OneHealth Tool:

A Tool to Support the Costing, Budgeting, Financing, and National Strategies Development of the Health Sector in Developing Countries, with a Focus on Integrating Planning and Strengthening Health Systems

Technical Notes

January 2012

OneHealth Tool:

A Tool to Support the Costing, Budgeting, Financing, and National Strategies Development of the Health Sector in Developing Countries, with a Focus on Integrating Planning and Strengthening Health Systems

Technical Notes

January 2012

`

The development of the OneHealth software and manual was supported by the World Health Organization, the Global Workforce Health Alliance, UNFPA, UNICEF, the Health Metrics Network and The Global Fund to fight AIDS, Tuberculosis and Malaria. It was prepared by Shetal Datta and Bill Winfrey of Futures Institute. Overall technical guidance on the development of the OneHealth tool is provided by the United Nations inter agency working group on Costing. The views expressed in this publication do not necessarily reflect the views of the funding organizations.

ACRONYMS & ABBREVIATIONS

AIM	AIDS Impact Model
ART	anti-retroviral therapy
CBHI	community-based health insurance
CPIA	Country Policy and Institutional Assessment
CSO	community service organization
DAC	development assistance committee
DAH	development assistance for health
GAVI	Global Alliance for Vaccines and Immunization
GFATM	Global Fund to Fight AIDS, Tuberculosis and Malaria
GGHE	general government expenditure on health
GGE	general government expenditure
GHE	government health expenditure
HIS	health information system
HFP	Health Financing Policy
HMN	Health Metrics Network
IAWG-Costing	United Nations Inter-Agency Working Group on Costing
ICT	information, communication and technology
IMF	International Monetary Fund
ITN	insecticide treated net
ITP	intermittent preventive treatment
IUD	intra-uterine device
JANS	Joint Assessment of National Strategies
LAM	Lactational Amenorrhea Method
LiST	Lives Saved Tool
MBB	Marginal for Bottlenecks
MDGs	Millennium Development Goals
MoH	Ministry of Health
MSH	Management Sciences for Health
MTEF	Medium Term Expenditure Framework
NCD	non-communicable disease
OASIS	Organizational Assessment for Improving and Strengthening
Health Financing	
OECD	Organization for Economic Co-operation and Development
OOP	out-of-pocket
ORS	oral rehydration solution
PHeNOM	Public Health Network Optimization and Modeling Tool
PMTCT	prevention of mother-to-child transmission
PRSP	Poverty Reduction Strategy Paper
PxQ	prices by quantities
ROI	return of investment
SHI	social health insurance
SWAp	sector wide approach
TB	tuberculosis
WASH	Water and Sanitation
WGI	Worldwide Governance Indicators
WHO	World Health Organization

GLOSSARY

Bottleneck – A constraint which limits the health systems ability to deliver the expected services or reach the desired coverage.

Financial space – The total resources available for the health sector including government resources private sector and funding from external sources.

Fiscal space – The government resources available to increase spending. when such an increase can take place without impairing fiscal solvency. This includes the government's present and future ability to cover its recurrent expenditures and service its national debt. Fiscal space analysis is included within the broader envelope of financial space analysis.

Fixed cost – A cost that does not change with an increase or decrease in the quantity of goods or services produced.

Health information system – A set of components and procedures organized with the objective of generating information which will improve health care management decisions at all levels of the health system

Health system – The combination of resources, organization, financing and management that culminate in the delivery of health services to the population

Infrastructure – The fundamental systems and physical plan serving a health system, such as hospitals, clinics, other facilities, and equipment.

Ingredients based costing – Costing based on quantity and price of each component of a service delivery package

Input – Item used as part of a health intervention. This is typically defined in terms of number used per case.

Logistics – The management of the flow of goods between the point of origin and the point of destination in order to meet the requirements of customers or corporations. Logistics involves the transportation, inventory, and warehousing of goods used to deliver health services.

Marginal Cost – The additional cost to deliver a service to one more person.

Prioritization – As a principle, it means doing 'first things first;' as a process, it means evaluating a different interventions and ranking them in their order of importance or urgency.

Programme Cost – Costs incurred to manage or deliver a service or intervention that are not linked directly with clients, patients or health systems. These typically include but are not limited to training, supervision and administration and management costs.

Scale–up – The process of increasing the coverage or reach of a program or intervention.

Unit Cost – Cost per unit supplied; in the case of the OneHealth Tool, this typically refers to the cost of providing a service to one person.

Vertical programme – A health programme focused on a specific disease, or health issue (in contrast with primary or integrated care).

TABLE OF CONTENTS

I. OVERVIEW

These technical notes clarify the framework, modules, and formulas of the OneHealth Tool. The notes describe in detail the framework of the OneHealth tool, as well as the various components of the tool, the models used, the impact modules used and the linkage between these modules, and the general formulas used to derive cost estimates.

The notes are intended for users who want to learn more about the OneHealth Tool, and specifically to:

- Familiarize users about the structure and organization of the OneHealth Tool; and
- Understand the theoretical and methodological background of the model.

These notes are not meant to be a user guide or reference for the use of the tool. A companion guide called "OneHealth Start Manual" provides instructions on how to get started with the tool and provides helpful hints for its use.

Description of Technical Notes:

The OneHealth Technical Notes describe the overall framework of the model, including its various components. These notes include descriptions of the costing and planning modules used within OneHealth, as well as the various impact modules.

The development of the OneHealth tool has been informed and guided by a continuing dialog with the United Nations Inter-Agency Working Group on Health Costing and various expert groups. This dialog has generated several source and discussion documents. These technical notes are a consolidation and summary of these documents. Annex 1 is a list of document and files used in the development of these technical notes.

Annexes VI-XXIV provide additional documentation on the process of developing the tool, meeting and concept notes, further information for using the Bottlenecks Analysis and other contributing documents. They are provided in a separate downloadable file for those users who wish to access this information.

II. INTRODUCTION

1. Rationale[1]

A. Planning and Costing for sustainable scale-up of health systems

An analysis of resource needs is an essential part of the planning process as it allows policy makers to discuss the feasibility and financial sustainability of proposed health strategies, in view of existing budget constraints. Many of the countries lagging behind in their achievement of the Millennium Development Goals (MDGs) have cited the hurdle of a dysfunctional health system as being one of the largest challenges. The most current assessments show that despite some major advances, many countries are still "off track" in comparison to the expected trajectory of meeting the 2015 targets[2]. Another challenge faced to date is the integration of vertical plans into a holistic plan that considers the total resource requirements in comparison to the available financing.

The ambition to reach global health goals has spurred an improvement in data availability on the current disease burden and effective interventions to reduce this burden. There is broad agreement on a set of low-cost effective interventions to reduce mortality among women and children in the world's poorest countries[3]. Moreover there is global agreement on interventions and strategies to combat HIV, TB and Malaria, and the importance of nutrition interventions has been highlighted in recent publications. At the country level there is increasing emphasis on results based planning and the use of financial incentives to steer people's behaviour towards better health outcomes. There is increasing recognition of the need to strengthen health systems to move towards universal coverage[4]. There are now several initiatives calling for scaling up the health system[5] (GFATM, GAVI, High Level Task Force on innovative financing for health systems). These initiatives now need to be translated into country strategic health plans with the following features:

- Specification of the key activities needing to be undertaken to scale up the health system;
- Estimation of the expected benefits of the scale-up in terms of morbidity and mortality averted;
- Definition of the costs; and
- Determination of financial sustainability.

Effective strategies for scaling up health service delivery to meet targets such as the MDGs requires an assessment of which effective interventions are appropriate to meet the targets, taking into account the

[1] This section is based on the document: "Unified Health Model: Concept Note. First ROUGH Draft 14 January 2010" p1-2
[2] Millennium Development Goals Report 2008, United Nations, New York.
[3] Lancet series
[4] World Health Report 2010 Available at: http://www.who.int/whr/2010/en/index.html
[5] S. Lewin, J. Lavis, A. Oxman, G. Bastías, M. Chopra, A. Ciapponi, S. Flottorp, S. Martí, T. Pantoja, G. Rada Supporting the delivery of cost-effective interventions in primary health-care systems in low-income and middle-income countries: an overview of systematic reviews. The Lancet, Volume 372, Issue 9642, Pages 928-939.

feasibility of scale-up given existing infrastructure, human resources, and financing. For this purpose specific tools have been developed to inform the planning process in countries. Such costing tools can be powerful instruments for countries to estimate the resources needed to undertake specific health actions. The analysis of resource needs estimates allows policy makers to discuss the feasibility and financial sustainability of proposed health strategies, in view of existing budget constraints. An analytical process that compares costs and outcomes can help make the planning process results-driven and financially realistic. Moreover, with national government health budgets potentially at risk due to economic crisis or changing political priorities, it is critical that countries clearly understand how the choices they make in investments will impact the health of their population.

In summary, faced with the challenge of reaching the MDGs, countries seek tools to inform domestic resource allocation, and to attract external sources of funding. Not coincidentally, much donor funding is made conditional on sound planning tools that can generate scenarios to illustrate cost, financial sustainability and health impact.

B. A Joint UN Strategy for Projecting Costs of strengthening health systems to deliver Health Interventions

A United Nations Inter-Agency Working Group on Costing (IAWG-Costing)[6] was set up in the first quarter of 2008. At that time, a number of tools had been developed for the costing of the health MDGs yet there was not one unified tool available to facilitate comprehensive health system costing. Moreover, while the existing costing tools addressed the issue of resource needs associated with specific actions, each tool had a different logic and approach. Countries planners had repeatedly requested a harmonized costing tool to reduce confusion, workload and the general transaction costs associated with the processes of budgeting, costing and impact estimation.

One of the first activities of the IAWG-Costing was therefore to commission a comprehensive review of the existing tools used for costing in order to improve coordination and streamline in-country support[7]. A key result of this review was the determination that each of the existing models provided specific value to the country but that there was an opportunity to harmonise the methods, format and outputs of existing costing tools. More importantly the opportunity was recognized to leverage the best components of the different models into a single unified tool, which would streamline and improve the UN technical assistance provided to countries. The results of the review were presented to a user's meeting in Senegal. The need for a single unified tool was endorsed, as well as the coordinated provision of UN technical assistance[8]. The need for a tool to facilitate scenario analysis and prioritization was also seen as beneficial, such that a change in the planned policy or program can be modeled to immediately show a change in the expected cost, health benefits potentially attainable, or whether this is fiscally sustainable.

The IAWG-Costing took on the recommendation to support the development of a joint UN tool. The move towards joint planning tools and joint technical assistance for the health MDGs is seen as a key opportunity to provide countries with more consistent and coordinated support thus enabling the acceleration of the attainment of the MDGs.

---

[6] IAWG members to date include UNFPA, UNICEF, WHO, UNAIDS, UNDP and the World Bank.
[7] Bitran and Associates, (2008), Final Reports of Technical Review Of Costing Tools
[8] PMNCH (2008) Meeting Report - Technical Consultation Review of Costing Tools Relevant to the Health MDGs Saly Portudal, Senegal. Available at: http://www.who.int/pmnch/topics/economics/ctoolssenegalconsultation.pdf

2. General Approach[9]

Vision[10]

The OneHealth Tool is a single tool used for supporting planning processes at country level, specifically to strengthen aspects of costing, budgeting, financing and strategy development of the health sector in developing countries. The model builds on the Joint Assessment of National Strategies (JANS), and leverages the best components of the different tools that currently exist. The tool is built in a modular fashion allowing for program specific costing as well as health sector costing. The model has a focus on MDG-related health activities and subsequent needs to strengthen the overall health system. The development of the OneHealth tool has drawn upon the increasing volume of evidence available on effective planning processes in countries.

Specifically, OneHealth allows for *multi-stakeholder* involvement with a transparent consensual process to agree on directions for strategic plan scenarios. The tool requires that planning is driven by *explicit analysis of the current health system*, and overall context and what can realistically be achieved in the medium term. Disease programme-specific plans are *integrated* into the overall system planning framework. The assessment of costing and *financial feasibility/sustainability* is integrated into the planning process and not an afterthought. Investments are linked to results in terms of system outputs and predicted *health outcomes*. Where there are financial limitations, a process of *prioritization* and/or scenarios with more realistic levels of ambition is facilitated. Finally, planning is an *iterative* process.

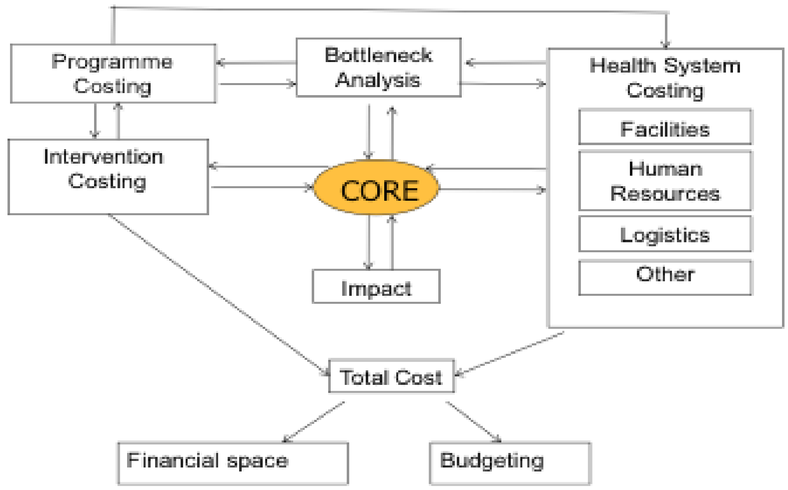
For the first time a fully integrated model is available, based on recommended guidelines of the UN technical agencies. The tool recognizes synergies in costs and impact across programmes and diseases. Moreover the tool links the program specific costing to the different health system building blocks, such as governance, human resources for health, infrastructure and equipment, health information systems and logistics.

3. OneHealth Framework

OneHealth can be used to address a number of challenges that countries face as they plan for expansions and improvements in their health care system. OneHealth is built on six health system building blocks, drawing upon the WHO framework on health systems: health workforce (human resources), infrastructure, logistics and supply chain, health information system, health systems financing, leadership and governance (Figure 1). Service delivery is costed as part of the disease and programme-specific costs.

[9] This section was taken from the document: "UHM: Report including Modeling Approach, Costing Questions, Costing Analysis, Conceptual Framework & Roadmap. Futures Institute, draft May 13, 2009 p6-7."
[10] This section is based on the document: "Unified Health Model: Concept Note. First ROUGH Draft 14 January 2010 p3."

Figure 1. Diagram Illustrating the Components of OneHealth



OneHealth uses a modular approach; the user can either decide to only use one module (e.g., Malaria or Human Resources) independently, and/or can make use of other modules in sequential order. Once the user selects which interventions s/he intends to focus, s/he then allocates these into different modules. After this, the disease modules are defined. This flexible approach allows for the variation between make-up of vertical disease programs in countries.

The model also includes options to link planned increases in intervention coverage with the investments made in the health system. A bottleneck analysis can be performed at both program and health system level. Once the user identifies bottlenecks or constraints, s/he can then use the system modules to identify strategies (e.g., action plans) to overcome these constraints.

4. Software[11]

The POLICY Project and its follow-on project, the USAID|Health Policy Initiative, developed a health policy computer model called Spectrum. Spectrum is a Windows-based system of integrated policy models. The integration is based on DemProj, which is used to create the population projections that support many of the calculations in the other components, such as FamPlan, the AIDS Impact Model (AIM), and the Lives Saved Tool (LiST). Each component has a similarly functioning interface that is easy to learn and to use. With little guidance, anyone with basic familiarity with Windows software can navigate the models to create population projections and project outcomes that are specific to the modules.

Spectrum serves as the core structure for OneHealth. The pre-existing modules: DemProj, FamPlan, AIM, GOALS and LiST provide the basis for most of the impact calculations converting increased health coverage into reduced mortality rates and lives saved. These modules also serve as a demographic basis for calculating costs that are variable based on population served.

[11] This section was taken from the document: "UHM: Report including Modeling Approach, Costing Questions, Costing Analysis, Conceptual Framework & Roadmap. Futures Institute, draft May 13, 2009 p7-11."

By using the Spectrum platform for OneHealth, updates to modules will be immediately reflected in OneHealth. The advantages of this approach include that:

1. Bi-annual updates of demographic information in DemProj are passed immediately to OneHealth.
2. Spectrum fixes and enhancements are automatically incorporated into OneHealth.
3. Distribution and support are part of other Futures Institute efforts.
4. Only a single unified Spectrum needs to be maintained.

Although OneHealth is built on Spectrum, OneHealth operates as a semi-autonomous unit. This is achieved by creating a "skin" that overlays Spectrum. A user who installs Spectrum as "OneHealth" will see a OneHealth interface rather than a Spectrum interface. Former Spectrum users will need to enable the OneHealth via a user option to access the OneHealth specific interface.

Ultimately, the goal is for the OneHealth Tool to be organized around planning questions, such as personnel, logistics, and financing needs. Depending on the question, the user will be instructed or guided to apply appropriate Spectrum modules. To the extent possible, modules contain the default values for all impact parameters and many country baseline values for demographic and health profile projections and cost inputs.

5. Tool Development Process[12]

While IAWG-Costing provides oversight to the model development, the Futures Institute has to date been responsible for the software development, and shared responsibility for training material development with the IAWG, as well as website updates and design. The IAWG provides oversight and feedback to the Futures Institute on details concerning the model scope, design, and calculations.

Development of OneHealth began in 2010 and was contingent upon the existence of several modules developed independently of the OneHealth project. The list of pre-existing modules is listed in Table 1.

Table 1: Pre-Existing Modules

	Impact Modeling	Intervention Costing
Master coordinating module & skin	DemProj	FamPlan
	FamPlan	AIM
	AIM	GOALS
	GOALS	
	LiST	

To facilitate and smooth the process, expert groups were set up specifically to provide technical guidance on the development of individual modules within OneHealth. The experts include members from participating UN agencies as well as external resource persons with specific expertise in the area under discussion. The appointment of these technical point persons was critical to assure that progress is made

[12] This section is from the documents: "UHM: Report including Modeling Approach, Costing Questions, Costing Analysis, Conceptual Framework & Roadmap. Futures Institute, draft May 13, 2009 p27-29" and the document: "Unified Health Model: Concept Note. First ROUGH Draft 14 January 2010 p9"

without the need for frequent consensus building meetings. To date, the expert groups include: Governance, Health Information Systems, Human Resources for Health, Logistics, Infrastructure (health technologies), Private Sector, Equity and Gender, Health Financing Policy, as well as a number of disease-programme planning specific discussion groups.

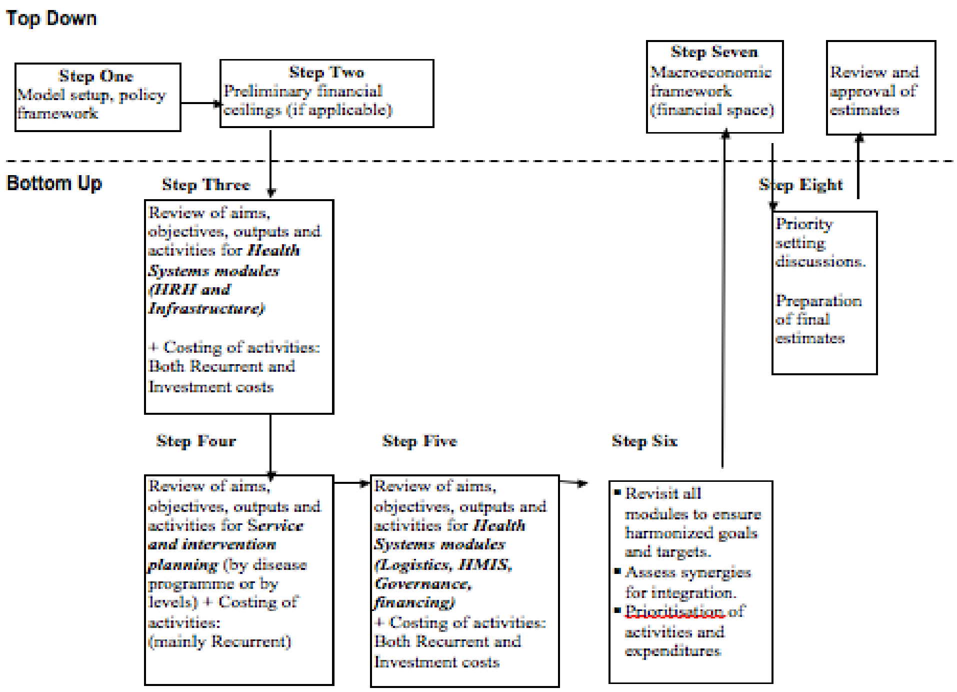
The development process for OneHealth modules included the following steps:

1. Development of a spreadsheet model. The detailed spreadsheet included outlines of input windows for Spectrum, definition of inputs needed from other modules or databases, detailed calculations to be translated by Spectrum programmers, definition of outputs to be used by other modules of Spectrum and outlines of output windows for Spectrum.
2. Creation of data entry screens for review by clients and other technical experts.
3. Programming of detailed calculations, creation of output windows.
4. Back checking of calculations with spreadsheet model to assure accuracy, fixing of bugs.
5. Review of draft model by client and other technical experts.
6. Revisions as necessary.

The OneHealth tool application process is flexible. One possibility is that the health systems modules for HRH and Infrastructure are filled in first, to provide a basis for projecting the health system's capacity to deliver services over the coming years. Next, the service and intervention planning could be completed (by disease programme or by levels). The scale-up of interventions will affect the Logistics and Supply Chain planning for medicines and commodities. Planning is meant to be iterative, and several cycles of adjustments are likely needed (Figure 2).

The financial space may be estimated prior to the costing or following the first round of costing and then compared with the costs. In the process of an MTEF, the financial ceiling may have already been set and the planning within each module (Health Systems, Services) should then be done within the anticipated resource envelope.

Figure 2. Notional OneHealth Tool Application Process



6. Applications of OneHealth

The OneHealth Tool has many uses, but it was specifically designed to respond to three basic costing questions:

1. What are the mortality **impact and cost implications** of different health programs, policy alternatives or scale up packages?
2. What are the **constraints** to scaling up health interventions and the costs of removing the constraints?
3. What is the **financing gap**?

OneHealth was designed to support various types of applications including costing of national strategies, action plans, and medium-term costing of the health sector or sub-sector, including maternal roadmaps, child survival strategies, EPI strategies, disease-specific plans (malaria, TB, and HIV/AIDS), non-communicable disease plans, nutrition, and water and sanitation. Specific outputs include:

- Total costs, by year, programme, and cost component;
- Incremental costs, by year, programme, and cost component;
- Incremental health outcomes, by year, age group and cause of illness/death;
- Financial analysis (financial space); and
- Costs presented by budget categories (mapping costs to the national chart of accounts).

OneHealth is also intended for medium term costing, budgeting and impact assessment of 3-7 year projections:

- ***Strategic scenario setting:*** OneHealth is equipped with defaults that can be used to simulate scenarios of rough cost and impact estimates for different scale-up strategies. The model can also indicate the feasibility of reaching the targets set, whether because of financial constraints or constraints inherent in the existing health system (such as the production of a heath workforce);

- ***National Health Sector Plan development:*** OneHealth can be used to produce consistent sector wide approaches (SWAPs) across disease modules, in order to facilitate the comparison of budget needs across MoH programme divisions;

- ***Multi-sector development plans:*** OneHealth can be used to help develop Poverty Reduction Strategy Papers (PRSPs) and Medium Term Expenditure Frameworks (MTEF). An important component of the MTEF approach is the production of bottom-up programme cost estimates (i.e. budget projections with spending targets). The results can also be used to optimize intra-sectoral allocations.

- ***Programme-specific approaches:*** OneHealth links specific disease programme investments to the health system requirements, and indicates system constraints that may influence progress towards set targets. The model uses the latest evidence available to help countries to improve the accuracy of estimated health budgets for different specific programs, which offers great value in predicting the future stream of costs and in indicating resource gaps for policy dialogue and planning considerations.

Cost and Impact

A most basic question to health policy makers is what set of interventions is the best for achieving declines in mortality and better health for their country. Answering this question requires knowing both the health impact and the costs of alternatives. OneHealth via Spectrum modules can estimate the potential mortality declines for the communicable[13] causes of death that contribute most to the low life expectancy in developing countries. Today, in many of the poorest countries of the world, these causes are infant and early childhood mortality (neonatal causes of death, diarrhea, respiratory infections and malaria), maternal mortality, tuberculosis (TB) and Acquired Immuno-deficiency Syndrome (AIDS). The first version of OneHealth released January 2012 can be used to calculate mortality impact for the scale up of the following services:

- Maternal and child health interventions (including malaria and nutrition)
- HIV/AIDS treatment;
- TB; and
- Water and sanitation .

[13] A second round of OneHealth may address non-communicable causes of death such as coronary heart disease, stroke and pulmonary disease.

OneHealth calculates the costs of health packages by first calculating costs on a per capita or per patient basis via an ingredients approach[14]. Costs of drugs, major medical supplies, lab tests, and contraceptive commodities are calculated on a per case basis. Labor inputs needed for direct service delivery are calculated based on international norms for the minutes per service. Bed days and numbers of outpatient visits are similarly calculated. Note however that labor *costs* and infrastructure costs are not calculated via these estimates. Instead these are calculated via the health systems modules.

Constraints to Health System Scale Up

At a moment in time, a health system is limited in the scale up that can occur, and most often significant systems, human resource, infrastructure or facility investments are necessary. There are a variety of issues that must be addressed in a complete model. Many investments require time to pay off including the training of health system workers. There are also investments that are indivisible. For example, workers must be deployed as full workers not the fractions of full time equivalents implied by intervention costing done with minute by minute accounting of worker time.

Working from user-supplied data on the baseline situation, OneHealth allows for detailed costing of health systems, helps the planner or policy analyst identify bottlenecks or other constraints to scaling up critical health interventions. These analyses are based on comparing baseline situations relative to national and international norms.

Financial Gap Analysis

OneHealth allows for a simple financial space analysis. In general it is beyond the scope of MoH planners to control the allocation of resources to the MoH, taxation policy, or the national economy. OneHealth will have capacity to link financial space alternatives with varying degrees of optimism about the availability of finance. The financial gap analysis allows for analysis of alternative scenarios of private sector participation in the health system, user fee schemes, conditional and cash transfer schemes.

4. Financing & Support

Financial Support

To achieve the product development timeframe, the IAWG-Costing required sufficient funding as well as appropriate time allocated from the technical experts in the respective agencies. Each IAWG UN agency contributed funds and staff time. In addition funding has been received by GFATM, the HMN network and GHWA. Bilaterals such as NORAD have contributed through the IHP+ work plan.

Support for Tool Implementation

The IAWG-Costing agencies intend to support this tool as the default tool and plan to have joint training sessions and missions involving this tool. The model will serve as an extension of One United Nations program by further linking the efforts of the IAWG-Costing towards the goal of harmonized, efficient and consistent support to countries. Key stakeholders in this joint program include the United Nations participating agencies (UNICEF, UNDP, UNAIDS, UNFPA, World Bank and WHO), donor agencies including GFATM, Global Health Workforce Alliance, Health Metrics Network (HMN) and the countries involved in the testing of this tool.

[14] This approach is available for the services mentioned immediately above.

III. USING THE ONEHEALTH TOOL

1. Models Used in the OneHealth Tool

A. Control Module

The OneHealth Tool and its modules are programmed as modules of Spectrum. This allows any updates to modules via other efforts to be reflected directly in the OneHealth tool. This is achieved by the creation of a “skin” that overlays the other Spectrum modules, so that to the user, it feels that OneHealth is the master program.

Within OneHealth, a coordination function keeps track of the modules in which the user has made changes. The user can enter and exit the tool as necessary, with all changes being saved and progress remembered at the next session. In addition, each module of Spectrum has its own particular display mode. OneHealth takes relevant output elements from each of the modules to display outputs relevant to a national sector plan.

DemProj is the centerpiece of the Spectrum suite of models. It projects the population for a country or region by age and sex, based on assumptions about fertility, mortality, and migration based on data from the United Nations Population Division. Fertility and mortality changes produced by health programs which are calculated in Spectrum’s impact models (see below) are fed into DemProj, which then revises population projections and vital events accordingly. For more information on the use and methodology of DemProj, users are encouraged to see the manual[1], found at: http://futuresinstitute.org/Download/Spectrum/Manuals/DemmanE.pdf

B. Impact Modules

Most of the impact modules included in OneHealth already existed in the Spectrum series. More information about each of these modules is available in manuals dedicated to the methodology, data sources, and calculation patterns for each tool. The manuals are available in the bottom right of the page at: http://www.futuresinstitute.org/Pages/spectrum.aspx

FamPlan - projects family planning requirements needed to reach national goals for addressing unmet need or achieving desired fertility. It can be used to set realistic family planning goals, to plan for the service expansion required to meet program objectives, and to evaluate alternative avenues of achieving goals. The program uses assumptions about the proximate determinants of fertility and the characteristics of the family planning program (method mix, source mix, discontinuation rates, etc.) to calculate the number of users and acceptors of different methods by service delivery source. The OneHealth costing module supplants the simple costing feature that currently exists in FamPlan. For more information on

[1] Stover, John. 2008. DemProj: A Computer Program for Making Population. Washington, DC: Futures Group International, Health Policy Initiative, Task Order 1.

FamPlan, please see the manual[2], available at:
http://futuresinstitute.org/Download/Spectrum/Manuals/FampmanE.pdf

LiST - a Spectrum model that projects the mortality impact of scaling up maternal and child health interventions. Currently over 50 health interventions are programmed into LiST. These interventions can be grouped or ungrouped into packages that can help policy and program managers decide what health interventions will receive priority in a health plan. LiST was developed with a costing tool that works with default costing parameters to project commodity, drug and intervention specific human resource needs. A version of this costing tool has been scaled up to be the intervention based costing of OneHealth. For more information, please refer to the manual[3], available at:
http://futuresinstitute.org/Download/Spectrum/Manuals/ListManE.pdf

AIDS Impact Model (AIM) - based on HIV prevalence and other epidemiological parameters, AIM projects the consequences of the HIV epidemic, including the number of people living with HIV, new infections, and AIDS deaths by age and sex. AIM also calculates the impact of PMTCT, ART and Cotrimoxozole on child deaths for the LiST module and the impacts of ART on adult mortality. For more information on this module, please see the manual[4], found at:
http://futuresinstitute.org/Download/Spectrum/Manuals/AimmanE.pdf

GOALS Model - converts coverage of key HIV/AIDS interventions into reductions in HIV prevalence. Where appropriate these features have been transferred to OneHealth. Incorporation of more prevention impact calculations from Goals will take place in 2012.

TB Impact - projects the impact of scaling up prevention and treatment interventions on tuberculosis (TB) mortality and morbidity. This model is based on the TB model developed within WHO by Chris Dye and his team. The existing WHO-Stop TB Planning and Budgeting Model was adapted for this purpose.

> It should be noted that work is ongoing to develop an impact model for non-communicable diseases (NCD) – such as heart diseases, pulmonary afflictions, and cancers. Currently, impact models have been developed in some form to address about half of the interventions included in the “best buys” package for NCDs (WHO 2010). As a next step, in 2012 or later, these will be converted into a linked computational model.

Annex III provides a list of OneHealth interventions with impact.

[2] Health Policy Initiative. 2008. FamPlan: A Computer Program for Estimating Family Planning Requirements. Washington, DC: Futures Group International, Health Policy Initiative, Task Order 1.

[3] DeCormier Plosky, Stover, and Winfrey. 2011. LiST: A Computer Program for Making Child Survival Projections. US Fund for UNICEF: New York, NY.

[4] Stover, John. 2009. AIM: A Computer Program for Making HIV/AIDS Projections and Examining the Demographic and Social Impacts of AIDS. Washington, DC: Futures Group International, Health Policy Initiative, Task Order 1.

C. Costing Approaches

The OneHealth Tool approaches costing from two directions: interventions and health systems. The intervention costing calculates costing elements that are variable depending on the number of people served. This includes inputs such as commodities and drugs. The health systems costing is based on health system needs most frequently via geographic or population norms, but is also informed by the intervention scale-up (e.g., logistics is informed by drug quantity and human resources by minutes quantity).

Intervention-Focused Costing

In the intervention focused costing, the user is able to select interventions or packages of interventions from a list provided[5]. The interventions are drawn from a master set of interventions that are priority from a public health perspective. For each of the chosen interventions the model then calculates the number of cases requiring treatment based on population data provided by DemProj and a disease/incidence database. Based on the user-defined coverage scale-up path, the model calculates the number of cases that actually will receive the different interventions.

Default Costing Option

For each of the interventions, standard defaults are included for case management protocols including drug treatments (based on WHO treatment guidelines and standards), prices available through centralized databases linking to all modules, and international drug prices from sources such as UNICEF, MSH and IDA. This database includes the price of drugs, lab tests, and contraceptive commodities. Not included are minor medical supplies such as syringes and cotton balls.

Cost per case estimates are then combined with projected number of cases requiring treatment to arrive at an estimate of total drug costs.

In addition, the disease impact modules provide estimates as to personnel types and time required to provide each of the interventions. Using this information together with the number of projected cases generates an estimate of the number of staff and staff mix required to provide the specified package of interventions. The information is then fed into the Human Resources model where it can be used to check whether the chosen human resources scale-up is sufficient and appropriate for the chosen set of interventions.

Documentation for the assumptions made for human and commodity resource requirements for case management is being assembled and will be made available on the Futures Institute website in early 2012. These documents include intervention treatment assumptions for maternal, newborn, and reproductive health, child health, malaria, TB, HIV/AIDS, vaccinations, and water and sanitation and nutrition interventions[6].

[5] Alternatively the interventions may be automatically loaded based upon inputs made within other modules, e.g., one of the impact modules or the bottleneck analysis.

[6] Weissman, Eva. 2011. OneHealth Tool. Intervention Treatment Assumptions (Draft 2011).

Pop-up User Supplied Costing Module
Although the default values will be supplied, the OneHealth Tool also has a feature that allows the user to change the defaults. For drugs and key commodities, the user can create a customized, country-specific version of the drug cost database provided. To change, delete or add drugs used for an intervention, the user must click on the average cost cell to activate an Excel-like pop-up listing the drugs and dosages currently underlying the cost estimate. Changes can be made in that pop-up and the drug cost per case would automatically update itself accordingly. For personnel, the user can change types of personnel, the needed time per case and salaries as s/he deems appropriate.

Bottleneck Analysis Module
The Bottleneck analysis is based upon the bottleneck analysis that currently exists in the MBB model developed by the World Bank. It guides users in an analysis of the different constraints (bottlenecks) presently faced by the system, and the possible strategies to overcome them.

The Marginal Budgeting for Bottlenecks (MBB) tool, developed by the World Bank and UNICEF, supports planning and costing of the health system while focusing on MDG related service delivery. It looks at impediments scaling up efforts and costing activities and investment required to removing impediments. MBB is currently available for use at the website: http://www.devinfolive.info/mbb/mbbsupport/.

Programme Costing
Most programmes require a number of inputs at the central level in order to achieve full functionality, including human resources, training, supervision, monitoring and evaluation, infrastructure and equipment purchases, transport, communications, advocacy, and general programme management. These inputs are covered in the Programme Costing modules that exist within each programme area of the OneHealth Tool. The user can enter either an estimated annual resource requirement, or be walked through editors that include the most common components of each type of programme cost. If there are items that are not included in the preset list, the user can enter additional items and specify their use.

Health System-Focused Planning and Costing[7]
Human Resources Module - Can be used to project personnel requirements for health service providers and health management and support personnel, salary and pre- and in-service training costs.

Logistics Module - Costing of the logistic and supply chain includes the costs of warehouses/forklifts and other equipment and delivery vehicles and their operating costs. Costs are calculated based on the volumes of the commodities that would need to be brought to the service delivery points. Costs also include the salaries of personnel like logisticians and drivers.[8]

Infrastructure Module – Allows the user to enter baseline data, set targets, configure programme management data, and generate a policy analysis impact package to achieve various infrastructure impacts, and generate results tables. Note that infrastructure includes facilities, medical equipment, furniture, vehicles and information, communication and technology (ICT) equipment.

[7] Note: These modules will be discussed in more detail in the subsequent chapters of this document.
[8] This means that the costs of drugs and consumables reflect the manufacturer's cost only and distribution within the country is costed under the logistics and supply chain.

Other Health System Components – This module contains several sub-modules that deal with other health system activities and investments required to improve the functioning of the health system and enable a country to do the desired scale-up.

Health Information Sub-Module

The Health Information System Sub-Module is currently organized around ten domains:

1. Alert and response system
2. Patient management system
3. Alert management system
4. Diagnostics management system
5. Environmental monitoring system
6. Financial management system
7. Census system
8. Supply chain management
9. Disease surveillance system
10. HR management system

Subactivities can be added to each domain, with a draft list of components to each activity, including consultants, workshops, training, etc. Work is ongoing to refine this Sub-Module, and subsequent versions of the OneHealth Tool are expected to reflect these changes.

Health Financing Sub-Module[9]

This module is set up to allow the user to enter information about a variety of health financing efforts, with the ability to add to or edit the preset categories of vouchers for health services, insurance subsidies, and conditional cash transfers.

Governance Sub-Module

Governance has been defined as "the set of traditions and institutions by which authority in a country is exercised, and includes a) the process by which governments are selected, monitored and replaced, b) the capacity of the government to effectively formulate and implement sound policies, and c) the respect of citizens and the state for the institutions that govern economic and social interactions among them" (Kaufmann, Kraay and Mastruzzi, 2008). It includes the costs of improving the performance of the Ministry of Health in several domains associated with governance, including in particular strategic vision, accountability and transparency (including regulation) and participation and consensus orientation. Costs are comprised mostly of the salary of a strategic policy unit in the Ministry of Health and at subnational levels, consultation and consensus meetings and activities associated with accreditation, licensing and certification of health facilities, equipment, drugs and human resources. Included under governance are the costs associated with better administration and performance of bureaucratic functions.[10]

[9] Details for this section were taken from the document "NFR meeting of IAWG-COSTING June 27-29" available in Annex XXI.
[10] From: HLTF synthesis report.

D. Budgeting and Financial Space Modules

Budget Mapping Module – This module allows the user to translate the cost findings of OneHealth to fit MoH Chart of Accounts and Budget Classification Codes, and thus facilitate budgeting at national level. Similarly, depending on the situation, the analyses can be structured to fit with budget formats required for MTEFs, PRSPs or Global Fund applications.

Financial Space Module - Allows the user to make simple calculations of the likely financial resources available to the health sector. Within the module alternative scenarios of financial space are possible. Although financial space has a technical, economic meaning with macroeconomic implications[11], OneHealth calculates health system financial space based upon a few exogenous economic and fiscal parameters including: GDP growth, share of GDP spent by public sector on health, donor expenditures on health, out-of-pocket health expenditures, etc.

2. Using the OneHealth Tool for Planning and Costing a Disease-Control Programme[12]

OneHealth is built up by modules, including specific modules for programme or disease specific planning. The user can set up and define national disease control programmes to match the country context, and then estimate the cost for a specific programme, including an analysis of the broader health system implications. The format for programme planning is streamlined so that a consistent approach is used across programmes. It is however encouraged that a programme plan looks at the broader health system constraints that may affect the delivery of the key interventions.

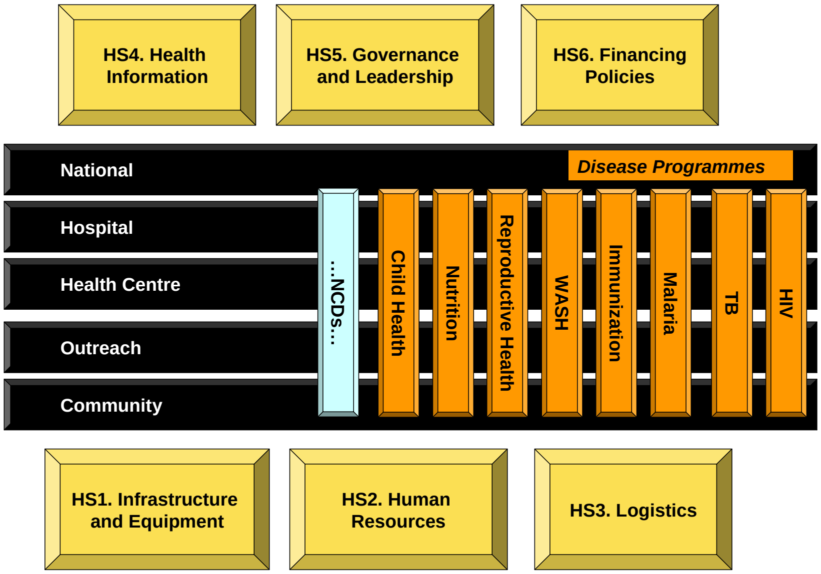
Figure 3 illustrates the generic setup of the tool when opened by a user. If the user chooses to perform the planning using the programme-specific planning mode, then the model opens with a pre-set list of programmes programmes that aim to capture the health MDGs: Child health; Reproductive and maternal health; Immunization; Nutrition; Water and Sanitation (WASH); HIV; TB; and Malaria. Future versions of the model (planned for 2012) will include additional programmes within the default setup, such as non communicable diseases (NCDs).

---

[11] Fiscal space is defined as "room in a government´s budget that allows it to provide resources for a desired purpose without jeopardizing the sustainability of its financial position or the stability of the economy. The idea is that fiscal space must exist or be created if extra resources are to be made available for worthwhile government spending. A government can create fiscal space by raising taxes, securing outside grants, cutting lower priority expenditure, borrowing resources (from citizens or foreign lenders), or borrowing from the banking system (and thereby expanding the money supply). But it must do this without compromising macroeconomic stability and fiscal sustainability—making sure that it has the capacity in the short term and the longer term to finance its desired expenditure programs as well as to service its debt." http://www.imf.org/external/pubs/ft/fandd/2005/06/basics.htm

[12] This section was taken from the document: "Using the OneHealth tool for planning and costing a disease control programme. 24 August 2011," which provides a brief overview of how the OneHealth tool may be used to inform a vertical planning process. For more details on how to use the tool, please refer to the general OneHealth User Guide.

Figure 3. OneHealth: a Tool Composed of Interlinking Modules



Activities and Costs Considered for Programme Planning

In general, for a specific plan, such as a child health strategy, OneHealth could be used to assess the resources used and the costs of scaling up the following:

1. **Priority health interventions for the national programme**. In terms of defining the programme, the user can shift interventions between programmes, and also merge and/or create new programmes as needed, depending on the national planning context. For example, the two programmes of nutrition and child health can be merged into one national programme if needed, and will then be treated as a joint programme entity within the tool. Moreover, the user can for example shift newborn care interventions from the reproductive health programme setup into the child health module, if this is where the planning for those interventions would "sit" within the national programme planning structure. In terms of costing specific interventions, the tool comes equipped with defaults for standard treatment protocols but the user can adjust these as needed. The user can also create new clinical interventions within the model and cost these.

2. **Programme activity costs** - this section allows the user to cost activities related to IEC, admin, M&E surveys, in-service training, programme staff, etc., as would be needed for the specific health programme to support the scale-up of direct care interventions. This is also where some of the policy - related activities can be costed, such as activities related to legislation and regulation.

3. An assessment of the **health system implications** of the planned scale-up and their resource costs, for example translating the number of required outpatient visits into numbers of full-time health workers.

Results generated for a vertical programme
Within the OneHealth tool: each programme module (e.g., Nutrition or Malaria) produces its own outputs for resource use and costs, in terms of how many clients will be reached per year, the requirements that this poses on the health system in terms of outpatient visits and inpatient days, and the total projected cost by activity, by level of service delivery, type of input, and year.

Results Generated for the Entire Tool
Health impact is estimated through impact models that are directly linked to the targets and strategies identified by the user within the model. Three submodels within the OneHealth tool draw upon the UN epidemiological reference group models, a recognized gold standard, are fully incorporated as part of the OneHealth software:

- The Lives saved Tool (LiST)[13] estimates impact for a range of child and maternal health interventions, including malaria interventions.
- The AIM model projects health impact for HIV/AIDS interventions
- The Family Planning (FamPlan) model computes the relationship between family planning and total fertility rate. The output is then communicated to the population projection parts of the tool.

Moreover, a newly developed TB model projects impact on TB health targets, and additional work is planned in the future to support further development of impact models where feasible, for example for non-communicable diseases and malaria in adults.

These impact tools inform the production of general output tables where the aggregate outputs are considered, for example the total predicted impact on maternal mortality.

The greatest benefits from using OneHealth to inform the planning for a disease specific or priority-programme is the ability to integrated the findings into a broader planning process that looks at the entire health system. The output from OneHealth can be used as a basis for discussing resource allocation and priority setting decisions both *between* and *within* programmes. This will ensure that the disease-specific plan is fully integrated into a sector-wide process and is incorporated into regular government processes for financing health programme activities.

1.1 Process

As mentioned above, the greatest benefits from using OneHealth to inform a disease specific programme plan is its ability to integrated results into a broader planning process. There are also disease-specific applications to donors where Health System components should be identified, for example Global Fund and GAVI applications for countries that are eligible to submit proposals for disease components (HIV and AIDS, tuberculosis, malaria as well as for Cross-Cutting Health Systems Strengthening). However the broader plan and the disease-specific plan may not be developed at exactly the same time. There may also be impetus to use the OneHealth for a programme-specific assessment for a specific advocacy purpose.

The process for using OneHealth may be a bit different depending upon the purpose and scope of analysis.

[13] http://www.jhsph.edu/dept/ih/IIP/list/

The overall process for implementation of OneHealth would typically involve[14]:

1) Initiation of planning process and initial assessment of data availability and data compilation

2) Stakeholder meeting (first plenary)

   This meeting would including all stakeholders, health systems and vertical programmes. The OneHealth expert explains the purpose and scope, and overall framework of OneHealth. An overall situational assessment (including assessment of mortality burden and effective interventions to address burden) is shared. The group reflect on progress made to date, and progress made with regards to the previous national health strategic plan. There is brainstorming on cross-cutting issues (e.g., role of private sector in service delivery). The importance of health system investments is discussed, and the concept of bottlenecks is raised and discussed. There is agreement on the process for the strategic planning, and OneHealth is configured with start and end years, etc., (plus the mapping of interventions by programme).

3) Tool set-up with baseline data entry

   Baseline data is entered into the tool:

   - For disease programmes this relates to situation analysis, Strengths and Weaknesses analysis, baseline coverage, the selection of intervention and a baseline analysis for the bottleneck analysis, i.e. enters information for tracer interventions and identifies constraints
   - For HSS modules this relates to entering baseline information.
   - Data is also entered into the Financial Space module.

   A consultant helps with discussions and data analysis.

4) Second plenary to agree on overall direction of national health plan

   A presentation is made on constraints identified by health system level (i.e., aggregated bottleneck analysis). At this meeting there is also a discussion with hospital mangers and district level managers, to ensure that their experience is captured in the discussions. The expected outcome of this meeting is to agree on health systems solutions. There is agreement on policy directions for 1-3 scenarios. A second plenary should have already discussed the financial space available.

5) Individual modules/groups – first draft of strategic plan

   At this point country participants break into their own technical programmes, and use the relevant OneHealth nodule to identify strategic plan targets and activities for scale-up) (e.g., for disease modules this includes the second part of the bottleneck analysis where possible solutions are presented and the likely impact modeled). Note: there is a preferred sequencing whereby the HRH and Infrastructure modules are completed before the disease programs begin their planning.

[14] This section was taken from the ppt: “Country level health sector planning: Process of planning and support/facilitating function of the UHM” IAWG-Costing Draft 12 July 2010.

Then Logistics is completed after the disease programme analysis, since it requires inputs on commodity volumes by level.

6) Participants regroup to assess the joint plan

The entire group comes together again to discuss the combined results (particularly looking at the expected impact and cost, and to what extent the strategies planned correspond to the key policy questions identified in the first plenary). Participants discuss possibilities for further integration and synergies in effective delivery. Available resources are assessed and prioritized.

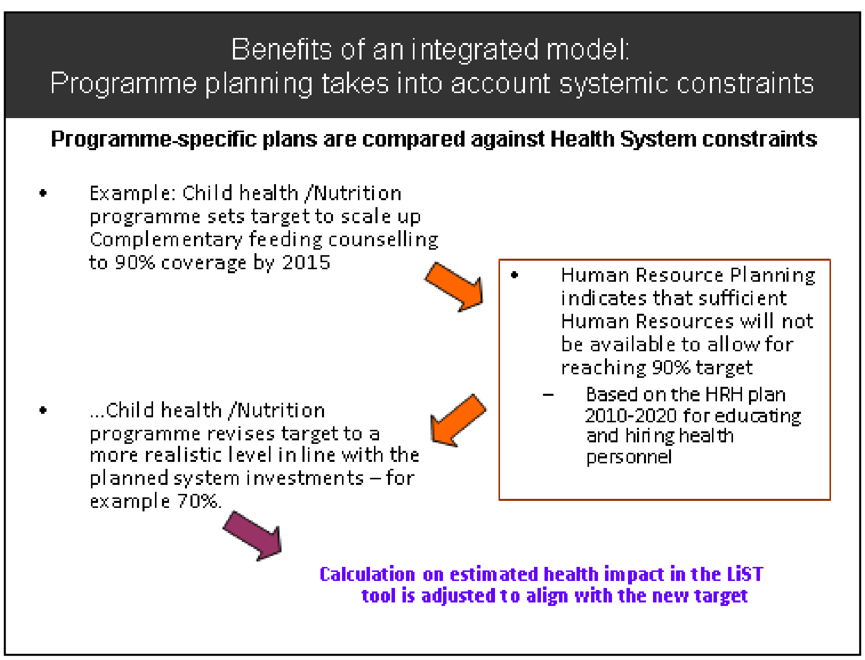
7) Individual modules/groups are adjusted with more specific instructions (e.g., to scale down this or that)

8) Revised modules are submitted and put together by central planners

9) A big group discussion and final presentation of NHSP is conducted, with costs, budget and expected impact. This includes a discussion with stakeholders on available financing.

If part of a broader planning process: (example nutrition)
The strategies for the disease specific programme (nutrition) would be developed in tandem with those for the other areas, and plenary sessions would be held to ensure a common approach in the overall policies and strategies outlined in the planning process. The nutrition managers would indicate the preferred targets and the implications would be communicated to the other modules, including Human resources, Logistics, Health information systems, and Financial Space. There may be iterations to the plan, for example if the health system modules indicate that service delivery targets are not realistic (Figure 4). Given scarce resources, once the financial space analysis has been completed, there may be a need to revisit targets and costs, and to reprioritize and reallocate the budget.

Figure 4. Programme Planning takes into Account Health System Constraints



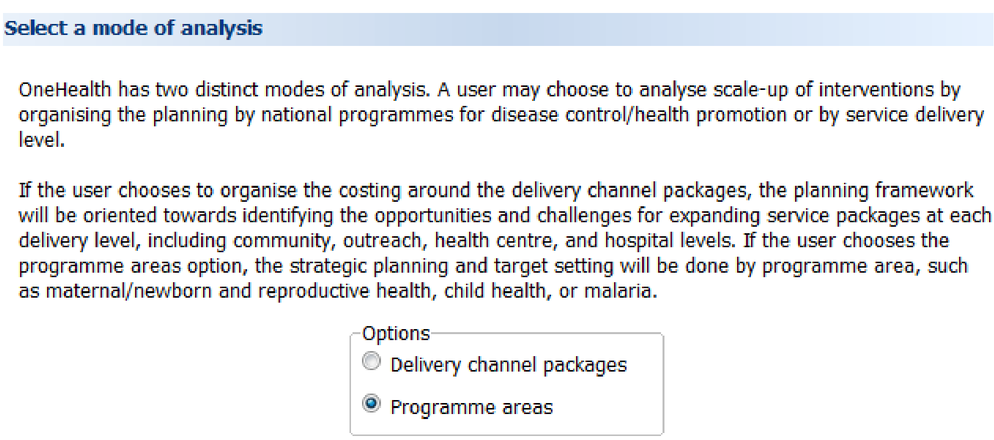
If a disease specific planning process: (example nutrition)
The nutrition planners would need to first enter baseline information into the Health Systems Modules for Human resources, infrastructure etc., in order to be able to see the impact on the health system. As such there is a need to become familiar with, and enter data into, more modules than Nutrition alone. Even so, the aggregate predicted impact on the health system would only be partial, since not all programmes' targets' would be taken into account. The nutrition managers would indicate the preferred targets and the implications would be communicated to the other modules, including Human resources, Logistics, Health information systems, and Financial Space. However the recommendations would remain without anyone acting upon them, as the planning for the health systems modules and related costing would not have been completed.

The user should note that the estimated health impact for scaling up nutrition interventions may appear different for a partial programme plan and for a holistic aggregate health sector plan, as risk factors interact and mortality profiles shift as interventions are scaled up.

Overall, efforts should be made to synchronize planning cycles. A nutrition strategy may set out specific targets that may seem reasonable from the programme-specific point of view, but may later need to be revised and re-costed when the entire set of programmes and health system components are considered jointly, since there may be a need to prioritize interventions within the boundaries of available financing.

1.2 Practical guidance on using the OneHealth software for a vertical programme costing

Model Configuration
For planning for a disease specific programme such as malaria or nutrition, the user would need to select the option “Programme areas" when configuring the model.



Defining the Scope of your Program
The current version of OneHealth comes equipped with assumptions for eight default programmes that aim to capture the health MDGs: Child health; Reproductive and maternal health; Immunization; Nutrition; Water and Sanitation (WASH); HIV; TB; and Malaria. It should be noted that additional programmes will be added in post January 2012, such as Non Communicable Diseases.

E.g.,: The scope of the WASH programme in OneHealth

In the current version, the following 5 interventions are "assigned" to the WASH programme:

- Improved water sources
- Water connection in the home
- Improved sanitation – utilization of latrines or toilets
- Hand-washing with soap
- Hygienic disposal of children's stools

The tool is flexible and the user can shift interventions between programmes, and also merge and/or create new programmes as needed, depending on the national planning context. The user can also create new interventions and cost these.

For more guidance on how to configure a vertical programme, refer to the OneHealth User Guide[15] section on Working With The Health Services Modules.

Framework for Programme Planning

It should be noted that the costing within each programme module follows a classification of costing whereby some costs are classifies as **direct patient costs** such as drugs and commodities directly related to each patient seen, whereas other costs are **programme administration costs,** such as activities related to monitoring and evaluation, research, training and general administration. Note that these should be activities specific to the programme.

OneHealth also includes the option for the user to undertake a bottleneck analysis for each programme, to undertake a problem analysis whereby current weaknesses in service delivery are assessed and strategies are proposed to overcome these.

Bottleneck analysis:

The use of bottleneck analysis within the tool is optional. A programme can use it to assess the specific challenges facing the scale-up of specific "tracer" interventions within the national health programme. Leaving it blank will not impact the target setting, cost and impact calculations. It may, however, result in fewer explicit linkages being made between different modules, in terms of identifying common factors across programme scale-up and health system requirements.

The function of the bottleneck analysis is to identify strategies that would facilitate scaling up the interventions. This is done through the use of indicators to indicate system and programme performance for different levels of access. The approach builds on that used in the Marginal Budgeting for Bottlenecks (MBB) model[16] where the identification of systemic bottlenecks is done using six coverage indicators:

- availability of essential commodities,
- availability of human resources,
- physical accessibility,
- initial utilization,
- timely continuous utilization, and

[15] UHM Quickstart User Manual, Futures Institute draft Aug 2011.
[16] The MBB tool is developed by UNICEF and the World Bank and is based on Tanahashi (WHO Bulletin 56(2), (1978).

- effective quality coverage of services (this can be directly linked to the final coverage, and thus the health impact modeling).

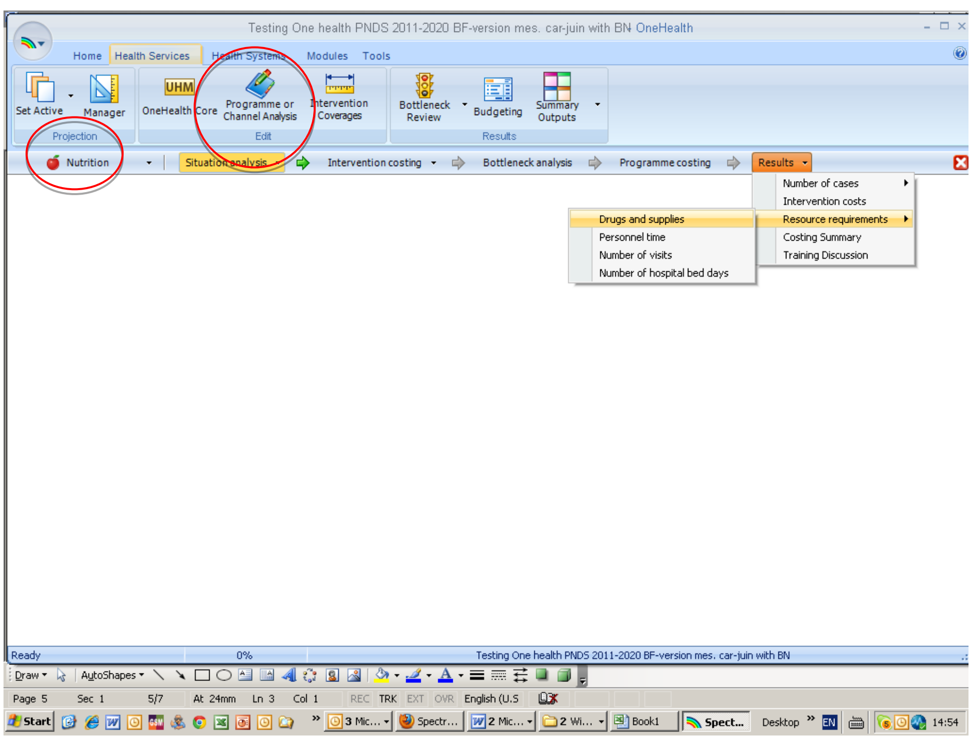
Programme planners can identify strategies that can be implemented to reduce the bottlenecks. Then, within each target setting and costing table, there is a button for accessing reminders on which bottleneck strategies have been proposed, to ensure that the user can review these and decide whether to cost them or not. Some strategies are costed in the health systems modules (Human Resources, Infrastructure, Logistics, etc.) and other strategies (e.g., training, supervision, etc.) are costing in the separate programmes, packages or channel specific costing areas.

Experience from countries having used a bottleneck type approach to assess current health system performance indicates that the analysis can be very useful for informing scale-up strategies to overcome existing problems. It should be noted that within OneHealth the bottleneck analysis does not drive any calculations within the tool. The bottleneck analysis helps the user to identify strategies and to ensure that these strategies appear on a common "check list for action points" that is accessible throughout the tool for all users.

As shown in the image below, the framework used within each programme module for strategic planning is:

1. Situation analysis
2. Intervention costing
3. Bottleneck Analysis
4. Programme costing

These four items are part of a "ribbon menu" within each programme as shown below.



Moreover, estimating the costs for interventions requires using another input area called "Intervention Coverage", circled in the screen shot above. This is where coverage targets are entered (in the current version of the tool, to be reviewed).

Process of data entry for a vertical programme
The envisioned process of entering data for a programme is as follows:

Assess the current situation:

- Download the UN country profiles by clicking on situation analysis tab
- Go do the impact modules to look at the current cause of death profile (when applicable to your programme, for example child health).

Define interventions:

- Define the population in need of each intervention
- Define the delivery channels, both for the current situation and for the future
- Define the ingredients
- Set coverage targets

In the current version of OneHealth, all interventions are shown in the same editor, so if a user is entering data for e.g., the Vaccine programme, s/he will still see the full list of OneHealth interventions in the "Intervention coverage" editor.

Instructions for coverage:

- Click on the “Intervention Coverages” Icon to see the pre-loaded baseline, frontier and target coverages (baseline coverage come from country-specific databases in the tool. The user can overwrite these).
- The target coverage is used to set targets and determine the cost directly related to the intervention coverage targets. The frontier coverage is an indicative target that is derived from the bottleneck assessment. Initially the frontier coverages (column 3) are set to be equal to the target coverage. If the user has done a bottleneck analysis the calculated frontier coverages will be automatically transferred to column 3. Refer to the user manual for more details on frontier and target coverage.
- The population in need, delivery channels and treatment input menu items have defaults loaded. However, you may wish to adjust them to your needs – especially the delivery channel which has a global default and is not country specific. You can adjust the figures in all three costing elements by clicking on the figure and re-typing a new one.

Programme Administration Costing
Within each module, in addition to intervention costing, there is also a section for programme costing which allows the user to cost activities related to IEC, admin, programme staff, etc.

Outputs within the Tool

Programme-specific outputs

Each programme module produces its own outputs for costs, including in terms of how many clients were reached, how many outpatient visits and inpatient days at each level are generated due to the programme scale-up, the quantity of different drugs and supplies needed, and what is the total projected cost by activ

General outputs

There are also general output tables within OneHealth where the aggregate outputs are considered, for example the total impact on child mortality not just due to e.g., WASH, but also due to other interventions such as immunization, diarrhea management etc.

Examples of interesting policy issues that can be explored using the tool:

- What are the cost and health system implications of shifting delivery from one delivery channel to another?
- What are the human resource implications of shifting service delivery to community level versus primarily first level health facility level?
- What are the resource implications of changing the standard treatment guidelines?
- What is the potential reduction in in-service hospital care when preventive services are scaled up?

Programme Costing, Broader Health Sector Costing and Including Costs Incurred by other Sectors

OneHealth has been facilitated to support integrated planning. As such it facilitates the integration of programme-specific plans within a broader health sector strategy.

The tool has been developed to include activities that are seen as strategically important for health planning. As such it also includes costs that may be funded by other ministries than the MoH. The OneHealth Tool produces a total cost, by year, broken down by inputs and activities. Within the budgeting module, the user can map each type of cost to a specific budget category and a specific financing source within the national system. This means that activities can be presented according to whether they are funded by the MoH or not. This may be important for example for WASH-related activities, and the cost can be presented as a cost that is to be borne by another department or Ministry, whilst it should still be included in the national strategic health plan and related costing.

3. Input * Output Relationships

The various modules pass information back and forth between one another. Figure 5 shows in a highly schematic fashion how the modules link up with one another. Each of the modules has its own display and output options. The OneHealth skin also provides customized output options that combine elements of the various modules to answer particular questions. Figure 6 shows in a bit more detail how the modules will combine to answer particular questions.

The user has the opportunity to make a selection of interventions from several places including from the OneHealth master module, the impact modules, the health intervention costing module or via the bottleneck analysis. The bottleneck analysis is linked with the health systems modules as a two-way communication. The bottleneck analysis draws information from the health system costing modules. Then, based upon the policy decisions made in the bottleneck analysis, health system scale up scenarios are fed back to the health system modules and coverages are sent to the impact and intervention focused costing modules. As noted above, the impact modules, intervention costing modules and the health systems modules may all by-pass the bottleneck analysis if the user desires to directly enter scale-up paths.

The intervention focused costing and the health systems costing modules are combined to calculate total cost. Since human resources are calculated in two places, the user may choose one or the other or both for calculation purposes. The outputs will make clear the decisions that the user has made.

The total costs and the implicit budget items are passed along to both the budget mapping module and the financial space module.

Figure 5: Schematic of module interaction for OneHealth

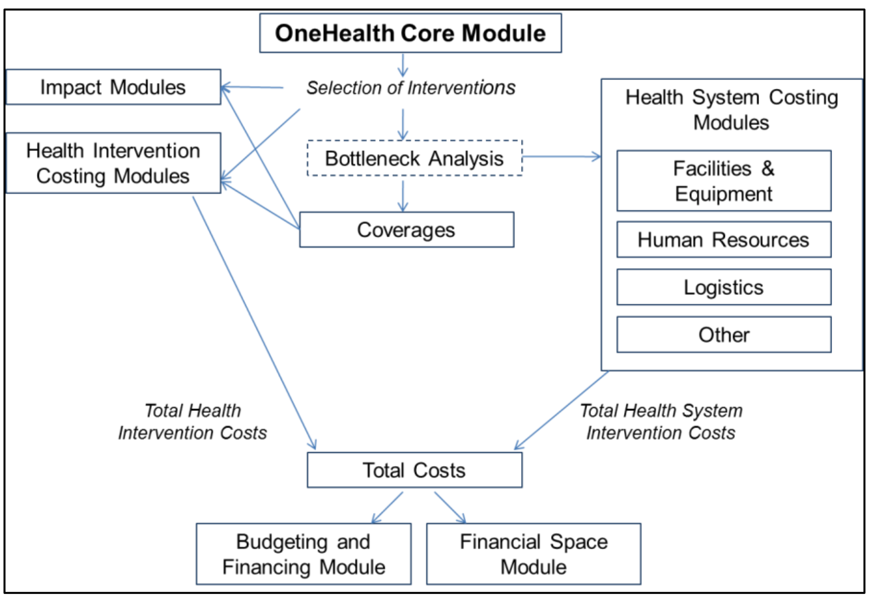
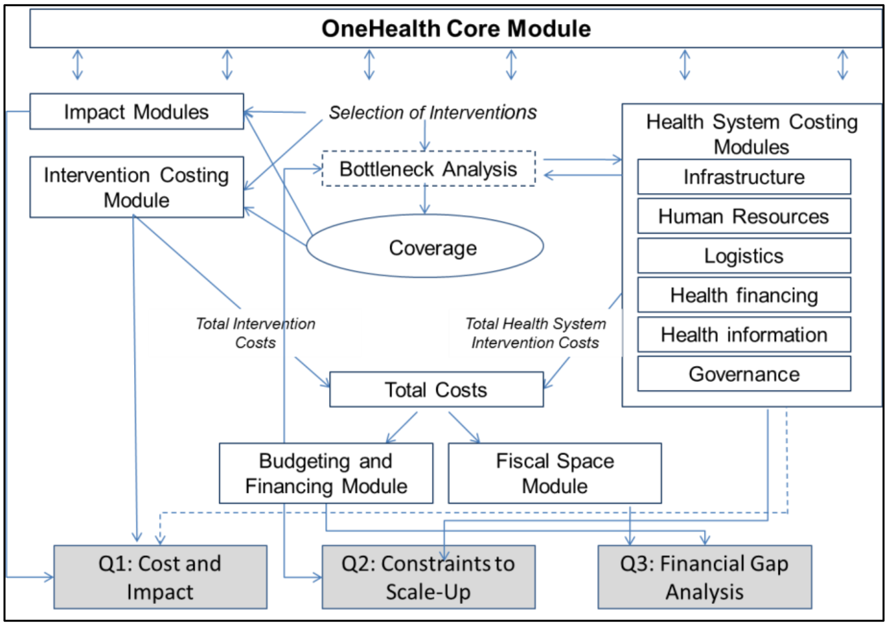


Figure 6 maps how the various modules work together to answer the three costing questions posed earlier. Lines pointing to Q1 show how OneHealth answers questions related to cost and impact of scaling up a set of interventions. Note that a dotted line is connected to the Health System modules. This indicates that the costing can be done with or without the health systems scale up included according to the needs of the user. The diagram also shows that the bottleneck analysis is optional, again depending on the needs of the user.

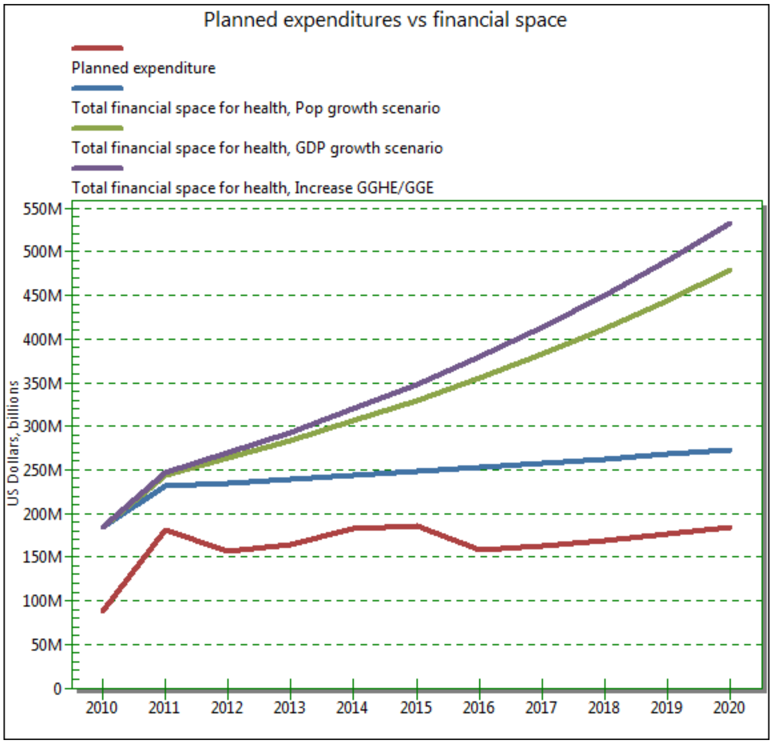
Figure 6: Relationship of modules for answering costing question one



Lines pointing to Q2 show how the modules interact to answer cost questions related to health system scale up. This diagram shows again that many options are available for answering the question. However, in this case, the user is strongly urged to use the bottleneck analysis (even though, as the diagram shows, s/he could go around it).

Figure 7 shows how the OneHealth Tool can compare financial needs for health system scale up with potentially available resources. The diagram is very similar to that for analyzing health system constraints except that the financial space module will need to be used.

Figure 7: Planned expenditures and financial space graphic



All of the modules have inputs as well as outputs. They also communicate with one another. Table 2 presents a nearly comprehensive list, for each module, the inputs it receives from other modules and the outputs it feeds to other modules.

Table 2: Input and output relationships among the modules

Module	Inputs from other modules or external sources	Outputs to other Modules
DemProj	Baseline population, mortality and fertility from UN Population Division Mortality Impacts from LiST AIM TB Impact Model Fertility Impacts from FamPlan AIM	Population data to: MCH Costing HIV/AIDS Costing Malaria Costing TB Costing Facilities & Equipment Human Resources
LiST	Population data from DemproJ HIV/AIDS Prevalence and Mortality from AIM Default coverage and effectiveness from external database	Coverage of interventions to intervention focused costing
FamPlan	Population data from DemProj Default country proximate determinants from external database	Fertility to DemProj Numbers of women using different FP methods to intervention focused costing
AIM	Population data from DemProj	Mortality Impact and prevalence to LiST

Module	Inputs from other modules or external sources	Outputs to other Modules
	HIV prevalence from Goals	Child intervention coverages to intervention focused costing
Goals*	Default intervention effectivenesses from database	HIV prevalence to AIM Coverage of interventions to intervention focused costing
TB	Population data from DemProj Default intervention effectivenesses and country defaults from database	Intervention coverages to intervention focused costing
NCD*	Population data from DemProj Default intervention effectivenesses and country defaults from database	Intervention coverages to intervention focused costing
Intervention focused costing	Population data from DemProj Depending on path chosen, intervention coverages from the Intervention Coverage section If bottleneck analysis is done, target coverage rates and scale-up path from Bottleneck Module Impact modules OneHealth master module	Coverage data to LiST impact model Cost to Total Cost Estimate of required human resources based on bottom-up approach to Human Resources
Pop-up costing	International drug and commodity costs from external database	Calculated unit costs to Intervention focused costing module
Bottleneck Analysis	Number of existing facilities and facility norms from Facilities & Equipment Number of existing health staff and personnel norms from Human Resources Logistics capacity from Logistics module	Target coverage achievable with the selected health system interventions to coverage sheets in MCH Costing HIV/AIDS Costing TB Costing Malaria costing Health intervention scale up to Health system modules
Facilities & Equipment	Population data from DemProj Baseline infrastructure information from country database	Cost results to Total Cost Number and type of technicians required to Human Resources Total cost of facility and equipment scale up to Total Cost to be added to heath intervention costs Baseline information to bottleneck analysis
Human Resources	Population data from DemProj Basic HR information from country database	Cost results to Total Cost Baseline information to bottleneck analysis
Logistics	Total drugs required from Health Intervention focused costing module	Cost results to Total Cost Baseline information to bottleneck analysis
Other Health System Interventions	Population data from DemProj Human Resources data from Human Resources	Cost results to Total Cost Baseline information to bottleneck analysis
Total Costs	Total health intervention costs From Intervention focused Costing Modules Total health system costs from Health System Costing Modules	Cost data to Budgeting and Financing Module Financial Space

Module	Inputs from other modules or external sources	Outputs to other Modules
	(facilities & Equipment, HR, Logistics, etc.)	
Budget mapping module	Cost data from Total Cost Module	--
Financial Space	Cost data from Total Cost Module Default data from country database	--

See Annex 2 for a list of Frequently Asked Questions about OneHealth, and Annex 3 for a table of OneHealth interventions with impact.

*Goals and NCD components to be incorporated in 2012.

IV. BOTTLENECK ANALYSIS[17]

1. Overview and Function

“Bottleneck Analysis” for an Informed Planning Process

The concept of a "bottleneck analysis" is a central idea in the Marginal Budgeting for Bottlenecks (MBB), developed by UNICEF and the World Bank. The analysis entails identification of health system bottlenecks that hinder service delivery and the possible causes of these bottlenecks; proposes strategies or policy scenarios to eliminate these constraints; and sets new frontier coverage targets.

OneHealth draws upon the experience of the MBB and other tools and approaches, to facilitate a planning process that takes into account existing system constraints and how to overcome them. The approach has been made more comprehensive in OneHealth.

Bottleneck Analysis in OneHealth

Similar to the MBB, OneHealth encompasses features to represent quantitatively what the users think/know about the constraints in the current health system and show how these would affect the scale-up of intervention coverage as planned. It aims to inform the target setting process, which is part of the general planning process. Similar to the MBB approach, these features take the user through a process looking at different aspects of the current health system and current constraints to improving health service utilization. The "bottleneck analysis" projects what intervention coverage targets can be reached in the final scale-up year, given the health system investments that are planned.

The model guides the user in an analysis of the different constraints (bottlenecks) presently faced by the system and the possible strategies to overcome them. This analysis helps discussions by guiding the projection of intervention coverage targets that can be reached within the planning period, given the health system investments that are planned and the specific activities identified to stimulate demand and improve quality, thereby informing the planning process.

> It should be noted that users may wish to set their own targets and not use the constraints analysis. Therefore, in OneHealth this feature is optional.

The model strongly links the assumed or planned scale-up of specific disease control programs with the health system requirements, and signals the:

1. Required investments in the health system that would need to go with the planned increase of health service coverage; and
2. Feasibility of reaching the proposed service delivery targets within the current or planned health system.

[17] This section was taken from the document: "'Bottleneck Analysis' for Guiding the Strategic Planning Process in United Health Model by K Stenberg 23 March 2010."

The analysis in OneHealth thus incorporates a solid framework linking each intervention or disease control area with specific health system investments.

Initial bottleneck analyses are carried out separately by the different programmes. Programmes then group their interventions into packages based on the way they are delivered (at the community level, through outreach, at health center or at hospital level) and carry out separate bottleneck analyses for each of these packages. The model hen aggregates the identified bottlenecks by service delivery ode, and program managers and central health systems managers (i.e., those in charge of human resources, commodity management, and infrastructure) to determine system-wide solutions to alleviate the supply-side bottlenecks that were identified. Once strategies for removing bottlenecks (and their expected impacts on coverage) at the commodities, human resource and infrastructure level have been identified and entered into the model, the programmes carry out another round of bottleneck analyses that take into account the planned improvements in the health system. This allows programme managers to identify programme-specific activities (e.g., training, IEC, etc) that would further alleviate identified bottlenecks (and which are costed in the programme costing module). An example is provided below.

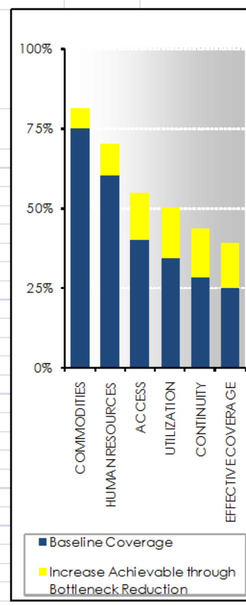
Bottleneck Calculations - Maternal Health Example

This is the bottleneck analysis screen for the program managers. There woudl be as many screens as there are delivery channels for that health program so program managers could discuss bottlenecks for each delivery channel separately. The findings for the top three bottleneck categories woudl be aggregated so they coudl be presented to the responsible entitites at central level (Logistics, HR and Infrastrcture) for action.

1. Community | 2. Outreach | 3 Health Center | 4. Hospital

Maternal Health - Community Level

	Indicator	Baseline Coverage	Plausible Causes for Bottleneck	Suggested Strategies to Overcome Bottlenecks	Bottleneck Reduction	Total Bottleneck Reduction	Calculated Frontier
COMMODITIES	Communities with monthly delivery of commmodities	75%	Shortages of folate tablets and condoms	Monthly deliveries from health centers	25%	25%	81%
HUMAN RESOURCES	Trained CHW available as % of need	60%	Not enough trained staff	Training of 2,000 more CHW	25%	25%	70%
ACCESS	% of village with at least 2 CHWs	40%	Not enough trained staff	Training of 2,000 more CHWs	25%	25%	55%
Functional	Intermediate calculation	40%	HIDE THIS ROW				55%
UTILIZATION	Low awareness of population of service available	34%		IEC campaign Theater group	30% 10%	40%	50%
CONTINUITY	Rude demeanor of CHWs	28%		Attitute training for CHWs	30%	30%	44%
EFFECTIVE COVERAGE		25%				0%	39%



2. Components of the Bottleneck Analysis

Problem Statement/Situation Analysis

For each OneHealth module (disease/programme modules as well as health system modules), there is a situation analysis that aims to facilitate the discussion around a problem statement. Where is progress currently lagging behind and how can it be improved? Within each module in OneHealth, this "Situation Analysis" screen is more or less the first screen appearing to the user.

For malaria information on the following is used:

- Trends in malaria morbidity and mortality (reported number of cases and deaths per 1,0000
- Coverage rates of key malaria interventions (ITN use, antimalarial treatment)
- Selection of malaria interventions with high impact on child mortality (from LiST)
- Data for 30 high-burden countries available from World Malaria Report 2009.

The upfront situation analysis may focus mostly on health outcomes and access to care since these will be indicators and graphs that pop up and that are populated with **default values available at global level.**

It should be noted that the Health Systems modules in OneHealth also include their own situation analysis, to show how the country is fairing and how system performance could be improved.

A subsequent step in the analysis and tool application process is to think about constraints within the system that are hindering progress - i.e., the bottleneck analysis.

Sub-Packages for which Bottleneck Analysis is Done

As described above, the MBB tool has 12 sub-packages based on levels of delivery. However given the modular approach of OneHealth, interventions are bundled *within disease programs* with the objective of doing a ***programme-specific bottleneck analysis.*** Thus, a vertical programme can determine the constraints specific to their set targets, and what activities should be planned to overcome these constraints. For large programmes with many interventions and different delivery channels it is suggested to carry out a bottleneck analysis for each of the four key service delivery levels: community level, outreach level, health center level, and hospital level.

In addition, within OneHealth there is a bottom-up aggregation of all bottlenecks identified by the vertical programmes to allow the user to see which are the ***common constraints*** across programmes and delivery channels, and how can these be addressed.

Moreover the Health System modules in OneHealth also include a ***Health Systems bottleneck analysis*** where relevant, for example HRH may face bottlenecks related to production of health workers or with regards to retention of staff.

Dynamic components are included to allow modules to communicate with each other, to indicate synergies and differences in the inputted parameters and ambitions.

Indicators for the Bottleneck Analysis

In the bottleneck analysis, the user is asked to enter data on the current (baseline) situation. Based on the data entered, OneHealth helps the planner or policy analyst to identify bottlenecks or other constraints to scaling up critical health interventions. These analyses compare baseline situations to national and international norms.

The tool has default indicators for identifying the bottlenecks. We rely on disease-specific experts within the UN health agencies - behind the development of OneHealth - to provide guidance on the indicators that should be used for each programme.

Similarly for the Health System modules in OneHealth, we rely on suggestions for indicators that would be common across countries and can be used to indicate weaknesses or challenges in current health systems.

As a first step, and unless other inputs are provided, the MBB default indicators could be used for OneHealth disease-specific bottlenecks, wherever applicable (see Annex 4).

Strategies to Overcome Bottlenecks
Strategies can relate to:

- Reducing supply-side bottlenecks such as those related to geographic access to health services (infrastructure); availability of HR and commodities (logistics).
- Reducing demand-side bottlenecks related to care-seeking and continuity in treatment - e.g., timely care-seeking for fever, children sleeping under an ITN. Here strategies may relate to IEC, mass media intervention etc.
- Reducing bottlenecks for quality of care, such as inappropriate prescription behaviors, by strengthening staff skills and/or motivation (e.g., through in-service training or provider incentives)

In general, it can be hypothesized that the supply-side bottlenecks relating to ACCESSIBILITY and AVAILABILITY fall largely under the responsibility of the entire health system, and not just under one programme. On the other hand, the constraints related to demand, UTILIZATION and QUALITY of care may more frequently fall under the responsibility of specific vertical disease-control programmes. Thus, a national malaria programme may organize IEC events or training specifically with the aim to improve malaria-related health outcomes.

Using the Bottleneck Analysis to Determine Appropriate Coverage Targets
OneHealth uses the MBB concept of "effective coverage". Investments in removing bottlenecks related to availability, access, acceptability, and quality influences the final effective coverage reached and subsequently impact. This is an optional function of the tool - the user can choose to over-write the tool-derived targets.

The user is guided through the Bottleneck analysis by the following process in OneHealth:

1. The user defines current coverage.
2. S/he is asked whether she wishes to use the constraints analysis function to set targets.
3. If NO: the user sets his/her own coverage targets.
4. If **YES (Strongly Recommended)**, The user assesses the system constraints for her specific area of interest (e.g., TB, malaria or nutrition), through a visual illustration of current

availability/ access/quality, etc., through the use of standardized indicators specific to that programme (each "disease module" or "package" would have its own "bottleneck indicators").

5. The user identifies strategies (action plans) for overcoming the constraints.
    a. Some of these will be systems wide strategies - for example employing more nurses or improving the logistics system.
    b. Others will be programme-specific.
6. The disease-specific modules communicate bottom-up to the health systems modules regarding identified requirements at central/systems level.

The health systems modules communicate "down" to the disease-specific modules, to indicate what is reasonable in terms of system investments (the child health program might ask for a 20% increase in nurses while the system can currently only produce a 10% increase). The user provides an estimate on how much each strategy will reduce the current bottleneck. The model adds up all these numbers to estimate an “achievable” effective coverage.

While the national ambition may be to achieve 95% coverage, the use of the bottleneck analysis might find that the country will only be able to achieve a coverage of 80%. If this is the case, the user is encouraged to go back to the health system modules and communicate a desire for greater ambition of system investments (Table 3).

Table 3. Draft Example of Bottleneck Analysis for Malaria at the Community Level (ITNs)

Red font shows user input

Malaria - Community Level

1	2	3	4	5	6	7	8
	Indicator	Baseline Coverage	Plausible Causes for Bottleneck	Suggested Strategies to Overcome Bottlenecks	Bottleneck Reduction	Total Bottleneck Reduction	Calculated Frontier
COMMODITIES	Availability of ITNs compared to need	90%	Shortage of ITNs	Purchase of more nets	50%	50%	95%
HUMAN RESOURCES	Trained staff available for hanging and retreating ITNs	80%	Not enough trained staff	and retreatment	30%	30%	86%
ACCESS	% of villages with trained staff	80%	Not enough trained staff	Training of 500	15%	15%	83%
UTILIZATION	Low awareness of population of service available	50%		Radio jingle	15%	15%	57%
CONTINUITY	Shortage of retreatment fluid	45%		Purchase of retreatment fluid	30%	30%	53%
EFFECTIVE COVERAGE		40%				0%	47%

1. Situation Analysis
The first column shows the 6 areas around which the discussion will revolve. In the second column the model would show possible indicators that could be used to carry out the analysis (the user can also enter his own indicators). In the third column the user would enter the current, baseline coverage for these indictors.

2. Strategy Discussion
In column 4 the user would enter the main results of a discussion of plausible causes for the lower than desired coverage. In column 5 the user would enter suggested strategies to overcome constraints then indicate the assumed reduction that would follow from implementing the proposed strategy in column 6.

3. Determining appropriate target levels
The tool will calculate a ***feasible*** target as shown in columns 7 and 8 in the Table above. For some additional detail on how the frontier is calculated see Annex 4.

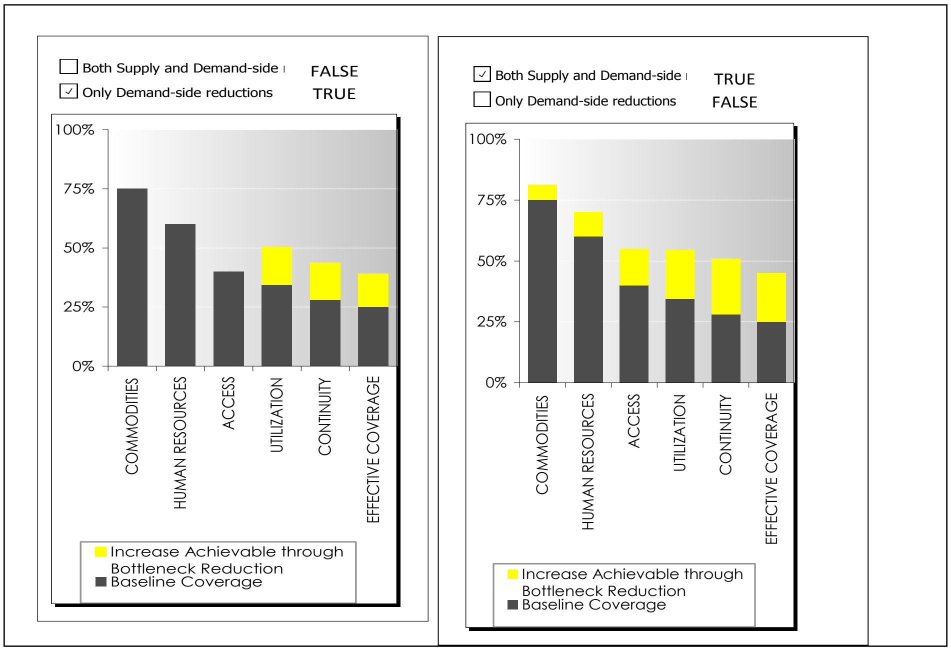
   The user can choose to either:

   a. Accept the feasible coverage target proposed
   b. Go back and adjust the strategies so as to make them more ambitious, thus removing additional constraints which should lead to a higher final effective coverage
   c. Decide to still go with the official coverage targets, even if they are higher and do not seem feasible given the bottleneck analysis (strongly discouraged).

It should be noted that the Bottleneck analysis requires an active participatory process where policymakers, planners and program managers are involved.

Visual Aids
Graph options exist which can be used to compare the implications of the current situation with the expected outcomes of an intensified strategy to overcome bottlenecks in the system. Graphs will help to visually illustrate the resource implications of different scenarios as the user goes through the planning process.

Figure 8. Comparison of Final Effective Coverage Reached



See Annexes 7-9 for more information on the Tanahashi framework and "cascading" function within MBB and additional details about the Bottleneck Analysis tool.

V. Health System Focused Planning and Costing Modules

1. Human Resources Module[18]

A. Purpose

The Human Resources (HR) module is a semi-autonomous component of the OneHealth Tool. It has interactive links with other parts of OneHealth to allow for synergistic planning (e.g., estimating human resource needs based upon infrastructure scale up). It also has links to programmatic planning areas where particular human resource-related needs can be communicated from the programme areas to the human resources planners. For example, perceived deficiencies in staffing numbers or pre-service training can be communicated to human resource planners, and aggregate training plans are available for analysis by human resource planners. In addition, the module can be used as a stand-alone tool.

B. Organization of the HR Module

The Human Resources module is organized into five distinct pieces:

1. ***Baseline data entry:*** the planner enters appropriate baseline information including numbers of current staff, salaries, benefits, incentives, attrition rates, training capacity, etc.
2. ***Situation analysis:*** a brief summary of the current situation.
3. ***Target setting:*** the planner selects an option (direct entry, population standards or facility standards) for projecting human resource needs into the future.
4. ***Policy analysis:*** the planner examines alternative scenarios for reaching targets. The scenarios allow alternative levels of attrition reducing incentives, increased training capacity, increased hiring, etc. These measures can be combined in any way as the user desires.
5. ***Finalization:*** the planner selects the policy option scenario and target s/he would like incorporated for final estimation of budgets and staffing levels.

The outputs from the HR module include:

1. Needed staff
2. Salaries, benefits and incentives
3. Pre-service training needs and scale up of training capacity
4. Budget

In addition to the items mentioned above, the HR module also has components for estimating the management and training needs of the HR division within the MoH (e.g., human resource management staffing, human resource training, planning, overhead, etc.).

[18] This section was taken from the document: "Concept Note: Human Resources Module of the United Health Model, 28 July 2010" and the Excel file: "Policy Approach to Achieve HR Targets"

C. A Systemic Modular Approach

The model uses a systemic modular approach. At the core of the model are the preventive and clinical interventions and the health system components, which interact in a dynamic form, to represent the actual working of health systems in a more realistic manner. Synergies are incorporated within the model to allow the different parts of the tool to communicate back and forth. The modular approach means that after the present system design and performance has been analyzed and incorporated into the model as the foundations of the analysis, a user can apply the model in different modes:

1. *System Approach*, starting from an analysis of health system bottlenecks and strategies to remove these, followed by an assessment of how these may affect the feasibility of reaching the proposed service delivery targets within the current or planned health system;
2. *Programme Approach:* Focusing on one programme, analyze its specific bottlenecks and model the expected impact and costs of the strategies designed, while taking the overall system design and constraints into account; or
3. *SequentialProgramme/System Approach*, going through this process for multiple programmes, which will highlight cross cutting systemic and policy issues to be addresses.

Since the systemic approach is taken, general as well as specific human resource management issues can be identified and addressed. Human resources can be scaled up consistent with infrastructure scale up. Pre-service training can be matched to the needs of issues identified either by programmes or managers of facilities at the community, clinic or referral level. Also since the modules are all linked to the demographic engine of Spectrum, human resource plans are consistent with dynamic population growth.

Users also have the option of incorporating policy analysis to the HR component, with the ability to analyze policy options such as retention incentives and their impact on the ability to meet human resource needs of the health system.

D. Intended Users

In general, OneHealth is intended for national and sub-national level use. The intended users of this tool include:

1. National and sub national health planners - including condition-specific planners (e.g. national malaria or reproductive health programme), planners for specific health system components (e.g., human resources department) and health sector planners (Department of planning)
2. NGOs, CSOs, and other agencies working in specific countries
3. Donors, academe and UN agencies
4. Independent consultants, researchers

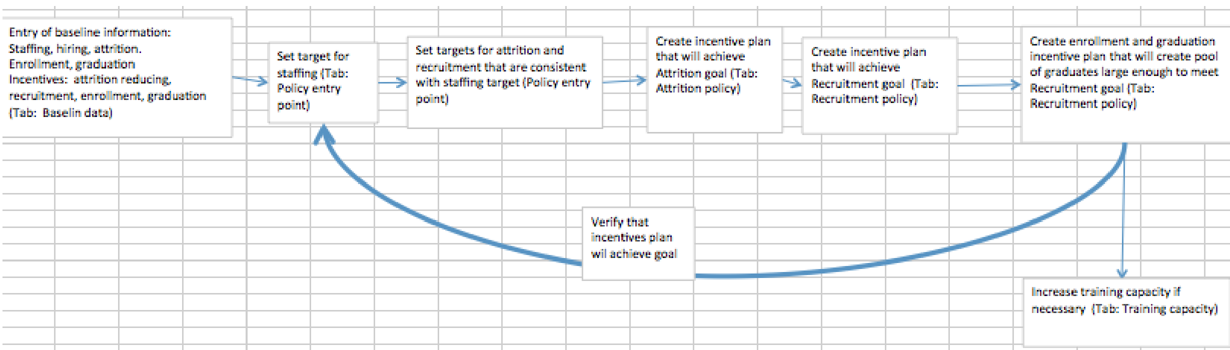
The primary anticipated users of the HR module are human resource planners.

E. Framework

Figure 8 below shows a simplified policy framework to examine policy options to achieve staffing targets. This approach needs to be replicated for each of the staff types. There are several things that are not included here, but that are implicit:

- Staffing targets could be set by population ratios or facility standards;
- Many of the incentives could be complicated considerably (e.g., incentives to reduce attrition by type of attrition); things are kept simple here for exposition
- Costing would need to be added.

Figure 8. Framework for Policy Options to Achieve Staffing Targets



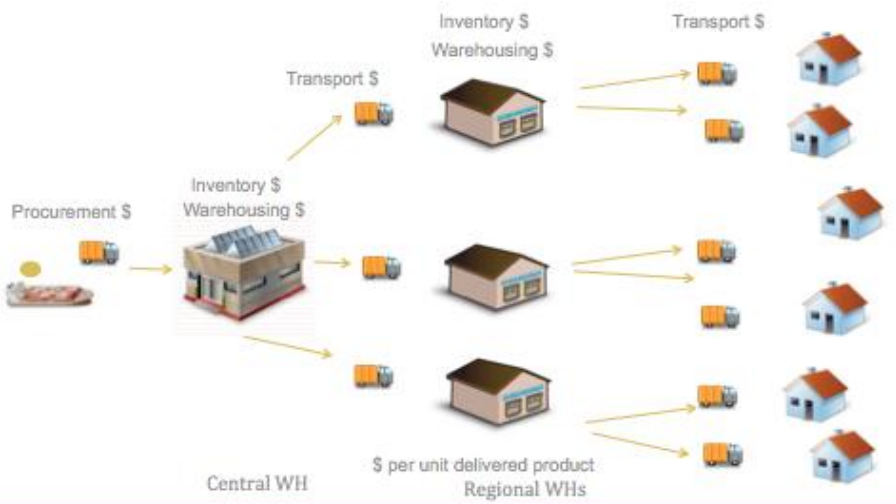
2. Logistics Module[19]

A. Overview

The Logistics Module is used to cost the logistic and supply chain, including costs of warehouses/forklifts and other equipment and delivery vehicles and their operating costs. The module tracks costs from procurement to delivery at the facility level (see Figure 9).

[19] This section was taken from the ppt: "A United Health Model for Strategic Planning and Costing: A Tool under Development by the UN IAWG-Costing. Logistics & Supply Chain Component. By K Stenberg WHO September 2010."

Figure 9. Costs from Procurement to Delivery at Health Centers



The Logistics Module is different from the other OneHealth modules, because it has the option to draw from a separate "calculator" that optimizes the logistics network needed to deliver the drugs and supplies indicated by the user. As such, the user does not provide a scale-up of logistics elements. Instead, the logistics calculator the Public Health Network Optimization and Modeling Tool (PHeNOM) is used to calculate the scale-up of vehicles, warehouse workers and warehouses based on the projections of drugs and supplies. The PHeNOM algorithm finds the lowest cost network configuration and optimal flows that satisfy all constraints. Default constraints include:

- Delivery Point within 250 kilometers of a warehouse,
- At least 1 central warehouse or import point, and
- No inter-facility flows within tier.

The user enters selects/edits:

- Country, years of analysis
- Commodities quantities, unit volumes, unit weights, prices
- Transportation details
- Warehousing details

B. Description of Databases

Default Geodata

The Logistics Module uses automatically loaded data for 52 African countries (see list of countries in Annex VIII). Databases include population to the lowest available level (with latitude and longitude), and are in XML-format, thus can be edited/viewed through Excel, XML-parsers or text-based programs like Notepad.

Facilities

For each country, a maximum of three facility levels can be considered: central, regional and district. For each country there is a central warehouse in the capital, regional warehouses in the province/region (admin level 1), capitals and district (admin level 2) warehouses in the capitals of the districts. By default the central and regional warehouses are included, the district warehouses can be considered if user chooses to.

Commodities

The Logistics database is pre-filled for disease specific commodities such as MCH, HIV/AIDS, PMTCT, malaria, etc. (see Figure 10).

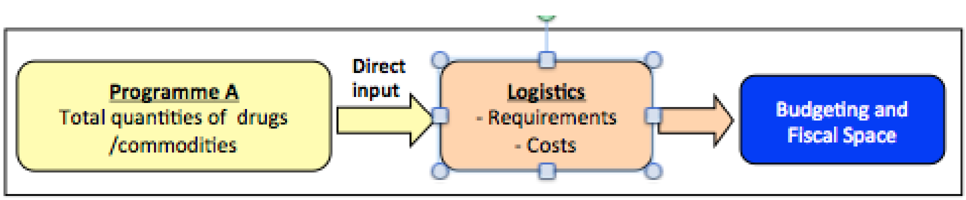
Figure 10. Examples of Commodities in Logistics Database

	A	B	C	D	E	F	G	H	I
1	Item	Description	Family	Weight	UoM_wt	Cubic	UoM_cubic	Cost	Price
2	CON001	Male Condoms, pieces	CONDOMS	0.43	kg	0.00203	m3	0.97	3.5
3	INF001	Artemether Lumef.20+120mg x24s	INFECTIVE	0.088	kg	0.0028	m3	0.08	0.26
4	INF002	Benzylpenicillin Inj 1MU	INFECTIVE	0.95	kg	0.00166	m3	1.14	4.19
5	FLU001	Water for Injection 10mlxvial	FLUIDS	0.01	kg	0.002	m3	0.44	1.83
6	INF003	Artemether Lumef.20+120mg x6s	INFECTIVE	0.022	kg	0.0016	m3	0.32	0.65
7	MIS001	Plastic Dispens Bott.60mlx pcs	MISC PH	0.5	kg	0.002	m3	0.08	3.12
8	ENH001	Mosquito Nets Treated Blue,Pcs	ENH	20	kg	0.02	m3	2.14	2.65
9	INF004	Gentamicin Inj. 80mg/2ml	INFECTIVE	0.7	kg	0.00284	m3	2.03	3.92
10	FLU002	Blood I.V. Giving Set,pcs	FLUIDS	4.33	kg	0.02723	m3	1.17	4.39
11	DIA001	ORS 500ml x satchet	DIARRHOEA	0.5	kg	0.002	m3	0.5	2.97
12	ENH002	Deltamethrin tabs (K-O tabs)	ENH	0.5	kg	0.002	m3	0.34	3.87

C. Linkages with the Rest of OneHealth

Commodities needed for MDG-related interventions are calculated by OneHealth within programme specific intervention costing modules. These quantities are communicated to the Logistics Module. Also, the unit costs of these commodities is coordinated between the programme modules and the Logistics Module. The unit costs may be set in either module, but they will at all times be the same in both modules. It is anticipated that quantities of some important commodities will not be calculated in the programme modules. Therefore the OneHealth interface will allow the user to input these quantities directly within the logistics module (Figure 11). The costing outputs from logistics are communicated to the areas of OneHealth that output overall costs for the health system scale up. These outputs are translated to appropriate level of detail or generality to fit with the general schemes for presentation and for budgeting.

Figure 11. Linkages of Logistics Module with other OneHealth Modules



D. Outputs Generated

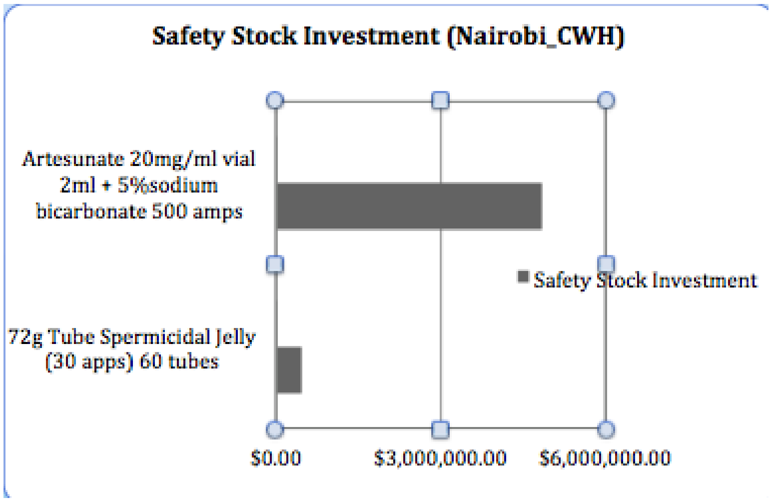
The Logistics Module generates extensive outputs, including:

- Guidance on the "optimal approach,"
- Supply chain performance indicators, which provide information on the basic functioning of the supply chain, providing a snapshot of the system's performance. These are presented in screens where easy comparisons are possible, and several indicators can be viewed in tandem and available via tables and graphs. As such, the user can output several projections side-by-side in order to understand the advantages and disadvantages of one option versus the next. The indicators include: satisfied demand, transportation (capital and recurrent) as a percent of procurement, transportation costs per kilogram of commodity moved, etc.,
- Detailed information on the costs of supply chain, disaggregated into incremental, recurrent, and capital costs. These costs include the costs associated with warehousing, transportation, supply and safety stocks needed, etc. The OneHealth interface allows the user to view two or more projections (as graphs or tables) side-by-side for easy comparison, and
- Detailed information on network structure that is available via Excel spreadsheets (including warehouse throughputs, stocks arriving at endpoints of the network, demand satisfied by endpoints of the network, distances traveled in the network, etc.).

Independent from the PHeNOM, OneHealth allows users to calculate the costs associated with national, regional and district level planning for logistics. Although the costs associated with planning and coordination are small relative to commodities, warehousing and transportation, it is important that the elements are included so that budget is allocated to their implementation.

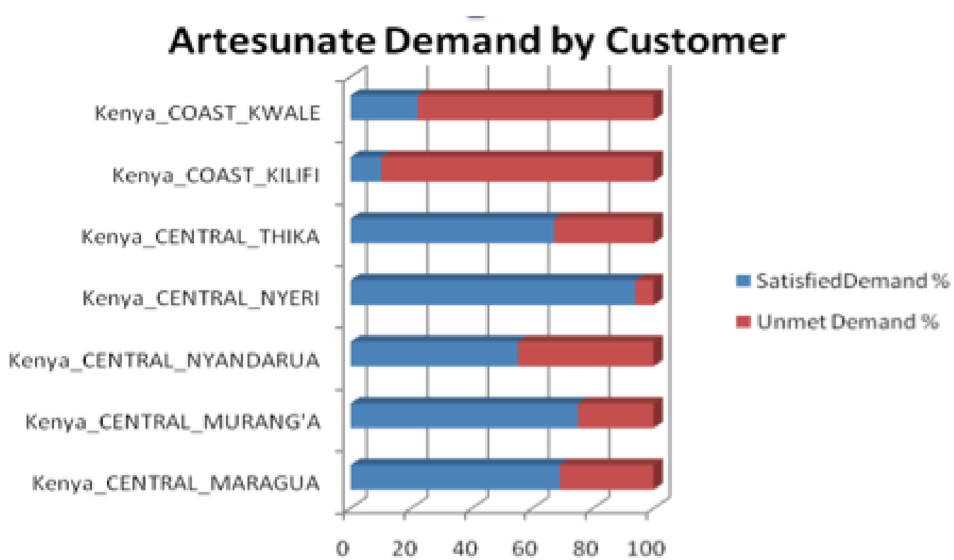
Figure 12 provides an example of how the PHeNOM calculated safety stock (in order to meet in-stock fill rate service requirements), and how the information can be presented to a user. This particular graph shows the cost of keeping the recommended level of artesunate and spermicidal jelly in stock at the Nairobi Central Warehouse. Safety stock is calculated based on the demand, variability in demand, supply lead time, variability in supply lead time and the in-stock fill rate service requirement. In other words, based on all these inputs, PHeNOM calculates how much of each product would need to be on hand in order to cover this variability and still be able to deliver right out of stock X% (the service requirement) of the time.

Figure 12. Costs of Safety Stock of Artesunate and Spermicidal Jelly at the Nairobi Central Warehouse, Kenya



The volume of information output from PHeNOM is enormous and much of it would be extremely difficult to manage within a hard-wired computer program such as OneHealth. Therefore, OneHealth creates Excel files with the complete set of network outputs from PHeNOM. With these files the user can drill down to find any of the useful information provided by PHeNOM. For example if the user wished to know how much Amoxicillin would be delivered to Namentenga in Burkina Faso, the information would be available to him/her via the Excel spreadsheets (Figure 13).

Figure 13. Safety Stock of Artesunate and Spermicidal Jelly at the Nairobi Central Warehouse, Kenya



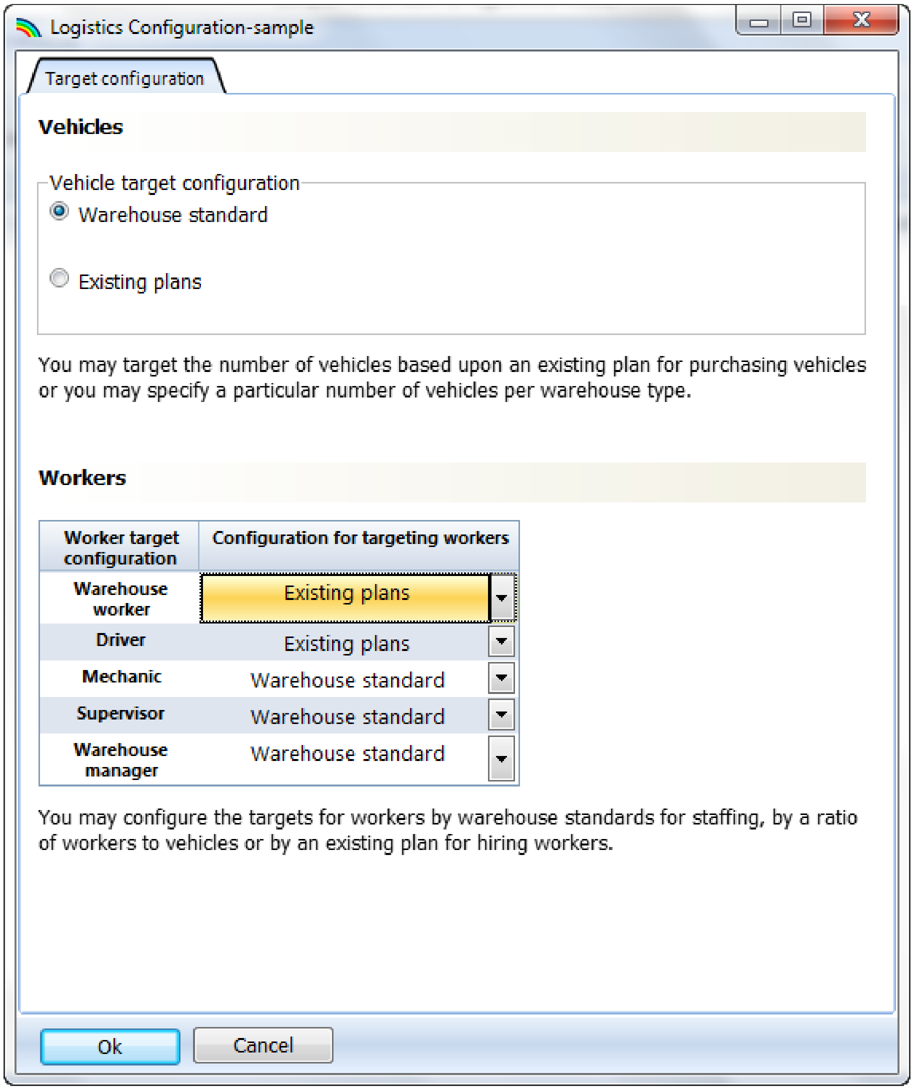
E. Alternate Logistics Costing Module

The user can also choose to use the OneHealth logistics costing templates. This is recommended for those who do not feel that they are logistics experts. These costing templates will walk the user through the process of inputting warehouse information, along with the required staff and vehicles to service the logistics needs of the health system. The process is as follows:

1. The user reviews and updates the baseline list of existing warehouses in the country or region, their distance from supplying warehouses, and their operating costs. They then enter information about new warehouses that the program anticipates building.
2. The user then specifies the number and type of vehicles, along with their capital and operating costs,
3. Next, the user specifies the number and type of workers associated with the logistics system, along with their salary, benefits, and anticipated increases.
4. The last piece of baseline data required for the logistics costing templates are any user defined commodities. This editor will allow the user to add the commodities, as well as edit information about the commodities entered in the programme areas, such as wastage, buffer stock, and prices.

Target Setting

Targets for the logistics segment can be set according to existing plans, or by standards. The tool allows the user to vary the type of target for different staff categories, while all vehicle targets are set either by warehouse standard or by existing plans. See below for an example of the target configuration editor.



As part of the target setting component, the user can also enter values for any third party logistics contracts that are expected during the time period of the plan, in order to account for these costs, as well as needed quantities of any user defined commodities.

Similar to other modules, there is a Programme Costs component that allows the user to specify any central or regional level staff costs, as well as training and other programme management activities with cost or staff implications.

Results that can be generated by the user for this section include the costs of constructing, rehabilitating, and maintaining the warehouse system. The user can also show the cost and number of vehicles and staff required for the logistics program, and quantities of commodities needed.

3. Infrastructure Module[20]

A. Purpose

The infrastructure module calculates the cost of:

1. Building and rehabilitating health facilities,
2. Equipping them, and
3. Operating and maintaining them.

B. Content

Base-Level Data

The model starts out by establishing the main health facility types that exist in the country. The default settings include: health post, health center, district hospital, provincial hospital and central hospital. The user can enter up to 10 facility types.

After entering facility types, the user is asked to provide average construction costs for the different facility types (Table 3). The user is provided with default values (indicated by blue font in the tool), which provide guidance but can be overwritten by the user if desired. (Note that red font in this document indicates user input throughout the model).

Table 3. Cost of Constructing and Equipping Facilities

Cost of Constructing and Equipping Facilities

	Construction of New Facility	Equipment f New Facilit
Health Post	$75,000	$10,0
Health Center	$200,000	$50,0
District Hospital	$1,000,000	$1,500,0
Provincial Hospital	$3,000,000	$6,500,0
Central Hospital	$10,000,000	$12,000,0
Maternity Waiting Home	$2,000	$5
Other:	$0	
Other:	$0	

When the user double-clicks on any of the cost values shown, he opens a table that provides more detail as to how that cost estimates was arrived at. The example shown in Table 4 below is for: equipment at a district hospital. The user can then, if desired, edit this table (adding or deleting equipment, modifying required quantities and prices, etc.) and thus modify the total equipment cost for this type of facility.

Table 4. Equipment – District Hospital (100 beds)

Item	Item (Spanish)	Unit Cost (US$)	Units per Hospital	Total Cost (US$)
Anaesthesia units/workstations	Unidad de anestesia	$65,520	1	$65,520
Anaesthesia units/workstations	Unidad de anestesia básica	$42,210	2	$84,420
Aspirators, Surgical/Suction	Aspirador rodable para toma de vacío	$720	1	$720
Aspirators, Surgical/Suction	Aspirador gástrico	$585	2	$1,170

[20] This section was taken from the document: "UHM – Infrastructure Module Discussion Points Draft 18 March 2010."

Next, the user must specify rehabilitation costs (Table 5). Three options are provided. The current generic names of the three rehabilitation options can be renamed to provide a clearer picture of what the rehabs entail. One might be "upgrades to the building" (e.g., water, power), one might be the "addition of an operating theater", the last one "an equipment upgrade". There are no defaults, as the scope and cost of the rehabilitation are very country-specific.

Table 5. Cost of Rehabilitating Facilities

	Small-scale Rehab	Medium-scale Rehab	Large-scale Rehab
Health Post	$7,500	$15,000	$22,500
Health Center	$20,000	$40,000	$60,000
District Hospital	$45,000	$90,000	$135,000
Provincial Hospital	$100,000	$200,000	$300,000
Central Hospital	$200,000	$400,000	$600,000
Maternity Waiting Home	$200	$400	$600
Other:	$0	$0	$0
Other:	$0	$0	$0
Other:	$0	$0	$0
Other:	$0	$0	$0

Next the user is required to enter annual operating costs (either as % of total capital costs or as absolute amounts whatever information is easier for him to obtain.

After that the user enters how many facilities of each type currently exist (Table 6). The following shows the table the user would get if he chose regional analysis in the setup section (the analysis can either be done for the country as a whole or at sub-national level).

Table 6. Current Number of Facilities

	Total	Region 1	Region 2	Region 3	Region 4	Region 5	Region 6
Health Post	282	47	28	30	19	15	12
Health Center	115	13	19	8	5	3	5
District Hospital	80	7	8	9	7	5	3
Provincial Hospital	94	11	10	10	6	4	4
Central Hospital	0	0	0	0	0	0	0
Maternity Waiting Home	0	0	0	0	0	0	0
Other:	0	0	0	0	0	0	0
Other:	0	0	0	0	0	0	0
Other:	0	0	0	0	0	0	0
Other:	0	0	0	0	0	0	0

Note: The above number of facilities includes all facilities in the country, those functioning and those in need of rehabilitation.

Target Setting for Facility Construction

To determine the number of facilities a country wants to have at the end of the (user-specified) planning period, the user is given three options, to choose methodology to set facility targets based on:

1. Population norms (1 facility per x population),
2. Regional and district standards (x facilities per district/region), or
3. Existing plans.

1. Setting Target Facility Numbers Based on Population Norms

Based on the number of facilities entered by the user above and population data provided by the population module, the model calculates current facility population ratios. In a second column the user can enter the desired ratios based on which the model will calculate how many facilities will be needed in the target year. Table 7 below indicates current geographic access to a physical structure, regardless of the state of functioning of that structure today.

Table 7. Current Geographic Access to a Physical Structure

Facility Type	Current	Desired
Health Post	6,139	1,000
Health Center	29,079	5,000
District Hospital	221,000	20,000
Provincial Hospital	276,250	100,000
Central Hospital	552,500	500,000
Maternity Waiting Home	0	0
Other:	0	0
Other:	0	0
Other:	0	0
Other:	0	0

Based on the calculated number of facilities that need to be built (Table 8), the model suggests a scale-up schedule.

Table 8. Number of Facilities Required to Reach Norms

	Current	2015	Additional Facilities Needed by 2015
Health Post	180	1,267	1,087
Health Center	38	253	215
District Hospital	5	63	58
Provincial Hospital	4	13	9
Central Hospital	2	3	1
Maternity Waiting Home	0	0	0
Other:	0	0	0
Other:	0	0	0
Other:	0	0	0
Other:	0	0	0

The suggested scale-up schedule is linear (spreading out the number of facilities to be built evenly over the years of the planning period), but can be modified by the user as desired (Table 9).

Table 9. Facility Scale-Up Schedule

	Current	2010	2011	2012	2013	2014	2015	Total built
Health Post	282	181	181	181	181	181	182	1,087
Health Center	115	36	36	36	36	36	35	215
District Hospital	80	10	10	10	10	10	8	58
Provincial Hospital	94	1	1	1	1	1	4	9
Central Hospital	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0	1	1
Maternity Waiting Home	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0	0	0
Other:	0	0	0	0	0	0	0	0
Other:	0	0	0	0	0	0	0	0
Other:	0	0	0	0	0	0	0	0
Other:	0	0	0	0	0	0	0	0

Suggested scale-up linear, can be overwritten by user

2. Setting Target Facility Numbers Based on District/Regional Norms

The user can also determine the required number of facilities based on district/regional targets. He first needs to decide which indicators the model is supposed to use for each facility type (for the lower level facilities this probably will be X numbers of facilities per district, while the higher-level facilities will be determined per region/province, etc.

Depending on the user's choice the model will calculate current average number of facilities in the respective column in the table below.

Table 10. Average Number of Facilities

	Current Avg. No. of Facilities			Desired Avg. No. of Facilities		
	Per district	Per Province	Nationally	Per district	Per Province	Nationally
Health Post	9.5			10.0		
Health Center	2.0			3.0		
District Hospital	0.3			1.0		
Provincial Hospital		0.2			1.0	
Central Hospital			2.0			2.0
Maternity Waiting Home	0.0			0.0		
Other:	0.0			0.0		
Other:	0.0			0.0		
Other:	0.0			0.0		
Other:	0.0			0.0		

Based on the above information the model will then calculate the number of facilities required by the final year of the planning period (Table 11).

Table 11. Number of Facilities Required to Reach Norm

	Current	Desired total number	Additional Facilities Needed
Health Post	180	190	10
Health Center	38	57	19
District Hospital	5	19	14
Provincial Hospital	4	6	2
Central Hospital	2	2	0
Maternity Waiting Home	0	0	0
Other:	0	0	0
Other:	0	0	0
Other:	0	0	0
Other:	0	0	0

The determination on how many facilities should be built per year follows the pattern described under 1.

3. Setting Target Facility Numbers Based on Existing Plans

The third option provides the most flexibility for a user who already has an existing facility build-up plan. The data can be entered either specifying total number of facilities per year or number of facilities to be added per year.

Target Setting for Facility Rehabilitation

4. Rehabilitation of Existing Facilities

The user must specify what number of facilities fall into the different categories for required upgrades (Table 12) and then provide a scale-up schedule (Table 13). Tthe default will again be linear, with facility rehabilitations spread out evenly over the planning period. If the decision from the beginning was to do the analysis on a regional basis, the tables would be repeated for each region.

Table 12. Number of Facilities to be Rehabilitated

		No. to be renovated		
	Current Total	Small-scale Rehab	Medium-scale Rehab	Large-scale Rehab
Health Post	180	20	25	35
Health Center	38	10	4	5
District Hospital	5	3	3	3
Provincial Hospital	4	1	1	1
Central Hospital	2	0	0	0
Maternity Waiting Home	0	0	0	0
Other:	0	0	0	0
Other:	0	0	0	0
Other:	0	0	0	0
Other:	0	0	0	0

Table 13. Rehabilitation schedule

	Current	2010	2011	2012	2013	2014	2015	Total to be renovated
Health Post	NA	3	3	3	3	3	3	20
Health Center	NA	2	2	2	2	2	2	10
District Hospital	NA	1	1	1	1	1	1	3
Provincial Hospital	NA	0	0	0	0	0	0	1
Central Hospital	NA	0	0	0	0	0	0	0
Maternity Waiting Home	NA	0	0	0	0	0	0	0
Other:	NA	0	0	0	0	0	0	0
Other:	NA	0	0	0	0	0	0	0
Other:	NA	0	0	0	0	0	0	0
Other:	NA	0	0	0	0	0	0	0

Improving the Referral System

The module also has a section that deals with the costs vehicles and communication equipment required for setting up/maintaining a referral system. The number of vehicles required is specified per facility type. There is also an option to enter a number of vehicles that is not tied to facilities (Table 14).

The following tables show the input required to calculate requirements and costs of vehicles for that referral system.

Table 14. Number of Vehicles Required

Type of vehicle	No. Required per Facility Health Post	Health Center	District Hospital	Provincial Hospital	Central Hospital	Other Non-facility-based	Total in Base Year
Ambulance				1			4
Ambulance 2			1				5
4-wheel drive						25	50
Motorcycle		1					38
Bicycle	1						180
Other:							--

Operating costs of these vehicles are calculated based on average number of kilometers driven per year, fuel consumption, and cost of fuel as provided by the user. Also included are repair and maintenance costs as well as the cost of a driver (should probably be several to ensure 24-hour availability) (see Table 15).

Table 15. Vehicle Maintenance and Operation Costs

	Drivers' salary	Cost of Petrol/Fuel				Repair and maintenance cost		
	US$	Fuel consumption (liter per 100km)	Avg. number of km driven per year	Avg. fuel consumption per year (liters)	Cost of Fuel per Year (US$)	As % of capital cost	US$	Total Operating Costs
Ambulance	$200	20	1,000	200	$220	10%	$3,000	$3,420
Ambulance 2	$250	15	1,000	150	$165	10%	$2,000	$2,415
4-wheel drive	$200	12	5,000	600	$660	10%	$2,000	$2,860
Motorcycle	$0	5	1,000	50	$55	10%	$200	$255
Bicycle	$0	--	1,000	--	$0	10%	$20	$20
Other		--	--	--	$0	10%	$0	$0

The calculation of required vehicles takes into account the lifespan of the different types of vehicles. It is assumed that every year "1/lifespan" vehicles will need to be replaced (e.g., lifespan 5 years would lead to the assumption that 1/5 of these vehicles would require replacement every year.

The section on required communication equipment works the same way.

C. Outputs

The model provides the following results in tables as well as graphs.

1. Facilities (disaggregated by type) to be built per year
2. Total number of facilities by year
3. Number of facilities to be rehabilitated per year
4. Cost of building new facilities by year (disaggregated by facility type)
5. Cost of equipping new facilities by year (disaggregated)
6. Total cost of rehabilitating facilities by year
7. Total cost of operating and maintaining existing facilities by year

VI. Health System-Focused Planning & Costing: Other Health System Components

These modules include the Health Information System sub-module, the Health Financing Policy sub-module, and the Health System Governance and Leadership sub-module. Since these sub-modules are currently being developed, their sections are included in the respective annexes:

Annex IX. Concept note for Estimating Costs of Country Health Information Systems

Annex X. Concept Paper: Review of Efforts to Cost Health Information Systems & Ideas for a UHM Costing Module

Annex XI. Concept Note on Module for Health Financing Policy

Annex XVII. Concept Note for Governance and Leadership Module

VII. BUDGETING, FINANCIAL SPACE AND FINANCING MODULE

1. Financial Space[21]

A. Purpose

The Financial Space and Financial Gap analysis is part of the Health Financing Policy module in the current version of OneHealth (version 2.78, 18 January 2011). Upcoming releases will convert it to a semi-autonomous component of OneHealth, with a separate icon and a position external to the health financing module.. The purpose of the Financial Space section is to look at financial indicators specific to the country, to project the financial resources available for health and then compare these with the estimated resource requirements, as computed from the other modules within OneHealth. The financial space module thus allows a user to undertake analysis that can be utilized as an input to a national strategic health plan or to an MTEF exercise.

> It should be noted that the OneHealth contains several modules for projecting the estimated resource use and related health costs, based on population growth, coverage, type of services provided, etc. The purpose of the Financial Space module is to provide the projections for the likely financing to be made available, so that the user can make a comparison with the estimated required health expenditure (i.e., costs).

Here, Financial Space refers to funding from three sources:

- Government
- Private sources
- External funding

Within a national accounts framework it is necessary to differentiate “Government” and “Private expenditure” further as those funded by domestic sources and those including external flows.

As such, the financial flows within the OneHealth Tool will be modeled as follows:

1. Government health expenditure
    a. Funded by domestic sources
    b. Funded by external aid channeled through government

[21] This section is from the document: “Financial Space Analysis Within the OneHealth Tool, Concept Note, Revised Draft 11 July 2011 by K Stenberg WHO/IAWG-Costing and B Winfrey, Futures Institute,” which describes the Financial Space analysis within OneHealth. Content from this document refers to version 2.14 of OneHealth dated 17 May 2011. References include:
Tandon and Cashin (2010) Assessing Public Expenditure On Health From A Fiscal Space Perspective
World Health Report 2010

2. Private health expenditure

    a. Funded by domestic sources

    b. Funded by external aid channeled through private sector (NGOs, etc.)

Financial space analysis allows for an assessment of total resources available for the health sector, including private sector and including funding from external sources.

At the same time, ***fiscal space analysis*** is a tool to assess the level of public resources available for health. Fiscal space refers to the government's budgetary room to increase spending, when such an increase can take place without impairing fiscal solvency, meaning the government's present and future ability to cover its recurrent expenditures and service its national debt. Fiscal space analysis is included within the broader envelope of financial space analysis.

> It should be noted that although financial analysis and fiscal space generally refers to overall total and government expenditure, here these concepts are only discussed specifically in relation to the health sector.
>
> Moreover, it should be noted that as a general principle, each module of OneHealth includes options for how detailed the user would like to make the calculations. At an aggregate level, the user can model projections based on defaults and/or simple multipliers. This section also outlines some options in case the user is interested in engaging in more detailed modeling (e.g., estimating the additional funds that could be made available from increasing taxes on tobacco products).

B. Content

Organization

The module is organized into five steps:

Step 1 - Situation analysis and Baseline data entry: the planner enters appropriate baseline information including GDP and sources of health financing.

Step 2 - Scenario generation: the planner names three scenarios.

Step 3 - Target setting for alternative scenarios: the planner enters assumptions on GDP growth, expected government revenue and expenditure on health, as well as expected funding coming from external sources. The target setting involves using multipliers that act on the standard assumption. The assumptions are described below for each indicator.

Step 4 - View results: the planner can examine the results from the alternative scenarios for financial space.

Step 5 - Finalization: the planner select the policy option scenario and target s/he would like incorporated for final estimation for financial space in the overall results matrix for OneHealth.[22]

Situation Analysis

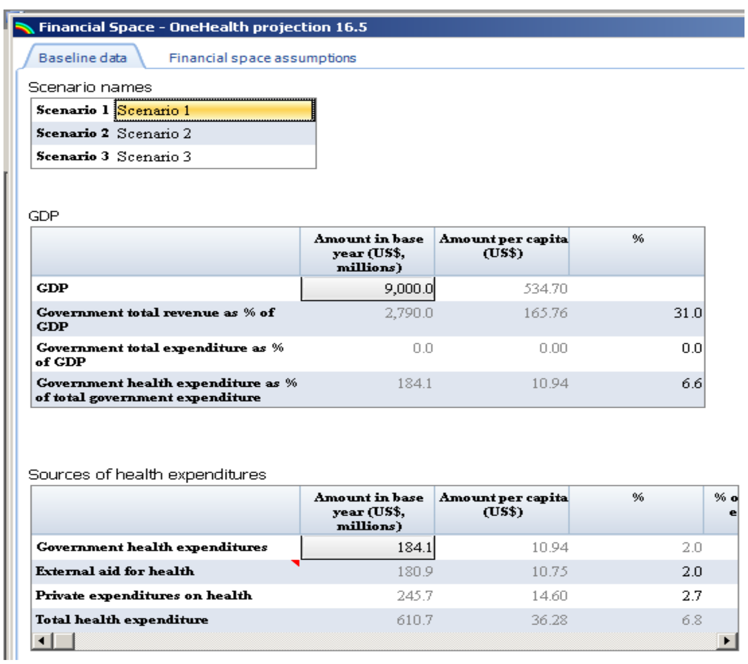
This section shows a country's spending relative to income level, as part of situation analysis for the financing module, so that the country can compare itself with other countries in the region.

Baseline data included in the Financial Space module

The following data is included and used for projections (Figure 14):

- Gross Domestic Product (GDP)
- Government revenue as (% GDP)
- Government expenditure (as % GDP)
- Government expenditure on health as percent of government expenditure
- External Aid for Health (as % GDP)
- Total private expenditure on health (as % of GDP). The total amount, and the per capita private health expenditures are automatically calculated based on the data entered.

Figure 14: Entering baseline data (OneHealth version 2.14)


Financial Space - OneHealth projection 16.5

Baseline data | Financial space assumptions

Scenario names

Scenario 1	Scenario 1
Scenario 2	Scenario 2
Scenario 3	Scenario 3

GDP

	Amount in base year (US$, millions)	Amount per capita (US$)	%
GDP	9,000.0	534.70	
Government total revenue as % of GDP	2,790.0	165.76	31.0
Government total expenditure as % of GDP	0.0	0.00	0.0
Government health expenditure as % of total government expenditure	184.1	10.94	6.6

Sources of health expenditures

	Amount in base year (US$, millions)	Amount per capita (US$)	%	% o e
Government health expenditures	184.1	10.94	2.0	
External aid for health	180.9	10.75	2.0	
Private expenditures on health	245.7	14.60	2.7	
Total health expenditure	610.7	36.28	6.8	

[22] Note: in the current version of OneHealth, the user does not make this choice in the Financing gap section. Instead the user makes the choice in the summary outputs matrix for the entire projection, where the tool prompts the user to indicate which scenario s/he would like to display.

C. Methodology Used for Projections Within the Financial Space Module

Options for Increasing Fiscal Space and their Implementation in OneHealth

Tandon and Cashin[23] (2010) outline five categories from which fiscal space for health can potentially be generated:

1. Conducive macroeconomic conditions such as economic growth and increases in overall government revenue that, in turn, might lead to increases in government spending for health;
2. A re-prioritization of health within the government budget;
3. An increase in health sector-specific resources, e.g., through earmarked taxation;
4. Health sector-specific grants and foreign aid; and
5. An increase in the efficiency of existing government health outlays.

They also underline that the first three options (including the possible use of health-specific earmarked taxes) usually lie outside of the domain of the health sector and are linked to general macroeconomic policies and conditions, as well as to political economy and cross-sectoral trade-offs. Areas (iv) and (v) are considered to be more in the direct domain of the health sector.

In OneHealth, categories (i) –(iv) would be modeled within the Financial Space Module.

Category (i) is dealt with by projecting an increase in GDP, and/or through modeling an increase in total government revenue and total government expenditure. Category (ii) is modeled by adjusting the % share of health as part of the total government expenditure over time (this could be either a decrease or increase).

Category (iii) would be implemented by both increasing the total amount available to the government, and increasing the total amount available for health by an equivalent amount. The same would apply to category (iv).

Category (v) would not be modeled as such in the Financial Space Module. Rather any increase in efficiency of existing government activities would be modeled as part of the overall planning and cost analysis. For example, the planner can model a shift of delivery of maternal health services from hospital level to health centre level. This can result in cost savings compared to an alternative scenario where a high proportion of deliveries take place at hospital level, depending on the health system structure and current efficiencies.

Formulas in OneHealth

Fiscal space: At any one point in time, the overall formula used for availability of total fiscal resources for health is:

Fiscal Resources = [GDP] x [Gov exp as % of GDP] x [GGHE as % of GHE]
All values are year-specific.

---

[23] Tandon and Cashin (2010) Assessing Public Expenditure On Health From A Fiscal Space Perspective.

The total costs to be borne by the Government can be identified in a budgeting exercise where the user of the projection model would assign costs according to envisioned funding sources. The budgeting module in OneHealth includes this facility.[24] However the user would need to create their own funding source mapping as this is an exercise idiosyncratic to country circumstances and the purpose of the scale up plan.

Financial space: The overall formula used for total financial resources is:

Financial Resources for Health = [Government expenditure on health] + [External Aid for Health] + [Private expenditure on health][25]

When costs exceed financial resources available, the financial space will be negative. There will be a financial gap. The tool thus assists the user to undertake a financial gap analysis.

Projections for Scenario Analysis

First, the user can select to predict using yearly assumptions or assumptions for start date and end year. In the latter case there is linear interpolation.

Projecting GDP:

1. The user decides on a Reference point for the GDP projection. S/he chooses whether to use the default projection for GDP as provided from International Monetary Fund (IMF), or whether to enter own data.
2. A GDP multiplier is used for each of the three scenarios. If the multiplier is set to 100, the same value as the chosen reference projection is applied each year. If the multiplier is set to 105, there is a 5% higher value used for the GDP projection each year (relative to the IMF projection), etc.

Projecting Government revenue as % GDP

1. The reference point in the current version is derived from the IMF 2009 Economic outlook as reported in the MBB tool version 5.1.56. Updates will be done to take into account the latest IMF projections before OneHealth is released.
2. A multiplier is used for each of the three scenarios. If the multiplier is set to 100, the same value as the chosen reference projection is applied each year. If the multiplier is set to 105, there is a 5% higher value used for the GDP projection each year, etc.

Projecting Government Expenditure as % GDP

The default assumption is that expenditure = revenue. However the user can change this assumption and type in values for expenditure as % GDP.

Projecting Government Expenditure on Health (GGHE; estimated as % GDP, or per capita)

This is derived from the previous variable.

[24] Note: the budgeting module is another section of the tool, and is not the same section as the financial space analysis.

[25] Note: the three sources of health expenditure treated as completely exclusive

Projecting the share of GGHE that is funded by External Aid for health (Development Assistance for Health -DAH):

1. A simple option for the user is to just enter an aggregate amount of DAH by year that is channeled through the government.
2. There is also a need to indicate the share that is channeled through the private sector (i.e., NGOs)
3. A more detailed option (yet to be programmed into the model) is that the user should be able to enter data into a table regarding the predicted Development assistance for health, by donor (as suggested in the IAWG meeting of January 2011). However programming this table into OneHealth is postponed until August 2011.
4. Source for current defaults: the current default data appearing for the baseline year comes from the default data supplied by the MBB version 5.1.56 and will be updated when WHO or Organization for Economic Cooperation and Development (OECD) – Development Assistance Committee (DAC) releases new figures.
5. Target setting for scenarios: The default assumption is that projected DAH remains the same as the baseline year. A multiplier is used for each of the three scenarios. If the multiplier is set to 100, the same value as the default projection is applied each year.

Projecting Domestic GGHE:

Domestic GGHE can be estimated as = Total Health Expenditure - Total external DAH - Private HE

Projecting Private Health Expenditure:

The default assumption in the model is that projected health expenditures as a percent of GDP remains the same as the baseline year. Again, the user chooses values for the multiplier in the three scenarios.

It should be noted that Tandon and Cashin assume that as an upper bound for most low income countries overall government expenditure in any economy can be assumed to be limited to 30-35% of GDP.

Box 1. Eventual Sources of Default Data

IMF Global economic outlook used in OneHealth has data on:

- GDP projections until year 2014 and will be updated as available

WHO expenditure database has estimates by country on:

- Total expenditure on health as % of GDP
- Breakdown of expenditure by financing agents
- Breakdown of expenditure by financing sources for external resources only, and for government sources for some African countries.
- Government expenditure in absolute values

D. Outputs of the Financial Space Module

The outputs from the Financial Space module include:

1. Financial indicators

a. Projected GDP

b. GDP per capita

c. Government revenue (billions of $)

d. Government revenue (% of GDP)

e. Government health expenditures (millions of $)

f. Government health expenditures (% of total health expenditures)

g. External aid (millions of $)

h. External aid (% of GDP)

i. Private expenditures (millions of $)

j. Private expenditures (% of GDP)

2. Financing space for health indicators

    a. Total financial space for health (all sources)

    b. Incremental financial space for health[26] (all sources)

    c. Incremental public financial space for health

3. Total financial space for health (broken down by source)

4. Incremental financial space for health (broken down by source)

5. Financial space compared to planned expenditure (costs)

E. Intended Users

In general, the OneHealth is intended for national and sub-national level use. The intended users of this tool include:

1. National and sub national health planners - including condition-specific planners (e.g. national malaria or reproductive health programme), planners for specific health system components (e.g., human resources department) and health sector planners (Department of planning)
2. NGOs, CSOs, and other agencies working in specific countries
3. Donors, academe and UN agencies
4. Independent consultants and researchers

The primary anticipated users of the Financial Space Module are financial analysts.

[26] Incremental values are calculated as the difference between the value in a given year minus the value in the base year of the projection.

F. Caveats and Concerns

Caveats and concerns related to the Financial Space Module include:

- No default data are available for government as a financing agent for health expenditure, and
- How to account for and reduce possible double counting when external funds are managed by the government and thus this share is included in the WHO data for General Government Expenditure on Health (GGHE)/GHE as well as in the data for external funds?

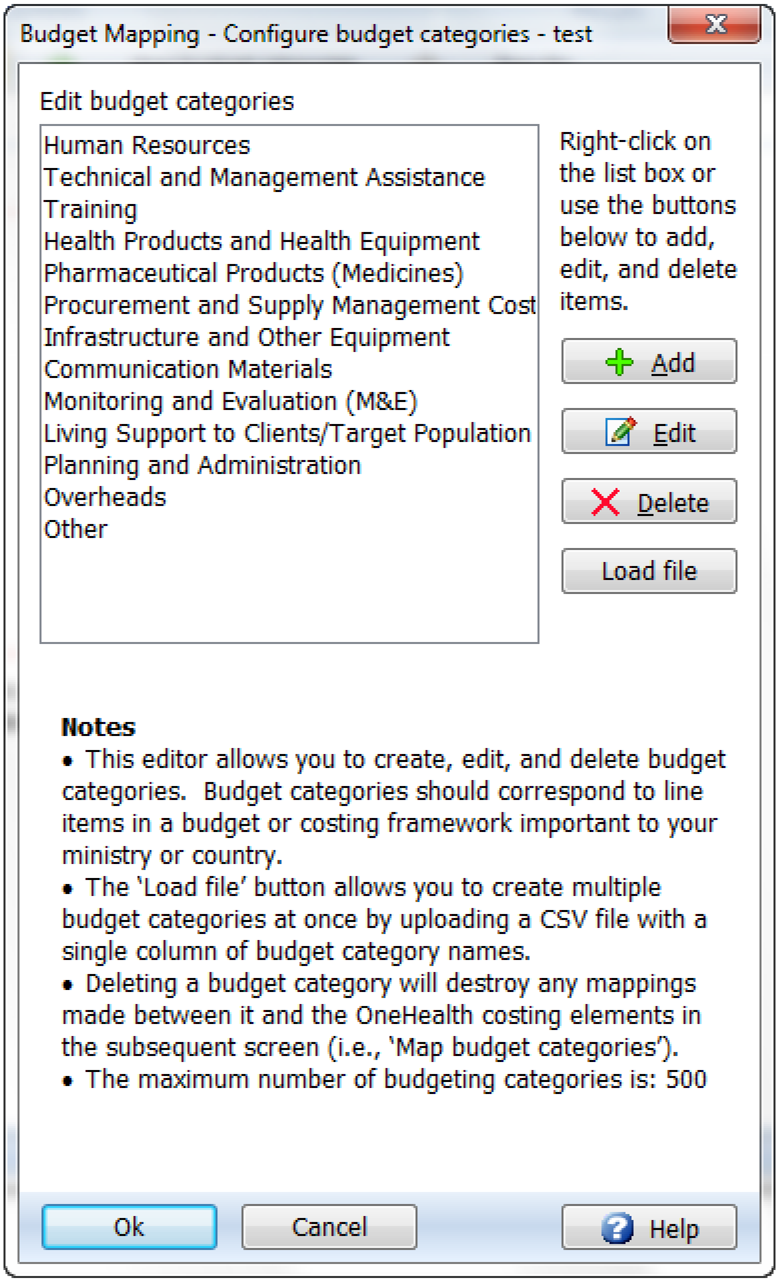
Limitations related to country application process include:

- Lack of data, and
- Need to engage with Ministry of Finance

G. Budget Mapping

This module allows the user to translate the cost findings of OneHealth to fit MoH Chart of Accounts and Budget Classification Codes, and thus facilitate budgeting at national level. Similarly, depending on the situation, the analyses can be structured to fit with budget formats required for MTEFs, PRSPs or Global Fund applications.

Global Fund Service Delivery Areas, and Global Fund Summary categories have been built into the tool by default. The user can also edit the existing budget categories, as seen in the below editor. This allows the user to map categories to those used for country budgets, if needed.

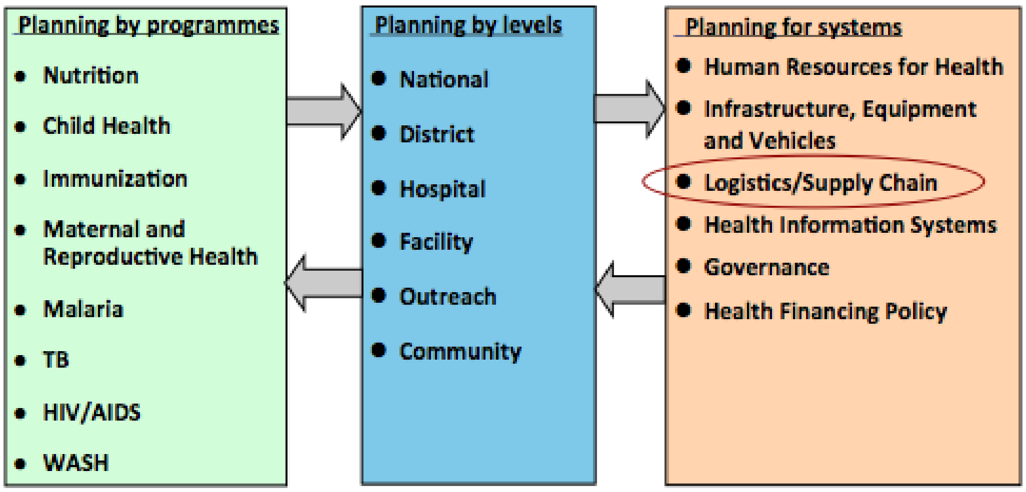


Results of this sub-module show the total annual cost of the scale-up plan distributed by the budget categories which have been selected, and the mapping of cost elements to those categories.

VIII. LINKAGE BETWEEN MODULES

OneHealth offers a flexible approach that emphasizes integration and inter-relationships between disease/programme/level-specific planning (Figure 15). Gender, equity and the private sector are cross-cutting considerations.

Figure 15. Relationships between programme, levels, and systems



IX. GENERAL FORMULAS USED TO DERIVE COST ESTIMATES

Intervention costing

Intervention costing comprises several elements to estimate the following:

- Number of cases
- Numbers of needed drugs, supplies and commodities
- Numbers of needed health personnel[27]
- Numbers of facility visits
- Numbers of bed days

These are all disaggregated by intervention and by delivery channel/facility type. Costs are estimated only for the drugs, supplies and commodities. Personnel, visits and bed days are calculated only as checks against plans created elsewhere in the tool (e.g., needed staff time may be compared with staffing plans created in the Human Resources Module).

The basic equation for calculating the number of the cases treated at delivery channel/facility type j at time t is the following:

1) $Num\_Cases_{i,j,t} = CV_{i,t} \times PI_{i,t} \times DC_{j,t} \times POP_{i,t}$

Where:

$CV_{i,t}$ = coverage of intervention i at time t

$PI_{i,t}$ = population in need for intervention i at time t, expressed as the percent of "POP" who should be receiving the intervention annually

$DC_{i,j,t}$ = percent of clients for intervention i who receive the intervention at delivery channel/facility type j at time t

$POP_{i,t}$ = population across which the population in need for intervention i is defined. For example, the population in need for comprehensive emergency obstetric care would be defined relative to the number of women who are pregnant or give birth.

[27] This refers only to the personnel needs for direct service delivery. This does not include training, managerial or administrative tasks.

2) $Num\_Drugs_{i,j,d,t} = Num\_Cases_{i,j,t} \times Drugs\_Case_{i,j,d}$

Where:

$Drugs\_Case_{i,j,d}$ = quantity of drug d needed to implement intervention i at delivery channel/facility type j.

3) $Drug\_Cost_{i,j,d,t} = Num\_Drugs_{i,j,d,t} \times Cost\_Drug_{d,t}$

Where:

$Drug\_Cost_{i,j,d,t}$ = drug costs for drug d used for intervention i delivered at delivery channel/facility type j at time t

$Cost\_Drug_{d,t}$ = cost of drug d at time t.

4) $Num\_Personnel_{i,j,p,t} = Num\_Cases_{i,j,t} \times Personnel\_Case_{i,j,p}$

Where:

$Personnel\_Case_{i,j,p}$ = minutes of personnel type p needed to implement intervention i at delivery channel/facility type j.

5) $Num\_Visits_{i,j,t} = Num\_Cases_{i,j,t} \times Visits\_Case_{i,j}$

Where:

$Visits\_Case_{i,j}$ = number of facility visits to implement intervention i at facility/delivery channel type j.

6) $Num\_BedDays_{i,j,t} = Num\_Cases_{i,j,t} \times BedDays_{i,j}\_Case_{i,j}$

Where:

$BedDays\_Case_{i,j}$ = number of bed days needed to implement intervention i at facility/delivery channel type j.

General programme costing

Programme costing is organized into several subsections, each with a particular mechanism of calculation. The following goes sub-section by subsection. The calculations provided how the numbers on the initial screen are arrived at. Note that these calculations are done separately for each programme area or if in delivery channel mode, by delivery channel, sub-package and national programme.

1. *Programme specific human resources*

1.1. National-level staff

1) $Staff\_cost_{p,t} = Salary_p \times Num\_staff_t$

Where:
$Staff\_cost_{p,t}$ = salary costs associated with staff type p at time t
$Salary_p$ = the annual salary of staff type p
Num_staff_t = the number of staff at time t

2) $Rec\_cost_{p,t} = Rec\_cost\_staff_p \times Num\_staff_t$

Where:
$Rec\_cost_{p,t}$ = non-salary recurrent costs associated with staff type p at time t

$Rec\_cost\_staff_p$ = non-salary recurrent costs per staff type p at time t

3) $Office\_costs_{p,t} = (Num\_staff_{p,t} - Num\_staff_{p,t-1}) * Office\_cost\_staff_p$

Where:
$Office\_costs_{p,t}$ = Costs of setting up offices for staff type p at time t
$Office\_cost\_staff_p$ = Cost of setting up a office for new staff type p

4) $Prog\_HR_{p,t} = Staff\_cost_{p,t} + Rec\_cost_{p,t} + Office\_costs_{p,t}$

The same procedure is following for items 1.2 Regional-level staff and 1.3 District-level staff.

2. *Training*

2.1. In-service/Refresher training

In-service training calculations include several elements including a calculation staff needing to be trained, staff that will be trained in the plan and the cost associated with training the staff.

Staff needing to be trained can be a direct entry, a calculation based upon facility norms or a calculation based on % of total staff available. Equation 5 describes the calculation based on facility norms.

5) $Staff\_Target\_training_{p,e} = Staff\_trained\_facility_{p,e,1} \times Num\_facility_{1,endyear} + Staff\_trained\_facility_{p,e,1} \times Num\_facility_{1,endyear} + \ldots\ldots Staff\_trained\_facility_{p,e,n} \times Num\_facility_{n,endyear}$

Where:

$Staff\_Target\_training_{p,e}$ is the number of staff type "p" needing to be trained in curriculum "e"

$Staff\_trained\_facility_{p,e,1}$ is the number of staff of type "p" at facility type 1,2,…n who need to be trained in curriculum "e"
$Num\_facility_{n,endyear}$ is the number of facilities of type 1,2…,n at the end of the projection period

Equation 6 describes calculation of staffing needing to be trained when based on percent of staff.

6) $Staff\_target\_training_{p,e} = \%Staff\_need\_training_{p,e} \times Num\_staff_{p,endyear}$

Where:

$\%Staff\_need\_training_{p,e}$ is the percent of staff type "p" needing to be trained in curriculum "e"
$Num\_staff_{p,endyear}$ is the number of staff of type "p" available in the final year of the projection

7) $Staff\_untrained_{p,e} = Staff\_target\_training_{p,e} - Staff\_trained_{p,e,o}$

Where:

$Staff\_untrained_{p,e}$ is the number of staff of type "p" who are targeted for training in curriculum "e" but are not yet trained
$Staff\_trained_{p,e,o}$ is the number of staff of type "p" who are already trained in curriculum "e" at the beginning of the plan

8) $Staff\_to\_be\_trained_{p,e} = Staff\_to\_be\_trained_{p,e.baseyear} + Staff\_to\_be\_trained_{p,e.baseyear+1} + \ldots\ldots Staff\_to\_be\_trained_{p,e.endyear}$

Where:

$Staff\_to\_be\_trained_{p,e}$ is the total number of staff of type "p" who will trained in curriculum "e" over the course of the plan
$Staff\_to\_be\_trained_{p,e,t}$ is the number of staff of type "p" who will trained in curriculum "e" at time "t"

Note that only $Staff\_to\_be\_trained_{p,e,t}$ is used in costing the plan. Equations 5, 6 and 7 are used only as references or checks on whether the plan will achieve its goal. For example the total staff to be trained can be compared to the total staff that is currently untrained.

9) $Cost\_training_{p,e,t} = Staff\_to\_be\_trained_{p,e.t} * Cost\_per\_trainee_e$

Where:
$Cost\_training_{p,e,t}$ is the cost of training staff type "p" in curriculum "e" in the year "t"
$Cost\_per\_trainee_{e}$ is the cost per trainee for curriculum "e"

2.2. Training of trainers

The training of trainers calculation is based upon a calculation of needed numbers of trainers relative to an existing stock of trainers. The needed number of trainers is calculated with equation 10.

10) $$Num\_trainerworkshops\_needed_{e,t} = Trainers\_per\_workshop_{e} * [\,Staff\_to\_be\_trained_{e,t} / Trainees\_per\_workshop_{e}] * Training\_length_{e}$$

Where:
$Num\_trainerworkshops\_needed_{e,t}$ is the number of trainersworkshops that are needed to train all of the staff who are to be trained in curriculum "e" in year "t". For example if three workshops were going to be conducted and each needed five trainers, then the trainerworkshops would be 15.
$Trainers\_per\_workshop_{e}$ is the number of trainers that are needed for a workshop in curriculum "e"
$Trainees\_per\_workshop_{e}$ is the number of trainees participating in workshop for curriculum "e"

11) $$Trainers\_needed\_in\_pool_{e,t} = Num\_trainerworkshops\_needed_{e,t} / Availability_{e} * (1 + Avail\_Adj_{e})$$

Where:
$Trainers\_needed\_in\_pool_{e,t}$ is the trainers that are needed to be available in any given year
$Availability_{e}$ is the number of workshops that a representative trainer is available in a given year
$Avail\_Adj_{e}$ is an adjustment allowing for imperfect availability of trainers for curriculum "e"

12) $$Num\_Trainers\_needing\_training_{e,t} = Trainers\_needed\_in\_pool_{e,t} - Trainers\_needed\_in\_pool_{e,t-1} + Trainers\_needed\_in\_pool_{e,t-1} * Attrition_{e}$$

Where:
$Attrition_{e}$ is the annual percent of existing trainers who are no longer available to do the training in curriculum "e"

13) $$TOT\_cost_{e,t} = Num\_Trainers\_needing\_training_{e,t} * Cost\_per\_trainer_{e}$$

Where:
$TOT\_cost_{e,t}$ is the total cost of training trainers for curriculum "e" in year "t"
$Cost\_per\_trainer_{e}$ is the cost per of training a trainer

2.3. Development of training programmes and materials

14) $Cost\_Training\_materials_t = Training\_Materials_{1,t} + Training\_Materials_{2,t} \ldots\ldots + Training\_Materials_{n,t}$

Where:

$Cost\_Training\_materials_t$ is the cost of training materials in year t

$Cost\_Training\_Materials_{n,t}$ is the cost of training materials for the curricula that are developed in year "t". Note that the first subscript indexes the curricula that are developed in a given year.

2.4. Changing the pre-service training curriculum

15) $Cost\_pre\text{-}service\_materials_t = Pre\text{-}service\_Materials_{1,t} + Pre\text{-}service\_Materials_{2,t} \ldots\ldots + Pre\text{-}service\_Materials_{n,t}$

Where:

$Cost\_Pre\text{-}service\_materials_t$ is the cost of pre-service materials in year t

$Cost\_Pre\text{-}service\_Materials_{n,t}$ is the cost of pre-service materials for the curricula that are developed in year "t". Note that the first subscript indexes the pre-service materials that are developed in a given year.

2.5. Support activities

The support activities line item has no associated calculations.

3. Supervision

3.1. Coordination meetings

16) $Coord\_meetings_t = Cost\_per\_meeting * Num\_meetings_t$

Where:

$Coord\_meetings_t$ is the total costs of coordination meetings in year "t"
$Num\_meetings_t$ is the number of coordination meetings in year "t"
Cost_per_meeting is the cost per coordination meeting

3.2. National staff visiting local staff

17) $Supervisory\_visits\_cost_{L,t} = Cost\_per\_visit_L * Num\_visits_{L,t}$

Where:

$Supervisory\_visits\_cost_{L,t}$ is the total cost of supervisory visits at level L in year "t"
$Num\_visits_{L,t}$ is the supervisory visits at level "L" in year "t"

$Num\_visits_{L,t}$ is the number of supervisory visits at level "L" in year "t"

Note that the levels correspond to National to Provincial, National to district, staff visits to facilities and facilities to communities. The total supervisory cost is the sum across the levels "L".

4. Monitoring and evaluation

4.1. Design of monitoring and evaluation framework

This is the simple sum by years of meetings, total annual consultant costs and printing/distribution of documents.

4.2. Design of quality control and assurance system

This is the simple sum by years of meetings, total annual consultant costs and printing/distribution of documents.

4.3. Data management system

This is the simple sum by years of meetings, total annual consultant costs and purchase of computers.

4.4. Data collection and analysis

This is the simple sum by years of the user entered data collection activities.

4.5. Quality control/quality assurance

This line item consists entirely of coordination meetings (same as above).

18) $Coord\_meetings_t = Cost\_per\_meeting * Num\_meetings_t$

5. Infrastructure and equipment

5.1. Situational assessment

This is the simple sum by years of meetings, total annual consultant costs and cost of site visits.

5.2. Equipment upgrade for health centers
5.3. Equipment upgrade for hospitals

19) $Cost\_upgrade_{f,t} = Num\_fac\_upgraded_{f,t} * Cost\_upgrade_f$

Where:

$Cost\_upgrade_{f,t}$ is the cost of upgrading facilities of type “f” in year “t”
$Num\_fac\_upgraded_{f,t}$ is the number of facilities of type “f” upgraded in year “t”
$Cost\_upgrade\_per\_fac_f$ is the cost of upgrading a facility of type “f”

6. Transport

6.1. Situational assessment

This is the simple sum by years of meetings, total annual consultant costs and cost of site visits.

6.2. New vehicle purchases

20) $Cost\_new\_vehicles_{v,t} = Num\_veh\_purchased_{v,t} * Cost\_per\_vehicle_v$

Where:

$Cost\_new\_vehicles_{v,t}$ is the cost of purchasing new vehicles of type “v” in year “t”
$Num\_veh\_purchased_{v,t}$ is the number of vehicles of type “v” purchased in year “t”
$Cost\_per\_vehicle_v$ is the cost of a new vehicle of type “v”

6.3. Vehicle operation and maintenance

21) $Cost\_maint\_vehicles_{v,t} = [Num\_veh\_purchased_{v,baseline} + Num\_veh\_purchased_{v,baseline+1} + \ldots.. Num\_veh\_purchased_{v,endyear}]*Cost\_annual\_maint_v$

Where:

$Cost\_maint\_vehicles_{v,t}$ is the cost of maintaining and operating vehicles of type “v” in year “t”
$Cost\_annual\_maint_v$ is the annual cost of maintenance and operation of vehicles of type “v”

7. Communication, Media and Outreach

7.1. Development of communication strategy

Consultative meetings

22) $Consult\_meetings_{c,t} = Cost\_per\_meeting_c * Num\_meetings_{c,t}$

Where:

$Coord\_meetings_t$ is the total costs of consultative meetings for strategy “c” in year “t”
$Num\_meetings_t$ is the number of consultative meetings for strategy “c” in year “t”
Cost_per_meeting is the cost per consultative meetings for strategy “c”

The line item 7.1. Development of communication strategy is the sum of all consultative meeting line items and consultant cost line items.

7.2. Mass media

23) $Cost\_media\_dev_t = Media\_dev_{1,t} + Media\_dev_{2,t} \ldots.. + Media\_dev_{n,t}$

Where:

$Cost\_media\_dev_t$ is the cost of media development in year t

$Media\_dev_{n,t}$ is the cost of development for a media campaign that is developed in year "t". Note that the first subscript indexes the media campaigns that are developed in a given year.

24) $Cost\_media\_campaign = Num\_campaigns_{m,t} * Cost\_per\_campaign_m$

Where:

$Cost\_media\_campaign_{m,t}$ is the cost of media campaigns of type "m" in year t

$Num\_campaigns_{m,t}$ is the number of campaigns of type "m" that are implemented in year "t"

$Cost\_per\_campaign_m$ is the cost per campaign of type "m"

7.3. Printed materials

25) $Cost\_print\_dev_t = Print\_dev_{1,t} + Print\_dev_{2,t} \ldots.. + Print\_dev_{n,t}$

Where:

$Cost\_print\_dev_t$ is the cost of print development in year t

$Print\_dev_{n,t}$ is the cost of development for a print campaign that is developed in year "t". Note that the first subscript indexes the print campaigns that are developed in a given year.

26) $Cost\_print\_materials_{p,t} = Num\_print_{,p,t} * Cost\_per\_print_p$

Where:

$Cost\_print\_materials_{p,t}$ is the cost of print materials of type "p" in year t

$Num\_print_{p,t}$ is the number of printed materials of type "p" that are printed in year "t"

$Cost\_per\_print_p$ is the cost per printed material of type "p"

7.4. Social outreach activities

27) $Cost\_social\_dev_t = Social\_dev_{1,t} + Social\_dev_{2,t} \ldots.. + Social\_dev_{n,t}$

Where:

$Cost\_social\_dev_t$ is the cost of social outreach strategy development in year t

$Social\_dev_{n,t}$ is the cost of development for a social outreach strategy that is developed in year "t". Note that the first subscript indexes the social outreach strategies that are developed in a given year.

28) $Cost\_social\_activities_{s,t} = Num\_activities_{,s,t} * Cost\_per\_activity_s$

Where:

$Cost\_social\_activities_{s,t}$ is the cost of print materials of type "p" in year t

$Num\_activities_{s,t}$ is the number of social outreach activities of type "s" that are carried out in year "t"
$Cost\_per\_activity_s$ is the cost per activity of type "s"

8. Advocacy

8.1. Planning an advocacy strategy

Consultative meetings

29) $Consult\_meetings_{c,t} = Cost\_per\_meeting_c \times Num\_meetings_{c,t}$

Where:

$Consult\_meetings_t$ is the total costs of consultative meetings for strategy "c" in year "t"
$Num\_meetings_t$ is the number of consultative meetings for strategy "c" in year "t"
Cost_per_meeting is the cost per consultative meetings for strategy "c"

Writing policy and regulation

30) $Writing\_cost_{p,t} = Cost\_per\_policy_{p,t}$

Where:

$Writing\ cost_t$ is the total costs of writing policies or regulations for advocacy strategy "p" in year "t"
$Cost\_per\_policy_{p,t}$ is the cost of writing a policy applied only in years whe writing occurs

Printing and distribution of policies and regulation

31) $Cost\_print\_materials_{p,t} = Num\_print_{,p,t} \times Cost\_per\_print_p$

Where:

$Cost\_print\_materials_{p,t}$ is the cost of print materials of type "p" in year t

$Num\_print_{p,t}$ is the number of printed materials of type "p" that are printed in year "t"
$Cost\_per\_print_p$ is the cost per printed material of type "p"

8.2. Advocacy activities

32) $Cost\_Global\_meeting_t = Cost\_per\_person \times Num\_attending_t$

Where:

$Cost\_Global\_meeting_t$ is the cost in year "t" of attending global or regional meetings
Cost_per_person is the cost per person of attending a global or regional meeting
$Num\_attending_t$ is the number of people attending global or regional meeting in year "t"

National meetings or advocacy events

33) $Cost\_event_{e,t} = Cost\_per\_event_e \times Num\_events_t$

Where:

$Cost\_event_{e,t}$ is the cost holding events or national meetings of type "e" in year "t"
$Cost\_per\_event_e$ is the cost per event or meeting of type "e"
Num_events_t is the number of events in year "t"

8.3. Advocacy materials

34) $Cost\_AdvocMat\_dev_t = AdvocMat\_dev_{1,t} + AdvocMat\_dev_{2,t} \ldots\ldots + AdvocMat\_dev_{n,t}$

Where:

$Cost\_AdvocMat\_dev_t$ is the cost of advocacy material development in year t

$AdvocMat\_dev_{n,t}$ is the cost of development for advocacy material that is developed in year "t". Note that the first subscript indexes the materials that are developed in a given year.

35) $Cost\_advoc\_materials_{p,t} = Num\_print_{,p,t} * Cost\_per\_print_p$

Where:

$Cost\_advoc\_materials_{p,t}$ is the cost of printing and distributing advocacy materials of type "p" in year t

$Num\_print_{p,t}$ is the number of printed materials of type "p" that are printed in year "t"
$Cost\_per\_print_p$ is the cost per printed material of type "p"

9. General programme management

9.1. Design and review of country strategy

Meetings

Consultative meetings

36) $Consult\_meetings_{,t} = Cost\_per\_meeting \times Num\_meetings_{c,t}$

Consultant costs

There are not calculations for this item.

Production of documents

37) $Print\_strategy_t = Cost\_copy \times Num\_copies_t$

Line items 9.2, 9.3, 9.4 and 9.5 follow the same costing strategy as line item 9.1.

Special programme costing (TB)

Programme costing for turberculosis has some special line items particular to costing tuberculosis programmes. The following notes the differences.

5. Infrastructure & equipment

5.1. Situational assessment

This costing element is the same as above.

5.2. Establishment of new laboratories

Construction

38) $Cost\_Const\_Labs_{TBL,t} = Cost\_per\_Lab_{TBL} \times Num\_labs\_const_{TBL,t}$

Where:

$Cost\_Const\_Labs_{TBL,t}$ is the costs of constructing TB laboratories of type "TBL" in year "t"
$Cost\_per\_Lab_{TBL}$ is the cost per laboratory of type "TBL"
$Num\_labs\_const_{TBL,t}$ is the number of laboratories of type "TBL" built in year "t"

Equipment

39) $Cost\_Equip_{e,TBL} = Cost\_unit\_Equip_e \times Num\_equip\_per\_lab_{,e,TBL}$

Where:

$Cost\_Equip_{e,TBL,t}$ is the cost of purchasing equipment type "e" for a TB laboratory of type "TBL"
$Cost\_unit\_Equip_e$ is the per unit cost of equipment type "e"

$Num\_equip\_per\_lab_{,e,TBL,t}$ is the number of units of equipment type "e" that are needed in a laboratory of type "TBL"

Equation 39 is then summed across the various types of equipment to obtain the cost of equipping a laboaratory of type "TBL": $Cost\_Equip_{TBL}$. Note that if the planner chooses to use the lump sum option for entry the lump sum is identical to $Cost\_Equip_{TBL}$.

40) $Total\_Cost\_Equip_{TBL,t} = Cost\_Equip_{TBL} \times Num\_labs\_const_{TBL,t}$

Where:

$Total\_Cost\_Equip_{TBL,t}$ is the cost of equipping all new laboratories of type "TBL" in the year "t".

The same procedure is followed for the additional equipment.

5.3. Rehabilitation/upgrade of existing laboratories

41) $Cost\_Rehab\_Labs_{TBL,t} = Rehab\_per\_Lab_{TBL} \times Num\_labs\_Rehab_{TBL,t}$

Where:

$Cost\_Rehab\_Labs_{TBL,t}$ is the costs of constructing TB laboratories of type "TBL" in year "t"
$Rehab\_per\_Lab_{TBL}$ is the cost per laboratory of type "TBL"
$Num\_labs\_Rehab_{TBL,t}$ is the number of laboratories of type "TBL" built in year "t"

10. TB specific activities

10.1. Collaborative TB/HIV activities

Establish mechanisms for collaboration

42) $Cost\_mechanisms_{m,t} = Cost\_Meeting_{m} \times Num\_meetings_{m,t}$

Where:

$Cost\_mechanisms_{m,t}$ is the cost of meetings to achieve collaborative mechanism "m" in year "t"
$Cost\_meeting_{m}$ is the cost of a meeting relative to collaborative mechanism "m"
$Num\_meetings_{m,t}$ is the number of meetings for collaborative mechanism "m" in year "t"

10.2. High Risk Groups

Situation analysis

43) $Consultative\_meetings_{t} = Cost\_Meeting \times Num\_meetings_{t}$

These meeting costs are added to the lump sum costs of situation analyses for high risk groups.

Coordination with partners and NGOs

44) $Partner\_meetings_{t} = Cost\_Meeting \times Num\_meetings_{t}$

Transportation

45) $Cost\_new\_vehicles_{v,t} = Num\_veh\_purchased_{v,t} * Cost\_per\_vehicle_{v}$

Where:

$Cost\_new\_vehicles_{v,t}$ is the cost of purchasing new vehicles of type "v" in year "t"
$Num\_veh\_purchased_{v,t}$ is the number of vehicles of type "v" purchased in year "t"
$Cost\_per\_vehicle_{v}$ is the cost of a new vehicle of type "v"

Development of strategy

Consultative meetings

46) $Consult\_meetings_{,t} = Cost\_per\_meeting \text{ X } Num\_meetings_{t}$

Consultant costs

There are not calculations for this item.

Development of training materials

47) $Printing\_cost_{t} = UnitCost \text{ x } Num\_copies_{t}$

The printing costs are then added to the consulting costs.

10.7. Community Involvement

Policy and piloting

National policy development

48) $Consult\_meetings_{t} = Cost\_meeting \text{ x } Num\_meetings_{t}$

Printing of policy guidelines

Printing and distribution of policies and regulation

49) $Cost\_print\_materials_{t} = Num\_print_{,t} \text{ x } Cost\_per\_print$

Situation analysis- National level

No calculations.

Field visits

50) $Field\_visits_{t} = Cost\_per\_visit \text{ x } Num\_visits_{t}$

National Level – consultative meetings

51) $Consult\_meetings_{,t} = Cost\_per\_meeting \text{ X } Num\_meetings_{t}$

Special programme costing (HIV/AIDS)

The following items have not calculations associated with them. Instead the planner directly inserts a lump sum item associated with the programme.

1. Mass media
2. Community mobilization
3. Youth focused interventions - In-school
4. Youth focused interventions - Out-of-school
5. Workplace programs
6. Interventions focused on sex workers and their clients
7. Interventions focused on men who have sex with men
8. Harm reduction for injecting drug users

Human Resources (Target setting mode)

The human resources module has two modes of operation: without policy analysis calculations functional (target setting mode) and with policy analysis calculations functional (policy analysis mode). Most of the calculations for the numbers of staff and attrition are differentiated by which mode is functional.

Target staff
The three methods for targeting staff are population norms, facility norms and direct user entry.

Population norms

1) $Target\_Num\_staff_{i,j,n} = Pop_n \times Target\_Ratio_{i,j} / 10{,}000$

Where:

$Target\_Num\_Staff_{i,j,n}$ is the targeted number of staff type "i" at level "j" (i.e., facility vs. district vs regional vs national) at the time "n" which is the final year of the projection.
Pop_n is the population at time "n", the end of the projection.
$Target\_Ratio_{i,j}$ is the targeted number of staff per 10,000 population for staff type "i" at level "j".

Facility norms

2) $Target\_Num\_staff_{i,j,n} = Num\_Fac_{1,n} \times Target\_Ratio_{i,j,1} + Num\_Fac_{2,n} \times Target\_Ratio_{i,j,2} + \ldots\ldots$

Where:

$Target\_Ratio_{i,j,1}$ is the targeted number of staff type "i" at level "j" for facility type 1,2,3,… where 1,2,3… correspond to the collection of facilities specified in the infrastructure module.

Direct user entry
The user directly types or copies in the values from an existing plan.

Targeted training and retention incentives
These items are direct entry items and do not involve calculations when in target setting mode.
Outputs
Staffing

3) $Num\_staff_{i,j,t} = Target\_Num\_staff_{i,j,t}$

4) $Attrition\_rate_{i,t} = Attrition\_rate_{i,o}$

Where :

Attrition_rate$_{i,t}$ is the attrition rate for staff type "i" specified in the baseline values

5) $Staff\_hired_{i,j,t} = (Num\_staff_{i,j,t} - Num\_staff_{i,j,t-1}) + Attrition\_rate_{i,t-1} \times Num\_staff_{i,j,t-1}$

Where :

Staff_hired$_{i,j,t}$ is the number of staff of type "i" at level "j" in time "t" who need to be hired to meet the staffing target established for time "t".

Number of staff

Target setting mode

The number of staff for costing is equivalent to the number of staff set in the targeting section of the human resources module.

Human Resources (Policy analysis mode)

1) $Num\_staff_{i,t} = Num\_staff_{i,t-1} - Num\_staff_{i,t-1} \times Attrition\_rate_{i,t-1} + Recruitment_{i,j,t}$

Where :

Recruitment$_{i,j,t}$ is the recruitment that occurs for staff type "i".

Note that this equation is not disaggregated by level (facility versus district versus regional versus national). The numbers for any staff type that aggregates of the staff at the various levels.

2) $Num\_staff_{i,j,t} = Target\_Num\_staff_{i,j,t} / (Target\_Num\_staff_{i,1,t} + Target\_Num\_staff_{i,2,t} + Target\_Num\_staff_{i,3,t} + Target\_Num\_staff_{i,4,t}) * Num\_staff_{i,t}$

Where :

Num_staff$_{i,j,t}$ is the number of staff disaggregatd by level where the staff serve.
Target_Num_staff$_{i,j,t}$ is as above and the second subscript j,1,2,3,4 refers to the level at which the staff serves.

3) $Attrition_{i,t}$ = $Attrition_{i,1,0}$ x [1 – (1-$\%Att\_Red\_Meas_{i,1,t}$ x $Imp\_Red\_Meas_{1,1}$)* (1-%Att-$\_Red\_Meas_{i,2,t}$ x $Imp\_Red\_Meas_{2,1}$).......* (1-$\%Att\_Red\_Meas_{i,m,t}$ x $Imp\_Red\_Meas_{m,1}$)]

+ $Attrition_{i,2,0}$ x [1 – (1-$\%Att\_Red\_Meas_{i,2,t}$ x $Imp\_Red\_Meas_{2,1}$)* (1-$\%Att\_Red\_Meas_{i,2,t}$ x $Imp\_Red\_Meas_{2,2}$).......* (1-$\%Att\_Red\_Meas_{i,m,t}$ x $Imp\_Red\_Meas_{m,2}$)].....

+ $Attrition_{i,n,0}$ x [1 – (1-$\%Att\_Red\_Meas_{i,1,t}$ x $Imp\_Red\_Meas_{n,1}$)* (1-$\%Att\_Red\_Meas_{i,2,t}$ x $Imp\_Red\_Meas_{n,2}$).......* (1-$\%Att\_Red\_Meas_{i,m,t}$ x $Imp\_Red\_Meas_{m,n}$)]

Where :

$Attrition_{i,t}$ is the total attrition for staff type "i" at time "t"
$Attrition_{i,,m,t}$ is the attrition of type "m" for staff type "i" at time "t"
$\%Att\_Red\_Meas_{i,m,t}$ is the percent of staff type "i" who receive incentive "m" at time "t"
$Imp\_Red\_Meas_{m,n}$ is the percent reduction in attrition type "n" that would occur with a 100 percent increase in incentive type "m"

Note that calculations are set up such that the percent reduction in attrition at most decreases the attrition to zero for any cause. This is done by applying the reduction in attrition for any incentive to operate only on the proportion of attrition that remains after other incentives have been applied.

4) $Staff\_hired_{i,j,t}$ = ($Num\_staff_{i,j,t}$ -- $Num\_staff_{i,j,t-1}$) + $Attrition\_rate_{i,t-1}$ x $Num\_staff_{i,j,t-1}$
Where :
$Staff\_hired_{i,j,t}$ is the number of staff of type "i" at level "j" in time "t" who need to be hired to meet the staffing target established for time "t".

5) $Target\_recruits_{i,t}$ = $Target\_grads_{i,t}$ + $Target\_experienced_{i,t}$

Where :

$Target\_recruits_{i,t}$ is the targeted number of recruits of staff type "i" at time "t"
$Target\_grads_{i,t}$ is the targeted recruitment of new graduates of staff type "i" at time "t"
$Target\_experienced_{i,t}$ is the targeted recruitment of experienced staff type "i" at time "t"

6) $Grads\_avail\_public_{i,t}$ = $Training\_capacity_{i,t-k}$ x $\%Grads\_Join\_Public_{i,t}$

Where :
$Grads\_avail\_public_{i,t}$ is the number of new graduates of staff type "i" available to be hired in time "t"
$Training\_capacity_{i,t}$ is the capacity of training institutes to produce staff type "i" in time "t"

$\%Grads\_Join\_Public_{i,t}$ is the percent of new graduates of staff type "i" who would join the public sector at time "t" if a job were offered

"k" indexes the duration of time to train staff type "k"

Human Resources (Costing)

Salary cost

1) $Salary\_cost_{i,j,t} = Num\_staff_{i,j,t} \times Salary_{i,o} \times (1 + Salary\_incr_i)^{(t-baseyear)}$

Where:

$Salary\_cost_{i,j,t}$ is the costs associated with salaries for staff type "i" at level "j" at time "t"
$Salary_{i,o}$ is the baseline salary for staff type "i"
$Salary\_incr_i$ is the increase in average salary per year for staff type "i"

2) $Benefit\_cost_{i,j,t} = Num\_staff_{i,j,t} \times Benefit_{i,o} \times (1 + Benefit\_incr_i)^{(t-baseyear)}$

Where:

$Benefit\_cost_{i,j,t}$ is the costs associated with benefits for staff type "i" at level "j" at time "t"
$Benefit_{i,o}$ is the baseline benefit cost for staff type "i"
$Benefit\_incr_i$ is the increase in average Benefit per year for staff type "i"

3) $Incentive\_cost_{i,t} = Num\_staff_{i,j,t} \times Incentive\_cost_{i,1} \times \%Staff\_incentive_{i,1,t} +$
$Num\_staff_{i,j,t} \times Incentive\_cost_{i,2} \times \%Staff\_incentive_{i,2,t} + \ldots..$
$Num\_staff_{i,j,t} \times Incentive\_cost_{i,n} \times \%Staff\_incentive_{i,n,t}$

Where:

$Incentive\_cost_{i,j,t}$ is the costs associated with incentives for staff type "i" at level "j" at time "t"
$Incentive\_cost_{i,1}$ is the annual cost of incentive 1,2..n for staff type "i"
$\%Staff\_incentive_{i,1....n,t}$ is the percent of staff type "i" who receives incentive 1,2…n at time "t"

In-service training

In-service training costs can be calculated in one of two way: 1) as a percent of annual salary; or 2) via detailed training information by type of training

As a percent of annual salary:

4) $In\_service\_training_{i,j,t} = Num\_staff_{i,j,t} \times Salary_{i,o} \times (1 + Salary\_incr_i)^{(t-baseyear)} \times \%Training\_of\_Salary_i$

Where:

$In\_service\_training_{i,j,t}$ is the costs associated with in-service training for staff type "i" at level "j" and time "t"

$\%Training\_of\_Salary_i$ is the annual cost of in-service training as a percent of annual salary of staff type "i"

By detailed training information

5) $In\_service\_training_{i,j,t} = Num\_staff\_training_{i,1,t} \times Cost\_training_{i,1} + Num\_staff\_training_{i,2,t} \times Cost\_training_{i,2} + \ldots Num\_staff\_training_{i,n,t} \times Cost\_training_{i,n}$

Where:

$Num\_staff\_training_{i,1,t}$ is the number of staff of type "i" who received training 1,2,..n
$Cost\_training_{i,1}$ is the per person cost of training staff type "i" for training type 1,2,…n

Pre-service training costs

To the extent that students drop out before graduation, it is assumed that the drop out rate is linear from the point of enrollment to the normal graduation date for the program.

6) $Pre\_service\_training\_costs_{i,t} = (Enrollment_{i,t} + Graduation_{i,t})/2 \times Avg\_Cost\_student_i$

Where:

$Pre\_service\_training\_costs_{i,t}$ is the costs of training staff type "i" at time "t"
$Enrollment_{i,t}$ is the enrollment for training of staff type "i" at time "t"
$Graduation_{i,t}$ is the graduation of staff type "i" at time "t"
$Avg\_Cost\_student_i$ is the average annual cost of training one student of staff type "i". Note that this is the weighted average of the costs of training students across the detailed training institutions at baseline.

7) $Graduation_{i,t} = Avg\_Grad\_rate_i \times Enrollment_{i,t-k}$

Where:

$Avg\_Grad\_rate_t$ is the average of Graduation/Enrollment across the various training institutions at the baseline
"k" is the weighted average of duration of training for staff type "i"

8) $Avg\_Cost\_student_i = (Cost\_student_{i,1,o} \times Num\_students_{i,1,o} + Cost\_student_{i,2,o} \times Num\_students_{i,2,o} + \ldots Cost\_student_{i,n,o} \times Num\_students_{i,n,o}) / (Num\_students_{i,1,o} + Num\_students_{i,2,o} + Num\_students_{i,n,o})$

Where:

$Cost\_Student_{i,1\ldots n,o}$ is the cost of training staff type "i" at institution 1,2…n at baseline
$Num\_students_{i,1\ldots n,o}$ is the number of students enrolled at institution 1,2,…n at baseline

Infrastructure

The numbers of facilities is determined via the target setting function of the infrastructure module. The numbers of facilities may be calculated via direct entry of targets or targets set via population ratios. The following is the equation for facilities set via the population ratios

1) $Num\_Fac_{i,n} = Target\_Ratio_i \times Pop_n$

Where:

$Num\_Fac_{i,n}$ is the targeted number of facilities of type "i" at the end of the projection in year "n"
$Target\_Ratio_i$ is the desired ratio of population per facility type "i"
Pop_n is the calculated population at the end of the projection in year "n"

Depending on the options chosen the targeting setting mode will calculate the number of facilities whose construction must begin or the number of facilities that will exist. If the number of facilities that exist in a given year is known then the facilities whose construction must begin in the various years is calculated with this equation.

2) $Facilities\_construction\_begin_{i,t} = Num\_Fac_{i,t+k(i)} - Num\_Fac_{i,t}$

Where:

$Facilities\_construction\_begin_{i,t}$ is the number of facilities of type "i" whose construction begins in year "t"
"k(i)" is an index indicating the number of years required to build a facility of type "i"

Alternatively the planner can specify the number of facilities that whose construction will begin in a given year. In this case the following equation will calculate the number of facilities that will exist at time "t".

3) $Num\_Fac_{i,t} = Num\_Fac_{i,o} + \sum Facilities\_construction\_begin_{i,j}$

For all j such that j is far enough back in time that construction has been completed (i.e., j <= t-k(i))

The number of facilities to be rehabilitated is a direct user entry.

Number of beds

4) $Num\_beds_{i,t} = Num\_Fac_{i,t} \times Beds\_Fac_{i,t}$

Where :

$Beds\_Fac_{i,t}$ is the number of beds per facility for facility type "i"

Required vehicles

5) $Num\_Veh_{v,t} = Veh\_Fac_{v,1} \times Num\_Fac_{1,t} + Veh\_Fac_{v,2} \times Num\_Fac_{2,t} + \ldots.. Veh\_Fac_{v,n} \times Num\_Fac_{n,t} + Non\_Fac\_Veh$

Where :

$Num\_Veh_{v,t}$ is the number of vehicles of type "v" at time "t"
$Veh\_Fac_{v,i}$ is the number of vehicles of type "v" per facility of type "i"
Non_Fac_Veh is the number of vehicles not associated with a particular facility type

6) $Num\_Veh\_Purchase_{v,t} = Num\_Veh_{v,t} – Num\_Veh_{v,t-1} + Num\_Veh_{v,t-1}/k(v)$

Where :

k(v) is the working life of a vehicle of type "v"

Communications equipment

7) $Num\_Comm_{v,t} = Comm\_Fac_{v,1} \times Num\_Fac_{1,t} + Comm\_Fac_{v,2} \times Num\_Fac_{2,t} + \ldots\ldots Comm\_Fac_{v,n} \times Num\_Fac_{n,t} + Non\_Fac\_Comm$

Where :

$Num\_Comm_{v,t}$ is the number of communication equipment of type "v" at time "t"
$Comm\_Fac_{v,i}$ is the number of communication equipment of type "v" per facility of type "i"
Non_Fac_Comm is the number of communication equipment not associated with a particular facility type

8) $Num\_Comm\_Purchase_{v,t} = Num\_Comm_{v,t} – Num\_Comm_{v,t-1} + Num\_Comm_{v,t-1}/k(v)$

Where :

k(v) is the working life of a communication equipment of type "v"

Capital costs

9) $Land\_Cost_{i,t} = Facilities\_construction\_begin_{i,t} \times Land\_Cost\_Fac_i$

Where:

$Land\_cost_{i,t}$ is the cost associated with acquiring land to build facilities of type "i" in the year "t"
$Land\_Cost\_Fac_i$ is the cost per facility of acquiring land

10) $Const\_Cost_{i,t} = Cost\_Meter\_Sq_i \times Meter\_Sq_i \times Facilities\_construction\_begin_{i,t}$

Where:

$Cost\_Meter\_Sq_i$ is the average cost per meter square to build facility type "i"
$Meter\_Sq_i$ is the average number of meters squared for a facility

Note that the user has the option to directly input the cost of construction per facility. If the user chooses this option, $Meter\_Sq_i \times Facilities\_construction\_begin_{i,t}$ is replaced with a lump sum value ($Constr\_Fac_i$).

11) $Rehab\_Cost_{i,j,t} = Rehab\_Fac_{i,j} \times Num\_Rehab_{i,j,t}$

Where :

$Rehab\_Cost_{i,j,t}$ are the total costs associated with rehabilitating facilities of type "i" in condition "j" at time "t"
$Rehab\_Fac_{i,j}$ is the cost of rehabilitating facility type "i" in condition "j"
$Num\_Rehab_{i,j,t}$ is the number of facilities of type "i" in condition "j" to be rehabilitated at time "t"

12) $Equipment\_Cost_{i,t} = Facilities\_construction\_begin_{i,t} \times Equipment\_Fac_i$

Where:

$Equipment\_Cost_{i,t}$ is equipment purchased to equip facilities of type "i" whose construction begins in year "t"
$Equipment\_Fac_i$ the cost of equipping a facility of type "i"

13) $Furniture\_Cost_{i,t} = Facilities\_construction\_begin_{i,t} \times Furniture\_Fac_i$

Where :

$Furniture\_Cost_{i,t}$ is equipment purchased to equip facilities of type "i" whose construction begins in year "t"
$Furniture\_Fac_i$ the cost of equipping a facility of type "i"

14) $Vehicle\_purch\_cost_{v,t} = Cost\_Veh_v \times Num\_Veh\_Purchase_{v,t}$

Where :

$Vehicle\_purch\_cost_{v,t}$ are the costs associated with purchasing vehicles of type "v" in year "t"
$Cost\_Veh_v$ is the purchase cost of a vehicle of type "v"

15) $Comm\_purch\_cost_{v,t} = Cost\_Comm_v \times Num\_Comm\_Purchase_{v,t}$

Where :

$Comm\_purch\_cost_{v,t}$ are the costs associated with purchasing communications equipment of type "v" in year "t"
$Costs\_Comm_v$ is the purchase cost of a communications equipment of type "v"

Operating costs

16) $Electrical\_Cost_{i,t} = Num\_Fac_{i,t} \times Electrical\_Fac_i$

Where :

$Electrical\_cost_{i,t}$ is the electrical costs associated with facilities of type "i" in year "t"
$Electrical\_Fac_i$ is the cost of electricity at facility type "i"

17) $Water\_Cost_{i,t} = Num\_Fac_{i,t} \times Water\_Fac_i$

Where :

$Water\_cost_{i,t}$ is the Water costs associated with facilities of type "i" in year "t"
$Water\_Fac_i$ is the cost of water at facility type "i"

18) $OtherOp\_Cost_{i,t} = Num\_Fac_{i,t} \times OtherOp\_Fac_i$

Where :

$OtherOp\_cost_{i,t}$ is the other operating costs associated with facilities of type "i" in year "t"
$OtherOp\_Fac_i$ is the cost of other operating costs at facility type "i"

19) $Fac\_Op\_Costs_{i,t} = Electrical\_Cost_{i,t} + Water\_Cost_{i,t} + OtherOp\_Cost_{i,t}$

The planner may also estimate the annual operating costs as a percent of the construction costs of a facility or as a lump sum estimate per year. The following describe those calculations.

20) $Fac\_Op\_Costs_{i,t} = Num\_Fac_{i,t} \times Op\_Fac_i$

21) $Fac\_Op\_Costs_{i,t} = Num\_Fac_{i,t} \times Op\_Fac\_\%Const_i \times Constr\_Fac_i$

Where :

Op_Fac_i is the cost of operating a facility of type "i"
$Op\_Fac\_\%Const_i$ is the cost of operating a facility of type "i" expressed as a percent of construction costs

Vehicle operation and maintenance

The annual cost of operating a vehicle consists of several components: driver salary, fuel cost and repair/maintenance.

22) $Veh\_Op\_Costs_{v,t} = (Driver\_Cost_v + Fuel\_Cost_v + Cost\_Veh_v \times Repair\_Cost\_\%_v) \times Num\_Veh_{v,t}$

Where:

$Veh\_Op\_Costs_{v,t}$ is the cost of operating vehicles of type "v" in the year "t"
$Driver\_Cost_v$ is the cost of a driver (or drivers) for a vehicle of type "v"
$Fuel\_Cost_v$ is the annual fuel cost for a vehicle of type "v"
$Repair\_Cost\_\%_v$ is the annual maintenance and repair costs for vehicle type "v" expressed as percent of the vehicle purchase cost

Note that the fuel cost can also be calculated via fuel efficiency calculations.

23) $Fuel\_Cost_v = Fuel\_Efficiency_v \times KM\_driven_v \times Cost\_Fuel_v$

Where:

$Fuel\_Efficiency_v$ is the liters of fuel required to travel 100Km for a vehicle of type "v"
KM_driven_v is the number Km driven per year by vehicle type "v"
Cost_Fuel is the cost of a liter fuel

The cost of repair and maintenance of communication equipment is based on a percentage of the cost to purchase new equipment.

24) $Equip\_Maint\_Op_{v,t} = (Op\_Cost\_Perc_v + Maint\_Cost\_Perc_v) \times Cost\_Comm_v \times Num\_Comm\_Purchase_{v,t}$

Logistics/Supply Chain Management

Number of vehicles

The number of vehicles can be targeted by the number of warehouses or direct entry by the planner. If the planner targets vehicles by warehouse standards the following formula is used.

1) $Num\_Whse\_Veh_{v,t} = Veh\_Whse_{c,v} \times Num\_Whse_{c,t} + Veh\_Whse_{r,v} \times Num\_Whse_{r,t} + Veh\_Whse_{d,v} \times Num\_Whse_{d,t}$

Where:

$Num\_Whse\_Veh_{v,t}$ is the targeted number of vehicles of type “v” at time “t”
$Veh\_Whse_{c,v}$ is the number of vehicles of type “v” per warehouse disaggregated by type of warehouse: central, regional or district
$Num\_Whse_{c,t}$ is the number of warehouses (central, regional or district) that exist at time “t”

2) $Num\_Whse\_Veh\_Purch_{v,t} = (Num\_Whse\_Veh_{v,t})/Veh\_Life_v + (Num\_Whse\_Veh_{v,t} - Num\_Whse\_Veh_{v,t-1})$

Note that the first term on the right hand side of the equation is rounded to the nearest integer. This may result in either no vehicles ever being taken out of service and replaced; or an excessive number of vehicles being taken out of service depending on the rounding small numbers.

Where:

$Num\_Whse\_Veh\_Purch_{v,t}$ is the number of vehicles of type “v” purchased in year “t”
Num_Life_v is the lifespan of a vehicle of type “v”

Number of workers

The number of workers can be targeted by the number of workers per warehouse, workers per vehicle or directly entry by the planner.

Warehouse standards:

3) $Num\_Whse\_Worker_{i,t} = Worker\_Whse_{c,i} \times Num\_Whse_{c,t} + Worker\_Whse_{r,i} \times Num\_Whse_{r,t} + Worker\_Whse_{d,i} \times Num\_Whse_{d,t}$

Where:

$Num\_Whse\_Worker_{i,t}$ is the number of warehouse workers of type "i" at time "t"
$Worker\_Whse_{c,i}$ is the number of workers of type "i" per warehouse disaggregated by type of warehouse: central, regional or district

Vehicle standards:

4) $Num\_Whse\_Worker_{i,t} = Worker\_Veh_{1,i} \times Num\_Veh_{1,t} + Worker\_Veh_{2,i} \times Num\_Whse_{2,t} + \ldots\ldots + Worker\_veh_{n,i} \times Num\_Whse_{n,t}$

Where:

$Worker\_Veh_{1,I}$ is the number of workers of type "i" per vehicle of type 1,2,3,…n
$Num\_Veh_{1,t}$ is the number of vehicles of type 1,2,3,….n at time t

Construction of new warehouses

OneHealth assumes that every warehouse has its own cost structure. Therefore the costs of construction for each warehouse are specified by the planner.

Third party logistics contracts

Contracts given to private companies for the delivery of drugs, commodities, etc. are entered as lump sums and do not have any calculations associated.

Cost of warehouse construction

The planner may enter warehouse construction costs as a lump sum or disaggregated by land cost and cost per square meter. The equation below is the calculation for the disaggregated case.

5) $Cost\_Whse\_Const_{i,t} = Cost\_Land_i + Cost\_Whse\_SqMeter_i \times Num\_SqMeter_i$

Where:

$Cost\_Whse\_Const_{i,t}$ is the total cost of building a new warehouse denoted "i" whose construction begins in year "t"
$Cost\_Land_i$ is the cost of the land needed to build a new warehouse denoted "i"
$Cost\_Whse\_SqMeter_i$ is the per square meter cost of constructing a new warehouse denoted "i"
$Num\_SqMeter_i$ is the number of square meters used to build a new warehouse denoted "i"

Cost of warehouse rehabilitation

The costs of warehouse rehabilitation are entered as specified lump sum values where both the year of rehabilitation and cost are entered.

Operating costs for the warehouses

6) $Whse\_Electrical\_Cost_i = Num\_Whse_i \times Electrical\_Whse_i$

Where :

$Whse\_Electrical\_cost_{i,t}$ is the electrical costs associated with warehouse "i"
$Electrical\_Whse_i$ is the cost of electricity at warehouse "i"

7) $Whse\_Water\_Cost_i = Num\_Whse_i \times Water\_Whse_i$

Where :

$Water\_cost_{i,t}$ is the Water costs associated with warehouse "i"
$Water\_Whse_i$ is the cost of water at warehouse "i"

8) $Whse\_OtherOp\_Cost_i = Num\_Whse_i \times OtherOp\_Whse_i$

Where :

$Whse\_OtherOp\_cost_{i,t}$ is the other operating costs associated with warehouse "i"
$OtherOp\_Whse_i$ is the cost of other operating costs at warehouse "i"

9) $Whse\_Op\_Costs_i = Whse\_Electrical\_Cost_i + Whse\_Water\_Cost_i + Whse\_OtherOp\_cost_i$

Where :
$Whse\_Op\_Costs_i$ is the total cost of operating warehouse "i" per year

The operating costs referred to above are applicable to warehouses only in the years that functional. I.e., there are no operating costs applied to new warehouses until the year that they are built.

Vehicle purchase costs

10) $Whse\_veh\_purch\_cost_{v,t} = Num\_Whse\_Veh\_Purch_{v,t} \times Cost\_veh_v$

Where:

$Whse\_veh\_purch\_cost_{v,t}$ is the capital cost of purchasing vehicles of type "v" in year "t"
$Cost\_veh_v$ is the cost of a vehicle of type "v"

$Whse\_veh\_op\_cost_{v,t} = Num\_Whse\_Veh_{v,t}$

Vehicle operating costs

The annual cost of operating a vehicle consists of fuel cost and repair/maintenance.

11) $Veh\_Op\_Costs_{v,t} = (Fuel\_Cost_v + Cost\_Veh_v \times Repair\_Cost\_\%_v) \times Num\_Veh_{v,t}$

Where:

$Veh\_Op\_Costs_{v,t}$ is the cost of operating vehicles of type "v" in the year "t"
$Fuel\_Cost_v$ is the annual fuel cost for a vehicle of type "v"
$Repair\_Cost\_\%_v$ is the annual maintenance and repair costs for vehicle type "v" expressed as percent of the vehicle purchase cost

Note that the fuel cost can also be calculated via fuel efficiency calculations.

12) $Fuel\_Cost_v = Fuel\_Efficiency_v \times KM\_driven_v \times Cost\_Fuel_v$

Where:

$Fuel\_Efficiency_v$ is the liters of fuel required to travel 100Km for a vehicle of type "v"
KM_driven_v is the number Km driven per year by vehicle type "v"
Cost_Fuel is the cost of a liter fuel

13) $Whse\_veh\_op\_cost_{v,t} = Num\_Whse\_Veh_{v,t} \times Fuel\_Cost_v$

Where:

$Whse\_veh\_op\_cost_{v,t}$ is the cost of operating vehicles of type "v" in year "t"

Worker costs

14) $Worker\_costs_{i,t} = Num\_Whse\_Worker_{i,t} \times [Salary_{i,o} \times (1 + Salary\_incr_i)^{(t-baseyear)} + Benefit_{i,o} \times (1 + Benefit\_incr_i)^{(t-baseyear)}]$

Where:

$Worker\_costs_{i,t}$ is the costs associated with workers of type "i" at time "t"
$Salary\_cost_{i,j,t}$ is the costs associated with salaries for staff type "i" at time "t"
$Salary_{i,o}$ is the baseline salary for staff type "i"
$Salary\_incr_i$ is the increase in average salary per year for staff type "i"
$Benefit_{i,o}$ is the baseline benefit cost for staff type "i"

$Benefit\_incr_i$ is the increase in average Benefit per year for staff type "i"

Bottleneck calculations

The expected bottleneck reduction for an indicator is the sum of the expected reductions for the individual strategies with a maximum of 100%.

The frontier coverages for commodities, human resources and access are calculated as follows.

1) $Frontier\_cov_{i,j,k} = Baseline\_cov_{i,j,k} + (100 - Baseline\_cov_{i,j,k}) \times Expected\_Reduction_{i,j,k}$

Where:

$Frontier\_cov_{i,j,k}$ is the frontier coverage for indicator "i" for tracer "j" at delivery channel "k"
$Baseline\_cov_{i,j,k}$ is the baseline coverage for indicator "i" for tracer "j" at delivery channel "k"
$Expected\_Reduction_{i,j,k}$ is expected bottleneck reduction for indicator "i" for tracer "j" at delivery channel "k"

"i" is indexed for commodities, human resources and access

The frontier coverage for utilization, continuity and effective coverage are calculated as a cascade from the three indicators that more or less determine the supply of the tracer intervention. First, a frontier coverage is calculated for the supply of the tracer intervention as the following.

2) $Supply\_Frontier_{j,k} = \text{Minimum}\ (Frontier\_cov_{commodities,j,k},\ Frontier\_cov_{HR,j,k},\ Frontier\_cov_{access,j,k})$

Where:

$Supply\_Frontier_{j,k}$ is the frontier for the supply for tracer "j" at delivery channel "k"

The frontier coverage for utilization is determined by the relative values of the baseline coverages and the supply frontier.

If $Baseline\_cov_{utilization,j,k} <= Supply\_Baseline_{j,k}$

3) $Frontier\_cov_{utilization,j,k} = Baseline\_cov_{utilization,j,k} + (Baseline\_cov_{utilization,j,k} / Supply\_Baseline_{j,k})* (Supply\_Frontier_{j,k} - Supply\_Baseline_{j,k})/(100 - Supply\_Baseline_{j,k}) + Expected\_Reduction_{utilization,j,k} * \{ Supply\_Frontier_{j,k} - [Baseline\_cov_{utilization,j,k} + (Baseline\_cov_{utilization,j,k}/ Supply\_Baseline_{j,k})* (Supply\_Frontier_{j,k} - Supply\_Baseline_{j,k})/(100 - Supply\_Baseline_{j,k})]\}$

If $Baseline\_cov_{utilization,j,k} > Supply\_Baseline_{j,k}$

4) $Frontier\_cov_{utilization,j,k} = \text{Minimum}\ [Supply\_Frontier_{j,k}\ ,\ Baseline\_cov_{utilization,j,k} + Expected\_Reduction_{utilization,j,k} * (100 - Baseline\_cov_{utilization,j,k})]$

One over-riding factor is that the frontier coverage for utilization will never be lower than the baseline value of utilization.

The frontier coverage for **continuity** is determined by the relative values of the baseline coverages for utilization and continuity; and the utilization frontier coverage.

If $Baseline\_cov_{continuity,j,k} <= Baseline\_cov_{utilization,j,k}$

5) $Frontier\_cov_{continuity,j,k} = Baseline\_cov_{continuity,j,k} + (Baseline\_cov_{continuity,j,k}/ Baseline\_cov_{utilization,j,k})* (Frontier\_cov_{utilization,j,k} - Baseline\_cov_{utilization,j,k})/(100 - Baseline\_cov_{utilization,j,k}) + Expected\_Reduction_{continuity,j,k} * \{ Frontier\_cov_{utilization,j,k} - [Baseline\_cov_{continuity,j,k} + (Baseline\_cov_{continuity,j,k}/ Baseline\_cov_{utilization,j,k})* (Frontier\_cov_{utilization,j,k} - Baseline\_cov_{utilization,j,k})/(100 - Baseline\_cov_{utilization,j,k})]\}$

If $Baseline\_cov_{continuity,j,k} > Baseline\_cov_{j,k}$

6) $Frontier\_cov_{continuity,j,k} = \text{Minimum}\ [Frontier\_cov_{utilization,j,k},\ Baseline\_cov_{continuity,j,k} + Expected\_Reduction_{continuity,j,k} * (100 - Baseline\_cov_{continuity,j,k})]$

One over-riding factor is that the frontier coverage for continuity will never be lower than the baseline value for continuity.

The frontier coverage for **effective coverage** is determined by the relative values of the baseline coverages for effective coverage and continuity; and the continuity frontier coverage.

If $Baseline\_cov_{effective,j,k} <= Baseline\_cov_{continuity,j,k}$

7) $Frontier\_cov_{effective,j,k} = Baseline\_cov_{effective,j,k} + (Baseline\_cov_{effective,j,k} / Baseline\_cov_{continuity,j,k}) * (Frontier\_cov_{continuity,j,k} - Baseline\_cov_{continuity,j,k})/(100 - Baseline\_cov_{continuity,j,k}) + Expected\_Reduction_{effective,j,k} * \{ Frontier\_cov_{continuity,j,k} - [Baseline\_cov_{effective,j,k} + (Baseline\_cov_{effective,j,k} / Baseline\_cov_{continuity,j,k}) * (Frontier\_cov_{continuity,j,k} - Baseline\_cov_{continuity,j,k})/(100 - Baseline\_cov_{continuity,j,k})]\}$

If $Baseline\_cov_{effective,j,k} > Baseline\_cov_{j,k}$

8) $Frontier\_cov_{effective,j,k} = Minimum\ [Frontier\_cov_{continuity,j,k}, Baseline\_cov_{effective,j,k} + Expected\_Reduction_{effective,j,k} * (100 - Baseline\_cov_{effective,j,k})]$

One over-riding factor is that the frontier coverage for effective coverage will never be lower than the baseline value for effective coverage.

Calculation of intervention coverage based on bottleneck frontier coverage

The following is the calculation of the suggested coverage value for interventions associated with tracer "i". Note that all interventions are calculated in this manner, even those that are tracers. I.e., the values calculated above for tracers are not communicated to the intervention coverage editor. The reason for this is that many, if not all tracer indicators, are delivered through more than one delivery channel.

For all interventions except family planning:

9) $Frontier\_Cov_n = Cov_{n,0} + (100 - Cov_{n,0})$ x
[$\%Channel_{n,comm,t}$ x $(Frontier\_cov_{effective,j,comm} - Baseline\_cov_{effective,j,comm})/(100 - Baseline\_cov_{effective,j,comm})/10{,}000$
+ $\%Channel_{n,outreach,t}$ x $(Frontier\_cov_{effective,j,outreach} - Baseline\_cov_{effective,j,outreach})/(100 - Baseline\_cov_{effective,j,outreach})/10{,}000$
+ $\%Channel_{n,clinic,t}$ x $(Frontier\_cov_{effective,j,clinic} - Baseline\_cov_{effective,j,clinic})/(100 - Baseline\_cov_{effective,j,clinic})/10{,}000$
+ $\%Channel_{n,hospital,t}$ x $(Frontier\_cov_{effective,j,hospital} - Baseline\_cov_{effective,j,hospital})/(100 - Baseline\_cov_{effective,j,hospital})/10{,}000$]

Where:

$Cov_{n,0}$ is the coverage of intervention n at time 0

$\%Channel_{n,channel,t}$ is the % distribution of intervention n at time t at a particular channel

For family planning interventions:

10) $Frontier\_Cov_{n,target} = Cov_{n,0} + (70 \text{ x } \%methodmix - Cov_{n,0}) \text{ x}$
$[\ \%Channel_{n,comm,t} \text{ x } (Frontier\_cov_{effective,j,comm} - Baseline\_cov_{effective,j,comm})/(\ 90 \text{ x } \%methodmix_{x,0} - Baseline\_cov_{effective,j,comm})/10{,}000$
$+\ \%Channel_{n,outreach,t} \text{ x } (Frontier\_cov_{effective,j,outreach} - Baseline\_cov_{effective,j,outreach})/(\ 90 \text{ x } \%methodmix_{x,0} - Baseline\_cov_{effective,j,outreach})/10{,}000$
$+\ \%Channel_{n,clinic,t} \text{ x } (Frontier\_cov_{effective,j,clinic} - Baseline\_cov_{effective,j,clinic})/(\ 90 \text{ x } \%methodmix_{x,0} - Baseline\_cov_{effective,j,clinic})/10{,}000$
$+\ \%Channel_{n,hospital,t} \text{ x } (Frontier\_cov_{effective,j,hospital} - Baseline\_cov_{effective,j,hospital})/(\ 90 \text{ x } \%methodmix_{x,0} - Baseline\_cov_{effective,j,hospital})/10{,}000\ ]$

Where:

$\%methodmix_{x,0}$ is the percent distribution for method x at the baseline

Note that this assumes that 90 percent is the maximum coverage for family planning.

X. Annex I. Source Documents/Files Included in this Technical Note

1. UHM Concept Note draft 1 (14 Jan 2010)
2. Using OneHealth Tool for Planning & Costing a Programme draft (26 July 2011)
3. 2nd Set of (detailed) FAQs on OneHealth (26 July 2011)
4. 2nd Set of (detailed) FAQs on OneHealth (August 2011)
5. Human Resources Module of UHM (28 July 2010)
6. "Bottleneck Analysis" for Guiding the Strategic Planning Process in UHM (23 March 2010)
7. Financial Space Analysis within OneHealth Tool (11 July 2011)
8. HIV/AIDS Costing Module Interventions, Treatment Assumptions for Review (12 May 2010)
9. UHM: Concept Note for Estimating Costs of Country HIS draft (April 2010)
10. Concept Paper: Review of Efforts to Cost HIS & Ideas for a UHM HIS Costing Module (18 May 2011)
11. UHM: Concept Note for Module on Governance (15 April 2010)
12. UHM Infrastructure Module Discussion Points (18 March 2010)
13. UHM: Concept Note on Module for Health Financing Policy (27 April 2010)
14. UHM Report Including Model Approach, Costing Questions, Consistency Analysis, Conceptual Framework & Roadmap (13 May 2009)
15. Costing Outputted by Level (5 May 2011)
16. NFR Meeting of IAWG-Costing June 27-29, 2011 WHO/HQ DRAFT (Annex XXI)
17. Excel spreadsheet: Policy Analysis to Achieving HR Targets
18. Excel spreadsheet: Mapping inputs/outputs (10 Nov 2010)
19. PPT: Country level health sector planning: Process of Planning & Support/Facilitating function of UHM (12 July 2010)
20. PPT: UHM update: Private Sector (November 2009)
21. PPT: UHM Discussion – Incremental cost assessment, Data Management (10 March 2011)
22. PPT: A UHM for Strategic Planning and Costing: A tool under development by the UN Inter-Agency Working Group on Costing. Logistics and Supply Chain component – developments to date (September 2010)

XI. ANNEX II. FREQUENTLY ASKED QUESTIONS ABOUT ONEHEALTH[28]

Content

What are the Different Modules in the Tool?

Health programmes and interventions:

The user can choose to plan for intervention target setting primarily by disease programme or by service delivery level. In both cases there is a process for detailed planning and for indicating which interventions should be delivered at which delivery level, and with which resources.

If the user chooses to configure planning parameters by disease programme, the model is opened up with default assumptions available for 8 programmes that aim to capture interventions related to the health MDGs: child health; reproductive and maternal health; immunization; nutrition; water and sanitation (WASH); HIV; TB; and malaria. Additional programme default values will be added after August 2011, including NCDs.

The tool is flexible and the user can shift interventions between programmes, and also merge and/or create new programmes as needed, depending on the national planning context. The user can also create new interventions and cost these regardless of the planning mode used.

In addition, the following modules are included for health systems planning

- Human Resources (available)
- Infrastructure (available)
- Logistics (available)
- Health Information Systems (under development)
- Health Finance (under development)
- Governance and leadership (under development)

Moreover, OneHealth includes a module for projecting the financial space, as well as Core Results modules that bring together all the calculations into a set of summary results, identifying both quantities of inputs planned for, anticipated costs, and the likely health impact.

Tool Formulae

What Formula Algorithms are Used?

OneHealth uses an ingredients approach, which multiplies “Prices” by “Quantities” (PxQ). Prices and quantities are sometimes aggregated and presented to the user as unit costs. The model allows for changes in quantities and prices over time (by year).

[28] This section was taken from the document: “Q&As on OneHealth – Expanded Set for Experts, 24 August 2011”

The following algorithms are used in the tool for intervention costing:

- Population in need of intervention = Population (demographic projection) x Proportion (%) of population identified as in need of the intervention (based on prevalence, incidence, or preventive properties of the intervention)
- Population receiving the intervention = Population in need of intervention x Coverage (%)
- Intervention cost = Population receiving the intervention x Units of resources needed per case* x Price per unit
- Cost per delivery channel = Population receiving the intervention x Units needed per case* x Price per unit x Delivery Channel (%)

*Note: the Units of resources needed per intervention and per case treated are specific to the delivery level. On the other hand, the unit prices for inputs are stored centrally within databases. There is one central database of commodities that links to all modules in order to ensure that all references to the same commodity will make user of the same price.

For health systems costing, similar algorithms are used.

For example:

Salary cost for nurses per year = Number of nurses x average salary cost per year

Number of nurses = Number of nurses in previous year + recruitment - attrition

Some modules within the tool make use of more advanced approaches to support decision making – for example, the Logistics module allows the user to make optimal planning decisions based on current supply chain capacity and budget restrictions.

To what Extent are Formulae Visible to the User?

The model maintains the balance between the simplicity in software design and the comprehensiveness of its function. As the model uses a Price x Quantity approach (PxQ), the calculations are easy to follow. However in the interests of a user-friendly interface, formulas themselves are not visible in the software. The user can review the formulas through information available in the accompanying technical documentation and the source code for the programming will be made available upon request.

How is an Increase in Intervention Coverage Handled throughout the Tool?

Any planned increase in intervention coverage is communicated throughout the tool into all relevant modules. At the level of intervention costing, any increase in population coverage is translated into a greater number of recipients of the intervention, and thus into greater amounts of quantities of drugs and commodities required, which informs the total budget for commodities within the plan.

Moreover there are direct links to the health system investment modules. For example, the increase in commodities is translated into specific requirements for the supply chain where the user can model logistics activities to ensure that commodities are transported to where they are needed, thus impacting costs for logistics. As another example, there is a link built in whereby population coverage is translated into the estimated required number of health care visits at all levels, which is then further translated into an estimated number of full time equivalent health care workers that would be required to provide the care, given the skills specification and time required indicated per each service provided. This estimate can be used as a check within the Human Resources planning module, to compare the predicted output of health workers with that estimated amount needed, based on a bottom-up approach.

Increases in intervention coverages may be entered manually by the user or through a menu of interpolation options.

To what Extent does the Tool Differentiate between Costs at Different Service Delivery Levels of the System?

The model distinguishes between different service delivery levels including community, outreach, health center and hospital level. The cost for providing the same service at different levels is different, given the costs for infrastructure, human resources, equipment, etc., associated with each level. Moreover, the model includes a function whereby the user can specify the commodities and human resource inputs needed for each intervention, by delivery level. As an example, costs for maternal health services at hospital level may be relatively high and the model can be used to model different scenarios for shifting maternal health services to lower levels, thus informing policy discussions.

To what Extent does the Tool take into Account Economies (or Diseconomies) of Scale?

Economies of scale refer to decrease in average unit costs as the number of outputs increases. This phenomenon also applies within the health sector where there are large fixed costs that are spread across the number of patients using health services, and higher coverage rates would spread costs over a greater number of people. There may also be increasing average costs as coverage is extended to populations that are hard to reach, and where a higher per-patient investment in both fixed and variable costs may be needed in order to ensure universal coverage of health care.

OneHealth takes into account economies and diseconomies of scale implicitly, since quantities of inputs are defined relative to the population covered. A progressive investment in infrastructure, with successive placement of new facilities in first highly populated, and then less populated areas, would first result in a lowering of average fixed infrastructure costs per person, followed by increasing average costs. The user can enter assumptions for the programme activities needed to reach hard-to-reach populations, including information campaigns, delivery of services via outreach, and financial incentives to generate demand or encourage human resources to work among marginalized populations.

In essence, OneHealth allows average costs to vary with scale, thus there may be implicit economies of scale as output is increased. However the average cost (fixed and variable) would not be a user input into model, rather it could be an output of the tool (for example the average infrastructure cost per average outpatient visit). The tool does not output the average cost per person reached, but a user could calculate this based on total costs and the number of persons reached by intervention, if needed.

Scope and Integration

To what Extent does the Tool Deal with Shared Costs and Potential Double Counting?

Resources and costs are estimated at the input level, which minimizes double counting. Shared resources for health systems are estimated within the health systems modules and not in the programme-specific modules, to ensure that resources are planned for by each cost centre. For example, the facilities, logistics, governance and human resources are system costs that are only represented once - in the health systems modules - in the tool. Numerous links are built into the tool to ensure that the user checks that double counting is minimised. For example, the list of surveys planned for M&E by each health programme is summarised and communicated to the module for HIS where they can be reviewed and discussed to inform the HIS plan. There are also mechanisms within the tool for looking at activities that could be considered cross-cutting and for which integration could be strengthened, such as training programmes that can be set up to deal with multiple conditions rather than single conditions.

Data Entry

How can Countries Find the Cost Information that they Need to Enter?

The application of OneHealth to inform health sector wide planning by necessity requires substantial data inputs. This is in line with global efforts to help countries develop comprehensive M&E systems that generate data that can be linked to results and from the foundation of evidence-based planning and budgeting. The approach used in OneHealth is ingredients based costing by which the user enters information on quantities and prices, rather than unit costs. Information on quantities and prices is often more readily available at country level than unit costs.

Where appropriate, OneHealth also comes equipped with default values for both quantities and prices, where the former are based on technical programme standards for service provision and health system strengthening. Price defaults are made available from UN statistical databases, to the extent possible as country-specific prices. Defaults for drug prices are incorporated based on UNICEF supply prices and the MSH drug price catalogue.

In practice, users of the tool will want to consult the appropriate country specific resources in order to have accurate inputs for system inputs such as the costs of facilities, transportation and other equipment.

How Does the Model Help to Ensure that the User Fills in Data in All Relevant Sections?

The model makes use of a logical framework in each section, guiding the user through a process of baseline data entry, situation analysis, strategic planning through various policy options, and viewing the anticipated costs and results. The use of this logical framework will minimize the risk of the user unintentionally skipping relevant sections. In addition there is an overall dashboard, which indicates to the user which modules have been filled in, and which modules have not yet been completed.

How will Default Data be Updated?

The IAWG-Costing will set up mechanisms for regular updates of price defaults as well as standard treatment regimens, demographic projections, epidemiological data, etc., on a regular basis. At a minimum, this will be done on an annual basis, and users may find information on the latest up dates through the regular OneHealth communication mechanisms, including websites. Mechanisms for updates include negotiations with external data suppliers such as the Management Sciences for Health (MSH) regarding an annual update to the OneHealth commodity price database based on the most recent MSH drug price catalogue.

Impact

How is Health Impact Calculated?

Health impact is estimated through impact models that are directly linked to the targets and strategies identified by the user within OneHealth. Three sub-models within the OneHealth tool draw upon the UN epidemiological reference group models, a recognized gold standard, are fully incorporated as part of the OneHealth software:

- The Lives saved Tool (LiST)[29] estimates impact for a range of child and maternal health interventions, including malaria interventions.
- The AIM model projects health impact for HIV/AIDS interventions
- The Family Planning (FamPlan) model computes the relationship between family planning and total fertility rate. The output is then communicated to the population projection parts of the tool.
- A newly developed TB model projects impact on TB health targets.

Additional work is planned in the future to support further development of impact models where feasible, for example for non-communicable diseases and malaria in adults.

Health outcome is measured as the number of health problems being averted or a reduction in morbidity. For example, the number of pneumonia deaths averted in children under 5 years is the number of deaths in the case of constant coverage minus the number of deaths in a situation with an increased intervention coverage.

Can the User Attribute Health Impact to Specific Health Programmes or Interventions?

With regards to health impact in terms of, for example, lives saved, the results are communicated for the entire plan, and not per programme or for specific interventions. Given the considerable interaction between different interventions and risk factors in the population it is important to show health impact as an aggregate, in order to take interactions into account and to avoid double counting. If a user wants to show the impact for one specific programme only, s/he would need to run the analysis only with the selected interventions and interpret results with caution.

How Does the Model Estimate Impact for Health Interventions and for Systems Activities?

In addition to direct health impact (mortality, morbidity), there are also other effect sizes built into the model, such as the impact of retention incentives on reducing health worker attrition. Currently the model does not include defaults for the estimated effectiveness of many of these health system interventions, but there is ongoing work to undertake systematic reviews to collect data on the effectiveness of such activities. The user can enter his/her own assumptions for impact, and whenever defaults are provided, the user is encouraged to adjust these if there is local data available which is believed to be more appropriate.

[29] http://www.jhsph.edu/dept/ih/IIP/list/

Disease-Specific Programme Planning

Can the Tool be Used to Support Disease-Specific Programme Planning?

Yes. OneHealth uses a systemic modular approach. The user can set up and define national disease control programmes to match the country context, and then estimate the cost for a specific programme, including an analysis of the broader health system implications. The format for programme planning is streamlined so that a consistent approach is used across programmes. It is, however, encouraged that a programme plan looks at the broader health system constraints that may affect the delivery of the key interventions. The greatest benefits from using OneHealth to inform a disease programme plan is when this can be integrated fully into a broader planning process that looks at the entire health system and includes a discussion on resource allocation and priority setting both between and within programmes.

To what extent does the tool include defaults for disease-specific programme activities?

Programme activities are planned to support the scale-up of interventions. This includes activities related to monitoring and supervision, programme-specific in-service training courses to build skills of health workers (e.g., IMCI); programme planning and updating of guidelines. Many of these activities can be considered fairly standardized, for example the type of equipment required to deliver TB services, and the recommended training courses to ensure that health workers have the skills to deliver interventions with high quality.

In order to simplify data entry, OneHealth includes default information on programmatic activities where these are standardized. This includes, where available, details on specific in-service training courses, and standard surveys that may be implemented for M&E of each programme. The intention is to provide default information, in order to reduce the data entry load on the user and to provide a checklist of activities. The default assumptions for programme activities are based on expert opinion of the WHO technical departments as to what kind of activities would need to be planned for within a national programme planning framework. It should be noted that the user must actively choose each activity and set a specific target in order for that activity to be included in the plan with an associated cost. The user guide makes it clear to users that these are to be treated as suggested activities for consideration, and not an absolute requirement for scaling up.

The advantage of using defaults is that users can make use of these, review and change the values as needed. It also helps to facilitate understanding of how the tool works, and what kind of data should be entered into each section. The disadvantage is that users may be encouraged to select as many of the default activities as possible without considering the true programme needs.

Responding to Different Planning Needs

How does OneHealth Link to the Joint Assessment of National Strategies (JANS)?

Joint assessment is a shared approach to assessing the strengths and weaknesses of a national strategy. It includes an examination of the strengths and weaknesses of generic attributes that are considered to be the foundation of a 'good' national strategy.[30] OneHealth primarily responds to the first key attribute of the JANS criteria, namely to ensure that the strategies outlined within the plan are based on a rigorous

[30] For details of the joint assessment tool and guidelines developed by the IHP+ interagency working group, go to www.internationalhealthpartnership.net

situation analysis. Moreover the software facilitates an assessment of the priority health needs where planning is driven by explicit analysis of the current health system and what can realistically be achieved in the medium term. OneHealth facilitates a comprehensive budget/costing of the program areas covered by the national strategy, and allows for analysis related to issues of equity and access.

To What Extent can OneHealth be Used in Countries Where there is Decentralized Planning?

OneHealth has a function whereby projections can be created for subnational planning and later combined to form the basis for an overall national health plan. This of course requires input data to be available at this sub-national level. For further information on developing subnational projections, please see Annex V.

How can Costs be Assessed for the Private/non-State Sector?

OneHealth was primarily developed to estimate a budget for public sector activities, but may also be used to take into account considerations of planning for activities carried out within the private sector. This includes service delivery by private providers, working in public-private sector partnership, training and accreditation, and monitoring the quality of care provided. Moreover the financial projections take into account health sector financing from private sector sources, including households.

Can the Model be Used for Equity-Sensitive Planning (e.g., targeting specific interventions to specific sub-groups within the population)?

The tool has a function whereby multiple projections can be developed and viewed side by side. In this manner a separate projection can be created for each sub-group. Different strategies can be developed and costed for different demographic groups, for example low-income quintile vs. other quintiles, and the outputs can later be combined to inform one national health plan. This would however require data to be available and inputted for the different population subgroups. Activities and targets can be specified within each projection.[31]

How can OneHealth Support an MTEF or a SWAp?

A Medium Term Expenditure Framework (MTEF) is a multi-year public expenditure planning exercise that is used to set out future budget requirements for planned services and strategic activities, and to analyse these within the likely resource envelope available according to the finance department expenditure ceilings. While the MTEF is often multi-sectoral, there is also a need to plan within the resource envelope specific to health. A sector-wide approach (SWAp) is a process whereby all significant government and donor funding for the sector is aligned to support a single sector policy and expenditure programme.

[31] In the current version of OneHealth, costs would need to be exported to Excel for aggregation. Work is ongoing to develop an aggregation feature within a future version of the tool.

OneHealth can support MTEF and SWAp processes in that it can facilitates the alignment with desired characteristics such as:

- Costs are estimated based on a bottom-up, evidence based approach.
- Revenue flows, including aid flows, are estimated over time based on realistic targets.
- The future implications of policy decisions are modeled and their affordability considered.
- The basis for the MTEF costs and revenue projections is transparent, thus line departments need to plan activities explicitly and their implementation can also be monitored over time.
- The national health strategy is evidence based and inputs can be compared with costs, outputs and health outcomes thus facilitating a priority setting process. This should facilitate buy-in to the plan from external donors.

How Does the Tool Support Informed Priority Setting?

OneHealth facilitates priority setting in several way. First, costs are compared with the financial resources available, which compels the users to consider their financial limitations and to plan realistically. Second, the model is designed to illustrate the health system implications of scaling up intervention delivery, and to show the capital investment need required. The fact that the model highlights to the user where intervention scale-up would be difficult given a weak health system helps to put emphasis on the need to strengthen systems for sustainable long term planning. In this way choices are informed. Third, policy levers within modules can be adjusted and the user can observe the effects on the targets (both system targets and health impact targets). Fourth, multiple projections can be set up and viewed side by side, varying certain parameters and observing how costs and outputs change.

What will Happen to Existing Tools when OneHealth is Rolled Out?

The OneHealth tool was developed in response to country requests for a single tool that reflects the best aspects of the various tools that had been in existence, but which strengthens integrated planning. While the aspiration of the IAWG-Costing is that OneHealth will demonstrate significant added value compared to existing tools, the choice of which tool to use is always the decision of the country based on their needs and preferences. Some of the existing tools could be modified to serve as complementary tools to OneHealth, for example where appropriate they can serve to calculate some of the costs that would then be used as inputs in OneHealth. Existing tools could also be reformatted into data collection tools for OneHealth.

Does the Planning for Medical Equipment Include Operating Costs?

Yes, both capital and operating costs are included.

Outputs

Are Costs Shown in Current or Constant Prices?

The tool currently estimates costs in constant prices, but a function to adjust for inflation will be programmed into the tool as an option.

Development, Testing and Validation

What Processes are in Place to Ensure that Assumptions and Modeling Metrics for Impact Assessment is Agreed upon though Expert Group Consultation?

Existing models for health impact as developed and supported by the UN epidemiological reference groups, are integrated into the tool. These models are reviewed by expert groups on a regular basis. For other components of the tool, such as Logistics, HRH and Health Financing Policy, expert groups have been set up specifically to provide technical guidance on the development of individual modules within OneHealth. This includes experts from the participating UN agencies as well as external resource persons with specific expertise in the area under discussion. To date the expert groups set up include the following: Governance; HIS, HRH, Logistics, Infrastructure (health technologies), Private sector; Equity and Gender, Health Financing Policy, as well as a number of disease-programme planning specific discussion groups.

Constitution of the (mednet) expert groups to date have been set up following suggestions made by the participating IAWG members on whom to invite. All IAWG agencies are encouraged to continue to nominate experts for the discussion groups, to ensure that there is broad representation, including country experts and CSOs.

Frameworks for health system planning and impact modeling will evolve over time. IAWG-Costing will set up mechanisms for regular technical meetings to discuss updates to the OneHealth. At a minimum this will be done on an annual basis.

What Elements of the Tool were Tested as Part of the Desk Review May-August 2011?

There are three objectives of the desk review. First, it entails testing the functionality of the software and obtaining feedback from country planners on the format of the tool including the logic of organization, ease of navigation, and the usefulness of default data being provided. Second, the review examines the content of the current version of the tool to assess to what extent it captures elements of existing country health plans. Third, the intent is to assess the added value of OneHealth compared to other tools that were used for costing the national health plans.

Can the Tool be Used on Any Operating System?

OneHealth is a Windows-based program. Work is ongoing to ensure compatibility with Macintosh. Currently, two options exist to run OneHealth on a Macintosh: the user can either use "Parallels" software, or partition the hard-drive with Windows.

How Can the Tool be Incorporated with Excel-Based Programs?

OneHealth is designed to allow for easy outputting of information from the OH tool to Excel, and Excel information may be copy/pasted into the OneHealth Tool.

XII. Annex III. OneHealth Interventions with Impact

OneHealth	LiST	AIM	GOALS	FamPlan
Maternal/Newborn and Reproductive Health				
Family Planning				
Contraception:				
Pill				X
Condom				X
Injectable				X
Intrauterine devise (IUD)				X
Implant				X
Female sterilization				X
Male sterilization				X
Lactational Amenorrhea Method (LAM)				X
Vaginal tablets				X
Vaginal barrier method				X
Other contraceptives				X
Abortion services:				
Safe abortion	X			
Post-abortion case management	X			
Ectopic pregnancy case management	X			
Pregnancy Care:				
ANC				
Tetanus toxoid (pregnant women)	X			
Syphilis detection and treatment (pregnant women)	X			
Treatment of pregnancy complications				
Hypertensive disease case management (facility)	X			
Management of pre-eclampsia (magnesium sulphate)	X			
Childbirth care				
Antenatal corticosteroids for preterm labour	X			
Antibiotics for pRPoM	X			
Induction of labour (beyond 41 weeks)	X			
Facility Births				
Essential Delivery Care	X			
Active management of the 3rd stage of labour	X			
Management of eclampsia (magnesium sulphate)	X			
Neonatal resuscitation (institutional)	X			
Kangaroo mother care	X			
Home Births:				
Clean practices and immediate essential newborn care (home)	X			
Neonatal resuscitation (home)	X			
Postpartum care				

OneHealth	LiST	AIM	GOALS	FamPlan
Preventive postnatal care	X			
Maternal Sepsis case management	X			
Newborn Sepsis – injectable antibiotics	X			
Newborn Sepsis – full supportive care	X			
Child Health				
Vitamin A for prevention (children)	X			
Oral rehydration soluation (ORS)	X			
Zinc (diarrhea treatment)	X			
Antibiotics for treatment of dysentery	X			
Pneumonia treatment (children)	X			
Malaria treatment (children)	X			
Vitamin A for measles treatment (children)	X			
Malaria				
Insecticide treated materials	X			
ITN (pregnant women)	X			
Indoor residual spraying	X			
Intermittent preventive treatment (IPT) for pregnant women	X			
Treatment of malaria (pregnant women)	X			
HIV/AIDS				
Prevention[32]:				
Voluntary counseling and testing			*	
Condoms			*	
Male circumcision			*	
PMTCT		X		
Under Program Costing:				
Mass media			*	
Community mobilization			*	
Youth focused interventions (in school)			*	
Youth focused interventions (out-of-school)			*	
Workplace programs			*	
Interventions focused on sex workers and their clients			*	
Interventions focused on men who have sex with men			*	
Harm reduction for injecting drug users			*	
Blood safety			*	
Post-exposure prophylaxis			*	
Safe injection			*	
Universal precautions			*	
Care and Treatment:				
ART (First-line treatment) for adults		X		
ART (Second-line treatment) for adults		X		
Additional ART for TB patients			X	
Diagnostics/lab costs			X	

[32] Items denoted with a * are planned for incorporation in a future version of the tool (post December 2011)

OneHealth	LiST	AIM	GOALS	FamPlan
Management of opportunistic infections			X	
Nutrition supplements in first 6 months for HIV/AIDS cases			X	
Cotrimoxazole for children	X			
ART for children who are HIV+	X			
Vaccination:				
Rotavirus vaccine	X			
Measles vaccine	X			
Hib vaccine	X			
Pneumococcal vaccine	X			
DPT vaccination	X			
Polio vaccine	X			
BCG vaccine	X			
WASH				
Use of improved water source within 30 minutes	X			
Use of water connections in the home	X			
Improved excreta disposal (latrine/toilet)	X			
Hand washing with soap	X			
Hygienic disposal for children's stools	X			
Nutrition				
Folic acid fortification	X			
Periconceptual folic acid supplementation	X			
Balanced energy supplementation (pregnant women)	X			
Calcium supplementation for prevention and treatment of pre-eclampsia and eclampsia	X			
Multiple micronutrient supplementation (pregnant women in emergency situations)	X			
Breastfeeding promotion	X			
Complementary feeding – education only	X			
Complementary feeding – supplementation and education	X			
Severe malnutrition	Therapeutic feeding			

XIII. Annex IV. Countries with Default Data for the Logistics Module

Algeria	Ethiopia	Niger
Angola	Gabonese Republic	Nigeria
Benin	Ghana	Rwanda
Botswana	Guinea	Sao Tome and Principe
Burkina Faso	Guinea-Bissau	Senegal
Burundi	Kenya	Seychelles
Cameroon	Lesotho	Sierra Leone
Cape Verde	Liberia	Somalia
Central African Republic	Libya	South Africa
Chad	Madagascar	Sudan
Comoros	Malawi	Swaziland
Congo	Mali	Tanzania
Côte d Ivoire	Mauritania	Togo
Democratic Congo	Mauritius	Tunisia
Djibouti	Morocco	Uganda
Egypt	Mozambique	Zambia
Equatorial Guinea	Namibia	Zimbabwe
Eritrea		

XIV. ANNEX V. DEVELOPING SUB-NATIONAL PROJECTIONS

The process of developing sub-national projections is as follows[33]:

1. Collect data on:

- Population of the sub-national region and Population of the nation in the same year
- TFR of the sub-national region and the TFR of the nation in the same year
- CPR of the sub-national region and the CPR of the nation in the same year (option: if you are using the family planning module)
- HIV prevalence and HIV treatment data in the sub-national region and HIV prevalence
- and HIV treatment data in the nation in the same year (optional: only needed if you are using the AIM module OR there is a significant HIV epidemic)
- Births, population information and census data since 1970 (optional: to be used as quality control)

2. Open the country projection of interest and enter AIM data

- Go to the Home tab of the Spectrum menu, and use 'Open projection' or 'New projection' to open the country projection of interest.
- If HIV is active, you must click on the Modules tab of the Spectrum Menu and select AIM.
- Under the incidence tab, select "Direct incidence input".
- Copy the 'HIV prevalence' trend into Excel. Multiply by the ratio of the sub-national region to the national. Paste these new values back into the HIV prevalence
- For PMTCT, Adult ART, and Child treatment: All numbers need to be converted into percents. Use the outputs in the Results, Child 0-14, Summary to see the number in need and the number receiving PMTCT and the Child Treatment options. Use the Results, Adult 15-49, Summary to see the number in need and the number receiving Adult ART.
- Calculate the percent receiving by dividing the number receiving by the number in need and then multiplying. The value should be 0-100.
- Replace all numbers with percents. Ensure that the number row only has zeros in it.

[33] DeCormier Plosky, Stover, and Winfrey. 2011. LiST: A Computer Program for Making Child Survival Projections. US Fund for UNICEF: New York, NY.

- If you have sub-national treatment data in numbers, enter of the values directly, but calculate the number in need AFTER making the population changes.

3. Edit DemProj data

- Go to the 'Home' tab of the Spectrum menu and select DemProj. Go to 'Demographic Data'.
- Change the 'International Migration' values to 0.
- Multiply the 'First year population' by the ratio of the sub-national region to the national (The ratio value should be between 0- and 1).
- Copy the 'TFR' trend into Excel and multiply by the ratio of the Sub-national TFR to the national TFR (value likely to be 0.6 to 1.4). Replace the old TFR values with these new ones.

HINT: If there is note linking TFR to FamPlan, you must go to the Projection Manager and turn FamPlan off (uncheck the box). Once you have completed step 3e, you may return to the Projection Manager and turn FamPlan on (recheck the box).

- If the 'CPR' in the sub-national region is significantly different than that found in the national area, one should also replace the CPR with the sub-national value. If possible, collect data from multiple surveys and calibrate at multiple points. Assume that the time when contraception was first used is the same in the sub-national region as in the nation.
- If you have census data or other data which confirms the total population or the total births, check that now. If the values are different, then make minor adjustments to the values discussed above. This is a trial and error process. Also, remember to check the number of HIV deaths compared to any data you have available