

Cost of new born care interventions in four regions of Ghana: implications for health resource allocation.

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Research article

Keywords: New-born care, Marking every baby count initiative, Ghana, cost efficiency, evaluation

Posted Date: March 20th, 2020

DOI: <https://doi.org/10.21203/rs.3.rs-18181/v1>

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Abstract

Background Limited financial, human and material health resources coupled with increasing demand for new born care services require efficiency in health systems to maximize the available sources for improved health outcomes. Making Every Baby Count Initiative (MEBCI) implemented by local and international partners in 2003 in Ghana aimed at attaining neonatal mortality of 21 per 1,000 livebirths by 2018 in four administrative regions in Ghana. **Objective** Determine the cost of MEBCI interventions towards sustaining new born care best practices, and strengthening capacity for frontline clinical staff involved in new born care.

Methods Cost of MEBCI interventions was evaluated on unit cost calculations. Expenditure items trainings, supervisions, monitoring and evaluation, advocacy, administrative costs and logistics. Data collection started in October 2017 and ended in September 2018. Key cost data sources were invoices, expense reports and ledger books at the national, regional and district levels of MEBCI implementation.

Results Approximately GH¢ 24.5 million (US\$ 5.5 million) expenditure data was recorded as overall cost of MEBCI interventions at the national and regional levels of project activities. Out of this figure, fixed cost constituted 71% and recurrent cost represented 29%. A total of GH¢ 1.6 million (US\$ 372,727) expenditure values were expended in strengthening national leadership at the national health level; nearly 70% of this cost was spent on workshops and training related activities. Cost of implementing MEBCI at the various regional health directorates was approximately GH¢ 17.6 million (US\$ 3.9 million). Out of this amount, direct provider training and related activities constituted 98% and indirect cost accounted for the remaining 2%. Overall, it was found that the MEBCI interventions covered 4,027 health providers, out of which 3,453 (86%) were clinical healthcare staff.

Conclusion The MEBCI intervention had a wide coverage in terms of training for frontline healthcare providers albeit the associated cost may be potentially unsustainable for the Ghana's health system. M-learning and e-learning platforms could be leveraged to reduce cost of the on-site batch-training approach.

Background

According to Ghana Demographic and Health Survey (GDHS) report [1], Ghana has over the years recorded significant improvements in infant and under-five mortality rates with infant mortality rate per 1000 population reducing from 77 in 1988 to 41 in 2014; likewise, under-five mortality rate has improved from 155 per 1000 population in 1988 to 60 per 1000 population in 2014.

Notwithstanding these achievements, the country continues to battle with challenges of newborn care evident in the fact that as at 2015 Ghana still recorded a neonatal mortality rate of 28 per 1000 live births, marginally above the African average of 28 [2]. According to a WHO report [2], for Ghana to attain the 2030 target of 22 neonatal deaths per 1000 live births, there is the need to invest in more cost-effective health interventions to promote greater impact and sustainability of these public health interventions. The

quest for greater efficiency in the execution of health care interventions is particularly compelling for resource-poor countries such as Ghana since it is critical to meeting the increasing demand for basic health care services in the midst of limited financial, human and material health resources [3-7].

While health care for the newborn remains a priority area for the government of Ghana, programmes targeting these vulnerable populations must work within a constrained resource envelope, especially as donor budgetary support for the health sector is in a declining trajectory [8]. As part of efforts to support the Government of Ghana (GoG) to attain the goal of reducing neonatal mortality, the Ministry of Health, Ghana Health Service and other local and international partners initiated a joint collaborative project in 2013 called Making Every Baby Count Initiative (MEBCI). The project aimed at attaining neonatal mortality of 21 per 1,000 livebirths by 2018 in four administrative regions in Ghana (names withheld for anonymity).

The overall goal of MEBCI intervention is that by 2018, 90% of newborns delivered in selected healthcare facilities in target intervention regions will receive essential newborn care and appropriate interventions to address asphyxia, infection, and prematurity as per GoG standard guidelines for newborn care [9]. Moreover, the MEBCI intervention sought to complement efforts towards establishing mechanisms to sustain impact at the national level and in the four target regions. The MEBCI intervention activities lasted for five (5) years (September 2013 to August 2018) with funding from an international donor, in the United Kingdom (UK) and implemented jointly by local government agencies within the health sector.

The MEBCI interventions entailed initial health facility assessments prior to start of staff trainings to establish facility capacity for newborn care; clinical skills training for care givers in the form of Essential Care for Every Baby (ECEB), Helping Babies Breathe (HBB), Infection Prevention (IP), Kangaroo Mother Care (KMC), and follow-up visits. The remaining components of the MEBCI interventions included advocacy and policy dialogues, and related administrative/support activities on the project deliverables.

First, this evaluation is estimating the global cost of a large-scale donor-funded intervention in a critical area of health services delivery with an eye to sustainability and scalability in a resource-constrained setting such as Ghana. Also, paper presents evaluation findings on the direct and indirect cost estimations of the MEBCI interventions and the implications for sustainability and scale-up of the public health intervention in Ghana. Additionally, this evaluation offers scenarios of alternate approaches to implementation to inform future policy decisions, financing options and programme planning for neonatal care and related health service provision in Ghana.

Methods

Design

Unit cost calculations were used to estimate the cost of MEBCI interventions along the spectra of inputs and outputs. Proxies for the input factors were the direct and indirect cost of the MEBCI interventions quantified in absolute Ghana Cedis (GHC) and United States Dollars (US\$) equivalence. Output indicators

were proxied by the average training scores of MEBCI-trainees on HBB and ECEB. Other output indicators were total number of staff trained in HBB and ECEB; neonatal asphyxia cases; premature cases; neonatal hypothermia; neonatal sepsis, and still births throughout the period of the MEBCI interventions.

The cost analysis technique was retrospective in nature where administrative records were audited alongside desk review of financial expenditure records at the various cost centers involved in the MEBCI intervention implementation at the national, regional and district levels.

Cost evaluation sites

The evaluation was done in four (4) out of the then ten (10) administrative regions of Ghana. Since project was implemented before the creation of the new administrative regions, this paper makes reference to the old regional demarcations. Total population of healthcare facilities engaged in MEBCI were 155, from the four intervention regions. These include 4 regional hospitals, 99 district hospitals, 4 polyclinics and 48 health centers (see Table 1). Cost data were retrieved from the local funding agent in Accra; the four Regional Health Directorates (RHDs), and Regional Hospitals (RHs) in the target regions.

Insert Table 1: Health facilities engaged in MEBCI interventions: disaggregated by region

Source: Local Funding agent administrative data (2017)

Legend: Note: names of regions anonymized with letters (A, B, C & D)

Sampling

All available data on financial cost pertaining to MEBCI activities at both national and regional levels were retrieved from the various cost centers at the level, regional and district levels and analyzed. All four intervention regions including the four regional hospitals were evaluated in terms of expenditure reports on the MEBCI interventions.

An audit census was done on all cost data in the four RHDs and regional hospital which were responsible for budgeting, disbursing and expending on provider training activities in their regions. Likewise, all expenditure records at the local funding agent in Accra were retrieved and analyzed to determine global cost of the interventions, including advocacy, developing training curricula, building capacity and national leadership in newborn care.

Inclusion and Exclusion Criteria

Inclusion criteria for the cost data review were: (1) the region should have benefited from MEBCI intervention activities, and (2) beneficiary health facilities and staff should have received MEBCI provider

trainings and follow-up visits. All four regional hospitals that received the core MEBCI intervention were equally included.

Data collection/exploration

A “top-down bottom-up” approach was used in the cost data collection process. Data were first retrieved from the level of the interventions’ funder, in a top-down approach. The bottom-up approach entailed data collection from direct beneficiaries of the MEBCI Project, namely the national health policy level, the four RHDs (which directly administered funds for the district hospitals, polyclinics and health centers) and the four regional hospitals. Figure 1 shows the framework for data collection and the cost analysis.

Data sources

Data were largely retrieved from administrative records at the local funding agent level and local implementing partners. Data included administrative and cost accounting records. Other data sources were annual budgets, invoices, expense reports and ledger books by the various cost centers.

Key informants during the data collection at funding agent were the Project administrator and accountant. At the RHDs, the key informants were mostly MEBCI regional focal persons, regional accountants or their delegates.

Expenditure items reported included trainings, supervisions, monitoring and evaluation, advocacy, support/administrative running costs and logistics. Provider training data were used to estimate average staff time lost to MEBCI trainings. These man-hours were costed per capita in monetary terms with the aim of deriving opportunity cost of the MEBCI interventions to the individual staff using a liberal parameter of the prevailing national daily minimum wage (NDMW) [10].

Data Collection Instruments

Four set of guideline instruments were designed and validated over a period of three months before implementation. The instruments were uniquely designed to collect cost data at all cost centres. Each cost analysis tool had sections, unit cost, quantities and frequency of cost, and total cost per item or activity as applicable. Specific cost items were further disaggregated into direct (fixed and recurrent) and indirect (fixed and recurrent) costs.

Data Collection Process

A team of two data collectors with academic backgrounds in Health Economics were recruited and trained to collect data. Data collection at funding agent level started from 23rd October, 2017 and ended on 30th November, 2017. At the RHDs, data collection was done at different time intervals in the first quarter of 2018 while cost data from the regional and district levels were in the third quarter of 2018.

The field workers were directly supervised by the lead consultants for the cost analysis of the MEBCI Project. Double entry of data was done by the two trained evaluators prior to data coding and cleaning to minimize data entry errors and promote validity of the data. Field data were captured into Microsoft Excel (2013) and later exported to STATA (version 12.0) for analysis.

Data completeness

Cost records retrieved from the funding agent spanned from September 2013 to August 2017 which represented the first four fiscal years of the five-year project. At the RHDs, data from each of the four regions were collected at different time periods as stated earlier. Data from national implementing agents were retrieved between June and September 2018. It was observed that cost data had different dates in the respective regions depending on the fiscal year when the MEBCI project was started in the pertinent region. Cost data accessed from the RHDs ranged from November 2014 to March 2018.

Cost estimations and analysis

Cost figures were derived from reported lump sums of expenditures from all cost centres. Parameters for the cost estimation included direct cost and indirect cost, including quantified cost of one day of staff time lost to training (proxy for opportunity cost). The unit cost analysis for the MEBCI interventions was done based on “cost of MEBCI activity” per “year” per “region” and later decomposed into “cost per capita” (i.e. individual staff).

The units of analysis for the provider training cost were the four regions and the MEBCI implementation periods (i.e. fiscal years). At the funding agent level, cost estimations were done based on cost related to regional and district levels.

Results

Cost of MEBCI national and regional level activities

Cost expenditure data were categorized into fixed cost and recurrent cost. Fixed cost comprised of purchase of project vehicles, project office rent and sunk cost on equipment and sub-agreements with intervention regions. Recurrent cost components included staff salaries, international and local travels for staff of GHS and consultants, consultative/sub-committee meetings, advertisements, bills and utilities, stationery, repairs and maintenance.

It was found that a cumulative amount of GH₵ 24,555,370.41 (US\$ 5,518,061^[i]) was recorded as expenditure for fixed and recurrent cost activities between September 2013 and August 2017. Out of this amount, fixed cost expenditure constituted 71% while recurrent cost represented 29% of the total expenditure. Fiscal year one recorded the least expenditure of GH₵ 1,379,013.12 (equivalent to US\$ 429,599.10, using the 2014 end of year exchange rate^[1]). The highest cost was recorded in fiscal year four

(4) with an expenditure of GH₵ 10,817,985.59 (equivalent to US\$ 2,367,174.09, using the 2017 end of year exchange rate^[2]) (see Figure 2).

Cost of strengthening national leadership

Greater proportion of the expenditure on the local government implementing partner was on recurrent cost activities. Out of the cumulative amount of GH₵ 1,658,633.00 (US\$ 372,727) reported as expenditure incurred on best practices for newborn care, GH₵ 1,141,735.00 (US\$ 256,570) was spent on workshops and training-related activities which represented approximately 69% of the total cost. These costs also include development of guidelines on newborn standards, and KMC guidelines.

Additionally, the cumulative expenditure on national leadership for newborn care activities was GH₵ 1,666,827.44 (US\$ 374,568) out of which 76% was spent on workshops and training followed by “other project cost” (14%), consultancy (4%), travel (4%), support for seconded staff (2%) and printing (1%).

Project support and advisory activities for the local government implementing partner accounted for 21% of the total expenditure as at the time of the data collection. Expenditures related to travel and consultancy services accounted for 2% and 8% of the total expenditures respectively. It was also observed that expenditure at the GHS National level increased over time with the majority of expenditures occurring in the fourth year and lowest expenditure occurring in the first year.

Cost of strengthening capacity in four Regional hospitals

Cost data from Kybele showed that a total amount of US\$ 1,030,679.86 was recorded as cost for strengthening capacity of health staff from 1st Dec, 2015 – 31st May, 2018. Out of this amount, approximately US\$ 936,981.69 was reported as direct cost expenditure, representing 91% of the total cost while indirect cost constituted 9%. Out of the direct cost expenditure, cost of consultants and contract staff (US\$446,026.88) was the major cost component constituting 48%; cost of MEBCI core training and Observed Structured Clinical Examination (OSCE) sessions and clinical observations was the second highest cost component amounting to US\$ 394,849.74, representing 42%.

The least cost components were expenditures associated with computers and telecommunication (US\$ 1,276.04); MEBCI core training and supplies (US\$ 3,113.12), incidentals (US\$ 3,315.15), training, equipment and supplies (US\$ 340.76). Each of these cost components constituted less than 1% of the total direct cost expenditure. Indirect cost was US\$ 93,698.17, representing 9% of the total cost. Direct cost peaked from US\$ 144,545.23 in “fiscal year 3 quarter 2” to US\$ 182,330.47 in “fiscal year 3 quarter 4” then gradually dipped in “fiscal 5 quarter 2” (US\$ 39,876.68) and rose marginally to US\$ 81,231.46 in “fiscal year 5 quarter 3”. Figures 3 shows the trend of direct and indirect cost over the fiscal years and quarters.

It was also found that aggregate cost per capita was highest (US\$ 9,477.06) in “fiscal year 3 quarter 4” (1st June 2016 – 31st August 2016) and least cost of per capita (US\$ 3,028.52) was in “fiscal year 5 quarter 2” (Figure 4).

Cost of RHD Sub-agreements implementation

Cost data from the four RHDs were analyzed to ascertain the cost of strengthening capacity in the district hospitals and selected health centres. In terms of regional percentage share of the total cost of MEBCI interventions, approximately 34% (GH¢ 5,997,952.06) Overall, it was observed that the direct cost component constituted 98% of the total MEBCI interventions in the four RHDs; the remaining 2% of the expenditure was on indirect activities including supportive/technical visits, funding agent local office refurbishment.

Cost of MEBCI district provider trainings

According to provider training records retrieved from funding agent, a total of 4,027 individuals were involved in the MEBCI training activities. This number includes key clinical staff (n=3,453) and non-clinical personnel (n=574). For the purposes of this evaluation, only data related to key clinical staff were further explored and analyzed.

As shown in Table 2, beneficiaries of the MEBCI training interventions at the district hospitals, polyclinics and health centres were generally youthful with a mean age of 32 years and average of 6 years work experience. Out of the total number of 3,453 clinical providers trained, 85% were females; midwives constituted 61% with the least being physician assistants (1%). Approximately 90% of the staff trained were from district hospitals while staff from polyclinics and health centres constituted 2% and 8% respectively.

In terms of regional percentage share of the number of district clinical care providers trained, 40% of the staff trained were from Ashanti region while Volta region had the least percentage share of 14%; two thirds of the total number of trained clinical staff were from public (government and quasi-government) facilities and the remaining from faith-based health facilities (see Table 2).

Insert Table 2: Summary statistics on district providers trained and followed-up

Source: MEBCI training data (2018)

Legend: Helping Babies Breathe First Assessment (HBB0, the first OSCE score immediately after the training) and Essential Care for Every Baby First Assessment (ECEB0, the first OSCE score immediately

after the training)

**Includes specialist doctors such as pediatricians, obstetrics and gynecology*

***Includes health assistants, perioperative nurses, enrolled nurses, pediatric nurses, community health nurses, critical and emergency care nurses, ward assistants*

****One provider each was drawn from the four regional hospitals which constitutes less than 1% of the total number of providers trained*

+Facilities owned by faith-based organizations

++Facilities owned by Ghana Health Service or Quasi-government organizations

Cost per capita estimation

It was observed that even though Region A recorded the highest cost of training, cost of training per capita appeared to be the lowest (GH₵ 4,384.47 approximately US\$ 985).

For those trained to be followed up, Region D had the highest cost of training per capita (GH₵ 5,864.89 approximately US\$ 1,318), followed by Region C region (GH₵ 5,635.00 approximately US\$ 1,266) and Region B (GH₵ 5,341.84 approximately US\$ 1,200). The overall average cost of training per capita was GH₵ 5,104.98 (approximately US\$ 1,147) (see Figure 4).

Training cost per capita (all category of staff versus core clinical staff)

Training cost per capita was explored first based on the composite direct and indirect cost. It was found that the average cost per capita for all staff was GHC4, 377 (US\$ 982.05) compared to GHC3, 554 (US\$ 798.65) per capita for the core clinical staff. Secondly, the cost per capita was estimated using only the direct of training and it was found that the average cost per capita for all regions was GHC 4, 294 (US\$ 964.94) for all cadre of staff compared to GHC 3, 457 (US\$ 776.85) per capita for only clinical staff (see Figures 5&6).

[1]2014 end of year exchange rate of 1 US\$ = GHS 3.21. Source: www.oanda.com/currency/converter
Accessed on 27/09/2018

[2]2017 end of year exchange rate of 1 US\$ = GHS 4.57. Source: www.oanda.com/currency/converter
Accessed on 27/09/2018

[i]There were no readily available uniform US\$ equivalence of all recorded expenditures in the four regions hence, the US\$ equivalence as quoted in this report are based on the current prevailing exchange rate of 1 US\$ = 4.45 GHC. US\$ 4.45 Source: www.oanda.com/currency/converter Accessed on 27/09/2018. Accessed on 24/09/2018

Discussion

This evaluation addressed four main objectives in relation to the cost of MEBCI interventions. The first level of cost explored was the global cost of MEBCI and related interventions to the local funding agent in terms of fixed and recurrent expenditures over the period of September 2013 to August 2017. Secondly, the cost of MEBCI interventions in strengthening national leadership for best practices in newborn care was explored. Also, the absolute nominal cost and cost per capita of the provider trainings at the district and sub-district levels were explored and analyzed.

The overall cost evaluation findings on the MEBCI project has raised important questions on the sustainability and scale-up of the interventions by the Ministry of Health and GHS after donor funding ends. For instance, the total cost projections for the health sector by the Ministry of Health was about GH¢ 45.9 million for the periods 2014 to 2017 as contained in the 2014-2017 Health Sector Medium Development Plan (HSMTDP) policy document [11]. Comparing these projections with the cost expenditure of nearly GH¢ 44.0 million on MEBCI, the majority of which was expended in only four out of ten (10) regions, calls for broader stakeholder dialogues on how this could be sustained by the MoH/GHS and subsequently scaled-up to other regions of the country.

A review of literature on donor support for resource-poor settings in Africa has shown that many laudable initiatives often financially propelled by donor agencies could not be sustained by beneficiary governments and health systems because they are expensive for health budgets to accommodate [12-15]. While recognizing the limitations of the assumptions made in the cost evaluation analyses presented in this report, they could offer a pathway for the MoH, GHS and its partners to explore for more cost-efficient ways to scale up and sustain MEBCI in the future.

The World Health Organization (WHO) is increasingly propagating self-sustaining interventions towards attaining the United Nations-led Sustainable Development Goal (SDG) 3 [16,17]. Internationally acceptable yet locally sustainable initiatives are significant impetus for ensuring resilience in health systems towards attaining health sector goals and universal health coverage. Many African countries, including Ghana, are constrained by severe macro- and micro-economic stability challenges which have the potential of reversing gains already made in the health sector if available health resources are efficiently allocated and distributed [18,19]. Ghana, like many African countries, continue to spend less than 15% of government expenditure on health. In light this, there is need for tailored-made interventions that suit the local conditions communities if sustainability and scalability are to be realized after donor funding ends.

Finally, it must be emphasized that this evaluation does not seek to conclude the MEBCI intervention cost is expensive per se relative to other countries or similar intervention within Ghana. This conclusion cannot be drawn since the evaluators did not do comparative cost analysis within country or with other countries where similar MEBCI interventions were implemented. In view of this, we recommend that future interventions on MEBCI devote some time and resources to a comprehensive systematic review of cost data on previous interventions vis-à-vis the current intervention to inform the empirical basis for comparison on parameters of efficiency and value for money.

Policy implications

First, it is recommended that strategies for scaling-up the MEBCI interventions to other regions be prioritized for policy dialogues by relevant stakeholders. A scale-up of the MEBCI intervention based on lessons learnt will help provide a nationally representative empirical basis for policy adoption of the MEBCI approach towards improving new born outcomes on Ghana.

Secondly, the Ghana Health Service and its partners should consider complementary alternatives to the batch wholesale training system for health workers by leveraging emerging Information Communication Technology (ICT) solutions such as e-learning and m-learning which are relatively cost effective and perhaps more sustainable.

Additionally, the Policy Planning Monitoring and Evaluation (PPME) unit of the GHS and MoH should consider a joint scientific impact assessment of the MEBCI interventions on key new born indicators. This impact assessment will form the empirical basis for scale-up of the MEBCI intervention.

Finally, there is need for renewed commitment to new born care and related health services through enhance resource allocation. This commitment could be achieved by increasing government budget allocation to health with a statutory fund dedicated to new born care in Ghana.

Conclusion

Over 70% of the cost associated with the MEBCI intervention was on fixed cost and training related activities for over 4,000 health workers. On the whole, the MEBCI intervention had a wide coverage in terms of training for frontline healthcare providers albeit the associated cost figures may be potentially expensive for the local health system to sustain. In light of this, innovative training options such as e-learning and m-learning complementary alternatives could be employed to help reduce cost and achieving substantial scale in reaching health care workers throughout the country. Ensuring reasonable coverage and affordability of mobile data services in the areas where the health providers work would be a prerequisite to the success of this approach. Moreover, distilling which components of the training need to be in-person versus which can be offered online would make this scenario more feasible.

Abbreviations

ECEB:	Essential Care for Every Baby
GDHS:	Ghana Demographic and Health Survey
GHS:	Ghana Health Service
GoG:	Government of Ghana
GSS:	Ghana Statistical Service
HBB:	Helping Babies Breathe
HSMTDP:	Health Sector Medium Development Plan
ICT:	Information Communication Technology
IP:	Infection Prevention
KMC:	Kangaroo Mother Care
MEBCI:	Making Every Baby Count Initiative
MoH:	Ministry of Health
NDMW:	National Daily Minimum Wage
RHDs:	Regional Health Directorates
RHs:	Regional Hospitals
SDGs:	Sustainable Development Goals
UK:	United Kingdom
UN:	United Nations
WHO:	World Health Organization

Declarations

Ethics approval and consent to participate

Ethics approval and consent to participate

Data on individual staff and healthcare facilities were anonymized to ensure privacy and confidentiality. The evaluation protocol was approved by the Ghana Health Service Ethics Review Committee in August 2017 (clearance number: GHS-ERC: 20/06/17). Administrative approvals were also sought from the various Regional Health Directorates (RHDs) prior to data collection.

Consent for publication

Author of this manuscript has consented to publish this work.

Availability of data and materials

There are no restrictions to data and materials used in this manuscript per se and the project Principal Investigator (P) Dr Nana Twum-Danso should be contacted on matters of data accessibility.

Competing interests

Author is a section Associate Editor for the BMC Health Services Research, Health systems, and services in low and middle income settings.

Funding

Funding support for this paper was by Children's Investment Fund Foundation (CIFF), United States of America (USA). The funder provided financial support for the field data collection and writing of the report.

Authors' contributions

RKA: provided conceptualization direction, analysis, design of collection tools, review and supervision; resource mobilisation for the evaluation; RKA: collected data, wrote initial draft; supported in collecting data made comments on data collection tools; reviewed draft manuscript and made inputs on from the health economics and health policy dimensions.

Acknowledgements

The researchers appreciate and acknowledge the support of the health facilities in all the four regions as well the Ghana Health Service headquarters for supporting to collect data on the field. Voluntary participation of the various contact persons at the national, regional and district levels in providing relevant cost data is equally appreciated. The support of Mr. David Aduhene Tanoh and Eugene Ada in the data collection is also acknowledged as well as the financial support and resource mobilisation by Madam Angela Gadz is highly appreciated.

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Tables

Table 1: Health facilities engaged in MEBCI interventions: disaggregated by region

Health Facilities	Region A	Region B	Region C	Region D	Total
Regional Hospitals ¹	1	1	1	1	4
District Hospitals	36	19	24	20	99
Polyclinics	0	2	2	0	4
Health Centers	20	8	10	10	48
Total	57	30	37	31	155

Source: Local Funding agent administrative data (2017)

Legend: Note: names of regions anonymized with letters (A, B, C & D).

Table 2: Summary statistics on district providers trained and followed-up

Staff Characteristics	Mean	Std. Dev.
Age (n=3,367)	32	8.4
Years of work experience (n=3,323)	6	7.7
HBB0 score (n=3,450)	21	2.3
ECEB0 score (n=3,450)	27	2.4
Sex (n=3,453)	Freq.	%
Male	506	15
Female	2947	85
Cadre (n=3,453)	Freq.	%
Medical doctors*	165	5
Anesthetists	190	6
Nurses**	941	27
Midwives	2,106	61
Physician assistants	51	1
Facility type (n=3,449)***	Freq.	%
District hospital	3,101	90
Polyclinic	59	2
Health center	289	8
Regions (n=3,453)	Freq.	%
Region A	1,368	40
Region B	790	23
Region C	806	23
Region D	489	14
Ownership (n=3,453)	Freq.	%
Private ⁺	1,234	36
Public ⁺⁺	2,219	64

Source: MEBCI training data (2018)

Legend: Helping Babies Breathe First Assessment (HBB0, the first OSCE score immediately after the training) and Essential Care for Every Baby First Assessment (ECEB0, the first OSCE score immediately after the training)

*Includes specialist doctors such as pediatricians, obstetrics and gynecology

**Includes health assistants, perioperative nurses, enrolled nurses, pediatric nurses, community health nurses, critical and emergency care nurses, ward assistants

***One provider each was drawn from the four regional hospitals which constitutes less than 1% of the total number of providers trained

⁺Facilities owned by faith-based organizations

⁺⁺Facilities owned by Ghana Health Service or Quasi-government organizations

Figures

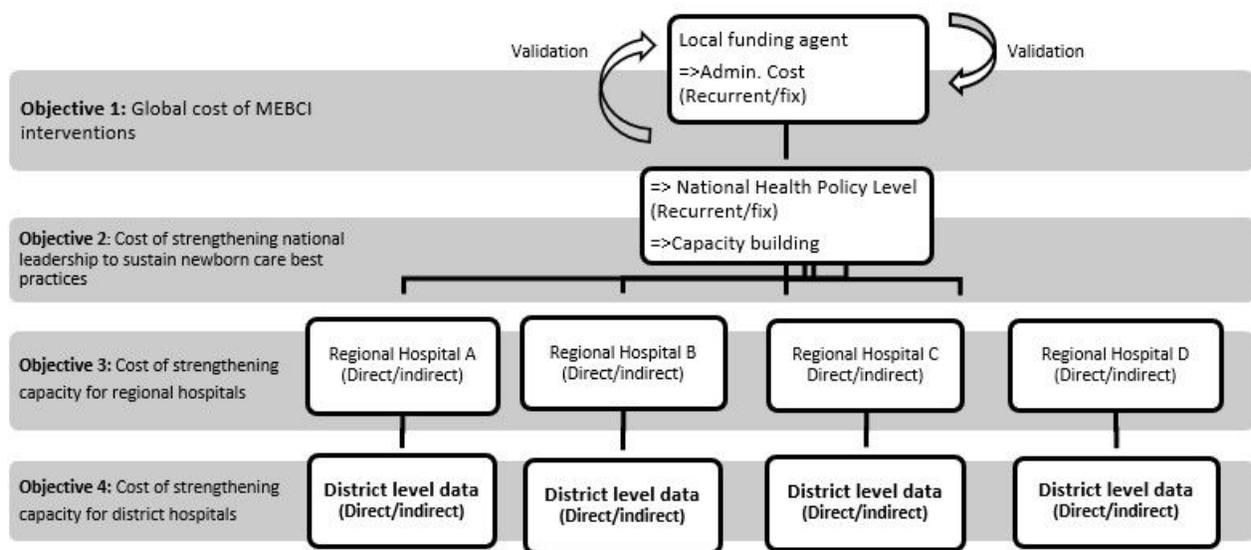


Figure 1

Procedure for data collection and cost efficiency analysis Legend: Source: Conceptualized by Authors (2018)

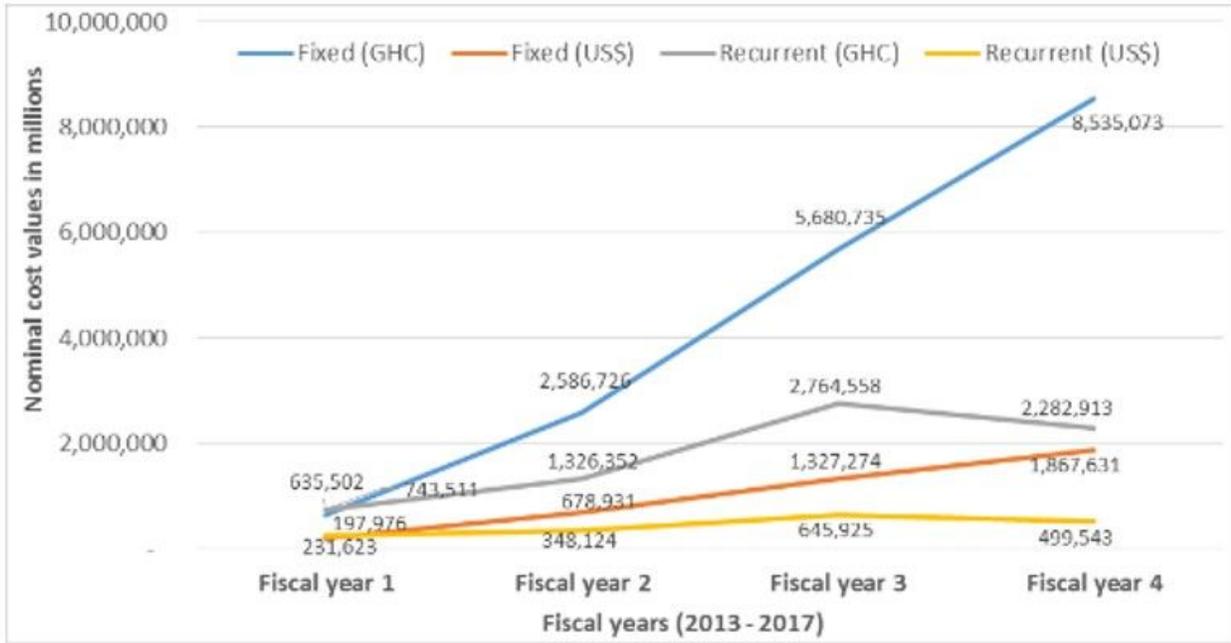


Figure 2

Cost at the funding agent level: disaggregated by fiscal year Legend: Source: Cost per fiscal year funding agent data (Sept, 2013 – Aug, 2017)

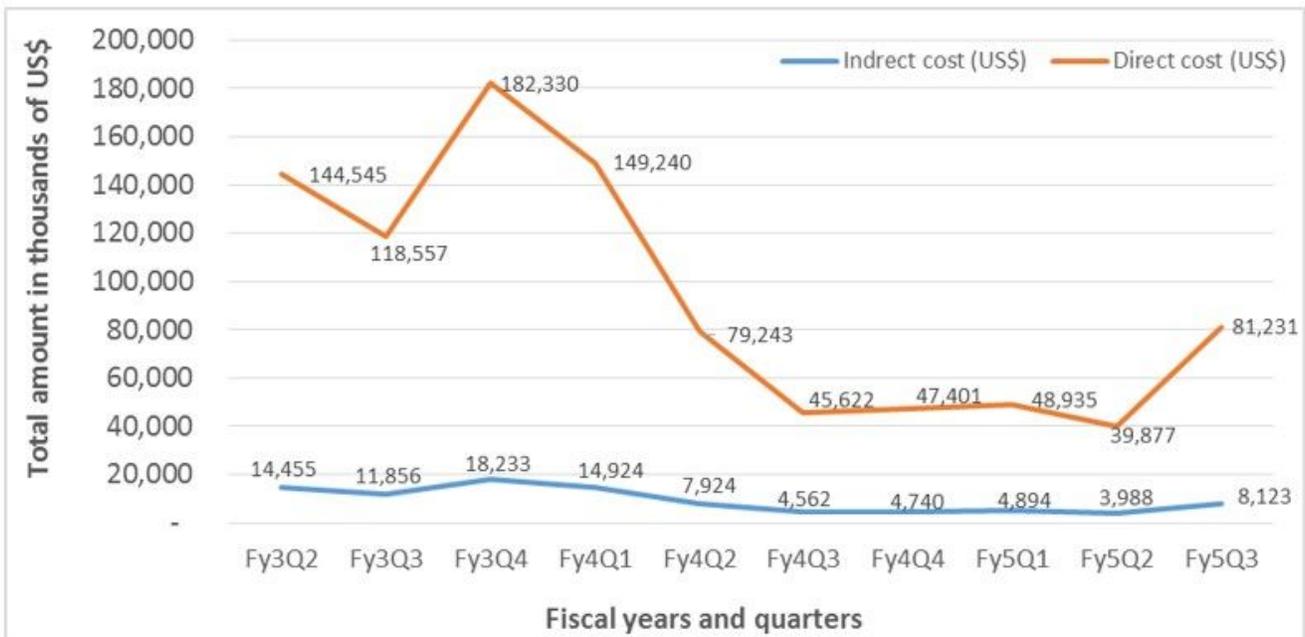


Figure 3

Cost of regional hospital related activities disaggregated by direct and indirect cost Source: Regional Hospitals Data (2014-2018); Note: Data points for fiscal year1, year2 and Fiscal year 3 quarter 1 were not available in the cost data hence their exclusion in this graph Legend: Fy3Q2 (1st Dec, 2015 – 29th Feb, 2016); Fy3Q3 (1st March, 2016 – May, 2016); Fy3Q4 (1st Jun, 2016 – 31st Aug, 2016); Fy4Q1 (1st Sept, 2016 – 31st Nov, 2016); Fy4Q2 (1ST Dec, 2016 – 28th Feb, 2017); Fy4Q3 (1st March, 2017 – 31st May, 2017); Fy4Q4 (1st Jun, 2017 – 31st Aug, 2017); Fy5Q1 (1st Sept, 2017 – 30th Nov, 2017); Fy5Q2 (1st Dec, 2017 – 28th Feb, 2018); Fy5Q3 (1st March, 2018 – 31st May, 2018)

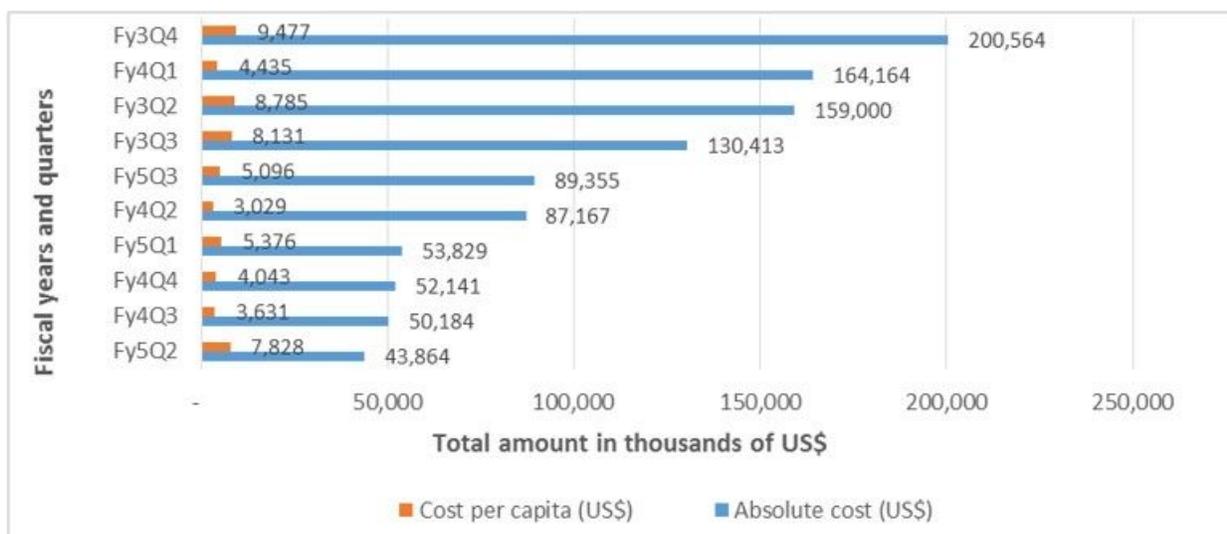


Figure 4

Cost of regional hospital related activities disaggregated by cost per capita and absolute cost Source: Regional Hospitals Data (2014-2018); Note: Data points for fiscal year1, year2 and Fiscal year 3 quarter 1 were not available in the cost data hence their exclusion in this graph Legend: Fy3Q2 (1st Dec, 2015 – 29th Feb, 2016); Fy3Q3 (1st March, 2016 – May, 2016); Fy3Q4 (1st Jun, 2016 – 31st Aug, 2016); Fy4Q1 (1st Sept, 2016 – 31st Nov, 2016); Fy4Q2 (1ST Dec, 2016 – 28th Feb, 2017); Fy4Q3 (1st March, 2017 – 31st May, 2017); Fy4Q4 (1st Jun, 2017 – 31st Aug, 2017); Fy5Q1 (1st Sept, 2017 – 30th Nov, 2017); Fy5Q2 (1st Dec, 2017 – 28th Feb, 2018); Fy5Q3 (1st March, 2018 – 31st May, 2018)

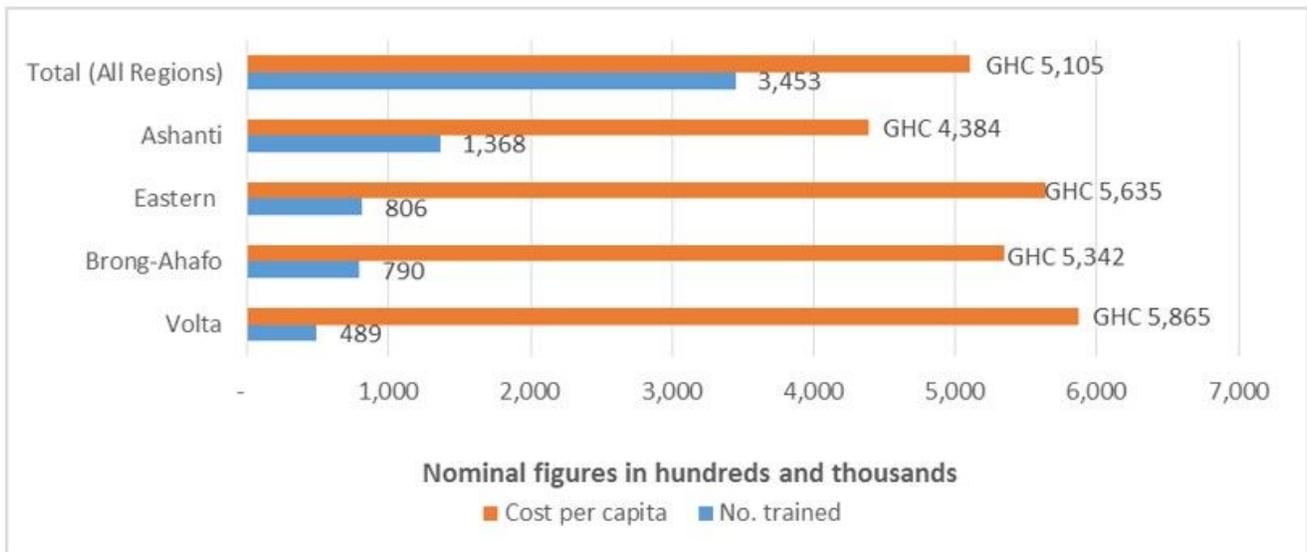


Figure 5

Number of district-level providers trained and the cost per capita in absolute and staffing category
 Legend: Source: Regional health directorates (RHDs) in four MEBCI regions (Jan-March, 2018); NOTE:
 *Cost per capita estimations based on consolidated direct and indirect cost components

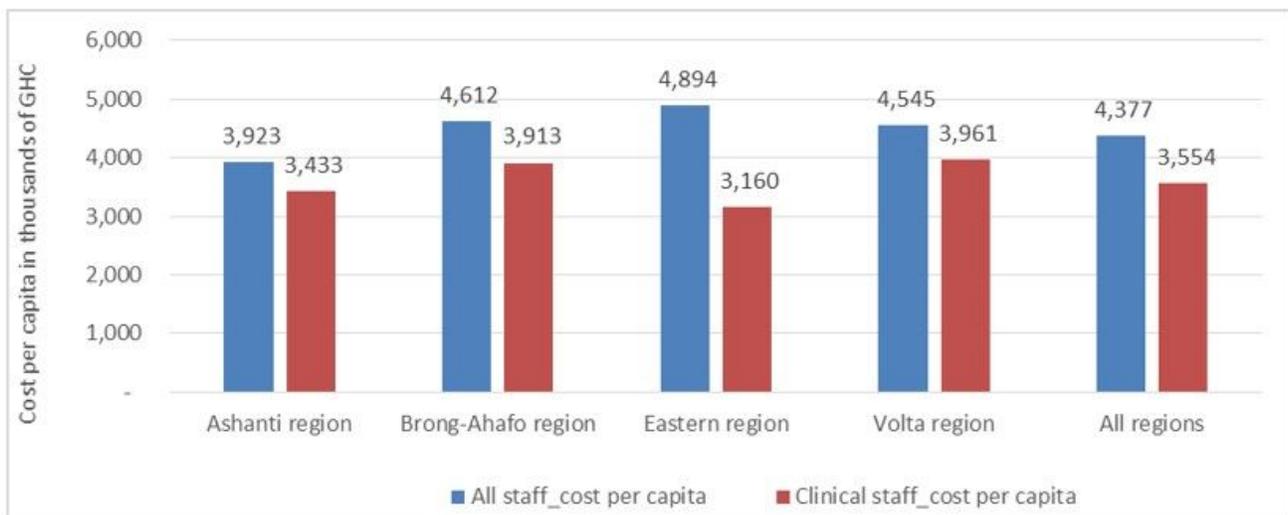


Figure 6

Number of district-level providers trained per capita: disaggregated by region Legend: Source: Regional health directorates (RHDs) in four MEBCI regions (Jan-March, 2018); NOTE: *Cost per capita estimations based on consolidated direct and indirect cost components