

# policy

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## UNIT COST OF PROVIDING KEY SERVICES AT THE FACILITY LEVEL TO PREVENT MOTHER-TO-CHILD TRANSMISSION OF HIV

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This publication was prepared by Andrew Koleros  
of the Health Policy Project.



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# Unit Cost of Providing Key Services at the Facility Level to Prevent Mother-to-Child Transmission of HIV: Ghana

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**SEPTEMBER 2012**

This publication was prepared by Andrew Koleros<sup>1</sup> of the Health Policy Project.

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## FOREWORD

The Government of Ghana has responded progressively to the HIV epidemic, using locally generated evidence and gradually scaling up effective HIV interventions. Good estimates, projections, and planning depend on having knowledge about accurate costs. This study examines the unit cost of preventing mother-to-child transmission (PMTCT) of HIV in Ghana. Understanding the costs and components of PMTCT services will allow for their sustainable scale-up and provide evidence to ensure that sufficient resources are available for that expansion. This is one of the first studies to look at the costs of PMTCT services in Ghana and provides valuable information for the planning and monitoring of the programme.

The Ghana AIDS Commission and the National AIDS Control Programme are grateful to all of the researchers and particularly the participating institutions for contributing to the success of this study. The study results will help to shape resource mobilisation and allocation during implementation of the National Strategic Plan for HIV and AIDS (2011–2015), as well as inform health sector programmes in their efforts towards achieving the Millennium Development Goals.

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## EXECUTIVE SUMMARY

The fight against HIV and AIDS is an integral component of Ghana's efforts to improve the country's social and economic conditions. Though prevalence among pregnant women appears to be decreasing based on Ghana's antenatal care sentinel surveillance system, national programme data also indicate that only 28 percent of women estimated to be in need of antiretroviral therapy to prevent mother-to-child transmission received these services in 2009. Given the importance of prevention of mother-to-child transmission (PMTCT) programmes within the national HIV response, several stakeholders addressing HIV in Ghana had expressed a need for country-specific PMTCT costing data to inform the national planning processes underway in 2011, including development of the National Strategic Plan (NSP) on HIV and AIDS 2011–2015.

A study team was formed, comprising representatives from the government, U.S. Agency for International Development (USAID), and USAID-funded Health Policy Project. The principal government agencies involved in the study were the Ghana AIDS Commission and the National AIDS/STI Control Programme of the Ghana Health Service. With the above data in mind, the study team identified the following questions:

- What is the cost of providing PMTCT services for one woman and child from the period of pregnancy through the recommended period of postpartum care according to national guidelines?
- What is the cost of providing PMTCT services to an HIV-negative woman?
- What is the cost of providing PMTCT services to an HIV-positive woman from intake in a PMTCT programme during the first trimester through the recommended duration of breastfeeding?
- What is the cost of providing PMTCT services to an HIV-exposed infant from delivery through the recommended period of postpartum care according to national guidelines?

After an extensive literature review, the team designed a mixed methods study consisting of primary and secondary data collection and analysis to estimate the average national financial cost to the provider for delivering the full PMTCT programme to pregnant women for nine months of pregnancy and to HIV-exposed infants for 12 months of postpartum care. The team examined the cost of drugs, lab testing, staff time, and consumables for both pregnant women and exposed infants. The approach considered a representative care schedule for the intervention.

The study team selected a purposive sample of 14 sites, reflecting regional and operational variation within the country. A standard questionnaire was developed to collect data from the sample of facilities. The questionnaire was pre-tested at one site and then used to train facility data collection teams. Data collectors interviewed local programme officials, administered the questionnaire, and reviewed programme and facility documents at each facility. At each site, data were collected on the time they spent with each client, the various stages of the intervention, and what resources they used. Respondents also provided information on management functions, including time allocation and resources used. Throughout the data collection period, the local consultant gathered information from both central sources on resource use and prices, as well as a variety of local sources. Inputs were first analysed according to type of cost. Inputs were categorised as follows: labour (healthcare workers and administrative staff); supplies (drugs and medical consumables); and capital costs, such as equipment. The range of inputs was determined by expert interviews with key central-level staff and providers at a limited number of facilities.

The study yielded findings on the cost of delivering PMTCT services (the national average unit cost) to a woman and her infant from pregnancy through the recommended period of postpartum care.

The most representative indicator of national costs was an average cost across the 14 sites included in this study, weighted by the number of clients served at each facility. Application of the weighted average yielded an average cost per different type of client served: GH¢ 84 (US\$57) for providing PMTCT services to an HIV-negative pregnant woman, GH¢ 1,088 (US\$739) for providing PMTCT services to an HIV-positive pregnant woman on antiretroviral (ARV) prophylaxis, and GH¢ 1,553 (US\$1,054) for providing PMTCT services to an HIV-positive pregnant woman on ARV treatment. The cost for providing PMTCT services to an HIV-exposed infant ranged from GH¢ 43 (US\$29) to GH¢ 101 (US\$69), based on the period in which the infant's HIV status was confirmed.

Analysis of the programme's cost structure found that direct costs accounted for 75 to 83 percent of the total cost for HIV-positive pregnant women on ARV prophylaxis and ARV treatment, respectively. The two major contributors to cost were antiretroviral drugs and laboratory testing. General support costs of the national PMTCT programme were the largest source of indirect programme costs, representing 11 percent of the total cost for HIV-positive pregnant women on ARV prophylaxis and 8 percent of the total for HIV-positive pregnant women on ARV treatment.

The most important results of this study were the high direct service delivery costs relative to indirect costs for delivering PMTCT services and the costs associated with higher-level staff implementing PMTCT services in facilities. These results suggest that the Government of Ghana and stakeholders have little control over the major cost drivers of their PMTCT programme at present and should not anticipate large variations in the cost of delivering PMTCT services in the short term, though some cost efficiencies could be achieved through more strategic staffing of the PMTCT programme.

While the largest cost components are not subject to much variation, there are some cost drivers that could be reduced in function of changes in service delivery, which could reduce the unit cost per client of delivering PMTCT services. The study team found that higher staff costs were associated with higher-level facilities, such as teaching and regional hospitals, where more specialised staff often provide basic services. If non-specialised PMTCT services were shifted to a lower level of nursing staff or to lay counselors, cost efficiencies would be achieved. This would require up-front investment in training and capacity building to ensure that the quality of service delivery is maintained—costs that would need to be considered. A weak monitoring and evaluation system for the PMTCT programme also contributed to challenges in analysing costs and should be a priority area for support moving forward.

In general, the team recommends that the Government of Ghana use these results when updating the costing of the NSP and in budgeting future project proposals to the Global Fund to Fight AIDS, Tuberculosis and Malaria and other potential donors. The government should also strengthen the national monitoring and evaluation system for the PMTCT programme. Finally, it should conduct further research on the impact of task-shifting within PMTCT services on the quality of care.

Donor support related to HIV currently focuses on consumables and covering drugs and laboratory costs, whereas government support focuses more on human resources. Donors should review their support to ensure it is achieving maximum impact. Supporting lay staff to provide PMTCT interventions—particularly at sites with high client loads—would free up more specialised staff to address more specialised tasks and reduce the overall cost of delivering services per client. The most important role donors should play is in continued resource allocation to the PMTCT programme to ensure that supply is able to meet demand in coming years.

## ABBREVIATIONS

AIDS	acquired immune deficiency syndrome
ANC	antenatal care
ART	antiretroviral therapy
ARV	antiretroviral
CHPS	Community-based Health Planning Services
DBS	dried blood spot (Method)
EID	Early Infant Diagnosis
GAC	Ghana AIDS Commission
GFATM	Global Fund to Fight AIDS, Tuberculosis and Malaria
GHS	Ghana Health Services
HAART	highly active antiretroviral therapy
HIV	human immunodeficiency virus
HTC	HIV testing and counselling
M&E	monitoring and evaluation
NACP	National AIDS/STI Control Programme, Ghana
NSP	National Strategic Plan on HIV and AIDS 2011–2015
OI	opportunistic infection
PMTCT	prevention of mother-to-child transmission
STI	sexually transmitted infection
UNAIDS	Joint United Nations Programme on HIV and AIDS
UNICEF	United Nations Children’s Fund
USAID	United States Agency for International Development
WHO	World Health Organisation
WTO	World Trade Organisation

# INTRODUCTION

## HIV and AIDS in Ghana

The fight against HIV and AIDS is an integral component of Ghana's efforts to improve the country's social and economic conditions. Although not as hard hit as many of the countries of eastern and southern Africa, Ghana continues to face impediments to its national development efforts because of the HIV epidemic, which is considered to be a mature, mixed epidemic—that is, a low-level generalised epidemic with pockets of high infection levels among certain populations. The National AIDS/STI Control Programme (NACP) estimated HIV prevalence to be 1.9 percent in the general adult population in 2009 and indicated that it appeared to be declining (NACP, 2010). Prevalence among pregnant women appears to be decreasing—from a peak of 3.6 percent in 2003 to 2.2 percent in 2008, according to the 2008 report of Ghana's antenatal care (ANC) sentinel surveillance system. Despite this positive trend, according to the Ghana 2008 Demographic and Health Survey, only 24 percent of women who gave birth in the previous two years received HIV counselling and testing and test results. Data from the national prevention of mother-to-child transmission (PMTCT) programme indicate that approximately 39 percent of women attending antenatal clinics were counseled, tested, and received test results, while only 28 percent of women estimated to be in need of antiretroviral therapy (ART) to prevent mother-to-child transmission received these services in 2009.

## Programme and Policy Response to HIV and AIDS

NACP, as the lead service delivery agency, and the Ghana AIDS Commission (GAC), as the strategic planning, policy, and coordination body, are key public sector actors in Ghana's National Strategic Plan on HIV and AIDS 2011–2015 (NSP). NACP was established in 1987, shortly after the first AIDS case was reported in Ghana in 1986. NACP is organised under the Ghana Health Services (GHS), the autonomous executive agency responsible for implementing health policies and plans under the Ministry of Health. GAC was established by an act of Parliament in 2002 as a supra-ministerial body with multisectoral representation. As the highest policymaking body on HIV and AIDS in the country, it leads the coordination of Ghana's NSP, with key ministries, the private sector, traditional and religious leaders, and civil society participating in the design, planning, implementation, and monitoring and evaluation (M&E) of programmes.

Under GAC's coordination, the government has begun implementing its NSP 2011–2015, which emphasises that to maintain or lower the relatively low prevalence in the general population, the national HIV response must be sustained and scaled up. Particular emphasis is put on scaling up PMTCT services.

From 2006 to the present, significant progress has been made in increasing the coverage of PMTCT services, with services now available at the national, regional, district, and health center levels—covering both public and private facilities. HIV testing and counselling services for pregnant women are available through Community-based Health Planning Services (CHPS). This has coincided with an increase in the number of official PMTCT sites in Ghana—from just 135 sites in 2005 to 793 in 2009.

## STUDY RATIONALE

Given the importance of PMTCT programmes within the national HIV response, several stakeholders addressing HIV in Ghana had expressed a need for country-specific PMTCT costing data to inform national planning processes underway in 2011, including development of the NSP 2011–2015. In addition, the lack of accurate unit cost estimates for PMTCT services was cited as a weakness of a previous Ghana proposal to the Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM) for Round 10 funding. In response to this need, a study team was formed, comprising representatives from the government, U.S. Agency for International Development (USAID), and USAID-funded Health Policy Project.

With these data needs in mind, the study team identified the following questions:

- What is the cost of providing PMTCT services for one woman and child from the period of pregnancy through the recommended period of postpartum care according to national guidelines?
- What is the cost of providing PMTCT services to an HIV-negative woman?
- What is the cost of providing PMTCT services to an HIV-positive woman from intake in a PMTCT programme during the first trimester through the recommended duration of breastfeeding?
- What is the cost of providing PMTCT services to an HIV-exposed infant from delivery through the recommended period of postpartum care according to national guidelines?

The team first reviewed the existing literature to determine whether these questions could be answered using current data. It was determined that no studies to date had examined the cost of delivering these services in Ghana. Few studies, even at the international level, have examined unit costs for delivering PMTCT services (Galárraga et al., 2011). Among the few studies that has looked at PMTCT unit costs, no studies examined had looked at the unit cost of delivering PMTCT services under the new 2009 World Health Organisation (WHO) guidelines. This was not surprising, since despite growing international experience, the costing of HIV and AIDS programmes is a relatively recent undertaking. In fact, the Joint United Nations Programme on HIV/AIDS (UNAIDS) only just published its first “Guidelines for Costing HIV/AIDS Prevention Strategies” in 2000.

In addition, HIV programme costs are changing rapidly; results from studies undertaken even a few years ago may already be outdated and not appropriate for planning future endeavors. Furthermore, differences in relative prices, programme protocols, what programmes consider as “PMTCT interventions,” and costing methodologies make it difficult to compare study results between countries. For these and other reasons, experts recommend using local unit cost data, whenever feasible, to develop national cost estimates (Bollinger and Stover, 2007).

It was thus determined that a Ghana-specific unit cost study would best meet the stakeholders’ data needs. Note that while the literature included little information about both facility-based and community-based unit cost data for PMTCT interventions, based on the data needs identified, the study team focused only on facility-based interventions. Though some facility programmes selected for this study have a community-based component, which is discussed in this report, further research would be necessary to determine the unit cost of delivering community-based PMTCT services in Ghana.

## METHODOLOGY

The study team designed a mixed methods study, consisting of primary and secondary data collection and analysis in order to estimate the average national financial cost to the provider for delivering the full PMTCT programme in Ghana to pregnant women for nine months of pregnancy and to HIV-exposed infants for 12 months of postpartum care. We examined the cost of drugs, lab testing, staff time, and consumables for both pregnant women and exposed infants. The approach considered a representative care schedule for the intervention based on the following inclusion criteria:

- Services included in the national guidelines for PMTCT
- Services provided in a clinical setting
- Community-based interventions being implemented by health facility staff
- Services already being provided (no new or unplanned services)

## Background

The entry point into the PMTCT programme is through routine care provided to all pregnant women. In the context of PMTCT, HIV testing is integrated into reproductive and child health services. All pregnant women accessing these services receive information on HIV testing at all levels of the health sector. All HIV testing and counselling (HTC) interventions are performed by trained counselors. After testing, HIV-negative pregnant women are counseled to help them remain uninfected. Pregnant women who test positive receive counselling and are referred to an ART clinic for immunological assessment.

Clients identified as seropositive during pregnancy receive follow-up counselling and support services to facilitate the acceptance of their serostatus, as well as direct referral to treatment and care services. All clients receive counselling at regular intervals; prophylaxis, diagnosis, and treatment of opportunistic infections (OIs); periodic laboratory testing; and routine medical consultations throughout pregnancy. All pregnant seropositive women that have been identified receive either ARV prophylaxis or treatment. ARV treatment in pregnancy implies the long-term use of ARV drugs to treat maternal HIV and AIDS and prevent mother-to-child transmission. ARV prophylaxis is the short-term use of ARV drugs to reduce HIV transmission from mother to infant. Women initiate ARV treatment or prophylaxis after evaluation using the CD4 cell absolute count. All seropositive pregnant women with a CD4 cell count less than 350 cells/mm<sup>3</sup>, irrespective of clinical staging, are offered triple combination highly active antiretroviral therapy (HAART) according to national guidelines. All seropositive pregnant women with WHO Clinical Stages III or IV (refer to National OI and ART Guidelines), irrespective of CD4 cell count, are offered HAART according to national guidelines. All seropositive pregnant women with a CD4 cell count of more than 350 cells/mm<sup>3</sup> or Clinical Stages I or II are offered combination ARV prophylaxis according to national guidelines. For more information on ARV treatment and prophylactic guidelines, the national eligibility criteria are provided in **Annex 1**.

Any woman with an undocumented HIV status at the time of labour is offered HTC. Immediate initiation of appropriate ARV prophylaxis is given to women in labour in the event of a positive test. Postpartum care for seropositive women includes information, education, and counselling on infant feeding methods, Vitamin A supplementation, screening and treatment for STIs, counseling on breast and cervical cancer screening, provision of medical and psychosocial supportive care, prophylaxis for OIs with cotrimoxazole and treatment for existing OIs and other infections, and referrals to other programmes as appropriate. Women of unknown HIV status are offered HTC. Seropositive mothers are linked to ART clinical care and follow-up. All seropositive women receive either ART or ARV prophylaxis for the recommended duration of breastfeeding. Some facilities implement community-based services to ensure the continuum of care at the community level between regularly scheduled facility visits.

HIV-exposed infants receive the normal standard care for a newborn, ARV prophylaxis for the first six weeks of life, and OI prophylaxis (cotrimoxazole) for the duration of breastfeeding. HIV-exposed infants are assessed regularly for HIV seroconversion using the dried blood spot (DBS) method for early infant diagnosis (EID) at six weeks, six months, and 12 months. All HIV-exposed infants confirmed as HIV positive through DBS are referred to the ART clinic for HIV care and follow-up. Some facilities implement community-based services to ensure the continuum of care at the community level between regularly scheduled facility visits.

### ***Categorisation of services by core component of the PMTCT programme***

Services in the national guidelines for PMTCT respond directly to the following four core components of a national PMTCT programme, as recommended by WHO and the United Nations Children’s Fund:

1. Primary prevention of HIV infection among women of childbearing age
2. Prevention of unintended pregnancies among women living with HIV
3. Prevention of HIV transmission from women living with HIV to their infants
4. Provision of appropriate treatment, care, and support to mothers living with HIV and their children and families

**Table 1** displays the interventions costed in this study according to the core components of the national PMTCT programme. It is important to note that interventions under the first prong of the PMTCT Strategy—primary prevention of HIV infection among HIV-negative pregnant women—are much broader than those included in this study. Details on the full costing of activities under the first prong of the PMTCT programme are included in the Ghana National PMTCT Scale-up Plan 2011–2015.

**Table 1. Core components of the PMTCT programme**

<b>PMTCT Strategy Component</b>	<b>Costing Component Used in this Study</b>	<b>Comments/observations</b>
1. Primary prevention of HIV infection	HIV-negative pregnant women	Includes primary prevention in an ANC setting
2. Prevention of unintended pregnancies among women infected with HIV	HIV-positive pregnant women	Includes family planning in a PMTCT setting; this service is fully costed in the ART Unit Cost Study, 2010
3. Prevention of HIV transmission from women infected with HIV to their infants	HIV-positive pregnant women	Unit cost disaggregated by HIV-positive women on ARV prophylaxis and ARV treatment
4. Provision of treatment, care, and support to women infected with HIV, their infants, and their families	HIV-exposed infants	Includes services in a PMTCT setting and community outreach; unit cost disaggregated by <ul style="list-style-type: none"> <li>• HIV-positive women on ARV prophylaxis and treatment</li> <li>• HIV-exposed infant at time of HIV serostatus determination</li> </ul>

## Study Management

The study team included representatives from the government, U.S. Agency for International Development (USAID), and USAID-funded Health Policy Project. The principal government agencies involved in the study were the GAC and the NACP of GHS. The GAC and NACP provided technical guidance, reviewed and commented on the study methodology, facilitated access to primary data and secondary information, facilitated entry to health facilities, ensured the collaboration of facility staff, and reviewed and commented on reports. USAID funded the study, provided technical guidance, reviewed and commented on the study methodology, facilitated travel by international consultants, and reviewed and commented on reports. The Health Policy Project was accountable for all aspects of the study: developing the methodology, protocols, and data collection and analysis plans; pre-testing the study data collection templates; training data collectors; collecting, cleaning, entering, and analysing data; and disseminating the results.

## Sampling

The study team selected a purposive sample of 14 sites, taking into account the following criteria to ensure that the selected sites reflected regional and operational variation within the country:

- **Level of facility:** Teaching hospital, regional hospital, district hospital, CHPS
- **Type of facility:** Public or private facilities
- **Site milieu:** Urban or rural facilities
- **HIV prevalence in the facility catchment area:** A range of low- and high-prevalence areas
- **Geographic diversity:** Inclusive of the three main agro-ecological zones of the country: savannah, forest, and coastal

Based on these criteria, the team first selected the regions and then the sites within each region. The 14 sites included both of Ghana's teaching hospitals, three of its 10 regional hospitals, and three of its 126 district hospitals that provide PMTCT services (see **Table 2**). To understand differences in services being delivered at the community level, the team included three CHPS and three maternity home sites.

Interviews were conducted with 32 programme and finance staff at the 14 sites and four central-level programme managers and financial officers during data collection.

**Table 2. Sites included in the study, by region and facility level**

Region	Teaching Hospital	Regional Hospital	District Hospital	Maternity Homes	CHPS
Greater Accra	Korle Bu	Ridge Hospital	Dangme West (Dodowa)	Nyame Bekyere Maternity Home	Pokuase CHPS
Ashanti	Komfo Anokye Teaching Hospital	Kumasi South Hospital	Mampong Ashanti	Asempa Maternity Home	Fenaso CHPS
West	None	Effia-Nkwant regional hospital	Eikwe	Mrs. Akoto Mat Home	Nsadweso CHPS Zone

## Data Collection

The study team developed a standard questionnaire to collect data from the sample of 14 facilities. The team pre-tested the questionnaire at one site and then used it to train facility data collection teams. Under the supervision of the local consultant, the data collection team members traveled to study sites between September and November 2011. The data collectors interviewed local programme officials, administered the questionnaire, and reviewed programme and facility documents at each facility, spending between 3–5 days at each facility depending on the size and complexity of services offered at the site. At each site, data were collected on the time they spent with each client, the various stages of the intervention, and what resources they used. Respondents also provided information on management functions, including time allocation and resources used.

The data collectors asked participating facility staff to show them any facilities and equipment used at each site for the delivery of PMTCT services, such as counselling rooms. Dimensions of areas used and descriptions of equipment provided were recorded. The data collectors also gathered any relevant secondary data the each site, including service utilisation data on client loads and financial records on prices for specific supplies and commodities.

Throughout the data collection period, the local consultant gathered information from both central sources on resource use and prices, as well as a variety of local sources (see **Annex 2**). The consultants began cleaning and entering data immediately upon the completion of field work, using a Ghana-specific Excel data entry and analysis template that was adapted from other costing tools, including the USAID-funded CORE+ model (MSH, 2010). The template includes one workbook for each facility, a workbook containing standard national price information, and a workbook that consolidates the data for analysis.

## Data Analysis

Inputs were first analysed according to type of cost. Inputs were categorised as follows: labour (healthcare workers and administrative staff); supplies (drugs and medical consumables); and capital costs, such as equipment. The range of inputs was determined by expert interviews with key central-level staff and providers at a limited number of facilities. The study valued inputs in local currency—Ghana cedi (GHc) or U.S. Dollars (\$), as appropriate. In this document, the results are presented in both currencies, using average exchange rates for the relevant time period.<sup>1</sup> To adjust for inflation, all costs reflect constant 2010 prices.

At a stakeholders' meeting in late October 2011, team members presented preliminary results from a selected number of sites in Greater Accra for initial feedback and guidance on further analysis. The team disseminated final unit costs in November 2011 to obtain feedback from the main stakeholders. Validation of the data occurred in January and February 2012, and the comments and suggestions from stakeholders were incorporated into this final report. A full description of costing analysis can be found in **Annex 2**.

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<sup>1</sup> Exchange rate of GHc 1.4738 per US\$1.

## RESULTS

The study yielded findings on the cost of delivering PMTCT services (the national average unit cost) to a woman and her infant from pregnancy through the recommended period of postpartum care.

### Unit Costs of PMTCT Services

The most representative indicator of national costs was an average cost across the 14 sites included in this study, weighted by the number of clients served at each facility. Application of the weighted average yielded an average cost per different type of client served, ranging from GHc 43.46 for HIV-exposed infants who are seropositive at 6 weeks to GHc 1553.45 for HIV-positive women on ARV treatment.

**Table 3** provides a summary of overall costs for each type of PMTCT client, disaggregated by type of cost. Further details are provided in **Annex 3**.

**Table 3. Average unit costs of PMTCT services, by type of client and type of cost (GHc)**

	HIV-negative Women	HIV-positive Women on ARV Prophylaxis (Option B)	HIV-positive Women on ARV Treatment	HIV-exposed Infants Who Are HIV Positive at 6 Weeks	HIV-exposed Infants Who Are HIV Positive at 6 Months	HIV-exposed Infants Who Are HIV Negative or HIV positive at 12 Months
<b>DIRECT COSTS</b>	<b>84.04</b>	<b>816.94</b>	<b>1,281.94</b>	<b>43.46</b>	<b>74.12</b>	<b>101.40</b>
Staff	39.50	155.22	153.83	11.30	19.27	27.38
Drugs	9.24	482.00	589.69	6.52	11.12	11.15
Laboratory testing	34.46	171.56	461.50	25.21	42.99	61.86
Medical consumables and supplies	0.84	8.17	76.92	0.43	0.74	1.01
<b>INDIRECT COSTS</b>		<b>271.52</b>	<b>271.52</b>	-	-	-
<i>Facility Level</i>	-	<b>154.02</b>	<b>154.02</b>	-	-	-
Non-client staff time	-	6.97	6.97	-	-	-
Office equipment	-	5.92	5.92	-	-	-
Physical infrastructure	-	4.13	4.13	-	-	-
Transportation costs	-	10.93	10.93	-	-	-

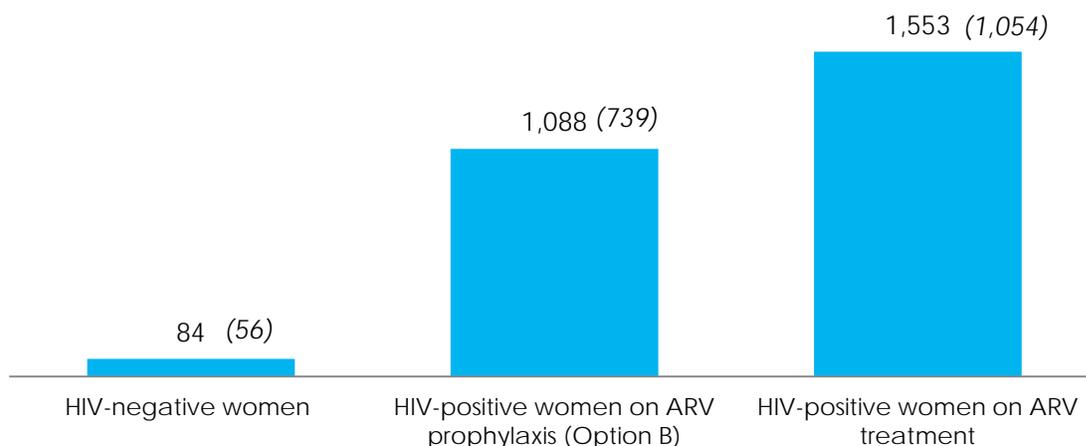
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	HIV-negative Women	HIV-positive Women on ARV Prophylaxis (Option B)	HIV-positive Women on ARV Treatment	HIV-exposed Infants Who Are HIV Positive at 6 Weeks	HIV-exposed Infants Who Are HIV Positive at 6 Months	HIV-exposed Infants Who Are HIV Negative or HIV positive at 12 Months
Public utilities and running costs	-	10.93	10.93	-	-	-
Maintenance and repair	-	53.27	53.27	-	-	-
Staff training and volunteers	-	0.70	0.70	-	-	-
Local medical and other supply costs	-	58.74	58.74	-	-	-
Vehicle costs	-	2.44	2.44	-	-	-
<b>General Programme Support</b>	-	<b>117.49</b>	<b>117.49</b>	-	-	-
Planning and programme management	-	2.35	2.35	-	-	-
Centrally managed trainings and supervision	-	89.30	89.30	-	-	-
M&E	-	19.97	19.97	-	-	-
Communication materials	-	5.87	5.87	-	-	-
<b>TOTAL</b>	<b>84.04</b>	<b>1,088.46</b>	<b>1,553.45</b>	<b>43.46</b>	<b>74.12</b>	<b>101.40</b>

**Unit costs, by different types of pregnant women**

Figure 1 shows unit costs by different types of pregnant women. When comparing the unweighted and weighted average costs, the weighted costs ranged from 1 to 10 percent higher. This is primarily because the majority of clients access services at higher-level facilities, where more specialised—and therefore more costly—staff deliver services. Although the fixed costs of drugs and other commodities were relatively stable across sites, changes in staff costs mainly contributed to the variation between weighted and unweighted costs. For instance, higher-level nursing staff often delivered PMTCT services at teaching and regional hospitals, where the majority of clients in this sample accessed services.

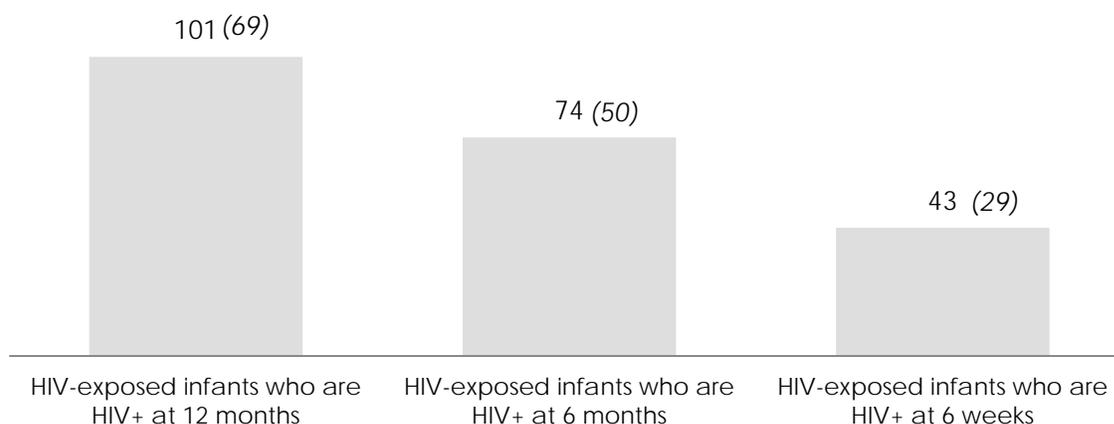
**Figure 1. Cost per pregnant woman served, national average in GHc (US\$)**



***Unit cost of PMTCT services, by different types of HIV-exposed infant***

Figure 2 shows unit costs for different types of HIV-exposed infants. According to national guidelines, HIV-exposed infants of seropositive women—either mothers on ARV prophylaxis or ARV treatment—receive a confirmatory HIV test with the use of a DBS test at six weeks, six months, and 12 months. An HIV-exposed infant determined to be HIV positive at any of these visits is transferred immediately to the pediatric care and treatment programme. As each confirmatory test has related costs, the cost of providing PMTCT services to an HIV-exposed infant differed based on if or when the infant’s final HIV status was determined and thus the number of confirmatory tests performed.

**Figure 2. Cost per HIV-exposed infant served, national average in GHc (US\$)**



Due to several factors—including the relatively small sample size, limitations of the M&E systems at the sites sampled to capture and track client visits accurately, and the lack of EID at the maternity home or the CHPS level—it was not possible to calculate weighted and unweighted average costs for the different types of HIV-exposed infants.

**Unit cost for mother-child pairs**

Figure 3 shows the unit cost for different types of mother-child pairs. The total unit cost for delivering the full package of PMTCT services was calculated based on different combinations of costs for a mother-infant pair, as each type of seropositive pregnant woman and HIV-exposed infant incurred different average unit costs.

**Figure 3. PMTCT unit cost for mother-child pairs, in GHC**

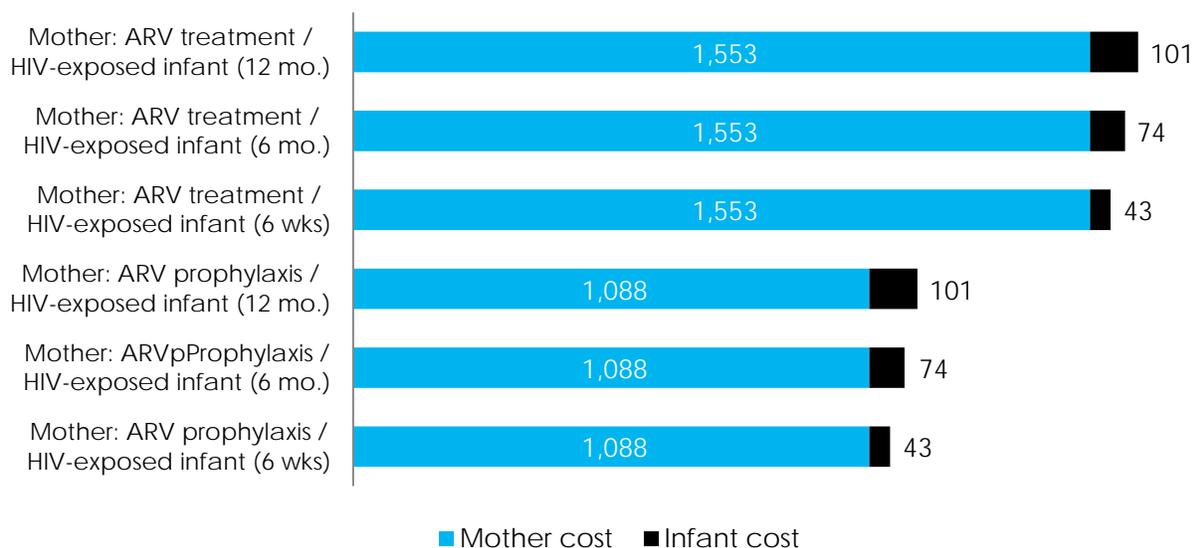
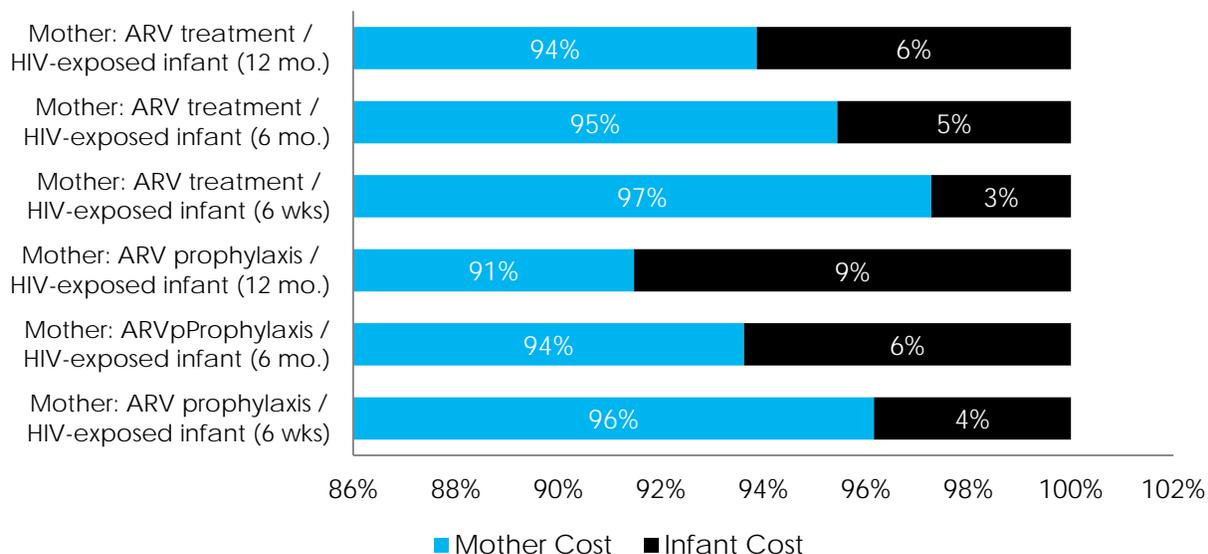


Figure 4 presents the distribution of costs for mother-child pairs as a percentage of total costs. In all mother-child pairs, the cost of care to the mother exceeded 90 percent of the total cost of services.

**Figure 4. Distribution of cost for mother-child pairs**

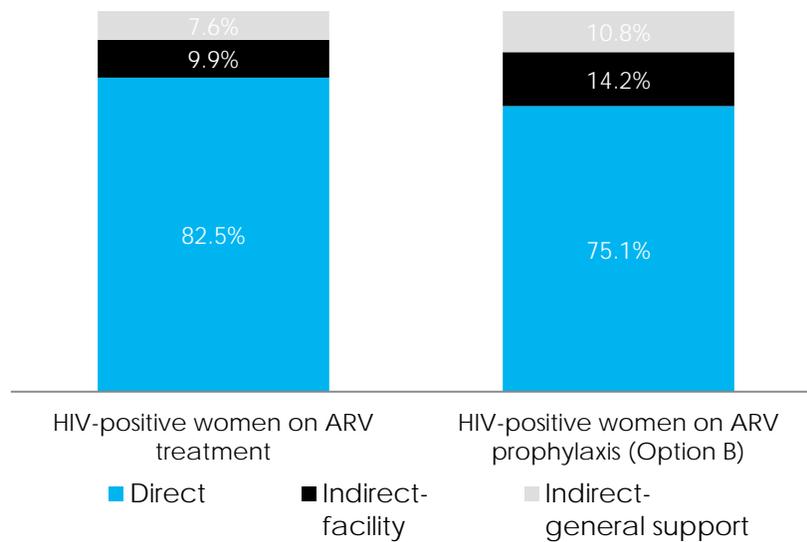


## Distribution of Costs

### *Distribution of direct and indirect costs for pregnant women*

The analysis permitted an examination of the programme's cost structure, including a breakdown by direct and indirect costs. **Figure 5** presents the distribution of direct and indirect costs within the average unit cost for delivering PMTCT services for different client types of pregnant women. Direct costs were resources explicitly identified with PMTCT services and included inputs such as the time spent by health workers in direct contact with clients, drugs and medical supplies used in a clinical setting, and medical equipment. Indirect costs were costs of supporting direct activities, including resources such as administrative staff, other general administrative costs, and support from the national PMTCT programme.

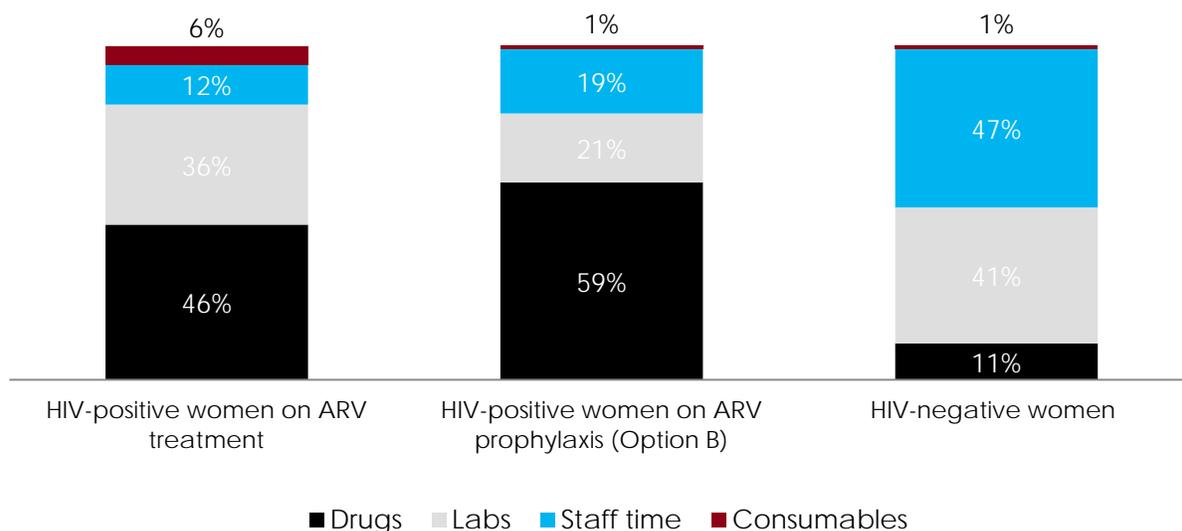
**Figure 5. Distribution of direct and indirect costs, HIV-positive pregnant women**



### *Distribution of direct costs for different types of pregnant women*

**Figure 6** presents the major components of direct costs as a proportion of all direct costs by the different types of pregnant women.

**Figure 6. Distribution of direct costs, pregnant women**



### *Drugs*

The following drugs were included in the analysis: ARV drugs; OI drugs; and other drugs associated with routine ANC care, such as Vitamin A and folic acid. For seropositive women on ART and seropositive women on prophylaxis, as expected, drugs were the largest cost components of direct costs. As no ARV or OI drugs are required for seronegative women, the cost component for drugs for this group represented a relatively smaller percentage of total direct costs.

### *Laboratory testing*

The study team included all tests associated with the PMTCT programme, including HTC, laboratory tests associated with immunologic assessment after a positive HIV diagnosis, and testing for OIs. For seropositive women on ART and seropositive women on prophylaxis, laboratory testing was the second largest cost component of direct costs. For seronegative women, since the laboratory tests that are part of HTC represent some of the only material costs associated with PMTCT services, the cost component for laboratory testing represented a relatively higher percentage of total direct costs.

### *Staff time*

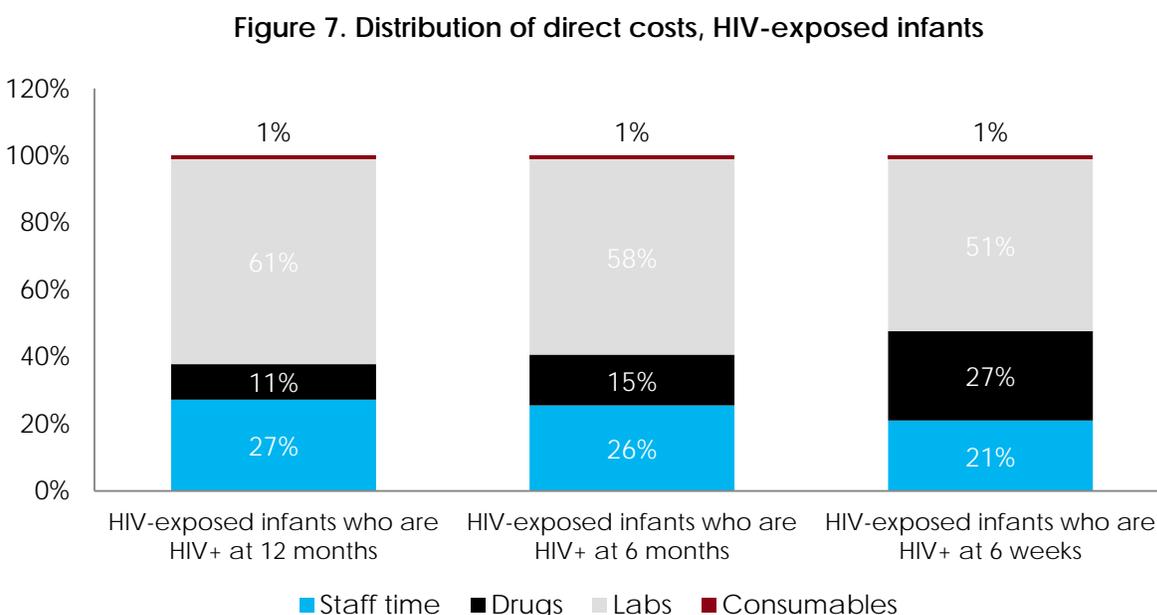
For seropositive women on ART and seropositive women on prophylaxis, staff time of healthcare workers who care directly for clients accounted for a relatively smaller percentage of total direct costs. For seronegative women, the cost of staff time represented the largest component of total direct costs. Some of the variation was attributable to differences in the categories of health workers delivering health services (i.e., doctors versus nurses). Other variation was attributable to the amount of time that health workers estimated they spent with clients; even more variation resulted from differences in what facility staff estimated as the average number of visits made by clients in a typical year.

### *Consumables*

The study team included medical and non-medical consumables associated with direct client care, such as cotton swabs, PMTCT registers, and bandages used after blood draws. For seropositive women on ART and seropositive women on prophylaxis, consumables accounted for the smallest percentage of direct costs. Similarly, for seronegative women, the cost component for consumables represented the smallest proportion (1%) of total direct costs.

### Distribution of direct costs for different types of HIV-exposed infants

Figure 7 presents the major components of direct costs as a proportion of all direct costs by the different types of HIV-exposed infants.



#### Drugs

The following drugs were included in the analysis: ARV prophylactic drugs administered to all HIV-exposed infants for the first six weeks of life and OI drugs administered for the duration of breastfeeding. Drugs represented a relatively smaller cost component of direct costs.

#### Laboratory testing

The study team included all laboratory testing for HIV-exposed infants, primarily comprising confirmatory tests associated with a polymerase chain reaction (PCR)-based HIV diagnosis at regular intervals as part of EID. These tests represented the largest cost components of direct costs. As expected, the relative proportion increased with the number of confirmatory tests performed. For instance, an HIV-exposed infant confirmed as seropositive during the first confirmatory test at six weeks incurred a relatively lower proportion of laboratory-associated costs than an HIV-exposed infant confirmed as seronegative or seropositive at 12 months.

#### Staff time

Staff time accounted for a relatively smaller cost component of direct costs. Some of the variation is attributable to differences in the categories of health workers delivering health services (i.e., doctors versus nurses). Other variation is attributable to the amount of time that health workers estimate as spent with clients; even more variation may result from differences in what facility staff estimate as the average number of visits made by clients in a typical year.

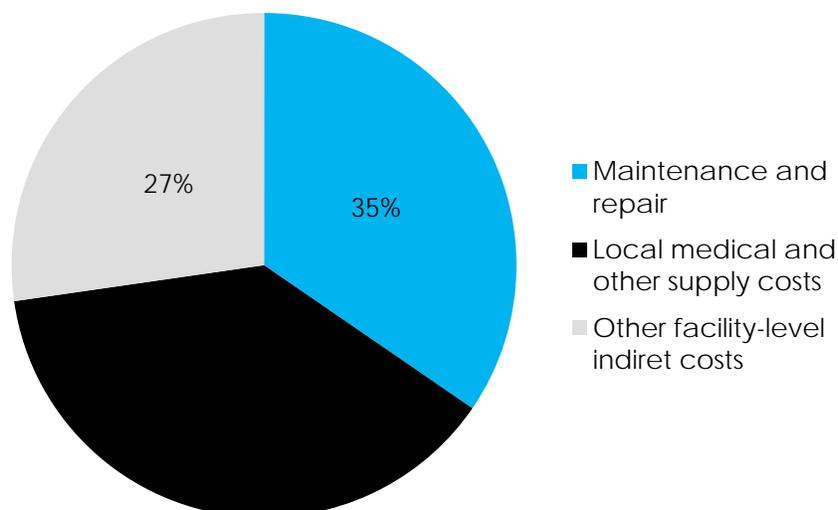
#### Consumables

The study team included medical and non-medical consumables associated with direct client care, such as cotton swabs, PMTCT registers, and bandages used after blood draws. Consumables account for the smallest cost component of direct costs, representing approximately 1 percent of all direct costs for all types of HIV-exposed infants.

### ***Distribution of facility-level indirect costs***

Figure 8 displays the distribution of facility-level indirect costs.

**Figure 8. Distribution of facility-level indirect costs**



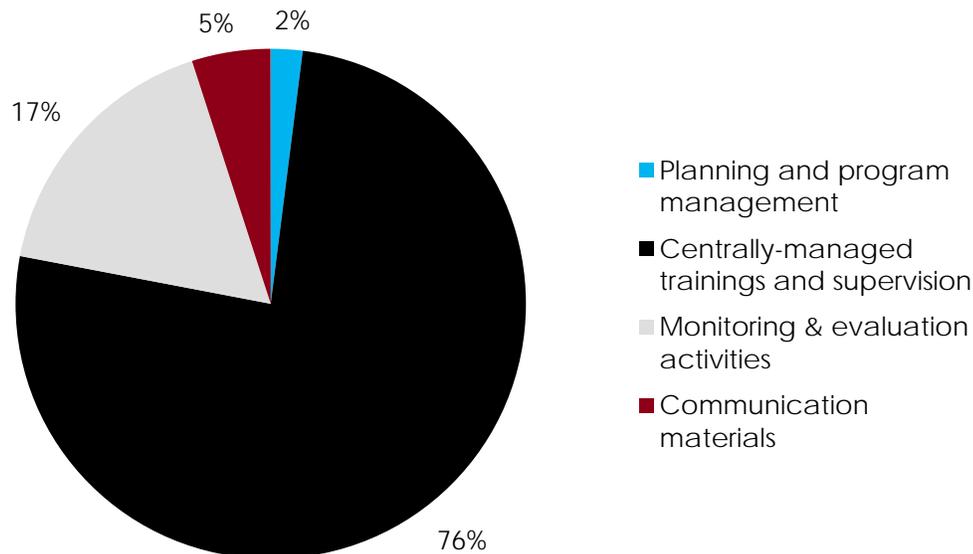
The largest cost component of facility-level indirect costs was the cost for facility-level equipment and local medical supplies and other supply costs for the facility. Although not all sites provided data for this category, data from those that did showed this cost to be driven largely by local costs of private facilities at the maternity home level, which procured many of their supplies locally. Maintenance and repair of vehicles and equipment accounted for the second largest cost component. Anecdotally, PMTCT professionals reported that facilities incurred many capital costs at the start-up of the project but have not reinvested much for new equipment since the establishment of the PMTCT programme—a factor that drove the costs of maintenance and repair of existing equipment.

All other costs only accounted for 27 percent of total facility-level indirect costs. Office equipment (4%) was reported to have a relatively long useful life, resulting in relatively low annual costs associated per client. Similarly, vehicles (2%) were reported to have relatively long useful lives. In addition, lower-level facilities, such as CHPS, did not report having access to vehicles for PMTCT, thus reducing the overall proportion of this cost. Non-client staff time only accounted for 5 percent of total costs. The cost components of volunteers and training accounted for only 0.5 percent. As most PMTCT services are not stand-alone but rather distributed throughout different units and departments within a facility, the relative contribution of PMTCT service costs to overall facility costs for physical space and utilities was comparably lower.

### ***Distribution of PMTCT central-level general support costs***

Figure 9 displays the distribution of central-level, general support indirect costs associated with the national PMTCT programme. As expected, centrally organised training and supervision was by far the largest cost component of overall general support costs, as training and supervision are primary activities of the central level.

Figure 9. Distribution of PMTCT central-level general support indirect costs



#### ***Distribution of total indirect costs***

The largest cost component of indirect costs was training and supervision organised at the central level, accounting for 33 percent of total indirect costs, with training costs by facilities accounting for under 0.25 percent of total indirect costs. Local medical supplies and other supply costs for the facility accounted for 22 percent of total indirect costs, with transport of supplies accounting for 4 percent. Maintenance and repair of vehicles and equipment accounted for 20 percent of total indirect costs.

The monitoring and evaluation of the national PMTCT programme accounted for 7 percent of total indirect costs. Planning and administration of the PMTCT programme accounted for 4 percent, and the production and distribution of communication materials in the promotion of PMTCT in Ghana accounted for 2 percent. Office equipment at facilities accounted for only 2 percent of total indirect costs. Costs associated with vehicles accounted for only 1 percent of total indirect costs. Non-client staff time accounted for only 3 percent. The relative contribution of PMTCT service costs to overall facility costs for physical space and utilities was comparably lower, accounting for only 2 percent and 4 percent of total indirect costs, respectively.

## DISCUSSION AND CONCLUSION

The most important results of this study were the high direct service delivery costs relative to indirect costs for delivering PMTCT services and the costs associated with higher-level staff implementing PMTCT services in facilities. These results suggest that the Government of Ghana and stakeholders have little control over the major cost drivers of their PMTCT programme and should not anticipate large variations in the cost of delivering PMTCT services in the short term—though some cost efficiencies could be achieved through more strategic staffing of the PMTCT programme. A weak monitoring and evaluation system for the PMTCT programme also contributed to challenges in analysing costs and should be a priority area for support moving forward.

The study team found that unit costs were driven more by direct costs than indirect costs. Within direct costs, the two major cost contributors were ARV drugs and the associated laboratory testing for seropositive pregnant women, accounting for more than 60 percent of total unit costs across different client types. These results are consistent with findings from a 2010 Ghana-specific study on ART costs and other similar studies in low- and middle-income countries (Rosen and Asante, 2010; Galárraga et al., 2011). At the international level, it is important to acknowledge that the cost of ARV drugs has changed dramatically over the last 10 years—due to increased availability of generically manufactured drugs and reforms to importation and intellectual property rights since 2001, with the price of some drug regimens dropping by more than 90 percent (Perez-Casas et al., 2001; WTO, 2001; MSF, 2011). However, according to UNAIDS, the scope for further reductions in the price of ARV drugs is assumed to be limited moving forward (UNAIDS, 2011). Though laboratory-associated and other commodity costs procured internationally may continue to drop over time through further negotiations, these prices are largely out of the control of the government and its donors; thus, stakeholders should expect relatively little variation in these costs in the short term.

While the largest cost components are not subject to much variation, some cost drivers could be reduced with functional changes in service delivery and thus reduce the unit cost per client of delivering PMTCT services. Indirect costs, such as centrally managed trainings and supervision and national monitoring and evaluation activities, contributed to between 17 percent and 25 percent of total costs for providing services to seropositive pregnant women. As these costs are distributed over all PMTCT clients, higher client loads and increased uptake of PMTCT services among pregnant women will reduce the per-client cost of delivering PMTCT services. This is important because national PMTCT programme figures included in the NSP 2011–2015 indicate that more clients are using PMTCT services each year. The PMTCT Scale-up Plan 2011–2015 also includes the significant scale-up of community awareness raising and sensitisation around the importance of PMTCT services at the community level, which may further increase PMTCT uptake. Though more clients accessing PMTCT services will distribute indirect costs over a larger client population and may slightly lower the total unit cost per client, the largest drivers of cost are not subject to these economies of scale, as described above, suggesting that increased funding must be mobilised to meet increased client needs over time with limited variability of overall unit costs.

Similarly, although the study team was not tasked to detect changes by facility level, and the sample was too small to draw any concrete conclusions, the team found that higher staff costs were associated with higher-level facilities, such as teaching and regional hospitals, where more specialised staff often provide basic services. In contrast, at lower-level facilities, such as the CHPS and the maternity homes, staff costs were relatively lower. In this context, efficiencies also may be gained by task shifting within PMTCT service delivery or hiring lower-level, non-specialised staff dedicated to delivering non-specialised services (e.g., counselling service). If non-specialised PMTCT services were shifted to a lower level of nursing staff or to lay counselors, cost efficiencies would be achieved. This would require up-front investment in training and capacity building to ensure that the quality of service delivery is maintained—costs that would need to be considered. The relatively low cost components of volunteers

and training at the facility level for example (0.5% of indirect costs) suggest that most training events are organised and sponsored by central-level organisations, with the facilities incurring no local costs and not investing in facility-level initiatives to improve the quality of services. This might be an area of further research.

The PMTCT programme also varied in significant ways across sites, which needs to be addressed at the facility level. Anecdotally, staff did not describe the PMTCT programme as an integrated service but rather as a series of different services distributed throughout the different units and departments of their facilities—and with various staff playing different roles at different times in the programme in the absence of dedicated staff. Although most PMTCT services were housed within ANC clinics, no stand-alone PMTCT sites were included in our sample. Based on the client load and number of available staff, staff often rotate between units and wards and often share responsibilities when high client loads exist. The number of clients also differs dramatically, ranging from fewer than 150 clients at a CHPS or maternity home to more than 10,000 clients at some teaching hospitals. The diversity of the sites along these dimensions complicated the analysis of the entire PMTCT programme package and the interpretation of results.

Although this study identified six different types of PMTCT clients, facilities were not capable of accurately reporting on the use of services by different types of clients. For instance, non-client staff time only accounted for 5 percent of total costs, suggesting that the majority of staff time in the PMTCT programme is spent on direct service delivery to clients, with staff spending less time on non-client-related tasks such as monitoring and reporting activities. These data are essential for estimating reliable national estimates of the PMTCT programme so that adequate resources are mobilised to meet the demand for different services. This could be particularly problematic in the case of HIV-exposed infants, where an inability to accurately report on the number of HIV-exposed infants tested at six weeks, six months, and 12 months could be indicative of weak follow-up systems at the community level within some facilities—though further research would be required into this area.

Though the study team was able to collect adequate data to answer the study questions, there were some limitations. The biggest limitation was the non-randomised selection of study sites, which introduced an element of uncertainty in extrapolating results to the national level. To mitigate the magnitude of this bias, the study attempted to include sites with relatively higher levels of service delivery—that is, major teaching and regional hospitals throughout the country. Another limitation was the relatively small sample size of only 14 facilities, particularly given the large number of CHPS and maternity homes offering community-level PMTCT services. The small sample size did not allow analysis of variations according to the different criteria used to select study sites and allowed only for the development of one national average unit cost for service delivery.

Further, this study did not take into account the significant role that HIV stigma may play in the limited uptake of PMTCT programmes. Further research would be necessary to fully understand the impact of stigma on client loads and PMTCT uptake. Another limitation was that much of the data on resource use were based on estimates or best guesses derived from expert interviews rather than direct observation. Among the most important data elements were the amount of staff time consumed in the typical client visit and the average number of visits made by the typical client during a year. Although all sites had information on the number of clients enrolled in the programme, few kept accurate data on the number of visits made by clients in a year. These estimates could introduce errors into the cost results.

Lastly, although the data collection teams administered a standard questionnaire at each site, the quality and completeness of the data were not uniform across sites. As the results indicate, these inputs were all relatively minor contributors to overall unit cost. As a consequence, any underestimate of unit cost arising from absent information probably is minimal. The data collection teams attempted to contact and

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interview those persons most knowledgeable about programme operations. However, responsibility for programmes typically is scattered across various persons and departments within sites. Given the limited time available at each site, the data collection teams were not always able to locate and interview key informants and thus unable to collect data on some of the facility-wide indirect costs shared by the PMTCT programme, such as the cost of public utilities, maintenance and repair, and transportation.

## RECOMMENDATIONS

This study provided useful and actionable findings for PMTCT stakeholders in Ghana, with recommendations towards reducing cost while improving the quality of PMTCT services. In general, the Government of Ghana should use these results when updating the costing of the NSP on HIV/AIDS 2011–2015 and in budgeting future project proposals to GFATM and other potential donors. Specific recommendations below are presented for the Government of Ghana, health facilities, and donors.

First, the government should strengthen the national M&E system for the PMTCT programme. Facilities need to be collecting accurate, high-quality data on the different types of clients accessing different services and report it up to the central level in a timely manner. This will enable for improvements across different dimensions of the programme—from improving the ability of national-level stakeholders to accurately project national PMTCT programme costs to increasing the identification of HIV-exposed infants lost to follow-up within communities. To accomplish this, the national PMTCT programme should review programme indicators and tools in line with the new PMTCT guidelines, revise tools accordingly, and conduct targeted training on their use for facility staff responsible for reporting and monitoring and evaluation.

Next, the government should conduct further research on the impact of task shifting within PMTCT services on the quality of care. This could include determining the most appropriate level of nursing and other healthcare staff to perform the different PMTCT services included in the national guidelines and conducting modeling on the resources required or cost savings achieved by shifting some services down to less specialised staff. Qualitative research and client satisfaction surveys could also provide insight into the quality of care currently being provided to different PMTCT clients by the different levels of healthcare staff providing services within facilities to determine the most appropriate levels of staff to provide different services. Finally, it is imperative that the government continue to mobilise resources to ensure that the PMTCT supply meets increasing demand, under the assumption that unit costs will not significantly decline over time, while more pregnant women are projected to use PMTCT services over time.

Health facilities offering PMTCT services should review and analyse their PMTCT client loads over the calendar year in terms of healthcare personnel to better understand and plan for the most efficient use of staff time for PMTCT service delivery. This could include exploring strategies to recruit peer educators or other volunteers who can support healthcare staff in providing non-specialised PMTCT services, such as counselling services and health education. In addition, many facilities reported high costs of procuring local medical supplies and other consumables at the local level. Facilities should explore mechanisms for conducting procurements together, where a group of facilities could negotiate lower prices for bulk supplies.

Donor support related to HIV currently focuses on consumables and covering drugs and laboratory costs, whereas government support focuses more on human resources. However, supporting lay staff to provide PMTCT interventions—particularly at sites with high client loads—would free up more specialised staff for more specialised tasks and reduce the overall cost of delivering services per client. The most important role donors should play is in continued resource allocation to the PMTCT programme to ensure that supply is able to meet demand in coming years.

## ANNEX 1. ARV TREATMENT OPTIONS RECOMMENDED FOR HIV-POSITIVE PREGNANT WOMEN

ARV treatment options recommended for HIV-positive pregnant women who need treatment for their own health

	Treatment Options
<b>Mother</b>	
<p>All HIV-positive pregnant women with CD4 cell count &lt;350 cells/mm<sup>3</sup>, irrespective of WHO clinical staging</p> <p>and</p> <p>All HIV-positive pregnant women in WHO Clinical Stages 3 or 4, irrespective of CD4 cell count</p>	<p>The preferred first-line ART regimen should include an AZT + 3TC backbone:</p> <p>AZT + 3TC + NVP or</p> <p>AZT + 3TC + EFV (EFV is contraindicated in 1<sup>st</sup> Trimester)</p> <p>Alternative regimens that are recommended include</p> <p>TDF + 3TC (or FTC) + NVP or</p> <p>TDF + 3TC (or FTC) + EFV*</p> <p>(TDF recommended in cases of anaemia)</p>
<b>Infant</b>	
All HIV-exposed infants	Irrespective of feeding option: Provide AZT twice daily for six weeks; NB: NVP should be given daily for six weeks if baby has anemia or hemorrhagic disease

Definitions: AZT: zidovudine; 3TC: lamivudine; NVP: nevirapine; EFV: efavirenz; TDF: tenofovir; FTC: emtricitabine.

## ANNEX 2. DETAILS ON COSTING METHODS AND ANALYSIS

For each main type of input, the table below describes the methods and sources for estimating quantities of inputs, prices, and unit costs. The inputs are grouped into categories of (1) direct costs per visit, (2) indirect costs directly associated with the PMTCT programme, and (3) general support costs.

Quantities	Sources	Comments	Prices	Sources	Comments
<b>Direct Costs per Visit</b>					
<b>Staff Time</b>					
Average number of minutes each health worker directly provides services to the typical client, by type of visit	Facility staff interviews	Reported average times may not reflect real resource use; reported average times do not incorporate down time and may underestimate true resource costs	Calculated per minute of compensation for 20 categories of staff, based on 2010 GHS central-level data on compensation	GHS national data GHS 2010 salary structure	Compensation includes salary and benefits

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Quantities	Sources	Comments	Prices	Sources	Comments
<b>Drugs</b>					
<b>ARV Drugs</b>					
Quantity required for one woman on ARV prophylaxis from 14 weeks of pregnancy and for 12 months of breastfeeding Quantity required by one woman on ARV treatment for 21 months Quantity required for one HIV-exposed infant for one week  Price per dose * doses per day * total number of days on prophylaxis; calculated separately for each type of client	National PMTCT Guidelines  NACP data on distribution of clients by drug regimen (NACP, 2010)  National Cost Quantifications for PMTCT (NACP, 2011)  For women on ARV treatment (Rosen and Asante, 2010)	Does not include transportation fees	Negotiated international rate	Central-level information on negotiated ARV drug prices (NACP 2010 prices in US\$)	
<b>OI Drugs and Other ANC-related Drugs</b>					
For cotrimoxazole, quantity required for one pregnant woman and one HIV-exposed infant over a 21-month period  For Vitamin A and folic acid, quantity required for one pregnant woman and one HIV-exposed infant over a 21-month period	National PMTCT Guidelines  For women on ARV treatment (Rosen and Asante, 2010)		Price per drug dose	National Health Insurance Scheme Medicines List (October 2011 price list)	

Quantities	Sources	Comments	Prices	Sources	Comments
<b>Medical Consumables and Other Supplies</b>					
Average quantity used per visit, by type of visit  Price per item, multiplied by average quantity of items used in a visit	Facility staff interviews  For women on ARV treatment (Rosen and Asante, 2010)		Price of item used	Estimates by authors, based on international and local prices	
<b>Laboratories</b>					
For each test, quantity for one pregnant woman or one HIV-exposed infant for 21 months  For each test, price per test *average number of tests per client * percent of clients getting test; calculated separately for pregnant women and HIV-exposed infants	National PMTCT Guidelines  For women on ARV treatment (Rosen and Asante, 2010)		Cost per laboratory test	National Cost Quantifications for PMTCT, NACP 2011	
<b>Indirect Costs per Visit Associated with the PMTCT Programme at the Facility Level</b>					
<b>Staff Time (professional and administrative)</b>					
Number of professional and administrative staff and percentage of non-client time spent on PMTCT programme in a year	Facility staff interviews		Calculated per minute of compensation for 20 categories of staff, based on 2010 GHS central-level data on compensation	GHS national data GHS 2010 Salary Structure	Compensation includes salary and benefits.

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Quantities	Sources	Comments	Prices	Sources	Comments
<b>Office Equipment</b>					
Number and types of equipment used in each type of visit Yearly depreciated replacement cost * use in PMTCT programme as percentage of total use in facility ÷ yearly number of PMTCT clients served by facility	Walk-through of facility, facility staff interviews		Replacement cost of item, straight-line depreciation by useful life	Price estimates by authors, based on local prices; useful life set by authors using international standards	
<b>Physical Infrastructure</b>					
Number of square meters of physical space used in PMTCT programme	Measured in each facility		Cost per square meter, based on rental cost of equivalent commercial space Yearly cost per square meter * number of square meters * use of space in PMTCT programme as proportion of total use of space ÷ yearly number of PMTCT clients served by facility	Authors' estimates, based on information from local property valuation experts	
<b>Transport Costs</b>					
Total yearly cost * PMTCT visits as proportion of all outpatient visits at facility * outpatient visits as proportion of all facility services ÷ yearly number of PMTCT clients served by facility	Measured in each facility		Annual transportation costs for facility	Facility staff interviews, review of facility records	

Quantities	Sources	Comments	Prices	Sources	Comments
<b>Public Utilities &amp; Running Costs</b>					
Total yearly cost * PMTCT visits as proportion of all outpatient visits at facility * outpatient visits as proportion of all facility services ÷ yearly number of PMTCT clients served by facility	Measured in each facility		Annual costs for facility as a whole	Facility staff interviews, review of facility records	
<b>Maintenance &amp; Repair</b>					
Total yearly cost * PMTCT visits as proportion of all outpatient visits at facility * outpatient visits as proportion of all facility services ÷ yearly number of PMTCT clients served by facility	Measured in each facility		Annual costs for facility as a whole	Facility staff interviews, review of facility records	
<b>Staff Training</b>					
Fixed quantity of training costs per PMTCT site	Facility staff interviews		Total yearly amount spent on trainings ÷ yearly number of PMTCT clients served by facility	Measured in each facility	
<b>Local Medical &amp; Other Supply Costs</b>					
Vary by facility Total yearly cost ÷ yearly number of PMTCT clients served by facility	Facility staff interviews, review of facility records		Total cost for year	Local facility	

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Quantities	Sources	Comments	Prices	Sources	Comments
<b>Vehicle Costs</b>					
Number and types of vehicles used for service delivery Yearly depreciated replacement cost * use in PMTCT programme as percentage of total use in facility ÷ yearly number of PMTCT clients served by facility	Walk-through of facility, Facility staff interviews		Replacement cost of item, straight-line depreciation by useful life	Price estimates by authors, based on local prices; useful life set by authors using international standards	
<b>Indirect Costs per Visit Associated with General PMTCT Programme Support</b>					
Total support costs allocated to PMTCT programme ÷ total number of PMTCT clients nationally	NACP, 2011 Authors' calculations		Total annual NACP support cost	NACP, 2011	

## ANNEX 3. DETAILED COST RESULTS

### Cost per client for PMTCT programme, by direct and indirect costs (Ghc)

	HIV-negative Women			HIV-positive Women on ARV Prophylaxis (Option B)			HIV-positive Women on ARV Treatment			HIV-exposed Infants Who Are HIV Positive at 6 weeks			HIV-exposed Infants Who Are HIV Positive at 6 months			HIV-exposed Infants Who Are HIV Negative or HIV Positive at 12 months		
	Cost	% of Cost Component	% of Total Cost	Cost	% of Cost Component	% of Total Cost	Cost	% of Cost Component	% of Total Cost	Cost	% of Cost Component	% of Total Cost	Cost	% of Cost Component	% of Total Cost	Cost	% of Cost Component	% of Total Cost
<b>DIRECT COSTS</b>	<b>84.04</b>	<b>100%</b>	<b>100%</b>	<b>816.94</b>	<b>100%</b>	<b>75%</b>	<b>1,281.94</b>	<b>100%</b>	<b>83%</b>	<b>43.46</b>	<b>100%</b>	<b>100%</b>	<b>74.12</b>	<b>100%</b>	<b>100%</b>	<b>101.40</b>	<b>100%</b>	<b>100%</b>
Staff	39.50	47%	47%	155.22	19%	14%	153.83	12%	10%	11.30	21%	21%	19.27	26%	26%	27.38	27%	27%
Drugs	9.24	11%	11%	482.00	59%	44%	589.69	46%	38%	6.52	27%	27%	11.12	15%	15%	11.15	11%	11%
Laboratory testing	34.46	41%	41%	171.56	21%	16%	461.50	36%	30%	25.21	51%	51%	42.99	58%	58%	61.86	61%	61%
Medical consumables and supplies	0.84	1%	1%	8.17	1%	1%	76.92	6%	5%	0.43	1%	1%	0.74	1%	1%	1.01	1%	1%
<b>INDIRECT COSTS</b>		<b>0%</b>	<b>0%</b>	<b>271.52</b>		<b>25%</b>	<b>271.52</b>		<b>17%</b>	<b>-</b>	<b>0%</b>	<b>0%</b>	<b>-</b>	<b>0%</b>	<b>0%</b>	<b>-</b>	<b>0%</b>	<b>0%</b>
Facility Level	-	0%	0%	154.02	100%	14%	154.02	100%	10%	-	0%	0%	-	0%	0%	-	0%	0%
Non-client staff time	-	0%	0%	6.97	5%	1%	6.97	5%	0%	-	0%	0%	-	0%	0%	-	0%	0%
Office equipment	-	0%	0%	5.92	4%	1%	5.92	4%	0%	-	0%	0%	-	0%	0%	-	0%	0%
Physical infrastructure	-	0%	0%	4.13	3%	0%	4.13	3%	0%	-	0%	0%	-	0%	0%	-	0%	0%
Transportation costs	-	0%	0%	10.93	7%	1%	10.93	7%	1%	-	0%	0%	-	0%	0%	-	0%	0%
Public utilities and running costs	-	0%	0%	10.93	7%	1%	10.93	7%	1%	-	0%	0%	-	0%	0%	-	0%	0%
Maintenance and	-	0%	0%	53.27	35%	5%	53.27	35%	3%	-	0%	0%	-	0%	0%	-	0%	0%

Unit Cost of Providing Key Services at the Facility Level to Prevent  
Mother-to-Child Transmission of HIV: Ghana

	HIV-negative Women			HIV-positive Women on ARV Prophylaxis (Option B)			HIV-positive Women on ARV Treatment			HIV-exposed Infants Who Are HIV Positive at 6 weeks			HIV-exposed Infants Who Are HIV Positive at 6 months			HIV-exposed Infants Who Are HIV Negative or HIV Positive at 12 months		
	Cost	% of Cost Component	% of Total Cost	Cost	% of Cost Component	% of Total Cost	Cost	% of Cost Component	% of Total Cost	Cost	% of Cost Component	% of Total Cost	Cost	% of Cost Component	% of Total Cost	Cost	% of Cost Component	% of Total Cost
repair																		
Staff training and volunteers	-	0%	0%	0.70	0%	0%	0.70	0%	0%	-	0%	0%	-	0%	0%	-	0%	0%
Local medical and other supply costs	-	0%	0%	58.74	38%	5%	58.74	38%	4%	-	0%	0%	-	0%	0%	-	0%	0%
Vehicle costs	-	0%	0%	2.44	2%	0%	2.44	2%	0%	-	0%	0%	-	0%	0%	-	0%	0%
<b>General Programme Support</b>	-	<b>0%</b>	<b>0%</b>	<b>117.49</b>	<b>100%</b>	<b>11%</b>	<b>117.49</b>	<b>100%</b>	<b>8%</b>	-	<b>0%</b>	<b>0%</b>	-	<b>0%</b>	<b>0%</b>	-	<b>0%</b>	<b>0%</b>
Planning and programme management	-	0%	0%	2.35	2%	0%	2.35	2%	0%	-	0%	0%	-	0%	0%	-	0%	0%
Centrally managed trainings and supervision	-	0%	0%	89.30	76%	8%	89.30	76%	6%	-	0%	0%	-	0%	0%	-	0%	0%
M&E	-	0%	0%	19.97	17%	2%	19.97	17%	1%	-	0%	0%	-	0%	0%	-	0%	0%
Communication materials	-	0%	0%	5.87	5%	1%	5.87	5%	0%	-	0%	0%	-	0%	0%	-	0%	0%
<b>TOTAL</b>	<b>84.04</b>	<b>100%</b>	<b>100%</b>	<b>1,088.46</b>	<b>100%</b>	<b>100%</b>	<b>1,553.45</b>	<b>100%</b>	<b>100%</b>	<b>43.46</b>	<b>100%</b>	<b>100%</b>	<b>74.12</b>	<b>100%</b>	<b>100%</b>	<b>101.40</b>	<b>100%</b>	<b>100%</b>

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