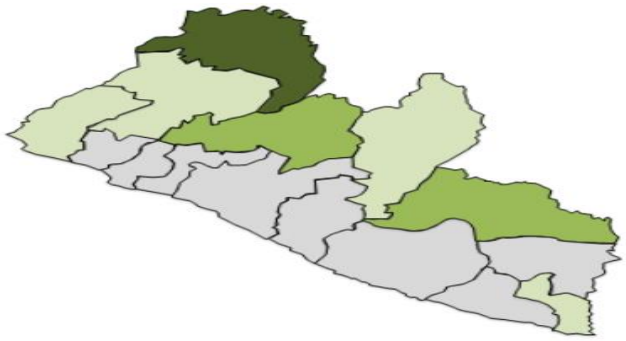
Review of Costing Tools Health System in Liberia

Project Technical Assistance to Support the Implementation of the National Health Plan and the Roadmap for the Reduction of Maternal Mortality in Liberia



EPOS Health Management in Cooperation with the European Union

Project Technical Assistance to Support the Implementation
of the National Health Plan and the Roadmap for the Reduction
of Maternal Mortality in Liberia

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List of acronyms

CORE Plus	Cost and Revenue Analysis Tool Plus
EU	European Union
HFU	Health Financing Unit
HIV/AIDS	Human immunodeficiency virus infection and acquired immune deficiency syndrome
MBB	Marginal Budgeting of Bottlenecks
MDG	Millennium Development Goals
MoHSW	Ministry of Health and Social Welfare of Liberia
MSH	Management Sciences for Health
PRSII	Poverty Reduction Strategy
TB	Tuberculosis

1. Introduction

As a consequence of the Ebola crisis, the Liberian Ministry of Health and Social Welfare‘s (MoHSW) adopted measures to strengthen the health sector leading to the “Investment Plan for Building a Resilient Health System” (1). Numerous partners assisted in this effort, including the European Union (EU), which contributed to the development of the plan and participated in the revitalization of the technical working groups along with the nine pillars of intervention. The EU contributed a substantial part as it addressed with preference one of the biggest public health concerns of the country: the reduction of maternal and newborn mortality (2, 3, and 4). It predominantly supported two intervention pillars, namely strengthening Leadership and Governance and Efficient Health Financing Systems and contributes as well to others. These elements represent important requirements to the implementation of the "Roadmap for Accelerating the Reduction of Maternal and Newborn Morbidity and Mortality in Liberia" and the "Accelerated Action Plan to Reduce Maternal and Neonatal Mortality", within the overall framework of the National Health Plan (2, 3, 4, 5).

One important barrier to achieving the National Health Plan in Liberia is a lack of funding (6). As in many developing countries, the Health systems in Liberia fail to reach large coverage of the population that would benefit from cost-effective interventions related to child and maternal health, malaria, Tuberculosis (TB), Human immunodeficiency virus infection and acquired immune deficiency syndrome (HIV/AIDS), and other diseases, due to missed opportunities for mobilization of financial resources or the required financial assistance.

The introduction of three appropriate analytical costing tools programs Cost and Revenue Analysis Tool Plus (CORE Plus), Marginal Budgeting of Bottlenecks (MBB) and OneHealth tools, was an

opportunity to support Health Financing Unit of MoHSW of Liberia (HFU), to manage, improve and harmonize the process of costing and budgeting plans and interventions in the health system. The aim of Review of Costing Tools is to present costing tools that were introduced during the Project "Technical Assistance to Support the Implementation of the National Health Plan and the Roadmap for the Reduction of Maternal Mortality in Liberia", in order to implement in the Liberian Health System (7).

2. Background

The MoHSW of Liberia developed a Primary Health Care approach encompassing decentralization, community empowerment, and partnership. These objectives have been defined in the health sector policy and plan 2011-2021 and the Poverty Reduction Strategy – PRSII 2012 – 2017, both stressing the importance of making progress in maternal and newborn health (Millennium Development Goals MDG 5) (5). EPOS Health Management through the Project Technical Assistance to Support the Implementation of the National Health Plan and the Roadmap for the Reduction of Maternal Mortality in Liberia, contributes to the achievement of the objectives and targets set for 2016-2017 in the 10-years strategic health and Social welfare plan and the Roadmap for the reduction of maternal mortality (7, 2). The overall objective of this project is to contribute to improving the health status of the Liberian population in general and reducing maternal mortality in particular, by improving access to as well as the quality of the Essential Package of Health Services (7). This includes mentoring of local staff to contribute to a sustainable reform and modernization of the health sector. EPOS Health Management supported to produce a needs-based comprehensive Capacity Development Plan (human resources, institutional and system) for Central Office and County Health Team, covering: health planning and budgeting, accounting, financial management and reporting, contracting of health services; health information management; human resources management; assets management; supervision skills; logistic and supply management and Quality Assurance management.

Approach and strategy chosen to achieve one part of the goals are to provide Costing Tool trainings such as Marginal Budgeting for Bottlenecks, CORE Plus and OneHealth tools, for HFU MoHSW of Liberia (8, 9).

The aim of this trainings is to strengthen health systems and to improve medium-term sector, planning, costing, budgeting, financing and analysis and to estimate the costs of individual services and packages of services under the different scenarios.

Table 1. List of Costing Tools included in the Review that are introduced to Health Financing Unit in Liberia

Tool	Developed by	Developer
Marginal Budgeting for Bottlenecks (MBB)	UNICEF/ World Bank	Rudolf Knippenberg, Susie Villeneuve, Netsanet Walelign, Agnes Soucat
CORE Plus	Management Science for Health	David Collins
OneHealth Tool	Inter-Agency Working Group on Costing	Avenir Health

3. Marginal Budgeting for Bottlenecks

The Marginal Budgeting for Bottlenecks tool estimates the potential impact, resource needs, costs, and budgeting implications of country strategies to remove systemic bottlenecks and implementation constraints of the health system (9). MBB is intended to help formulate medium-term (one to 10 years) national or provincial expenditure plans and poverty reduction strategies that explicitly link expenditure to health and nutrition MDGs (9, 10, 11)

The model has been developed in the context of Heavily Indebted Poor Countries and PRSP to respond to the request of low-income countries to plan, cost and budget marginal allocations to health services and assess their potential impact on health of the population. (9, 10).

The Aim of MBB is to answer the following questions (10):

1. Which high impact interventions are priorities for the integration into existing service delivery arrangements, to accelerate the progress towards the health and nutrition MDGs?
2. What are the major health systems hurdles or "bottlenecks" hampering the delivery of health services, and what is the potential for their improvement?
3. What is the potential investment required by alternative options to alleviate the identified health systems bottlenecks? What would be the cost of the incremental service provision as coverage increase?
4. What is the total amount of resources required to achieve the desired coverage?
5. What could be achieved in terms of health outcomes by removing health system bottlenecks and increasing coverage of effective interventions?
6. What amount of financing could be mobilized under various fiscal and macroeconomic scenarios and how should additional funding be allocated?

The centerpiece of the MBB tool is the bottlenecks identification and analysis approach (9, 10). The main goal of the bottlenecks analysis is to identify the limitations in a health system which responsible of reaching a desired level of service coverage. This approach identifies any weakness and gaps across six determinants (10):

- Availability of essential commodities,
- Availability of human resources,
- Geographical or financial access to health services,
- Initial utilization of health services,
- Continuous utilization or adequate coverage,
- Effective coverage or quality of care.

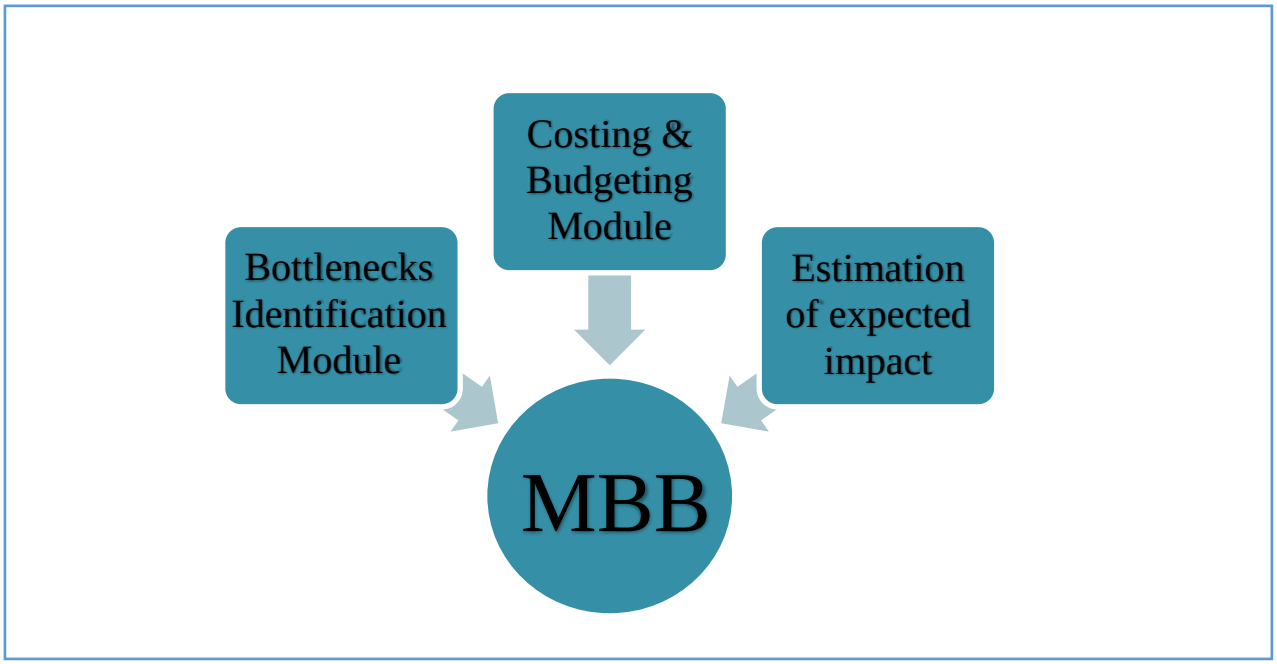
By identifying these bottlenecks, the tool's outputs help policy makers to (10 - 14):

- Select the priority health interventions, policies, and strategies they wish to implement,
- Estimate the additional resources needed and progress toward achieving the health MDG-related goals,
- Project the estimated impact of the chosen strategies on the health MDGs.

MBB tool is organized in three main modules (10, 11):

1. Bottlenecks identification
2. Costing & Budgeting module
3. Estimation of expected impact

Figure 1. Main modules of MBB



The bottlenecks identification module uses a country-specific data or default data and defines three main packages of health interventions. On the basis of present levels of effective coverage, it analyses bottlenecks in implementation and sets new performance frontiers (10, 11). The costing and budgeting module is structured to take into account the strategic changes in the health care delivery policies, addressing both supply and demand constraints. Estimation of expected impact relies on the results of epidemiological modules. It shows the consequences of the choices of the policy makers and gives them a chance to change their decisions.

MBB tool is built on the theoretical concept of effective coverage (15). Effective coverage can be defined as the proportion of the population in need of an intervention who have received an effective intervention (15). In order to achieve a high level of effective coverage and a significant health gain, the intervention should be effective, available, accessible and acceptable (15).

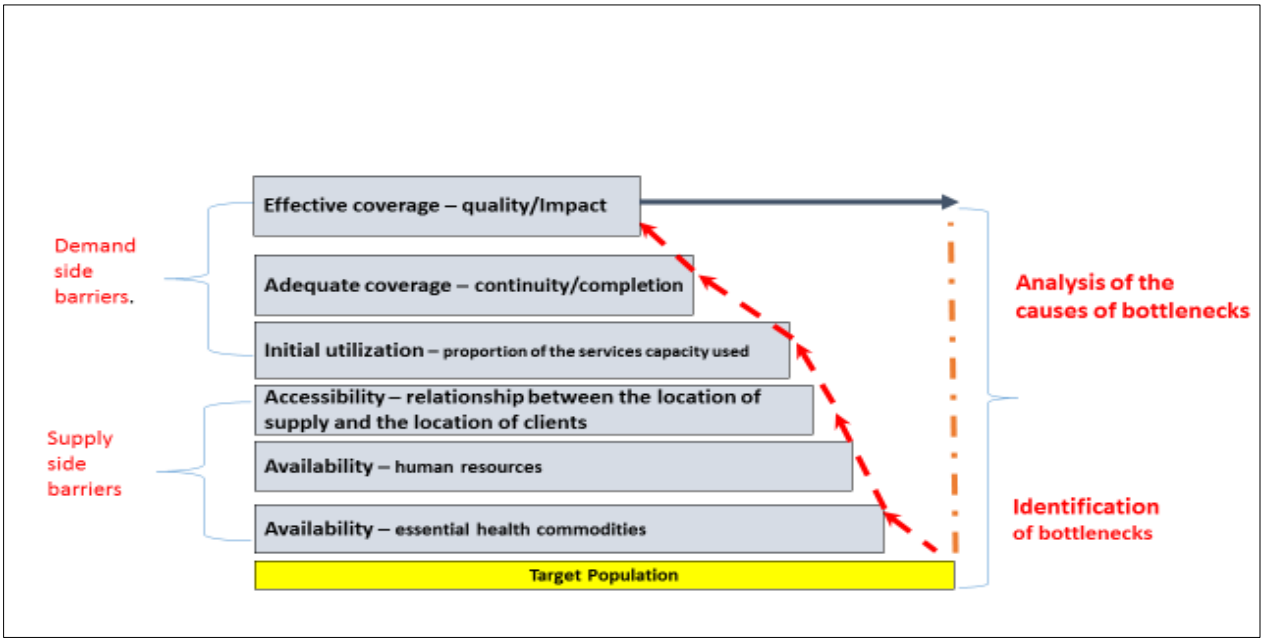
MBB builds upon The Tanahashi modified model of effective coverage concept and used six coverage determinants to assess the capacity of the health system to deliver the full effect of

interventions or achieve effective coverage (16). This modified model was used to identify bottlenecks, through a step-by-step approach, that evaluates six determinants of the effective coverage of intervention.

These are determinants (16):

1. Availability of essential health commodities,
2. Availability of human resources,
3. Accessibility of distribution points for the interventions,
4. Initial utilization of interventions,
5. Continuity/completeness in the continuous utilization of interventions,
6. A quality of interventions delivered.

Figure 2. Tanahashi modified Model Determinants of effective coverage



Adapted from Tanahashi T. Bulletin of the World Health Organization, 1978, 56 (2), http://whqlibdoc.who.int/bulletin/1978/Vol56-No2/bulletin_1978_56 (2) 295-303.pdf

The first three determinants focus mainly on supply-side barriers, while the other three focus on demand-side barriers.

The MBB focuses on the selection of high impact interventions which are currently implemented in a country and organizes them into three service delivery modes (17, 18).

Within each service delivery mode, high impact interventions are grouped into four sub-packages which are based on their similarity, delivery mode, and/or beneficiaries.

Table 1. Services delivery modes, sub-packages and tracker indicators in health system in Liberia

Family-oriented community-based services			
Family preventive wash services	**Family neonatal care**	**Infant and child feeding**	**Community illness management**
Insecticide-treated mosquito nets	*Exclusive infant breastfeeding from the 1 to 6 months*	*No alternative to breastfeeding*	*Community case management of pneumonia.*

Outreach / schedulable services			
Preventive care for adolescents and adults	**Preventive pregnancy care**	**HIV/AIDS prevention and care**	**Preventive infant and child care**
Family planning	*Antenatal care*	*Prevention of mother-to-child transmission*	*Immunization*

Individual-oriented clinical services			
Maternal and neonatal care at primary clinical level	**Management of illnesses at primary clinical level**	**Clinical first referral care**	**Clinical second referral care**
Skilled delivery	*Pneumonia*	*TB treatment*	*Emergency obstetrics and neonatal care*

From the extensive menu of high impact interventions which are grouped into tree services delivery modes and four sub-packages, the expert group in Liberia has chosen representative interventions

or tracer interventions. Tracer interventions are considered to have the greatest impact on reducing maternal mortality, under-five mortality, neonatal mortality, malnutrition, and control of priority of diseases.

Analysis of "determinants of effective coverage" for each tracer intervention, through the bottlenecks analysis, allows the identification of the health system bottlenecks that constrain the achievement of a high effective coverage level. There are a major criteria for choosing a tracer intervention for a bottleneck analysis (10, 11):

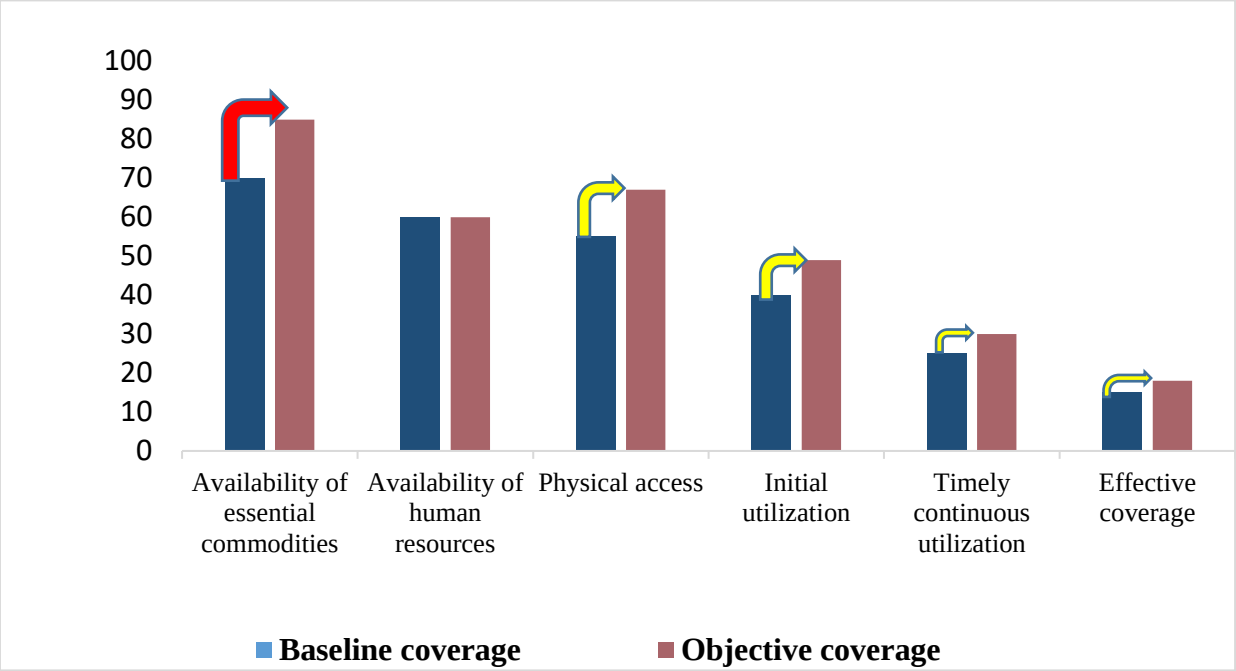
1. The tracer intervention is selected only if data is available for each of its six determinants: availability of commodities, availability of human resources, geographical accessibility, initial utilization, continual utilization, and effective coverage level.
2. The tracer intervention is an internationally recommended intervention, with proven and quantified efficacy on mortality reduction.
3. The tracer intervention is nationally relevant.
4. The tracer intervention should be representative of the other indicators within its intervention group, concerning facing similar health system constraints

For all tracker interventions, the expert group needs to assess baseline and coverage frontiers. That is one of the most crucial steps in the MBB exercise. Coverage objectives or “frontiers” represent the highest, realistically achievable coverage level in a given period. The centerpiece of the MBB Tool is the bottlenecks analysis.

The main goal of the bottlenecks analysis is to identify the limitations in a health system that are responsible for reaching a desired level of coverage. Bottlenecks are measured regarding the six coverage determinants, and a coverage determinant bottleneck is defined as the difference between

the maximum achievable coverage and the actual coverage. The result of any reduction in bottlenecks is an increase in the utilization of effective interventions.

Figure 3. Example of bottlenecks analysis of the tracker intervention



- The coverage determinant bottlenecks are hierarchical, each bottleneck having a ceiling that is set by its previous determinant and each determinant determines the ceiling of the next.
- Reductions in bottlenecks have a cascading effect, where changes in one produce changes in the ones that follow.
- The magnitude of the cascading effect is set by the baseline ratio between coverage determinants, which is calculated by the tool.

Table 3. Example of frequent bottlenecks and their main causes bottlenecks in the service delivery modes

Family-oriented, community-based services	Population-oriented, schedulable services	Individually-oriented (clinical care) services
● Low availability of essential commodities and human resources ● Low affordability of commodities ● Low levels of knowledge ● No mainstreaming in societal/community values	● Low accessibility of promotion programmes ● Logistical difficulties and difficulties in sustaining efforts at outreach ● Low levels of continuity, high drop-outs	● Difficulties in leading qualified human resources to serve the poor ● Participation of less qualified providers ● Difficulties in controlling the non-retail pharmaceutical market: ● Low-quality harmful pharmaceutical products. ● Major problems of affordability of health care and impoverishment.

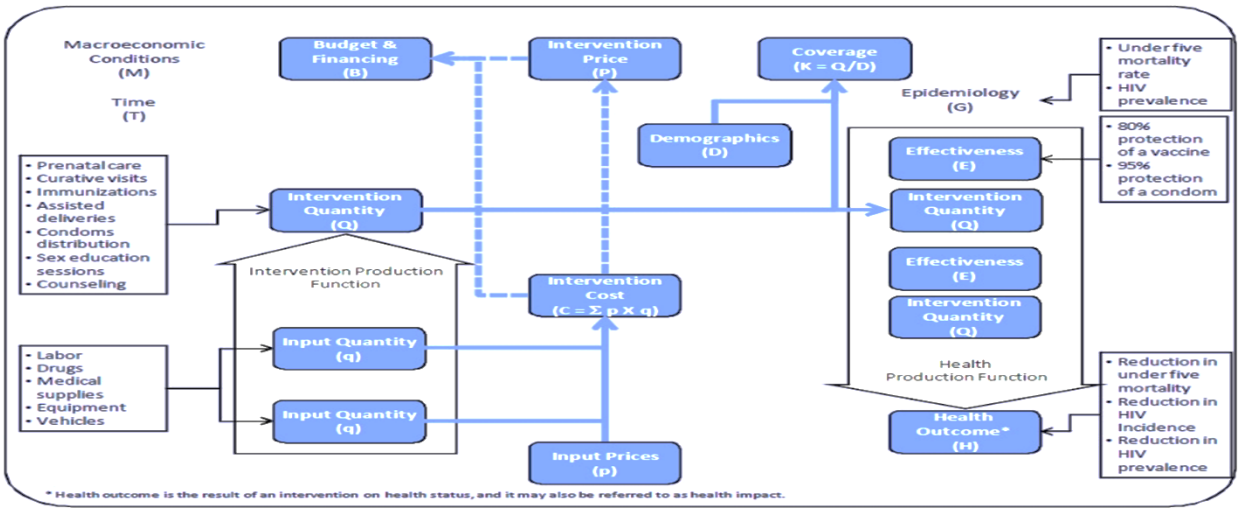
Table 4. Example of causes and corrective actions in the service delivery modes

Family-oriented, community-based services	Population-oriented, schedulable services	Individually-oriented (clinical care) services
● Free or subsidized supply of commodities ● Increase number of community health workers ● Improve social marketing ● Female education ● Community/ societal support mechanisms	● Improve mobile, outreach, and home visits ● Centralized control and planning ● Community involvement in planning and monitoring ● Demand-side incentives	● Incentives for qualified staff to work in rural areas and development of alternative skills ● Public control of provision of care and prices, regulation of private sector, and combined consumer's information and providers' trainings ● Modulated pricing, exemptions when funded, and third-party payment mechanisms and subsidies to insurance

Costing module in MBB involves two basic production functions; intervention production function and health production function. The intervention production function represent the process

of how inputs are used to produce health outputs or health service coverage. The intervention cost is calculated by multiplying the quantity of inputs with input prices. The intervention price is the amount of money at which the intervention is bought or sold. Both the intervention cost and intervention price have an impact on a budget. The budget can be compared against available financing. The health production function, represents the process of transforming health outputs into health outcomes. Health outcomes are generally calculated by multiplying the quantities of interventions produced by their effectiveness.

Figure 4. Elements in costing health interventions and health outcomes



Source; WHO, UNICEF, the World Bank, and UNFPA, in collaboration with the Partnership for Maternal, Newborn and Child Health and the Norwegian Government (2008) TECHNICAL REVIEW OF COSTING TOOLS FOR THE HEALTH MDGS Final Report.

4. Cost and Revenue Analysis Tool Plus

Cost and Revenue Analysis Tool (CORE Plus) is an Excel-based tool developed by Management Sciences for Health (MSH) (19). The tool estimates the costs of individual intervention (services) and packages of interventions as part of the cost of integrated primary health care facilities (19). The tool was designed to be used by planners and managers of government, private and NGO primary health care services.

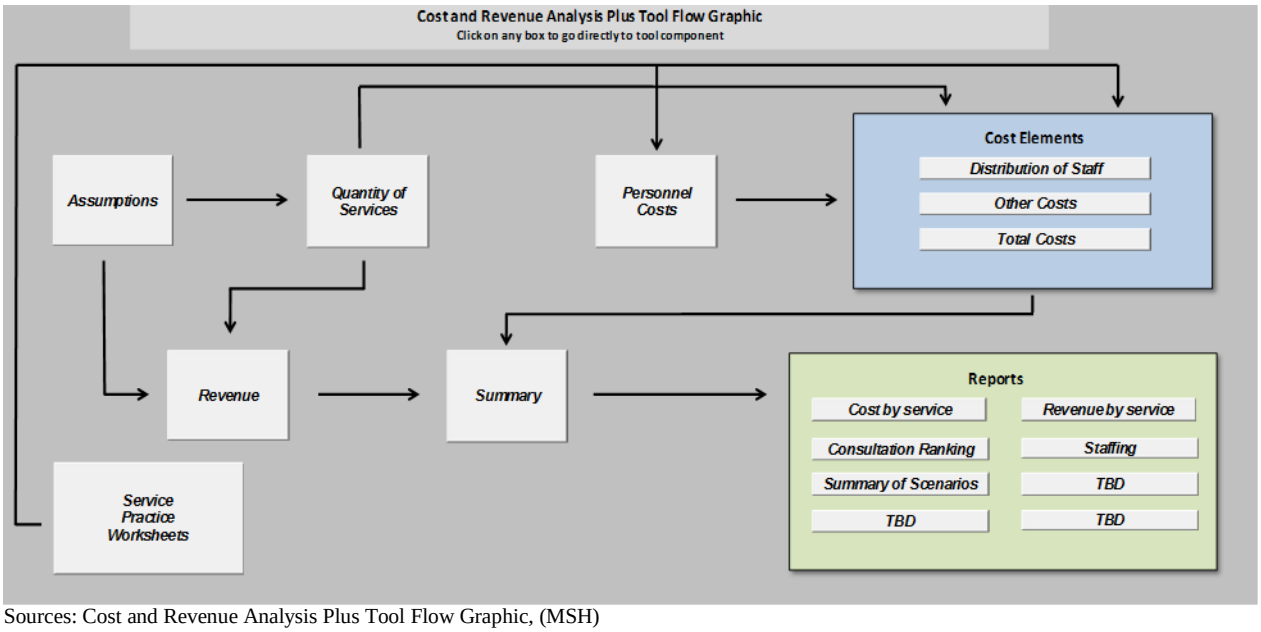
The tool uses a bottom-up costing methodology to determine the standard cost of each service in the package. A standard unit cost is set for the variable costs of each service, and the total variable costs are then estimated by multiplying those unit costs by the numbers of services (19). The tool can estimate the expected number of each type of intervention provided through a primary health care facility, based on the catchment population and using disease prevalence and incidence rates and service delivery norms. It can then cost each of those interventions and the total package of interventions and can also be used to produce a budget (9, 19, 20, and 21). Fees and other revenue sources can be entered for each intervention and compared with individual intervention and total facility costs (9, 19, 20, and 21).

The tool defines the intervention production function by enabling the user to choose from five possible service and costing scenarios (19):

1. Scenario A: Actual services and actual costs;
2. Scenario B: Actual services and normative costs;
3. Scenario C: Needed services and normative costs;
4. Scenario D: Projected services and normative costs;

- Scenario E: Projected services and ideal staffing

Figure 5. CORE Plus Tool Flow Graphic



Sources: Cost and Revenue Analysis Plus Tool Flow Graphic, (MSH)

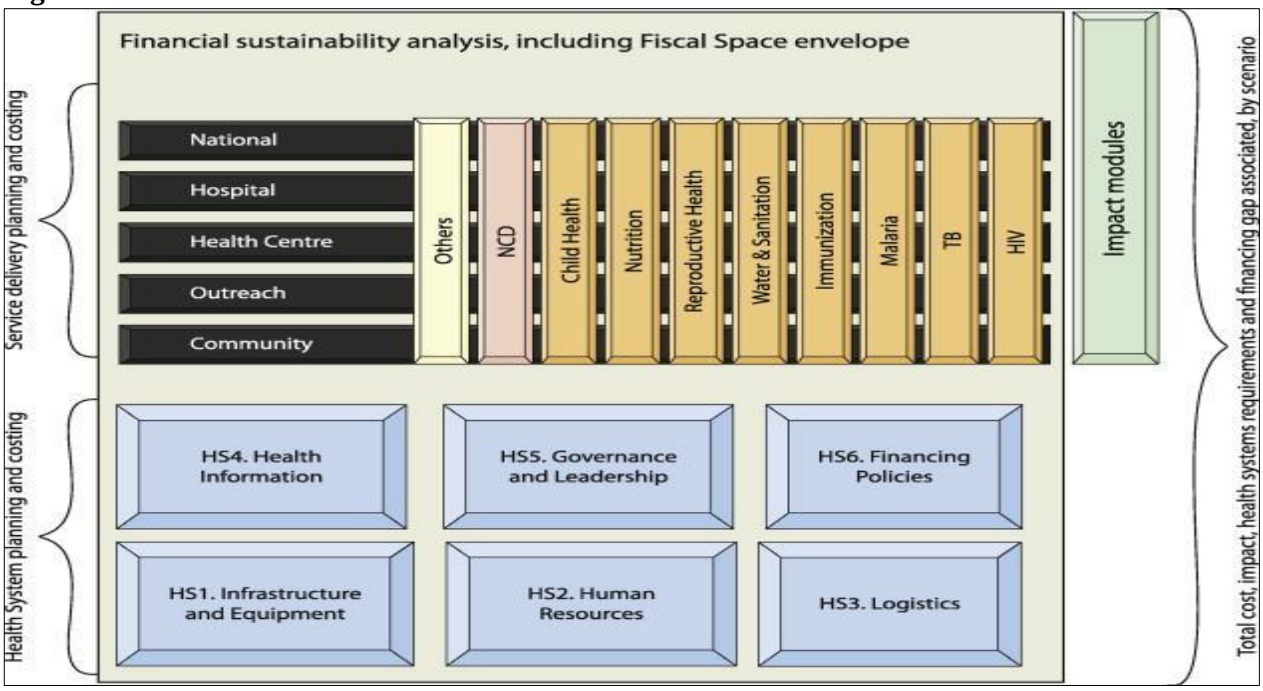
Potential applications CORE Plus tool are (19, 9):

- To improve planning and budgeting at the national, district, and facility levels.
- To identify resource and service delivery gaps and assess the equitable and efficient allocation of resources.
- To determine staffing and treatment norms and encourage consistency in quality.
- To analyze current revenue streams and perform sustainability analysis.
- To compare performance across different facilities.
- To determine the cost of adding or scaling up services.
- To determine the volume of services that can be provided within a given budget.

5. OneHealth Tool

The OneHealth Model is a new software tool designed to strengthen health systems, integrating planning and analysis, costing, budgeting and financing at a country level (22). The OneHealth tool aims to support integrated strategic planning and costing processes in countries, by taking together disease-specific program and health systems planning (22, 23). The tool helps an assessment of costs related to the areas of maternal, newborn as well as reproductive health, child health, vaccination, malaria, tuberculosis, HIV/AIDS, nutrition, water sanitation and hygiene, to inform progress towards the MDGs, including assessment of achievable health impact (23). Additionally, it contains modules for the areas of human resources, infrastructure, logistics, financial space, programme and channel analysis, intervention coverage and costing, bottleneck analysis, programme costing, summary outputs and budgeting. Potentially, OneHealth could have several users. In the most comprehensive case, health planners would be able to put together a multi-year health plan and use the tool to create a costed plan for addressing critical health needs; to compare different scenarios for reaching the health sector priority goals. The different scenarios could be used as part of a national strategic health planning exercise or as a part of a proposal to a multilateral funding organizations. Health system planners from disease area can use the programme planning modules to develop plans addressing their needs concerning health systems. Also, they can use the system modules to make medium and long range plans for Human Resources, Infrastructure, Logistics, etc. The advantages of OneHealth software is generated when multiple modules are used at the same time, to identify synergies and to ensure that planning processes take into account systemic constraints.

Figure 6 General structure of OneHealth Tool



Sources: Stenberg K, Chisholm D (2012) Resource Needs for Addressing Non-communicable Disease in Low- and Middle-Income Countries. Global Heart 7: 53-60. doi:10.1016/j.gheart.2012.02.001.

5.1 Modules of OneHealth Tool

OneHealth Tool is primarily organized into three main modules:

1. Health services module
2. Health systems modules
3. Impact modules

The health services module estimates the costs of items that vary by the number of intervention recipients. These items include commodities, drugs and other supplies. The tool utilizes user defined inputs such as target populations that interventions focus and populations in need of interventions, type of interventions, percentage coverage of intervention and the delivery channel.

In addition of this, numerous treatment inputs related to interventions that are provided by various types of health care workers, have to be defined by the tool. The unit costs of specified inputs also have to be indicated. The average time used for each type of health workers involved in an intervention also needed for computation of staff time utilization patterns and assessment of staff time adequacy.

Health systems module consists of several sub-modules. They include;

- ➢ Infrastructure and equipment module estimates the cost incurred on buildings, the cost involved in vehicles and the cost of Information and Communication Technology Equipment (construction, rehabilitation/maintenance and utility costs)human resource module,
- ➢ Human resource module calculates the cost of paying emoluments to health staff, the cost of preservice training and cost of providing retention incentives. The staff baseline, staff distribution by various levels of health care, annual salary, incentives and increment patterns and numbers and unit costs related to preservice training of different types of staff have to be indicated.
- ➢ Logistic module estimates the expenditure incurred on logistic activities related to a health program. The module estimates the cost of warehouses (construction, maintenance and utilities), the cost of transport and the cost of paying warehouse workers
- ➢ Health information systems module is designed to estimate the cost of developing and maintaining the management information system related to a health program. It also involves several management functions such as training, supervision, review and updating of the information systems, etc.

- Governance and leadership module estimates the cost of governance activities such as the development or review of strategic vision and ethics, improving responsiveness, participation and consensus, carrying out legal reforms and maintaining the transparency and accountability of health programs.
- Financing Policy module contains the total resources available for the health sector including government resources, private sector and funding from external sources.

Impact models includes (22);

- **DemProj** DemProj projects the population for an entire country or region by age and sex, based on assumptions about fertility, mortality, and migration.
- **FamPlan** projects family planning requirements needed to reach national goals for addressing unmet need or achieving desired fertility.
- **LiST**: Lives Saved Tool (LiST- Child Survival). A program to project the changes in child survival in accordance with changes in coverage of different child health interventions
- **AIM**: AIDS Impact Model. AIM projects the consequences of the HIV epidemic, including the number of people living with HIV, new infections, and AIDS deaths by age and sex; as well as the new cases of tuberculosis and AIDS orphans.
- **Goals:** The Goals Model helps efforts to respond to the HIV/AIDS epidemic by showing how the amount and allocation of funding is related to the achievement of national goals, such as reduction of HIV prevalence and expansion of care and support.
- **RAPID**: Resources for the Awareness of Population Impacts on Development. RAPID projects the social and economic consequences of high fertility and rapid population growth for such sectors as labor, education, health, urbanization, and agriculture.

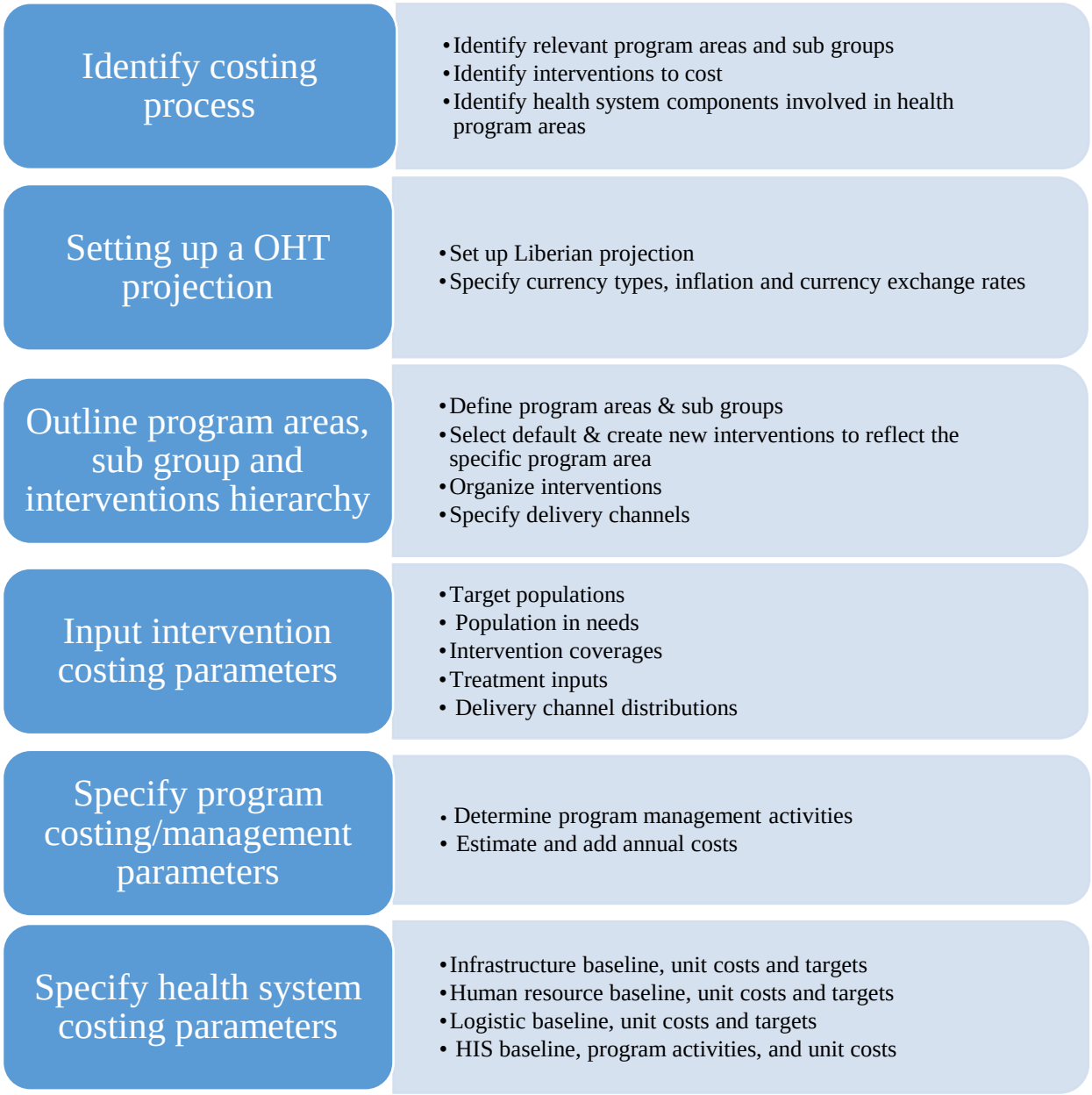
- **RNM**: Resource Needs Model. This model is used to calculate the funding required for an expanded response to HIV/AIDS at the national level.
- **TIME**: TB Impact Module and Estimates module provides the user with smoothed estimates of historical and current TB incidence and notification as well as short term statistical projections.
- **NCD**: The non-communicable disease impact module calculates the populations affected by, and the impact of scaling up interventions on cardiovascular and respiratory disease, diabetes, cancer, and mental health, neurological, and substance abuse disorders.

5.2. Costing process

Adaptation of OneHealth Tool cost health programs required the adoption of a systematic process.

In Costing Flow Graphic we identified six steps in the systematic process.

Figure 7. Costing Flow Graphic



Cost analysis of programme management

Program management costs incurred by a health program may include training, supervision, monitoring and evaluation, transportation, advocacy and communication, media and outreach. These costs derived from health program managers' inputs, and were incorporated into the annual costs at the program level. Figure 8 illustrates how the cost of program management, together with the direct interventions' cost, represents the total cost of a given health programme.

Figure 8. Diagram of health programmes cost analysis

<table>
<tr><th colspan="3">Total costs for Health Program 1</th></tr>
<tr>
<td>Intervention A;
Target population size
X
Percentage of target population in need of intervention
X
Target coverage
=
Number of population reached by intervention A</td>
<td>Intervention B;
Target population size
X
Percentage of target population in need of intervention
X
Target coverage
=
Number of population reached by intervention B</td>
<td>Intervention C;
Target population size
X
Percentage of target population in need of intervention
X
Target coverage
=
Number of population reached by intervention C</td>
</tr>
<tr><td colspan="3">Total cost of drugs and commodities for Health program 1 + Cost of in-service training + coordination meetings + transport consultancies in supervision + monitoring and evaluation</td></tr>
</table>

6. Conclusion

EPOS Health Management through the "Project Technical Assistance to Support the Implementation of the National Health Plan and the Roadmap for the Reduction of Maternal Mortality in Liberia", contributes to the achievement of the objectives and targets set for 2016 - 2017 in the 10-years strategic health and Social welfare plan and the Roadmap for the reduction of maternal mortality. Approach and strategy chosen to achieve one part of the goals were to provide Costing Tool pieces of training, for HFU. Review of Costing Tools represents the collaborative effort of the EPOS Health Management and HFU, and opportunity to support HFU, to manage, improve and harmonize the process of costing and budgeting plans and intervention in the health system of Liberia.

The introduction of three appropriate analytical costing tools programs, CORE Plus, MBB and OneHealth tools, provided the opportunity to improve medium-term sector planning, costing, budgeting, financing and analysis. In particular, it gives a chance to estimate the potential impact on health, resource needs, costs, and budgeting implications of strategies to remove systemic bottlenecks and implementation constraints of the health system. Even more costing tools can be used to estimate the costs of individual services and packages of services under the different scenarios which gives valuable insights into the costs and incomes across the clinics and health centers.

One of the recommendations of the Mission reports was that HFU should develop the process of applying CORE Plus in all primary health care institutions at the county level and OneHealth tool software, designed to strengthen health systems, integrating planning, costing and analysis, at a country level.

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