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Maternal and Child Survival Program

Costing of an Essential Child Health Package in Uganda

Analysis of Costs to Roll-out and Deliver the Package at Public Primary Health Care Facilities

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www.mcsprogram.org

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MCSP is a global USAID initiative to introduce and support high-impact health interventions in 25 priority countries to help prevent child and maternal deaths. MCSP supports programming in maternal, newborn, and child health, immunization, family planning and reproductive health, nutrition, health systems strengthening, water/sanitation/hygiene, malaria, prevention of mother-to-child transmission of HIV, and pediatric HIV care and treatment. MCSP will tackle these issues through approaches that also focus on household and community mobilization, gender integration, and digital health, among others.

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Cover Photo: A health worker at a HCIII in East Central Uganda explaining results of a rapid diagnostic test to a mother; Credit Kate Holt/MCSP

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Acronym List

ACT	Artemisinin-combined therapy
ARV	Antiretroviral therapy
cMYP	Comprehensive Multi-Year Plan
DHIS2	District Health Information System 2
DL	Distance learning
EC	East-Central
ECHP	Essential Child Health Package
ENT	Ear, nose, throat
GFATM	The Global Fund to Fight AIDS, Tuberculosis, and Malaria,
GOU	Government of Uganda
HC	Health center
HIV/AIDS	Human immunodeficiency virus/Acquired immunodeficiency syndrome
HMIS	Health management information system
iCCM	Integrated Community Case Management
IMNCI	Integrated Management of Neonatal and Childhood Illness
MAM	Moderate acute malnutrition
MCSP	Maternal and Child Survival Program
M&IE	Meals and incidental expenses
MOH	Ministry of Health
mRDT	Malaria rapid diagnostic test
NMS	National Medical Stores
PBF	Performance-based financing
PEPFAR	President's Emergency Plan for AIDS Relief
PHC	Primary health care
REC	Reaching Every Child
RHITES	Regional Health Integration to Enhance Services
RMNCAH	Reproductive, maternal, newborn, child, and adolescent health
SAM	Severe acute malnutrition
SIC	Short-interrupted course
SW	Southwest
TOT	Training of trainer
U5	Under-five
UGX	Ugandan Shilling
USAID	United States Agency for International Development
USD	United States Dollar
VHT	Village Health Team

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Executive Summary

Introduction and Motivation

In Uganda, the United States Agency for International Development (USAID)'s flagship Maternal and Child Survival Program (MCSP) has provided child health technical assistance to two of USAID's Regional Health Integration to Enhance Services (RHITES) programs in the Southwest (SW) and East-Central (EC) regions. In collaboration with the Government of Uganda (GOU) and MCSP, the RHITES programs have worked to implement aspects of Uganda's Reproductive, Maternal, Newborn, Child, and Adolescent Health (RMNCAH) Sharpened Plan. Since 2017, these groups have worked together in four prioritized high child mortality districts—Kaliro and Luuka in EC and Ntungamo and Sheema in SW—to implement a prioritized or "essential" child health package (ECHP) with the goal to assess the feasibility of scaling the package to other districts in Uganda. Accordingly, MCSP conducted a costing analysis to understand the financial implications of expanding the ECHP, specifically estimating the costs of the MCSP- and RHITES-supported activities, such as integrated trainings and mentorship, and the costs to deliver the full ECHP at public primary health care (PHC) facilities.

Costs of Strategies to Roll-out ECHP

MCSP worked with the GOU, RHITES-SW, and RHITES-EC to conduct a costing analysis of national, regional, and district strategies to roll out the ECHP. The programmatic costing of strategies to roll out ECHP focused on direct costs associated with training and supporting the implementation of integrated management of neonatal and childhood illnesses (IMNCI) as part of the ECHP. The analysis used prospective data collection to gather and analyze programmatic/financial data as MCSP and RHITES implemented the activities from August 2017 through June 2018.

MCSP and RHITES employed two different integrated IMNCI training and mentorship methodologies across the four districts to roll out the ECHP—distance learning (DL) and short-interrupted course (SIC)—to compare the logistical and cost feasibility of the approaches, as well as the relative effectiveness of improving health worker competencies. They also conducted national and regional training of trainers (TOT) to support district-level roll-out. Table 1 summarizes the facility-based DL and SIC approaches.

Table 1: Short-interrupted course and distance learning methodologies

Approach	Training	Mentorship
Short-interrupted course	Two in-person sessions ideally two weeks apart; the first a three-day session, the second a two-day session	Three mentorship sessions in total; one in between each face-to-face session and two following course completion. Conducted by district and programmatic staff.
Distance learning	Three one-day in-person sessions followed by independent/group-led learning onsite.	Four mentorship sessions in total; one in between each face-to-face session and two following course completion. Conducted by district and programmatic staff.

The analysis team first calculated and averaged costs for each level of implementation—national, regional, and district—and further analyzed by cost category and training delivery method based on the costs incurred by the three programs (i.e., programmatic perspective). For the TOTs, the analysis team averaged costs per person trained for each level of activities to calculate training unit costs for scale-up; Table 2 displays the national and regional per trainer trained costs in Ugandan Shillings (UGX) and United States Dollar (USD).

Table 2: Average cost per trainer trained, programmatic perspective

Training of trainers	Average cost per trainer trained
National TOT	UGX 1,663,945 / USD 449
Regional TOT	UGX 7,094,655 / USD 1,915

At the district level, RHITES-SW and RHITES-EC conducted IMNCI trainings for health center (HC) II, HCIII, and HCIV staff. On average, the programs trained two facility staff from each HCII, four staff from each HCIII, and 8-10 staff from each HCIV. Facilities then received mentorship from district and programmatic staff in accordance with the SIC or DL mentorship sequence. Table 3 details the combined training and mentorship average costs from a programmatic perspective to roll out the SIC and DL methodology and at each facility level. Using a weighted average cost for each training/mentorship methodology, the average cost to fully train and mentor a facility using the SIC methodology was approximately 1.5 times more than the DL average.

Table 3: Average per facility combined training and mentorship costs, by methodology and facility level, programmatic perspective

Facility level	Distance learning (4 mentoring visits)	Short-interrupted course (3 mentoring visits)
HCII (2 persons trained)	UGX 4,679,231 / USD 1,263	UGX 5,242,151 / USD 1,415
HCIII (4 persons trained)	UGX 7,176,483 / USD 1,937	UGX 9,190,838 / USD 2,481
HCIV (9 persons trained)	UGX 13,419,615 / USD 3,622	UGX 19,062,555 / USD 5,145

The analysis team also estimated costs from the GOU perspective, determining what it would cost the GOU to assume financial responsibility for implementing the TOT and integrated training and mentorship methodologies. To estimate these costs from the GOU perspective, the analysis team applied an average government salary rate[1] to the MCSP and RHITES program level of effort (captured in days). The analysis team did not adjust lodging and meals and incidental expenses (M&IE) rates as those reported by the programs aligned with government scales, though budgeting projections may vary depending on the level and number of government staff involved in trainings. Table 4 displays the average per facility costs from the GOU perspective to train and mentor health workers using the DL and SIC methodologies.

Table 4: Average per facility combined training and mentorship costs, by methodology and facility, government perspective

Facility level	Distance learning (4 mentoring visits)	Short-interrupted course (3 mentoring visits)
HCII (2 persons trained)	UGX 2,912,019 / USD 782	UGX 3,841,498 / USD 1,031
HCIII (4 persons trained)	UGX 4,630,961 / USD 1,243	UGX 6,979,053 / USD 1,873
HCIV (9 persons trained)	UGX 8,928,315 / USD 2,396	UGX 14,823,017 / USD 3,978

Costs to Deliver ECHP in Public PHC Facilities

To complement the cost estimates of the strategies to roll out the ECHP, MCSP determined the actual costs of delivering the services and activities included in the ECHP at PHC facilities in the supported districts. The facility costing employed a retrospective ingredients-based approach to estimate the costs of provision of the services and activities included in ECHP in HCIIs, HCIIIs, and HCIVs. The costing identified each of the services and activities within the ECHP (e.g., malaria or outreach), identified cost categories, collected unit

[1] Calculated as the average of U2 upper and U2 lower Government of Uganda salary band monthly rates. Monthly salary estimates were divided by an average 20 work-day month for a daily rate.

cost and utilization and data for each service/activity, and then generated annual cost estimates for the overall package. The analysis used the period from January 2018 to June 2018. Data came from a 12-facility sample across four districts and from other public sources.

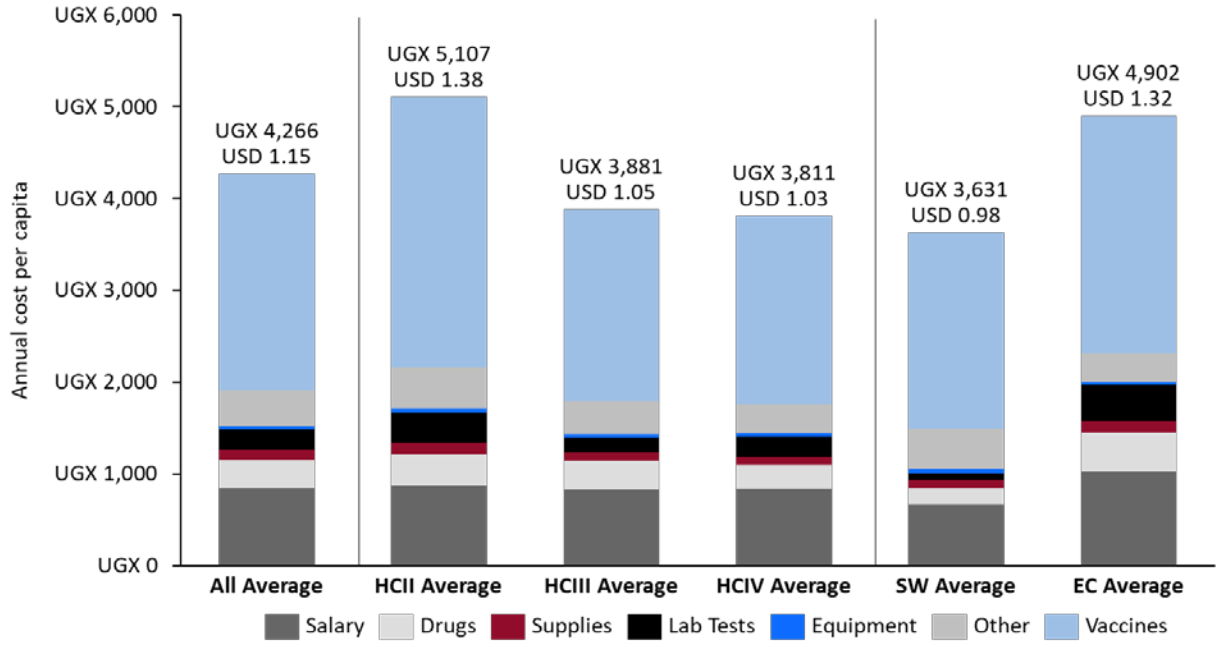
Across all twelve sampled facilities, the average annual cost to provide the ECHP was approximately UGX 59 million (USD 15,900), with the average annual costs increasing for higher level health facilities; Table 5 displays the annual average cost by different facility levels and regions.

Table 5: Average annual facility costs to deliver ECHP, by facility level and region

Facility level	All average	East-Central	Southwest
HCII	UGX 40,431,769 USD 10,800	UGX 59,869,488 USD 16,160	UGX 20,994,050 USD 5,666
HCIII	UGX 61,502,871 USD 16,700	UGX 89,202,698 USD 24,076	UGX 33,803,043 USD 9,124
HCIV	UGX 74,174,742 USD 20,000	UGX 91,942,959 USD 24,816	UGX 56,406,526 USD 15,224

Across all sampled facilities, the annual per capita and per child under-five (U5) cost was UGX 4,266 and UGX 19,184 (USD 1.15 and USD 5.18), respectively. Per capita and per child U5 costs decreased from HCII to HCIV given the relatively larger catchment populations of HCIVs, thereby spreading the costs over a larger population. These costs were also higher in EC compared to SW; the EC per capita and per child U5 costs were UGX 4,902 and UGX 21,522, respectively (USD 1.32 and USD 5.80) compared to UGX 3,631 and UGX 18,845 (USD 0.98 and USD 5.08) in SW (Figure 1).

Figure 1: Annual per capita cost to deliver ECHP, by cost category, facility type, and region



Across all facilities and regions, the cost of vaccines/antigens provided during static and outreach immunization activities—regardless of financing source—comprised the largest proportion of costs, 55% on average. Salary of facility staff comprised the next largest share of costs at approximately 20%; as expected with the larger staffing figures at higher facility levels, the proportion of salary cost marginally increased from lower to higher level facilities. Drugs and lab tests comprised 7% and 6% of annual total costs, respectively, and consumables/supplies and equipment represented 3% and 1% of average annual costs. Other costs (e.g., safari-day allowances) comprised 8% of costs.

Across all facilities, static immunization services and outreaches comprised the largest proportion of ECHP costs. There were differences between the relative costs of the remainder of the ECHP components between the two regions. Febrile illness—whether malaria on non-malarial fever—and diarrhea comprised a larger relative proportion of costs in EC, while pneumonia and cough/cold were larger contributors of total ECHP costs in SW. Aggregation of the ECHP services and activities by in-facility curative, in-facility preventive, and community outreach activities show that in-facility curative services comprised approximately one-quarter of annual costs, in-facility preventive services comprised 41%, and community outreach comprised 34%. In-facility curative services comprised a larger portion of annual costs in East-Central versus Southwest. (29% versus 14%, respectively).

Nearly half (47%) of the financing for the ECHP came from GOU sources, followed by 44% from Gavi, 7% from the Global Fund to Fight AIDS, Tuberculosis, and Malaria (GFATM), 1% from the United States President's Emergency Plan for AIDS Relief (PEPFAR), and 1% from other United States Government (USG) sources.

On a per capita basis and excluding private domestic sources of financing, the estimated total annual cost of the ECHP was approximately 5% of Uganda's per capita current health expenditure from external and domestic public sources. Considering only domestic GOU cost components, the annual per capita ECHP cost was approximately 10% of per capita domestically sourced general government health expenditures.

Conclusions

In addition to the costing outputs described in this report, it is also essential to consider the corresponding programmatic outputs to inform scale-up of the ECHP in Uganda. While average costs per facility staff trained and mentored varied by methodology, pre- and post-test results from the training/mentorship showed a similar 30% improvement in health worker competencies in IMNCI for both methodologies, suggesting that there was no significant difference in competency improvements between the two. At the service delivery level, the combined set of interventions supporting the delivery of the ECHP corresponded to a greater percentage of cases appropriately managed and treated per the ECHP guidelines. With improved health worker capacity, improved case management, and improved quality of care, these cost estimates can provide important inputs into identifying resources to scale up the ECHP to aid in the reduction of U5 mortality across Uganda.

Introduction

The Maternal and Child Survival Program (MCSP) is a global United States Agency for International Development (USAID) cooperative agreement to introduce and support high-impact health interventions in 32 priority countries with the ultimate goal of preventing child and maternal deaths. In Uganda, MCSP has provided technical assistance on child health to two of USAID's Regional Health Integration to Enhance Services (RHITES) programs in the Southwest (SW) and East-Central (EC) regions. In collaboration with the Government of Uganda (GOU) and MCSP, the RHITES programs have worked to implement aspects of Uganda's Reproductive, Maternal, Newborn, Child, and Adolescent Health (RMNCAH) Sharpened Plan. The Plan serves as the guiding strategy document for RMNCAH, identifying high-burden districts and a package of low-cost, high-impact, and evidence-based interventions to reduce maternal, newborn, and child mortality.

Since 2017, MCSP has worked with the GOU, USAID, and the two RHITES programs in four prioritized high child mortality districts—Kaliro and Luuka in EC and Ntungamo and Sheema in SW—to implement a standardized or "essential" child health package (ECHP) with the goal to assess the feasibility of scaling the package to other districts in Uganda. MCSP and RHITES prioritized this ECHP from a proposed package in the RMNCAH Sharpened Plan to reduce newborn and under-five (U5) mortality.

MCSP and RHITES collaboratively worked to enhance national guidelines for the implementation of the ECHP, strengthen competencies of providers in public primary health care (PHC) facilities to implement the ECHP through multiple in-service training approaches, improve district- and facility-level planning practices by adapting the Reaching Every Child (REC) approach applied to immunization to child health, and increase the availability of strategic knowledge on child health (e.g., improving facility data use for child health) as it related to the implementation of the ECHP.

The ECHP comprises a set of prioritized interventions—both curative and preventive—that address common causes of childhood illnesses, including malaria, diarrhea, pneumonia, malnutrition, tuberculosis, and HIV/AIDS. The package also includes interventions for prevention, such as integration with the expanded immunization program, and promotion of health, such as community-based promotion of key family care practices. MCSP supported a revision of the national integrated management of neonatal and childhood illness (IMNCI) guidelines to enable delivery of the ECHP in an integrated way for every child at a facility and in the community through outreach services and support from a cadre of community-based health workers referred to as Village Health Teams (VHTs). MCSP and RHITES supported the implementation of this package at the PHC level at public health centers (HC) IV, III, and II in the four districts.[2] Table 6 summarizes key characteristics of the supported districts.

Table 6: Demographic and health facility characteristics of supported districts

Region/District	Population[1]	U5 Population[2]	U5 Mortality[3]	Public Facilities[1]		
				HCII	HCIII	HCIV
East-Central	4,395,560	821,790	84 per 1,000 live-births	365	111	18
Kaliro	268,000	50,228	*Not available*	15	8	1
Luuka	256,000	47,872	*Not available*	31	9	1
Southwest	4,488,228	839,299	70 per 1,000 live-births	524	183	38
Ntungamo	519,100	97,072	*Not available*	38	12	4
Sheema	214,800	4,168	*Not available*	36	5	2

[1] DHIS2 2018; [2] Estimated with DHIS2 district populations and UN Population Prospects; [3] Uganda DHS 2016 (ten-year preceding survey)

[2] HCIIs are the first-level PHC facility with a target population of 5,000, offering the closest curative and preventives services to their surrounding community. HCIIIs have a target population of 20,000 and provide additional 24-hour maternity, emergency, and inpatient services (in addition to the curative and preventive HCII services). HCIVs serve as a PHC referral facility with a target population of 100,000; in addition to the other services provided at HCIIs and HCIIs, HCIVs provide comprehensive emergency obstetric care. All three levels conduct community outreaches.

To generate evidence on the implementation of the ECHP in the four districts, MCSP conducted a comprehensive costing analysis to understand the financial implications of rolling out the ECHP. The overall objective of this analysis was to estimate the costs of the MCSP- and RHITES-supported activities, such as the IMNCI trainings, and the costs to deliver the full ECHP at public PHC facilities. The results of these analyses can inform further support to expand coverage of the ECHP, but also can be an input into larger health financing discussions in Uganda.

This report presents the full methodology and results of the multiple cost analyses. The report follows the following structure: 1) the first section describes the motivation, methodology, and results of the costing of the strategies to roll-out the ECHP, such as integrated IMNCI trainings and mentorship; 2) the second section presents the same components for the costing of facility-level provision of the services and activities comprising the ECHP; and 3) the final section discusses overall conclusions across both results.

Costing of Strategies to Roll Out ECHP

Objectives

To assess the feasibility of scaling the ECHP to other districts in Uganda, MCSP worked with the GOU, RHITES-SW, and RHITES-EC to conduct a costing analysis of national, regional, and district strategies to roll out the ECHP. The objectives of costing the programmatic support to rolling out the ECHP were to assess the cost of ECHP roll out in the four demonstration districts by activity, and from this analysis, estimate costs to scale up the ECHP roll-out to other districts across Uganda while maintaining implementation in demonstration districts.

Methodology

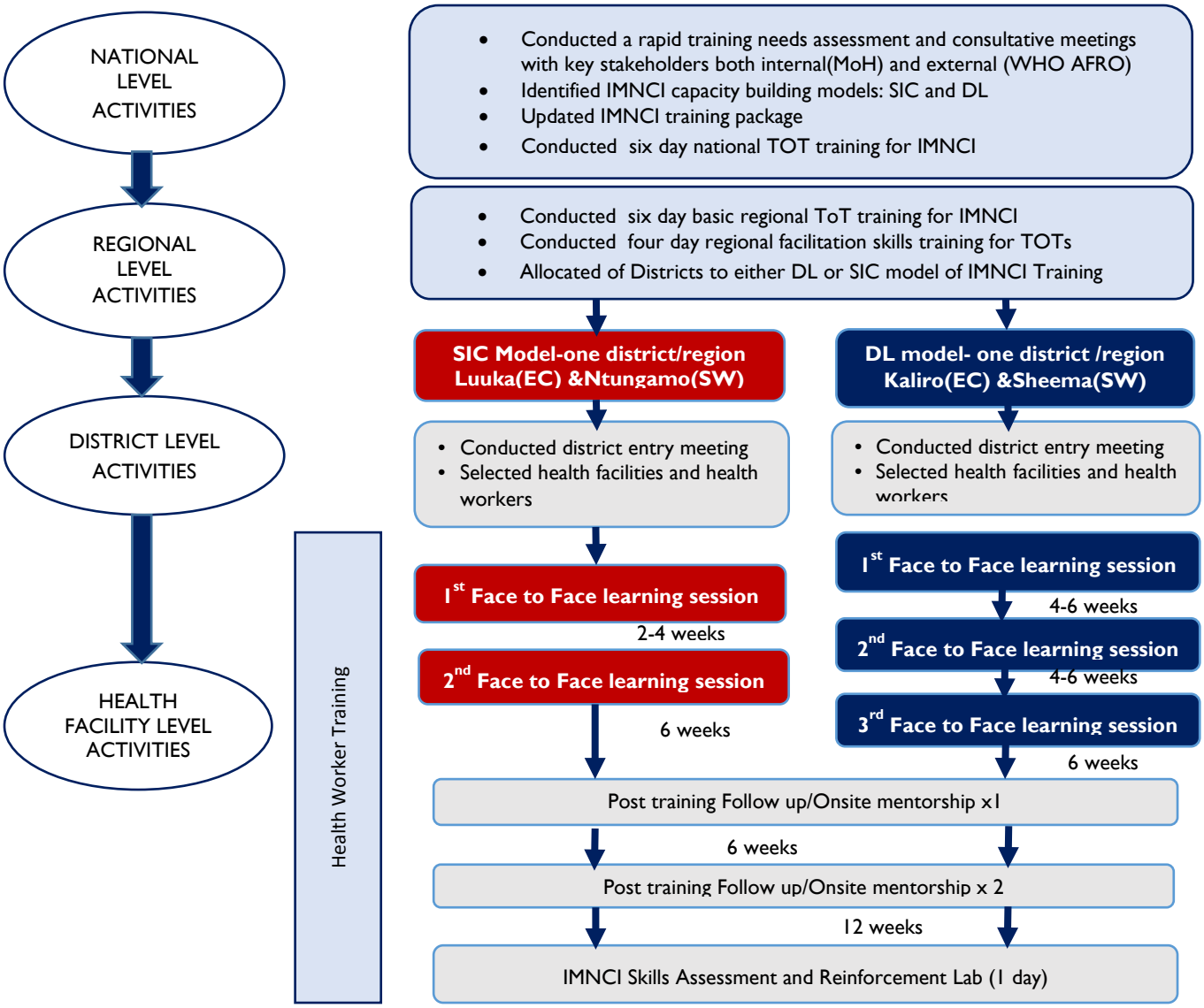
Analysis Design

The programmatic costing of strategies to roll out the ECHP focused on direct costs associated with training and building the competencies of health workers to deliver the ECHP. The analysis team used prospective data collection to gather and analyze programmatic and financial data as MCSP and RHITES implemented activities over the course of the analysis period. The analysis used the period August 2017 through June 2018 to capture costs for all ECHP roll-out activities supported by MCSP and the RHITES programs. These activities included cascade training activities, such as training of trainers (TOT), mentorship visits, and district-level support to a REC adaptation for child health.

Scope of ECHP Roll-out Activities

Using a cascade training approach as outlined in Figure 2, MCSP, RHITES-EC and RHITES-SW supported the government rollout of national guidelines at four different levels of the health system. The costing of ECHP roll-out strategies included only the trainings, dissemination of materials, and implementation support activities outlined below and does not include activities to revise the child health policy, guidelines, and IMNCI materials that preceded the rollout.

Figure 2: ECHP roll-out activities diagram



National training of trainers: MCSP trained program staff and national-level stakeholders within the Ministry of Health (MOH) on IMNCI and facilitation methods for subnational rollout. The national TOT consisted of two parts: one two-day refresher training on IMNCI and another six-day training focused on training approaches and methodology. MCSP estimated that the number of national-level trainers was sufficient for them to lead regional TOTs in all regions beyond SW and EC.

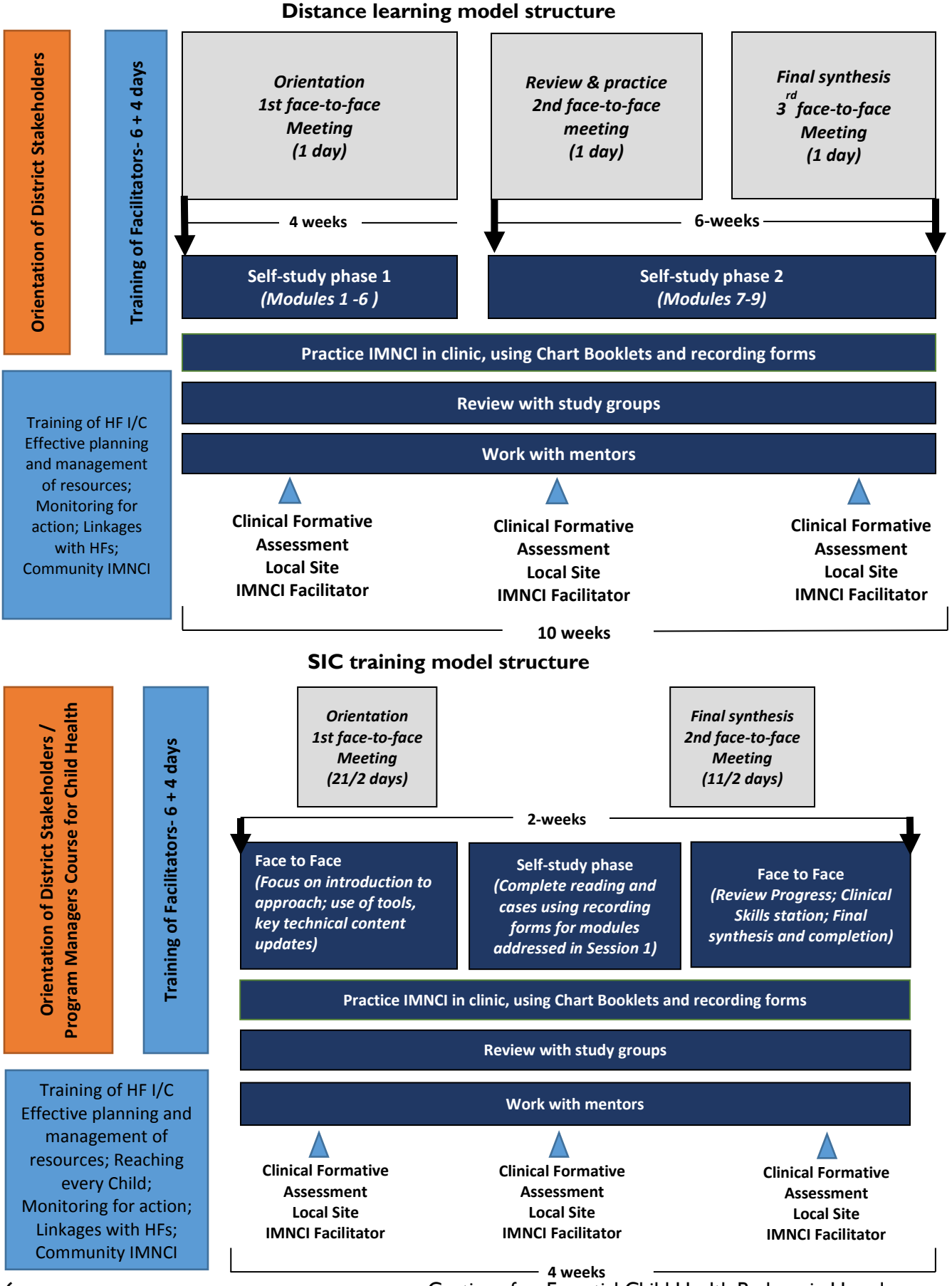
Regional training of trainers: National trainers facilitated regional TOT sessions for the two USAID regions (EC and SW) to which the four demonstration districts correspond. Regional trainers were district health management team members. The regional TOT consisted of two parts: one six-day refresher training on IMNCI and another three-day training focused on training approaches and methodology. The number of regional trainers trained were sufficient to conduct the trainings in the two districts in each region; therefore, to scale the training approaches to other districts would require additional regional TOTs

District-level trainings and facility-based mentorship: Regional training teams conducted IMNCI training sessions and post-training mentorship for health facility workers using two alternative training delivery methodologies: short-interrupted course (SIC) and distance learning (DL). In each of the two regions, one district used DL and the other used SIC to compare the relative effectiveness on increasing health worker IMNCI competency. Table 7 and Figure 3 summarize the two methodologies. The average number of health workers trained per facility level were two in HCIIs, four in HCIIIs, and 8-10 in HCIVs; however, there was variation in the number trained, as staffing levels differed across facilities.

Table 7: Short-interrupted course and distance learning training and mentorship methodologies

Approach	Training	Mentorship
Short-interrupted Course *Luuka* *Ntungamo*	Two in-person sessions ideally two weeks apart; the first a 3-day session, the second a 2-day session	Three mentorship sessions in total; one in between each face-to-face session and two following course completion. Conducted by district and programmatic staff.
Distance Learning *Kaliro* *Sheema*	Three one-day in-person sessions followed by independent/group-led learning onsite.	Four mentorship sessions in total; one in between each face-to-face session and two following course completion. Conducted by district and programmatic staff.

Figure 3: Short-interrupted course and distance learning methodology and timelines



REC adaptation support: In addition to these cascade training and mentorship approaches, MCSP and the RHITES supported subnational adaptation of the REC approach for immunization to broader child health based on MCSP's experience supporting the REC immunization approach in Uganda. The child health adaptation focused on catchment-area based resource planning (i.e., micro-mapping and planning) and management to better align resources to child health needs within specific catchment areas. This approach included identifying and focusing on underserved community members and implementing child health service delivery strategies to better reach them (e.g., integrated outreaches, VHT registration of households with children U5), including engaging communities to identify locally appropriate interventions. MCSP also supported quarterly supportive supervision and quarterly reviews among facility and VHTs, which included data monitoring to refine community-based approaches and linkages to facilities for child health. Implementation of the approach varied slightly in each district, hence costed activities differ by district.

Data Sources and Data Collection

Given the prospective nature of the ECHP roll-out costing, the analysis team collected data directly from MCSP, RHITES-EC and RHITES-SW (Table 8). Data collection frequencies and methodologies differed for each program team to maximize the accuracy of each dataset. Raw expenditure data for MCSP was available monthly while RHITES data cleaned and aggregated their data prior to sharing with the analysis team.

Table 8: Data sources for ECHP roll-out strategies costing

Data type	Data source
MCSP direct activity costs	Monthly voucher review of all individual program expenditures
MCSP level of effort by activity	Monthly time tracking sheet submitted by each member of the child health team with detailed activity descriptions
RHITES direct activity costs	Direct cost summary aggregated by ECHP roll-out activity and cost category totals (sent monthly)
RHITES level of effort by activity	Total technical and oversight LOE by ECHP roll-out activity (sent monthly)
Salary estimates	Ministry of Public Service FY2018-19 public salary schedule, including pension and gratuity as outlined by Ministry of Public Service formulae, Program budget estimates by level, including pension and benefits
Program output: Number of participants trained	MCSP training database

Data Analysis

The analysis team cleaned and analyzed data on a rolling basis using Excel models to consolidate program and activity data. This process included coding and aggregating data by activity area, geography, and cost category for analysis. The team then calculated the average cost per activity type and average cost per person trained by activity. The team then adjusted these activity-based unit costs from the programmatic perspective to a government perspective (i.e., what it would cost the GOU to implement the same set of activities. All calculations used Uganda Shillings (UGX); any converted figure into United States Dollar (USD) assumed an exchange rate of 1 USD to 3,705 UGX.

Assumptions and Limitations

The analysis team identified the following assumptions and limitations in the interpretation of the results:

- *Integrated nature of programmatic activities:* Given the integrated nature in which MCSP and RHITES implemented the programmatic activities, the analysis team could not always easily estimate direct costs for ECHP roll-out activities as separate from other program areas (e.g., HIV services,

immunization, and particularly mentoring). As necessary, the analysis team worked closely with program staff to make refined estimates or assumptions to allocate ECHP roll-out costs.

- *Opportunity costs for training:* The analysis did not include salary costs of trainees (whether trainees at TOT or facility staff at the IMNCI trainings) as the costing took a financial—rather than economic perspective. Costs labeled as "MOH salary" are those related to GOU trainers.
- *Variable data quality across programs:* Given differing financial tracking systems across programs and limited access to certain financial information for programs, the analyses team acknowledged that some data may be more precise that others. In cleaning and analyzing the data, the analysis team followed up with program staff to verify potential discrepancies and cross-checked values with normative estimates when possible.
- *Training drop-out rates:* In calculating unit costs per person trained, the analysis team counted only those who completed the final test and thus the full training course. The cost per person trained calculation excluded these drop-outs in its denominator.[3]
- *Cost-effectiveness:* The costing of strategies to roll-out the ECHP was not able to measure cost-effectiveness. Therefore, the analysis team could not make direct conclusions related to cost-effectiveness of roll-out activities. The analysis team, however, provided relevant programmatic outputs to illustrate changes in outputs indicators vis-à-vis the costs required to achieve them.
- *Indirect costs:* Since the analysis focused on components of broad integrated health programs, the analysis team was not able to easily estimate indirect costs (e.g., utilities) applicable to ECHP roll-out activities; therefore, the analysis team excluded indirect costs in the presented estimates.

Findings

Summary of Training and Mentorship Costs

The following section summarizes the total estimated costs for TOT, facility IMNCI training and integrated mentorship from the MCSP and RHITEs programmatic perspective. The analysis team calculated and averaged training costs for each level of implementation—national, regional, and district—and further analyzed by cost category and training delivery method. For the TOTs, the team averaged costs per person trained for each level of activities to calculate training unit costs for scale-up; Table 9 shows the national and regional per trainer trained costs.

Table 9: Average cost per trainer trained

Training of trainers	Average cost per trainer trained
National TOT	UGX 1,663,945
Regional TOT	UGX 7,094,655

At the district level, MCSP and RHITES conducted IMNCI trainings for health workers in HCII, HCIII, and HCIV. On average, these trainings included two health workers from each HCII, four health workers from each HCIII, and 8-10 workers from each HCIV. Facilities then received mentorship from district and programmatic staff in accordance with the SIC or DL mentorship sequence (Figure 3). Table 10 details the combined training and mentorship average costs to roll out the SIC and DL methodology and at each facility level. These unit costs are based on the average number of participants by facility type, average unit cost per facility staff trained, and average mentoring cost per facility.

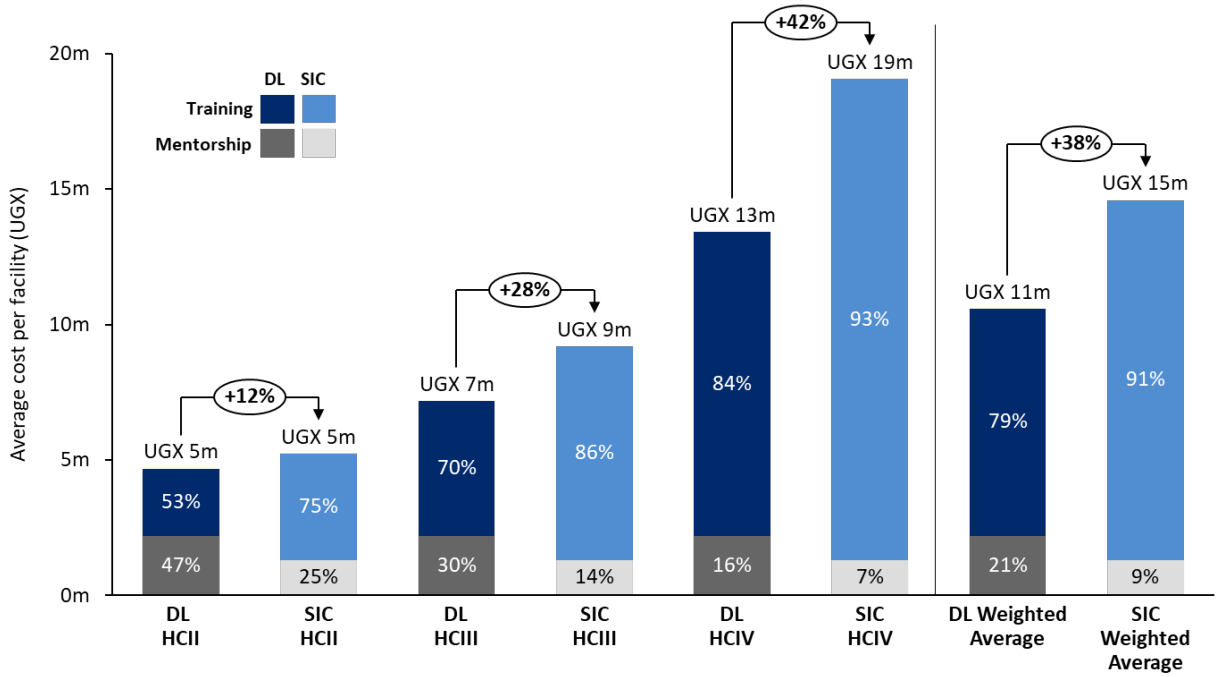
[3] The average dropout rate across all four districts was 8%.

Table 10: Average facility training and mentorship rollout costs, by training methodology and facility level

	Distance Learning (4 mentoring visits)	Short-interrupted course (3 mentoring visits)
HCII (2 persons trained)	UGX 4,679,231	UGX 5,242,151
HCIII (4 persons trained)	UGX 7,176,483	UGX 9,190,838
HCIV (9 persons trained)	UGX 13,419,615	UGX 19,062,555

Using a weighted average cost for each methodology, the average cost to fully train and mentor a facility using the SIC methodology was approximately 1.5 times more than the DL average (Figure 4). Across facility levels, mentoring costs became a smaller proportion of total facility costs from HCIIs to HCIVs as the mentoring costs are relatively fixed regardless of the facility level. However, training costs became a larger proportion of total facility costs as the average number of facility staff trained increases from HCIIs to HCIVs regardless of the training methodology.

Figure 4: Average facility training and mentorship combined costs, by training methodology and facility level



The analysis team did not allocate REC adaptation costs to the facility level as their implementation varied by districts and were, therefore, better interpretable at a district rather than facility level. Additional disaggregation of the TOT, district rollout costs, and REC adaptation costs follow in the subsequent sections.

Training of Trainers Cost

National Training of Trainers Cost

In costing the national TOT, the analysis team disaggregated one-time preparation costs from implementation costs. As the first in the series of cascade trainings, a significant portion of staff time prior to the national TOT included developing, testing, and refining the training materials. In total it cost approximately UGX 21,494,682 (USD 5,769) to prepare for the national-level training, with 90% of those costs associated directly with MCSP and MOH staff time for developing and revising materials; these costs were a one-time fixed cost for ECHP roll-out.

Implementation of the national-level TOT cost a total of UGX 36,606,784 (USD 9,825) with 22 trainers fully trained resulting in a unit cost of UGX 1,663,945 (USD 447) per trainer trained. The national training of trainers cost was the same irrespective of district-level training methodology (i.e., DL or SIC).

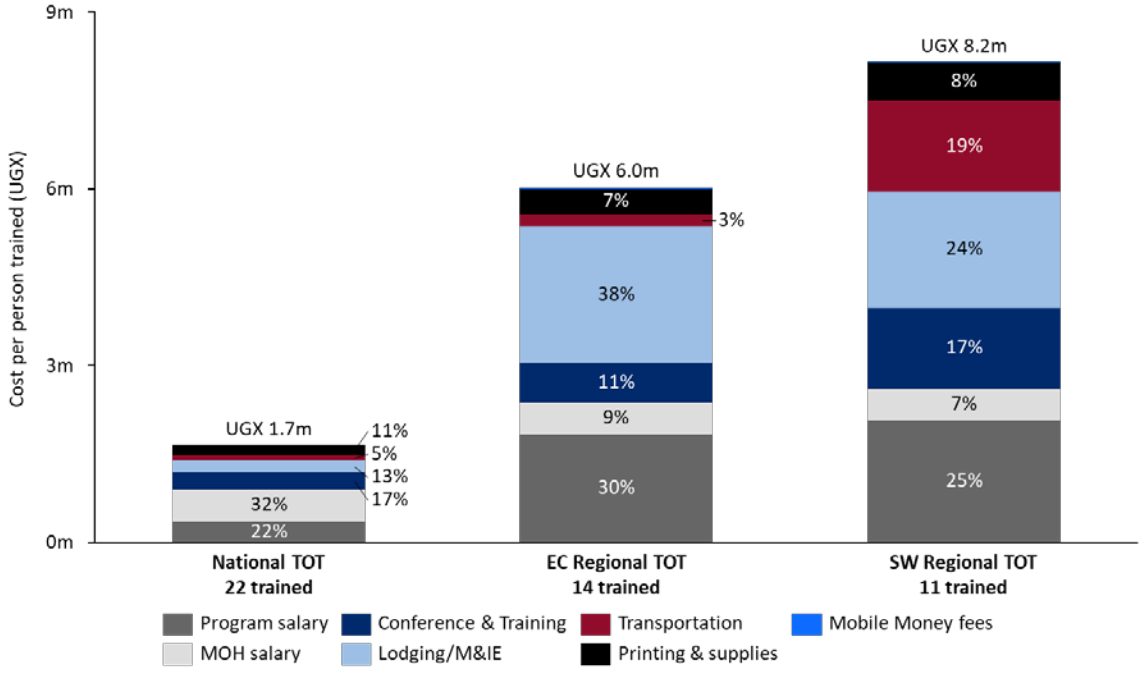
Regional Training of Trainers Cost

In rolling out the regional-level TOT, national trainers found that an additional training on the basics of IMNCI were necessary before a focused facilitation skills session. Regional TOT costs presented here include the costs associated for both the basic course and the facilitation skills course; the analysis team determined unit costs based on the number of trainers fully trained during both activities. Based on EC and SW regional implementation, the average cost for a regional TOT was UGX 87,092,748 (USD 23,374). With 11 trainers trained in SW, and 14 trained in EC, the average per trainer trained was UGX 7,094,655 (USD 1,904) per as shown in Table 11. Salary, lodging, and meals and incidental expenses (M&IE) costs accounted for over half of total costs (Figure 5).

Table 11: Regional cost per trainer trained, by cost category

	East-Central TOT cost per person trained (n=14)	Southwest TOT cost per person trained (n=11)
Program salary	UGX 1,831,463	UGX 2,071,287
MOH salary	UGX 540,000	UGX 540,000
Conference & Training	UGX 677,169	UGX 1,366,635
Lodging/M&IE	UGX 2,317,083	UGX 1,973,241
Transportation	UGX 196,411	UGX 1,552,596
Printing & supplies	UGX 442,287	UGX 641,458
Mobile Money fees	UGX 29,947	UGX 9,735
Total cost	**UGX 6,034,359**	**UGX 8,154,952**

Figure 5: National and regional cost per trainer trained, by major cost categories



Facility Roll-out Costs by Training Methodology

Both methodologies used to train facility staff at the district level consisted of IMNCI training and mentoring components. To determine the full cost of each methodology, the analysis team calculated: 1) training costs per person trained, 2) mentoring costs for the full set of associated mentoring visits per facility, and 3) a combined cost per facility to conduct the integrated training and mentorship.

Table 12 presents the costs per health worker trained for each of the training methodologies in all four districts by cost category. MCSP and RHITES-EC conducted the trainings in the EC region (i.e., Kaliro and Luuka) outside of the district and thus lodging and M&IE rates were higher than for participants in SW, in which MCSP and RHITE-SW held trainings within a given district (i.e., Sheema and Ntungamo).

Table 12: District training costs per health worker trained, by cost category

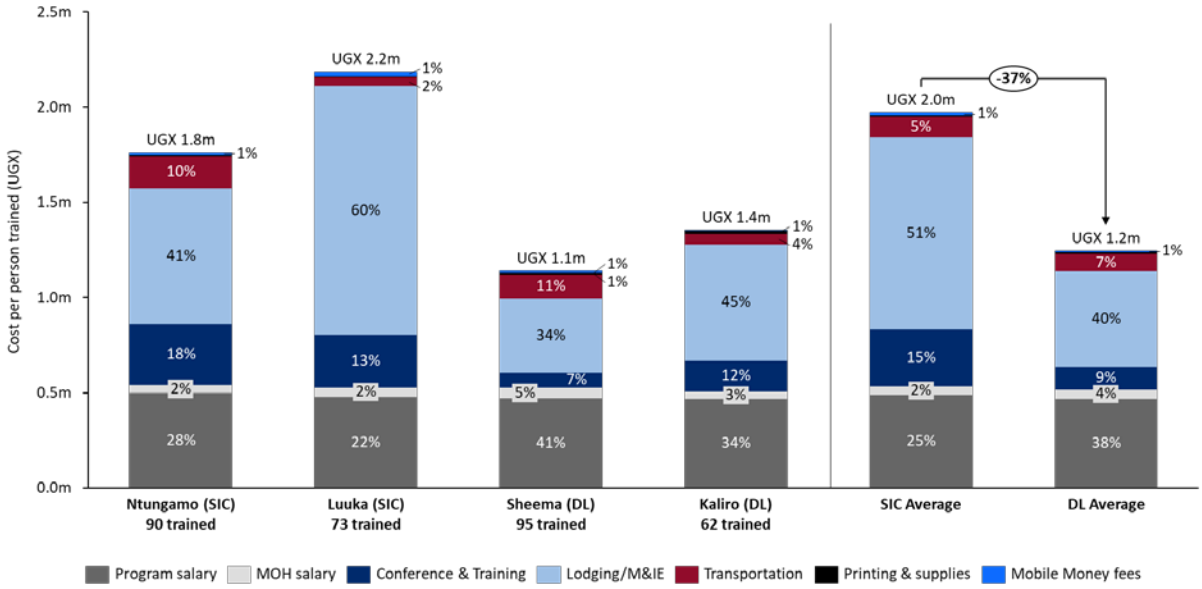
	Kaliro DL Training (n=62)[4]	Sheema DL Training (n=95)	Luuka SIC Training (n=73)	Ntungamo SIC Training (n=90)
Program salary	UGX 467,126	UGX 469,877	UGX 477,176	UGX 499,303
MOH salary	UGX 40,645	UGX 58,737	UGX 50,548	UGX 42,000
Conference & Training	UGX 160,548	UGX 75,179	UGX 275,600	UGX 318,722
Lodging/M&IE	UGX 611,532	UGX 392,226	UGX 1,307,374	UGX 714,720
Transportation allowance	UGX 56,871	UGX 123,689	UGX 46,525	UGX 169,191
Printing & supplies	UGX 15,806	UGX 10,316*	UGX 4,795	UGX 4,833
Mobile Money fees	UGX 3,738	UGX 10,962	UGX 24,950	UGX 12,948
Total unit cost	**UGX 1,356,267**	**UGX 1,140,986**	**UGX 2,186,969**	**UGX 1,761,718**

* This is based on an estimate of total printing and supplies costs.

As seen in Figure 6, lodging, and M&IE were the main drivers of increased costs for the SIC methodology, with additional variation attributed to conference and training costs (which included venue, audio/visual services, and lunches during workshops). Both training methodologies resulted in approximately UGX 500,000 per health worker trained attributable to program and MOH staff time for facilitation. The average cost per health worker trained using the SIC methodology was more than 1.5 times greater than the cost using the DL methodology; UGX 1,974,343 (USD 530) per health worker trained under the SIC model, UGX 1,248,626 (USD 335) per health worker trained under the DL model. This difference was because of higher trainer salary time and travel-related expenses in the SIC versus DL methodology.

[4] Unit costs for training in Kaliro are based on 62 participants from health facilities in the district. 50 additional participants from Kamuli district participated in the same trainings, however, the costs associated with their participation were not included in the present costing study.

Figure 6: Average cost per health worker trained, by district and training methodology



Mentoring costs

RHITES implemented the child health mentoring visits in an integrated manner (i.e., visiting multiple facilities within a given time period); accordingly, both RHITES programs reported costs attributed at the district and regional levels as detailed in Table 13.

Table 13: Total mentoring costs attributed at district and regional levels

Level of cost attribution	No. facilities reached	No. mentoring visits per facility	Attributed mentoring costs
Kaliro	20	4	UGX 31,982,343
Luuka	36	3	UGX 21,185,310
East-Central			UGX 30,046,921
Ntungamo	41	3	UGX 44,935,851
Sheema	32	4	UGX 49,970,285
Southwest			UGX 35,389,180

As such, the analysis team had to calculate a cost per facility mentoring by allocating these regional- and district-level costs based on the total number of facilities trained and mentored in each district and the number of visits to each facility based on the training methodology (i.e., four visits for DL and three visits for SIC). Based on this methodology, Table 14 details the average mentoring cost per facility visit.

Table 14: Average mentoring cost per facility visit, by district and training methodology

	Average cost per facility visit	Average cost per facility visit by training methodology
Kaliro (DL)	UGX 559,603	UGX 545,494
Sheema (DL)	UGX 531,386	
Luuka (SIC)	UGX 355,984	UGX 431,155
Ntungamo (SIC)	UGX 506,325	

The average per facility mentoring cost under the SIC methodology (UGX 431,155/USD 146) was less than the average per facility cost using the DL methodology (UGX 545,494/USD 116). The largest cost driver for mentorship for all districts and training methodologies was staff time required to conduct the visits. The analysis team also used the per facility visit unit cost for each training methodology to calculate the total mentoring cost per facility for DL (UGX 2,181,978/USD 589) and SIC (UGX 1,293,464/USD 349) to estimate a combined cost of integrated training and mentorship for each training methodology and facility level.

REC Adaptation Costs

The level of support and advancement of REC adaptation activities varied by district based on local priorities and program funding availability. Generally, cost estimates included regional REC adaptation meetings and district-level VHT orientations. Table 15 details the average costs for regional and district support.

Table 15: Average cost for regional and district REC adaptation support, by cost category

	Regional REC CH support	District REC CH support
Program salary	UGX 9,156,839	UGX 4,849,106
MOH salary	UGX 540,000	UGX 135,000
Conference & Training	UGX 14,952,500	-
Lodging/M&IE	UGX 37,093,000	UGX 3,260,750
Transportation	UGX 6,749,609	UGX 634,125
Printing & supplies	UGX 5,380,005	-
Mobile Money fees	UGX 2,286,190	UGX 114,269
Total cost	**UGX 76,158,143**	**UGX 8,993,250**

The majority of technical and financial support for REC adaptation was at the regional level, which included a series of meetings and workshops on application of the approaches outlined in the REC adaptation for child health, such as VHT-led registration of children U5 in their catchment areas; the regional activities served as the basis for applying these approaches at the district level. On average, MCSP and RHITES spent UGX 76,158,143 (USD 20,440) regionally compared to UGX 8,993,250 (USD 2,414) at the district level. These costs did not include direct support for conducting regular microplanning for child health, but MCSP and RHITES recommended that future funding should include support for such activities.

Government Scale-up Cost Modeling

By calculating average unit costs of program-supported ECHP roll-out activities, the analysis team generated modeled estimates for future scale-up of these approaches in Uganda. However, it is also helpful to generate costs estimates if the GOU were to fully assume financial responsibility for implementing the TOT and integrated training and mentorship methodologies. To estimate these costs from the GOU perspective, the analysis team applied an average government salary rate[5] to the MCSP and RHITES program level of effort (captured in days per costed activity). The team did not adjust lodging and M&IE rates reported by the programs as they aligned with government scales (though budgeting projections could vary depending on the level and number of government staff involved in trainings).

[5] Calculated as the average of U2 upper and U2 lower Government of Uganda salary band monthly rates. Monthly salary estimates were divided by an average 20 work-day month for a daily rate.

Table 16: Average cost per trainer trained from government cost perspective

Training of trainers	Average cost per trainer trained
National TOT	UGX 1,362,984
Regional TOT	UGX 5,473,768

From the government cost perspective, the DL methodology (including both training and mentoring) remained a lower cost for all facility levels compared to SIC with an average UGX 929,449 (USD 249) savings at HCII facilities and UGX 5,894,702 (USD 1,582) savings at HCIV facilities. Table 17 presents the average combined training and mentorship costs for a given facility from the GOU cost perspective by facility level and training methodology.

Table 17: Average ECHP rollout cost per facility from government cost perspective, by training methodology and facility level

	Distance Learning (4 mentoring visits)	Short-interrupted course (3 mentoring visits)
HCII (2 persons trained)	UGX 2,912,019	UGX 3,841,468
HCIII (4 persons trained)	UGX 4,630,961	UGX 6,979,053
HCIV (9 persons trained)	UGX 8,928,315	UGX 14,823,017

The GOU can ultimately use these costs to identify the range of financial resources required to further scale-up the ECHP TOT, training, and mentorship approaches.

Discussion

This analysis sought to estimate the average costs of rolling out the ECHP from national to regional to facility levels based on programmatic implementation in the four demonstration districts. Cost modeling for future expansion of the ECHP roll-out strategies to additional districts can leverage the outputs of the analysis, including estimating costs required for refresher training to retain competency gains in the four supported districts.

Key takeaways of these findings include:

- Lodging, M&IE for trainers and participants and thus the number of days spent offsite at trainings predominantly drive the per health worker trained costs. This finding is an important consideration when comparing the SIC and DL methodologies and other logistical variables in roll-out.
- Over half of mentoring costs are attributable to staff time and salary for conducting visits. Should child health mentoring become integrated in other forms of facility supportive supervision or mentoring, cost efficiencies could help minimize this cost. As the use of integrated supportive supervision visits increases, the portion of mentoring visit costs allocated specifically to the ECHP could diminish.

While average costs by training methodologies differed, pre- and post-test results from the IMNCI trainings showed that there was no significant difference in improved competency; both the SIC and DL training and mentoring methodologies resulted in an approximate 30% competency improvement (Table 18).

Table 18: Pre- and post-IMNCI training competency exam results, by training method

Approach	Pre-Test	Post-Test	n	Mean Change
Distance Learning	46.2%	75.8%	211	29.6% (95% CI: 27.9-31.2)
Short-Interrupted Course	40.7%	71.9%	163	31.1% (95% CI: 29.2-33.1)

Source: MCSP program data, September 2018

These improvements in IMNCI competency are the combined result of the training and mentorship methods of the SIC and DL methodologies. While the methodologies involved different opportunity costs of health workers participating in the training and mentorship visits (not quantified in the scope of this analysis), competency improvements improved most dramatically between the second and third mentorship visits for both SIC and DL (according to MCSP programmatic data). Hence, in planning for further expansion of these strategies, it is critical to consider the overall costs of these two methodologies, the expected IMNCI competency gains, trainee experience, and the time available for facility staff to attend trainings and for district staff to conduct mentorship.

Costing of Facility Provision of ECHP

Objectives

To complement the cost estimates of the strategies to roll out the ECHP, MCSP analyzed the actual costs of delivering the services and activities included in the ECHP at PHC facilities (HCII, HCIII, and HCIV) in the supported districts. The objectives of this facility-based costing were to:

- Estimate annual costs to deliver the ECHP at public PHC facilities in the USAID-supported districts,
- Identify the key cost drivers across major cost categories and ECHP service components,
- Determine the annual cost per child U5 and cost per capita to deliver the ECHP, and
- Estimate the sources of financing supporting the ECHP in public facilities.

Methodology

Analysis Design

The facility-level costing analysis employed a retrospective ingredients-based approach to estimate the costs of providing the services and activities included in ECHP in public PHC facilities in the four districts, which received support from the USAID MCSP, RHITES-SW, and RHITES-EC programs on child health starting in 2017. The analysis identified each of the services and activities within the ECHP (e.g., malaria or outreach), identified cost categories, collected unit cost and utilization and data for each service/activity, and then generated annual cost estimates for the overall package. The analysis used the period between January 2018 and June 2018 as all districts had completed the majority of their IMNCI trainings by that time; the analysis thus assumed that facilities were implementing the ECHP as originally designed. The analysis also took a financial perspective rather than an economic perspective, producing estimates of the financial resources required to deliver the ECHP; the analysis excluded opportunity costs related to care-seeking.

Geographic Scope and Sampling

The analysis team sampled three facilities in each district, one HCII, one HCIII, and one HCIV (Table 19); this led to a total of twelve facilities in the overall sample. The analysis team used purposive sampling to select facilities that demonstrated relatively stronger implementation of the ECHP package during the period January 2018-June 2018; MCSP and RHITES provided inputs into facility sample, including ensuring there was appropriate geographic variation of facilities within a given district (e.g., lower level facilities were not in the same sub-county or sub-district as higher-level facilities if possible.)

Table 19: Sampled facilities, by district and level

District	Facility Level and Name
Kaliro	HCII Buyinda HCIII Nawaikoke HCIV Bumanya
Luuka	HCII Kiwalazi HCIII Irongo HCIV Kiyunga
Ntungamo	HCII Buhanama HCIII Kayonza HCIV Rwashamaire
Sheema	HCII Muzira HCIII Bugongi HCIV Shuuku

Scope of Services and Activities

The demonstration ECHP served as the basis for identifying services and activities included in the facility costing analysis, which included:

- All conditions diagnosable and manageable in the 2017 Uganda IMNCI guidelines
- Immunization services provided at static clinics at HCIIs, HCIIIs, and HCIVs
- Outreach services provided through HCIIs, HCIIIs, and HCIVs
- Vitamin A supplementation and deworming (as included in IMNCI guidelines and outreaches)
- Suspected HIV testing and counseling for children under five (followed by referral if necessary)
- Tuberculosis screening services at HCIIs, HCIIIs, and HCIVs (followed by referral if necessary)
- Facility-managed VHT engagement strategies for child health, such as quarterly check-in meetings, annual microplanning, child registration, etc.

Furthermore, the analysis only considered ECHP services provided through the outpatient department and excluded any child health services provided in the inpatient ward for HCIII and HCIVs. Additionally, the analysis did not account for any costs related to referrals or any out-of-pocket costs incurred by patients.

Utilization Data Sources and Collection

The Health Management Information System (HMIS) Outpatient Form 105—the primary facility-level monthly reporting form to the district health information system (DHIS2) for all outpatient services—was the primary source of case quantities for services provided during the analysis period. Using the 2017 IMNCI guidelines and ECHP description as a starting point, the analysis team agreed upon the included HMIS codes through consultations with the MCSP team; Table 20 summarizes included HMIS codes against services.

Table 20: Summary of ECHP services and HMIS source codes

Roll-up Category	Service Category	HMIS Codes and Calculations
Anemia*	Anemia*	HMIS 105 1.3.4.44 (Sickle Cell) + HMIS 105 1.3.4.45 (Other)
Cough/cold	Cough or cold	HMIS 105.1.3.2.27
Diarrhea	Acute Diarrhea	HMIS 105.1.3.2.17
	Cholera	HMIS 105.1.3.2.3
	Dysentery	HMIS 105.1.3.4
	Persistent Diarrhea	HMIS 105.1.3.2.18
Malaria	Malaria	HMIS 105.1.3.6 Confirmed
Malnutrition	Complicated severe acute malnutrition (SAM)	HMIS 105.1.3.4.95 (with edema)
	Moderate acute malnutrition (MAM)	HMIS 105.1.3.4.96
	Uncomplicated severe acute malnutrition	HMIS 105.1.3.4.95 (without edema)
Neonatal	Neonatal jaundice	HMIS 105.1.3.3.41
	Neonatal possible severe bacterial infection	HMIS 105.1.3.3.37 (Sepsis) + HMIS105.1.3.38 (Sepsis) + HMIS 105.1.3.40 (Meningitis)
	Neonatal pneumonia	HMIS 105.1.3.3.39

Roll-up Category	Service Category	HMIS Codes and Calculations
Non-malarial fever	Measles	HMIS 105.1.3.1.7
	Non-malarial fever	HMIS 105.1.3.1.6 (Total - Confirmed) + HMIS 105.1.3.1.13 (SARI) + HMIS 105.1.3.1.14 (AEFI) + HMIS 105.1.3.1.15 (Typhoid) + HMIS 105.1.3.2.23 (UTI) + HMIS 105.1.3.4.49 (Gingivitis)
Outreach	Outreach	HMIS 105.2.11 Outreach (All antigens)
Pneumonia	Pneumonia	HMIS 105.1.3.2.28
Skin/ENT	Ear, nose, throat (ENT) condition	HMIS 105.1.3.4.55
	Skin condition	HMIS 105.1.3.2.31
Static Immunization	Static immunization	HMIS 105.2.11 Static (All antigens)
Suspected HIV	Suspected HIV	HMIS 105.4.H2 + HMIS 105.2.4.E1
Tuberculosis	Tuberculosis**	HMIS 105.1.3.2.30
Vitamin A/Deworming	Deworming	HMIS 105.2.8.C1 + HMIS 105.2.8.C2
	Vitamin A supplementation	HMIS 105.2.8.C3 + HMIS 105.2.8.C4

* No cases reported during data collection period in sampled facilities
** Only one of twelve facilities reported a case of tuberculosis in a child U5 during the date collection period

The analysis team collected copies of the HMIS Outpatient Form 105 at the sampled facilities and extracted data from the DHIS2 online platform. Case data only included children U5 and for the period January 2018 to June 2018. The team also conducted verification between the two data sources for a random sample of facilities and reporting periods, concluding that the DHIS2 data matched the HMIS Outpatient Form 105 data for the random sample.

Since the data collection period only covered the six-month period after which health workers completed their IMCNI training, the analysis team had to adjust for the seasonality of utilization to generate an estimate of annual costs. To make this adjustment, the team extracted similar case data for each sampled facility for the period from July 2017 to December 2017 and then generated ratios between the two periods; these ratios allowed for an extrapolation of the estimated utilization for included services for the second half of the year.

Cost Data Sources and Data Collection

The analysis team collected unit cost data from multiple sources; Table 21 summarizes the data sources by each of the major cost categories. The team collected data over the course of three weeks in August 2018; the data collection included a one- to two-hour interview at each facility. At each facility, the number of interviewees ranged from one to 10 depending on the facility level and staffing structure; interviewees included the in-charge and staff members from the outpatient department, laboratory, dispensary, cold chain, and records (as applicable for each facility level).

Table 21: Summary of facility costing data sources, by cost categories

Cost Category	Data Source(s)
Salary and Staff Time	Ministry of Public Service FY2018-19 public salary schedule, including pension and gratuity as outlined by Ministry of Public Service formulae; facility interviews
Drugs	Uganda National Medical Stores order forms and price lists, UNICEF Supply Division,[6] The Global Fund Pooled Procurement Mechanism[7]
Consumables/Supplies	Uganda National Medical Stores order forms/price lists, Uganda cMYP Costing Tool
Vaccines	Uganda cMYP Costing Tool and Uganda Gavi Co-financing Information Sheet 2018[8]
Lab Tests	National Medical Stores order forms and price lists, RHITES-SW (HIV), and The Global Fund Pooled Procurement Mechanism[9] (mRDT)
Equipment	MCSP, RHITES-SW, and RHITES-EC
Other Costs	PHC grant non-wage budgets, facility records, and facility staff interviews

Staff Time and Salary

Facility-level interviews served as the primary source of data to determine the amount of time staff spent providing services under the ECHP. The interview began with facility staff describing the patient flow process from intake to discharge and quantifying the time that different cadres of staff spent doing different activities throughout this patient flow. For the clinical assessment step, interviewers asked the respondents to describe the amount of time spent assessing and diagnosing a patient by different signs, symptoms, or suspected diagnoses (e.g., child with fever, child with diarrhea). Based on the responses, the analysis team grouped the time spent for each service and for each cadre of staff engaged in the process as follows: 1) registration/triage, 2) clinical assessment, 3) laboratory (if applicable), 4) post laboratory assessment/diagnosis (if applicable), and 5) dispensary (if applicable).

The analysis team used FY2018-19 salary rates published by the Ministry of Public Service. The analysis team converted these annual estimates into a salary per minute using the number of hours a facility reported being open over the course of a year. These estimates also included pension and gratuity based on published formulas from the Ministry of Public Service (approximately 14% on top of base pay). The analysis team then multiplied the reported per service staff time against the corresponding loaded pay rate for each staff member involved, generating an average salary cost per service for the entire episode of care for service in the ECHP and for each facility. As they were unpaid as of the time of the analysis, the analysis did not include any salary estimates for VHTs involved in clinical or outreach services; should the GOU pay VHTs in the future, salary costs for lower level facilities would likely be higher at this facility level since HCIIs and HCIIIs often reported VHTs contributing to key processes within the patient flow process.

Drugs and Medical Consumable Supplies

The 2017 revised IMNCI guidelines served as the basis for determining drug and supply types and quantities needed to treat sick children in the outpatient departments. Using the IMNCI chartbook, the analysis team calculated the quantities of drugs needed to treat each condition based on the dosages outlined in the guidelines; the guidelines also served as the basis for quantities of supplies though the analysis did include basic supplies for every service, such as disposable gloves. If the guidelines included multiple first-line treatment options, then the analysis team either selected the option for which the National Medical Stores (NMS) procured the required drugs or assumed a percentage breakdown of treatment options (i.e., if NMS procured two first-line treatment options, then each received a 50% weighting). Similarly, the analysis team adjusted for dosages that differed by age and/or weight of patient. Interviews with facility staff provided self-reported consumable supplies for outreach services.

6 UNICEF Supply Division. 2018. Ready-to-use therapeutic food. At https://www.unicef.org/supply/files/RUTF_Prices.pdf
7 GFATM. 2018. ACT Pricing. At https://www.theglobalfund.org/media/5812/ppm_actreferencepricing_table_en.pdf?u=636759769100000000
8 Gavi. 2018. Uganda Co-financing Profile. At https://www.gavi.org/country/uganda/documents/cofiss/co-financing-information-sheet-uganda/
9 GFATM. 2018. mRDT Pricing Table. At https://www.theglobalfund.org/media/7565/psm_malariardtreferencepricing_table_en.pdf

Unit costs for each drug and supply came from a variety of sources depending on the entity responsible for procurement. Most drug unit costs came from FY2018-19 NMS order forms for HCIVs and other price lists. Costs for malaria treatments came from the Global Fund to Fight AIDS, Tuberculosis, and Malaria (GFATM) Pooled Procurement Mechanism price list and costs for the ready-to-use therapeutic food came from UNICEF Supply Division. The analysis team then multiplied drug/supply unit costs against their respective quantities for each service, generating an average drug and supply cost per service.

While facility staff reported stock-outs of certain drugs at the interview (e.g., dispersible amoxicillin tablets), the analysis assumed that all drugs needed to treat would be available at the facility. This assumption produces an estimate of the resources needed to provide adequate drugs and supplies to the facility for the ECHP.

Vaccines

The actual quantity of vaccines delivered during the analysis period reported through the DHIS2 served as the basis for determining the vaccine-related costs of immunization outreaches and static clinics. The analysis included all antigens for children U5 per the national immunization schedule. The Comprehensive Multi-Year Plan (cMYP) costing tool was the source of per dose vaccine and syringe costs. The analysis team also accounted for co-financing contributions from the GOU and adjusted per dose costs funded by Gavi, the Vaccine Alliance. The analysis team included other costs related to static clinics and outreaches in their respective cost categories (i.e., salary, other, etc.).

Laboratory Tests

Based on the services included in the ECHP, the analysis team included costs related to malaria rapid diagnostic tests (mRDT) and HIV testing kits for children with suspected infections and their mothers; RHITES-SW provided the protocol for HIV testing, which differed if the mother's HIV status was known or unknown. While the analysis team estimated the costs of malaria and non-malarial fever separately, the non-malaria fever case includes the cost of an mRDT as all facilities reported administering mRDTs for any child that entered the facility with a fever. RHITES-SW provided unit costs for HIV testing kits and the GFATM Fund Pooled Procurement Mechanism was the source for mRDT unit costs as GFATM supplied all mRDTs in the included public facility levels.

Equipment

The MCSP and the RHITES programs provided supported facilities with a range of basic equipment to implement the ECHP. The equipment included: 1) oral rehydration therapy corner consisting of a table, bench, tray, cups, pitchers, teaspoons, and tippy tap; 2) middle upper arm circumference tapes; 3) digital thermometers; 4) acute respiratory infection timer; 5) weighing scale (child and infant), 6) height measure roller; 7) infantometer, 8) stadiometer (HCIV only), and 9) pulse oximeter (HCIV only). There were some differences in item quantities among the different health center levels. Unit costs were from local Uganda sources or NMS order forms for all items except the pulse oximeter, which came from UNICEF Supply Division. To determine an annualized cost of the equipment, the analysis team applied a straight-line depreciation for each item using the anticipated useful life, which ranged from two to five years.

Other Direct Costs

Facility staff reported additional costs to implement the ECHP, which were primarily for outreaches, VHT meetings, and annual micro-planning. Costs included transportation allowances, safari-day allowances, meeting refreshments for both facility staff, VHTs, or other activity participants (e.g., local leaders involved in micro-planning). Each facility reported different unit costs and quantities for different activities (e.g., allowances paid to two facility staff and one VHT for four outreaches per month). The analysis team averaged these costs and quantities across facilities of the same level within a region to generate average costs per activity. Facility staff also reported the frequency of different activities; using these frequencies and average unit costs, the analysis calculated an aggregate amount of other direct costs associated with providing the package. All facility staff reported facility-level PHC grant budgets as the source of funds for these expenses.

Additional Data

The facility interview also collected information on the frequency of outreaches as they were not standard across facilities; however, most facilities conducted at least four outreaches per month, but some HCIIs reported conducting fewer due to staffing constraints. The analysis team also collected data on the range of services provided during outreaches. Beyond immunization services, some facilities reported conducting HIV testing, family planning counseling, mRDTs, and health education during outreaches; for those instances, the analysis team included these costs in determining averages. The analysis team also collected data on the types of VHT activities they implemented as part of the package, which included regular VHT meetings and annual micro-planning. The analysis team also collected the full catchment population and U5 catchment population for each facility.

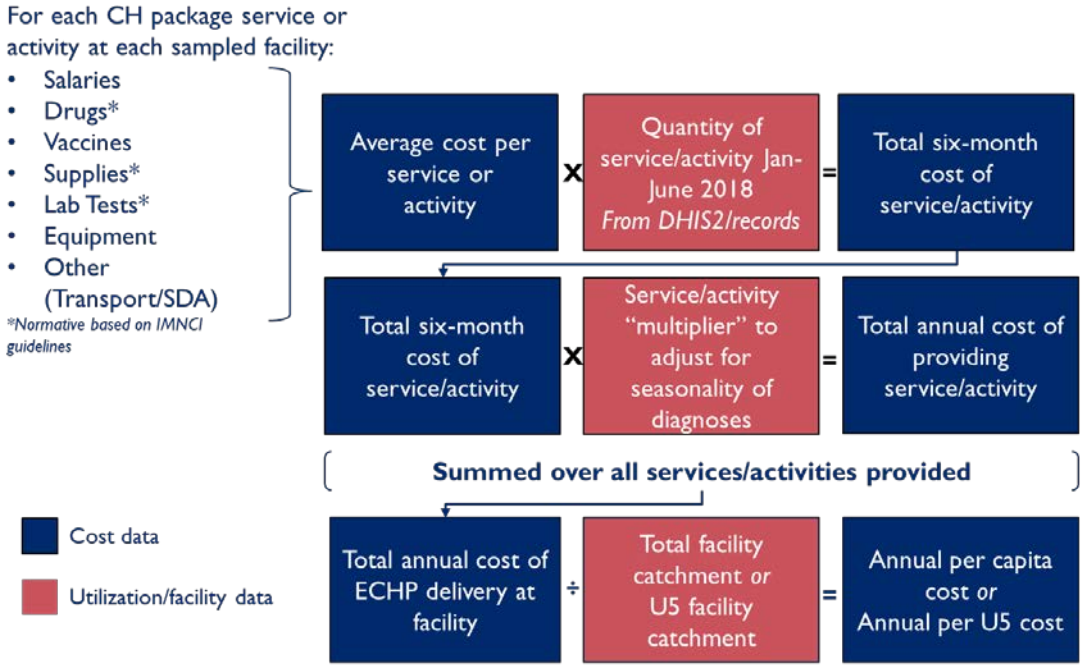
Revenue Sources

The analysis team also collected limited information on the likely revenue sources for the costs of the package, which included GOU PHC grants, GOU NMS budget, GOU vaccine budget, Gavi, GFATM, President's Emergency Plan for AIDS Relief (PEPFAR), and other United States Government (USG) sources. In the absence of a full expenditure tracking analysis, the team identified the contributions from each revenue source against the individual package services (e.g., malaria) and the cost categories included in the analysis (e.g., the GFATM procuring mRDTs in the included public facilities). The analysis team then used these relative contributions to estimate the revenue sources for the package.

Data Analysis

The analysis team created a customized Excel-based model to analyze the collected dataset and generate overall cost estimates. The general approach to analysis was to calculate an average cost for each service in the package (e.g., malaria) for each of the 12 facilities; then using utilization data (i.e., caseload for each service) each facility, the team estimated an annual cost for the package in total, per capita, and per child U5 terms. Figure 7 provides an overview of the general calculation procedures.

Figure 7: Summary of delivery cost calculation procedures



For each service or activity included the package, the analysis team calculated a facility-specific average service cost using staff time, salary, drug, vaccine (as applicable), supplies, lab tests, and other transport or safari-day allowances; however, the team did not allocate equipment costs to an individual service but included them as a separate component of the ECHP. With the facility-specific average cost per service, the analysis team then used the six-month utilization figures for each service to generate a six-month cost figure for each service. The analysis team then used the annual adjustment ratio to generate an estimate of 12-month utilization and then used the same per service cost to estimate an annual cost. The analysis team repeated this process for each service (see Table 20) to generate a full package cost. Using the total facility and U5 catchment populations, the team then generated annual per capita and per child U5 costs for each facility, then computed average costs in aggregate, by region, by district, and by facility level.

Financing Source Estimation

While the analysis was not a formal expenditure tracking analysis, the team used publicly available information on the source of key costs and commodities to estimate the financing sources for the ECHP. The following describes the assumptions used to calculate the sources for each cost category:

- *Salary*: As all facility staff are based at the district, the GOU PHC district-level wage grant served as the sole source of salaries.
- *Drug and Supplies*: The analysis assumed that the GOU and NMS paid for all drugs except for malaria artemisinin-combined therapies (ACTs) and HIV/AIDS antiretroviral therapies (ARV). For malaria ACTs, the FY2019 Malaria Operational Plan stated that the GOU provided 7% of ACTs and the GFATM the remaining 93%. For HIV/AIDS ARVs, the PEPFAR Country Operational Plan FY2019 stated that the source for ARVs is 14% from GOU, 39%from the GFATM, and 48% from PEPFAR; however, co-trimoxazole was the only drug cost related to suspected HIV testing should a child test positive for HIV, which was a low percentage of children in the sampled facilities. The analysis team assumed that all consumable medical supplies came from GOU NMS sources.
- *Lab Tests*: Based on the FY2019 Malaria Operational Plan, the GFATM provided all mRDTs in public facilities. According to the PEPFAR Country Operational Plan FY2019, the GFATM provided 73% of HIV RDTs and PEPFAR provided the remaining 27%. For services or activities that required these tests, the analysis team used the listed percentages to determine the relative contribution from each revenue source.
- *Vaccines*: Co-financing requirements for the following vaccines allowed for differentiation of the proportion of vaccines paid for by GOU and the proportion paid for by Gavi: rotavirus (USD 0.40 per dose), pneumococcal conjugate (USD 0.40), pentavalent (USD 0.40), and measles (USD 0.20). Inactivated polio virus did not have a co-financing requirement in Uganda as of 2018. The analysis team accordingly adjusted price per dose to differentiate between GOU and Gavi sources to estimate the financing sources for vaccines.
- *Equipment*: MCSP and RHITES procured the equipment package; hence, the analysis coded these as a USG financing source.
- *Other Direct*: This category of costs included transport and other allowances to conduct outreaches and VHT-related activities at the facility-level. Based on facility staff interviews, these costs originated from facility-level GOU PHC non-wage budgets.

Assumptions and Limitations

Based on the chosen methodology, the analysis team identified the following assumptions and limitations to consider in the interpretation of results:

- *HMIS/DHIS2 source for utilization data*: While the team conducted cross-checks between facility monthly HMIS reports and the DHIS2 database to check for reporting accuracy, gathering register-level case data was beyond the scope of the exercise. The MCSP and RHITES programs supported

efforts to strengthen child health-related DHIS2 reporting and data use; therefore, the analysis team felt that the DHIS2 information provided strong estimates of the quantity of services delivered.

- *Utilization does not account for cost efficiency for multiple diagnoses*: As DHIS2 served as the main source of utilization data, the analysis did not account for possible efficiencies in the facility care processes, such as less health worker time spent. Because the DHIS2 does not report individual-level data, this calculation method could lead to some over-estimation of costs.
- *Immunization services represent costs at current coverage levels:* The cost estimates for static immunization services and outreaches used the numbers of vaccine doses delivered by each facility during the analysis period; therefore, the costs presented represent an estimate of *facility-based (or outreach)* costs to provide this range of services at the current 2018 coverage level. Furthermore, the estimated costs do not include costs related to the larger expanded immunization program, such as cold chain maintenance, logistics, etc., for which other costing exercises estimated.
- *Drug and lab test availability:* The analysis assumed that health workers would provide drugs and lab tests according to the 2017 IMNCI guidelines. This assumption implies rational prescribing practices by facility staff and full drug and lab test availability. Most facility staff reported some recent stock-outs of some commodities, primarily dispersible amoxicillin tablets and occasional mRDT stock-outs at HCIIs; however, the analysis team did not account for these stock-outs in the analysis.
- *Community-level costs*: The analysis did not include costs related to integrated community case management (iCCM) of childhood illness. Costed community and VHT activities in the package include those activities supported by MCSP and RHITES in adapting REC for broader child health facility-level planning.
- *Influence of iCCM in Southwest*: The SW region benefits from iCCM implementation; therefore, this could contribute to lower facility caseloads of pneumonia, diarrhea, and febrile illness in this region, thereby potentially influencing overall facility-level costs.
- *Cost-effectiveness:* Like the costing of the strategies to roll-out the ECHP, the facility-level costing did not measure cost-effectiveness against an alternative package of services given the timeline of programmatic implementation. Therefore, the analysis team could not make direct conclusions related to the ECHP's cost-effectiveness.
- *Indirect costs:* Since the analysis focused on a package of services delivered at public facilities—and not an analysis of all facility services—the analysis team was not able to easily estimate indirect costs (e.g., utilities) applicable to ECHP services; therefore, the analysis team excluded indirect costs in the estimates.

Findings

Based on the methodology and assumptions described above, the following section details the results of the analysis that estimates the annual costs to provide the package at public PHC facilities. This section first examines average costs by major cost categories, then presents the results by major ECHP components, then discusses per capita costs, and ends with presentation of financing source analysis. For converted USD, the team assumed an exchange rate of 1 USD to 3,705 UGX.

Annual Costs by Region and Facility Level

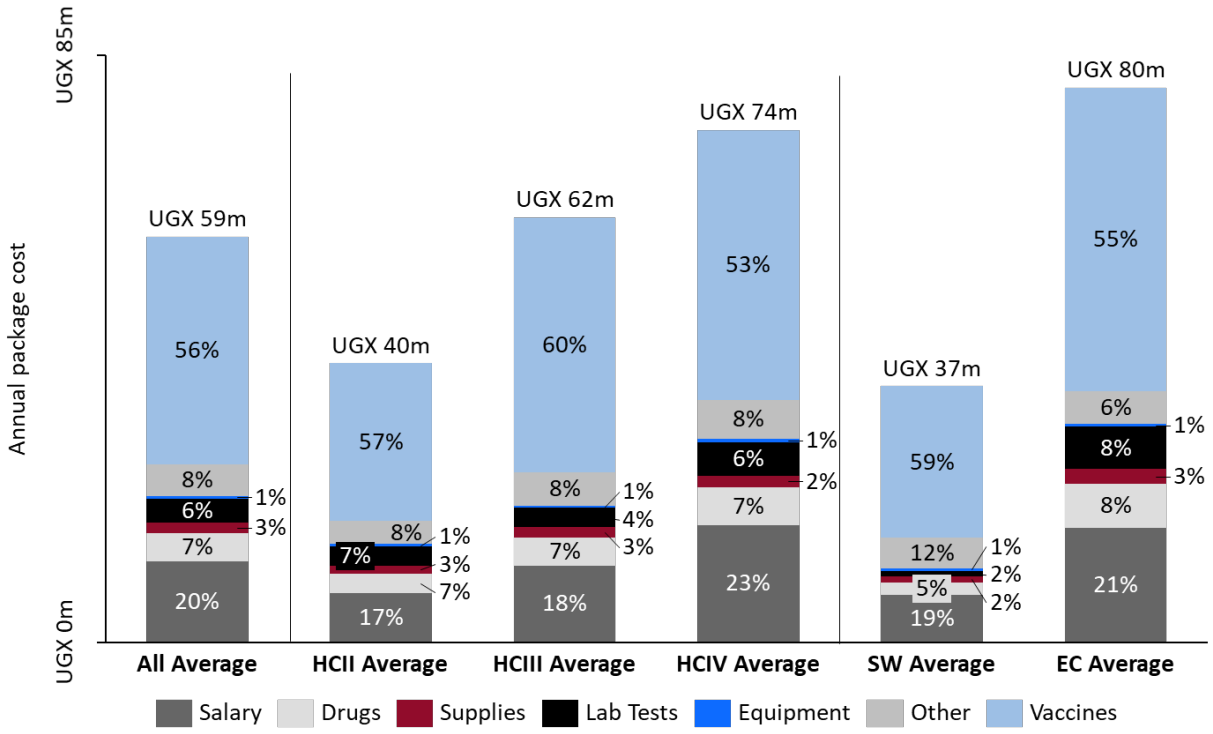
Table 22 provides a detailed breakdown of these average annual costs by facility levels and regions. Across all twelve sampled facilities, the average annual cost to provide the ECHP was approximately UGX 59 million (USD 15,900), with the average annual costs increasing for higher level health facilities; on average, it cost UGX 40 million (USD 10,800) per year at an HCII, UGX 62 million (USD 16,700) per year at an HCIII, and UGX 74 million (USD 20,000) per year at an HCIV. On a regional level, it cost UGX 37 million (USD 10,000) and UGX 80 million (USD 21,600) to deliver the package in a SW and EC facility on average, a 117% difference.

Table 22: Average annual facility costs to deliver ECHP, by facility level and region

Facility level	All average	East-Central	Southwest
HCII	UGX 40,431,769 USD 10,800	UGX 59,869,488 USD 16,160	UGX 20,994,050 USD 5,666
HCIII	UGX 61,502,871 USD 16,700	UGX 89,202,698 USD 24,076	UGX 33,803,043 USD 9,124
HCIV	UGX 74,174,742 USD 20,000	UGX 91,942,959 USD 24,816	UGX 56,406,526 USD 15,224

Figure 8 shows these averages and the breakdown of these costs by the major cost categories.

Figure 8: Average annual cost of ECHP provision, by cost categories



Across all facilities and regions, the cost of vaccines—regardless of financing source—comprised the largest proportion of overall costs, approximately 53% to 60%. Salary of facility staff comprised the next largest share of costs at approximately 20%; as expected with larger staff numbers at higher facility levels, the proportion of salary cost marginally increased from lower to higher level facilities. Drugs and lab tests comprised 7% and 6% of annual total costs, respectively, and consumables/supplies and equipment represented 3% and 1% of average annual total costs, respectively. At a regional level, there were differences in the relative proportion of drug and lab tests between EC and SW, with facilities in the latter requiring fewer drugs and lab tests (discussed later within the following sub-section). Other costs (e.g., transport, transport allowances, and safari-day allowances during outreaches or for non-outreach VHT-related activities) comprised approximately 8% of the overall ECHP annual cost.

Per Capita and Per Child Under-Five Costs

The analysis team also computed the costs of the ECHP on an annual per capita and per child U5 basis. These costs used the estimated annual cost of delivering the ECHP at each facility and divided them by the facility's total catchment population or U5 catchment population. These costs represent the annual amount

per individual or per child U5 in a facility's catchment zone required to deliver the package, regardless of an individual's actual utilization within that year.

Across all sampled facilities, the annual per capita and per U5 cost was UGX 4,266 and UGX 19,184 (USD 1.15 and USD 5.18), respectively (Figure 9 and Figure 10). Per capita and per U5 costs decreased from HCII to HCIV given the relatively larger catchment populations of HCIVs, thereby spreading the costs over a larger population. These costs were also higher in EC compared to SW; the EC per capita and per U5 costs were UGX 4,902 and UGX 21,522, respectively (USD 1.32 and USD 5.80) compared to UGX 3,631 and UGX 18,845 (USD 0.98 and USD 5.08) in SW.

Figure 9: Average annual per capita costs, by cost category, facility level, and region

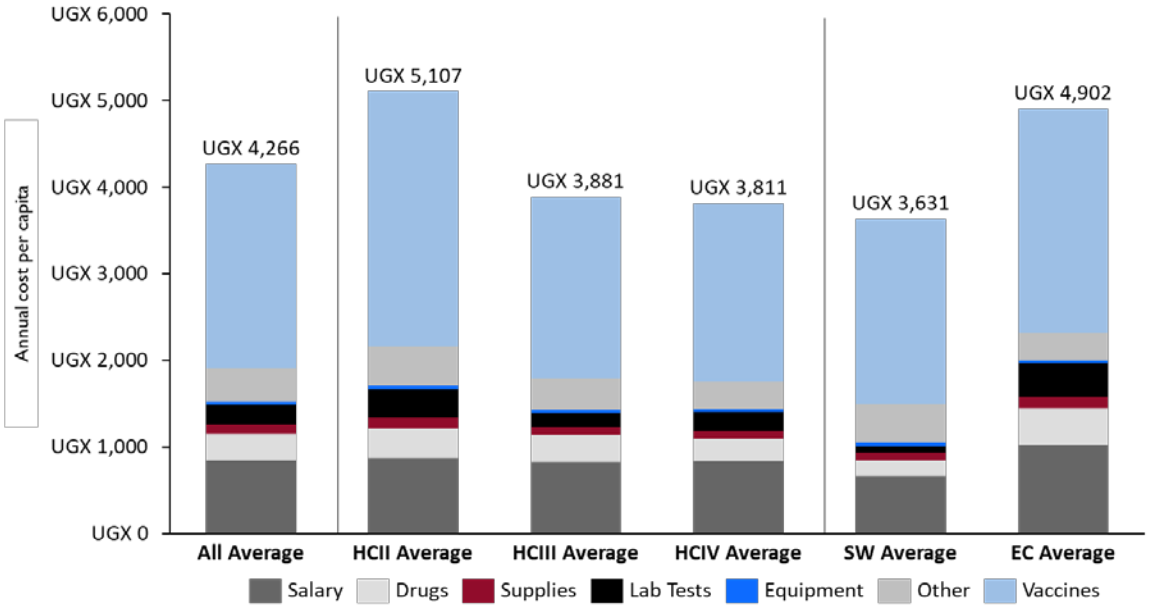


Figure 10: Average annual cost per child under-five, by cost category, facility level, and region

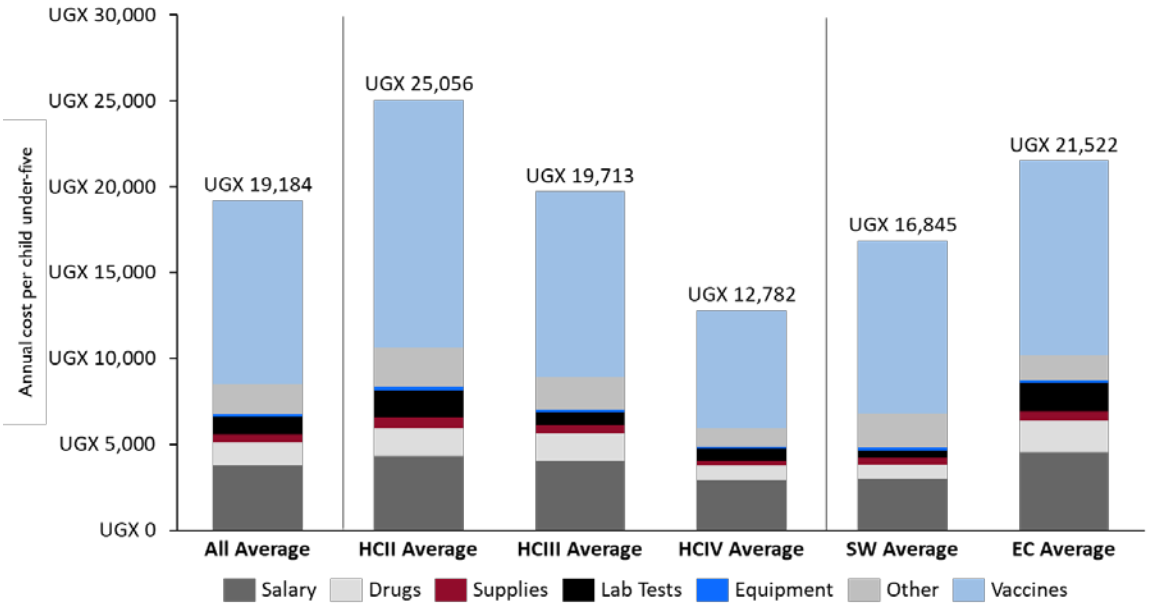
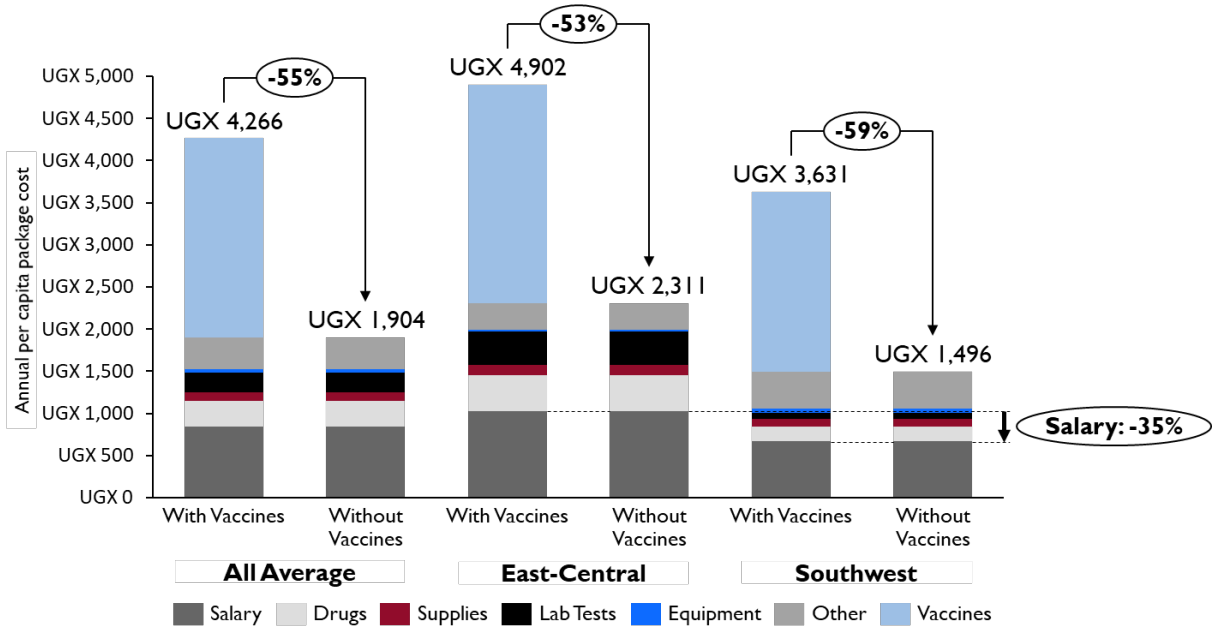


Figure 11 presents the relative contribution of vaccines costs across all sampled facilities, EC facilities, and SW facilities. Removing the cost of vaccines would reduce the annual cost per facility by 57% on average; average per facility annual cost would drop by 53% and 59% in EC and SW facilities, respectively, suggesting that vaccines represent a relatively larger proportion of ECHP costs in SW.

Figure 11: Annual ECHP per capita costs with and without vaccine costs, by region



The most recent Uganda Demographic and Health Survey of 2016 showed that coverage of three doses of diphtheria, pertussis, and tetanus (DPT3) coverage rate stood at 69% of children in EC and 85% in SW.[10] While annual average ECHP cost estimates showed that the total vaccine cost per facility was higher in EC than SW (Figure 8); vaccine costs in proportional and per capita terms were higher in SW than EC (Figure 9 and Figure 11) thereby supporting the relatively higher coverage rate in SW compared to EC.

As the second largest component of ECHP costs, salary costs in SW were 35% lower compared to the salary costs in EC (Figure 11). While SW has more facilities and lower staff vacancy rates than EC districts, the per facility caseload of the included services was higher in EC. Since the analysis used a per service/activity salary average for each facility (based on the actual staffing mix at each sampled facility) to determine total salary costs, the higher caseload rate was a key contributor of the higher salary costs in EC. Furthermore, SW received support for iCCM, which could drive down the caseload of conditions otherwise provided in facility.

Annual Costs by ECHP Components

Another way to view the annual estimated costs are by the service components of the ECHP. Table 23 displays the average cost by facility level and region to diagnose and treat a child for conditions included in the 2017 IMNCI guidelines, as well as the average cost for an outreach and average cost per static immunization clinic. For conditions that require stabilization or initial treatment and then referral per the IMNCI guidelines, the analysis only included the costs of the pre-referral services, excluding costs related to transport to higher level facilities as most sampled facilities did not report having funds and/or the means to cover these costs. Most condition-specific costs increased from HCIIs to HCIVs; however, there were some instances in which HCIII condition-specific services were higher than those at HCIV. The driver of this difference appeared to be the relative larger amount of time spent and larger number of staff involved in the care processes at the sampled HCIIIs versus HCIVs.

[10] Uganda Demographic and Health Survey, 2016.

Regionally, most condition-specific costs were marginally higher in SW facilities compared to those in EC; based on the survey responses, facilities in the SW on average either reported spending more time on the care process or reported more staff involved in the care process, thereby increasing the total salary costs. Facilities on average reported conducting four static immunization clinics and four outreaches per month; the average cost (including vaccine costs) for each of these services increased between HCIIs and HCIIIs, but then decreased between HCIIIs and HCIVs, likely the result of more staff time involvement at HCIIIs or a greater number of vaccines delivered at HCIIIs versus HCIVs. Regionally, an outlying EC facility, which had a higher number of vaccine doses delivered at static immunization clinics compared to other facilities, somewhat skewed upward the EC average costs for outreach and static immunization services.

Table 23: Average cost by ECHP condition or activity, by facility level, and region

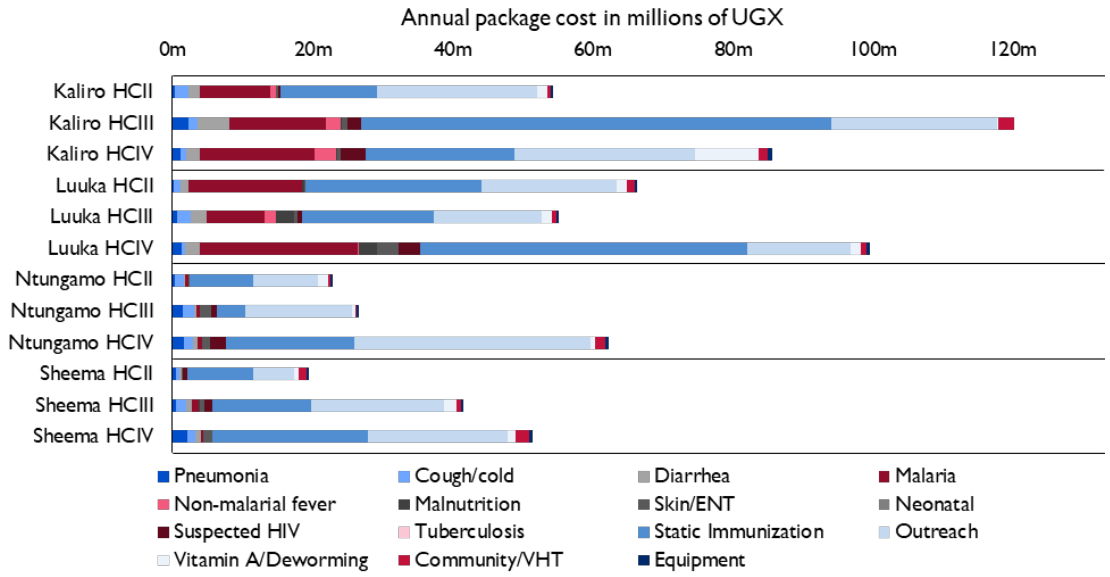
	All	HCII	HCIII	HCIV	SW	EC
Acute Diarrhea	UGX 3,936	UGX 3,707	UGX 4,249	UGX 3,853	UGX 4,232	UGX 3,640
Anemia	UGX 1,925	UGX 1,812	UGX 1,946	UGX 2,017	UGX 2,498	UGX 1,352
Cholera	UGX 4,855	UGX 4,595	UGX 5,230	UGX 4,741	UGX 5,120	UGX 4,590
Complicated SAM	UGX 5,426	UGX 4,721	UGX 6,427	UGX 5,130	UGX 5,870	UGX 4,982
Cough or Cold	UGX 2,167	UGX 1,950	UGX 2,515	UGX 2,036	UGX 2,543	UGX 1,791
Deworming	UGX 188	UGX 172	UGX 200	UGX 191	UGX 188	UGX 187
Dysentery	UGX 1,958	UGX 1,677	UGX 2,374	UGX 1,823	UGX 2,203	UGX 1,714
ENT Condition	UGX 4,805	UGX 3,427	UGX 4,865	UGX 6,124	UGX 4,584	UGX 5,027
Malaria	UGX 6,220	UGX 4,952	UGX 6,982	UGX 6,725	UGX 6,549	UGX 5,891
MAM	UGX 4,353	UGX 2,578	UGX 5,342	UGX 5,139	UGX 4,745	UGX 3,961
Measles	UGX 5,300	UGX 4,918	UGX 5,764	UGX 5,217	UGX 5,740	UGX 4,859
Neonatal Jaundice	UGX 2,339	UGX 1,881	UGX 2,707	UGX 2,430	UGX 2,923	UGX 1,756
Neonatal Pneumonia	UGX 3,203	UGX 2,826	UGX 3,346	UGX 3,438	UGX 3,746	UGX 2,661
Neonatal PSBI	UGX 2,644	UGX 2,185	UGX 3,012	UGX 2,734	UGX 3,227	UGX 2,060
Non-Malarial Fever	UGX 6,187	UGX 4,961	UGX 6,928	UGX 6,671	UGX 6,495	UGX 5,879
Persistent Diarrhea	UGX 6,301	UGX 4,909	UGX 6,603	UGX 7,390	UGX 6,041	UGX 6,561
Pneumonia	UGX 3,672	UGX 3,414	UGX 3,979	UGX 3,622	UGX 4,007	UGX 3,336
Skin Condition	UGX 6,276	UGX 4,898	UGX 6,335	UGX 7,596	UGX 6,179	UGX 6,374
Suspected HIV	UGX 11,856	UGX 10,043	UGX 12,869	UGX 12,655	UGX 12,140	UGX 11,571
Tuberculosis	UGX 4,062	UGX 2,519	UGX 4,297	UGX 5,371	UGX 4,635	UGX 3,489
Uncomplicated SAM	UGX 34,461	UGX 32,686	UGX 35,450	UGX 35,247	UGX 34,853	UGX 34,069
Vitamin A Supp.	UGX 326	UGX 319	UGX 322	UGX 337	UGX 334	UGX 318
Static Immunization*	UGX 208,295	UGX 147,947	UGX 269,580	UGX 207,359	UGX 102,620	UGX 313,970
Outreach*	UGX 195,728	UGX 162,496	UGX 203,628	UGX 221,060	UGX 196,177	UGX 195,279

*Includes the cost of vaccines based on actual number of doses delivered; also accounts for facility self-reported frequency of outreach and static immunization services in calculating averages

Figure 12 presents annual costs of each sampled facility disaggregated by ECHP components (based on the aggregation categories listed in Table 20). Across all facilities, static immunization services and outreaches comprised the largest proportion of ECHP costs. There were marked differences between the relative costs of the remainder of the ECHP components between the two regions. Febrile illness—whether malaria or non-malarial fever—and diarrhea comprised a larger proportion of costs in EC, while pneumonia and

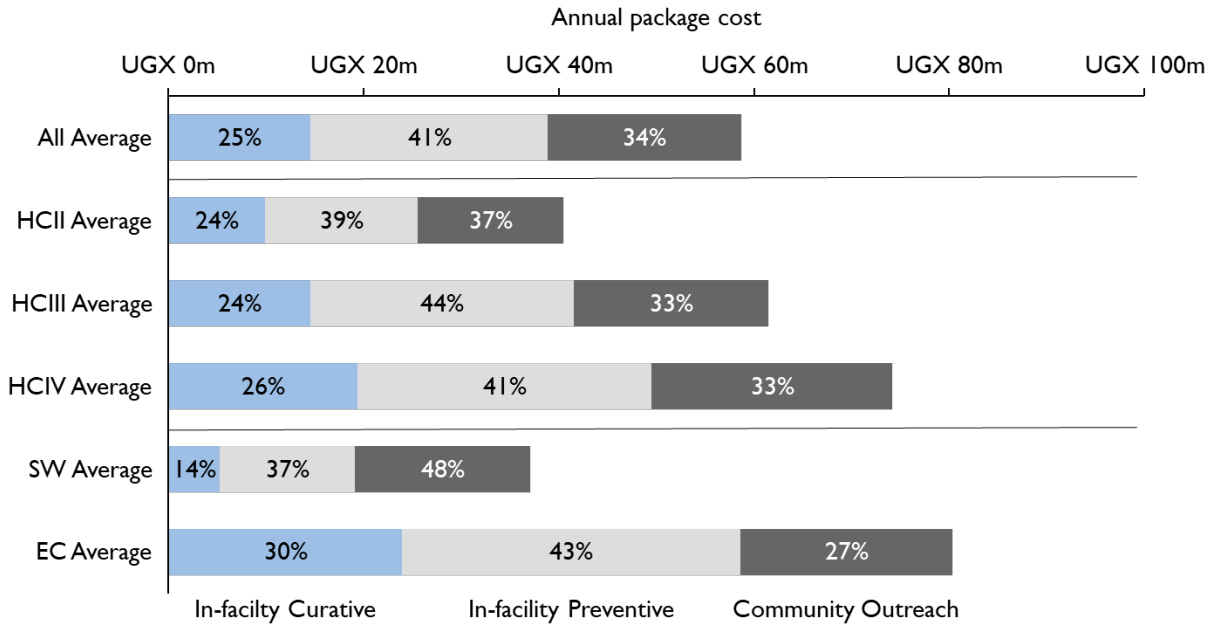
cough/cold were a larger proportion of ECHP costs in SW. Figure 12 also highlights that there were outliers in the estimated annual costs for the sampled facilities. For example, the Kaliro HCIII showed high in-facility caseloads, as well as relatively large number of antigens delivered in static and outreach immunization activities, thereby increasing the overall costs and facility/regional averages as described above.

Figure 12: Annual cost per sampled facility, by ECHP components



Aggregation of the ECHP services and activities by in-facility curative, in-facility preventive, and community outreach activities showed that in-facility curative services comprised approximately one-quarter of annual average costs, in-facility preventive services 41%, and community outreach activities (including immunization outreaches) 34% (Figure 13). Across facility levels, the breakdown of costs across these categories are relatively similar; however, in-facility curative services comprise a larger portion of annual costs in EC versus SW. (30% versus 14%, respectively).

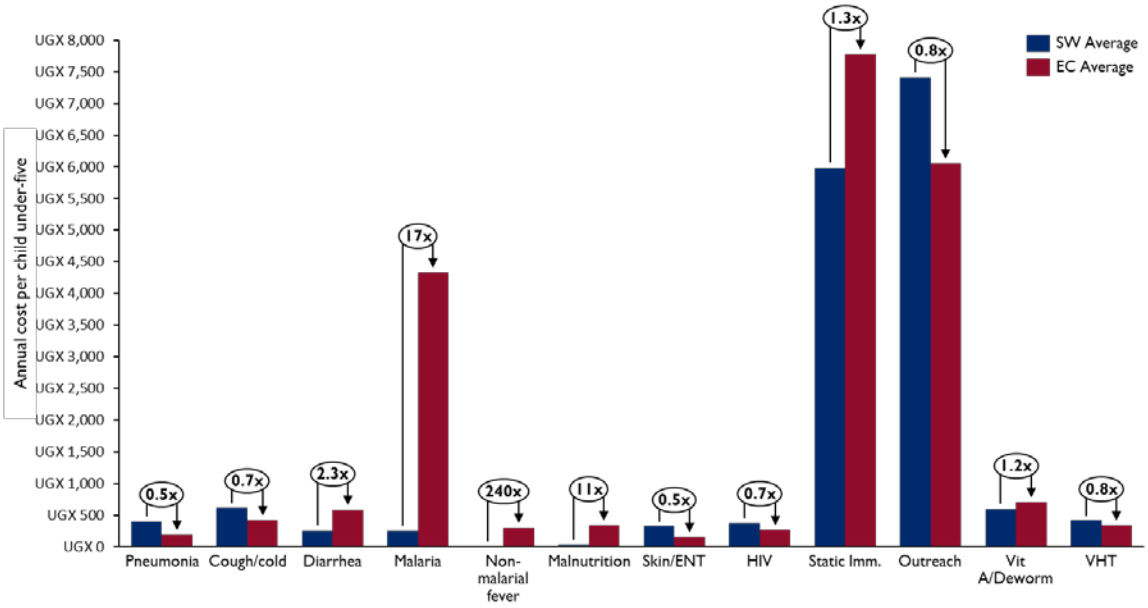
Figure 13: Average annual costs of ECHP, by curative, preventive, and community components and facility type



Influence of ECHP Components on Total Costs

Figure 14 shows the relative difference in the costs of ECHP components in the sampled facilities between the two regions; the figure displays per child U5 costs to adjust for the effect of population size on relative costs between the two regions. The biggest drivers of the cost differential between SW and EC region came from febrile illness; annual costs to diagnose and treat malaria and non-malaria fever were 17 times and 240 times, respectively, more in EC compared to SW despite per service costs for both conditions being more expensive in SW. Malnutrition and diarrhea-related costs were also substantially higher in EC compared to SW. Conversely, pneumonia, and cough/cold represented a relatively smaller proportion of the total ECHP cost in EC compared to SW. The total costs of static immunization and outreach services were relatively similar between the two regions, as well as vitamin A supplementation and deworming activities.

Figure 14: Relative cost difference of ECHP components between regions



Cost Estimates to Provide ECHP at District Level

The previously presented per capita costs can help estimate the total costs of the package for a given district. Using the facility-specific average estimates for each region, average catchment population size for each facility level, and the number of public HCIIs, HCIIIs, and HCIVs in each district, the analysis team computed an estimate of the annual costs of providing the ECHP in the four districts, presented in Table 24. Estimated total annual district costs range from UGX 1.5 billion (USD 405,000) in Kaliro to UGX 2.6 billion (USD 702,000) in Ntungamo.

Table 24: Annual district costs to deliver ECHP at all public facilities, by cost categories

District	Salary	Drugs	Vaccines	Supplies	Lab Tests	Other	Total
Kaliro	UGX 337M	UGX 142M	UGX 834M	UGX 40M	UGX 117M	UGX 8M	UGX 1478M
	USD 89,716	USD 38,024	USD 222,059	USD 10,900	USD 31,330	USD 2,274	USD 394,303
Luuka	UGX 446M	UGX 191M	UGX 1,180M	UGX 56M	UGX 168M	UGX 11M	UGX 2,052M
	USD 118,758	USD 50,928	USD 314,102	USD 15,083	USD 44,808	USD 3,131	USD 546,810
Ntungamo	UGX 558M	UGX 145M	UGX 1,796M	UGX 73M	UGX 59M	UGX 33M	UGX 2,664M
	USD 148,760	USD 38,611	USD 478,103	USD 19,495	USD 15,887	USD 8,988	USD 709,844
Sheema	UGX 319M	UGX 83M	UGX 1,043M	UGX 42M	UGX 33M	UGX 21M	UGX 1,541M
	USD 84,962	USD 22,185	USD 277,656	USD 11,426	USD 8,970	USD 5,640	USD 410,839

Annual Costs by Financing Sources

Figure 15 presents breakdown of ECHP costs by its estimated sources of financing. Nearly half of the financing for the ECHP came from GOU sources, followed by 44% from Gavi, 7% from the GFATM, 1% from PEPFAR, and 1% from other USG sources.

Figure 15: ECHP costs, by financing sources

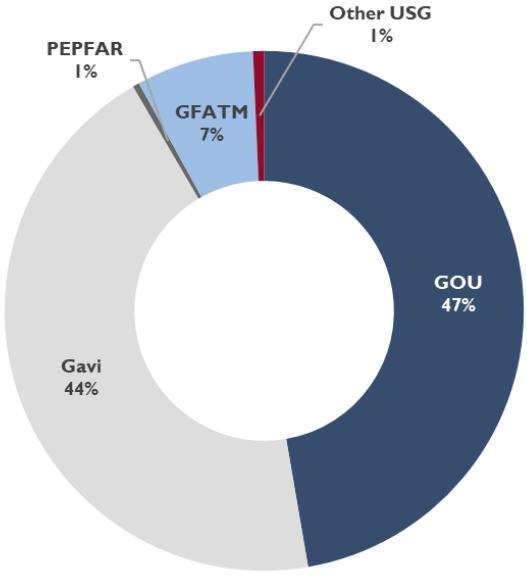


Figure 16 displays a further breakdown of the annual average facility ECHP cost by these financing sources and by the types of costs that each source funds. All UGX 11.7 million of salary costs originated from GOU PHC wage grants. The majority of funding for drugs and supplies/consumables came from GOU through the NMS (81%), while the GFATM funded approximately 19% of these costs and PEPFAR less than 1%. As the largest cost category, 74% of the vaccines cost came from Gavi with the remaining 26% funded by GOU. GFATM provided the majority of funding for laboratory tests (93%)—in this case all mRDTs at public facilities—and PEPFAR funded the remaining 7% of lab test costs—the costs of HIV testing kits. As MCSP and RHITES provided them, the team assumed that all costs for equipment originated from USG sources. Finally, other direct costs—primarily costs to conduct outreaches, such as transport and safari-day allowances—originated from facility level PHC non-wage grants. There was not significant variation in financing sources by facility level or region.

Figure 16: Annual average ECHP facility cost, by financing source and major cost category

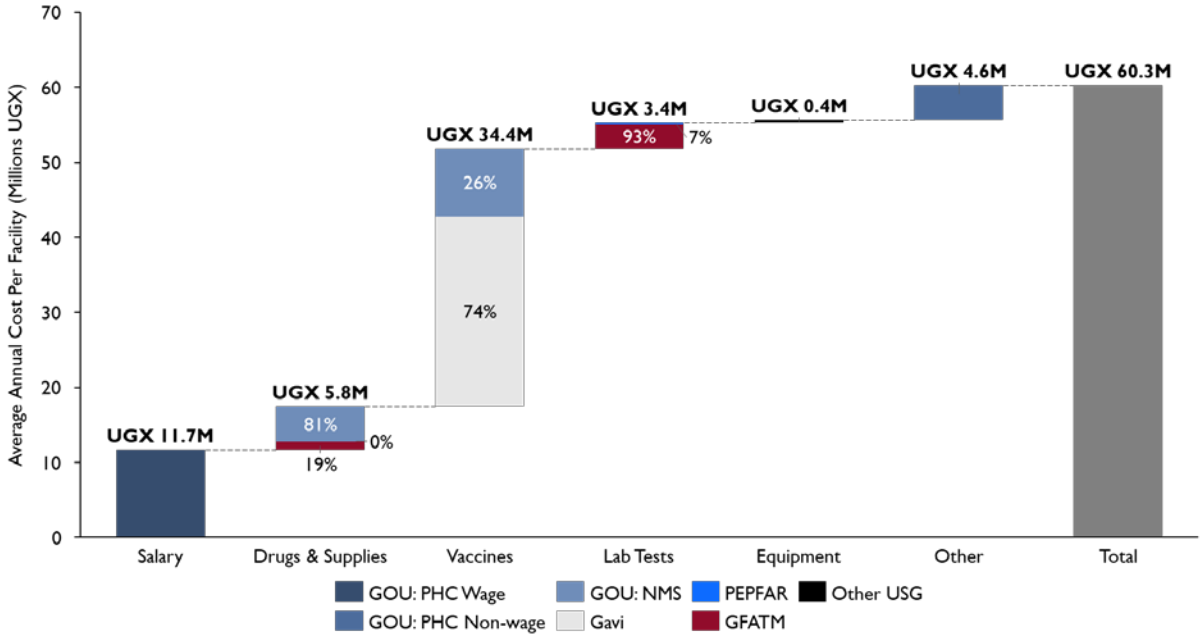
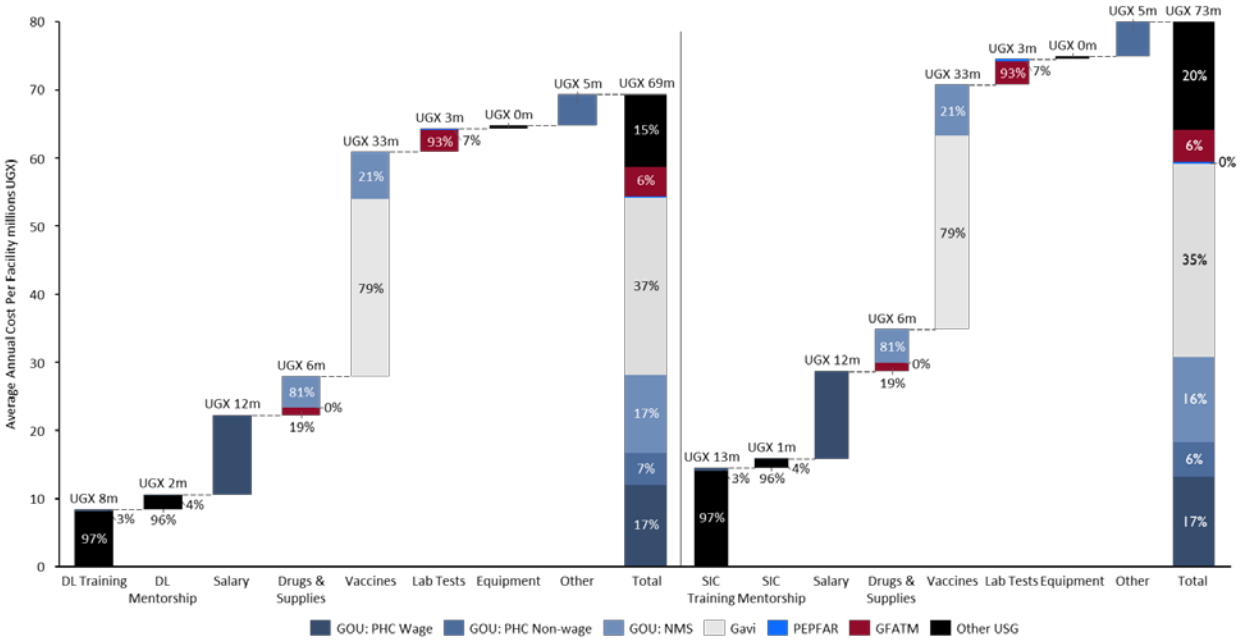


Figure 17 adds the average cost to train and mentor an average facility using the DL and SIC methodologies to the costs associated with providing the full ECHP at an average facility. While it excludes costs related to the TOT and REC adaptation, these estimates provide a sense of the financing sources to roll-out and deliver the package from a programmatic perspective. Across DL and SIC methodologies, GOU sources comprised approximately 40% of total costs, followed by approximately 36% from Gavi, 6% from GFATM, and 16% from USG sources for the DL methodology and 20% from USG sources for the SIC methodology.

Figure 17: Combined ECHP facility roll-out and service delivery costs, by training methodology, cost category, and financing sources



Comparison to Per Capita Health Expenditures

Comparing the per capita costs of the ECHP against Uganda's per capita health expenditures can give a sense of the relative affordability of the ECHP. As of 2016, Uganda's per capita current health expenditure measured approximately USD 38, with approximately 17% sourced from domestic government spending, 40% from external sources, and 43% from private domestic sources, such as out-of-pocket spending and voluntary health insurance. Per capita domestically sourced general government health expenditures were USD 6.[11] On a per capita basis and excluding private domestic sources of financing (as the analysis excluded these costs), the estimated total annual cost of the ECHP was approximately 5% of the per capita current health expenditure from external and domestic public sources. The breakdown of the annual ECHP cost by financing sources allows for a comparison of the relative affordability against domestic sources of financing. Considering only domestic GOU cost components (i.e., 47% of the total ECHP cost presented in Figure 15), the annual per capita ECHP cost was approximately 10% of per capita domestically sourced general government health expenditures.

11 World Health Organization. Global Health Expenditure Database 2018. At http://apps.who.int/nha/database

Discussion

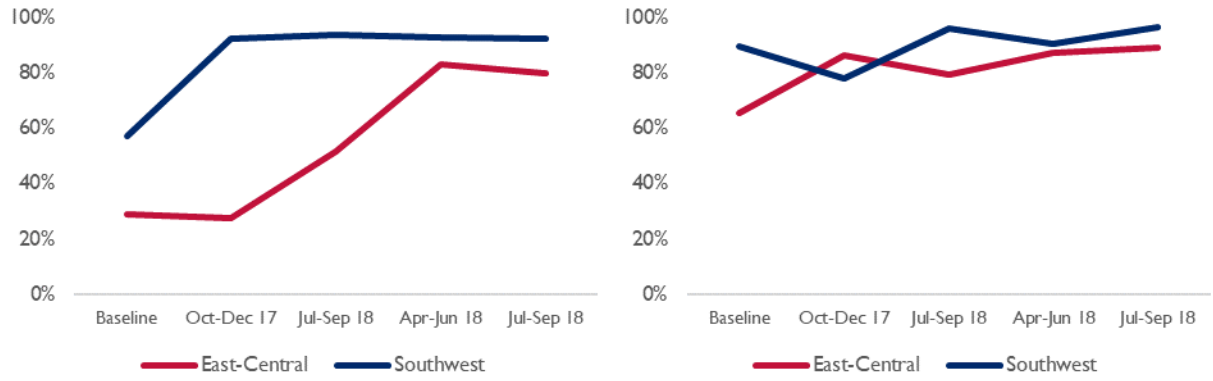
This cost analysis sought to estimate the costs of the providing the demonstration ECHP at public PHC facilities in four districts in Uganda. As an integrated package, the costs of the ECHP included costs related to the provision of health services, including components of standalone programs, such as integration with the expanded immunization program and broader VHT and community-based activities. The outputs of this analysis are useful for multiple purposes, such as national- and district-level planning for expansion of the ECHP or planning for transitions in donor-supported funding areas of the ECHP. Key takeaways of the findings are:

- Overall, the main cost drivers of the ECHP are costs associated with the provision of immunization services, either provided through static clinics or outreaches; the main driver of this cost is that of antigens/vaccines. After immunization services, costs associated with febrile illness, diarrhea, and malnutrition are the major costs drivers in EC compared to pneumonia and cough/cold in the SW. Given the relative difference in costs of these services, annual costs tended to be higher in EC. The costs of providing the ECHP will therefore vary based on a region or district's epidemiological profile, and users of this data should exercise caution in generalizing the findings to other geographies within Uganda.
- The ECHP is a set of integrated services for conditions that public PHC facilities often already treated, albeit in a limited manner or of low quality. Hence, the estimated package costs presented in this report represent the likely additional resources needed to provide the full package in an integrated and high-quality manner.
- With an annual per capita cost of USD 1.15 and per U5 cost of USD 5.58, the costs of the ECHP represented 5% of public and non-out-of-pocket current health expenditure, and the domestically funding portion of the ECHP represented approximately 10% of GOU health spending. Current estimates also place per capita PHC spending in Uganda at USD 20;[12] as a package of PHC services, the annual ECHP per capita cost was 6% of current PHC spending. In the absence of a comparator package of services, it appears that the annual costs of the ECHP are affordable relative to the U5 proportion of the population, approximately 20%.
- The financing source estimation reveals that approximately half of all financing comes from the GOU, with the majority of GOU spending on staff salaries, drugs, and facility-level costs to conduct outreaches and support VHTs. To maintain the full suite of services in the ECHP, it is critical that facilities receive adequate funding, especially the annual average UGX 4.6 million (USD 1,200) through non-wage PHC grants to conduct outreaches and community/VHT activities. For HCIVs, whose drug supply functions through a pull system, it is also important that they receive sufficient funding to have full stocks of drugs and supplies for conditions within the ECHP. For HCIIIs and HCIIs, whose supply systems function as push systems, improved quantification and distribution processes should ensure that there is sufficient funding to provide the full range of drugs and supplies needed for the ECHP services.
- The costs estimates can also serve as a starting point to understand the implications of the GOU gradually assuming responsibility for a larger share of ECHP costs, especially those costs related to malaria-related commodities as they represent a large proportion of non-GOU funded costs.
- Given the landscape of larger health financing reforms underway in Uganda, the ECHP cost estimates can also provide inputs into planning and implementation of performance-based financing (PBF) and national health insurance. For example, should the PBF program include output-based payments on child health services, service-specific cost estimates could serve as a basis for reimbursement. Similarly, the cost outputs could also help in program-based budgeting for child health care or in the design of a PHC benefits package for the National Health Insurance Scheme.

12 Primary Health Care Performance Initiative. 2018. Primary Health Care Expenditure Per Capita. At https://improvingphc.org/indicator/primary-health-care-expenditure-capita-usd#?loc=130&viz=0&ci=false

In addition to the costing outputs previously described, it is also essential to consider corresponding programmatic outputs for key child health indicators. The combined strategies to roll-out the ECHP (i.e., training and mentorship) and deliver the ECHP at public facilities contributed to improvements in overall case management of key conditions, including a greater percentage of cases appropriately treated as per the ECHP guidelines in the four demonstration districts (Figure 18).

Figure 18: Proportion of under-five cases with pneumonia (left) and diarrhea (right) who received appropriate treatment at facility in last quarter, by regional averages



Source: MCSP PY4 Annual Report, December 2018. Stock-outs of Amox-DT has been a persistent problem in East-Central in latter part of 2018, one possible explanation of the slight recent decrease in appropriate treatment of pneumonia cases in that region.

Conclusions

With the roll-out and delivery of the ECHP in the four demonstration districts in Uganda, this costing analysis produced an important piece of evidence to inform planning for the expansion of training and service delivery approaches regionally and nationally.

The combined training and mentorship methodologies supported by MCSP and RHITES showed relatively similar improvements in health worker IMNCI competencies (Table 18) though different cost implications, including the amount of time health workers spent away from the health facility and the resources required to implement the mentoring approaches. However, mentoring was a critical component to reinforce and improve IMNCI competencies of health workers across both of the training methodologies.

The costs to deliver the ECHP showed that the package was a relatively affordable set of integrated interventions with the potential to contribute to U5 mortality reductions through improved case management (Figure 18). Though health worker child health case management capacity and facility-level quality of care improved with the support from MCSP and RHITES, the service delivery costs to deliver the ECHP could shift over time, decreasing with increased efficiencies depending on the change in utilization of services in public facilities.

With these encouraging improvements in health worker competency and appropriate treatment of key services to influence U5 mortality, discussions and planning for the expansion of these programmatic approaches can leverage these cost estimates to determine the level of domestic and external resource mobilization needed to scale-up the strategies to roll-out the ECHP and deliver the package at public PHC facilities in Uganda.

Bibliography

Gavi, The Vaccine Alliance. (2018). *Uganda Co-financing Profile.* At https://www.gavi.org/country/uganda/documents/cofiss/co-financing-information-sheet-uganda/.

Government of Uganda Ministry of Health. (2013). *Reproductive Maternal, Newborn and Child Health Sharpened Plan for Uganda.* At http://library.health.go.ug/download/file/fid/580688.

The Global Fund to Fight AIDS, Tuberculosis, and Malaria (2018). *Malaria RDT Reference Price Table.* At https://www.theglobalfund.org/media/7565/psm_malariardtreferencepricing_table_en.pdf.

The Global Fund to Fight AIDS, Tuberculosis, and Malaria. (2018). *ACT Reference Price Table.* At https://www.theglobalfund.org/media/5812/ppm_actreferencepricing_table_en.pdf?u=636759769100000000

President's Emergency Plan for Aids Relief. (2018). *Uganda FY2018 Country Operational Plan.* At https://www.pepfar.gov/documents/organization/285851.pdf

President's Malaria Initiative. (2018). *FY2018 Malaria Operational Plan.* At https://www.pmi.gov/docs/default-source/default-document-library/malaria-operational-plans/fy-2018/fy-2018-uganda-malaria-operational-plan.pdf?sfvrsn=11

Primary Health Care Performance Initiative. 2018. *Primary Health Care Expenditure Per Capita.* At https://improvingphc.org/indicator/primary-health-care-expenditure-capita-usd#?loc=130&viz=0&ci=false

Uganda Bureau of Statistics - UBOS and ICF. (2018). *Uganda Demographic and Health Survey 2016*. Kampala, Uganda and Rockville, Maryland, USA: UBOS and ICF.

United Nations Children Fund. (2018). *Ready-to-use therapeutic food price list.* At https://www.unicef.org/supply/files/RUTF_Prices.pdf.

World Health Organization. (2018). *Global Health Expenditure Database.* At http://apps.who.int/nha/database