



## **COSTING THE BASIC PACKAGE OF HEALTH SERVICES AT CLINICS AND HEALTH CENTRES IN LIBERIA**

**RBHS**

**Rebuilding Basic Health Services Project (RBHS)**

Horton Building, Horton Avenue, Monrovia, Liberia

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Costing the basic package of health services at clinics and health centres in Liberia. 07 August 2009.

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Most of the standards for service provision were developed by an expert task team formed of MOHSW and NGO representatives. The main members of this team were Dr Roland Suomi (EQUIP), Dr J. Mehnmon Tokpa (Africare), Dr Tete K. Brooks (MERCY), Dr Edmund T. Eisah (IMC), and Dr Ansumana Camara (MOH CMO/MCHT).

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## Executive Summary

The primary objective of this study was to model the costs and funding requirements of the Liberian Ministry of Health and Social Welfare's Basic Package of Health Services (BPHS), which covers services provided by clinics and health centres. The resulting cost and funding estimates are intended to support planning and implementation, as well as to assist in the preparation of county-level service delivery plans and budgets. They should also assist the MOHSW to coordinate and harmonize external assistance.

The cost model uses incidence and prevalence rates together with catchment population figures to estimate the number of each type of service needed for different levels of coverage. The model analyzes and estimates the costs and revenues using a bottom-up, or micro-costing, approach. It determines the standard costs associated with the delivery of a particular health service, taking into account the staff time, drugs, medical supplies and tests required. Operating costs and indirect staff costs are distributed proportionally across the health services in accordance with direct staff costs. The model determines the unit cost for each service, which is used to allocate actual costs across services or to project costs under different scenarios.

All the major assumptions used in the model can be changed easily by the user. These include the catchment population, need norms, overall utilization rate, standard quantities and prices of drugs and supplies, standard staff times, staff pay levels and standard operating costs. Any new services added to the BPHS list of services can also be included.

In order to collect and verify data for the costing and to test both the functionality of the model and the norms, standards and prices used, the model was used to estimate costs and revenues for a sample of clinics and health centers from four NGOs operating in Liberia. However, only a limited number of facilities could be input into the model due to incomplete or inconsistent data.

Based on the need norms, the model shows that for a health center to meet 100% of the services needed by the community it should provide an average of 2.64 services per capita. Using this figure, we developed a set of low, medium, and high utilization targets. The targets were split amongst immunization services, which tend to have much higher coverage rates, and all other services. The low target was set using the actual utilization rates for immunization services in 2008, and 27% coverage for all other services. This came out to a total of 0.92 services per capita. The medium target was set at 77% coverage of immunization services and 50% for all other services. This came out to 1.50 services per capita. Finally, the high target was set at 90% coverage of immunization services and 70% coverage of all other services. This came out to a total of 1.98 services per capita. It should be noted that the low set of utilization targets was set based on actual utilization rates from 2008 that were provided by the NGOs. The targets are meant to create feasible low, medium, and long-range goals and can be adjusted as desired.

Of the 1.50 services per capita needed for the medium level target, 0.29 would be curative services, 1.18 preventive services, and 0.03 delivery services. For the high level target, the 1.98 services per capita would need to be broken down between 0.41 curative services per capita, 1.53 preventive services, and 0.04 delivery services. In both cases, about 20% of the services would

be curative, 78% would be preventive, and 2% would be delivery services. These projections represent significant increases from the low target of 27% coverage. To reach the medium target would require 1.6 times the low level of utilization; the high target would require 2.2 times the low target level of utilization.

Using the standard costs, the average **cost per capita** for a clinic would be \$3.41 at the medium target and \$4.28 at the high target; for a clinic with lab, the costs per capita would be \$3.66 and \$4.53, respectively. We split the costs per capita at the health centre between primary and secondary levels of care, because these two levels serve different sized catchment populations. The costs per capita at the primary level of a health centre would be \$3.84 and \$4.50 to meet the medium and high targets, respectively. The costs per capita at the secondary level of a health centre would be \$0.59 and \$0.72 for the medium and high targets.

To meet the medium and high targets, the average **cost per service** at a clinic would be \$2.28 and \$2.16; at a clinic with lab, \$2.44 and \$2.29. Health centres would need to spend an average of \$3.60 and \$3.21 per service to meet the medium and high targets, respectively. For all facilities, the total costs would be broken down roughly as follows: 26-32% for salaries, 57-61% for drugs, and 10-14% on other fixed costs. To meet the high utilization target, clinics would need a total of 6 professional staff, clinics with labs would need 7 staff, and health centres 10 staff.

At the clinics, the two most costly programmes under both the medium and high targets would be Child Health (CH) and Communicable Disease Control (CDC). Under the high target of utilization, CH services would cost a total of \$11,365 at clinics, and CDC services would cost \$10,980. The CDC services would increase to \$12,803 at clinics with labs due to the additional TB diagnostic services that would be available. At health centres, the CDC programme would still cost the most under the high target, at \$22,169, but the Maternal and Newborn Health (MNH) programme would be the second most costly at \$15,835, closely followed by CH at \$15,728.

It is important to note that while the figures produced by the study appear to be precise, they are only estimates and are based on the norms, standards and resource prices. A detailed review by the MOHSW would be worthwhile before the models or specific figures produced by them are used for resource allocation, budgeting or business planning. In addition, the prices used were from 2008 and will need to be updated before the model is used for planning and budgeting.

Based on the experiences of gathering information for developing and testing the models, it appears that financial information is not generally collected at the clinic and health center level and is not often used for allocating and monitoring the use of resources. In addition, at the time of the study, the HMIS had not been rolled out across all the counties, and therefore the service delivery information being collected varied greatly from county to county. Strengthening the systems for the collection, management and use of financial and health service information will be necessary to achieve national improvements in planning, budgeting and reporting.

### ***Recommendations***

The study provides some useful insights into the cost and income across the clinics and health centres. In particular it provides an understanding of the relationship of costs to the different mixes of services. However, due to incomplete or inconsistent data, the sample of facilities was small, and the picture provided is, therefore, somewhat limited.

Each county should conduct this type of analysis for every clinic and health center. The results would provide information on service delivery performance and on the equitable and efficient distribution of resources. This would be useful for improving the future planning of services and the allocation of resources. This would also provide valuable information for facilities under performance-based contracts, since this analysis links costs with service delivery.



## Introduction

The National Health Plan 2007-2011 (NHP) provides a summary of the situation in Liberia at the time that it was written and the following sections of it are relevant as an introduction to this report.

It noted that Liberia was emerging from more than 14 years of destructive war and a ‘culture’ of violence. The elections of 2005 ushered in an era of new leadership and optimism that have already resulted in significant improvements in the health sector.

At the time of writing the NHP, the population was estimated at 3.2 million with a growth rate of 2.4%. Land area comprised 111,370 square km and population density was estimated at around 30 per square km, but very uneven, with four counties containing 70% of the total population.

Massive population displacement in the rural areas during the war led to artificially accelerated urbanization, resulting in severe overcrowding in towns and cities. The literacy rate was less than 40%. And three fourths of the population lived below the poverty line on less than US\$1 a day. The economy, however, was making a modest recovery, and there has been a gradual improvement in security in rural areas.

Liberia’s health services were severely disrupted by years of conflict and looting. While revitalization of the health services has begun, the NHP noted that it was still far from satisfactory. The following table summarizes the health status of Liberia, based on two different sources - the NHP and the 2007 DHS. Whereas the DHS surveys occurred over 2006/2007, the National Health Plan quotes a variety of sources for the health indicators, some of which date back to 2000. As a result of the differing times at which the data were collected, as well as the differing methodologies used, some of the indicators vary widely.

**Table 1: Comparison of Liberia’s health indicators, based on National Health Plan and Demographic Health Survey**

Indicator	2007 NHP <sup>1</sup>	2007 DHS <sup>2</sup>
Infant Mortality Rate (per 1,000)	157 <sup>3</sup>	72
Under-Five / Child Mortality Rate (per 1,000)	235 <sup>4</sup>	111
Maternal Mortality Ratio (per 100,000)	580 <sup>5</sup>	994

<sup>1</sup> Republic of Liberia National Health Plan, 2007 – 2011. Ministry of Health and Social Welfare, Monrovia, Liberia.

<sup>2</sup> Liberia Institute of Statistics and Geo-Information Services (LISGIS) [Liberia], Ministry of Health and Social Welfare [Liberia], National AIDS Control Program [Liberia], and Macro International Inc. 2008. *Liberia Demographic and Health Survey 2007*. Monrovia, Liberia: Liberia Institute of Statistics and Geo-Information Services (LISGIS) and Macro International Inc.

<sup>3</sup> UNICEF: The Official Summary of The State of the World’s Children 2006; World Development Indicators database, April 2006

<sup>4</sup> Ibid.

<sup>5</sup> According to the NHP, this figure was estimated by the UNFPA in 2005.

HIV prevalence (%)	5.2 <sup>6</sup>	1.5
Exclusive breast-feeding of children < 6 months (%)	35 <sup>7</sup>	29
Moderate underweight rates of children < 5 years (%)	27 <sup>8</sup>	39
Severe underweight rates of children <5 years (%)	7 <sup>9</sup>	8
Access to safe water (%)	24 <sup>10</sup>	65
Access to sanitation (%)	26 <sup>11</sup>	10

The MOHSW Rapid Assessment (2007)<sup>12</sup> identified 354 functional health facilities, including 286 clinics, 50 health centres, and 18 hospitals. An additional 200 health facilities were identified as nonfunctional. Access to health services was estimated to be 41%. The health workforce was estimated at approximately 4,000 full-time and 1,000 part time staff. This included 168 physicians, 273 physician assistants, 453 registered nurses, and more than 1,000 nurse aides and other health professionals.

The NHP described the health care system as fragmented, uneven, and heavily dependent on vertical programs and NGOs still operating in a humanitarian mode. However, it noted that the vertical programs resulted in some significant achievements, e.g., 35% of health facilities received some rehabilitation, and EPI coverage increased to 87%.

The NHP noted that the challenges for rebuilding the health system are many and diverse. The immediate challenge was described as ***expanding access to basic health care of acceptable quality***, by:

- Ensuring the availability of funds at county level to support the continuous delivery of basic services;
- Improving the availability of essential medicines and other critical health commodities;
- Rehabilitating health facilities in under-served areas;
- Upgrading the skills of health workers and redeploying them to areas where they are most needed;
- Boosting management capacity at all levels to support the delivery of services. The first step in this direction is improving the information base and monitoring and evaluation capacity.
- Improving availability of safe water and sanitary facilities.

***The NHP also described the many long-term challenges***, which included:

- Ensuring the availability of adequate resources to sustain the investments called for by reconstruction, as well as the increased recurrent expenditure induced by it;

<sup>6</sup> According to the NHP, HIV prevalence rate estimates vary widely, but the Interim Poverty Reduction Strategy (iPRS) suggests a figure of 5.2%.

<sup>7</sup> UNICEF, 2006.

<sup>8</sup> Liberian National Micronutrients Survey, 2000.

<sup>9</sup> Ibid.

<sup>10</sup> UNDP, 2006.

<sup>11</sup> UNICEF, 2006.

<sup>12</sup> Republic of Liberia, National health policy / National health plan, 2007-2011. Ministry of Health & Social Welfare. Monrovia, Liberia.

- Restructuring resource allocation patterns, so that underserved communities benefit adequately from health sector recovery;
- Strengthening the supply chain and rationalizing pharmaceutical management to ensure the availability of affordable, safe, effective essential drugs and other critical commodities;
- Revamping the health care network, through targeted investments in health care and support facilities, in view of increasing access to primary and referral health services;
- Establishing effective management systems capable of operating a modern health sector and evolving as the context and health needs of the Liberian population change over time;
- Introducing effective regulatory provisions and mechanisms to ensure adherence to norms, fair and productive competition, and quality health services.

The MOHSW has defined a Basic Package of Health Services (BPHS), which is described as the cornerstone of the national health plan. The BPHS defines the services that the Ministry of Health and Social Welfare (MOHSW) assures will be available to each and every Liberian. The BPHS standardizes prevention and treatment services throughout the health system to ensure that all individuals, wealthy or poor, living in urban or in rural areas, receive the same package of care.

The NHP describes the BPHS as a “minimum package” to be made available as an integrated whole, rather than an assortment of vertical and parallel programs. Additional services not currently included in the BPHS will, once approved by the MOHSW, be added to, but not substituted for, those already included in the BPHS. A fully functional health facility must be able to offer the complete BPHS to the entire catchment population.

The BPHS is intended to provide a basis for the preparation of operational plans, and thus also for budgets.

### ***Objectives of the costing***

The main objective of this assignment was to develop cost models for the provision of the BPHS at clinics and health centres. These models should enable the MOHSW to estimate the cost of the package at different levels of utilization, which should help the MOHSW and donors to address several of the challenges laid out earlier in this section.

A separate assignment to develop a cost model for county hospitals will be conducted at a later stage.

# 1. BPHS structure

## *Types of service*

The BPHS covers the following services: Maternal and Newborn Health, Child Health, Reproductive and Adolescent Health, Communicable Disease Control, Mental Health and Emergency Care. A summary of the services can be found in Annex 1.

At present, the BPHS includes only the highest priority services that can be implemented given Liberia's current resources and constraints. As a result, certain services that are often included under basic primary health care may not be included in the current version of the BPHS. Control of Non-Communicable Diseases, especially diabetes and hypertension, will be added to the BPHS as soon as they have been assessed and resources become available to provide the services.

## *Levels of care*

According to the BPHS Guidelines, the BPHS involves an integrated provision of primary and secondary care. Primary care, including both outpatient curative and preventive care as well as outreach services, is provided at all health facilities for their primary catchment area. This applies equally to hospitals, health centres and clinics. Secondary care is provided at health centres and hospitals.

The four levels of care of the BPHS can be summarized as community, clinic, health centre and county hospital. The following details are largely extracted from the BPHS Guidelines.

## *Community-based health activities*

The intention is to develop a cadre of community health workers to promote health awareness, to distribute a limited number of medicines and commodities, and to refer those in need of care at a health facility to the appropriate place. At this time there is no government policy on Community Health Workers (CHWs) or community-based health care. It has, however, been decided that CHWs will not be on the government payroll and that antibiotics and artemisinin combination therapy for malaria will not be available in the community at this stage. According to the BPHS Essential Drug List, CHWs should be provided with mebendazole (de-worming medication), contraceptive pills, condoms, multivitamins, and Vitamin A.

## *Clinics*

According to the BPHS, the clinic is the basic unit of the health system. It is a small facility, often with no laboratory or beds, although some do have a laboratory and up to five beds. The clinic is intended to have two professional staff, a nurse and a midwife, although there may only be a licensed practical nurse and trained traditional midwives (TTMs) in some cases at present. Depending on the population density, the catchment populations should vary between about 3,500 and 12,000. The working hours are from 8.00am to 4.00pm, so the beds are only used for observation. Anyone requiring further supervised care should be referred to the nearest health centre or hospital. Some deliveries may be done at the clinic by the midwife, but this activity is constrained by the availability of the midwife and the working hours of the clinic.

### ***Health centres***

Health centres provide both primary and secondary care. They are supposed to be open 24 hours, and the staff is usually organized in two shifts in order to provide appropriate medical, midwifery and nursing cover at all times. Reportedly, however, the health centre outpatient departments often close at 4 pm, after which a smaller number of staff just look after the inpatients. In addition to providing primary care to their immediate catchment area of 3,500 to 12,000 people, health centres provide secondary medical care to a population of between 25,000 and 40,000 from the catchment areas of four to five clinics. To do this they are supposed to have an average of eight professional staff as well as supporting staff. There should be up to 40 beds and a basic laboratory. A health centre does not provide any surgical services beyond very minor procedures. Health centres are supposed to be equipped with an adequate power source, communication equipment and an ambulance.

### ***County hospitals***

County hospitals provide both primary and secondary care. These hospitals are open 24 hours, and the staff is usually organized in two shifts in order to provide appropriate medical, midwifery and nursing cover at all times. This makes it possible for more severe medical and pediatric cases to be cared for and for basic emergency obstetric care (BEOC) to be provided. The county hospital provides primary care to the people living close by, secondary medical care and BEOC to a similar size of population as a health centre, and general surgical and surgical obstetric care to the whole county (an average population of about 200,000). It is supposed to have an operating theatre, a more extensive laboratory with blood transfusion services, a basic X-Ray machine and small ultrasound machine. It should have more than 50 beds, with a permanent capacity for intensive care. The hospital should be staffed with doctors and should have an ambulance and a 4-wheel drive vehicle.

### ***Catchment populations***

The effective catchment area for primary level care is thought to be an area with a diameter of about ten kilometers round the facility. According to the BPHS, a clinic should serve between 3,500 and 12,000 people and a HC between 25,000 and 40,000; also, there should be between 4 and 5 clinics to a HC. If we take the mid-points between the two sets of figures, we can estimate an average catchment population of 32,000 for a health centre and 8,000 for a clinic. This means that there would be 3 clinics covering 8,000 people each and the primary care part of the health centre would cover another 8,000 people. This comes to a ratio of 3 clinics to a health centre, which is slightly less than the ratio stated in the BPHS, unless it is assumed that the primary care part of the health centre is also counted as a clinic.

Using the same logic, a county hospital should provide primary services to a population of 8,000, secondary services to a population of 32,000 and higher level secondary services to a population of 200,000.

## **2. Methodology**

### ***Overall methodology***

The cost models use norms to estimate the numbers of services needed and then use target utilization levels to calculate the numbers of services. Diagnosis and treatment standards are established by an expert group and are combined with prices to estimate the resources needed for each service and the cost of each service. Figures for fixed operating costs are usually derived from a sample of facilities. The sample of facilities is usually used to test the models.

The work included a three week visit to Liberia by the two authors. During the first week of the visit a three-day workshop was held with personnel of the MOHSW and with the selected NGOs. This was used to develop the first draft of the service delivery standards and to start collecting utilization and cost data. Follow-up visits were made to the NGO offices to collect or refine the utilization and cost data. Follow-up discussions were also held with MOHSW officials and a visit was also made to the National Drug System (NDS). The utilization norms were mainly provided by the MOHSW and obtained from documents such as the DHS. During the final week a presentation was made to senior officials of the MOHSW and valuable feedback was received.

Three types of models were created, one for each type of facility—clinic without laboratory, clinic with laboratory, and health centre.

The following sections describe the methodology in more detail.

### ***Model description***

The models developed for this study analyze and estimate costs and revenues using a bottom-up, or micro-costing, approach. The model determines the standard costs associated with the delivery of a particular health service, taking into account the staff time, drug, medical supplies and tests required. Operating costs and indirect staff costs are distributed proportionally across the health services in accordance with the direct staff costs. The model determines the unit cost for each service, which is used to allocate actual costs across services or to project costs under different scenarios. Standard fees for service and other types of funding can also be included in the model, which then uses those figures to assess actual revenues and funds received and to estimate income under the different scenarios.

The model contains five different scenarios:

- Scenario A: numbers of actual services and actual costs;
- Scenario B: numbers of actual services and standard costs;
- Scenario C: numbers of needed services and standard costs;

- Scenario D: numbers of projected services and standard costs; and
- Scenario E: numbers of projected services and standard costs using shared or part time staff.

For the purposes of projecting the costs and funding requirements in Liberia, Scenario D is the most relevant. Scenarios A and B can be used to compare and analyze the generation, allocation and use of resources at actual health centres. Scenario C assumes 100% coverage and Scenario E is used where staff can be shared across facilities or where part time staff can be used. Neither of these scenarios is currently feasible for the MOHSW facilities.

In order to estimate the cost of needed or projected numbers of services, the model uses normative incidence and prevalence rates together with catchment population figures to estimate the number of each type of service needed for full coverage of the community. The model can then be set to meet a percentage of the total need figures so that projections or targets can be used.

The standard costs are estimated by determining the quantities of resources (staff type and time, drugs and supplies, and tests) required to provide a good quality service. These quantities are then multiplied by the price of each resource to produce a total standard cost for each service. The portion of staff time related to the each service is treated as a direct cost and the balance of staff time used for non-patient tasks, such as health centre management, is treated as an indirect staff cost. A separate cost is determined for the fixed facility operating costs (e.g. electricity) and that cost, together with the indirect staff cost, is allocated across the services in proportion with direct staff cost.

The standard costs represent the cost of the resources that are required to provide each service at an ideal level of quality. The model also allows standard staff times to be reduced across the board. This feature can be used if it is decided that an acceptable level of quality can be provided with less than optimal staff times.

Actual costs may be quite different from the standards because the actual resources used and/or prices paid can be quite different from the standards<sup>13</sup>. Actual costs may be lower because fewer resources were available (e.g. insufficient staff or drugs) or lower prices were paid, or they may be higher because excessive resources were allocated or higher prices were paid. Where there are fewer resources available than those required according to the standards, the quality of the services may not be adequate and where resources are greater there may be waste.

The model also shows the sources of funds, such as the NGOs for staff payments and NDS and donors for drugs supplies.

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<sup>13</sup> Another reason for a difference can be that the standard cost reflects the numbers of drugs used whereas the actual cost reflects the amount of drugs purchased or received.

All the major assumptions used in the model can be changed easily by the user. These include the catchment population, need norms, overall utilization rate, standard quantities and prices of drugs and supplies, standard staff times, staff pay levels and standard operating costs. Any new services added to the BPHS can also be included in the model.

## ***Modeling tool***

The Cost and Revenue Plus (CORE Plus) analysis tool was used to develop the model<sup>14</sup>. CORE Plus and an earlier version called CORE are flexible tools that have been used in many countries<sup>15</sup>. CORE Plus has been reviewed by international donor agencies, including the World Health Organization (WHO), and details of the review can be found on the web site of the Partnership for Maternal, Neonatal and Child Health<sup>16</sup>.

CORE Plus is a Microsoft Excel-based workbook<sup>17</sup> that contains different types of worksheets including: service practice worksheets, assumptions and data entry worksheets, calculation pages, and data report pages.

The service practice worksheets are the backbone of CORE Plus as they are used to determine the standard staff time needed for each service, as well as the standard quantities and types of drugs, medical consumables and laboratory tests required. Prices of drugs, clinical supplies, and tests are also entered into the service practice worksheets via a Look-Up sheet. In addition to the service practice details, CORE Plus requires general facility data, personnel information, number of services, and income and expenditure figures for each health centre. Prevalence or incidence norms are also necessary for to estimate the numbers of services needed.

CORE Plus has an accompanying User's Manual and assistance can also be obtained from MSH.

The tool was adapted for Liberia to reflect the two levels of care provided at a health centre.

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<sup>14</sup> CORE Plus was developed by Management Sciences for Health (MSH) and a generic version and user's manual can be found on MSH's web site at <http://erc.msh.org/mainpage.cfm?file=5.11.htm&module=toolkit&language=English>

<sup>15</sup> For example, CORE Plus was recently used to cost the basic package of services in Cambodia and to analyse the cost of HIV/AIDS services in Rwanda.

<sup>16</sup> [http://www.who.int/pmnch/topics/economics/costing\\_tools/en/index.html](http://www.who.int/pmnch/topics/economics/costing_tools/en/index.html)

<sup>17</sup> The use of Microsoft Excel requires a license from Microsoft Corporation. This tool is not a product of Microsoft Corporation and is not guaranteed by that company.



## ***Data and assumptions***

This set of models covers BPHS activities carried out by, or through, the clinics and health centres. The models do not include some preventive activities carried out primarily by national programmes, such as the distribution of Insecticide Treated Nets (ITNs) to households and supplemental immunization activities. However, ITN distribution to pregnant women during antenatal visits is included, as are routine childhood immunizations.

The model only includes expenditures made by, or on behalf of, the clinics and health centres and does not include the opportunity cost of volunteer activities; for example, the time of community health workers. It does not include any NGO or donor agency costs other than those paid to, or on behalf of, the clinic or health centre. It does, however, include the cost of donated drugs and vaccines; in Liberia, these include vaccines, family planning commodities, anti-malarials, and TB drugs.

The cost of outreach services has been included in the study since they are part of the clinic and health centre activities.<sup>18</sup> The cost of support provided by the health centre to community health workers has also been included. However, it is not clear if community health services are included in the HMIS figures. The current HMIS form does not have a specific field for services provided at the community level, so clinics and health centres may or may not include these services as a part of their total figures.

Management costs have been included at the level of the cost centre where they are budgeted and incurred. For example, the cost of supervising and supporting community health workers is included in the facility costs since the staff that perform that function would be under the health centre budget. Similarly the cost of supervision of the clinics and health centres is not included in this study because it is assumed that they are budgeted at the county office level. Also, no regional and central level support costs were included.

Neither capital expenditures nor depreciation costs are included in the costing since these would not normally be part of the recurrent budgets of the MOHSW. In addition, the cost of training staff, either pre-service or in-service, has not been included. The cost of related services sometimes used by a clinic or health centre such as blood, ambulance and external laboratory tests are also not included.

The financial data was collected and modeled in US\$. Inflation has not been taken into account in the projected costs.

## ***Costing a sample of actual facilities***

In order to collect and verify additional data for the costing and to test both the functionality of

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<sup>18</sup> We assume all costs for outreach (such as drugs, labor, and transportation) have been included as part of the total clinic or health centre costs. The travel time required to provide outreach is factored into the direct service time available for each staff member.

the model and the norms, standards and prices used, we used the model to run costs and revenues for a small number of facilities.

Many of the facilities in Liberia are supported by NGOs, in some cases with assistance from international donors. The facilities that comprised the sample were those supported by 4 NGOs that are currently receiving transition grants from the RBHS project. This sample was used because it was considered that data should be more easily available and because the data for those facilities would also be useful for the performance-based contracting element of the RBHS project. More NGOs were not included due to time constraints.

The four NGOs were Merci, EQUIP, Africare and IMC. They provided support to a total of 91 facilities in 7 counties with transition grants from the RBHC project. Of these 91 facilities, 82 are clinics, 7 are health centres and 2 are hospitals. This represents about 30% of the 286 clinics and 14% of the 50 health centres described as functional in the National Health Plan (NHP). Some of the clinics have laboratories and the others do not. According to the NGOs, some of the clinics are in urban areas but most are in rural areas and some of those are in extremely remote areas.

The NGOs provided catchment population figures, utilization data and expenditure figures for these facilities. We were not able to get complete data from three of the NGOs, with one common problem being the lack of information on the cost of drugs and clinical supplies by facility. Whilst we, therefore, used information from all of them to help develop the model, we only used the information from one of them to run the model for comparisons. Also, for the actual health centre model, we were not able to get the breakdown of utilization between the primary and secondary levels of care. Instead, we calculated split between primary and secondary services based on norms (10% referral rate for most services)<sup>19</sup>.

## ***List of services***

The services included in the modeling are those set out in the BPHS. Using the BPHS Guidelines, a list of services was compiled, with each service classified as preventive, curative, or other (deliveries). Services were also categorized under one of six major programs: Maternal and Newborn Health (MNH), Child Health (CH), Reproductive and Adolescent Health (RAH), Communicable Disease Control (CDC), Mental Health (MH), and Emergency Care (EC) (see Annex 2). The information reported in the new HMIS, which contains data from monthly facility reports, was also taken into account.

Although the BPHS and HMIS include a large number of services, we limited the number of services in the models to make it more manageable. Services that are high priority or are high volume or require expensive treatments were listed individually, while other services were bundled together. For example, services specific to child survival interventions, such as Vitamin A supplementation and measles vaccination, remained as individual services. On the other hand,

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<sup>19</sup> The 10% average referral rate was suggested as a rough estimate by the panel of clinicians that were assembled to provide standard treatment guidelines for the Basic Package of Health Services.

the numbers of rare diseases such as Lassa fever and acute flaccid paralysis were small and these services were therefore bundled together under “Epidemic Diseases”. Also, since the costing is based on numbers of services provided to patients, we only took into account services where a single patient or client has contact with a health centre employee<sup>20</sup>.

Currently, there is no category for “Other” services in the HMIS. As a result, certain services, such as minor ailments, that are being provided in facilities but are not listed specifically on the reporting form were not included. The use of the models to estimate the cost of actual services will, therefore, be limited by the availability of information from the HMIS. In addition, the services listed in the HMIS do not correspond exactly with those services listed in the BPHS (See Annex 3 for HMIS recommendations).

With the above bundling of services, we arrived at a total of 35 services for a clinic without lab, 36 services for a clinic with lab, and 54 services for a health centre (which includes secondary level of care). The CORE Plus tool was expanded to allow for a total of 75 services and having 54 services pre-entered allows the MOH to add another 21 services in the future<sup>21</sup>.

Since clinics only provide services at the primary level of care, referrals were included only in the health centre models. Health centres provide two different types of secondary care. The first type is a referral from a clinic where a patient is not responding to primary level treatment. For the model, we have assumed that 10% of primary-level curative services require referral to the secondary level of care provided at a health centre. For example, for every ten cases of bloody diarrhea treated at a clinic, one case is expected to present with severe dehydration and require referral to a health centre. The second type is a referral from a clinic for a service, such as VCT, which is only provided at a health centre, and for which no treatment is provided at the clinic. Similarly, the services bundled under “Epidemic Diseases – Treatment” are also referred directly to health centres. These services include measles and pertussis, both of which are initially treated at the health centre and are then referred to a hospital. For example, before referring patients with pertussis to a hospital, health centres should give a start dose of antibiotics.

## **Need Norms**

The prevalence and incidence rates that are used to estimate the numbers of services needed (need norms) were obtained from a variety of sources, including the Liberian Demographic Health Survey (DHS) 2007 (see Annex 4 for a list of the norms and sources). The prevalence rates for TB, HIV/AIDS, and malaria were obtained from the WHO website and UNAIDS.

Where norms could not be identified for some curative services, rates were derived from a previous costing study using CORE Plus in Cambodia.<sup>22</sup> In the Cambodian study, when norms

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<sup>20</sup> For example, health talks given to groups of people are not included.

<sup>21</sup> The number of services can be increased beyond 75, but this requires changes in formatting and copying formulas, and should only be done by a person who is very experienced in working with spreadsheets.

<sup>22</sup> *Cost and Funding Projections for the Minimum Package of Activities for Health Centers: Ministry Of Health, Royal Government of Cambodia.* Collins, David, Zina Jarrah, and Prateek Gupta. USAID/BASICS. 2009.

could not be identified for curative services, the rates were extrapolated from actual utilization figures for a particular service. However, at the time of this study, the Liberian HMIS is still being rolled out on a national scale, and consistent and accurate utilization data are not currently available. When reliable data specific to Liberia do become available, the norms can be updated in the model. For now, services with prevalence rates that are difficult to predict without any actual utilization data—Emergency First Aid, for example—have been obtained from the Cambodia costing study.

No regional variations were taken into consideration for any of the norms. The need for certain services, such as malaria, may vary drastically by geographical location within the country; however, in the case of Liberia, we did not find evidence of significant variations.

## ***Service Standards***

The service delivery standards were determined by a small team of local experts comprised primarily of physicians, nurses and midwives from the MOHSW and the four NGOs. The three-day workshop that was held for this purpose was organized by the RBHS project and led by the consultants. The standards were based where possible on MOHSW official guidelines and standards of treatment. The team of experts provided detailed information on the staff time and activities, drugs and supplies, and laboratory tests required for each service.

The standards for clinics and health centres reflect only the costs specific to providing that service. For inpatient services at the health centres, which are offered at the secondary level of care, the staff time involved is specific only to direct staff time in contact with a patient. The model assumes that health centres will have enough beds to meet the full inpatient demand, and that any additional resources required for inpatient services are covered by the operating costs (bed linens, etc).

The standards were entered into the CORE Plus service practice worksheets and these were then distributed to the workshop participants for feedback. Additionally, the standard treatment guidelines were compared with those used in previous costing exercises in Cambodia and Rwanda.<sup>23</sup> (See Annex 5 for a list of sources and assumptions for each service).

## ***Service statistics***

For the clinic and health centre comparisons, the actual numbers of services used in this study were obtained from the NGOs. The exception was IMC who, reportedly due to computer problems, were unable to provide the figures and we therefore obtained them from the national HMIS.

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<sup>23</sup> Rwanda: Cost and Revenue Analysis in Six Rwandan Health Centers: 2005 costs and revenues. Thomas McMennamin and Gyuri Fritsche. USAID/Rwanda. 2007.

Because the HMIS is still being rolled out on a national scale, the utilization figures obtained from the NGOs were not consistent with each other, or with the HMIS. The data provided by NGOs was input into the models as best as possible, but some assumptions had to be made. For example, where only a figure for total diarrhea cases was available, we used an average ratio to determine the breakdown between bloody and watery diarrhea. Also, some services had no data available, and it is unclear whether this was because they were not recorded, or simply not being provided. For example, the clinics and health centres modeled in this report did not have figures for STI treatments, TB treatment, mental health care, emergency first aid, or sexual gender based violence. These services are currently set at zero in the model, but can be updated as more data is made available.

Currently, clinics and health centre staff perform some deliveries at home. The model assumes that, under standard scenarios, all deliveries should be made at a facility. However to reflect reality the model also includes a service for deliveries at home with health staff, so that the actual values can be input when running the clinic and health centre comparisons.

While the majority of immunizations are supposed to be provided at the facility or through outreach, in some cases campaigns are also carried out. Facility staff are involved in these campaigns but the numbers of immunizations provided through the campaigns are not reported in the HMIS. The models currently assume that all vaccines required for fully immunized children (BCG, Measles, OPV, Pentavalent, and Yellow Fever) should be provided at clinics, in addition to all TT vaccines for pregnant women and women of reproductive age. When there are data to estimate the proportion of immunizations that are carried out through campaigns, the model can be adjusted accordingly.

Each service was identified in the model as curative or preventive and also categorized under one of the six major programmes: MNH, CH, RAH, CDC, MH, or EC. This enabled the model to automatically calculate the total numbers of services and costs for each programme.

## Staffing

The staffing patterns used in the clinic and health centre models are based on information provided in the BPHS Guidelines (Table 2), except as explained below, in the case of Nurse Aides at the health centres. The BPHS states what types of staff are to be used and also how many of each type of staff are required. We used the information on the types of staff in the modeling, but the model determines how many of each staff are required (as explained below).

**Table 2: Proposed staffing for Clinics and Health Centres<sup>24</sup>**

	Health Clinic	Health Centre
Officer in Charge (PA, N/M or nurse)	1	1
Physician Assistant		2 (3)
Nurse		1

<sup>24</sup> Source: BPHS Guidelines

Certified Midwife	1	4
Nurse Midwife		
Dispenser	1	1
Nurse Aide	1	
Environmental Tech.		1
Social Worker		1
Lab Technician	(1)	1
Recorder/HIS	1	1
Security/Cleaner	1	1
Total	6 (7)	14 (15)

The team of local experts decided which staff member should be the key provider for each service. Based on the number of each kind of services and the standard times, the model determines how many of each type of staff are required in total for each facility. Although staffing patterns for clinics and health centres have been outlined in the BPHS, not all facilities are currently following these patterns. Specifically, the BPHS suggests that only clinics and not health centres should have a Nurse Aide (NA) on staff, although according to the team of local experts, the NA should provide all vaccinations. We included a Nurse Aide in the model, but this can be changed in the future to reflect changes in staffing patterns.

According to the BPHS, each clinic and health centre should have one staff designated as Officer in Charge (OIC). This position may be filled by a Physician's Assistant (PA), Nurse/Midwife (NM), or Nurse. Initially, our team of local experts suggested that only the OIC was the appropriate staff member to provide a majority of the services. However, this assumes that the remaining staff would be assigned few or no services, which does not appear to be realistic. We therefore assumed that, since each facility has only one OIC and several other staff members of the same cadre (PA, NM, or Nurse), these tasks were split equally amongst the three cadres. This was done so as to create a reasonable approximation of reality in the model—when the OIC is busy providing another service, the next qualified staff member will be available.

We used information provided by the expert group to estimate staff time used for vacation, sickness and training. This was then used to estimate the average staff time available for each centre. We used a preliminary estimate of 10% for the average time that each type of staff member spends in meetings of different types and in travelling to provide outreach services<sup>25</sup>. This figure was deducted from the average number of days worked to estimate the time available to provide patient care services.

The number of each type of staff is determined by number of each type of service to be provided. This will be different from the numbers shown in the BPHS Guidelines which is assumed to be appropriate for a facility with an average catchment population. We did not set the number of staff at a minimum level in the model but this can be done if the MOHSW decides that there should be a minimum level for each facility. However, because each category of staff available at a clinic or health centre is required according to the standard treatment guidelines, by default there is a minimum level of 5 categories of patient care staff at clinics, 6 at clinics with labs, and 9 at health centres<sup>26</sup>. The scenarios used in this report assume there is no capacity for part-time staff; thus, even if a particular category of staff, such as a social worker, only provides care for

<sup>25</sup> A more accurate estimate should be obtained from the MOHSW and NGOs.

one service, the model will account for the cost of a full-time social worker.

The staff are paid fixed incentives in lieu of salaries. The rate for each type of staff is recommended by the MOHSW and there are two rates for the country – one for easily-accessible areas and one for areas that are not easily accessible. The NGOs are supposed to use these rates but do not always do so. Since the incentives are only comprised of one element and there are no other payments made to staff, the model only has one input for staff salaries. However, if other types of payment are added they can be included in the model.

## ***Drugs and medical supplies***

Prices for drugs and medical supplies were obtained from a current list on the website of the National Drug System (NDS). Since prices for donated drugs and medical supplies were not included in the NDS, these prices were obtained from the relevant donors or MOHSW departments. For example, vaccine prices were obtained from the EPI division of the MOHSW.<sup>27</sup> Any remaining prices were obtained from the MSH International Drug Price Indicator Guide.<sup>28</sup> To reflect the cost of donated drugs and medical supplies, CORE Plus has been modified to show these as donations using the standard cost and the number of services provided. Donated drugs and supplies include vaccines, family planning commodities, TB medication, anti-malarials, and Insecticide-Treated Nets (ITNs). Antiretroviral drugs are also donated, but since ARV therapy is not provided at the clinic or health centre level, we did not account for these drugs in CORE Plus.

We did not include certain common low-cost supplies used in small quantities (such as cotton wool, gauze and alcohol) under individual services, but treated them as bulk supplies instead. We used a provisional figure based on estimates from other countries and this figure can be modified when more accurate information is received from the NGOs.

It should be noted that the quantities of vaccines used in the model are understated to some degree since wastage has not been taken into account. This may also apply to some other drugs and supplies that are particularly subject to wastage.

It should also be noted that the model calculates drug costs and drug revenue based on the amount of drugs needed to provide the services. This can have an impact when comparing actual funding for drugs with the normative funding for drugs calculated by the model—drugs received from the NDS are not necessarily all used within the same period as the utilization figures. For example, where a 3 month supply of a particular drug is received at the beginning of one month the cost of the 3 month's supply would be included in the actual costs whereas the cost of one

<sup>26</sup> For all facilities the OIC is treated as a separate category. The health centre figure includes a Nurse-Aide, which is not shown in the BPHS. Non-patient care staff such as the security guard/cleaner and environmental technical are excluded from these figures.

<sup>27</sup> EPI drug prices set by GAVI.

<sup>28</sup> <http://erc.msh.org/mainpage.cfm?file=1.0.htm&module=DMP&language=English>

month's use would be included in the standard costs (assuming the costing is done for one month).

### ***Operating and other fixed costs***

The figures used for operating costs were derived from expenditure or budget data provided by the NGOs and the Pool Fund. These figures—one for clinics, and one for health centres—were used for all the scenarios. We also included the salary costs related to meetings and travel time to provide outreach services. This was assumed to be 10% of the staff time for clinics and health centres.

It is recognized that certain operating costs may be higher for facilities in remote areas. No additional cost has been included for this but one can be added where applicable on the basis of circumstances at particular facilities<sup>29</sup>.

The salary of the cleaner/security guard is included under operating costs. The salary of the Environmental Technician at the Health Centre is also included under operating costs since the tasks performed by that person do not relate to direct patient care.

### ***Revenue modeling***

The sources of funding for the different resources are shown separately under the revenue section. Staff payments are either shown under MOHSW or under NGO donations. The drugs are also split between MOHSW and the NGOs, based on the information provided. Drugs for HIV/AIDS, TB and Malaria, vaccines and family planning commodities are all shown as donations. Operating costs are shown as donor funding. The costs of the drugs, vaccines and commodities vary with the numbers of services and the revenue elements for these vary accordingly.

### ***Targets***

We ran the model for 3 types of facility and 3 sets of targets, and for each one we estimated the difference in cost for the two different incentive rates (for counties with easy access and with difficult access). However, for this report, all the standard cost projections and actual cost comparisons were made using the staff pay levels for counties with easy access.

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<sup>29</sup> From a previous costing exercise: at one remote rural health centre in Cambodia the operating costs for 2007 were US\$300 higher than average – reportedly due to the higher transport cost of having to use boats for outreach.



The 3 types of facility are:

- Regular clinics (without labs)
- Clinics with labs
- Health centres

In the case of the health centre we produced separate costs for primary and secondary level services.

We used the average catchment populations for both types of clinic and for the primary services of a health centre, which were set at 8,000 in accordance with the BPHS Guidelines. The catchment population for the secondary services of a health centre was set at 32,000. The calculation of these catchment populations was explained earlier in this report.

We developed a low set of utilization targets, a medium set of utilization targets and a high set of utilization targets. These were calculated as follows:

- The low set of targets represent short-term targets that should be achievable. They are mainly based on an average of the total actual utilization figures for the sample of donor-supported facilities and can be regarded as a reasonable target for facilities that have less than this average utilization level. The average number of visits (headcount) per capita was 0.61 for that sample<sup>30</sup>. This was increased by 18% to reflect the average number of services per visit.<sup>31</sup> That gives an average of 0.72 services per capita, which represents 27% of the total normative number of 2.64 services per capita<sup>32</sup>. The figure of 27% was used for all services except immunizations, for which we used the individual coverage figures for the country, based on the 2007 DHS report.<sup>33</sup> Due to the fact that immunization coverage was significantly higher than 27%, the average services per capita then increased from 0.72 to 0.92.
- The medium set of targets uses a figure of 77% for all immunizations and 50% for the other services. The figure of 77% was set to be just higher than the highest of the individual immunization levels achieved in 2007. The figure of 50% is roughly double the low level of utilization of 27% and roughly half way between the 27% and the high level of utilization of 70%.

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<sup>30</sup> This figure was derived from a small sample of facilities and it does not representative of all facilities in the country.

<sup>31</sup> The 18% figure was based on the median between EQUIP, which was 13%, and Africare, which was 23% based on the sample data provided.

<sup>32</sup> The figure of 27% represents an overall average for all services. For simplicity, this figure was allocated across the individual services in the model according to the norms instead of using the actual figures for these services.

<sup>33</sup> Vaccination coverage rates varied significantly by source; we have chosen to use the DHS 2007 figures, which had the lowest coverage rates and thus seemed reasonable given Liberia's current situation.

- The high set of targets uses a 90% utilization level for all immunizations and a 70% utilization level for the other services (as recommended by the Pool Fund). These are assumed to be the maximum targets achievable in the medium term<sup>34</sup>.

Meeting 100% of a catchment population's needs is not considered feasible in any country for a variety of reasons including variations in health-seeking behavior (people may self-treat or use the private sector).

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<sup>34</sup> The NHP has coverage targets for immunizations for the 6 childhood diseases of 80% in 2008, 85% in 2011 and 90% in 2015. The NHP does not show targets for other services.

## 3. Standard Models

### *Utilization Projections*

#### **Clinics**

The targets described above were input into the three different types of models: regular clinics (without labs), clinics with labs, and health centres.

In this section we present the findings for the two types of clinic. In both cases we used a catchment population of 8,000 people. The model assumes that, after bundling, clinics should provide a total of 35 types of services, and clinics with labs 36 types of services. At the estimated low target utilization levels, a clinic without a lab should provide a total of 7,326 services per year; to meet the medium and high targets, a clinic would need to provide 11,962 and 15,821 services per year, respectively (Table 3). It should be noted that each service in the total figure is counted as a single service, whether it is an immunization or the delivery of a baby.

Looking at the service mix for clinics, the vast majority of services should be preventive (12,245 preventive services compared with 3,271 curative services for the high target). The need for preventive services is greater for two reasons: first, these services are more likely to have universal coverage norms (such as immunizations, where at 100% met need, all children should get a measles vaccine); and second, the current BPHS places a higher emphasis on the provision of preventive services. Delivery services are a separate category because they are not classified as preventive or curative; and while the number of these services is relatively small, deliveries consume a high volume of resources.<sup>35</sup>

At clinics, the average projected number of services per capita is 0.92 for the low utilization target, 1.50 for the medium utilization target and 1.98 for the high utilization target. The figure of 1.98 for the high utilization target is made up of 1.53 preventive services, 0.41 curative services and 0.04 deliveries. As mentioned previously, the majority of services included in the BPHS are preventive, with a focus on maternal, newborn, and reproductive, and child health. Curative interventions currently included in the BPHS include treatment for malaria, tuberculosis, diarrhea, and pneumonia; however, several other services commonly included in basic healthcare packages are absent. For example, chronic diseases such as hypertension and diabetes are not currently part of the BPHS. As a result, the projected needed services are mainly preventive. It should also be noted that the BPHS does not include a category for minor ailments although this can be a significant figure.<sup>36</sup>

A clinic with a laboratory should have a slightly higher level of utilization. In addition to providing the same types of services as regular clinics, clinics with laboratories can provide one

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<sup>35</sup> Delivery services also include services provided to women with complications from miscarriages, spontaneous abortions, etc.

<sup>36</sup> In the Cambodia costing study, we estimated that approximately 15% of all services were categorized as “Other” services, not specifically listed in the HMIS. These were mainly minor ailments.

additional service, TB Diagnosis. Clinics without labs are unable to test a patient sputum smear and confirm a suspected TB diagnosis; however, for the purposes of the model, all clinics are assumed to be able to provide TB treatment in the form of DOTS. Clinics with labs require an additional staff, a lab technician, and are able to provide higher quality services due to the ability to process bloodwork and stool samples. However, because these activities are still part of the same services provided at the clinics without laboratories, the difference in utilization rates between the two types of clinics is not very significant.

Thus, the number of types of services provided by clinics with labs increases from 35 to 36 and the total number of curative services increases slightly due to the additional service of TB diagnosis - by 18 services under the high utilization model (from 15,821 to 15,839).

Table 3. Utilization figures by type of service for Clinics and Clinics with Labs

<i>Currency: US\$</i>	Clinic			Clinic with Lab		
	Low Utilization	Medium Utilization	High Utilization	Low Utilization	Medium Utilization	High Utilization
<b>Basic Statistics</b>						
Catchment population	8,000	8,000	8,000	8,000	8,000	8,000
Total types of services in full package	35	35	35	36	36	36
<b>Services: Total and Per Capita</b>						
<b>Total types of services offered in scenario</b>	35	35	35	36	36	36
<b>Total services provided</b>	7,326	11,962	15,821	7,333	11,975	15,839
<b>Average number of services per capita</b>	0.92	1.50	1.98	0.92	1.50	1.98
Total curative services provided	1,262	2,336	3,271	1,269	2,350	3,289
Average number of curative services per capita	0.16	0.29	0.41	0.16	0.29	0.41
Total preventive services provided	5,947	9,408	12,245	5,947	9,408	12,245
Average number of preventive services per capita	0.74	1.18	1.53	0.74	1.18	1.53
Total delivery services provided	118	218	305	118	218	305
Average number of delivery services per capita	0.01	0.03	0.04	0.01	0.03	0.04

## Health Centres

The health centre model assumes that primary care is provided to its own primary catchment population of 8,000, and that referrals to its secondary level services are made from its primary service level and also from three clinics, each serving 8,000 people. This makes the referral population of 32,000 served at the secondary level of the health centre. The prevalence norm for each service was applied to the appropriate catchment population, depending on whether the service is at the primary or secondary level.

As described earlier, health centres provide both primary and secondary care, resulting in a total of 54 types of service—37 at the primary level, and 17 at the secondary (referral) level.<sup>37</sup> Table 4 shows the utilization figures by type of services for health centres at the primary and secondary levels. (Note that the first 3 columns of figures in the table are for the primary level services and the second 3 columns of figures are for the secondary level of services. The third 3 columns of figures show the combined total for primary and secondary levels of services, where applicable.)

<sup>37</sup> There are a total of 54 services listed in the full package in the current model. However, because Delivery at Home with Skilled Staff is actually provided at clinics but is not part of the standard service mix, the total types of services for the standard models is actually 53 (36 primary and 17 secondary).

To meet the low utilization targets, health centres should provide a total of 8,326 services, of which 7,333 are primary and 992 are secondary. To meet the medium and high targets, health centres would need to provide a total of 13,813 and 18,412 services, respectively.

The mix of services at health centres is similar to that at the clinics and is mostly comprised of preventive services (13,074 preventive services compared with 4,900 curative for the high target). However, the secondary level of care changes the service mix significantly. Whereas the majority of services at the primary level are preventive, most services at the secondary level are curative. This is due to the fact that preventive services—such as immunizations and family planning—in large part, do not require referrals. However, curative services—such as pneumonia treatment or emergency first aid—are much more likely to require referral to a higher level of care. In this model, we have assumed that 10% of curative services will need to be referred to the secondary level. Obstetric complications comprise the bulk of referrals from clinics to health centres.

The per capita utilization figures are different for the primary and secondary levels since they depend on the different catchment populations. A total, combined, per capita figure for primary and secondary levels would be misleading and is, therefore, not provided for health centres. Comparing the average services per capita to achieve the high utilization target, health centres would need to provide 1.98 primary services per capita (the same figure as for a clinic) and 0.08 secondary services per capita. Thus, although the catchment population at the secondary level is four times higher, the referral rate of 10% results in much lower service per capita figures. This is in accordance with the BPHS, which states that most services within the package should be provided as primary healthcare.

Table 4. Utilization figures by type of service for Health Centres – Primary and Secondary Levels

<b>Currency: US\$</b>	<b>Health Centre - Primary Level</b>			<b>Health Centre - Secondary Level</b>			<b>Health Centre - TOTAL (Primary &amp; Secondary)</b>		
	<b>Low Util</b>	<b>Medium Util</b>	<b>High Util</b>	<b>Low Util</b>	<b>Medium Util</b>	<b>High Util</b>	<b>Low Util</b>	<b>Medium Util</b>	<b>High Util</b>
<b>Basic Statistics</b>									
Catchment population	8,000	8,000	8,000	32,000	32,000	32,000			
Total types of services in full package	54	54	54	54	54	54			
<b>Services: Total and Per Capita</b>									
<b>Total types of services offered in scenario</b>	36	36	36	17	17	17	53	53	53
<b>Total services provided</b>	7,333	11,975	15,839	992	1,838	2,573	8,326	13,813	18,412
<b>Average number of services per capita</b>	0.92	1.50	1.98	0.03	0.06	0.08			
Total curative services provided	1,269	2,350	3,289	621	1,150	1,610	1,890	3,500	4,900
Average number of curative services per capita	0.16	0.29	0.41	0.02	0.04	0.05			
Total preventive services provided	5,947	9,408	12,245	320	592	829	6,267	10,000	13,074
Average number of preventive services per capita	0.74	1.18	1.53	0.01	0.02	0.03			
Total delivery services provided	118	218	305	52	96	134	169	313	439
Average number of delivery services per capita	0.01	0.03	0.04	0.002	0.003	0.004			

## Cost Projections

### Clinics

A comparison of cost projections for the two types of clinic shows similar relationships among the costs of curative, preventive, and delivery services (Table 5). Clinics with laboratories should incur the same costs as regular clinics, with the addition of staff pay for a lab technician, and the cost of supplies for laboratory and diagnostic services. At the highest level of utilization, the total cost of clinics and clinics with labs comes out to \$34,251 and \$36,250, respectively. The majority of this cost difference is due to curative services, which cost an average of \$4.53 per service at regular clinics and \$5.04 at clinics with labs. This is in line with expectations, due to the availability of curative TB diagnostic services at clinics with labs, as well as the ability to perform microscopy on stool samples for the curative diarrhea services. The slight increase in the average cost of preventive and delivery services is due to the fact that clinics with labs are able to perform bloodwork during antenatal visits and pregnancies, as well as administer rapid diagnostic tests for syphilis and HIV.

The total cost of services for a regular clinic at the low target level of utilization should be \$20,648. This would increase to \$27,305 for a clinic operating at the mid-level of utilization and to \$34,251 for a clinic operating at the high utilization level. The average cost per capita for a regular clinic should be \$2.58 for the low target utilization levels, and should increase to \$3.41 for the medium levels and \$4.28 for the high levels. These increases are mainly related to the increases in the numbers of services at the higher levels of utilization.

The average cost per service at a regular clinic should be \$2.82 for the low target level of utilization, and this should decrease to \$2.28 for the medium level and \$2.16 for the high level. The decreases in cost per service from the low to mid levels of utilization indicate a high level of inefficiency at clinics operating at the low levels. The main reason for this is the requirement to have at least one of each different type of staff in the BPHS guidelines (see next section).

Table 5. Clinic Costs by type of Service

Currency: US\$	Clinic			Clinic with Lab		
	Low Utilization	Medium Utilization	High Utilization	Low Utilization	Medium Utilization	High Utilization
<b>Costs: Total and Per Capita</b>						
<b>Total cost of all services</b>	20,648	27,305	34,251	22,525	29,248	36,250
<b>Cost per capita</b>	2.58	3.41	4.28	2.82	3.66	4.53
<b>Cost per service</b>	2.82	2.28	2.16	3.07	2.44	2.29
Total cost of curative services	8,942	12,070	14,815	10,626	13,794	16,576
Average cost per curative service	7.09	5.17	4.53	8.37	5.87	5.04
Total cost of preventive services	10,515	13,897	17,458	10,711	14,118	17,697
Average cost per preventive service	1.77	1.48	1.43	1.80	1.50	1.45
Total cost of delivery services	1,191	1,337	1,978	1,189	1,336	1,978
Average cost per delivery service	10.13	6.14	6.49	10.11	6.14	6.49

A breakdown of costs by salaries, drugs, and other fixed costs shows similar patterns between clinics and clinics with labs (Table 6). As mentioned earlier, the model requires at least one of

each category of staff to be providing services at both types of clinic. Thus, the number of staff required—and consequently the total salaries—remains the same under the low and medium utilization levels. For the high utilization level only one more staff person is required.

With the staff costs being relatively fixed due to the BPHS requirements the main changes in costs at the different levels of utilization are related to drugs, supplies and lab tests, which are directly variable with the number of services.

As expected, salaries make up a higher percentage at the clinics with labs, due to the staff payment for the lab technician—at the 2008 utilization level, salaries increase from 34% of the total costs at clinics to 39% at clinics with labs. And as a result, although the total figures for drugs and other fixed costs are higher, they make up a smaller percentage of the total costs at clinics with labs.

Table 6. Clinic Costs by type of resource

Currency: US\$	Clinic			Clinic with Lab		
	Low Utilization	Medium Utilization	High Utilization	Low Utilization	Medium Utilization	High Utilization
<b>Break-down of Total Costs</b>						
Salaries	7,032	7,032	8,748	8,832	8,832	10,548
<i>Salaries as % of total</i>	34%	26%	26%	39%	30%	29%
Drugs, supplies and lab tests	9,899	16,556	21,786	9,976	16,699	21,985
<i>Drugs, medical supplies, and tests as % of total</i>	48%	61%	64%	44%	57%	61%
Other fixed costs	3,717	3,717	3,717	3,717	3,717	3,717
<i>Other fixed costs as % of total</i>	18%	14%	11%	17%	13%	10%

The situation of the staffing is shown in more detail in Table 7, which shows the number of staff required for each utilization level, the average number of services per staff per day, and the average yearly salary. Under the low and medium utilization levels, clinics have the same number of staff, and the same average pay per employee. This is because clinics need a minimum of 5 patient care staff per the BPHS (one for each category), and therefore each category is included in the standard treatment guidelines. Similarly, clinics with labs need a minimum of 6 patient care staff; the 5 at regular clinics, plus an additional lab technician.

The model indicates that the high utilization target would be achievable with the addition of a single extra person at both clinics and clinics with labs. It also shows that, at the low target rates of utilization, staff would provide 7.8 services per day, which is significantly fewer services than the 10.8 and 14.1 services that should be provided at the medium and high utilization levels. While the figure of 14.1 services per day is a reasonable target for a highly utilized clinic serving a catchment population of 8,000 people, a clinic serving a higher catchment population could achieve even greater efficiency, since the staff are not fully utilized even at the level of 14.1 services per day.

Table 7. Staffing Figures for Clinics

Currency: US\$	Clinic			Clinic with Lab		
	Low Utilization	Medium Utilization	High Utilization	Low Utilization	Medium Utilization	High Utilization
<b>Staffing (professional staff only)</b>						
Total number of staff in scenario	5	5	6	6	6	7
Average services per employee per day	7.8	12.8	14.1	6.5	10.7	12.1
Average annual pay per employee	1,406	1,406	1,458	1,472	1,472	1,507

As outlined earlier, the BPHS is organized into six national programmes; the total cost of each is estimated by the model (Table 8)<sup>38</sup>. The highest cost programme is Child Health (CH), with \$11,365 (high target for a regular clinic), followed by Communicable Disease Control (CDC) and Maternal and Newborn Health (MNH). In addition to the national programmes, we have calculated the costs of providing malaria services, which fall under CDC.<sup>39</sup>

The Mental Health and Emergency Care programmes, both of which are represented only by a single service in the BPHS, have relatively low total costs. Both MNH and CH comprise mainly preventive services, such as antenatal visits and immunizations, which tend to be much higher volume services than curative. This high volume, factored in with high costs for certain drugs and supplies—such as Pentavalent vaccine at \$3.50 per dose and Insecticide-Treated Nets at \$7.00 per net—results in high costs for the programme overall. The high costs of the CDC programme are mainly due to the high cost of TB medications and anti-malarials, even with these services occurring at lower volume.

Table 8. Clinic Costs by national program

<sup>38</sup> Average costs per capita and per service are not shown here but can be easily calculated by dividing the total cost per programme by the catchment population of 8,000 and by the total number of services for each programme.

<sup>39</sup> Malaria services include: malaria treatment <5, malaria treatment >5, and malaria prevention: IPT



Currency: US\$	Clinic			Clinic with Lab		
	Low Utilization	Medium Utilization	High Utilization	Low Utilization	Medium Utilization	High Utilization
<b>Break-down by National Programme</b>						
Maternal and Newborn Health	4,414	5,700	8,095	4,646	5,955	8,369
Child Health	8,169	10,104	11,365	8,111	10,047	11,305
Reproductive and Adolescent Health	1,968	2,602	3,385	1,944	2,576	3,356
Communicable Disease Control	5,716	8,495	10,980	7,450	10,273	12,803
<i>Malaria (under CDC)</i>	3,305	4,353	5,336	4,593	5,646	6,637
Mental Health	232	237	243	227	232	238
Emergency Care	150	167	183	148	165	180
<b>National Programme Cost as % of Total</b>						
Maternal and Newborn Health	21%	21%	24%	21%	20%	23%
Child Health	40%	37%	33%	36%	34%	31%
Reproductive and Adolescent Health	10%	10%	10%	9%	9%	9%
Communicable Disease Control	28%	31%	32%	33%	35%	35%
<i>Malaria (under CDC)</i>	16%	16%	16%	20%	19%	18%
Mental Health	1.1%	0.9%	0.7%	1.0%	0.8%	0.7%
Emergency Care	0.7%	0.6%	0.5%	0.7%	0.6%	0.5%

## Health Centres

The total cost of providing primary and secondary care at health centres should vary, respectively, from \$36,620 to \$49,713 to \$59,083 at the low (2008), medium, and high target levels of utilization (Table 9). The cost per capita for the primary level of care should be \$2.87 for the 2008 level of utilization, \$3.84 for the medium level and \$4.50 for the high level<sup>40</sup>. These costs are similar to the per capita costs of a clinic with laboratory (Table 5). The per capita cost for secondary services should be \$0.43 for the low target level of utilization, \$0.59 for the medium level and \$0.72 for the high level. These costs are lower than the primary level costs per capita because secondary level services are supposed to be less utilized.

The cost per primary care service is highest for the low target level of utilization (\$3.13), and decreases at the medium and high levels (\$2.56 and \$2.27 respectively). The situation is similar at the secondary level, with the costs per service much higher (\$13.73 for the low target level of utilization, \$10.35 for the medium level and \$8.98 for the high level. At the clinics, this indicates inefficiencies in staffing at the lower levels of utilization.

Although the health centres provide more preventive than curative services, the total costs incurred by curative and preventive interventions are similar at the primary level (\$17,191 and \$17,104 for the high target levels). The high curative costs are mainly due to expensive TB and malaria drugs; high preventive costs are due to high coverage services such as immunizations, and distribution of high-priced Insecticide-Treated Nets (ITNs). At the primary level, health centres offer the same types of services as clinics with labs; however, certain services are performed at a higher level of quality, which costs more per service and results in higher total cost of services. For example, additional tests may be run during routine antenatal care visits at a health centre.

<sup>40</sup> We did not calculate a combined cost per capita for a health centre because it includes primary and secondary levels of care, which have different target populations.

In terms of cost per service, the average cost per primary-level curative service (\$5.23) at the high target utilization level would be almost four times the average cost per primary-level preventive service (\$1.40). Predictably, the average cost for delivery services is also high (\$5.54), due to the large amount of staff time required to perform a delivery. At the secondary level, the average cost of a curative service is similar to that of a preventive service. The changes in costs from primary to secondary care show lower total costs for each type of service, but significantly higher average costs per service. Again, due to the nature of secondary care, which would require more staff time and higher quality services, this result is expected. There is a large increase in average cost per preventive service from primary to secondary level of care. Preventive services at the secondary level consist of antenatal and postpartum care visits that are referrals for complicated pregnancies and deliveries. These services require significantly more resources, particularly staff time. Similarly, delivery services cost more per service at the secondary level due to increased staff time. The average cost per delivery service, for all three utilization targets, is basically doubled from the primary to secondary level of care.

Table 9. Health Centre Costs by type of Service

<b>Currency: US\$</b>	<b>Health Centre - Primary Level</b>			<b>Health Centre - Secondary Level</b>			<b>Health Centre - TOTAL (Primary &amp; Secondary)</b>		
	<b>Low Util</b>	<b>Medium Util</b>	<b>High Util</b>	<b>Low Util</b>	<b>Medium Util</b>	<b>High Util</b>	<b>Low Util</b>	<b>Medium Util</b>	<b>High Util</b>
<b>Costs: Total and Per Capita</b>									
<b>Total cost of all services</b>	22,989	30,693	35,984	13,631	19,020	23,100	36,620	49,713	59,083
<b>Cost per capita</b>	2.87	3.84	4.50	0.43	0.59	0.72			
<b>Cost per service</b>	3.13	2.56	2.27	13.73	10.35	8.98	4.40	3.60	3.21
Total cost of curative services	11,330	14,512	17,191	9,449	12,368	14,838	20,779	26,880	32,029
Average cost per curative service	8.93	6.18	5.23	15.22	10.75	9.22	11.00	7.68	6.54
Total cost of preventive services	10,558	14,607	17,104	3,253	5,358	6,907	13,811	19,965	24,011
Average cost per preventive service	1.78	1.55	1.40	10.17	9.05	8.33	2.20	2.00	1.84
Total cost of delivery services	1,101	1,573	1,689	929	1,294	1,355	2,030	2,868	3,044
Average cost per delivery service	9.37	7.23	5.54	17.98	13.52	10.11	12.00	9.15	6.94

The breakdown of health centre costs by salaries, drugs, and other fixed costs is similar at the primary and secondary levels of care (Table 10). In total, at the low target utilization level, health centres should spend \$13,944 (38%) on salaries, \$15,439 (42%) on drugs, and \$7,238 (20%) on other fixed costs. The increases in costs at the higher levels of utilization relate mostly to the cost of drugs, supplies and tests, since salary costs are similar at the medium and high levels due to the minimum staffing level required by the BPHS. Cost of drugs, medical supplies, and lab tests would increase from 42% of the total at the low utilization rate to 61% at the high rate, whereas staffing would drop from 38% of the total to 27%, respectively.

Table 10. Health Centre Costs by type of resource

Currency: US\$	Health Centre - Primary Level			Health Centre - Secondary Level			Health Centre - TOTAL (Primary & Secondary)		
	Low Util	Medium Util	High Util	Low Util	Medium Util	High Util	Low Util	Medium Util	High Util
<b>Break-down of Total Costs</b>									
Salaries	8,536	9,588	9,580	5,408	6,072	6,080	13,944	15,660	15,660
Salaries as % of total	37%	31%	27%	40%	32%	26%	38%	32%	27%
Drugs, supplies and lab tests	9,976	16,699	22,023	5,463	10,116	14,163	15,439	26,815	36,186
Drugs, medical supplies, and tests as % of total	43%	54%	61%	40%	53%	61%	42%	54%	61%
Other fixed costs	4,477	4,406	4,381	2,760	2,832	2,857	7,238	7,238	7,238
Other fixed costs as % of total	19%	14%	12%	20%	15%	12%	20%	15%	12%

There are currently 9 categories of patient-care staff at health centres; and with at least one staff required for each category, health centres need a minimum of 9 professional staff<sup>41</sup>. At the low level of utilization, these 9 staff provide 4.8 services per employee per day. This indicates a low level of efficiency and the model indicates that only one extra staff member would be needed to reach the high utilization target, which would come out to 9.8 services per staff per day. However, even then several staff members would be under-utilized. The social worker, for example, is only responsible for providing care for Mental Health services, which are low in volume; however, the health centre would still pay his or her full-time salary.

Table 11. Staffing Figures Health Centres

Currency: US\$	Health Centre - TOTAL (Primary & Secondary)		
	Low Util	Medium Util	High Util
<b>Staffing (professional staff only)</b>			
Total number of staff in scenario	9	10	10
Average services per employee per day	4.9	7.4	9.8
Average annual pay per employee	1,549	1,566	1,566

Table 12 shows the total health centre costs by national programme (at both primary and secondary levels of care). The Communicable Disease Control programme requires the greatest amount of resources at the health centres, mainly due to high costs of TB and malaria treatment, as well as the availability of VCT services. With malaria prevalence rates around 30%, malaria services are both high volume and high cost. The total costs for the Mental Health programme are higher at the health centre level than the clinics due to the additional staff available (social worker) to provide these services.

Table 12. Health Centre Costs by national programme

<sup>41</sup> The 9 categories include the OIC as a separate category and also a Nurse-Aide which is not included in the BPHS (See Table 1).

<b>Currency: US\$</b>	<b>Health Centre - TOTAL (Primary &amp; Secondary)</b>		
	<b>Low Util</b>	<b>Medium Util</b>	<b>High Util</b>
<b>Break-down by National Programme</b>			
Maternal and Newborn Health	8,541	13,128	15,835
Child Health	11,574	14,042	15,728
Reproductive and Adolescent Health	2,575	3,458	4,077
Communicable Disease Control	12,708	17,832	22,169
<i>Malaria (under CDC)</i>	7,291	9,498	11,326
Mental Health	984	991	994
Emergency Care	238	262	281
<b>National Programme Costs as % of Total</b>			
Maternal and Newborn Health	23%	26%	27%
Child Health	32%	28%	27%
Reproductive and Adolescent Health	7%	7%	7%
Communicable Disease Control	35%	36%	38%
<i>Malaria (under CDC)</i>	20%	19%	19%
Mental Health	2.7%	2.0%	1.7%
Emergency Care	0.7%	0.5%	0.5%

## **Funding Projections**

The total funding figures are the same as the total cost figures and the analysis of funding focuses on the breakdown by source. Liberia does not have a system of user fees at public clinics and health centres. There are also currently no health insurance schemes or other payment mechanisms in place. Modeling the funding and revenue for these facilities is therefore limited to the following: the payment of staff, operating costs, and other fixed costs by the government or donor; the provision of drugs from the NDS; and the provision of vaccines, family planning commodities, malaria drugs, and TB drugs from donors (Table 13). If, in the future, other sources of revenue are adopted, these can be input into the models. Funding for staff pay, operating costs, and other fixed costs is provided both by the Government of Liberia and the NGOs. Staff pay at health facilities may be funded by either the government or the NGOs, although the salary for each cadre of staff should remain the same.

The breakdown of funding is similar at both types of clinic types; the same base staff pay figures were used in all models, as well as the same operating and other fixed costs. Predictably, vaccines and TB drugs constitute the bulk of the donated drug costs. In addition, comparing the remaining cost of the drugs provided by NDS suggests that a significant portion of the revenue comes in the form of donated drugs.

Comparing the revenue between the regular clinics and the clinics with labs, the only significant difference lies in the staff payments, which is due to the extra staff available at the clinics with labs. Since all clinics are assumed to be treatment centres for TB, the cost of TB drugs are the same for both types of clinic.

The revenue modeling suggests that, at the low target utilization rate for a clinic, the Government of Liberia and/or NGOs would pay a total of \$10,749 for salaries, operating and other fixed costs. This figure would increase slightly under the high utilization scenario due to the addition of an extra staff person. The major increases in revenue will need to be for drugs—from \$9,898 for 2008 utilization to \$21,785 at high utilization. Achieving the higher utilization targets will place an even greater burden on donors and the Government of Liberia will need to determine how long these donations will continue and to find new sources of funding if the donations are reduced.

Table 13. Clinic funding by source

<i>Currency: US\$</i>	Clinic			Clinic with Lab		
	Low Utilization	Medium Utilization	High Utilization	Low Utilization	Medium Utilization	High Utilization
<b>Funding</b>						
GoL/NGO - Salaries	7,032	7,032	8,748	8,832	8,832	10,548
GoL/NGO - Operating Costs	2,817	2,817	2,817	2,817	2,817	2,817
GoL /NGO- Other fixed costs	900	900	900	900	900	900
National Drug Supply - drugs	2,855	5,091	7,029	2,932	5,233	7,229
Donations - Vaccines	3,878	5,604	6,550	3,878	5,604	6,550
Donations - FP Commodities	530	982	1,375	530	982	1,375
Donations - Malaria drugs + ITNs	624	1,155	1,617	624	1,155	1,617
Donations - TB drugs	2,011	3,724	5,214	2,011	3,724	5,214
<b>TOTAL Revenue</b>	<b>20,648</b>	<b>27,305</b>	<b>34,251</b>	<b>22,525</b>	<b>29,248</b>	<b>36,250</b>

The health centres require significantly more funding than the clinics, although the same sources of funding apply (Table 14). All figures shown are the total funding required for both primary and secondary levels of care. The same figures for staff pay were used for all models; based on the revenue modeling, the medium and high utilization scenarios would both require the same amount of resources in terms of salaries. Operating costs were based on actual costs for health centres, as obtained from financial information from the NGOs.

At the low target utilization rate, the Government of Liberia and NGOs should pay \$21,182 for salaries, operating and other fixed costs. Like the clinics, the majority of drug revenue would be funded through donations. Whereas the NDS should currently be providing \$8,395 in drugs and medical supplies, this figure would need to increase significantly (to \$21,429) at the high level of utilization.

Table 14. Health Centre funding by source – Primary and Secondary Levels

<i>Currency: US\$</i>	<b>Health Centre - TOTAL (Primary &amp; Secondary)</b>		
	<b>Low Util</b>	<b>Medium Util</b>	<b>High Util</b>
<b><i>Funding</i></b>			
GoL/NGO - Salaries	13,944	15,660	15,660
GoL/NGO - Operating Costs	5,378	5,378	5,378
GoL /NGO- Other fixed costs	1,860	1,860	1,860
National Drug Supply - Drugs	8,395	15,349	21,429
Donations - Vaccines	3,878	5,604	6,550
Donations - FP Commodities	530	982	1,375
Donations - Malaria drugs + ITNs	624	1,155	1,617
Donations - TB drugs	2,011	3,724	5,214
Total Revenue	36,620	49,713	59,083

## 4. Comparisons with actual utilization and costs

### ***Utilization Comparisons***

Three NGO-run facilities were used for comparison with the utilization targets and standard costs—one regular clinic, one clinic with lab, and one health centre. We selected the facilities from one NGO, which had the best data and chose ones which had median utilization rates for each type of facility. Actual utilization and cost data for 2008 were obtained for these three facilities. The data were entered into the appropriate CORE Plus model as best as possible; however, not all of the utilization data from the NGOs conformed exactly to the services listed in the BPHS (and, by extension, CORE Plus). Where no data were available for certain services, such as TB treatment, a “0” was input; however, if more information is provided, these figures can be updated to more accurately reflect actual service delivery. The models were compared for three different scenarios: actual utilization rates and actual cost data (Scenario A), actual utilization data and standard costs (Scenario B); and the high target utilization data and standard costs (Scenario D).

### **Clinics**

The actual utilization figures by type of service for the regular clinic and the clinic with a lab are displayed below (Table 15). Scenarios A and B both use the actual utilization for 2008 for these facilities, so the utilization figures in the first two columns are identical. Note that despite very different catchment populations, the actual utilization rates are similar (0.78 and 0.80 services per capita). The high target level of utilization of 1.98 services per capita (Scenario D) would represent a significant increase in the numbers of services. At the regular clinic, only 17 of the full package of 35 services were provided, with an average of 0.78 services per capita. Similarly, at the clinic with lab, only 19 of the 36 possible services were provided, at 0.80 services per capita. To meet the high utilization target for their respective catchment populations, the two clinics would need introduce more types of service and more than double the total number of services. Although the clinic and clinic with lab have very different sized catchment populations, their utilization per capita is comparable. Both preventive care services and deliveries would need to be increased greatly to meet the high targets (from 0.43 to 1.53 preventive services per capita and 0.01 to 0.04 deliveries per capita).

Table 15. Utilization figures by type of service for an actual Clinic and Clinic with Lab

<i>Currency: US\$</i>	Clinic			Clinic with Lab		
	Scenario A	Scenario B	Scenario D	Scenario A	Scenario B	Scenario D
<b>Basic Statistics</b>						
Catchment population	5,164	5,164	5,164	22,662	22,662	22,662
Total types of services in full package	35	35	35	36	36	36
<b>Services: Total and Per Capita</b>						
<b>Total types of services offered in scenario</b>	17	17	35	19	19	36
<b>Total services provided</b>	4,012	4,012	10,212	18,044	18,044	44,868
<b>Average number of services per capita</b>	0.78	0.78	1.98	0.80	0.80	1.98
Total curative services provided	1,716	1,716	2,111	4,928	4,928	9,318
Average number of curative services per capita	0.33	0.33	0.41	0.22	0.22	0.41
Total preventive services provided	2,232	2,232	7,904	12,764	12,764	34,687
Average number of preventive services per capita	0.43	0.43	1.53	0.56	0.56	1.53
Total delivery services provided	64	64	197	352	352	863
Average number of delivery services per capita	0.01	0.01	0.04	0.02	0.02	0.04

*Scenario A: Actual Utilization, Actual Costs*

*Scenario B: Actual Utilization, Standard Costs*

*Scenario D: Target Utilization, Standard Costs*

## Health centres

The actual utilization figures for 2008 for the selected health centre were input into CORE Plus. However, because the health centre did not specify whether services were provided at the primary or secondary level of care, we divided the figures based on the norms.<sup>42</sup> (Note that the first 3 columns of figures in Table 16 are for the primary level services and the second 3 columns of figures are for secondary level of services. The third 3 columns of figures show the combined total for primary and secondary levels of services, where applicable. Again the model was also run for Scenario D so that the actual figures could be compared with the high utilization target.

Unlike the clinics described above, this health centre provided a reasonably high level of primary-level services per capita (1.74), when compared with the number required for the high-level target (1.98). The total actual number of curative services provided was higher than those required for the high target level, whereas the numbers of preventive and other services was lower. However, only 21 of the 36 required services were provided at the primary level, and only 8 of the 17 services at the secondary level. In addition, looking at the actual service mix, a much higher proportion of the services are immunizations, compared with the other needed services.

The numbers of preventive and delivery services that were actually provided at the secondary level of care are much less than the services required under the high target utilization. The only preventive services at the secondary level are antenatal, postpartum, and newborn care. With low volume numbers for these services at the primary level, the referrals to secondary care will also be low.

Table 16. Utilization figures by type of service for the actual Health Centre

<sup>42</sup> In most cases, we assumed 10% of curative patients were referred to the secondary level of care.



Currency: US\$	Health Centre - Primary Level			Health Centre - Secondary Level			Health Centre - TOTAL (Primary & Secondary Levels)		
	Scenario	Scenario	Scenario	Scenario	Scenario	Scenario	Scenario	Scenario	Scenario
	A	B	D	A	B	D	A	B	D
<b>Basic Statistics</b>									
Catchment population	10,788	10,788	10,788	19,472	19,472	19,472			
Total types of services in full package	54	54	54	54	54	54			
<b>Services: Total and Per Capita</b>									
Total types of services offered in scenario	21	21	36	8	8	17	29	29	53
Total services provided	18,776	18,776	21,359	571	571	1,566	19,347	19,347	22,925
Average number of services per capita	1.74	1.74	1.98	0.03	0.03	0.08			
Total curative services provided	4,808	4,808	4,436	481	481	980	5,289	5,289	5,416
Average number of curative services per capita	0.45	0.45	0.41	0.02	0.02	0.05			
Total preventive services provided	13,812	13,812	16,512	82	82	504	13,894	13,894	17,017
Average number of preventive services per capita	1.28	1.28	1.53	0.004	0.004	0.026			
Total delivery services provided	156	156	411	8	8	82	164	164	493
Average number of delivery services per capita	0.01	0.01	0.04	0.0004	0.0004	0.0042			

Scenario A: Actual Utilization, Actual Costs

Scenario B: Actual Utilization, Standard Costs

Scenario D: Target Utilization, Standard Costs

## Cost Comparisons

### Clinics

A comparison of actual and standard clinic costs is shown below (Table 17). Both Scenarios A and B use the same utilization figures, but whereas Scenario A uses the actual costs incurred by the clinic in 2008, Scenario B shows what they should have spent (using the standard costs calculated by the model). Scenario D shows the costs for providing the numbers of services at the high utilization target levels. For the regular clinic, the actual costs were higher (\$14,967) than they should have been (\$12,434) to provide those services. This higher cost is mainly due to the higher amount that was paid for salaries, which is described in greater detail below. However, to reach the high-level targets they would have to spend \$21,299. The model suggests that clinics spent much more on delivery services—\$24.62 compared with the standard cost per service of \$5.07 at the target level. The clinic provided a much smaller number of delivery services in 2008 than the model suggests was needed, and a much higher indirect cost was allocated to each service. In addition, at the actual clinics the services include home deliveries attended by health staff, whereas the under the normative scenarios the facilities provide all delivery services.

The selected clinic with lab, on the other hand, underspent according to the model. The clinic with lab spent \$1.27 per capita in 2008 but should have spent \$1.63 per capita, and for the target utilization level would need to spend \$3.68. Note that the catchment population for the clinic with lab is quite high at 22,662—to reach the target level, the utilization would need to increase by about 2.5 times as much. This pattern is reflected at the curative, preventive, and delivery service levels – where actual spending was too low compared with the standard cost of delivering services for both the actual and high levels of utilization.

Table 17. Actual annual clinic costs by type of service

Currency: US\$	Clinic			Clinic with Lab		
	Scenario A	Scenario B	Scenario D	Scenario A	Scenario B	Scenario D
<b>Costs: Total and Per Capita</b>						
Total cost of all services	14,967	12,434	21,299	28,759	36,990	83,366
Cost per capita	2.90	2.41	4.12	1.27	1.63	3.68
Cost per service	3.73	3.10	2.09	1.59	2.05	1.86
Total cost of curative services	6,232	5,867	9,327	9,689	11,624	37,765
Average cost per curative service	3.63	3.42	4.42	1.97	2.36	4.05
Total cost of preventive services	7,159	5,023	10,973	18,114	23,863	42,367
Average cost per preventive service	3.21	2.25	1.39	1.42	1.87	1.22
Total cost of delivery services	1,576	1,544	998	956	1,503	3,234
Average cost per delivery service	24.62	24.12	5.07	2.72	4.27	3.75

Scenario A: Actual Utilization, Actual Costs

Scenario B: Actual Utilization, Standard Costs

Scenario D: Target Utilization, Standard Costs

The actual costs of the regular clinic and the clinic with lab are shown broken down by salary, drug, and other fixed costs (Table 18). While the other fixed costs remain the same across the three scenarios, the regular clinic spent more on salaries and less on drugs than were needed according to the standard costs<sup>43</sup>. In particular, the clinic spent \$1840 more on staff salaries than the model suggests was necessary. This suggests inefficiencies—a smaller number of staff could have provided the same number of services. The salaries included in these costs also do not include non-professional staff (such as the security/cleaner), so it is possible there are even more inefficiencies with regards to staff. At the clinic with lab, more spending was required both for salaries and drugs for the services provided in 2008. While the clinic with lab needed more staff salaries in 2008, the main difference is in the drugs provided—the model suggests almost \$7,000 more in drugs was needed to provide the same number of services.

Table 18. Actual annual clinic costs by type of resource

Currency: US\$	Clinic			Clinic with Lab		
	Scenario A	Scenario B	Scenario D	Scenario A	Scenario B	Scenario D
<b>Break-down of Total Costs</b>						
Salaries	8,076	6,236	6,236	8,616	9,216	20,088
Salaries as % of total	54%	50%	29%	30%	25%	24%
Drugs, supplies and lab tests	5,891	5,198	14,063	19,143	26,774	62,278
Drugs, medical supplies, and tests as % of total	39%	42%	66%	67%	72%	75%
Other fixed costs	1,000	1,000	1,000	1,000	1,000	1,000
Other fixed costs as % of total	7%	8%	5%	3%	3%	1%

Scenario A: Actual Utilization, Actual Costs

Scenario B: Actual Utilization, Standard Costs

Scenario D: Target Utilization, Standard Costs

Table 19 shows the total number of staff by scenario, the average number of services per employee per day, and the average pay per employee. The actual average figure of 3 services per provider per day indicates that the regular clinic had too many staff for the number of services provided in 2008. It even has more staff than are needed to provide the high target number of services. The clinic with lab was staffed appropriately for the services provided in 2008 but

<sup>43</sup> In the absence of more accurate data we assumed that the fixed costs are the same for a regular clinic and a clinic with lab and would also not change even if the number of services increases significantly. This can be modified as and when better data become available.

would need double the number of staff to provide the target level of utilization. The increase in staff would need to include some of the higher-paid cadres, which would result in a higher average annual pay per employee in Scenario D.

The regular clinic should provide an average of 11 services per employee per day, which is more than were provided, and the clinic with lab should provide 17 services per employee per day. Even at 11 services per day, the regular clinic would not be operating at full efficiency since some of the staff would not be fully occupied.

Table 19. Staffing Figures at Clinics

<i>Currency: US\$</i>	Clinic			Clinic with Lab		
	Scenario A	Scenario B	Scenario D	Scenario A	Scenario B	Scenario D
<b>Staffing (professional staff only)</b>						
Total number of staff in scenario	7	5	5	7	7	14
Average services per employee per day	3	4	11	14	14	17
Average annual pay per employee	1,154	1,247	1,247	1,231	1,317	1,435

*Scenario A: Actual Utilization, Actual Costs*

*Scenario B: Actual Utilization, Standard Costs*

*Scenario D: Target Utilization, Standard Costs*

Table 20 shows the breakdown of costs by national programme. At the regular clinic, Child Health cost the most, and Reproductive and Adolescent Health, Mental Health, and Emergency Care all incurred no costs due to the fact that no services were provided for these programmes. In the case of Mental Health and Emergency Care, there were no utilization figures available to input into the model; however, for Reproductive and Adolescent Health, the clinic did not provide any family planning services. The clinic with lab, on the other hand, did provide family planning services, so there is a figure under Reproductive and Adolescent Health, but zeros under the Mental Health and Emergency Care programmes for the reason described earlier. For both clinics and clinics with labs, all programmes would require more money to provide services at the target level of utilization.

Table 20. Actual annual clinic costs by national programme and staff

Currency: US\$	Clinic			Clinic with Lab		
	Scenario A	Scenario B	Scenario D	Scenario A	Scenario B	Scenario D
<b>Break-down by National Programme</b>						
Maternal and Newborn Health	2,346	2,266	4,596	6,026	8,586	16,812
Child Health	8,347	6,162	7,314	10,197	12,224	28,587
Reproductive and Adolescent Health	0	0	2,017	4,411	6,264	7,721
Communicable Disease Control	4,274	4,005	7,138	8,125	9,917	29,369
<i>Malaria - under CDC</i>	4,274	4,005	3,428	8,125	9,917	13,367
Mental Health	0	0	129	0	0	482
Emergency Care	0	0	104	0	0	395
<b>National Programme Costs as % of Total</b>						
Maternal and Newborn Health	16%	18%	22%	21%	23%	20%
Child Health	56%	50%	34%	35%	33%	34%
Reproductive and Adolescent Health	0%	0%	9%	15%	17%	9%
Communicable Disease Control	29%	32%	34%	28%	27%	35%
<i>Malaria - under CDC</i>	29%	32%	16%	28%	27%	16%
Mental Health	0%	0%	1%	0%	0%	1%
Emergency Care	0%	0%	0%	0%	0%	0%

Scenario A: Actual Utilization, Actual Costs

Scenario B: Actual Utilization, Standard Costs

Scenario D: Target Utilization, Standard Costs

## Health Centres

The costs for the actual health centre are shown below, broken down by type of service (Table 21). The health centre actually cost a total of \$45,023 in 2008 to provide care at both the primary and secondary level. The standard cost of providing the same number of services should have been \$44,390, and the cost of providing services at the target utilization level would be \$60,107. So the health centre spent roughly the right amount for the services that it provided in 2008 but it would need to increase spending to achieve the high service delivery target. At the primary level of care, the health centre spent slightly more per capita (\$3.77) than it should have done (\$3.72), but it would need to spend \$4.31 per capita to achieve the target level of utilization. At the secondary level, the actual and standard cost per capita of the 2008 services is the same (\$0.22), but it would need to increase to \$0.70 for the target utilization level.

Table 21. Actual annual health centre costs by type of service

Currency: US\$	Health Centre - Primary Level			Health Centre - Secondary Level			Health Centre - TOTAL (Primary & Secondary Levels)		
	Scenario A	Scenario B	Scenario D	Scenario A	Scenario B	Scenario D	Scenario A	Scenario B	Scenario D
	<b>Costs: Total and Per Capita</b>								
Total cost of all services	40,712	40,093	46,526	4,311	4,372	13,581	45,023	44,464	60,107
Cost per capita	3.77	3.72	4.31	0.22	0.22	0.70			
Cost per service	2.17	2.14	2.18	7.55	7.66	8.67	2.33	2.30	2.62
Total cost of curative services	15,918	16,549	21,604	3,731	3,970	8,584	19,649	20,520	30,188
Average cost per curative service	3.31	3.44	4.87	7.76	8.26	8.76	3.72	3.88	5.57
Total cost of preventive services	21,984	22,023	22,609	347	272	4,168	22,331	22,295	26,777
Average cost per preventive service	1.59	1.59	1.37	4.22	3.31	8.26	1.61	1.60	1.57
Total cost of delivery services	2,810	1,520	2,314	233	129	828	3,043	1,650	3,142
Average cost per delivery service	18.01	9.75	5.63	29.13	16.16	10.16	18.56	10.06	6.38

Scenario A: Actual Utilization, Actual Costs

Scenario B: Actual Utilization, Standard Costs

Scenario D: Target Utilization, Standard Costs

The breakdown of the actual health centre costs by salary, drugs, and other fixed costs is shown

in Table 22. In total, the health centre spent \$15,570 on salaries, compared with the \$11,148 that was needed to provide that number of services. The health centre should, however, have spent more on drugs, (it spent a total of \$21,375 but should have spent \$25,239. To provide services at the target level of utilization, the health centre would need to increase total spending on drugs to \$38,265 but decrease spending on salaries to \$13,764.

Table 22. Actual annual health centre costs by type of resource

Currency: US\$	Health Centre - Primary Level			Health Centre - Secondary Level			Health Centre - TOTAL (Primary & Secondary Levels)		
	Scenario A	Scenario B	Scenario D	Scenario A	Scenario B	Scenario D	Scenario A	Scenario B	Scenario D
	<b>Break-down of Total Costs</b>								
Salaries	13,873	9,703	10,604	1,697	1,445	3,160	15,570	11,148	13,764
Salaries as % of total	34%	24%	23%	39%	33%	23%	35%	25%	23%
Drugs, supplies and lab tests	19,647	23,198	29,647	1,728	2,041	8,618	21,375	25,239	38,265
Drugs, medical supplies, and tests as % of total	48%	58%	64%	40%	47%	63%	47%	57%	64%
Other fixed costs	7,192	7,192	6,275	886	886	1,802	8,078	8,078	8,078
Other fixed costs as % of total	18%	18%	13%	21%	20%	13%	18%	18%	13%

Scenario A: Actual Utilization, Actual Costs

Scenario B: Actual Utilization, Standard Costs

Scenario D: Target Utilization, Standard Costs

The health centre had 12 professional staff, each of whom provides an average of 9 services per day (Table 23). To provide the same level of services, the model calculates that 8 staff would have been sufficient at a rate of 13 services per day; and, at the target utilization level, 10 staff would be required at a rate of 12 services per day. This emphasizes that the health centre had too many staff for the numbers of services that it provided in 2008.

Table 23. Staffing Figures for Health Centres

Currency: US\$	Health Centre - TOTAL (Primary & Secondary Levels)		
	Scenario A	Scenario B	Scenario D
	<b>Staffing (professional staff only)</b>		
Total number of staff in scenario	12	8	10
Average services per employee per day	9	13	12
Average annual pay per employee	1,298	1,394	1,376

Scenario A: Actual Utilization, Actual Costs

Scenario B: Actual Utilization, Standard Costs

Scenario D: Target Utilization, Standard Costs

Table 24 shows the breakdown of costs by national programme. As with the clinics described earlier, there were no utilization figures for Mental Health and Emergency Care services; as a result, in the first two scenarios, the figures for those programmes are shown as zero. There were also no figures for TB diagnosis and treatment at these facilities, so the total cost of CDC does not currently reflect TB in Scenarios A and B. Under Scenario D, however, all of these programmes are represented since the utilization is based on norms; and CDC is the highest cost programme, mainly due to the addition of TB services. The highest spending at the 2008 utilization occurs is on the Child Health programme, mainly due to the high volume of immunizations, some of which are relatively high cost as well.

Table 24. Actual annual health centre costs by national programme and staff

<b>Currency: US\$</b>	<b>Health Centre - TOTAL (Primary &amp; Secondary)</b>		
	<b>Scenario</b>	<b>Scenario</b>	<b>Scenario</b>
	<b>A</b>	<b>B</b>	<b>D</b>
<b>Break-down by National Programme</b>			
Maternal and Newborn Health	5,920	3,693	15,154
Child Health	22,159	23,711	17,476
Reproductive and Adolescent Health	2,667	1,957	4,838
Communicable Disease Control	14,276	15,103	21,327
<i>Malaria - under CDC</i>	<i>14,276</i>	<i>15,103</i>	<i>10,550</i>
Mental Health	0	0	1,011
Emergency Care	0	0	300
<b>National Programme Costs as % of Total</b>			
Maternal and Newborn Health	13%	8%	25%
Child Health	49%	53%	29%
Reproductive and Adolescent Health	6%	4%	8%
Communicable Disease Control	32%	34%	35%
<i>Malaria - under CDC</i>	<i>32%</i>	<i>34%</i>	<i>18%</i>
Mental Health	0%	0%	2%
Emergency Care	0%	0%	0%

*Scenario A: Actual Utilization, Actual Costs*

*Scenario B: Actual Utilization, Standard Costs*

*Scenario D: Target Utilization, Standard Costs*

## Funding Comparisons

### Clinics

The sources of funding for the clinics are shown in Table 25. The actual staff payments made by the NGOs were \$8,076 for the clinic and \$8,616 for the clinic with lab.

The regular clinic would require less MOSHW and NGO funding for staff and less NDS and donor funding for drugs to provide the 2008 level of utilization, whereas the clinic with lab would require more of these types of funding for both staff and drugs. The clinic received greater funding in the form of drugs than the model suggests was necessary—\$2,146 in drugs where it needed \$1,453. On the other hand, the clinic with lab received less drugs from the NDS—\$2,340 where it needed \$9,971.<sup>44</sup> Also, the revenue modeling suggests a heavy reliance on donated drugs, a fact that should be assessed if the ultimate goal is for the clinics to be sustainable.

<sup>44</sup> The funding received from the NDS reflects the amount of drugs *supplied*, not used. While the clinic in this sample could have received more drugs from the NDS than needed, it did not necessarily use them all. The clinic may have received fewer drugs in the next shipment cycle. However, CORE Plus calculates drug revenue based on the total amount of drugs *used* to provide the services.

Table 25. Clinic funding by source

Currency: US\$	Clinic			Clinic with Lab		
	Scenario A	Scenario B	Scenario D	Scenario A	Scenario B	Scenario D
<b>Funding</b>						
GoL/NGO - Salaries	8,076	6,236	6,236	8,616	9,216	20,088
GoL/NGO - Operating Costs	100	100	100	100	100	100
GoL /NGO- Other fixed costs	900	900	900	900	900	900
National Drug Supply - Drugs	2,146	1,453	4,538	2,340	9,971	20,478
Donations - FP Commodities	0	0	888	4,748	4,748	3,895
Donations - Malaria drugs + ITNs	858	858	1,044	3,348	3,348	4,582
Donations - TB drugs	0	0	3,366	0	0	14,770
TOTAL Revenue	14,967	12,434	21,299	28,759	36,990	83,366

*Scenario A: Actual Utilization, Actual Costs*

*Scenario B: Actual Utilization, Standard Costs*

*Scenario D: Target Utilization, Standard Costs*

## Health Centres

The total funding required at a health centre for the low and high utilization level is shown in Table 26 below. As discussed earlier, this health centre was overstaffed in 2008 and received fewer drugs from NDS than required. Whereas the total revenue required at the low level is \$45,833, the standard modeling indicates that a little less was required to provide the same number of services (\$44,464). To provide services at the target utilization level, the health centre would need \$60,107 in funding. This breaks down into \$21,842 needed from the Government of Liberia/NGOs for salaries, operating, and other fixed costs; \$18,366 from the NDS for drugs; and \$11,066 from donors for all other drugs.

It is interesting to note that the amount spent on funding for vaccines in 2008 was much higher (\$14,469) than the amount needed under Scenario D (\$8,832), which assumes 90% coverage of immunizations. The utilization figures for all immunization services are significantly higher at this health centre, exceeding the number of immunizations required to achieve 100% coverage. It is possible that this health centre's immunization figures include national campaigns, or that the health centre serves a larger population than its immediate catchment area. Also, we had to multiply the monthly average utilization figures by 12 to get the utilization for a year – this may have caused some services to be misrepresented if they vary from month to month.

Also, without figures for the TB treatment at the health centre, there is a large discrepancy between the actual and needed drug donations. While the amount of funding for salaries decreases from \$16,380 in Scenario A to \$13,764 in Scenario D, the amount of drugs provided by NDS would need to increase drastically from \$3,210 to \$18,366 to provide the 70%/90% coverage rate described under the high utilization target. NDS will need to determine whether such increases are possible; and if not, alternate sources of funding would be needed.

Table 26. Health centre funding by source

<b>Currency: US\$</b>	<b>Health Centre - TOTAL</b>		
	<b>(Primary &amp; Secondary Levels)</b>		
	<b>Scenario</b>	<b>Scenario</b>	<b>Scenario</b>
	<b>A</b>	<b>B</b>	<b>D</b>
<b>Funding</b>			
GoL/NGO - Salaries	16,380	11,148	13,764
GoL/NGO - Operating Costs	5,378	5,378	5,378
GoL /NGO- Other fixed costs	2,700	2,700	2,700
National Drug Supply - Drugs	3,201	7,064	18,366
Donations - Vaccines	14,469	14,469	8,832
Donations - FP Commodities	833	833	1,854
Donations - Malaria drugs + ITNs	2,872	2,872	2,181
Donations - TB drugs	0	0	7,031
<b>TOTAL Revenue</b>	<b>45,833</b>	<b>44,464</b>	<b>60,107</b>

*Scenario A: Actual Utilization, Actual Costs*

*Scenario B: Actual Utilization, Standard Costs*

*Scenario D: Target Utilization, Standard Costs*



## 5. Conclusions and recommendations

### Summary:

Based on the low target of 0.92 services per capita, the medium target of 1.50 services per capita and the high target of 1.98 services per capita, the following numbers of services and costs are estimated:

- The breakdown of curative, preventive, and delivery services would be as follows:
  - Low target: 0.16 curative, 0.74 preventive, and 0.01 delivery services per capita
  - Medium: 0.29 curative, 1.18 preventive, and 0.03 delivery services per capita
  - High: 0.41 curative, 1.53 preventive, and 0.04 delivery services per capita
- The breakdown of costs per capita would be as follows:
  - Low target: \$2.58 for clinics, \$2.82 for clinics with lab, and \$2.87 for primary level health centre
  - Medium: \$3.41 for clinics, \$3.66 for clinics with lab, and \$3.84 for primary level health centre
  - High: \$4.28 for clinics, \$4.53 for clinics with lab, and \$4.50 for primary level health centre
- Child Health (CH) and Communicable Diseases (CDC) are two consistently high-cost programmes

These figures are based on the norms and standards set during the course of the study and all of these should be reviewed by the MOHSW. In addition, the financial and service delivery data collection systems should be reviewed and improved where necessary. With national roll-out of HMIS, there should be better utilization data available. The costing, using CORE Plus, can be updated as better information is made available; but prices, norms, and standards also need to be reviewed periodically and updated accordingly

### Conclusions and recommendations:

The low utilization targets for regular clinics, clinics with labs, and primary care at health centres were 0.92 services per capita. To achieve the medium target, which was set at 77% coverage of immunizations and 50% coverage of all other services, the number of primary care services would need to increase to 1.50 services per capita. And to achieve the high targets of 90% coverage of immunizations and 70% all other services, facilities would need to provide 1.98 primary care services per capita.

Of the 1.50 services per capita needed for the medium level target, 0.29 would be curative services, 1.18 preventive, and 0.03 delivery. For the high level target, the 1.98 services per capita would need to be broken down between 0.41 curative services per capita, 1.53 preventive, and 0.04 delivery. In both cases, about 20% of the services would be curative, 78% would be preventive, and 2% would be delivery services. These projections represent significant increases from the low target of 27% coverage. To reach the medium target would require 1.6 times the low level of utilization; the high target would require 2.2 times the low target level of utilization.

Using the standard costs, the total cost per capita for a clinic would be \$3.41 at the medium target and \$4.28 at the high target; for a clinic with lab, the costs per capita would be \$3.66 and \$4.53, respectively. We split the costs per capita at the health centre between primary and secondary levels of care, because these two levels serve different sized catchment populations. The costs per capita at the primary level of a health centre would be \$3.84 and \$4.50 to meet the medium and high targets, respectively. The costs per capita at the secondary level of a health centre would be \$0.59 and \$0.72 for the medium and high targets.

To meet the medium and high targets, the average cost per service at a clinic would be \$2.28 and \$2.16; at a clinic with lab, \$2.44 and \$2.29. Health centres would need to spend an average of \$3.60 and \$3.21 per service to meet the medium and high targets, respectively. For all facilities, the total costs would be broken down roughly as follows: 26-32% for salaries, 57-61% for drugs, and 10-14% on other fixed costs. To meet the high utilization target, clinics would need a total of 6 professional staff, clinics with labs would need 7 staff, and health centres 10 staff.

At the clinics, the two most costly programmes under both the medium and high targets would be Child Health (CH) and Communicable Disease Control (CDC). Under the high target of utilization, CH services would cost \$11,365 at clinics, and CDC services would cost \$10,980. The CDC services would increase to \$12,803 at clinics with labs due to the additional TB diagnostic services that would be available. At health centres, the CDC programme would still cost the most under the high target, at \$22,169, but the Maternal and Newborn Health (MNH) programme would be the second most costly at \$15,835, closely followed by CH at \$15,728.

The analysis indicates that staffing is an important issue. Having a minimum of one of each of the different categories of staff required by the BPHS means that there is considerable inefficiency if the facilities are not seeing high numbers of patients. For example, according to the model a clinic serving a catchment population of 8,000 people at the low utilization target level requires about 2.5 patient-care staff. However according to the BPHS a minimum of 5 patient-care staff are required. Unless the numbers of patients can be increased rapidly at under-utilized facilities, consideration should be given to sharing tasks and assigning staff in accordance with workload.

Currently, funding for clinics is broken down into three sources: the Government of Liberia and NGOs, which fund staff payments and operating costs; the National Drug Supply, which provides drugs; and various donors, which provide certain drugs and commodities (vaccines, family planning commodities, malaria drugs and ITNs, and TB drugs). The donated drugs make up a high proportion of the total funding required for the facilities, so it is important that the donors increase funding in the short and medium-terms and that the MOHSW ensures that donations continue or finds alternate sources of funding. For example, for a regular clinic to provide services at the high level of utilization would require a total of \$34,251: \$12,465 for salaries, operating and other fixed costs; \$7,029 in drugs from NDS; and \$14,756 in donated drugs. This amounts to 43% of the total funding coming in as donated drugs, which is a very significant proportion and should be assessed to ensure sustainability.

As we have shown, CORE Plus can be used to estimate the cost of implementing the BPHS for different population levels and at different levels of utilization. The model can also estimate the

amounts of funding required at the facilities, and can be updated to include different sources of revenue, such as user fees, if they are implemented. As a result, the model can be used to develop business plans and budgets for the clinics and health centres. If the MOHSW would like to input different national targets, the models can easily be updated to reflect the new costs that would be required to meet them. It should also be noted that a review by the MOHSW of the norms and standards used in the model would be worthwhile before the models or specific figures produced by them are used for resource allocation, budgeting or business planning.

As the BPHS is implemented and expanded, CORE Plus can be updated to include more services which are not currently available, such as treatment for hypertension and other chronic diseases. In addition, it is our recommendation that the BPHS and HMIS be more closely aligned so that the HMIS can be used to closely monitor the progress facilities are making in providing the full range of services listed in the BPHS (See Annex 3 for HMIS Recommendations). The HMIS would need to be rolled out on a national scale, so that all facilities were using the same forms and reporting their data in a similar, accurate manner.

Based on our experiences gathering information to develop and test the models, it appears that financial information is not always available at the clinic or health centre level and is not often used for allocating and monitoring the use of resources. Also, the collection of utilization data does not always appear to be consistent and accurate. Meeting the goals for improved health outcomes in Liberia will require significant strengthening in financial management and data collection systems.

## ANNEX 1. Basic Package of Health Services (Summary)

Table 2. An Abridged Summary of Key Elements of the BPHS

INTERVENTIONS and SERVICES	Community	Clinic	Health Center	County Hospital	Referral Hospital
<b>I. MATERNAL &amp; NEWBORN CARE</b>					
<b>1.1.1. ANTENATAL CARE</b>					
Diagnosis of high-risk pregnancy	Yes	Yes	Yes	Yes	Yes
IPT with SP, Iron Supplementation, ITNs	Yes	Yes	Yes	Yes	Yes
Treatment of malaria, Tetanus toxoid immunization	-	Yes	Yes	Yes	Yes
<b>1.1.2. LABOUR and DELIVERY CARE</b>					
Identify fetal malpositions	Refer	Refer	Yes	Yes	Yes
Normal vaginal delivery	Yes	Yes	Yes	Yes	Yes
Emergency Obstetric Care	Refer	Refer	Yes/Refer	Yes	Yes
PMTCT Package	Yes	Yes	Yes	Yes	Yes
<b>1.1.3. POST PARTUM CARE</b>					
Prevention and detection of puerperal infection	Yes	Yes	Yes	Yes	Yes
Detection and treatment of anemia	Yes	Yes	Yes	Yes	Yes
Counseling on birth spacing and FP service	Yes	Yes	Yes	Yes	Yes
<b>1.1.4. CARE OF THE NEWBORN</b>					
Emergency neonatal care	Refer	Yes	Yes	Yes	Yes
Manage neonatal infections and sepsis	Yes & Refer	Yes & Refer	Yes	Yes	Yes
HIV care/ Replacement feeding, Immunizations	-	Yes	Yes	Yes	Yes
<b>2.0. CHILD HEALTH</b>					
Vaccine security/cold chain	-	Yes	Yes	Yes	Yes
EPI, BF, GM, Vit. A, Deworming, ITNs, ORT	Yes	Yes	Yes	Yes	Yes
Management of pneumonia, fever and malaria	Yes	Yes	Yes	Yes	Yes
Identify & manage dehydration/ severe diarrhea	Yes & Refer	Yes & Refer	Yes	Yes	Yes
<b>3.0 ADOLESCENT, SEXUAL, and REPRODUCTIVE HEALTH</b>					
<b>3.1 FAMILY PLANNING</b>					
Distribute oral Contraceptives and condoms	Yes	Yes	Yes	Yes	Yes
DMPA injection	-	Yes	Yes	Yes	Yes
Intrauterine devices	-	-	Yes	Yes	Yes
<b>3.2 ADOLESCENT HEALTH</b>					
Substance abuse prevention, Family life education	Yes	Yes	Yes	Yes	Yes
Oral contraceptives and Condom distribution	Yes	Yes	Yes	Yes	Yes
<b>4.0 DISEASE PREVENTION, CONTROL &amp; MANAGEMENT</b>					
<b>4.1 HIV/AIDS</b>					
ABC Promotion and Condom distribution	Yes	Yes	Yes	Yes	Yes
Home-based Care	Yes	-	-	-	-
Treatment of opportunistic infections	-	-	Yes	Yes	Yes
VCT, PMTCT	-	Yes	Yes	Yes	Yes
Blood Screening and Antiretroviral therapy	-	-	-	Yes	Yes
<b>4.2 Control of Malaria</b>					
Clinical diagnosis	Refer	Yes	Yes	Yes	Yes
RDT/Microscopy, Treating uncomplicated cases	-	Yes	Yes	Yes	Yes
Distribution of ITNs and IPT	Yes	Yes	Yes	Yes	Yes
<b>4.2 Control of Tuberculosis</b>					
Case detection - sputum smear	Refer	-	Yes	Yes	Yes
DOTS and Active case-finding in community/OPD	Yes	Yes	Yes	Yes	Yes
BCG vaccination	-	Yes	Yes	Yes	Yes
<b>5.0 Essential Emergency Treatment</b>					
Shock, Injuries, Poisoning	Yes & Refer	Yes & Refer	Yes & Refer	Yes	Yes

## **ANNEX 2. BPHS Programmes**

### **Maternal and Newborn Health**

- Antenatal care
- Labor and delivery care
- Emergency obstetric care
- Postpartum care
- Newborn care

### **Child Health**

- Expanded Programme on Immunization
- Integrated management of childhood illnesses
- Infant and young child feeding

### **Reproductive and Adolescent Health**

- Family planning
- Sexually transmitted infections
- Adolescent Health

### **Communicable Disease Control**

- Control of STI/HIV/AIDS
- Control of tuberculosis
- Control of malaria
- Control and management of other diseases with epidemic potential

### **Mental Health**

### **Emergency care**

## ANNEX 3. HMIS Recommendations

General recommendations:

It would be useful for the HMIS form to be updated and organized so that it is in alignment with the BPHS. The data entry points in the HMIS could be grouped in a similar way as the interventions and services in the BPHS. In addition, there are certain services listed in the BPHS which do not appear in the HMIS (for example, the entire sections under Mental Health and Emergency Care are not listed in the form). Other services, particularly Sexual Gender Based Violence, appear much more often in the HMIS form than in the BPHS.

Another important addition to the HMIS is a category for "Other" services—any service provided at a clinic or health centre that is not listed in the HMIS. This category, which is generally used for minor ailments, can represent a large proportion of services delivered at clinics and health centres. In addition, there should be a space available to write in what type of service has been delivered under “Other”.

Throughout the HMIS form, it is important that the number of consultations across the different categories should add up to the total figures. For example, where there are different categories of a service (such as bloody or watery diarrhea, and diarrhea <5 and >5), these two different categorizations should both add up to the same total number. The total PHC headcount should also be equal to the sum of all the services listed in the HMIS form.

The current HMIS has one data entry line for referrals – “Maternal health referral to next level of care”. Referrals should be documented at each level of service where referrals are made to a higher level, in addition to a total number of referrals. Health centres should furthermore distinguish if cases have come in as referrals from clinics or lower levels of care.

The following table lists some specific suggested additions or changes to the HMIS form.

<b>Suggested additions/changes</b>	<b>Comments</b>
Total PHC headcount	Include an overall total headcount for the facility; should be equal to the sum of PHC headcount <5 and PHC headcount >5
Total new cases	Include an overall total number of new cases; should be less than or equal to total PHC headcount
Other PHC services (specify)	Include a section for other PHC services that are not listed in HMIS; should have room to specify the service
Total Other PHC services	Total number of services provided that are not listed elsewhere in HMIS
Total Child Nutrition	Total number of children seen at facility for child nutrition; then include breakdown categories which should add up to total
Total Diarrhea <5	Total number of children with diarrhea
Total Bloody Diarrhea	Subheading under total diarrhea; sum of bloody and watery should

<5	add up to total diarrhea
With dehydration	Subheading under Total Bloody Diarrhea
Without dehydration	Subheading under Total Bloody Diarrhea
Total Watery Diarrhea <5	Subheading under total diarrhea; sum of bloody and watery should add up to total diarrhea
With dehydration	Subheading under Total Watery Diarrhea
Without dehydration	Subheading under Total Watery Diarrhea
Total Diarrhea >5	Total number of adults with diarrhea; should include same sub-headings as Total Diarrhea <5
Total ARI <5	Total number of children with an Acute Respiratory Infection; then include subheadings i.e. Upper and Lower ARI
Total ARI >5	Total number of adults with an Acute Respiratory Infection; then include subheadings i.e. Upper and Lower ARI
Total number of clients given male condoms	Total number of clients (not number of condoms distributed) given male condoms at facility
Total number of clients given female condoms	Total number of clients (not number of condoms distributed) given female condom at facility
Total antenatal visits	Total number of women who come to facility for antenatal visit
Total STI treated	Total number of treatments for STI at facility (should be equal to the sum of the categories below)
Total STI treated - males	Total number of males treated for STIs; then include different categories of STIs/symptoms
Total STI treated - females	Total number of females treated for STIs; then include different categories of STIs/symptoms
Total STI partner treated - male	Total number of partners treated for STI; should not be double-counted in category above
Total STI partner treated - female	Total number of partners treated for STI; should not be double-counted in category above
Total clients tested for HIV	Total number of patients tested for HIV; includes STI, TB, antenatal patients
Total clients tested for TB	Total number of patients tested for TB; includes HIV, etc.
Total treatment for TB	Total number of patients receiving treatment for TB
Total referrals	Total number of referrals made to either health center or hospital; should equal the sum of next two categories below
Total referrals from facility to health center	Total number of referrals that are made to a health center
Total referrals from facility to hospital	Total number of referrals that are made to a hospital
Total referrals <5	Total number of referrals for children <5
Total referrals >5	Total number of referrals for >5
Total referrals for each service	Individual services should have a line for total referrals for that service

## ANNEX 4. Assumptions for Norms

Service	Relevant Population	Prevalence or incidence norm	Percentage of cases that are referrals	Normative number of visits per case	Source	Notes
<b>PRIMARY LEVEL</b>						
Antenatal Care	Total pop * birth rate * 1.	90.0%	-	4.00	-	Universal coverage (10% referred)
Labor and Delivery Care	Total pop * birth rate * 1.	90.0%	-	1.00	-	Universal coverage, assume all births at facility (10% referred)
Postpartum Care	Total pop * birth rate	90.0%	-	2.00	-	Universal coverage (10% referred)
Postpartum Vitamin A	Total pop * birth rate	100.0%	-	1.00	-	100% is universal coverage norm
Newborn Care	Total pop * birth rate	90.0%	-	1.00	-	Universal coverage (10% referred)
Family Planning: OCs	F 15-49	15.4%	-	1.00	DHS 2007	Percentage of women who have used a contraceptive pill
Family Planning: DMPA	F 15-49	8.9%	-	1.00	DHS 2007	Percentage of women who have had DMI injection
Family Planning: IUCD	F 15-49	0.9%	-	2.00	DHS 2007	Percentage of women who have had IUCD
Family Planning: Condoms	F 15-49 + M > 15	19.7%	-	1.00	DHS 2007	Percentage of males and females who reported condom use with last partner
Treatment STIs - Male	M > 15	10.8%	-	1.00	DHS 2007	Percentage of males reporting STI symptoms
Treatment STIs - Female	F > 15	20.3%	-	1.00	DHS 2007	Percentage of females reporting STI symptoms
Immunization: BCG <1 year	Total pop * birth rate	100.0%	-	1.00	-	100% is universal coverage norm
Immunization: Pentavalent 1,2,3	Total pop * birth rate	100.0%	-	3.00	-	100% is universal coverage norm
Immunization: OPV 1,2,3	Total pop * birth rate	100.0%	-	3.00	-	100% is universal coverage norm
Immunization: Measles <1 year	Total pop * birth rate	100.0%	-	1.00	-	100% is universal coverage norm
Immunization: Yellow fever	Total pop * birth rate	100.0%	-	1.00	-	100% is universal coverage norm
Immunization: TT pregnant women	Total pop * birth rate * 1.	100.0%	-	2.00	-	100% is universal coverage norm
Immunization: TT non-pregnant women	F 15-49 * 22%	100.0%	-	2.00	-	100% is universal coverage norm
Watery diarrhoea <5 years	<5	14.9%	-	1.00	DHS 2007	Percentage of children who had non-bloody diarrhoea in the two weeks preceding the survey
Bloody diarrhoea <5 years	<5	4.9%	-	1.00	DHS 2007	Percentage of children who had bloody diarrhoea in the two weeks preceding the survey
Pneumonia <5 years	<5	62.2%	-	1.00	DHS 2007	ARI care-seeking for children under 5
Child Vitamin A	<5	100.0%	-	2.00	-	100% is universal coverage norm
Child Deworming	<5	100.0%	-	1.00	-	100% is universal coverage norm
Child iron supplementation	<5	100.0%	-	1.00	-	100% is universal coverage norm
VCT	MF > 15	0.0%	-	1.00	-	VCT not currently offered at clinics
TB Diagnosis	Total pop	0.3%	-	1.00	WHO	Liberia country profile; Incidence of TB, 2006
TB Treatment	Total pop	0.6%	-	1.00	WHO	Liberia country profile; Prevalence of TB, 2006
Malaria Treatment <5 years	<5	30.7%	-	1.00	DHS 2007	Percentage of children with symptoms of malaria in the two weeks preceding the survey
Malaria Treatment >5 years	>5	33.7%	-	1.00	WHO	WHO World Malaria Report 2008 [(report malaria cases/total population)*percentage of total population >5]
Malaria Prevention: IPT	Total pop * birth rate * 1.	100.0%	-	2.00	-	100% is universal coverage norm
Cholera	Total pop	0.0%	-	1.00	-	
Epidemic Diseases - Refer to Hospital	Total pop	0.0%	-	1.00	-	
Mental Health	>5	0.5%	-	1.00	JAMA (1)	Estimated prevalence of major depression in post-conflict countries
Sexual Gender Based Violence	>5	0.5%	-	1.00	JAMA (1)	
Emergency First Aid	Total pop	1.8%	-	1.00	Cambodia (2)2007	Based on actual utilization of Cambodian facilities for accidents and emergency care
Delivery at home with skilled staff	Total pop * birth rate * 1.	0.0%	-	1.00	-	Delivery at home with skilled staff not part of BPHS
Abortion Complications	Total pop * birth rate * 1.	2.5%	-	1.00	Cambodia (2)	% of women of reproductive age requiring Comprehensive Abortion Care



Service	Relevant Population	Percentage of Normal			Source	Notes
		Prevalence of cases or incident that are referrals	Prevalence of cases or incident that are referrals	Prevalence of cases or incident that are referrals		
<b>SECONDARY LEVEL</b>						
Antenatal Care HC	Total pop * birth rate	100%	10%	4.00	-	100% is universal coverage norm
Labor and Delivery Care HC	Total pop * birth rate	100%	10%	1.00	-	Assume all deliveries should be at a facility
Postpartum HC	Total pop * birth rate	100%	10%	2.00	-	100% is universal coverage norm
Newborn Care HC	Total pop * birth rate	100%	10%	1.00	-	100% is universal coverage norm
Treatment STIs - Male HC	M > 15	11%	10%	1.00	DHS 2007	Percentage of males reporting STI symptoms
Treatment STIs - Female HC	F > 15	20%	10%	1.00	DHS 2007	Percentage of females reporting STI symptoms
Severe Watery diarrhoea <5 years	< 5	15%	10%	1.00	DHS 2007	Percentage of children who had non diarrhoea in the two weeks preceding survey
Severe Bloody diarrhoea <5 years	< 5	5%	10%	1.00	DHS 2007	Percentage of children who had bloody diarrhoea in the two weeks preceding survey
Severe Pneumonia <5 years	< 5	62%	10%	1.00	DHS 2007	ARI care-seeking for children under 5
VCT HC	MF > 5	1.7%	100%	1.00	UNAIDS 2008	Adult HIV prevalence in Liberia
Severe Malaria Treatment <5 years	< 5	31%	10%	1.00	DHS 2007	Percentage of children with symptom malaria in the two weeks preceding survey
Severe Malaria Treatment >5 years	> 5	34%	10%	1.00	WHO	WHO World Malaria Report 2008 [(r malaria cases/total population)*perc of total population >5]
Epidemic Diseases - Treatment	Total pop	0%	100%	1.00		Estimated prevalence of major depressive disorders in post-conflict countries
Mental Health HC	MF > 5	1%	10%	1.00	JAMA (1)	
Sexual Gender Based Violence HC	MF > 5	1%	10%	1.00	JAMA (1)	
Emergency First Aid HC	Total pop	2%	10%	1.00	Cambodia (2007)	Based on actual utilization of Cambodia facilities for accidents and emergencies
Abortion Complications HC	F 15-49	3%	10%	1.00	Cambodia (2007)	% of women of reproductive age requiring Comprehensive Abortion Care

Notes:

1. Association of Combatant Status and Sexual Violence With Health and Mental Health Outcomes in Post-conflict Liberia. Kirsten Johnson; Jana Asher; Stephanie Rosborough; et al. JAMA. 2008;300(6):676-690

2. Collins, David, Zina Jarrah, and Prateek Gupta. 2009. Cost and Funding Projections for the Minimum Package of Activities for Health Centres: Ministry Of Health, Royal Government of Cambodia. Arlington, Va., USA: Basic Support for Institutionalizing Child Survival (USAID/BASICS) for the United States Agency for International Development (USAID).

3. Assume 10% of curative services at primary level are referred to health center. Assume 10% of preventive (antenatal visits, etc) and delivery services referred to health center.

4. Services provided ONLY at health centers and not at clinics (VCT and Epidemic Diseases-Treatment) are all treated at health centers (100% referral rate).

## ANNEX 5. Assumptions for Standards

Service	Source*	Comments/Assumptions
<b>PRIMARY LEVEL</b>		
Antenatal Care	1,2	4 visits required; ITNs given out during antenatal visits; malaria test given to all women; complications referred to health center (10%)
Labor and Delivery Care	1,2	Uncomplicated deliveries estimated to require an average of 2 hours of direct service time from a midwife; complications referred to health center (10%)
Postpartum Care	1,2	2 visits required, immediate and follow-up; Vitamin A distribution postpartum included as a separate service
Postpartum Vitamin A	1,2	Given immediately postpartum; separated out as a service but includes only the time of staff to administer vitamin and the cost of the Vitamin A
Newborn Care	1,2	ITNs distributed during antenatal visits, not as part of newborn care.
Family Planning: COCs	1,2	Oral contraceptives are distributed by midwives; patients should receive COC supply every 3 months; counseling also given
Family Planning: DMPA	1,2	DMPA shot administered by midwives; patients should receive injection every 3 months; counseling also given
Family Planning: IUCD	1,2	IUCD inserted by midwives; patients should receive pregnancy test before procedure and should have follow-up visit; counseling also given
Family Planning: Condoms	1,2	Condoms distributed by midwives; approximately 3/4 of these are male condoms to 1/4 female condoms; counseling also given
Treatment STIs - Male	1,2,3	Syndromic approach to STI treatment; if treatment doesn't work, refer to health center
Treatment STIs - Female	1,2,3	Syndromic approach to STI treatment; if treatment doesn't work, refer to health center
Immunization: BCG <1 year	1,2	Given immediately at birth; nutrition counseling and growth monitoring during immunization visits
Immunization: Pentavalent 1,2,3	1,2	Given at 6, 10, 14 weeks; nutrition counseling and growth monitoring during immunization visits
Immunization: OPV 1,2,3	1,2	Given at 6, 10, 14 weeks; nutrition counseling and growth monitoring during immunization visits
Immunization: Measles <1 year	1,2	Given at 9 months; nutrition counseling and growth monitoring during immunization visits
Immunization: Yellow fever	1,2	Given at 9 months; nutrition counseling and growth monitoring during immunization visits
Immunization: TT pregnant women	1,2	2 TT vaccinations should be given during pregnancy; administered at antenatal visits
Immunization: TT non-pregnant women	1,2	A total of 5 TT vaccinations should be given to women of childbearing age for complete protection
Watery diarrhoea <5 years	1,2,3	Syndromic management of watery diarrhea; severely dehydrated cases are referred to health center (10%)
Bloody diarrhoea <5 years	1,2,3	Stool specimen may be required to determine causative agent; severely dehydrated cases are referred to health center (10%)
Pneumonia <5 years	1,2,3	Differential diagnosis of pneumonia; severe cases referred to health center (10%)
Child Vitamin A	1,2	One Vitamin A capsule twice a year for each child
Child Deworming	1,2	One mebendazole tablet per child per year (currently only receive at clinics when children are there for another service)
Child iron supplementation	1,2	One iron supplement tablet per child per year (currently only given to children who appear anemic at clinic)
VCT	1,2	Not currently offered at clinic level according to BPHS
TB Diagnosis	4	TB diagnosis only at clinics with laboratories and health centers
TB Treatment	4	TB treatment is DOTS, should be available at all clinics and health centers; assume direct observation for all 6 months treatment
Malaria Treatment <5 years	1,2,3	No malaria testing for children <5; only uncomplicated malaria treated at clinic level, complications given start dose and referred to health center (10%)
Malaria Treatment >5 years	1,2,3	Testing using paracheck strips; only uncomplicated malaria treated at clinic level, complications given start dose and referred to health center (10%)
Malaria Prevention: IPT	1,2,3	All pregnant women should receive IPT during antenatal visits
Cholera	1,2	Cholera diagnosis must be confirmed by the county hospital; clinics will treat symptoms of watery diarrhea in the meanwhile
Epidemic Diseases - Refer to Hospital	1,2	Epidemic diseases in BPHS diagnosed at clinics and referred to hospitals: yellow fever, lassa fever, acute rheumatic fever, hemorrhagic fever, acute flaccid paralysis, neonatal tetanus.
Mental Health	1,2	Mental health treatment involves counseling only; no drugs provided to clinics for mental health disorders; cases may be referred to health center or hospital
Sexual Gender Based Violence	1,2	Sexual gender based violence treatment involves counseling and rape exam; cases may be referred to health center, hospital, or safe house
Emergency First Aid	1,2	Treatment of shocks, minor injuries, cuts, snake bites, eye infections, etc.; referral if necessary to higher level (10%)

Service	Source*	Comments/Assumptions
<b>SECONDARY LEVEL</b>		
Antenatal Care HC	1,2	Referred from primary care level; includes diagnosis and treatment for hypertension and pre-eclampsia
Labor and Delivery Care HC	1,2	Referred from primary care level; delivery of complicated pregnancies
Postpartum HC	1,2	Referred from primary care level; postpartum care for complicated
Newborn Care HC	1,2	Referred from primary care level; includes management of low birth weight newborns
Treatment STIs - Male HC	1,2,3	Referred from primary care level; for recurrent treatment of STIs requiring laboratory tests
Treatment STIs - Female HC	1,2,3	Referred from primary care level; for recurrent treatment of STIs requiring laboratory tests
Severe Watery diarrhoea <5 years	1,2	Referred from primary care level; treatment of severe dehydration
Severe Bloody diarrhoea <5 years	1,2	Referred from primary care level; treatment of severe dehydration
Severe Pneumonia <5 years	1,2	Referred from primary care level; treatment of severe pneumonia
VCT HC	1,2	No VCT offered at primary care level; all referrals to health center
Severe Malaria Treatment <5 years	1,2	Referred from primary care level; treatment of severe (complicated) malaria
Severe Malaria Treatment >5 years	1,2	Referred from primary care level; treatment of severe (complicated) malaria
Epidemic Diseases - Treatment	1,2	No treatment at primary care level; referral to health center for treatment of measles and pertussis
Mental Health HC	1,2	Referred from primary care level; social worker gives treatment at health center
Sexual Gender Based Violence HC	1,2	Referred from primary care level; social worker gives treatment at health center
Emergency First Aid HC	1,2	Referred from primary care level; treatment of more complicated emergencies
Abortion Complications HC	1,2	Referred from primary care level; treatment of complicated abortions and obstetric emergencies

\*Sources:

- 1) 3-day standard treatment guidelines workshop with members from MOHSW and NGOs (EQUIP, Africare, Merci, IMC)
- 2) The Basic Package of Health and Social Welfare Services (BPHS), Ministry of Health and Social Welfare; Monrovia, Liberia.
- 3) National AIDS & STI Control Program (NACP), MOHSW, Republic of Liberia, National Guidelines for the Management of Sexually Transmitted Infections, July 2007. International Medical Corps, MOHSW, Republic of Liberia, Standard Treatment Guidelines for IMC Supported Outpatients Department, PHC Facilities and Hospital.
- 4) National Tuberculosis program Manual. Ministry of Health and Social Welfare; Monrovia, Liberia, 3rd Edition, 2008.

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4. Liberia: Standard DHS, 2007. LISGIS, Monrovia, Liberia and Ministry of Health and Social Welfare, Monrovia, Liberia and National AIDS Control Program, Monrovia, Liberia and Macro International Inc. Calverton, Maryland, USA.
5. CORE Plus - CORE Plus. A generic version of the tool can be found at <http://erc.msh.org/mainpage.cfm?file=5.11.htm&module=toolkit&language=English>
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