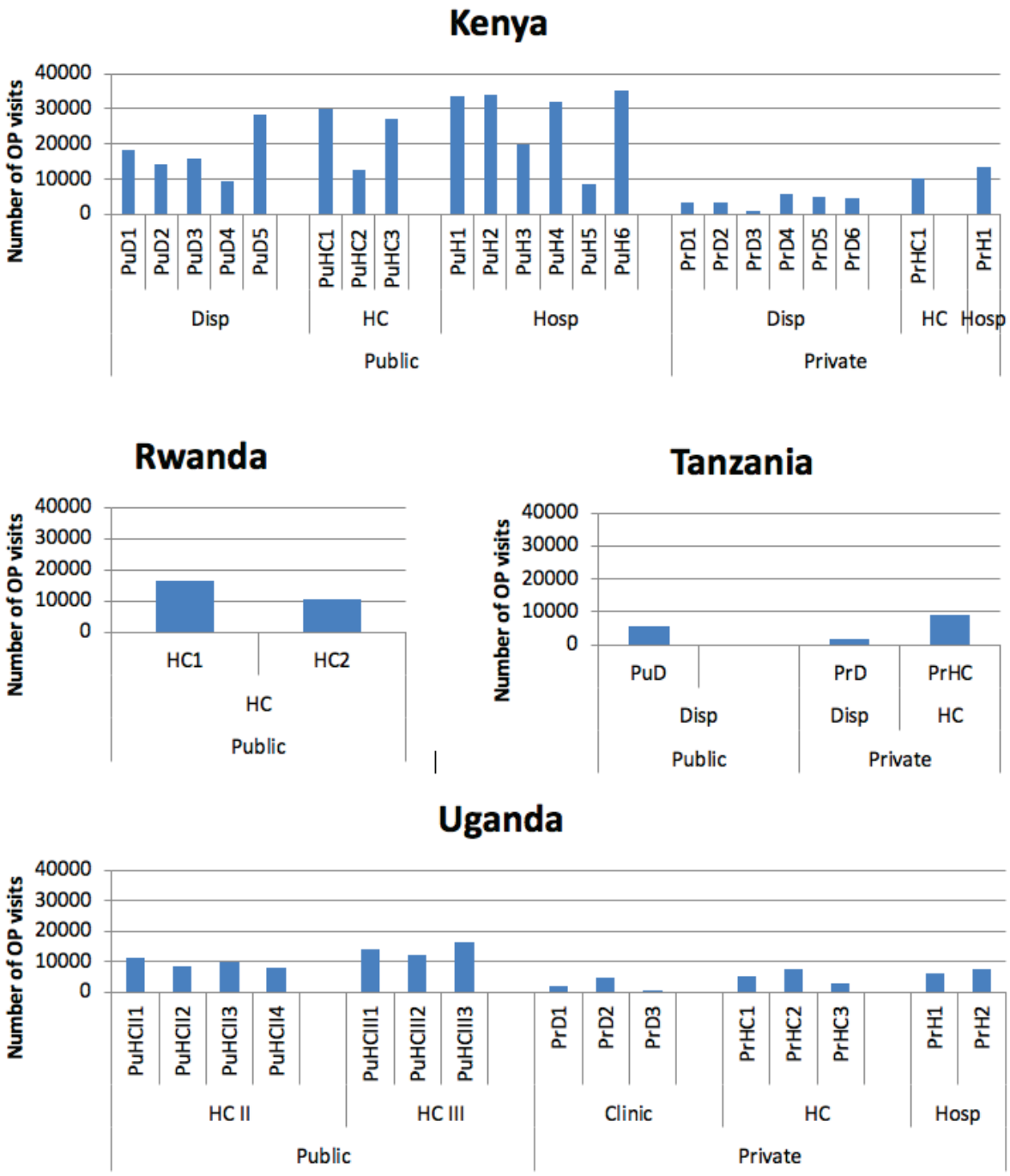
## 3.2. Average Cost of an OP Visit

**Figure 7. Multi-country comparison of the average OP visit cost in US Dollars**




The average OP visit cost was calculated by dividing the OP department operational costs by the total number of visits to the OP department (see Figure 7). Generally, private dispensaries and health centers in Kenya, Uganda and Tanzania had higher average OP visit costs than their public sector counterparts. This was due to the lower utilization/patient volumes at private facilities compared with public facilities, as shown in Figure 8. Kenyan public dispensaries and health centers had low average OP visit costs despite their high operational costs because of their high utilization. In Kenya, this ranged from 10,000 to 30,000 visits, while public primary care facilities in the other countries varied between 5,500 and 16,000 visits.

**Figure 8. Multi-country comparison of number of OP visits**

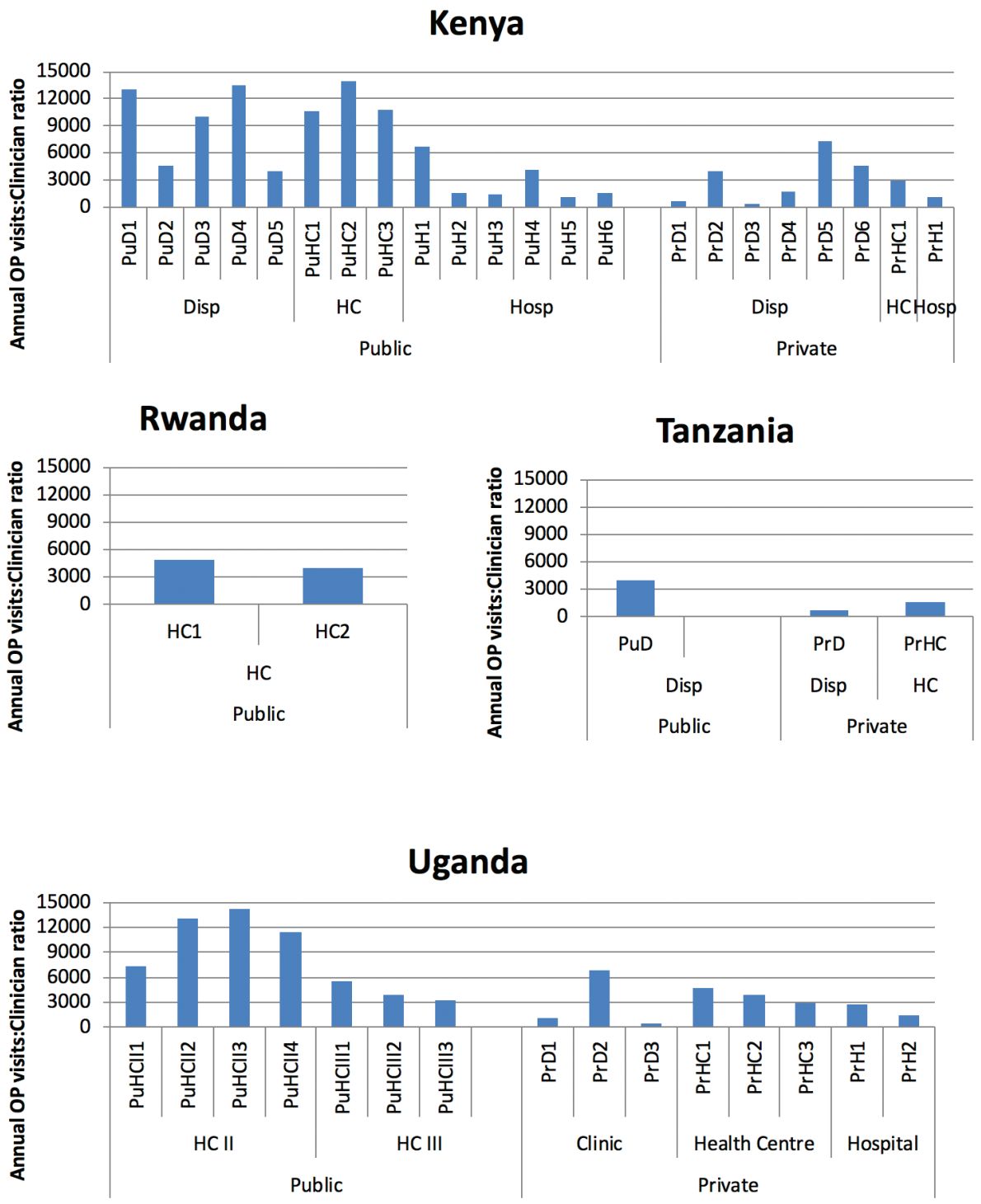



The OP visits to clinician ratio was highest in public primary care facilities in Kenya (dispensaries and health centers) and Uganda (health centers II) – see Figure 9. The OP visit to clinician ratio was as high as 14,000:1, meaning that a clinician was seeing approximately 39 patients a day and seeing more patients than their counterparts in private facilities and higher level public facilities. This impacted their average OP visit cost, which ranged from $0.75 to $3.13, as shown in Figure 7.

However, the high visit to clinician ratio may have an adverse effect on quality of care if clinicians are overworked or if adequate medical supplies and commodities are not available.

Figure 9 explains the high average OP visit cost at Kenyan public hospitals despite the high OP visit utilization (Figure 8). This is because the OP departments at public hospitals have a significantly higher number of clinicians - the clinician to visit ratio is almost four times lower in Kenyan public hospitals compared to Kenyan primary care facilities. This results in a higher proportion of costs on wages and therefore higher average OP visit costs at between $6.06 and $18.86 (Figure 7). The same is observed for health center III facilities compared to health center II facilities in Uganda.

Figure 9. Multi-country comparison of annual OP visits to clinician ratio




## 3.3. Average Cost of an IP Bed Day

Table 6 shows the IP bed day cost in USD and occupancy for health centers and hospitals. Of the 20 health facilities with IP services surveyed, only five had occupancy above 50%. One facility had occupancy of 121%, indicating more admissions than bed capacity and/or rapid turnover of patients. Surrounding health facilities had occupancy lower than 51% suggesting a shift of over-capacity from PuH2 to facilities with lower rates of occupancy.

Generally, the higher the occupancy, the lower the average cost of the IP bed day. Private health centers had low operating costs and more than five times the occupancy of public health centers in Uganda, resulting in low average IP bed day costs. This is opposite to the OP visit cost, which was lower at public than private health facilities, largely due to public facilities having more than double the OP visits of private facilities.

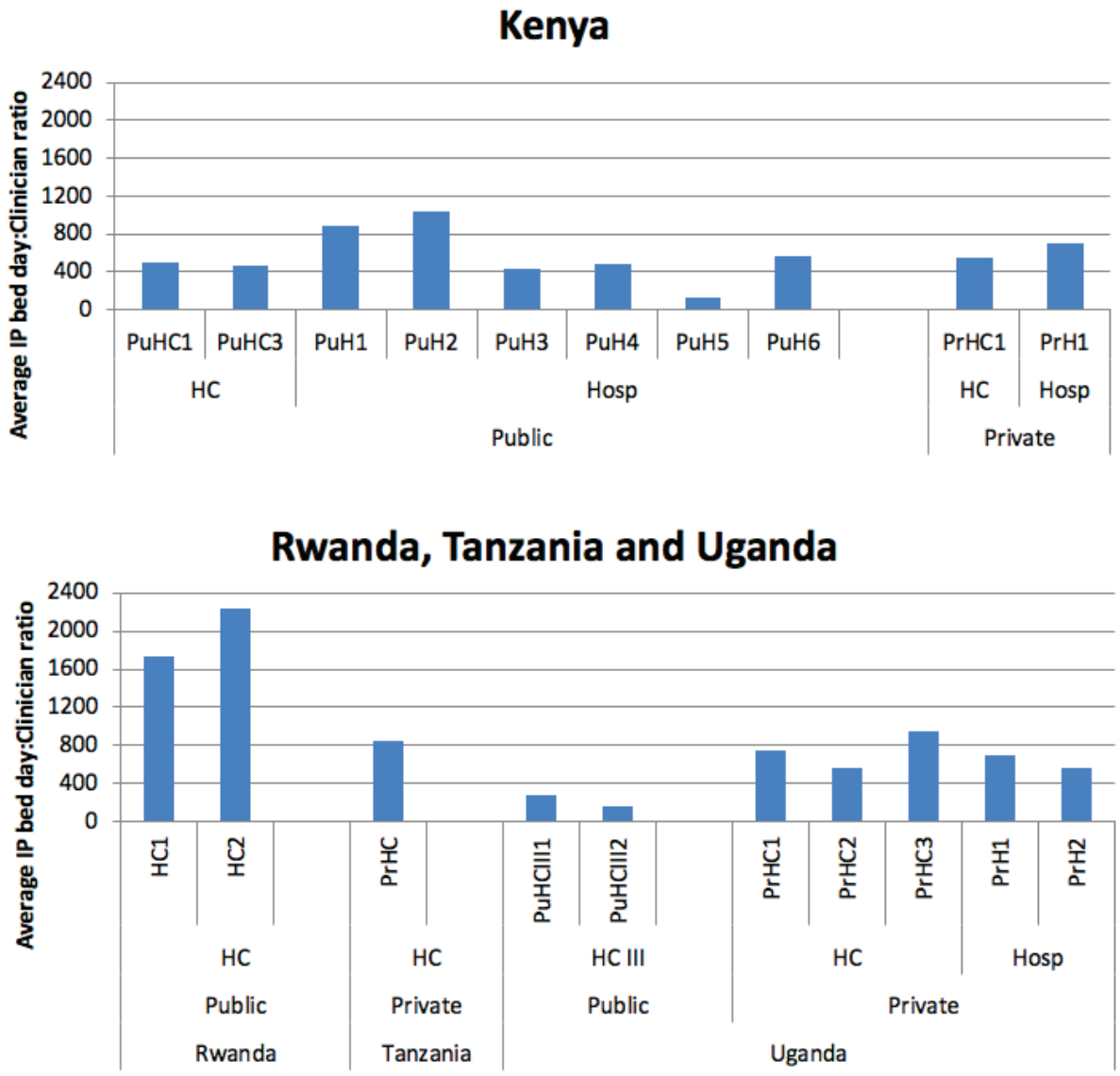
**Table 6. Multi-country comparison of the average cost of an IP bed day in USD and IP bed occupancy**

| Country | Ownership | Level | Facility code | IP bed day cost (USD) | Occupancy |
|---|---|---|---|---|---|
| **Kenya** | Public | HC | PuHC1 | 24.02 | 13% |
| | | | PuHC3 | 60.36 | 8% |
| | | Hosp | PuH1 | 24.10 | 51% |
| | | | PuH2 | 20.37 | 121% |
| | | | PuH3 | 32.37 | 44% |
| | | | PuH4 | 43.19 | 41% |
| | | | PuH5 | 90.88 | 28% |
| | | | PuH6 | 48.49 | 46% |
| | Private | HC | PrHC1 | 49.00 | 18% |
| | | Hosp | PrH1 | 26.57 | 53% |
| **Rwanda** | Public | HC | HC1 | 17.24 | 22% |
| | | | HC2 | 14.64 | 25% |
| **Tanzania** | Private | HC | PrHC | 11.00 | 36% |
| **Uganda** | Public | HC III | PuHCIII1 | 84.66 | 4% |
| | | | PuHCIII2 | 102.88 | 6% |
| | Private | HC | PrHC1 | 12.06 | 56% |
| | | | PrHC2 | 22.15 | 31% |
| | | | PrHC3 | 5.40 | 86% |
| | | Hosp | PrH1 | 14.05 | 16% |
| | | | PrH2 | 10.72 | 21% |

Figure 10 shows that the IP bed day to clinician ratio was between 400 and 800 bed days per clinician for 11 of the 20 facilities offering IP care. Rwandan facilities had the highest IP bed day to clinician ratio which lowered the average IP bed day cost as compared to Kenyan public health centers with similar occupancy but lower IP bed days to clinician ratios.

Facilities with both low occupancy and low IP bed days to clinician ratios had high average IP bed day costs. This is observed in Kenya PuH5 and Uganda public health centers III.

Figure 10. Multi-country comparison of annual IP bed days to clinician ratio




## 3.4. Service-Specific Cost Data

The study team collected data on inputs for delivery of services included in the CB-HIPP Standard Package of services (see Annex C) to generate average costs using the bottom-up approach. None of the facilities offered all of the services in the CB-HIPP Standard Package. In addition, treatment knowledge varied from national treatment protocols. A comparison of clinician knowledge of STIs and first line ART in Kenya and Uganda during this study found that clinicians' knowledge of first line ART was accurate but STI treatment knowledge, particularly of Gonorrhea and Chlamydia, was inaccurate for 80% to 100%of clinicians interviewed (Gatome-Munyua A. 2017). In most instances, the clinicians' knowledge was based on outdated treatment protocols.

The findings presented here are for the most commonly offered services and where clinician knowledge was most accurate. This includes HCT, ART, PMTCT (EMTCT in Uganda), TB, and short and long term FP methods.

### *3.4.1. HIV Counseling and Testing*

Figure 11 shows utilization data for 31 facilities that offered HCT services. The annual number of HCT visits varied widely and were highest Kenya, Rwanda and Uganda, and lowest in Tanzania. Public facilities in Kenya and Uganda had more HCT visits than private facilities.

**Figure 11. Multi-country comparison of annual HCT visits**

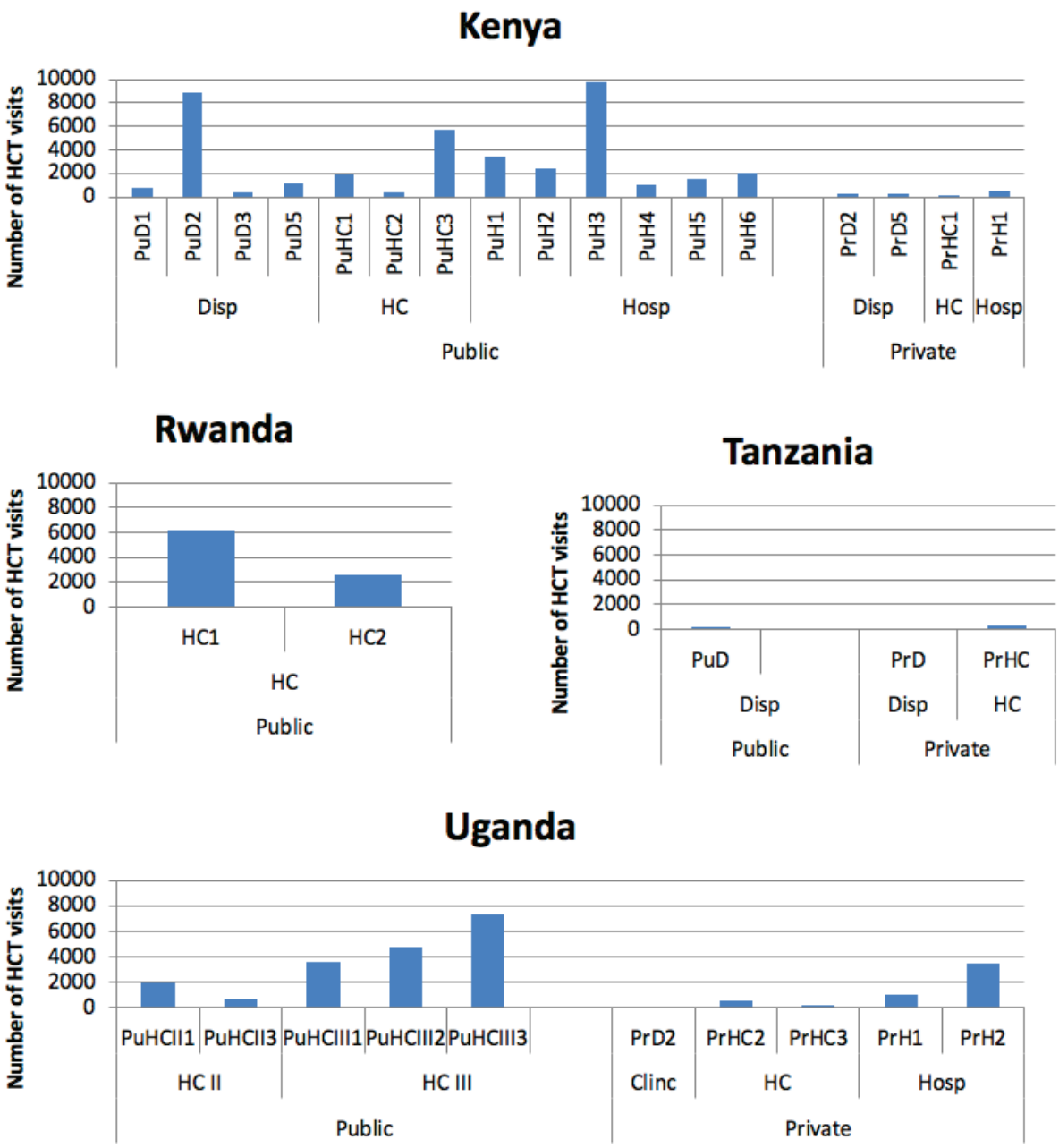
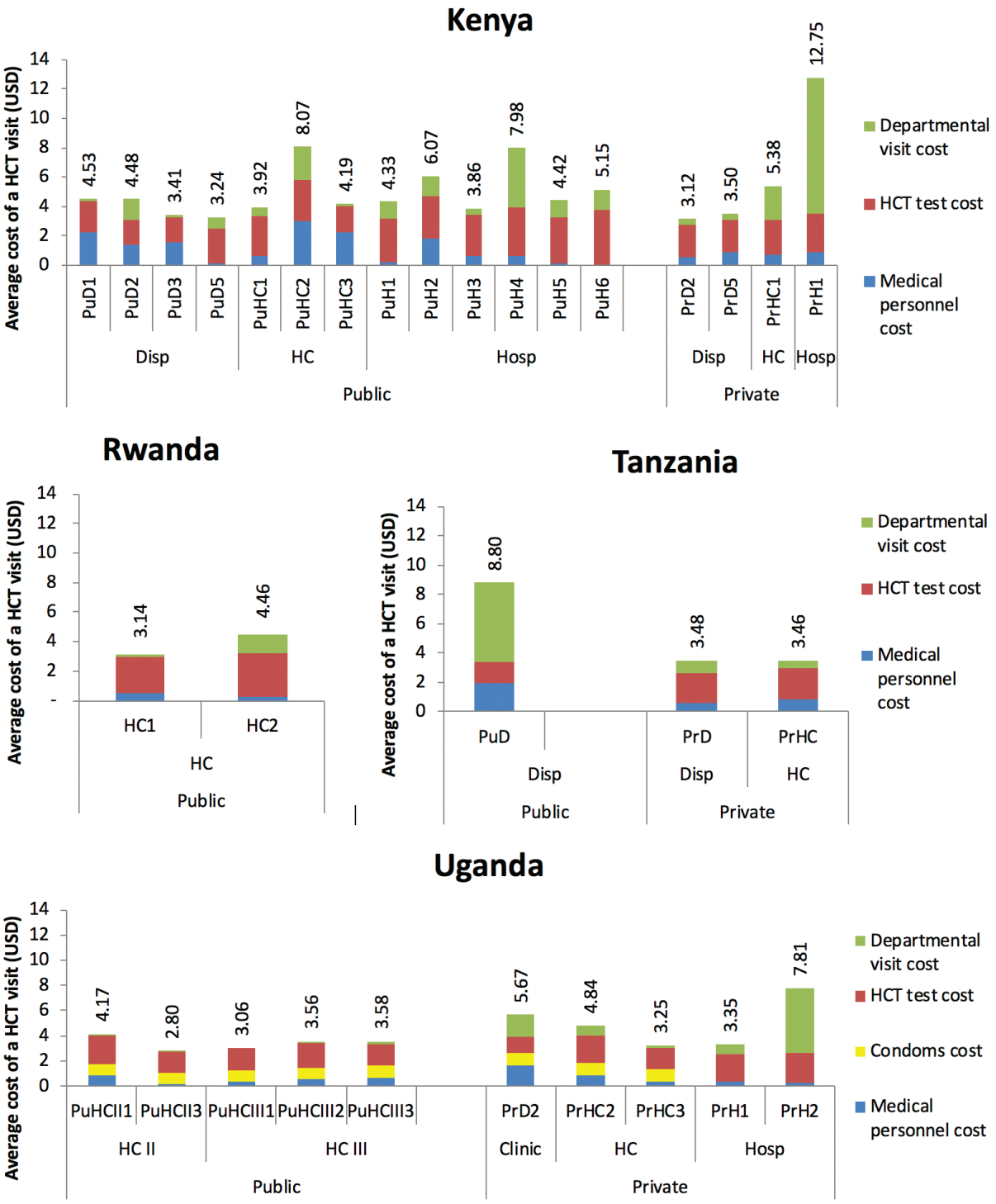


**Figure 12. Multi-country comparison of the average cost of a HCT visit in US Dollars**




Departmental costs, which represent the indirect costs and equipment depreciation costs were higher in low volume facilities, resulting in a higher average HCT visit cost (Figure 12).

The average cost of an HCT visit varied from $2.80 to $12.75 (Figure 12). In facilities with total average HCT costs above $5.00, the key cost driver was the departmental costs. In facilities with an average HCT cost below $5.00, the HCT test kit was the key cost driver. Reducing the cost of HCT test kits can reduce the total cost of the service.

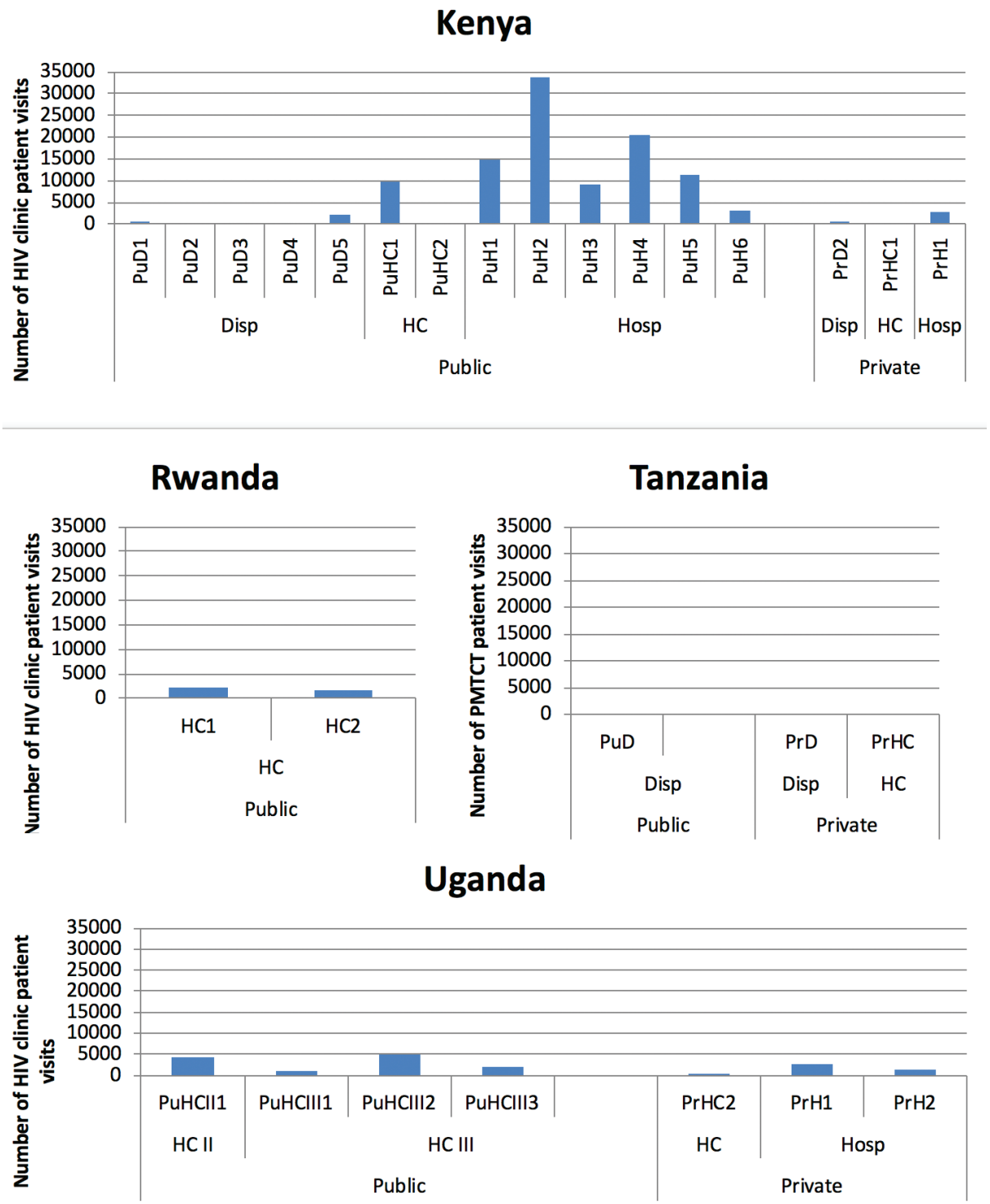
Other than Tanzania, public facilities had lower costs than private facilities. In Kenya and Tanzania, private facilities were able to access HCT test kits from the public sector, while three of the five private facilities in Uganda sourced their test kits from private distributors and retailers. In Uganda, it was common practice to dispense condoms after each HCT visit at all facilities other than the faith-based facilities surveyed. This was not the case in the other three countries. This is represented by the condom cost in Figure 12. However, due to the low cost of medical personnel in Uganda, the additional cost of condoms did not significantly affect the total average cost.

### *3.4.2. Antiretroviral Therapy*

Figure 13 shows the annual number of visits for the 22 HIV clinics surveyed. These include visits for adult and pediatric pre- ART, adult and pediatric ART care and PMTCT or EMTCT. Tanzania utilization data relates only to PMTCT since facilities did not offer pre-ART or ART.

Other than six high volume facilities in Kenya, most facilities offering ART services had less than 5,000 visits. More public than private facilities offered these services. In addition, public facilities in Kenya and Uganda had much higher utilization rates than private facilities. The level of utilization affected departmental costs, with high utilization resulting in low departmental costs, and vice versa. This affected the costs presented in later sections.

**Figure 13. Multi-country comparison of annual HIV clinic visits**



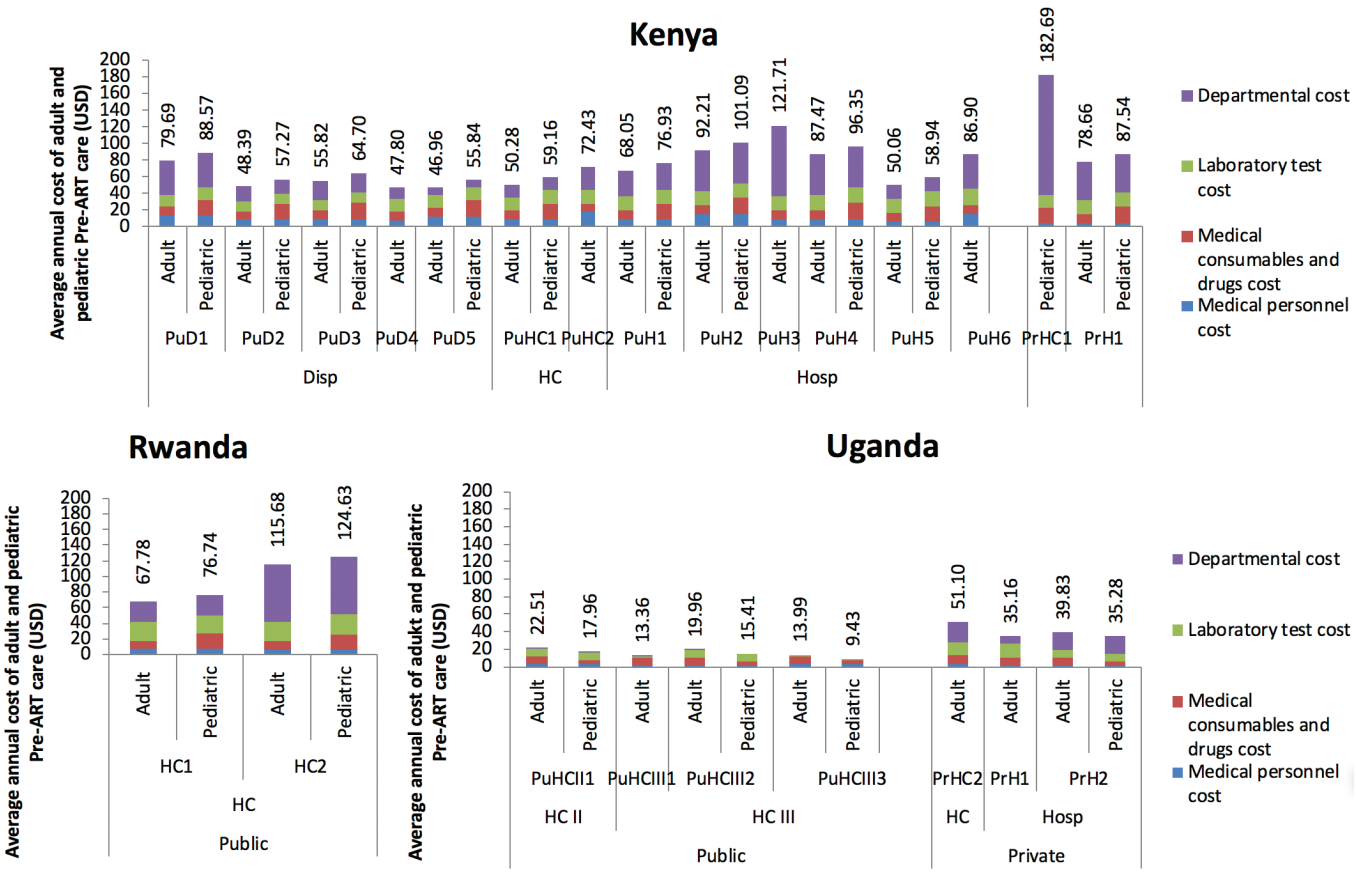
Pre-ART and ART first and second line treatment results presented below are for Kenyan, Rwandan and Ugandan facilities. Adult and pediatric pre-ART and ART first and second line treatment results are presented together. Some facilities offered adult care but not pediatric care, and therefore results are presented only for the services offered. Tanzanian facilities were excluded because none of the facilities surveyed offered pre-ART or ART.

### *3.4.2.1 Adult and pediatric HIV care/pre- ART*

The annual average cost of pre-ART included clinician time, medical supplies used during the visit, cotrimoxazole dispensed for prophylaxis against opportunistic infections (OIs), laboratory tests and the departmental cost allocated to each visit. In Kenya and Rwanda, patients had two hemoglobin and two CD4 counts annually, while patients in Uganda received one hemoglobin and one CD4 count test per year. Note that, PuHCIII1 and PuHCIII3 in Uganda had no laboratory equipment for monitoring HIV patients resulting in low average costs. While patients in Kenya and Rwanda had monthly visits, Ugandan patients visited the facility quarterly, which reduced the medical personnel, consumables and departmental costs allocated to the service over the year.

Annual costs of care ranged widely between countries (Figure 14). Kenya (Adult $91.73; Pediatric $100.69)and Rwanda (Adult $70.46, Pediatric $84.46) had higher average annual costs while Uganda (Adult $27.99; Pediatric $19.51) facilities had lower average annual costs partly due to the lower number of visits per patient and fewer laboratory tests per patient in Uganda.

**Figure 14. Multi-country comparison of the average annual cost of adult and pediatric Pre-ART care in USD**




Furthermore, the low cost of medical personnel in Ugandan public facilities contributed to the low average annual cost. Private facilities in Uganda were more expensive than their public counterparts due to the lower numbers of patients which increased the departmental visit cost allocated. In Rwanda, the departmental costs for the ART department for HC2 was double that of HC1 and HC1 had 1.2 more visits as compared to HC2. This resulted in a departmental cost per visit that was 2.8 times higher in HC1 while other costs were similar.

Pediatric pre-ART care was more expensive in Kenya and Rwanda than adult care. This is because Kenya and Rwanda used more expensive pediatric formulations as compared to Uganda facilities.

### *3.4.2.2 Adult and pediatric first line ART costs*

Table 7 below shows the major inputs used for costing. Different first line treatment regimens were in use due to a change in treatment protocols in 2014 in all three countries. Therefore one treatment protocol was selected, and inputs were standardized across all facilities to allow for comparison. The results presented are for the regimen indicated in Table 7 and do not reflect the method mix of different regimens in use at the facilities. The dosage used for pediatric ART was for 10 to 14 kilograms. In addition to ART, patients were given cotrimoxazole for OI prophylaxis.

**Table 7. Details of inputs included in first line ART costing**

| Country | Adult regimen | Pediatric regimen | Laboratory monitoring |
|---|---|---|---|
| Kenya | Lamivudine, Tenofovir and Efavirenz | Abacavir, Lamivudine and Nevirapine | Hemoglobin(1), viral load (1) |
| Rwanda | Lamivudine, Tenofovir and Efavirenz | Abacavir, Lamivudine and Nevirapine | Hemoglobin (1), CD4 count (1), viral load (1), creatinine (2) |
| Uganda | Lamivudine, Tenofovir and Efavirenz | Abacavir, Lamivudine and Nevirapine | Hemoglobin (1), CD4 count (1) |

Figure 15 shows that the average annual costs of first line ART varied by facility level, ownership and country. Similar to pre-ART care, Ugandan facilities had the lowest average cost partly due to the quarterly visit schedule and the fewer laboratory tests. PuHCIII1 and PuHCIII3 in Uganda did not have laboratory equipment for monitoring HIV patients resulting in lower average costs. In addition, viral load tests in Kenya and Rwanda were analyzed centrally and therefore only specimen collection costs were included in these costs.

Across all countries, the key cost driver was medical consumables and drugs, attributed to the cost of ART. The average proportion of medical consumables and drug costs to total cost of the first line ART treatment was highest in Uganda (adult 90%, pediatric 89%). In Kenya the average proportion of medical consumables and drug costs to total cost was 74%for adult ART and 79%for pediatric ART. In Rwanda, this was 62%for adult ART and 73%for pediatric ART.

Comparing adult and pediatric ART care (Figure 16), pediatric care was more expensive than adult ART care in Kenya and Rwanda. Kenya and Rwanda pediatric care used more expensive formulations compared to Ugandan facilities, which increased the average cost.

**Figure 15. Multi-country comparison of the annual average costs of adult and pediatric first line ART in USD**

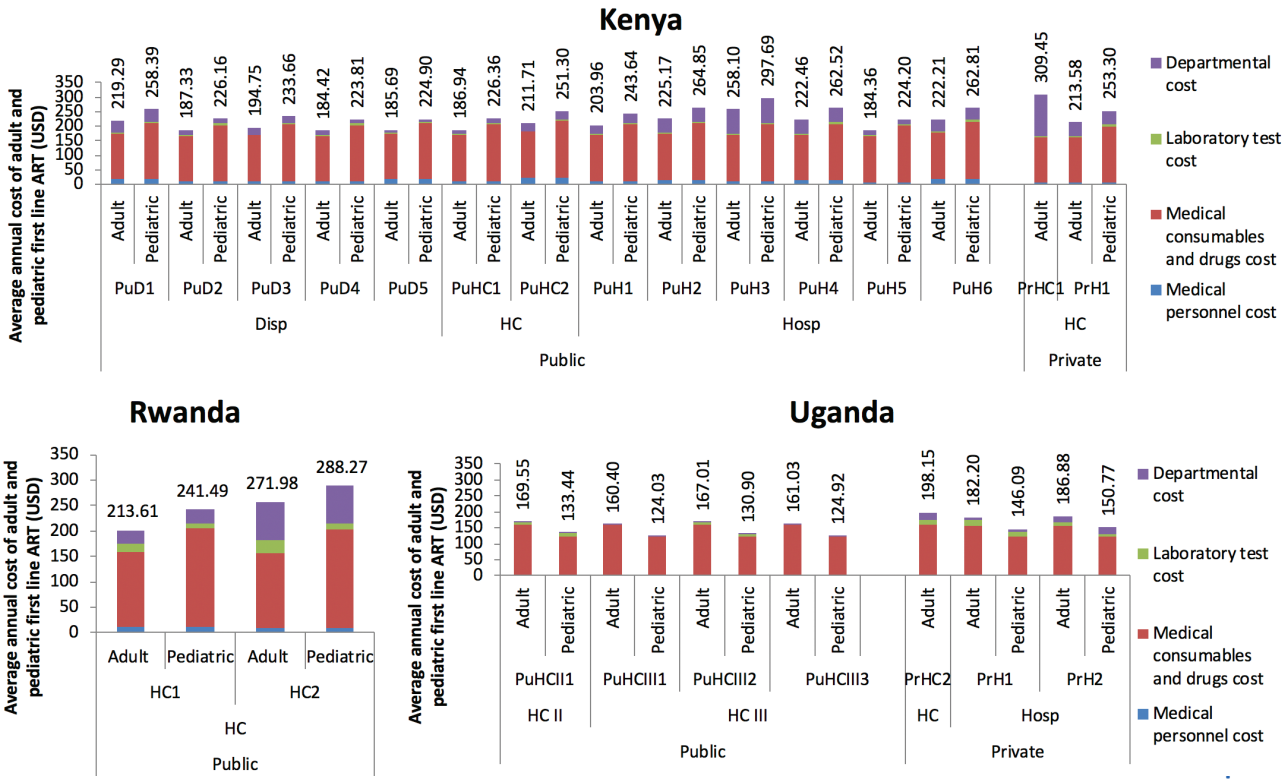
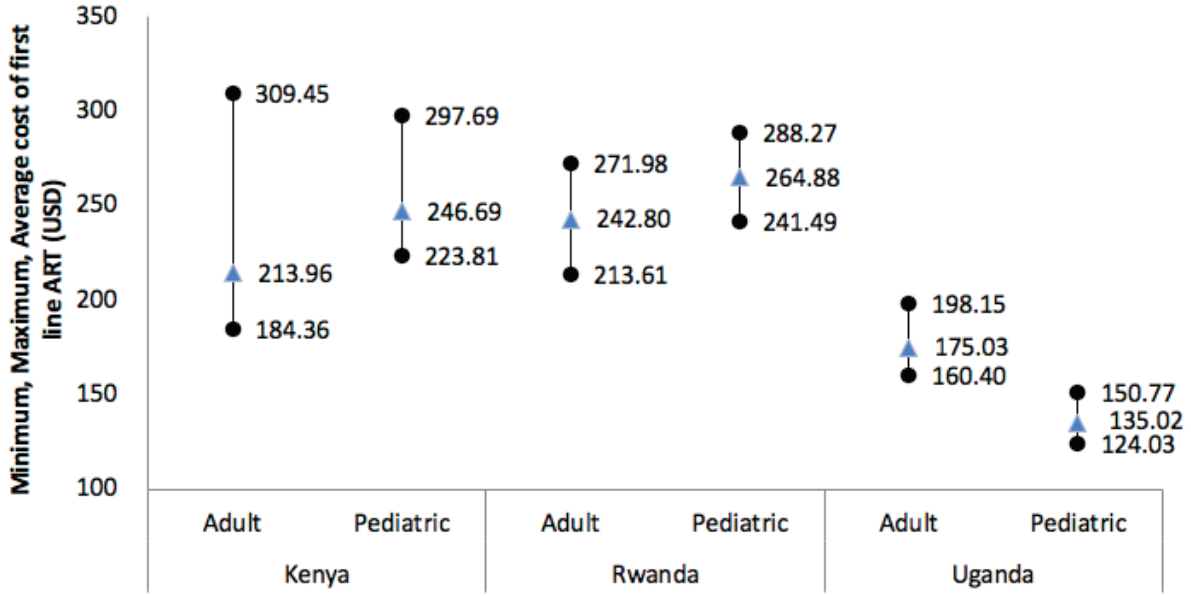


Figure 16. Minimum, maximum and average annual cost of first line ART in US Dollars




### *3.4.2.3 Adult and pediatric second line ART costs*

Table 8 shows the major inputs used for the costing. The dosage used for pediatric ART was for 10 to 14 kilograms. In addition to ART, patients were given cotrimoxazole for OI prophylaxis.

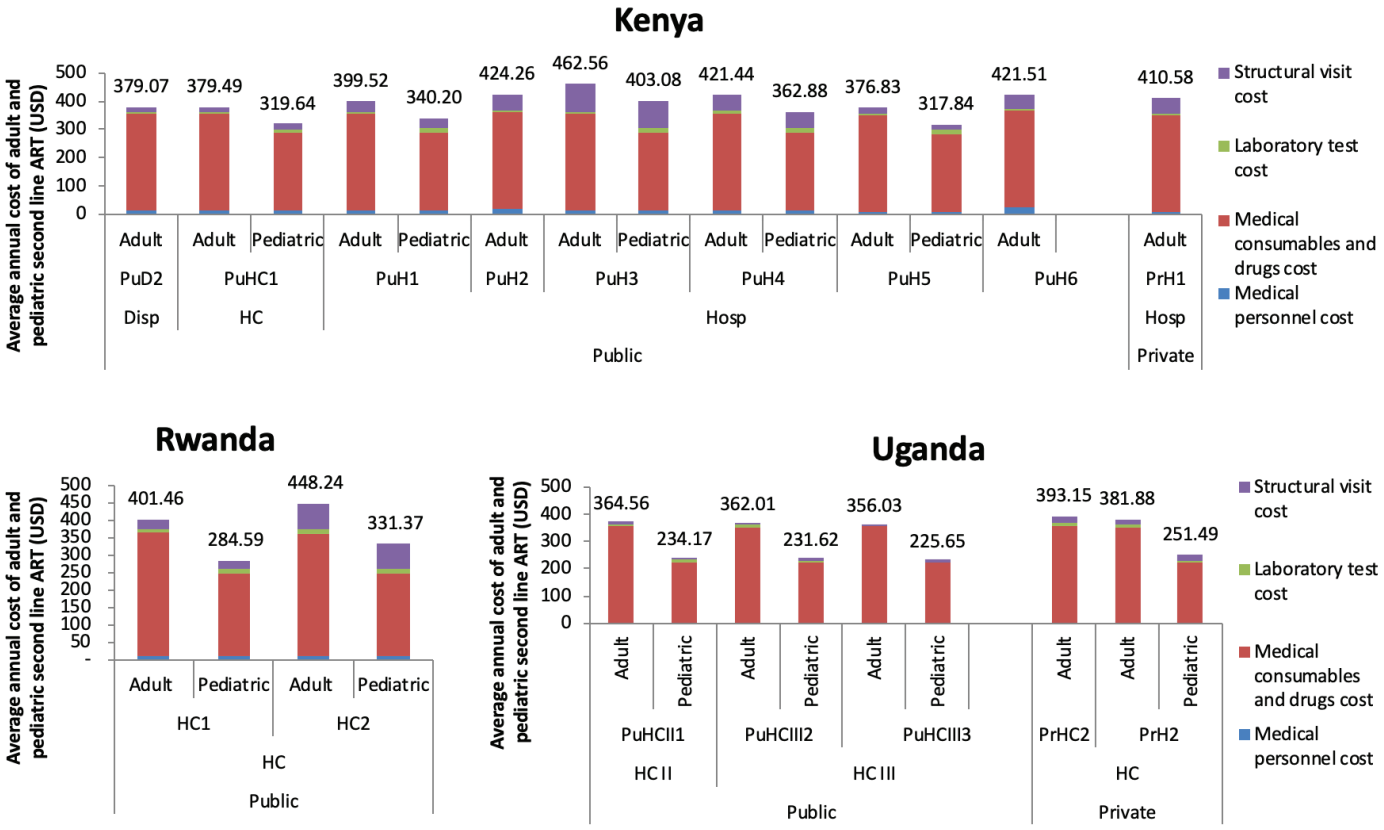
Table 8. Details of inputs included in the second line ART costing

| Country | Adult regimen | Pediatric regimen | Laboratory monitoring |
|---|---|---|---|
| **Kenya** | Zidovudine, Lamivudine, Lopinavir/Ritonavir | Abacavir, Lamivudine, Lopinavir/Ritonavir | Hemoglobin (2), viral load (2) |
| **Rwanda** | Zidovudine, Lamivudine, Atazanavir/Ritonavir | Zidovudine, Lamivudine, Lopinavir/Ritonavir | Hemoglobin (1), CD4 count (1), viral load (1) |
| **Uganda** | Zidovudine, Lamivudine, Atazanavir/Ritonavir | Zidovudine, Lamivudine, Lopinavir/Ritonavir | Hemoglobin (1), CD4 count (1) |

There were different regimens in use for second line treatment due to change in treatment protocols in 2014 in all three countries. Therefore one treatment protocol was selected and inputs were standardized across all facilities to allow for comparison. The results presented are for the regimen indicated in Table 8 and do not reflect the method mix of different regimens in use at the facilities.

Figure 17 shows the second line ART costs across the three countries. The differences were attributable to personnel costs, frequency and type of laboratory monitoring, and frequency of visits. PLHIV received four visits in Uganda and twelve in Kenya and Rwanda. PuHCIII1 and PuHCIII3 in Uganda did not have laboratory equipment for monitoring HIV patients, resulting in lower average costs. In addition, viral load tests in Kenya and Rwanda were analyzed centrally and therefore only specimen collection costs were included here.

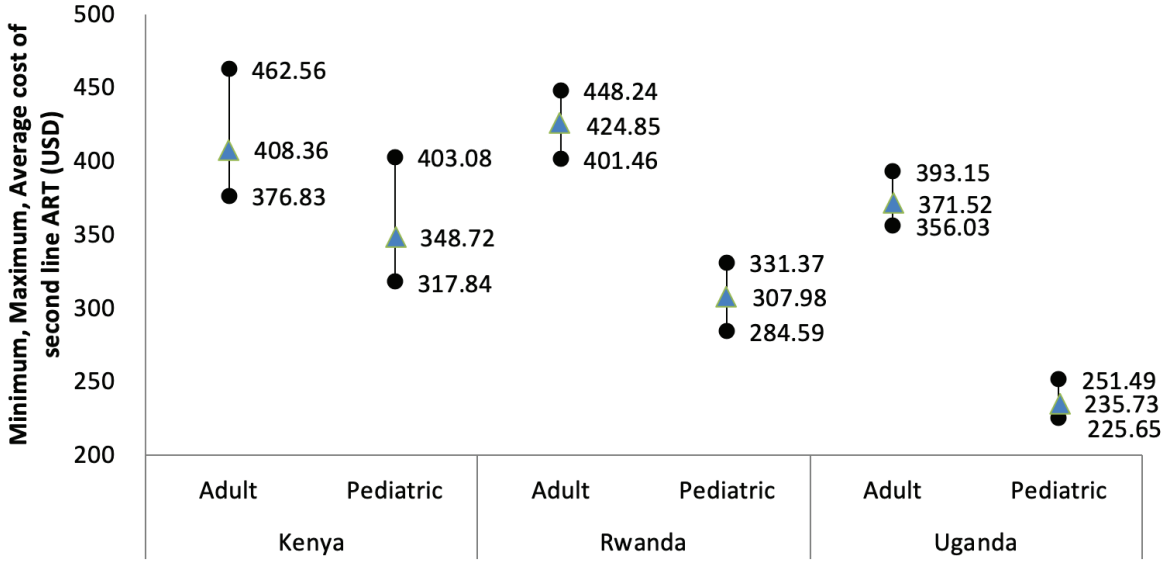
**Figure 17. Cross country comparison of the average annual cost of adult and pediatric second line ART in USD**




The average costs of medical consumables and drugs did not vary widely between the three countries. Across all countries, medical consumables and drugs was the key cost driver, specifically the cost of second line ART. The proportion of medical consumables and drugs to total costs was highest in Uganda (adult 95%, pediatric 94%). The proportion of medical consumables and drugs to total costs were similar in Kenya (adult 84%, pediatric 80%) and Rwanda (adult 83%, pediatric 77%).

Average annual costs were higher for adult ART compared to pediatric ART due to the difference in the cost of the regimen (between $70 and $130) - Figure 18.

**Figure 18. Minimum, maximum and average annual costs of second line ART in US Dollars**



### *3.4.3. PMTCT/EMTCT*

The average cost of antepartum PMTCT/EMTCT was calculated using an estimate of five monthly visits for antenatal care[5]. Table 9 shows the detailed inputs included in each country.

**Table 9. Details of inputs included for antepartum PMTCT costing**

| Country | ART regimen for 5months | Additional inputs | Laboratory monitoring |
|---|---|---|---|
| Kenya | Lamivudine, Tenofovir and Efavirenz | Tetanus toxoid (2 doses), Cotrimoxazole for OI prophylaxis, multivitamins, iron and folate supplements, Mebendazole | Hemoglobin (1), blood grouping (1), syphilis test (1), urinalysis (1), malaria test (1), viral load (1) |
| Rwanda | Lamivudine, Tenofovir and Efavirenz | Tetanus toxoid (2 doses), Cotrimoxazole for OI prophylaxis, multivitamins, iron and folate supplements, Vitamin A | Hemoglobin (1), blood grouping (1), syphilis test (1), urinalysis (1), viral load (1), creatinine (2) |
| Tanzania | Lamivudine, Tenofovir and Efavirenz | Tetanus toxoid (2 doses), Cotrimoxazole for OI prophylaxis, multivitamins, iron and folate supplements | Hemoglobin (1), blood grouping (1), syphilis test (1), viral load (1) |
| Uganda | Lamivudine, Tenofovir and Efavirenz | Tetanus toxoid (2 doses), Cotrimoxazole for OI prophylaxis, multivitamins, iron and folate supplements, Mebendazole, malaria prophylaxis | Hemoglobin (1), blood grouping (1), syphilis test (1), urinalysis (1), malaria test (1), CD4 count (1) |

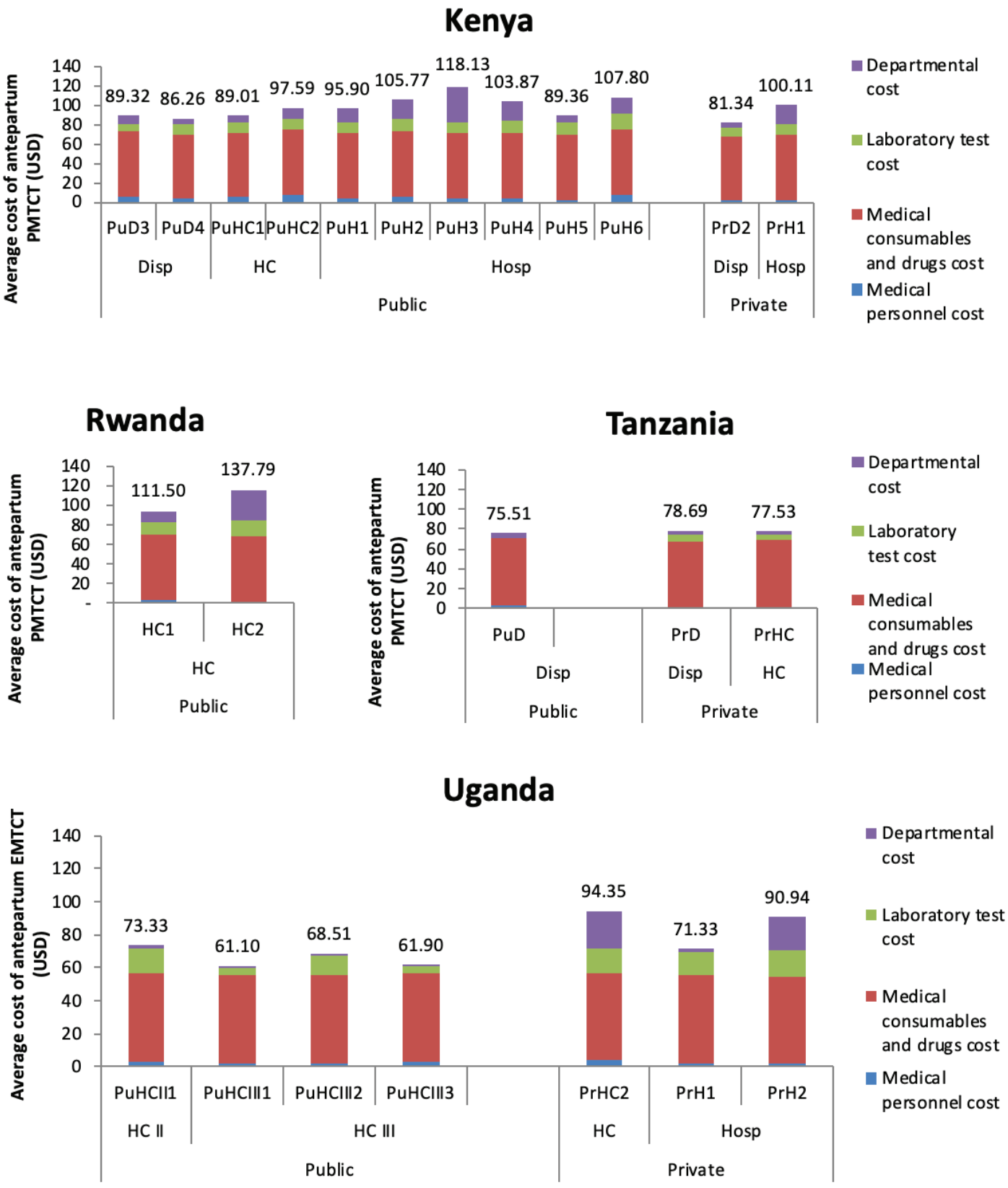
All four countries used Option B+[6] with the same ART combination. The costs of PMTCT/EMTCT were therefore similar across the four countries. The key cost driver for this service was the medical consumables and drugs, driven by ART costs (Figure 19). The proportion of medical consumables and drugs to total costs was highest in Tanzania (87%) compared to the other countries (Kenya 70%, Rwanda 54% and Uganda 74%).

The difference in costs between facilities was attributable to personnel, laboratory monitoring, and number of patients. The higher the number of patients, the lower the departmental costs allocated to PMTCT/EMTCT visits. PuHCIII1 and PuHCIII3 in Uganda did not have laboratory equipment for monitoring HIV patients, resulting in lower average costs, while PuD in Tanzania had no laboratory facilities to conduct HIV monitoring and antenatal care routine tests. In addition, viral load tests in Kenya, Rwanda and Tanzania were analyzed centrally and therefore only specimen collection costs are included.

5 The study assumed a newly diagnosed HIV positive pregnant woman presented in her fourth month of pregnancy, and initiated ART and attended antenatal care monthly for 5 months.

6 All HIV positive pregnant women are initiated on ART regardless of their CD4 count.

Figure 19. Multi-country comparison of the average costs of antepartum PMTCT/EMTCT in USD



### *3.4.4. Tuberculosis*

Figure 20 shows the annual TB treatment visits for 20 facilities offering this service. Eighteen of the 20 facilities had annual TB visits below 500, while two facilities in Kenya had visits above 1,000. This low utilization resulted in high departmental cost allocated per visit in most of the facilities.

**Figure 20. Multi-country comparison of annual TB visits**

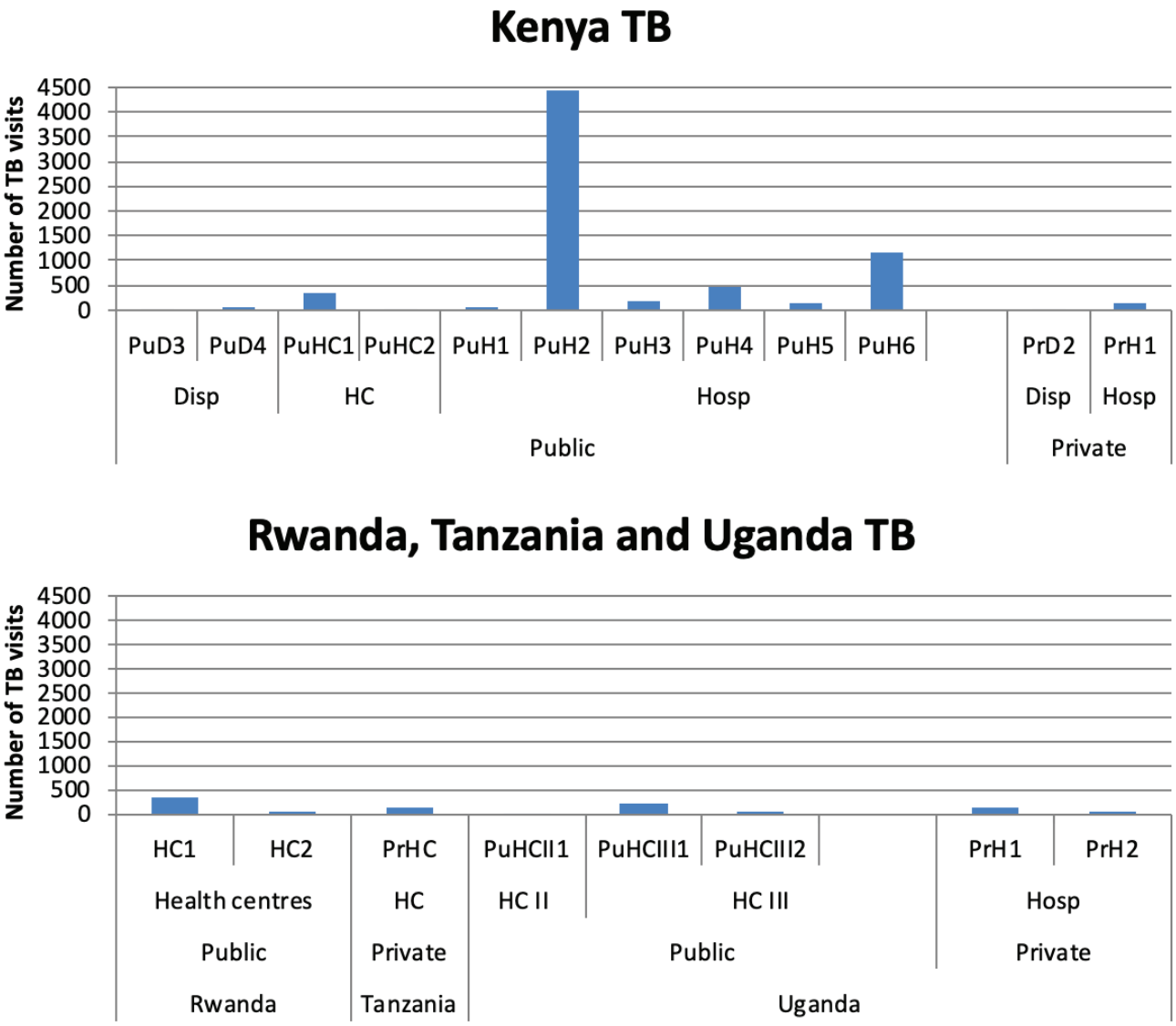
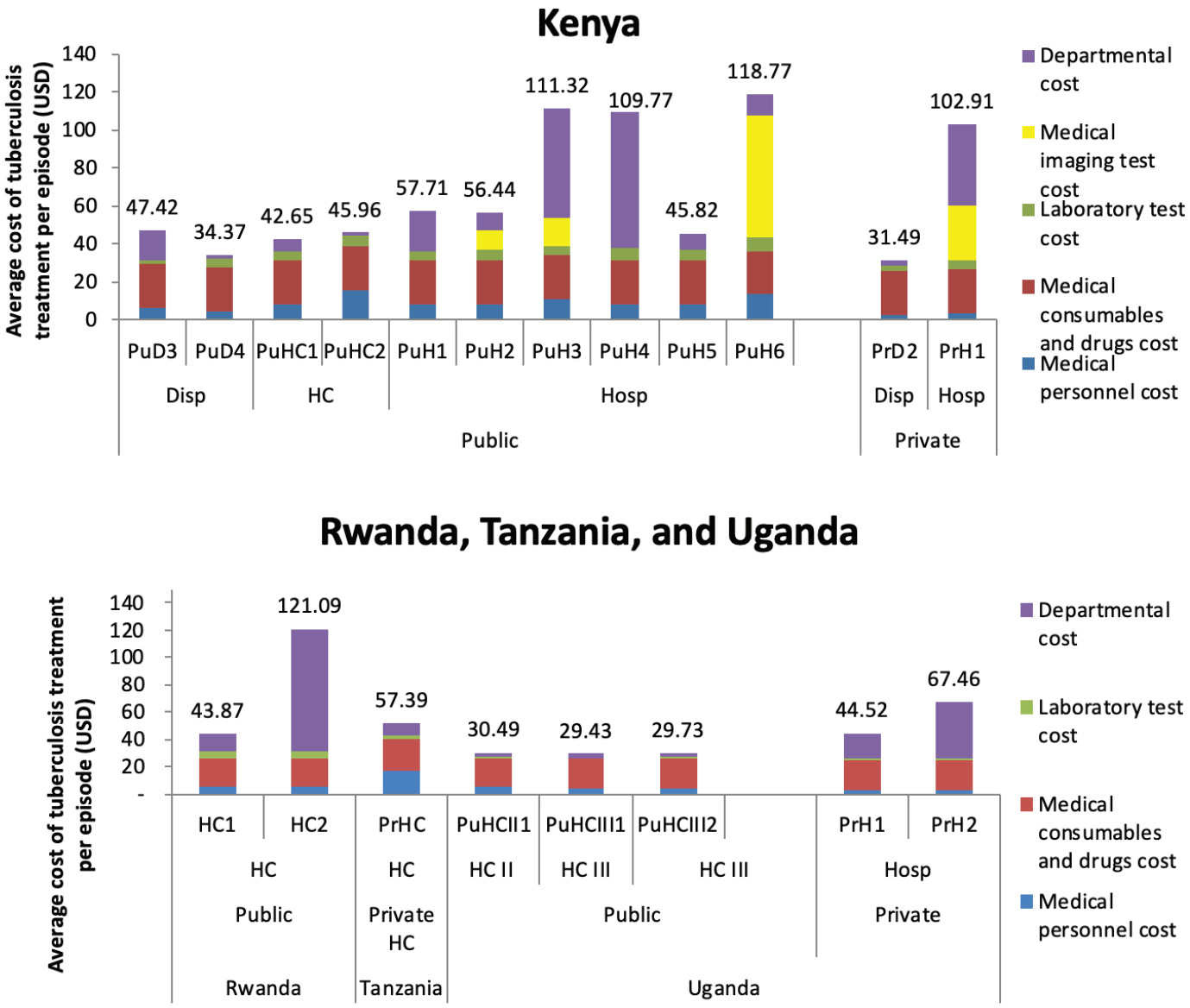



Figure 21 shows the average cost of TB treatment across the four countries. The treatment regimen was the same across all countries with a six month course of treatment. This included a two months intensive phase with a combination of Rifampicin, Isoniazid, Pyrazinamide and Ethambutol, and a four month continuation phase with Rifampicin and Isoniazid. Kenya routinely gave Vitamin B6 during treatment. Laboratory monitoring involved two sputum smears in all four countries, while Kenya PuH2, PuH3, PuH6 and PrH1 also offered a chest x-ray to support diagnosis. This increased their average costs. In Kenya and Uganda, Gene Xpert testing was also offered in a few sites but patients were referred to central testing centers. The cost of Gene Xpert testing is therefore not included in these costs.

The key cost drivers for TB treatment were the medical consumables and drugs and departmental costs. This was higher for facilities with few patient visits. Ugandan public facilities had the lowest average costs, while the highest cost facilities were in Kenya and Rwanda due to high medical imaging costs and/or departmental costs.

Figure 21. Multi-country comparison of the average costs of TB treatment per episode in USD




### *3.4.5. Family Planning*

Figure 22 shows the FP service utilization in the four countries. This was for all methods provided by 36 facilities offering FP services, including barrier and hormonal methods. Ugandan facilities PrD1 and PrHC1 did not maintain FP service data. The most common methods were male condoms, combined oral contraceptives (COC), and injectable contraceptives. Long term methods such as implants, IUDs, bilateral tubal ligations and vasectomies were less than 10%of FP services used for the facilities that had disaggregated data. Public facilities had higher utilization rates than private facilities in Kenya, Tanzania and Uganda.

Figure 22. Multi-country comparison of FP visits (all methods)

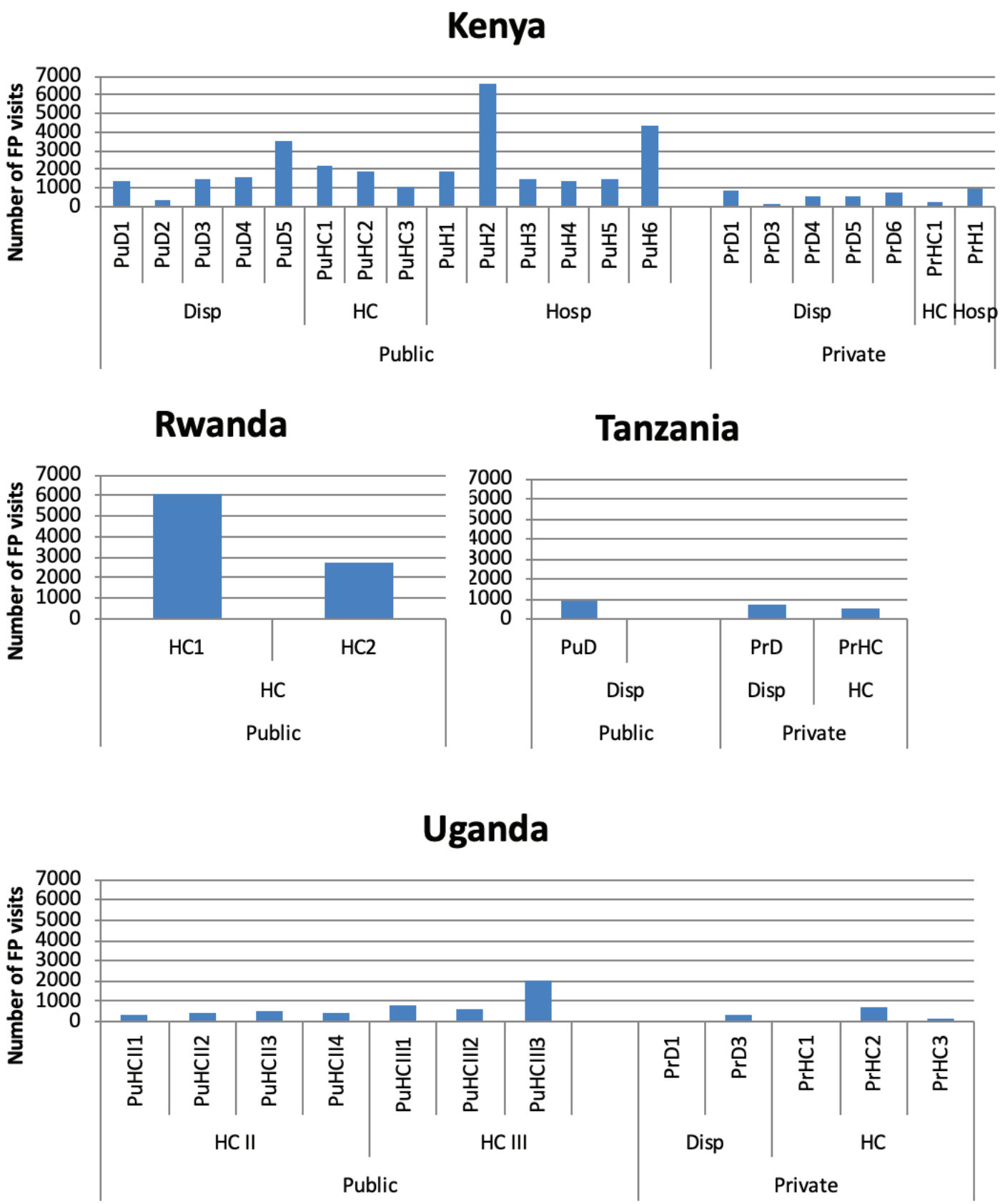



Table 10 provides the average annual costs of FP by four methods - COC, injectable contraceptives, implants and IUD. The costs for COC and injectable contraceptives assumes four visits a year, while the implant and IUD assumes one visit only. With the exception of Tanzanian PuD, facilities in Kenya, Rwanda and Tanzania had a mandatory pregnancy test prior to use of all FP methods. In Uganda, pregnancy tests were only undertaken prior to insertion of IUDs.

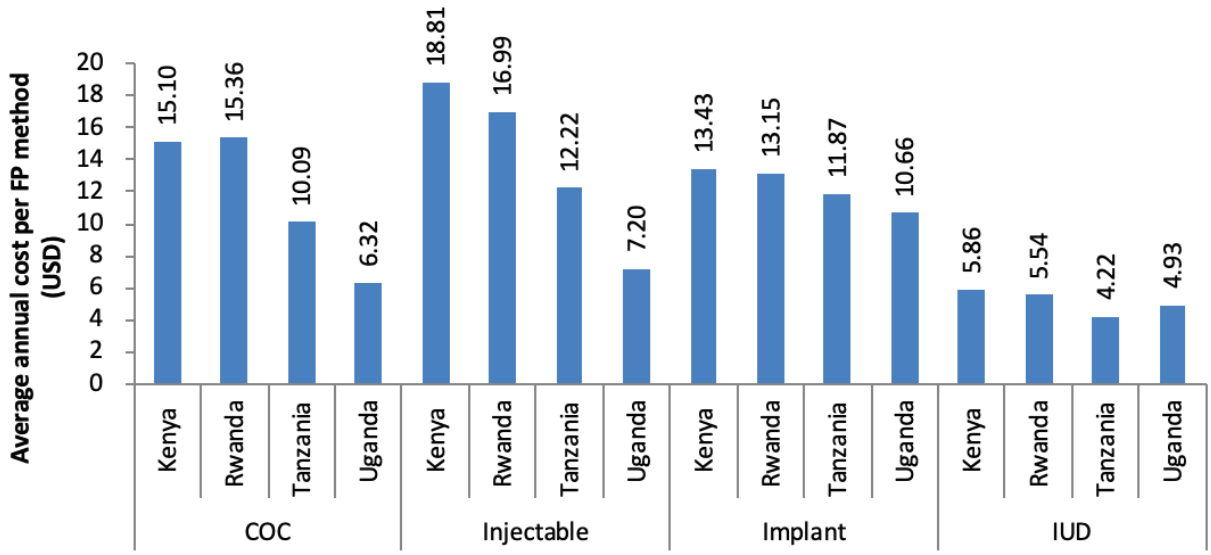
IUD insertion was the least expensive FP method. Costs were lowest in Uganda due to the low cost of personnel and because laboratory tests were not offered as part of this service. Average costs were generally higher for short term methods because of the multiple visits resulting in more medical personnel time and laboratory tests, and a higher departmental cost allocation. For implants, the cost of the implant itself was the key cost driver across all facilities. However, if the costs of long term methods were annualized over the five to ten year period of their utilization, the costs would be much lower than presented here.

**Table 10. Multi-country comparison of the average annual cost of family planning in USD**

| Country | Family planning method | Number of facilities | | Maximum (USD) | Average (USD) |
|---|---|---|---|---|---|
| Kenya | COC (Ethinylestradiol and Levonorgestrel) | 20 | $8.66 | $26.54 | $15.1 |
| | Injectable contraceptive (Medroxyprogestrone) | 21 | $9.70 | $56.04 | $18.81 |
| | Implant (Levonorgestrel) | 19 | $11.11 | $16.90 | $13.43 |
| | IUD (Copper T) | 19 | $3.74 | $9.13 | $5.86 |
| Rwanda | COC (Ethinylestradiol and Levonorgestrel) | 2 | $10.65 | $20.08 | $15.36 |
| | Injectable contraceptive (Medroxyprogestrone) | 2 | $12.28 | $21.71 | $16.99 |
| | Implant (Levonorgestrel) | 2 | $11.93 | $14.36 | $13.15 |
| | IUD (Copper T) | 2 | $4.33 | $6.75 | $5.54 |
| Tanzania | COC (Ethinylestradiol and Levonorgestrel) | 3 | $8.76 | $10.99 | $10.09 |
| | Injectable contraceptive (Medroxyprogestrone) | 3 | $10.77 | $13.45 | $12.22 |
| | Implant (Levonorgestrel) | 3 | $11.43 | $12.24 | $11.87 |
| | IUD (Copper T) | 1 | $4.22 | | $4.22 |
| Uganda | COC (Ethinylestradiol and Levonorgestrel) | 11 | $4.29 | $9.84 | $6.32 |
| | Injectable contraceptive (Medroxyprogestrone) | 11 | $5.30 | $10.85 | $7.2 |
| | Implant (Levonorgestrel) | 4 | $10.03 | $11.40 | $10.66 |
| | IUD (Copper T) | 3 | $4.15 | $5.82 | $4.93 |

The average annual cost of long term methods varied least between countries, and varied most for short term methods (Figure 23). These variances are driven by the four pregnancy tests included for short term methods in Kenya, Rwanda and Tanzania, and high departmental costs in Kenya and Rwanda. In Kenya, seven of the 2I facilities offering injectable contraceptives had average costs above $20 due to higher departmental costs allocated to the service.

**Figure 23. Multi-country comparison of the average cost of FP by method and country in USD**




## 3.5. Cross-Border Comparisons of Average Annual Cost of Adult and Pediatric First Line ART

In this section, cost results are compared for first line ART at each of the five cross-border locations below (Box 3):

Land-based study sites:

1. Busia Kenya/Busia Uganda
2. Malaba Kenya/Tororo Uganda
3. Gatuna Rwanda/Katuna Uganda
4. Taveta Kenya/Holili Tanzania

Water-based study sites:

5. Sio Port and Port Victoria Kenya/Majanji Uganda

First line adult and pediatric ART are used to illustrate the trend that was observed during the cross- border analysis across most services (Figure 24).

***Box 3. Five CB-HIPP Cross-border areas for comparison***

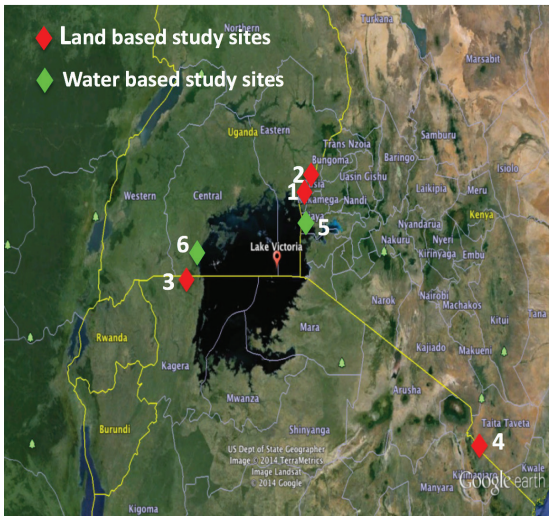
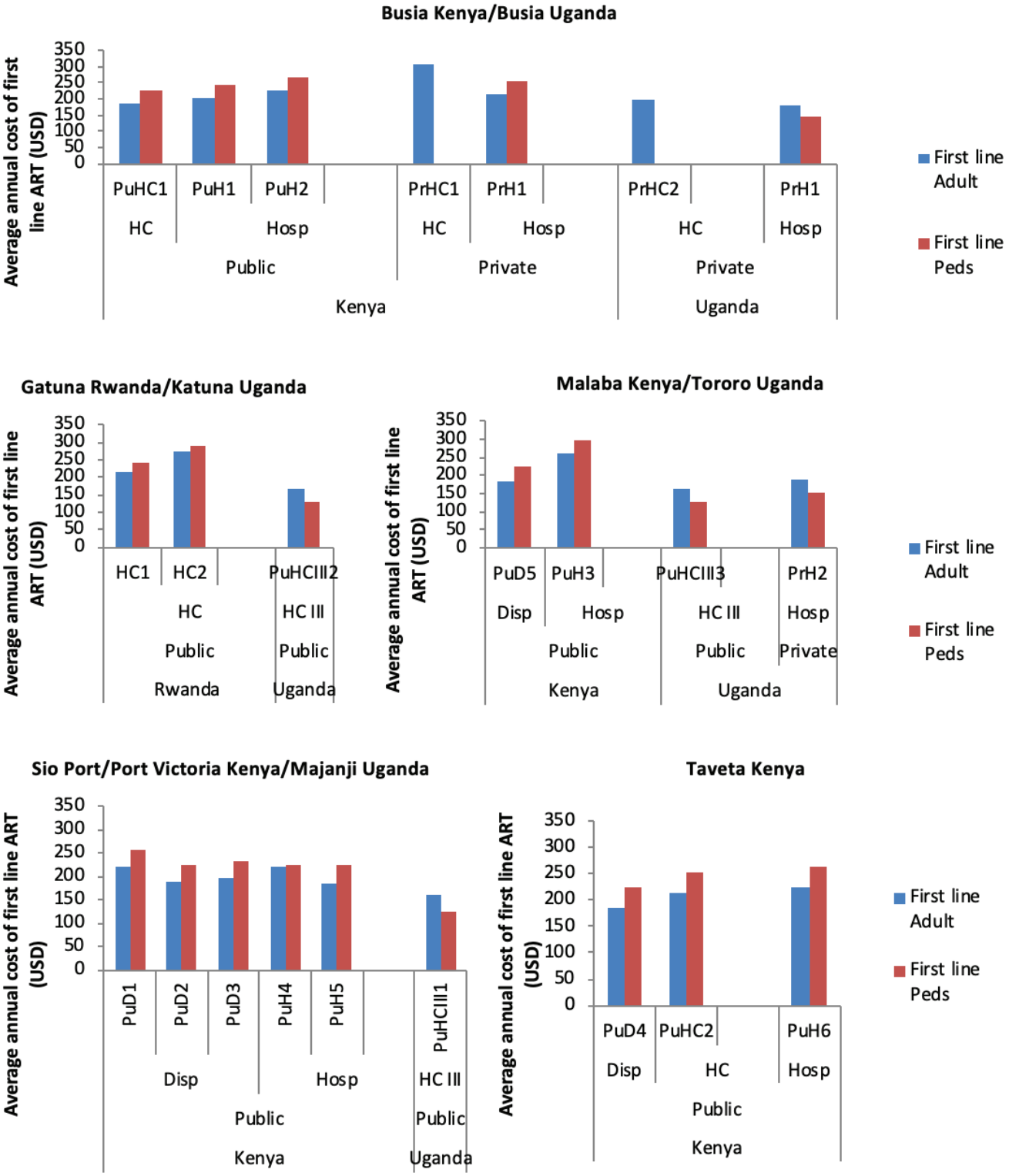


**Figure 24. Cross-border comparison of average annual cost of adult and pediatric first line ART in USD**



The average cost of first line ART was lowest in Ugandan facilities compared to facilities across the border in Kenya and Rwanda. This was due to lower departmental, laboratory monitoring and medical personnel costs in Uganda compared to other countries. In Kenya and Uganda, PPPs have enabled the private sector to offer ART drugs at comparable cost to the public sector and increase access to ART. As noted, the differences between public and private sectors arise from the different medical personnel costs and departmental costs. Access to ART in the private sector has given PLHIV the choice to access ART at their preferred provider. Similar PPPs exist for HIV test kits, second line adult and pediatric ART, PMTCT/EMTCT and TB treatment in Kenya, Tanzania and Uganda.

In Taveta Kenya/Holili Tanzania, only public facilities in Kenya offered first and second line adult and pediatric ART. This may result in PLHIV from Holili travelling long distances inland in Tanzania to access ART, or crossing the border into Kenya to access ART. Similar challenges were observed in Gatuna Rwanda/ Katuna Uganda where long term FP methods were only available in Gatuna Rwanda but not in Katuna Uganda. This presents geographical access barriers due to distance, and additional financial barriers due to increased cost of travel.

### 3.6. Summary of Costing Results

The results presented give insight into the cost of care in cross-border areas. The results may not be generalized to all inland facilities because of the omission of higher level facilities, such as hospitals, as well as different types of ownership.

Despite this, a number of conclusions can be drawn. Cost drivers vary by country, type of facility and ownership of the facility. For example, staff costs were a more significant cost driver in private facilities than public facilities, and staff costs were highest in Kenya and lowest in Uganda. In Uganda and Rwanda, medical consumables and drugs were the key cost driver. Facilities with a higher workload had lower OP visit costs and IP bed day costs.

The main differences in cost were driven by the cost of medical commodities and drugs, as well as the departmental cost. The lower the utilization rate, the higher the departmental cost applied, which resulted in some facilities having very high average costs. Differences in protocols for laboratory monitoring for ART and additional diagnostic procedures such as chest x-rays for TB caused variation in costs between countries. The implication of these variances in average costs between countries and different types of ownership and levels of care is discussed in the next section.

# 4. DISCUSSION

The EAC guidance for a minimum package of HIV other health services along EAC transport corridors recommends a list of services that should be availed to the general population and to key and vulnerable populations. The document recognizes that there are challenges in service delivery due to the number of agencies with inadequate coordination and networking, resulting in poor service quality (EAC 2015). However, there are also concerns of ensuring cross-border access, including who pays for services to non-nationals and the mechanisms for payment.

The objective of this study was to generate comparable average unit costs across the East Africa region. The purpose is to inform the design of new healthcare financing models, and/or improvement of existing models with portable health benefits, including the CB-HIPP Standard Package of services, which are accessible across the region. CB-HIPP will use these costing results and other project generated data, to conduct an actuarial analysis of the feasibility of portable healthcare financing products for cross-border populations. The data also provides relevant information for the discussion of cross-border provider payment and cost drivers that can be leveraged to reduce cost and optimize provider capacity. In addition, the following insights from the study are useful for health facility managers, healthcare planners and national and regional health administrators for better planning and management of financing and delivery of health services.

## What reimbursement can be used to increase productivity, incentivize high quality healthcare and contain costs, and how much do I pay providers?

Policy makers should evaluate current provider reimbursement and review whether it meets goals of incentivizing provision of high quality healthcare, containing costs and maximizing output. If not, policy makers should select reimbursement that is feasible within their context and meets these goals. Currently public providers in the region are commonly reimbursed with salaries and use line-item budgets, while private providers rely on fee-for-service. For public providers, this does not provide incentives to increase productivity or provide high quality services. For private providers, fee-for-service incentivizes supplier-induced demand and does not contain costs.

The choice of reimbursement may differ depending on the type of service, administration capacity and the need for cost containment. Mixed reimbursement models may be required, for example, using fee-for-service for priority services that may be underprovided (e.g., vaccinations), or linking to performance based payments to incentivize staff to increase number of services provided, capitation for OP care, and case-based payment for IP care.

Policy makers need to identify their health system priorities, consider the trade-offs to be made between ease of use, administration costs, and efficiency. If policy makers choose to significantly alter their reimbursement, for example, to transition from input based financing to output based reimbursement, these average costs provide a basis for negotiation with public and private providers on the amount paid for each unit of service, case or per person. As cost results from this study show, there is variation between levels of care and between public and private providers, and therefore one size will not fit all. It is necessary to consider the relative variations in pricing to set reimbursement rates and ensure the provider is compensated at a level that meets their costs, and in the case of private providers, makes a reasonable surplus or profit.

## What are the cost drivers for healthcare services and what do they imply for improvement of technical and allocative efficiency?

Understanding the elements that increase average costs in healthcare and how they impact on average costs can empower managers in maximizing the service delivery levels and identifying areas for cost control. Cost drivers varied across the four countries. Staff costs were most significant in Kenyan facilities, while medical consumables and drugs costs were most significant in public Ugandan facilities. Rwandan and Tanzanian facilities demonstrated a balance between the two. Private facilities had higher indirect costs than public facilities, while hospitals had higher indirect costs than health centers and dispensaries.

For public county or regional health teams, knowing the cost drivers can improve budgeting and planning decisions for different levels of health facilities. This ensures that each facility has the right number of health workers, avoiding over- and under-staffing. This also ensures the right volume of medical commodities and supplies for their catchments, reducing waste and stock-outs. For the private sector, it supports decisions on pricing of health services, identifying opportunities for revenue maximization and for growth in service provision.

Technical efficiency refers to maximizing the output from a defined set of inputs. In healthcare, we aim to achieve the highest improvement in outcome from a set of resource outputs. Using number of health services as an intermediate output and comparing similar levels of facilities that have the same inputs, health managers can identify facilities producing higher number of services with the inputs they have and make comparisons between facilities. From this study, primary level facilities had varying numbers of OP visits that affected their average costs. This resulted in wide differences, from as low as $1.34 in public primary care facilities to as high as $23.70 in private primary facilities in Kenya. Similar trends were observed in Uganda. The OP visit to clinician ratio was lower at private facilities. There is capacity to increase the number of visits at current staffing levels, thereby maximizing output and reducing the average cost. The analysis of technical efficiency can inform decisions on how to improve or optimize health service delivery in low output areas. In addition, health managers need to check on the quality of services being provided. Although the technical efficiency may be high, it can compromise quality due to overworked clinicians, reduced staff morale and lack of adequate medical commodities, supplies and drugs.

Allocative efficiency refers to the distribution of inputs to maximize community health outcomes and achieve Pareto efficiency - where no member of the community can be made better off without another becoming worse off. In this case, allocative efficiency is attained when the right mix of interventions maximizes the health of the community. This supports equitable distribution of healthcare services, where people are able to access healthcare according to need. Health managers should use their demographic and epidemiologic data to identify the health needs of their populations, and use cost data to allocate their resources to achieve the right mix of interventions. This can inform decisions on allocating more staff, medical commodities and supplies to facilities with a higher workload and reducing resources from facilities that do not require them, to avoid waste and over-staffing. For example, in Uganda, though the OP visits were comparable between the facility types health center II and III, the OP visit to clinician ratio was double in some cases. This shows that clinicians at health center II facilities have a higher workload. Health managers can review the distribution of staff and also review the commodities going to the health center to ensure staffing and commodities reflect workload and not facility size. In addition to this, managers need to take into account the quality of services being delivered, case-mix, size of the catchment, and population need. For example a facility in a rural area may be delivering fewer services because of a smaller catchment area compared to a similar level of facility in a populous urban area.

### How can domestic resources be mobilized to ensure sustainable delivery of priority services?

The majority of the CB-HIPP Standard Package of services (ART, FP, HCT, PMTCT/EMTCT and TB treatment), are currently funded through vertical programs and are heavily subsidized for patients. With increasing uncertainty about donor funding, EAC governments will be forced to look inward to support many of these vertical programs. A high level policy dialogue in 2016 among EAC health and finance ministers on achieving sustainable financing for UHC recognized the need for raising domestic resources to meet funding gaps, improving efficiency in the use of resources, and using innovative healthcare financing models to ensure sustainable access (EAC 2016).

Currently, public sources of health financing are low (15% to 34%). However, other than Burundi and South Sudan, the GDP of EAC partner states grew at 5% and above in 2015, and are projected to maintain this trajectory. As fiscal space expands with improved revenue collection, partner states should prioritize the health sector and increase the public contribution to healthcare. The high private expenditure (28% to 40%), which largely comes from OOP expenses, should be channeled to public and private pre-payment mechanisms. This would reduce the risk of clients forgoing health care if they lack the money to pay at the point of need. In addition, existing pre-payment schemes should be encouraged to provide priority services as part of their benefit packages. This will enhance access to their members and allow limited public sources to be better targeted and prioritized for those who cannot afford to pay.

This study provides costs of vertically funded healthcare services, such as ART, FP, HCT, PMTCT/EMTCT, and TB treatment, and insight into the cost drivers across countries and different levels of facilities. These service specific cost results can support the design of benefit packages to improve existing models and support purchasing decisions. The results can also inform the design of provider payment systems that account for differences in costs across countries, ownership and levels, and ensure sustainable provider reimbursement.

## How can we reduce financial and geographical access barriers to healthcare?

The CB-HIPP Standard Package of services was not offered in all health facilities in each cross-border area. This raises the concern about the availability of these services for those who need them. In addition, for some services, there is unequal distribution. For example, at Taveta Kenya/Holili Tanzania, ART was only available at the Taveta Kenya public facilities meaning that patients from Holili were required to travel long distances inland to access treatment.

Geographical access barriers to these services for the residents in these cross-border areas can delay access to treatment, and increase financial barriers due to the non-medical costs for transport and lost time away from work reducing wages. To address this, there is need for clinician training at both sides of border areas, as well as the supply of equipment, medical supplies and commodities to facilitate access to the CB-HIPP Standard Package of services.

Portable pre-paid health benefits across countries will allow citizens to access care on any side of the border. This reduces financial barriers of having to pay OOP at the point of need and reduces the need to travel long distances from home to access services that are available across the border.

## Can PPPs enhance access to priority services?

A mapping study of health facilities along major transport corridors and cross-border areas in East Africa revealed that 65% of facilities were non-state[7] (Burundi 39%, Kenya 88%, Rwanda 12%, Tanzania 25%and Uganda 86%) (EAC 2015). Therefore, non-state facilities are important partners to expand access to priority services and avoid duplication in service delivery. The study observed supply of program drugs and supplies for HCT, ART, FP and TB treatment to non-state facilities through formal and informal PPP arrangements in Kenya, Tanzania and Uganda. In these instances, there was an agreement for the private providers either to not charge user fees or to charge a subsidized fee. This facilitated access to services, allowed patients to choose their preferred provider, and reduced distances to the nearest facility.

Contracting non-state facilities provides a viable option to increase health care access. Costs of healthcare services were generally higher at private facilities. Other than in-kind subsidies received through program drugs and supplies, subsidies from seconded medical staff were only observed in faith-based facilities in Kenya and Uganda. The majority of non-state facilities must generate sufficient revenue to meet all their direct and indirect costs. In addition, reimbursement rates would need to take into account the variation in costs by level and ownership of facilities. Furthermore, consideration needs to be given to the efficiency of these facilities. For example, some high average costs were due to the low volume of services at these facilities - therefore costs should be benchmarked with peers and reviewed frequently to avoid over and under-payment.

## How can provider knowledge of treatment protocols be improved?

To allow for multi-country access of healthcare, providers must have the right knowledge and skills to provide high quality health services. During the study, the team discovered that clinicians' knowledge was based on outdated treatment protocols for some services. In addition, for some services such as first and second line ART, the regimen was different across countries.

This exposed the need for further post-service training to improve provider knowledge, improve quality of care and reduce waste due to inappropriate treatment or irrational prescription. In addition, clinicians need support with information on different treatment protocols to ensure accurate treatment of mobile citizens requiring long-term care. This could be through the use of paper-based, mobile and electronic tools and job aides. Accurate treatment can reduce the need for re-treatment or treatment of complications, which is more expensive in the long run.

7 Non-state facilities include those owned by private-for-profit, private not-for-profit, faith based and non-government organizations.

# 5. CONCLUSION

The EAC partner states have committed to achieving global health goals including the SDGs, "Every woman, Every Child" goals, and the UNAIDS 90-90-90 targets. The Every Woman, Every Child movement seeks to expand access to high quality reproductive health services, while UNAIDS 90-90-90 targets to expand HCT, ART and achieve viral suppression. To achieve SDG 3.8 on UHC, countries need to increase financial risk protection while expanding access to essential quality services and availability of safe medicines and vaccines. Further, there is an emphasis on essential services for the general population, including the most disadvantaged groups. This puts priority on high impact interventions including FP, maternal, newborn and child health services, and major infectious diseases such as HIV, TB and malaria.

Achieving these global commitments will require more efficient use of existing resources to achieve better health outcomes and reduce waste, while raising resources from innovative sources. The reality is that external sources are flat-lining or declining. In addition, as the EAC partner states' economies grow and they become classified as middle-income, they are expected to finance their social programs and can expect less external resources for health. The partner states need to start planning ahead for this eventuality. There are additional considerations due to the challenges presented by cross-border mobility, including disease and epidemic control for HIV and TB, as well as new threats seen in other parts of the world. Recent lessons on Ebola from West Africa show how easily and quickly a health threat spreads from country to country if health systems are weak, disease surveillance is poor and responses are slow.

Availability of services on one side of the border can draw in citizens from neighboring countries to avoid travelling long distances and/or because they perceive the quality to be better. In these instances, who pays and how much becomes an issue of concern. In addition, existing public and private insurers are considering expanding access to health benefits beyond a country's borders, requiring information on cost of care to provide portable health benefits.

These results provide relevant data as a first step towards initiating policy dialogue on expanding UHC across the EAC region. As shown here, differences in country health systems, such as staffing distribution, wages, and procurement of medical commodities, results in differences in costs; cost drivers vary by country and type of facility, which impacts on the design of portable products and reimbursement models used.

From this study, the following recommendations are made for EAC partner states:

### Design reimbursement mechanisms that take into account differences in facility cost structure.

Policy makers should evaluate current provider reimbursement and review if they are meeting the goals of incentivizing provision of high quality healthcare, containing cost and maximizing output. If not, policy makers should select reimbursement that is feasible to their context. Policy makers need to identify the priorities for their health system, consider the trade-offs to be made in the selected reimbursement between ease of use, associated administration costs, and efficiency. If policy makers choose to significantly alter their reimbursement, for example, to transition from input based financing to output based reimbursement that is set prospectively, then a first step is developing a roadmap for the transition. This roadmap should also identify other areas of the health system that need to be strengthened in tandem. For example, for centralized systems in the EAC partner states, they can begin by increasing autonomy to local health teams and facility administrators and hold them accountable for the outputs that must be delivered at their level. As they evolve to output based financing, setting the reimbursement rate should consider the average cost of services, which will provide a basis for negotiation with public and private providers on the actual amount paid for each unit of service.

### Leverage PPPs to expand access to services.

For partner states that lack PPPs, an initial step for national and regional health teams is to identify non-state actor numbers, geographical coverage, and services offered, and identify the areas of comparative advantage that would justify further engagement. This can be done through a mapping study of non-state actors. Subsequent to this, the public sector can initiate dialogue with the private sector and set-up a consultative forum for the public and private sector. In addition, the public sector should establish a PPP policy that defines the framework for engagement with the private sector. An enabling framework and dialogue are the foundations for setting up successful, mutually beneficial partnerships.

Where PPP arrangements already exist, the public sector can expand the scope of commodities that are channeled through private facilities to allow more services to be accessible at affordable rates from private facilities. In addition, the public sector can contract private providers for priority services and/or services that they can achieve benefits of economies of scale and reduce the need for duplication by the public sector. This includes laboratory and imaging diagnostic services.

### Design portable pre-paid healthcare financing products that can reduce financial and geographical access barriers to healthcare.

Cost data can be used in an actuarial analysis to determine the additional premium required to offer healthcare across the border. The additional benefit can be planned as a reimbursement to beneficiaries for services received, or a direct payment can be made to providers across the border. In addition, the benefit can be designed for all beneficiaries and the additional premium paid by all, with opt-in for those who require it to pay extra, or opt-out where everyone gets the benefit and pays for it unless they select not to participate. When a viable product has been designed, or the existing one improved, this can be piloted at a cross-border area and lessons used to refine and improve the product and its administration. If the pilot is successful, there will be need for investments in educating the public about the benefit. Distribution channels or sales agents will need to be well trained to explain to potential clients the benefits of the additional premium.
On the supply side, health facilities will need to be recruited and accredited to provide services. Contracting health facilities should include reimbursement amount, services offered, monitoring and mechanisms for conflict resolution. Health facilities will need training on beneficiary identification, benefit package and claims procedures if any. After roll out, continuous monitoring and evaluation is needed to identify areas for improvement, need for re-pricing of premiums and review of provider payment.

## ANNEX A: DEFINITION OF LEVELS OF CARE

The Ministries of Health categorize health functions into distinct levels of care. Each level is assigned staffing norms, expected services, and population of coverage. For the purpose of this study, we use the distinctions in Table A.11 to classify all the facilities into three main levels of care. Sub-County Hospitals and County Referral Hospitals are merged into the hospitals category.

**Table A.11 Levels of care**

| Level | Service delivery | Staffing |
|---|---|---|
| **Dispensary/ Clinic/ Health Post/ Health Center II** | Acts as the interface between the community and the formal health system.<br>Provides basic health services.<br>A facility at this level is not expected to offer laboratory diagnostic services but may be able to carry out simple diagnostic tests with rapid diagnostic tests. | Nurses<br>Community health workers |
| **Health center/ Health center III** | Provides basic health services, as well as<br>minor OP surgical surgeries<br>Limited emergency IP care<br>Limited oral health services<br>Maternity care for normal deliveries<br>Specific routine laboratory tests | Nursing staff<br>Clinical officers<br>Laboratory technicians/ technologists<br>Pharmaceutical technicians/ technologists<br>Community oral health officers |
| **Hospital/ Sub-County Hospital** | Provides appropriate curative care and constitutes the principal referral level from dispensaries and health centers.<br>Offers all the above services as well as:<br>• Broader OP and IP care<br>• Emergency obstetric care<br>• Oral health services<br>• Specialized laboratory and radiology services | Above staff, and:<br>Medical officers<br>Clinical officers (general and specialized)<br>Radiographer/ Radio-sonographer<br>Pharmacist<br>Dentist<br>Dental technologist |
| **County Referral Hospitals** | This level introduces a broader spectrum of specialized referral curative services, including intensive care and high dependency care.<br>Includes training facilities for cadres of health workers who function at the primary care level (nursing staff and clinical officers), serving as internship centers for all staff up to medical officers. | Above staff, and:<br>Medical specialists (physician, obstetrics and gynecology, surgeon, pediatrician)<br>Rehabilitative specialists (physiotherapist, occupational therapist, orthopedic technologist, social workers)<br>Nursing staff (intensive care units) |

## ANNEX B: SAMPLING FRAME

**Table B.12. Facilities surveyed by ownership**

| Country | Cross-border Site | Public Facilities | Private Facilities |
|---|---|---|---|
| **Kenya** | Busia | Busia County Referral Hospital<br>Alupe Sub-County Hospital<br>Matayos Health Center<br>Busia Trailer Park Dispensary | Tanaka Nursing Home<br>Pesi Medical Center<br>Equator Medical Clinic<br>Mubweka's Clinic<br>Your Family Clinic |
| | Malaba | Kocholya Sub-County Hospital<br>Malaba Dispensary | Apex Medical Center<br>FAO Hospital |
| | Port Victoria/Sio Port | Sio Port Sub County Hospital<br>Port Victoria Sub-County Hospital<br>Rukala Health Center<br>Agenga Dispensary<br>Budalangi Dispensary<br>Busembe Dispensary | |
| | Taveta | Taveta Sub-County Hospital<br>Ndilindau Health Center<br>Kitobo Dispensary | Divine Mercy Eldoro Dispensary<br>Meditech Clinic<br>Ndongo Purple Clinic |
| **Uganda** | Busia | Sikuda Health Center II | Dabani Hospital<br>Nabulola Medical Center<br>Africure Medical Center (AIMS)<br>Besesuda Medical Clinic |
| | Malaba | Malaba Health Center III | St. Anthony's Hospital<br>Veanna Medical Center |
| | Majanji | Busitema Health Center III<br>Majanji Health Center II<br>Mulindi Health Center II | |
| | Kasensero | Kasensero Health Center II | |
| | Katuna | Kamuganguzi Health Center III | Trust Medical Center<br>North Star Alliance (NSA) Clinic |
| **Tanzania** | Holili | Holili Dispensary | AMEC Medical Center<br>Faraja Health Center |
| **Rwanda** | Gatuna | Mulindi Health Center<br>Rubaya Health Center | |

## ANNEX C: LIST OF COSTED BIOMEDICAL SERVICES[8]

**Table C13. List of costed services**

| Service | Definition | Description | Tests/Procedures |
|---|---|---|---|
| Screening for STIs | Screening for STIs and diagnosis and treatment of asymptomatic and symptomatic STIs | 1. Verbal screening using the WHO STI syndromic chart<br>2. Management of each STI - this includes the consultation, any tests done and the drugs dispensed<br>- Syphilis<br>- Herpes simplex<br>- Gonorrhea<br>- Human Papilloma Virus<br>- Chlamydia | Syphilis –venereal disease research laboratory test (VDRL) or rapid test.<br>Gonorrhea - microscopy, culture and sensitivity of a discharge or rapid test<br>Chlamydia - microscopy, culture and sensitivity for a pus/discharge swab<br>Herpes and Human Papilloma Virus are viral infections and likely a clinical diagnosis without testing |
| Linkage to and support for adherence to ART | Linkage to and support for adherence to ART for PLHIV | 1. Linkage refers to the referral and escort of the patient to relevant departments within and without the facility<br>2. Adherence support refers to the follow up of patients by home visits, calls and text reminders | |
| Screening for hypertension and diabetes with referral | Screening for hypertension and diabetes with referral | 1. Measuring of blood pressure and referral to a clinician for hypertension management<br>2. Consultation visit and Random Blood Sugar test and referral to a clinician for diabetes management | Blood pressure measured with an automatic or mercury sphygmomanometer.<br><br>Random Blood Sugar measured with a rapid finger prick blood glucose test. |
| TB treatment | Screening for TB and treatment | Management includes the consultation visits, diagnostic tests, gene expert (where available) and treatment using first line TB regimen for a full course of treatment. | Lab test is Ziehl Neelsen staining on sputum<br>Radiology is a chest x-ray |
| HTC )services | HTC with a repeat every 6 months[2] through either health care facilities or outreach based HTC services | 1. Facility based HTC for adults<br>2. Facility based provider initiated testing and counseling as part of an OP visit<br>3. Facility based HTC for minors above 7 years accompanied by an adult<br>4. Outreach based HTC<br>5. Early infant diagnosis by Dried Blood Spot (DBS) | HTC will use rapid tests and a finger prick. Common kits used are determine. Confirmatory tests are rapid tests with a different brand usually unigold<br>Early infant diagnosis uses Polymerase Chain Reaction on a dry blood sport |
| HTC/ Provider Initiated Counselling and Testing for regular partner and children | HTC/provider initiated testing and counseling for regular partner and children | | |
| Screening for pregnancy with referral for antenatal care | Screening for pregnancy with referral for antenatal care | 1. Pregnancy test and referral to antenatal care | Pregnancy test uses urine sample on a rapid test checking for Human Chorionic Gonadotropin hormone |
| Cervical and breast cancer screening | Cervical and breast cancer screening | 1. Consultation and Visual inspection with Acetone (VIA) or iodine (VILLI) for cervical cancer<br>2. Consultation and manual breast exam for breast cancer | VIA includes inspection of the cervix using a speculum and staining with acetone for reaction of the cervix to the acetone.<br><br>Manual breast exam is done by the clinician by palpation of the breasts checking for lumps. |

8 The list of costed services is extracted from the EAC Minimum Package for HIV and AIDS and Other Health Services along the East African Community (EAC) Land Transport Corridors and Wet Border Areas and the CB-HIPP Standard Package of health services for Key, Vulnerable and Migrant Populations along East African Land Transport Corridors (Cross-border and in country hot spots)

| Service | Definition | Description | Tests/Procedures |
|---|---|---|---|
| Post sexual and gender based violence care | Includes general history, physical examination, trauma counselling, post exposure prophylaxis , emergency contraception, pregnancy test, management of soft tissue injury, collection of samples, psychological support and referral for legal aid/law enforcement | This is similar for all groups, but for men who have sex with other men excludes emergency contraception<br>1. Cost package for sexual and gender based violence visit including emergency contraception<br>2. Cost package for sexual and gender based violence excluding emergency contraception | Sexual and gender based violence visits has history taking, examination by a clinician for evidence of rape, pregnancy test using a rapid test, EC, swabs to check for sperm, blood, bruising or under finger nails for DNA testing if patient can afford. |
| Counselling on FP methods, provision of short term methods and referral for long term methods | Counselling on FP methods and provision of short term methods and referral for long term contraceptive methods | Counselling visit and dispensing of contraception for<br>1. Combined oral contraceptives<br>2. Injectable<br>3. Implants<br>4. IUD<br>5Bilateral tubal Ligation) | Bilateral tubal ligation can be done as a day theatre case. |
| Periodic Presumptive treatment of STI | Periodic Presumptive treatment of STI every six months | 1. Management includes consultation visit and dispensing of presumptive treatment for Gonorrhea and Chlamydia | No testing done for presumptive treatment of female sex workers |
| Routine nutrition assessment | Routine nutrition assessment | Nutritional counselling and measuring of specific indices<br>1. Anthropometric indices (weight, height, minimum upper arm circumference)<br>2. Clinical assessment/Physical examination<br>3. Dietary assessment (food recall) | Procedure is the weight height and minimum upper arm circumference which will need a weighing scale, tape measure. |
| ART refill or linkage to treatment center | ART refill or linkage to treatment center | 1. For facilities not offering ART then this includes linkage, referral and escort to treatment centers<br><br>2. For facilities with ART<br>*PreART visit-adult and pediatric<br>A PreART visit includes:<br>-Verbally screen for new symptoms, opportunistic infections (OI) and TB<br>-Nutritional assessment-weight, height, MUAC<br>-FP status for women<br>-Cotrimoxazole adherence<br>-Dispense Cotrimoxazole<br>-Routine tests HB, LFT, RFT, CD4<br><br>*ART visit<br>-newly initiated-adult and pediatric<br>-stable-adult first line, adult second line, pediatric first line, pediatric second line<br>ART visit includes above procedures and add:<br>-Track ART adherence and side effects<br>-Dispense ART and Cotrimoxazole<br>- Linkage for viral load testing | Routine tests at the lab are hemogram or Hemoglobin count, liver function tests or Aspartate and Alanine Aminotransferase, renal function tests or Urea Electrolytes and Creatinine<br>CD 4 count<br>Viral Load tests<br><br>Verbal screening for TB is a checklist of symptoms asked by the clinician. If testing for TB then Ziehl Neelsen stain for sputum and a chest x-ray |

| Service | Definition | Description | Tests/Procedures |
|---|---|---|---|
| PMTCT of HIV<br><br>In Uganda referred to as<br><br>EMTCT | PMTCT/EMTCT | A PMTCT/EMTCT visit<br>-Screen for new symptoms, OI and TB<br>-Nutritional assessment-weight, height, minimum upper arm circumference<br>-Nutritional counselling<br>-Cotrimoxazole adherence<br>-Track ART adherence and side effects<br>-Dispense ART and Cotrimoxazole<br>-Routine antenatal (ANC) tests VDRL, urinalysis<br>-HIV monitoring routine tests Hemoglobin, liver function test, renal function test and CD 4 count<br><br>-Tetanus toxoid vaccine | HIV monitoring routine tests at the lab are<br>hemogram or Hemoglobin count, liver function tests or Aspartate and Alanine Aminotransferase, renal function tests or Urea Electrolytes and Creatinine<br>CD 4 count<br>Viral Load tests<br>Nutritional assessment. |
| Eye exam using Snell's chart | Eye exam using Snell's chart | Consultation and eye examination using Snell's chart | Use Snell›s chart-basically this is a chart on the wall and it is read six meters away by the patient |
| Mass deworming | Mass deworming against schistosomiasis and soil transmitted helminths | Community deworming program-to use school deworming program as proxy. To include staff time, transport costs and dispensing of de-wormers | |

# ANNEX D: DATA AGGREGATION AND TREATMENT PROCESS TO POPULATE THE MASH COSTING TOOL

Five main types of data were used to populate the MASH sheets for each facility:

1. Service utilization data
2. Personnel salary data
3. Inventory and physical space
4. Program drugs and commodities
5. Facility expenditure

## Service Utilization Data

Data was collected at each facility for four categories of departments - administration, intermediate, OP and IP departments. Table D14 shows the details of the data collected which populated the MASH costing tool.

**Table D14. Data collection departments and data collection units**

| Department | Cost Center Name | Data collection unit |
|---|---|---|
| Administrative department | General Administration | None were defined |
| | Medical records | None were defined |
| | Financing and Accounting | None were defined |
| | Transport | Number of trips or kilometers travelled |
| | Cleaning | Number of cleaning sessions |
| | Building Maintenance | Numnber of maintenance and repairs |
| | Security | Number of security shifts |
| | Laundry | Number of kilograms of linen washed or number of washes |
| | Kitchen | Number of IP bed days or number of meals cooked |
| | Sterilization | Number of sterilization sets or number of sterilization sessions |
| Intermediate department | Pharmacy | Number of prescriptions or value of drugs dispensed |
| | Laboratory | Number of laboratory tests |
| | Radiology | Number of projections or patients |
| | Ultrasound | Number of scans or patients |
| | Operating room | Number of surgeries |
| | Physiotherapy and Occupational Therapy | Number of sessions |
| | Mortuary | Number of bodies preserved or number of number of days |

| | | |
|---|---|---|
| OP department | OP General | Number of visits or number of patients |
| | OP maternal and child health | Number of visits or number of patients |
| | OP FP | Number of visits or number of patients |
| | OP antenatal care | Number of visits or number of patients |
| | OP post natal care | Number of visits or number of patients |
| | OP Child Welfare Clinic | Number of visits or number of patients |
| | OP Nutrition | Number of visits or number of patients |
| | OP HIV | Number of visits or number of patients |
| | OP STI | Number of visits or number of patients |
| | OP TB | Number of visits or number of patients |
| | OP Specialist clinics | Number of visits or number of patients |
| | OP Eye | Number of visits or number of patients |
| | OP Dental | Number of visits or number of patients |
| | OP - Other | Number of visits or number of patients |
| IP department | IP General Ward | Number of admissions or number of IP bed days |
| | IP General Surgery Ward | Number of admissions or number of IP bed days |
| | IP Female Ward | Number of admissions or number of IP bed days |
| | IP Female Surgery Ward | Number of admissions or number of IP bed days |
| | IP Male Ward | Number of admissions or number of IP bed days |
| | IP Male Surgery Ward | Number of admissions or number of IP bed days |
| | IP Gynecology ward | Number of admissions or number of IP bed days |
| | IP Obstetrics Ward | Number of admissions or number of IP bed days |
| | IP Newborn | Number of admissions or number of IP bed days |
| | IP Pediatrics | Number of admissions or number of IP bed days |
| | IP - Other | Number of admissions or number of IP bed days |

Data was collected about utilization of intermediate departments by OP and IP cost centers, either from registers that showed the allocation of services by OP and IP department or from expert opinion of the heads of the intermediate departments. The utilization data was used to assign intermediate department costs to OP and IP departments during the step-down process.

## Personnel Salary Data

Data collectors compiled monthly salary data including allowances for each member of staff at all facilities or where they were available. The job groups were also collected and matched with the corresponding salary. The salary was multiplied by 12 to calculate the annual salary. Health facility managers provided staff allocations across departments. If the facility categorized a staff member as someone who worked solely for one clinic or ward, one full-time equivalent (FTE) for the cadre was allocated to that clinic or ward. For staff working across multiple departments, the FTE was assigned based on the allocation from the facility manager. Where the facility assigned staff to “OP clinic” or “IP ward” without specifying the type of clinic or ward, one FTE was proportionately allocated based on the number of OP visits at that clinic or IP days for that ward. For example, if the facility had a general OP clinic that had 1,000 visits and a maternal and child health clinic that had 500 visits, a nurse’s time was assigned at 0.66 FTE to the general OP clinic and 0.33 FTE to the maternal and child health clinic. Finally, the FTE was multiplied by the corresponding annual salary to assign a personnel cost to each department.

## Inventory and Physical Space

Data was collected about all equipment and physical assets from inventories where they existed, or produced an inventory for each facility. Where purchase cost, purchase date and life years data was missing, the team conducted searches for missing prices and developed a standard inventory price list used across all facilities. Straight line depreciation at 20%was used for equipment in MASH.

Updated building plans did not exist at any of the facilities. Data collectors therefore measured all facility rooms and noted the services offered in each room for space allocation criteria. Where rooms were shared across services, the allocation of space was based on the number of hours used for each

service; where this was not available, space was proportionately allocated to services based on the number of OP visits or IP bed days for the ward.

### Program Drugs and Commodities

Program drugs included FP commodities, HIV test kits, ART drugs, anti-TB drugs, antimalarial drugs, malaria test kits, nutrition supplements, vaccines and any other medical supplies or pharmaceuticals that were provided by donor funded programs or vertical programs. The amounts of program drugs and commodities used during the year were collected and price data was sourced from national medical/drug distribution agencies, UNICEF, UNFPA, Global Fund, MSH and the Global Drug Facility product catalogues. The program drugs were allocated across departments based on utilization provided from bin cards at the pharmacy or expert opinion by the head of the pharmacy department. Where allocation across departments was not provided, program drugs and commodities were proportionately allocated to services based on the number of OP visits.

### Facility Expenditures

Data on facility expenditures was collected from audited reports or income and expenditure statements. Where these were not available, the data collectors reconstructed expenditures from invoices, receipts, payment vouchers and other records available at the facility. See Annex E for allocation criteria for each type of expenditure.

# ANNEX E: COST ALLOCATION CRITERIA

**Table E15. Cost allocation criteria for each expenditure type**

| Expenditure Type | Allocation Criteria |
|---|---|
| Personnel salary | Number of FTE staff assigned to the cost center |
| Laboratory supplies | Number of tests attributed to the cost center |
| Surgery supplies | Number of surgeries conducted for the cost center |
| Pharmaceuticals and medical supplies | Number of prescriptions or value of pharmaceutical supplies dispensed to the cost center |
| Radiology supplies | Number of projections conducted for the cost center |
| Ultrasound supplies | Number of scans conducted for the cost center |
| Cleaning supplies | Proportion of space covered by the cost center |
| Laundry costs | Number of IP bed-days |
| Kitchen supplies and food | Number of IP bed-days |
| Electricity | Proportion of space covered by the cost center |
| Water | Proportion of space covered by the cost center |
| Transport | Proportion of direct cost attributable to the cost center |
| Communication | Proportion of direct cost attributable to the cost center |
| Building Maintenance | Proportion of space covered by the cost center |
| Other staff costs and training expenses | Number of FTE staff assigned to the cost center |
| Fuel | Proportion of direct cost attributable to the cost center |
| Stationaries and office supplies | Number of FTE staff assigned to the cost center |
| Security | Proportion of space covered by the cost center |
| Other indirect costs | Proportion of direct cost attributable to the cost center |

## ANNEX F: MEDICAL AND NON-MEDICAL PERSONNEL

Cadres of facility staff were categorized into either medical or non-medical personnel (Table F16). Only medical personnel time was included for the service costing as a direct cost, while the FTE for non-medical personnel were included in departmental costs.

**Table F16. Cadres for Medical and Non-Medical Personnel found at health facilities**

| Staff Group | Cadres Included in the Staff Group |
|---|---|
| Medical personnel | • Medical specialists including obstetricians, gynecologists, pediatricians, ophthalmologists, surgeons, radiologists, anesthesiologists<br>• Medical doctors including dentists and pharmacists<br>• Medical doctor interns<br>• Dental technician<br>• Laboratory technician and technologist<br>• Pharmacist technician and technologist<br>• Public health/social worker<br>• Radiographer and Ultrasonographer<br>• Anesthesiology technician<br>• Clinical officer/ medical officer (Tanzania)<br>• Mortuary attendant<br>• Nutritionist<br>• Occupational therapist<br>• Physical therapist<br>• Degree nurses<br>• Registered nurses<br>• Enrolled nurses |
| Non-medical personnel | • HMIS, information technology, medical/health records<br>• Reception, front office, registration<br>• Grounds keepers<br>• Maintenance, carpentry, artisan<br>• General/biomedical engineer<br>• Drivers<br>• Operations, logistics<br>• Security<br>• Laundry, tailoring<br>• Catering, kitchen<br>• Administration, office clerks<br>• Accounts clerks, finance officers, cashiers<br>• Procurement and purchasing |

# ANNEX G: DETAILS OF THE STEP-DOWN PROCESS FOR TOP-DOWN COSTING

Annex D describes the data input into the MASH tool. Subsequent to this, the MASH tool allocates all costs to specific cost centers using the following steps:

## Step 1: Classify costs as direct and indirect costs

The direct costs include personnel costs, equipment depreciation costs and medical commodities, drugs and supplies that can be directly attributed to a cost center. The indirect costs include shared costs such as laundry costs, kitchen supplies and food costs, electricity, water, transport, communication, building maintenance costs, other staff costs and training expenses, fuel, stationaries and office supplies, security and other miscellaneous indirect costs.

## Step 2. Allocate direct and indirect costs to cost centers

Allocation criteria in Annex E were used to allocate direct and indirect costs to the specific cost centers. This gives a total cost of running each cost center or department which is useful for budgeting for departments within a facility.

## Step 3: Allocate administration department costs to intermediate, OP and IP cost centers

The administration cost centers were grouped into two - general administration and support services. Criteria used to allocate administration department costs to intermediate, OP and IP departments are shown in Table G17. This step reflects the use of the administration department by the other departments.

**Table G17. Allocation criteria for step-down process**

| Department | Cost Center Name | Allocation criteria |
|---|---|---|
| **Administrative department** | General administration included administration, medical records, finance and accounting | Number of FTE at the cost center |
| | Support services included transport, cleaning, building maintenance, security, laundry, kitchen, sterilization | Space occupied by the cost center |
| **Intermediate department** | Pharmacy | Number of prescriptions or value of drugs dispensed |
| | Laboratory | Number of laboratory tests |
| | Radiology | Number of projections or patients |
| | Ultrasound | Number of scans or patients |
| | Operating room | Number of surgeries |
| | Physiotherapy and Occupational Therapy | Number of sessions |
| | Mortuary | Number of bodies preserved or number of number of days |

## Step 4: Allocate intermediate cost centers to OP and IP cost centers

This step allocates the intermediate cost centers, which includes its allocation of the administration department to the OP and IP cost centers. Allocation criteria are listed in Table G17 and reflect the usage of intermediate departments by OP and IP departments.

These final costs are divided by the total number of services delivered in the year to generate the unit cost of services in the OP and IP departments.

## ANNEX H: LIST OF TESTS AND EXAMS FOR EACH SERVICE USED IN THE SERVICE COSTING

**Table H18. Tests and exams included for each service**

| Service | Kenya | Rwanda | Tanzania | Uganda |
|---|---|---|---|---|
| Syphilis screening and treatment | VDRL Syphilis test (1) | RPR Syphilis test (1) | RPR Syphilis test (1) | RPR Syphilis test (1) |
| Chlamydia screening and treatment | Microscopy, culture and sensitivity (1) | NA | NA | Gram stain (culture and sensitivity) (1) |
| Herpes screening and treatment | NA | NA | NA | NA |
| Gonorrhea screening and treatment | Microscopy, culture and sensitivity (1) | NA | NA | Gram stain (culture and sensitivity) (1) |
| Condom demonstration and distribution | NA | NA | NA | NA |
| Emergency pill | NA | NA | NA | NA |
| Oral contraceptive | Pregnancy test (4) one for each visit | Pregnancy test (4) one for each visit | Pregnancy test (4) one for each visit | NA |
| Injectable contraceptive | Pregnancy test (4) one for each visit | Pregnancy test (4) one for each visit | Pregnancy test (4) one for each visit | NA |
| IUD | Pregnancy test (1) | Pregnancy test (1) | Pregnancy test (1) | Pregnancy test (1) |
| Implant | Pregnancy test (1) | Pregnancy test (1) | Pregnancy test (1) | |
| Early infant diagnosis | Polymerase Chain Reaction specimen collection (Dry Blood Spot) | Polymerase Chain Reaction specimen collection (Dry Blood Spot) | Polymerase Chain Reaction specimen collection (Dry Blood Spot) | Polymerase Chain Reaction sample collection |
| HCT adult | HIV rapid test: Determine (1 each) | HIV rapid test: Determine (1 each) | HIV rapid test: Determine (1 each) | HIV rapid test: Determine |
| Pre ART adult | CD 4 (2), Hemoglobin (2) (each test done every 6 months) | CD 4 (2), Hemoglobin (2) (each test done every 6 months) | CD 4 specimen collection (2), Hemoglobin (2) (each test done every 6 months) | Hemoglobin test (1), CD 4 (1) |
| Pre ART pediatrics | CD 4 (2), hemoglobin (2) (each test done every 6 months) | CD 4 (2), hemoglobin (2) (each test done every 6 months) | CD 4 specimen collection (2), hemoglobin (2) (each test done every 6 months) | Hemoglobin test (1), CD 4 (1) |
| Newly initiated on ART adult | CD 4 (1), viral load specimen collection (2), hemoglobin (2) | CD 4 (1), viral load specimen collection (2), hemoglobin (2), creatinine (3) | CD 4 specimen collection (1), viral load specimen collection (2), hemoglobin (2) | NA |
| Newly initiated on ART pediatric | CD 4 (1), viral load specimen collection (2), hemoglobin (2) | CD 4 (1), viral Load specimen collection (2), hemoglobin (2) | CD 4 specimen collection (1), viral load specimen collection (2), hemoglobin (2) | NA |

| Service | Kenya | Rwanda | Tanzania | Uganda |
|---|---|---|---|---|
| First line ART adult | Viral load specimen collection (1), hemoglobin (1) | Viral load specimen collection (1), hemoglobin (1), CD 4 (1), creatinine (2) | Viral load specimen collection (1), hemoglobin (1) | Hemoglobin test (1), CD 4 (1) |
| First line ART pediatric | Viral load specimen collection (1), hemoglobin (1) | Viral load specimen collection (1), hemoglobin (1), CD 4 1 | Viral load specimen collection (1), hemoglobin (1) | Hemoglobin test (1), CD 4 (1) |
| Second line ART adult | Viral load specimen collection (2), hemoglobin (2) | Viral load specimen collection (1), hemoglobin (1), CD4 1 | Viral load specimen collection (2), hemoglobin (2) | Hemoglobin test (1), CD 4 (1) |
| Second line ART pediatric | Viral load specimen collection (2), hemoglobin (2) | Viral load specimen collection (1), hemoglobin (1), CD 4 1 | Viral load specimen collection (2), hemoglobin (2) | Hemoglobin test (1), CD 4 (1) |
| TB screening and treatment | Sputum Ziehl Neelsen stain (2) | Sputum Ziehl Neelsen stain (2) | Sputum Ziehl Neelsen stain (2) | Sputum Ziehl Neelsen stain (2) |
| PMTCT/EMTCT | Viral load specimen collection (1), VDRL, HB, blood grouping, urinalysis, blood slide for malaria (for ANC profile 1 each) | Viral load specimen collection (1), creatinine (2) VDRL, HB, blood grouping, urinalysis, (for ANC profile 1 each) | Viral load specimen collection (1), RPR, HB, blood grouping, urinalysis (for ANC profile 1 each) | Pregnancy test (1), syphilis test (1), hemoglobin test (1), urinalysis (1), blood grouping (1), RDT (1), CD 4 (1) |
| SGBV | HIV rapid test: Determine (3), pregnancy screen (1) | | HIV rapid test: Determine (3), pregnancy screen (1) | HIV rapid test: Determine (1) |
| Eye exam with Snell's chart | NA | NA | NA | |
| Breast and cervical cancer screening | NA | NA | NA | NA |
| Diabetes screening | Rapid glucose test (1), urinalysis (1) | NA | Rapid glucose test (1), urinalysis (1) | Rapid glucose test (1) |
| Hypertension screening | NA | NA | NA | NA |
| Pregnancy screening | Pregnancy test (1) | NA | Pregnancy test (1) | NA |
| Nutritional screening | NA | NA | NA | NA |
| Mass deworming | NA | NA | NA | NA |

# ANNEX I: BOTTOM-UP COSTING PROCESS

Data collectors interviewed the clinicians providing each service to ensure accuracy of the data collected. Clinician inputs included:

- Number of visits provided for the service per year
- Number of medical personnel involved in providing the service and the amount of time spent during service provision
- The type of laboratory and radiology diagnostic services conducted and the number over the course of the service
- The type and quantity of drugs used during the course of the service
- The type and quantity of medical supplies and commodities used during the course of the service
- The type and quantity of equipment used during the course of the service
- The type and quantity of drugs, medical commodities and supplies dispensed by the clinician for use at home during the course of the service

Data collected for the services offered by each facility (Annex C) was reviewed for accuracy by medical practitioners from each country, including service conformance to national guidelines. A consultant was recruited to collect inputs for laboratory and radiology diagnostic services from Taveta Sub-County Hospital, and this data was used as a reference guide for all countries. Costs for the various inputs such as personnel cost were derived from the facility and from national medical/drug distribution agencies, UNICEF, UNFPA, Global Fund, MSH and the Global Drug Facility product catalogues for drugs, medical commodities and supplies, laboratory and radiology regents and supplies.

Costs were categorized into four:

1. Medical personnel time was the valuation of time spent by all medical personnel multiplied by their corresponding salary. Because time spent by clinicians was relatively similar across countries, time per service was standardized across all facilities in the same country and the corresponding salary for each staff member was used to compute medical personnel costs.
2. Drugs and medical supplies were based on standardized inputs that conformed to national guidelines. Inputs were multiplied by the corresponding value obtained from the various data sources listed above.
3. Laboratory and radiology diagnostic tests were based on data from Taveta Sub-County Hospital. Inputs were assigned prices based on available price lists or reference price catalogues.
4. Departmental estimates based on MASH represented the operating cost of each department and included indirect costs, equipment depreciation costs and allocations from administration departments. Departmental costs were derived after step down allocation of the administration departments (Step 3 in Annex G) less the personnel and drug expenditure cost of the department. The departmental costs were averaged by the number of services provided for the year to obtain the departmental cost per visit. The laboratory and radiology departmental costs were added to laboratory tests and radiology exams respectively to add to the cost of the service. The departmental cost for the service was added to the total cost of the service.

For services that required multiple visits over the year, inputs were checked to ensure accuracy. For example antenatal care tests are only done once for PMTCT and were not included in subsequent visits, whereas for short term FP methods, a pregnancy test was done at each visit in some countries and was therefore included at each visit.

Total costs presented in this report vary based on the number of visits over the year. For example, HCT visit cost generated is for each single visit, while pre-ART and ART costs generated were total costs for multiple visits for the year. PMTCT and TB costs generated were also total costs for multiple visits for each episode of pregnancy or illness respectively.

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