

Nutrition Modeling Consortium

November 2018 Meeting Report

November 8 - 9, 2018
World Trade Center
New York, NY



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This report was written by Kara Greenblott, under a consulting contract with The Sackler Institute for Nutrition Science.

This document is a record of presentations, discussions and agreements that occurred during this meeting. The ideas expressed by individual participants are not necessarily endorsed by the NMC as a group.

Executive Summary

Introduction: On November 8-9, 2018, the Sackler Institute for Nutrition Science convened the second meeting of the Nutrition Modeling Consortium (NMC) with the goal of reviewing and advancing progress towards the Consortium's previously stated goals and objectives (see impact pathway on next page). The two-day meeting was structured around the theme of 'knowing each other and working together,' with in-depth tutorials on four of the modeling tools forming the core of the meeting. The intention of the tutorials was to facilitate a more profound understanding of one another's tools; and with that foundation, enhance collaboration and commitment to the Consortium's common goal of guiding countries to the tools that best suit their needs.

New Members: Since the last NMC meeting (in February 2018), several new tools have joined the Consortium, including Micronutrient Action Policy Support (MAPS) (Edward Joy), Cost of Hunger / Double Burden (Rodrigo Martinez), Nutrition and Child Development Tool (Chris Sudfeld) and Global Health Cost Consortium (Carol Levin). Each was given an opportunity to present the modeling tool(s) that they represent.

Updates on Consortium Activities:

- 1. *Tool Matrix and Two-Page Briefs:*** The draft Tool Matrix consolidates detailed information on each of the modeling tools into one spreadsheet, and aims to aid policy makers in selecting the tool(s) that best addresses their needs. Meeting participants agreed to continue with development of the Matrix, and provided feedback on how to improve the format, e.g. limiting response options and providing more details in categories such as 'types of data required', and 'technical resource needs'. Several of the Two-Page Briefs are now complete and will be posted on the NMC website.
- 2. *Decision Tree:*** At the February NMC meeting, it was decided that an on-line Decision Tree would be developed to facilitate the selection of appropriate modeling tools for end users. The Matrix (described above) would form the foundation for moving step-by-step through a series of questions, and translating that data into branches of the Decision Tree. Throughout the meeting, a variety of concerns were raised regarding the suitability of the Decision Tree format, including: 1) users would come from different backgrounds, (many having limited knowledge of their country's micronutrient and general nutrition status), making it difficult to find a common starting point for the Tree; 2) extensive technical language and questions could be too difficult for end users with limited technical fluency; 3) the Tree format doesn't easily accommodate questions with multiple response options or responses with layers of detail. Based on these and other concerns elucidated during the discussion, the group ultimately decided that development of the Decision Tree would be halted in favor of a more visually-oriented format, such as the NMC Visualizer, presented below.
- 3. *NMC Visualizer:*** The NMC Visualizer is an adaptation of the [LiST Visualizer](#) which allows for a visual representation of relationships between the tools. A mock-up of the draft [NMC Visualizer](#) depicts the mapping of four of the tools (Profiles, CotD, Optifood and LiST) along an impact pathway and was presented for discussion. In addition to providing a more intuitive and visual representation of these relationships, the Visualizer assists in highlighting gaps and overlap between the tools; displaying where outputs from one tool can serve as inputs for another (i.e. facilitating collaboration); and displaying a myriad of possibilities in terms of the level of detail lying under each of the cells, e.g. data sources, data usage, literature, randomized controlled trials (RCTs), etc. Furthermore, the NMC Visualizer has the potential (and added benefit) of modelling the entire field of nutrition, providing a greatly enhanced version of the UNICEF conceptual framework for nutrition. This ambitious initiative was enthusiastically received by participants, and the LiST team was asked to continue development of this tool.
- 4. *End User Interviews in Countries:*** Results from interviews with 18 end users in nine countries were presented for discussion. In terms of the 'impact' of using the modeling tools, in some cases, (particularly where leadership, capacity and buy-in were strong), results were directly fed into work plans, policy decisions or further analysis. However, there was very little detail or documentation available to demonstrate these claims. The presentation highlighted challenges and facilitating factors, and discussed next steps for the Consortium in terms of addressing these issues. Participants articulated their commitment to assisting countries in identifying

the appropriate tool(s) for their needs, even when that means guiding them towards one of the *other* tools in the Consortium (i.e. instead of the one that they represent). Putting aside organizational interests and prioritizing the common good was a theme that surfaced repeatedly throughout the meeting.

- 5. **Co-locating modeling tools:** In addition to the pre-existing criteria for country selection (e.g. conducive policy environment, in-country staff, etc.), participants brainstormed additional criteria, and recommended the exercise take place where: modeling tools already have significant ‘traction’; a relationship with an academic institution exists; there is an opportunity to make an impact (i.e. a receptive government); cost data is available, the country is involved in the SUN budgeting process; and finally, the ‘double burden’ of malnutrition is an issue. Participants also advised clarifying the purpose of the exercise, its indicators for success, and the intended end-product *prior* to delving into planning.

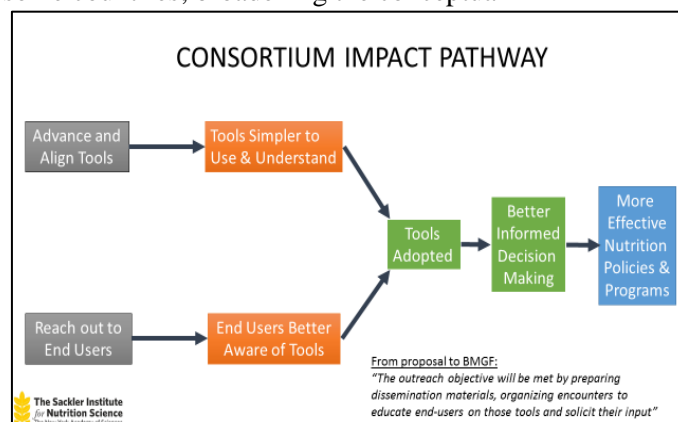
Nutrition Modeling Tutorials: One-hour-long tutorials were conducted with the goal of ‘lifting the hood’ on each tool and explaining how they work on a more granular level. Four tools were presented: OPTIMA Nutrition; MINIMOD; CotD/FNG; and OPTIFOOD. Each presentation included demonstrations on how to use the software and guided the audience through the types of analyses and decision making each tool was designed to facilitate. Following these demonstrations, results were presented from creating linkages between ‘MINIMOD and Optima Nutrition tools’ and ‘Optifood and the Cost of the Diet (CotD) tools.’ In the first linkage experiment, MINIMOD explored the capabilities of Optima Nutrition, using data from Cameroon that MINIMOD’s team had previously modelled. The exercise identified differences and complementarities between the tools in terms of inputs, assumptions, results and policy implications. It also highlighted the bi-directional benefits of creating linkages and pointed to future opportunities.

The NMC Website: An up-to-date version of the NMC website is now accessible at www.nyas.org/NMC. While it is currently ‘live’, it will not be ‘searchable’ via google (or other search engines) until it is reviewed by members and finalized. The site contains the history of the partnership; the NMC mandate; how the Consortium works together; details on each one of the modeling tools that’s involved; future and past events/trainings as well as initiatives such as the NMC Visualizer; and a variety of resources produced by both the Consortium and the individual members.

Next Steps and Concluding Remarks – Next Steps for the NMC include advancing the initial work done on the NMC Visualizer as well as continuing interviews with individuals in countries where tools have already been applied. The Consortium will prioritize ‘outreach to end users’ via the dissemination of publications (e.g. the two-page briefs on each tool), and in-person presentations at upcoming conferences, e.g. November meeting of the Latin American Society of Nutrition (SLAN) in Mexico. A compendium of case studies is also under development to consolidate and share lessons from countries where modeling tools have been applied and contributed to policy-oriented decision making.

Finally, at several points during the course of the meeting, participants were reminded of, and reflected upon, the following question: ‘What is the added value of this Consortium?’ It was suggested that going forward, group members should make an effort to ‘notice’, ‘brainstorm’ and ‘document’ what would *not* have happened had this Consortium not formed and endeavored to work collaboratively? According to participants, examples of the value being added include: changing the nature of the discussion in some countries; broadening the conceptual framework of nutrition; and making it easier for countries to find / identify all of the nutrition modeling options at their disposal. These represent ‘intermediate steps’ towards the Consortium’s end goal of contributing to more effective nutrition policies and programs.

The next meeting of the NMC will be a ‘virtual’ meeting, tentatively scheduled for October of 2019, with the final meeting scheduled for the end of the grant, February 2020. A second virtual meeting may be added during the summer of 2019 to provide an additional opportunity for dialogue and measuring of progress.



November 8 – Day One Proceedings

Welcome and Review of Past Meetings and Objectives

Gilles Bergeron, The Sackler Institute



The theme for this meeting is ‘knowing each other and working together’. Until we understand one another’s modeling tools in a more granular way, achieving optimal collaboration will remain challenging. With this in mind, this meeting was specifically structured to improve the participants’ knowledge and familiarity with each other’s modeling tools, and to improve overall collaboration among Consortium members. See the [meeting agenda here](#).

Since the last NMC meeting (in February 2018), several new modeling tools have joined the Consortium, including Micronutrient Action Policy Support (MAPS) (Edward Joy), Cost of Hunger / Double Burden (Rodrigo Martinez), Nutrition and Child Development Tool (Chris Sudfeld) and Global Health Cost Consortium (Carol Levin).

One of the ultimate outcomes intended by this Consortium is to bring end users into the discussions around the systems and processes being established by the NMC. End user participation will not be emphasized at *this* particular meeting, though Frances Knight will present the outcomes from her interviews with country-based stakeholders.

Unlike past meetings, this meeting will include four clinics (i.e. tutorials) aimed at giving participants detailed knowledge of four modeling tools: Optima, MINIMOD, Optifood and FNG / CotD, along with presentations on how these can be linked and used together. The remaining tools will be presented during future, on-line webinars. Other topics covered in this meeting include; the pilot initiative for combining the application of several complimentary tools in one country (which was proposed in the prior meeting); several communications tools that are under development; and next steps for the Consortium.

There are many ways that this group can learn to work together. The pilot is one, and another is through the use of ‘work packages’ aimed at solving a specific problem or dilemma that has yet to be solved. For example, Optima has already modeled the impact of multiple micronutrient supplementation (MMS) on diet outcomes, but perhaps the use of a work package can assist in examining these outcomes even further. Finally, the development of some form of joint technical support to end users would represent the ultimate collaboration that could evolve from this Consortium. This will also be discussed over the course of these Consortium meetings.

[Q&A and Discussion Link](#)

Session 1: Introducing New Members of the Consortium

Micronutrient Action Policy Support (MAPS)

Edward Joy, London School of Hygiene & Tropical Medicine



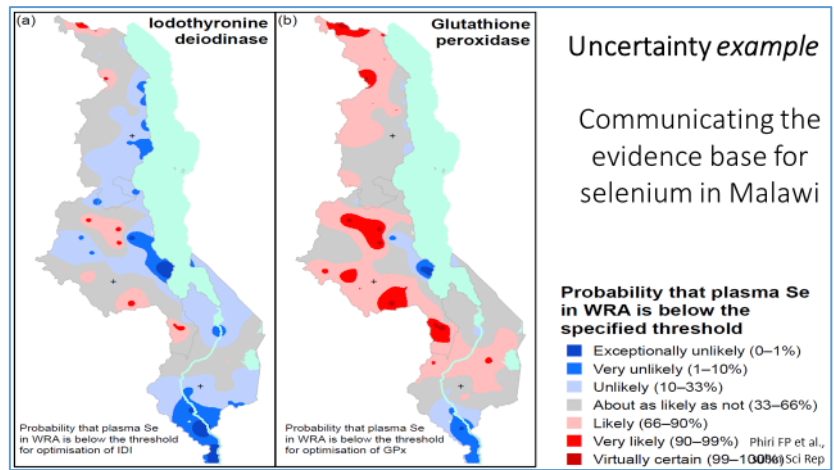
MAPS is a response to a request from the BMGF to build a *new* modeling tool that examines and assesses actions in food and agriculture systems with the aim of addressing micronutrient (MN) deficiencies. It is currently in the proposal development stage, and brings together three projects: the [GeoNutrition](#) project (also funded by BMGF), the MINIMOD project run by UC Davis, and the International Food Policy Research Institute’s (IFPRI’s) model entitled [IMPACT](#) (International Model for Policy Analysis of Agricultural Commodities and Trade).

MAPS aims to: work at the subnational level where appropriate data are available; incorporate spatial environmental data, such as soil properties; incorporate estimates of uncertainty; and draw on the IMPACT model and MINIMOD for forecasting food consumption and economic optimization, respectively.

The initial phase of work will focus on integration of spatial datasets for baselining MN status of food systems through to human health. The slide at top right (Phiri et al., submitted) shows how uncertainty can be communicated. In this case the selenium concentration in plasma of women of reproductive age (WRA) is shown relative to established thresholds of deficiency, with red indicating that a randomly selected individual in that area is ‘virtually certain’ to be deficient, and blue indicating they would be ‘exceptionally unlikely’ to be deficient. Human selenium status shows massive spatial variation due to soil properties where staple foods are grown.

The MAPS team will conduct extensive co-design activities to ensure that the tool incorporates the needs of stakeholders in target countries, including developing the ‘persona’ of the tool’s users, i.e. what they would use the tool for, what their data needs are and what skills / technology they need to use the tool. A mock-up of the tool appears at bottom right, delineating some of its primary functions. Additional functions include improved baselining and economic optimization.

[Q&A and Discussion Link](#)



What the tool might look like:

Inform MN policies and programmes

Get Started with MAPS

Users of tool, users of information

Soil management through to supplements

Spatial data

Cost of Hunger / Double Burden



Rodrigo Martinez, Economic Commission for Latin America and the Caribbean (ECLAC)

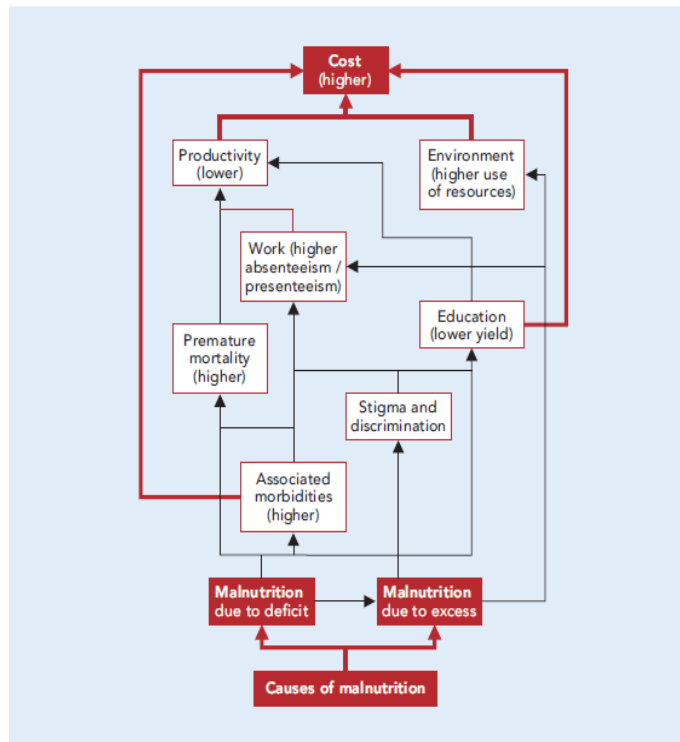
In 2003, ECLAC began partnering with the World Food Program (WFP) to analyze food security and *undernutrition* as it relates to social and economic issues in countries throughout Latin America and the Caribbean. Given the emergence of overweight and obesity as a phenomena, they now also address the double burden of under *and* overnutrition.

In 2005, ECLAC initiated a project to estimate the cost of the problem (i.e. the social and economic cost of not solving the problem of malnutrition), as opposed to the cost of the solution. In phase 1 (2005 – 2009), ECLAC worked to estimate the Cost of Hunger in 13 countries in Latin America. In 2010, a second phase began with the Cost of Hunger in Africa (COHA) including 21 countries. In phase 3 (2014 – 2019), the Cost of the Double Burden of malnutrition was initiated via three pilot studies in Latin America; and now, four countries in Central America have joined the study.

Ordinarily, policy makers analyze the cost of the solution (e.g. cost of new interventions), not including the social and economic cost of the existing problem. Estimating the cost of the problem (i.e. how much can be saved by addressing the problem) helps put the cost of a solution into its proper perspective, particularly when dealing with the Ministry of Finance of a given country.

The Cost of Hunger and Double Burden models examine the impacts of malnutrition (see both slides at right) on health, education, labor and productivity. They use an inductive method, and consider the direct and indirect impacts and costs to society in its entirety, not including MN deficiencies. An ‘incidental retrospective’ and a ‘prospective’ analysis is conducted on both undernutrition and overweight / obesity, taking, for example, the incremental relative risk of ‘mortality due to stunting’ and generating the impact of undernutrition on health.

In Ecuador, for example, this translates to: 338,986 people were not alive in 2014 due to the stunting rates over the past seven decades. In addition, 4,000 deaths would have occurred between 2014 and 2018, also due to stunting. The study finds that the 2014 estimated total cost of the double burden on Chile, Ecuador and Mexico is 493 million, 4.3 billion, and 28.8 billion (respectively), see table at bottom right. These types of studies would be an extremely useful part of an information system for decision making, including policy planning, implementation, monitoring and evaluation.



The impacts of malnutrition

Undernutrition

(stunting and underweight in children under 5 years of age)

- ✓ **Health:**
 - Morbidity (CD)
 - Mortality
- ✓ **Education**
 - Repetition
 - Drop out
- ✓ **Productivity**
 - Level of education
 - Working age population

Overweight

(overweight and obesity in adults over 19 years of age)

- ✓ **Health:**
 - Morbidity (NCD)
 - Mortality
- ✓ **Labor:**
 - Absenteeism
- ✓ **Productivity**
 - Working time
 - Working age population

Inductive method. Relative Risks from the Global Burden of Diseases

| | Chile | Ecuador | Mexico |
|---------------------------|-------------|--------------|---------------|
| Health costs | 385 | 1 666 | 7 338 |
| Education costs | - | 27 | 151 |
| Productivity costs | 108 | 2 651 | 21 341 |
| Total | 493 | 4 344 | 28 830 |
| % of GDP | 0,2% | 4,3% | 2,3% |

There was no Q&A and Discussion

Nutrition and Child Development Tool



Chris Sudfeld, Harvard T.H. Chan School of Public Health

The Nutrition, Child Development and Human Capital project is a brand new project which is also funded by the BMGF. The previous presentation is an apt precursor to this one, as this tool attempts to link nutrition interventions to economic benefit through child development improvements.

There is growing evidence that early life nutritional factors can positively impact cognitive and other ‘thrive’ outcomes; and that suboptimal child development can lead to reduced schooling attainment, which translates to lower lifetime earnings (i.e. human capital). We also know that there are critical windows of opportunity for nurturing various domains of care, (e.g. health, nutrition, early learning, etc.), in order to maximize various development outcomes, such as seeing, hearing and language development.

In recent years, there has been an explosion of studies correlating height-for-age Z-scores with cognitive scores. Taking this into consideration, in 2016, the team conducted a study to characterize and quantify the economic costs of growth faltering in low and middle income countries (LMICs). The study showed that growth faltering at two years (2010 NIMS estimates) had an economic cost of \$176.8 billion per birth cohort.

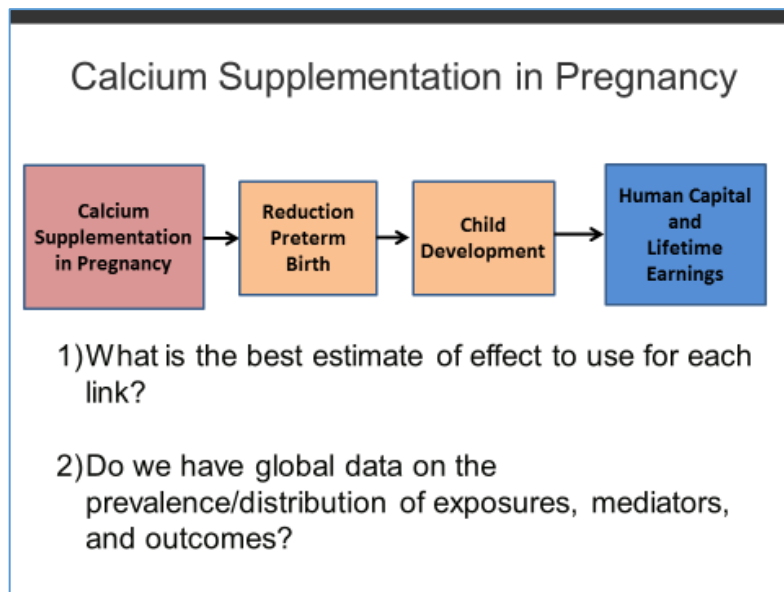
The study about to be embarked upon looks at the impact of nutrition interventions, instead of just looking at linear growth faltering. Thus, it is trying to better characterize and quantify the ‘thrive’ and human capital impacts of nutrition interventions. The interventions to be examined are listed in the slide at top right, and the activities will:

- 1) Review evidence and map modeling strategies for the relationship of nutrition interventions on development and human capital outcomes.
- 2) Review evidence and available global data on the relationship of child development with educational attainment, adult cognitive and socio-emotional development, and lifetime earnings.

A typical (and fairly simple) analysis would, for example, examine the effects of calcium supplementation in pregnancy, on human capital and lifetime earnings. And it would depend upon the availability of global data on the prevalence of exposures, mediators and outcomes, see slide at bottom right. The intention is to publish a manuscript summarizing findings by the end of next year, and in the meantime, the team is looking for possible modeling partners to build a global model. Finally, this could potentially evolve into a work package engaged in by two or more of the Consortium partners.

There was no Q&A and Discussion

| Interventions to Be Examined | |
|---|--|
| <i>Pregnancy Interventions</i> | <i>Infant and Young Child Interventions</i> |
| 1. Iron supplementation / fortification | 1. Iron supplementation / fortification |
| 2. Calcium supplementation | 2. Prophylactic zinc supplementation |
| 3. Multiple micronutrient supplements | 3. Multiple micronutrient powders |
| 4. Balanced energy-protein supplements | 4. Iodine fortification |
| 5. Intermittent preventive treatment for malaria | 5. IYCF Promotion (EBF, BF duration, CF education, etc.) |
| | 6. WASH Interventions |
| 1. Update existing RCT evidence reviews 2. Pooling study of 17 observational studies including child development assessments | |



Global Health Cost Consortium

Carol Levin, Washington University



Despite the title of this session, it only focuses briefly on the Global Health Cost Consortium (GHCC), and will rather focus on a new, more relevant project to support nutrition modeling. For information on the GHCC, please visit the [GHCC website](#). The GHCC is a BMGF-funded effort to improve the availability and use of improved cost estimates for HIV and TB programming. The GHCC has also developed more generic guidance to standardize costing in global health through the ‘GHCC Reference Case for Global Health Costing,’ available on the GHCC website.

Efforts to strengthen cost data for nutrition programming do not exist because of the absence of standard unit cost data for multi-sectoral nutrition-sensitive strategies, overweight/obesity and undernutrition. If there were sufficient cost data for a wide range of nutrition interventions, the nutrition community could work toward establishing a repository that could support nutrition modeling, similar to what has been done by the GHCC, see slides 3 and 4 in [PPP](#).

This presentation explores two initiatives that will help to improve and standardize information on cost and cost effectiveness. The first initiative was supported by the [Agriculture, Health and Nutrition \(AHN\) Academy](#) (funded by the BMGF), and established a technical working group on the economic evaluation of multi-sectoral strategies to improve health and nutrition. The working group is developing a guidance document and framework for estimating costs and benefits of multi-sectoral, nutrition-sensitive programming.

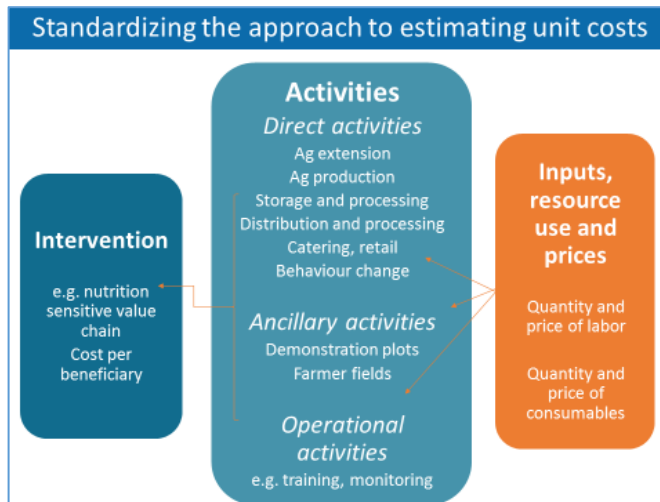
This initiative has led to a second, very recent initiative, (also funded by the BMGF), which aims to apply the framework from the first project to four country settings, and will focus on Strengthening the Economic Evaluation of Multi-Sectoral Strategies for Nutrition (SEEMS-Nutrition).

The focus of these initiatives is on *economic* evaluation approaches. Decision makers generally have good measures of program effectiveness and impact, but lack concrete data on the costs and cost effectiveness of multi-sectoral programming that addresses undernutrition, the double burden and non-communicable diseases (NCD). These projects aim to: review current approaches (see slide at top right); identify gaps and challenges of these approaches, and develop a *common* framework for measuring costs and cost-effectiveness that can be adapted for use under various scenarios.

This new initiative aims to explore the possibility of combining: 1) a typology of nutrition interventions, 2) nutrition-sensitive value chains, and 3) an impact pathway, towards forming a standardized approach to unit costing (see slide at bottom right). By doing this, it is possible to arrive at unit costing that is standardized and therefore comparable. The next step is more challenging; that is measuring the *benefits* side of the equation, which requires first agreeing on a set of standardized outcomes and impacts.

The most recent of these projects aims to apply the framework described above to retrospective and prospective data that has already been collected on costs and impacts from home gardens interventions in Malawi. This approach will then be tested in Nepal with Helen Keller’s multi-sectoral nutrition strategy, as well as with several other partners and countries in partnership with IFPRI and Results for Development.

| Focus on Economic Evaluation approaches | | |
|---|------------------|--|
| Method | Cost measurement | Outcome Measurement |
| Cost-effectiveness (CEA) | \$ | Single outcome- natural units (e.g. deaths or disease cases averted) |
| Cost-Utility (CUA) | \$ | Multiple outcomes-Index adjusted for quality of life (QALYs, DALYs) |
| Cost Benefit (CBA) | \$ | Multiple outcomes combined using monetary units |
| Cost analysis or cost minimization | \$ | Not measured |



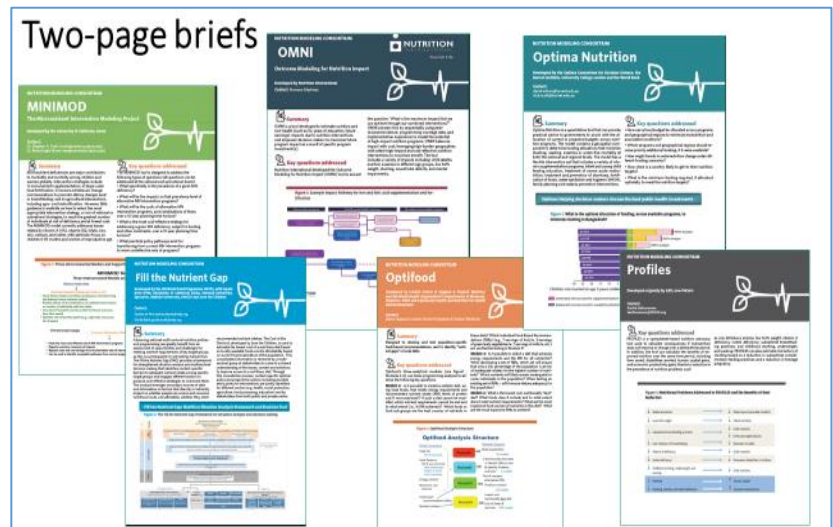
Session 2: Updates from Working Groups

Modeling Tool Matrix and Two-Pagers



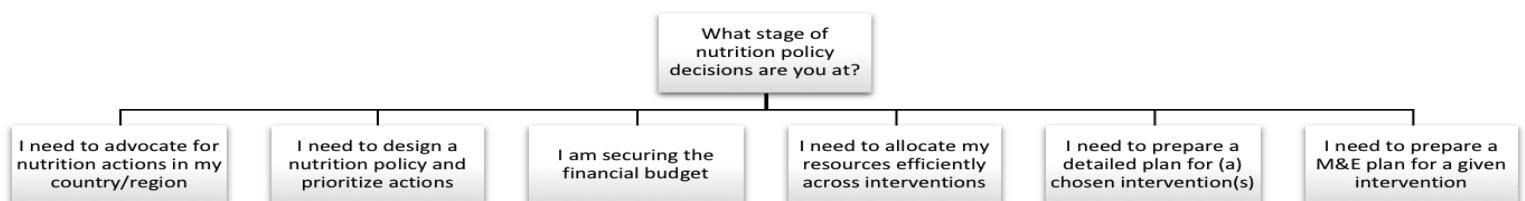
Saskia Osendarp, Osendarp Nutrition / The Sackler Institute

Since the Consortium meeting in February 2018, the three Task Forces have been working on their respective tasks. The topic for Task Force 1 was ‘tool synthesis for coordination’, and they were assigned the task of developing a Tool Matrix and a series of two-page briefs describing the basic characteristics of each tool using terminology that is similar to that used in the Matrix. A draft of the Tool Matrix was prepared for discussion at this session, and several of the two-page briefs were completed, with others pending (see slide at top right).



The reason that it is important to describe the details of each tool at such a granular level (both in the matrix and the briefs) is that these tools are intended to aid policy makers in selecting the tools that are most appropriate for their contexts and that best meets their needs. The Matrix and Briefs acknowledge that the tools are not mutually exclusive and there are many areas that overlap in utility and can play a complementary role in application.

Once completed, the original intention was to use the Matrix to feed into an on-line Decision Tree, which would ask step-by-step questions to the end user, and guide them to the modeling tool that best suits their needs, see sample question below.



After working on this, the presenter noted that it was challenging to find a way to categorize and align the various tools into one matrix, and that it is still unclear whether this format is the most useful. Participants were therefore asked to review the draft Matrix at the end of day one, to fill in any gaps related to their specific tools, and to provide their thoughts and commentary on the overall format and utility of the Matrix towards facilitating comparability.

Key Points from Q&A and Discussion:

While participants felt that it was useful to consolidate all of the modeling tools into the above-described Tool Matrix, they were less enthusiastic about using the Matrix to build a Decision Tree, which was the original intention. More on that discussion can be found in the section entitled ‘Decision Tree’ later in this document. With regards to the Tool Matrix, group articulated the following suggestions:

- Given the variability in the terminology used among the modeling tools, it would be helpful to limit answers to established response categories. For example, for the question, ‘how long does it take to implement your tool?’, responses might include: ‘less than a week’, ‘1-3 months’, ‘3-6 months’, etc. This ‘drilling down’ of the number of possible responses would also facilitate the conversion of this Matrix to the Decision Tree later.
- Key data needs might be further categorized into ‘demographic’, ‘epidemiological’, ‘food consumption’, ‘nutrient intake’, etc.
- It would be helpful for the user to have a more detailed sense of what ‘type’ of data is required. For example, some possible response categories might include: ‘software is pre-populated with default data’, ‘collection of primary data is required’, ‘secondary data can be used’, etc.
- There needs to be a balance between: 1) maintaining some level of agility and user-friendliness, so that those with minimal technical knowledge could still use the proposed ‘Decision Tree’, and 2) having enough complexity to accommodate the various levels of possibilities that the user might choose from.
- Under ‘technical resource needs’, categories could be created such as: ‘you are an informed user’, ‘you are an expert user’, and ‘you will likely need to outsource’.
- Caution should be exercised when limiting the number of response categories. If it is too limiting, it can lead to false dichotomies. For example, if the response is just ‘secondary data,’ this does not allow the modelers to explain that data has already been compiled and pre-loaded into the software, but it can be replaced, if desired, with customized data.

This exploratory discussion was useful in determining the needs of the Consortium as it moves towards the development of various work packages and activities. This discussion, and discussions later in the meeting concluded that while the Tool Matrix remains a useful repository of the details of each modeling tool, development of the Decision Tree will be halted in favor of a more suitable approach, such as the NMC Visualizer. The NMC Visualizer is presented in the next section of this document.

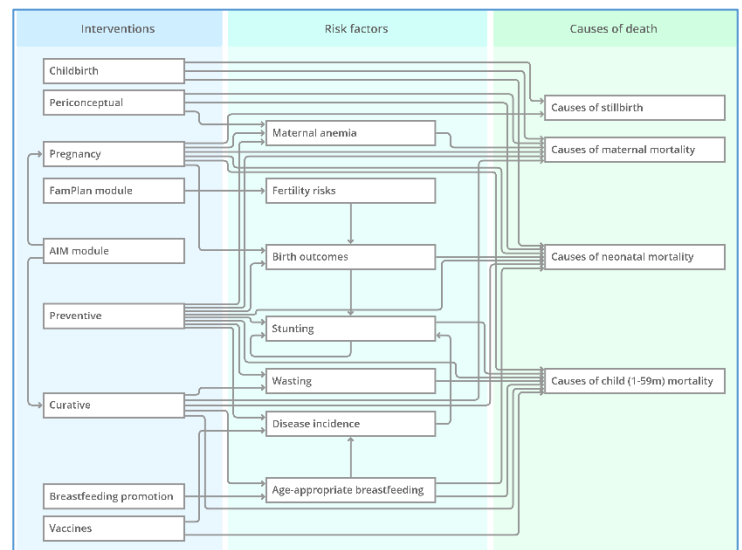
[Detailed Q&A and Discussion Link](#)

Interactive Tool Models

Tim Robertson, Johns Hopkins Bloomberg School of Public Health

There was no power point for this presentation.

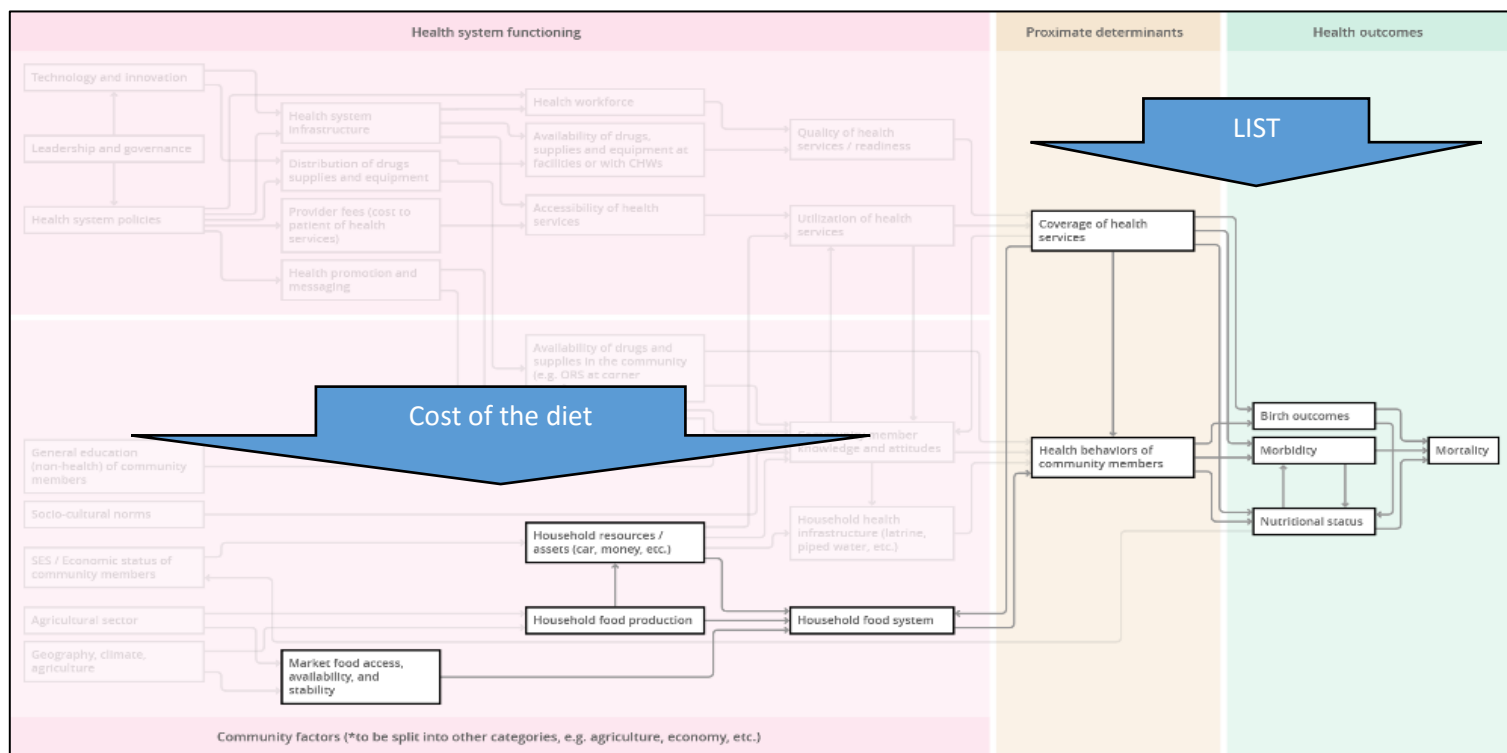
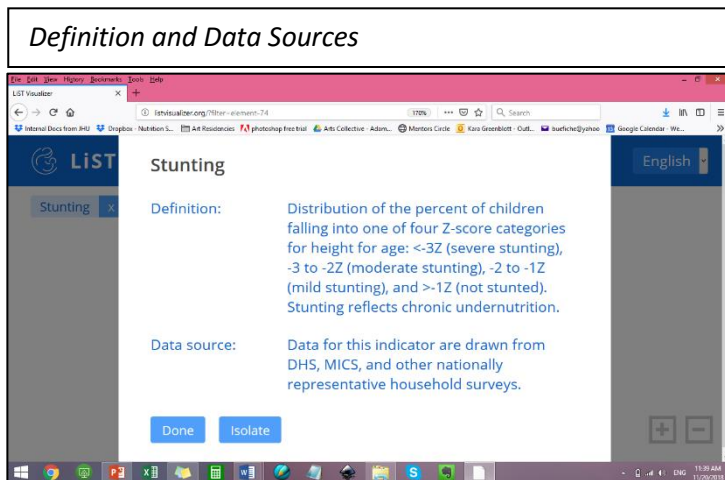
At the February NMC meeting, the idea was raised to somehow map out all of the modeling tools in a way that visually showcases how they can link together and functionally complement one another. Since then, the LiST team has deployed their proprietary software called the LiST Visualizer and developed a first draft of a mapping of four of the NMC tools. This adaptation of the Visualizer not only delivers a graphical representation of the relationships between the tools, but it also has the potential to model the entire field of nutrition, providing a greatly enhanced version of the UNICEF conceptual framework of the 1990s.



The LiST Visualizer uses the conceptual framework depicted in the slide above, structured around the category of interventions, risk factors and causes of death. If the user clicks on any of the individual cells, e.g. Childbirth, a drop down menu will list more detail, i.e. all of the interventions listed under that category. It is a glorified impact pathway that demonstrates how one element affects others further along the pathway.

It is used both to gain a better understanding of causes and effects, but also, by clicking on any of the individual cells, the user can learn the definition and data sources for given risk factors (e.g. stunting) as well as their associated outcomes (see slide at top right).

A first draft of a [NMC Visualizer](#) includes four of the NMC tools, (Profiles, CotD, Optifood and LiST) and was presented to the group for discussion. Any of the four tools can be selected, highlighting the section of the impact pathway that the tool covers, and showing how that tool links to and/or complements the other NMC tools, see slide below where the CotD and LiST have been selected. In the original LiST Visualizer, drilling



down on any of the interventions also allows the user to unveil a list of the literature / evidence base of support for that intervention, and similarly, drilling down on any of the risk factors unveils more details regarding each. This could also be done for the NMC Visualizer, though there may be instances where it is somewhat more challenging if evidence is lacking.

The NMC Visualizer could fulfill the following three purposes:

1. In addition to the Tool Matrix presented earlier, the Visualizer could provide end users with an intuitive, visually appealing way of demonstrating the relationships between the tools in the context of the above described impact pathway, or theory of change.
2. The group could use the NMC Visualizer to arrive at a mutually agreed-upon conceptual framework for the field of nutrition more broadly. To date, there is no overarching framework that captures health system components (within the framework), and can then be expanded into agriculture and other influencing sectors. This is a very ambitious goal, but could be very helpful to practitioners around the globe who are working on both nutrition programming and multi-sectoral, nutrition sensitive programming.
3. The group could use the NMC Visualizer framework to ensure that all of the tools are on the same page in terms of what aspects of nutrition are covered by this group, and facilitate agreement on various issues.

Some of the benefits to constructing a NMC Visualizer are that it:

1. Highlights gaps and overlaps between tools.
2. Allows the user to see where an input to one tool, is actually the output of other tools, thus facilitating collaboration.
3. Indicates where it may make sense for Consortium members to be harmonizing data sources and data usage.
4. Builds consensus around assumptions, and allows the group to come to agreement on various issues, or at a minimum, agree on where they disagree.
5. Includes and displays a myriad of possibilities in terms of specifying the assumptions that lie under each of the cells or arrows, including the supportive literature and randomized controlled trials (RCTs), etc.

The NMC Visualizer was enthusiastically received by participants, and the LiST team was requested to continue the development of this tool. In order to complete the NMC Visualizer, participants were asked to take home this [Homework Handout](#) asking questions about each modeling tool's attributes and characteristics. Any guidance on how to refine the draft Visualizer is appreciated.

[Q&A and Discussion Link](#)

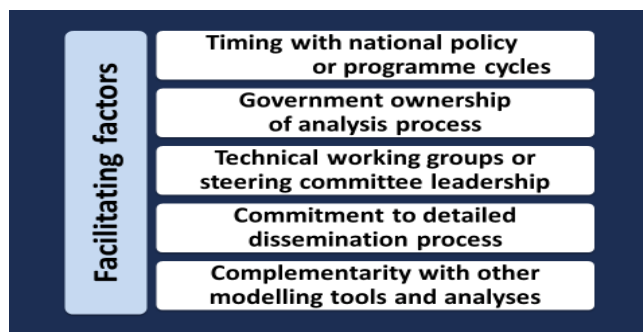
Summary of In Country Interviews

Frances Knight, London School of Hygiene and Tropical Medicine



During the NMC meeting in February, Task Force 3 took on the theme of 'Reaching out to End Users', and agreed to conduct interviews with end users to collect data on the process and impact of applying various tools in their countries. Thus far, interviews have been conducted with 18 end users in nine countries to: 1) document the process of using the tools and examine what changed; 2) determine future needs of end users; and 3) inform improvements to the tools and their application. End users were broken into three categories: brokers, analysts and consumers. This research activity is a work in progress, and will be expanded in 2019 to capture more users and conduct a more thorough analysis, with the view of developing publishable results.

In asking about the 'objective' of applying the tools in question, respondents variously replied that tools were used to aid in prioritizing nutrition or nutrition-sensitive interventions, provide evidence for advocacy / investment in nutrition, and/or shape the design of programs. Respondents articulated a list of 'challenges' (see slide below at left) as well as 'facilitating factors' (see slide below at right) to utilizing the tools.



In terms of the ‘impact’ of using the modeling tools, in some cases, (particularly where leadership, capacity and buy-in were strong), results were directly fed into work plans, policy decisions or further analysis. However, there was very little detail or documentation available to demonstrate these claims and evaluation had not been prioritized. In other cases, the impact on decision making was unknown or momentum was lost, (see quotes at right). The need for follow-up support to measure impact was a commonly-mentioned theme.

As a result of these research findings, three questions have emerged, along with three proposed activities for addressing identified challenges:

“The message was significant, but we don’t know if the government has really had the capacity to take this on.”

“I was there for the analysis but I don’t really know what happened next, I wasn’t involved.”

“The results showed what was needed but we didn’t have the funds to put this in practice.”

“The new multi-sectorial nutrition plan comes out this year, so we’ll see what happens.”

Questions for discussion:

1. To what extent are these issues specific to the processes of applying modelling tools?
2. Which factors can be addressed by the NMC?
3. How should issues or actions be prioritized?

Proposed activities, for discussion:

1. Develop an implementation guide for the modelling tools and resources for understanding methods
2. Create an advocacy toolkit and training for stakeholders
3. Identify indicators and tools for measuring impact and evaluation service

Key Points from Q&A and Discussion:

- Participants articulated their commitment to discerning the needs of a given country, and pointing them in the direction of the most relevant tool for their needs, even when that might *not* be modeling tool that that member represents. This means having a good understanding of all tools represented by the consortium, strong intra-consortium communication, a shared commitment to the countries’ needs, and at times, putting one’s own organizational interests aside.
- *When you need data, how you use data and how you present data is an art, more than a science.* There is a need for a policy guide that would assist NMC members (and others) on how to talk about data in a way that appeals to government officials’ needs and emotions.
- It is important to keep in mind that the modeling / analysis piece is just one aspect of the advocacy and policy making process.
- In an atmosphere where people are hungry for data, modelers don’t necessarily need brokers to advocate for using these tools; but in an environment where the support for evidence-based decision making is lacking, it is helpful to have a broker that can re-package the analysis into clear messages, and help decision makers to hear and understand them.
- The nutrition community almost always tells governments to ‘do more’ (of some intervention); and almost never tells them to ‘do less’. The concepts of optimization and prioritization (i.e. you can do more with less money) can be very appealing to those struggling with constrained budgets. Messaging in this way creates opportunities for bringing government officials on board.
- [The Profiles Manual for Country-Level Nutrition Advocacy](#) contains a section for planning and facilitating a field-based stakeholders’ workshop. There is no need to reinvent the wheel when this publication already provides a clear roadmap for conducting advocacy.

[Detailed Q&A and Discussion link](#)

Decision Tree

Saskia Osendarp, Osendarp Nutrition / The Sackler Institute



Based on agreement during the February NMC meeting, and using the Tools Matrix as a foundation, a draft Decision Tree is presented here for discussion. As initially conceived, the Decision Tree was to be tailored to the needs of the end user; it should not exclude or show preference for any of the tools; and was intended to guide the end user to the tool(s) that best meets their specific needs. The intention was to move step-by-step through the Matrix, translating the data into branches of the Decision Tree, see example in the slide at top right. Over the course of this presentation and discussion; however, it became clear that the ‘Tree’ format was not as appropriate or useful as initially anticipated.

To launch an exploratory discussion, the presenter posed the following questions:

Do you think this is a useful approach to pursue? Are there details that need to be added? Are there parts that should be eliminated? Some of the key points from the discussion are listed below:

Key points from Q&A and Discussion:

- If pursued, the Decision Tree should accommodate different kinds of users. For example, some will come to the Tree with no previous information about the national nutrition situation in their country, (particularly in the case of MNs, since MN data is less available than data on wasting, stunting, etc.). Therefore, these users will need a set of ‘precursor’ questions to get started. Other users, however, will already have detailed knowledge and are ready to look for a modeling tool that best meets their needs.
- A Decision ‘Tree’ might not be the best option, since a tree format doesn’t generally accommodate questions with the possibility of multiple responses. A multiple choice format is a possible alternative.
- The use of visuals on the landing page might be helpful towards engaging users from the outset, and preventing them from getting lost in the list of questions. Visuals would be particularly helpful for users who are not as comfortable with highly technical language, and for users who do not yet know what they want to achieve. Visuals would allow users to get a sense of ‘what’s possible’ by reviewing the various visual outputs. Examples of these outputs / products include: an image of a Cost of Hunger number for a country; an investment case for scaling up nutrition in a given country; an impact statement on the cost of a county’s national strategic plan.
- If used, the Decision Tree would need to accommodate questions such as: ‘if we meet our breastfeeding target for next year, what will be the impact on maternal anemia and stunting of under-fives?’, and ‘what do we need to do to reach our targets for maternal anemia, stunting and wasting?’
- A Venn diagram could be a good starting point. A question such as: ‘what are you trying to do?’ would frame the diagram, with hyperlinked (clickable) responses such as ‘advocacy,’ ‘priority setting,’ ‘estimate impact,’ ‘estimate gaps,’ ‘allocative efficiency,’ etc. This way, the hyperlinked tools would be placed visually in the response category(s) where they are best suited.

As noted earlier, the discussion eventually led to agreement that the Decision Tree format is not ideally suited to the needs of the Consortium; and given the relative enthusiasm around the NMC visualizer, that concept would be pursued instead. Details on the NMC Visualizer were presented earlier in this document under the section entitled ‘Interactive Tool Models’.

[Detailed Q&A and Discussion link](#)

Sample questions for Decision Tree

1. I need to advocate for nutrition actions in my country/region

1a. I would like to know the consequences if we do not improve malnutrition in a certain period

- yes--> 1a1

1a1. I have national survey data from DHS, MICS on prevalence of nutrition problems, health, mortality and education:

-yes -> 1a1a.

-no -> consider collecting/using data from other source and use Profiles.

1a1a. I have some information on coverage of key interventions in my country/region:

-yes -> consider LIST

-no -> consider Profiles

Session 3: Clinic

Optima Nutrition Tutorial

Nick Scott, Burnet Institute



Optima Nutrition has two primary uses:

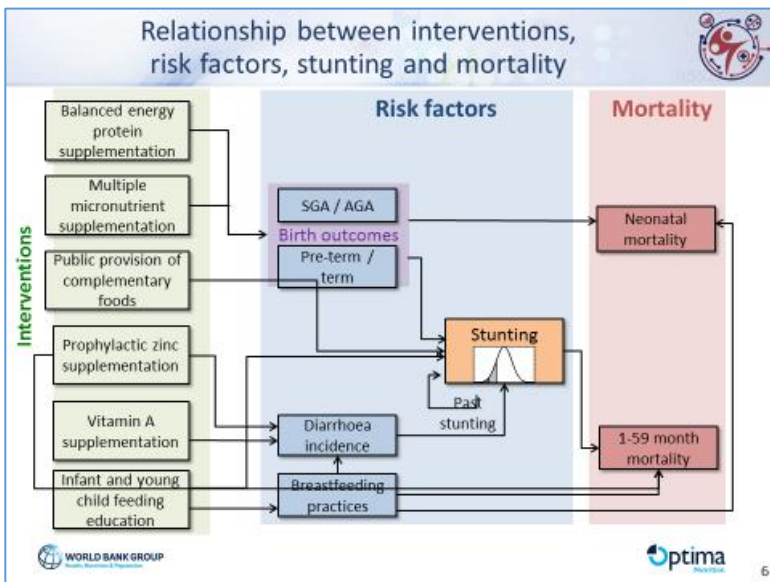
1. To optimize investment for the best health and economic outcomes
2. To project future scenarios, i.e. how will trends in malnutrition change under different funding scenarios?

Optima also has secondary uses, including assessment of the impact of interventions on stunting, wasting and anemia in children and WRA, as well as child and maternal mortality.

This modelling tool uses an optimization algorithm to allocate a given budget across various nutrition interventions to minimize or maximize a chosen objective, or set of objectives. The user should formulate the objective(s) with care to ensure that the objective is correctly understood. For example, if the user defines the objective as ‘minimizing the number of stunted children’, the algorithm may direct the user to defund programs for wasting and anemia to do this. Weighted objective functions can be used to generate more appropriate outcomes.

The underlying model tracks the under-five population over a given period (e.g. 2018-2030) and includes risk factors that contribute to mortality, stunting, wasting and anemia, (see slide below at left), demonstrating the relationship between the interventions, risk factors and mortality. The relationship graphic for wasting and anemia are also provided in the [PPP](#).

Users can define multiple Infant and Young Children Feeding (IYCF) packages, defining both the age category (e.g. <1 month, 1-5 months, etc.) and how the target will be reached, e.g. via a health facility, the community or mass media, see slide below at right.



User defined IYCF packages and input sheet

- Users can design their own IYCF packages using the table below
- Multiple IYCF packages can be designed and used in an optimization

| IYCF package | Target population | Health facility | Community | Mass media |
|--------------|-------------------|-----------------|-----------|------------|
| IYCF 1 | Pregnant women | x | | |
| | <1 month | x | x | |
| | 1-5 months | x | x | |
| | 6-11 months | x | x | |
| | 12-23 months | x | x | |
| | All | | | x |

Similarly, in the treatment of Severe Acute Malnutrition (SAM), it is possible to choose whether the treatment program includes the management of Moderate Acute Malnutrition (MAM) or not, and also whether it is delivered through health facilities only or health facilities *plus* the community. Delivering interventions through health facilities only restricts the maximum coverage of the intervention to be the fraction of the population who attend health clinics.

Optima allows the user to select from a number of different cost curves. A cost curve is the relationship between the amount you spend on an intervention and how many people it reaches, see slide at top right. Default options are constant or increasing marginal costs.

Essentially, Optima takes the amount the user plans to spend on a range of interventions, runs through the projection period, and generates estimates for the number of child deaths, maternal deaths, stunting, wasting and anemia. Then as the user changes the amount of investment in different programs, the model changes the outcomes. When the user enters the outcomes they want to maximize or minimize, it will shift the funding between programs until it finds the allocation that will achieve the maximum / minimum value of this objective.

An example was provided from Tanzania, where the National Nutrition Action Plan had coverage targets of 65% for IYCF, 58% for MN supplementation, and 90% for vitamin A supplementation, with a total estimated cost of \$64.8 million per annum. Optima found that if this action plan was achieved and maintained through 2030, it would result in 949,000 *additional* alive and un-stunted children compared to 2016 spending (without the plan).

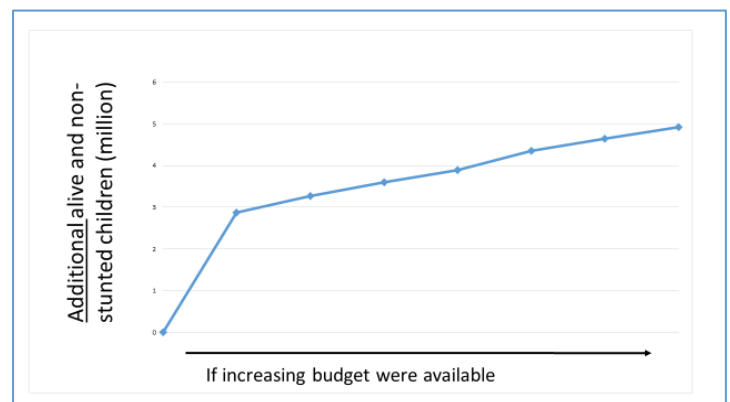
Optima was then used to *maximize* the number of alive and non-stunted children, which resulted in guidance to spend the budget in the following way: 63% towards IYCF, 23% towards public provision of complementary foods (*instead of* MN supplementation), and 14% towards vitamin A supplementation. This budget allocation could increase the number of alive and un-stunted children by *another* 192,000 between 2017 and 2030 and increase the impact of the Nutrition Plan by 20%!

Sub-national and geospatial analysis can also be done using Optima, with an investment staircase (for each region) demonstrating the impact that can be achieved for a range of different funding levels, see slide at middle right.

Comparing these investment staircases allows the user to make strategic decisions on how to incrementally invest in different regions for optimal impact. For example, in the fictional case with three regions in the slide at bottom right, the first ~\$4.5 million of spending would have the best cost-per-outcome in region 3 (green), but then returns would begin diminishing rapidly and further funding should be optimally allocated to other regions. One can also solve similar national or geospatial problems that involve ‘fixing’ current spending but optimizing future funding at various levels; optimizing existing funding only; having additional money distributed per capita across regions or

Cost-coverage curves

- The model can use a variety of shapes of cost-coverage curve
- Possible options include:
 - Constant marginal costs (red)
 - Increasing marginal costs (blue, current)
 - Decreasing marginal costs (green)
 - Logistic (purple)
- Default curves are likely to be **constant** or **increasing** marginal costs

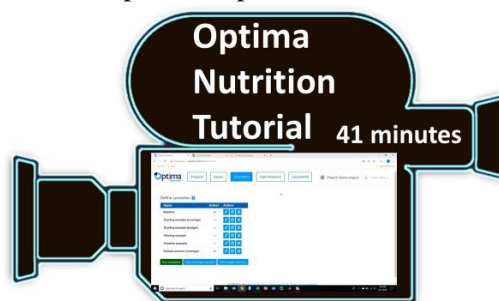


Comparing budget-impact curves across regions

- When the budget-impact curves for each region are compared, we can see where the best value for money is.
- For example, the first ~\$4.5 million would have the best cost-per-outcome in region 3.
- The next ~\$8 million is best spent in region 1
- After this, the cost-per-outcome (black tangent line) becomes worse than in region 2.

distributed optimally across regions with all money programmatically optimized. Finally, all of these scenarios can be compared over the 22 regions of the country, see [PPP](#) for detailed slides. These projections assisted the World Bank to decide how to allocate additional, future funding, and were also used for advocacy with the government, demonstrating where the issues are the greatest and where spending could have optimal impact.

The presenter went on line to the [Optima Nutrition website](#) and demonstrated how to use the platform using a pre-loaded demo project. For a tutorial using the actual Optima Nutrition software, click on the video icon at right.



[Q&A and Discussion Link](#)

MINIMOD Tutorial

Steve Vosti (University of California) and Reina Engle-Stone, (University of California)

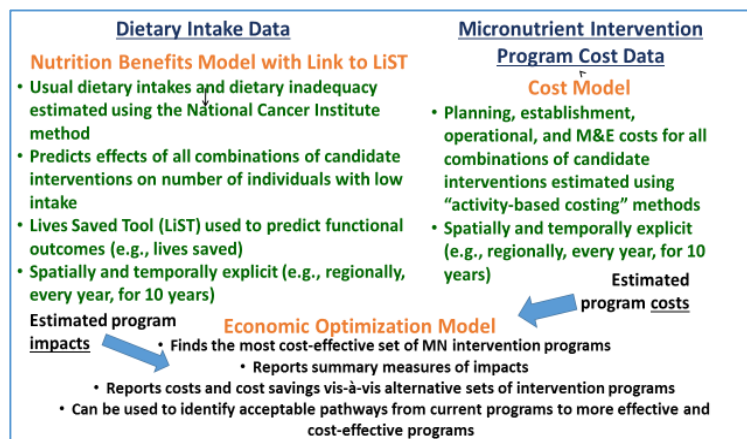


This presentation ‘lifts the hood’ on MINIMOD tool and the three models that comprise it, providing the audience with a more detailed understanding of its inner workings. The tool can be used to explore, over space and time and for selected beneficiary groups, an array of issues related to nutrition policy, among them:

1. Estimate MN intakes and levels of MN deficiencies
2. Estimate the effects on MN deficiencies of alternative MN intervention programs, and combinations of them
3. Estimate the costs of MN intervention programs, and combinations of them
4. Estimate the relative cost-effectiveness of alternative MN intervention programs
5. Identify the economically optimal set of MN intervention programs, over time and space
6. Identify policy pathways leading from business-as-usual to more cost-effective MN intervention scenarios
7. Contribute to the development and implementation of effective policy engagement strategies

The MINIMOD team has developed both a ‘full’ and a ‘simplified’ versions of the tool, with the simplified model able to operate using only secondary and generally available data. For example, the simplified model doesn’t require detailed dietary intake data to estimate MN needs or the effects of MN intervention programs. The MINIMOD team is currently working in Cameroon, Ethiopia and Haiti, with potential expansion to Malawi and Senegal.

The slide at right shows the interactions among the three models that comprise the full MINIMOD tool: 1) nutrition benefits model, 2) cost model, and 3) economic optimization model. It also demonstrates how dietary intake data and program cost data feed into the economic optimization model to identify the most cost-effective set of MN intervention programs, as well as estimates of the cost savings vis-à-vis alternate sets of intervention programs.



MINIMOD Nutrition Benefits Model, linked to LiST:

The objectives nutrition benefits model are to:

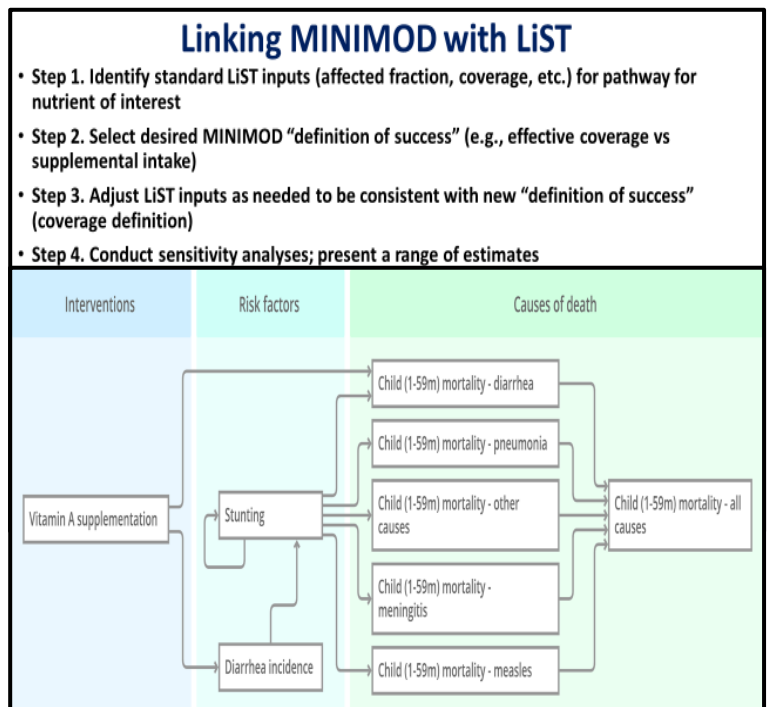
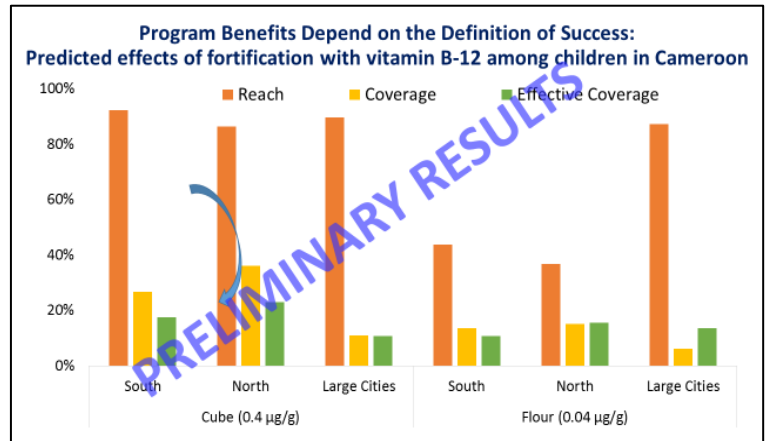
1. Assess MN intake and the adequacy of MN intakes (using 24 hour recall, program coverage, and biomarker data)
2. Estimate effects of current programs
3. Predict effects on MN adequacy of modifications to current programs, hypothetical *new* programs, and combinations of programs

The MINIMOD tool generates many indicators of MN intervention program impact. In the example based on young children in Cameroon shared in the presentation, the MINIMOD team compared effects of fortification using bouillon cubes versus wheat flour, using ‘reach,’ ‘coverage,’ and ‘effective coverage’ as their alternative definitions of success.

While both have high reach in large cities, for example, once the definition is narrowed from reach to effective coverage (defined as number (%) of individuals with inadequate intake who achieve adequate intake due to receiving an intervention¹), the outcomes change dramatically; fortified bouillon cubes, although consumed by many, are much less effective than wheat flour, in this case, see slide at top right.

The MINIMOD team has also been working with the LiST team to link estimates of effective coverage to functional outcomes, e.g., child mortality, maternal anemia, etc., see slide at middle right. This allows the MINIMOD team to ‘translate’ nutrition-based indicators of programmatic impact into measures that resonate better with policymakers and are easier to link to the Sustainable Development Goals (SDGs).

The slide at bottom right summarizes the information needs of the current LiST and MINIMOD-LiST analyses, and the ‘value added’ of the enhanced MINIMOD-LiST approach.

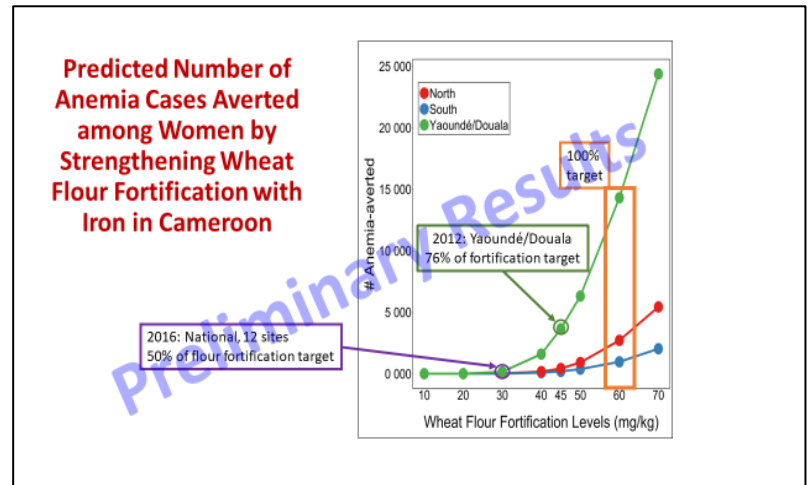


| | | Coverage | Effectiveness | Affected Fraction |
|-----------------------|--------------------|--|---|--|
| “Usual” LiST Analysis | Information needed | “Coverage”: number of children who received VAS | Effect of VAS on mortality | Prevalence of vitamin A deficiency (plasma retinol-binding protein <0.83 µmol/L) |
| | Source | National survey | Imdad et al. | National survey |
| MINIMOD LiST Analysis | Information needed | “Effective coverage”: % children with inadequate intake who achieve adequate intake after intervention | Effect of achieving dietary adequacy on mortality | Prevalence of inadequate vitamin A intake (usual vitamin A intake < estimated average requirement, 210 µg RAE/d) |
| | Source | Simulations using data from national dietary survey | Estimate from Imdad et al., scaled using simulations from kinetic model of hepatic VA content | National dietary survey |

¹ Both effective coverage and usual intake are calculated using the National Cancer Institute’s method. These methods are described in detail in the [power point presentation](#).

In addition to comparing across different MN program interventions, the nutrition benefits model can also be used (using additional monitoring data), to examine the effects of changes in the performance of programs over time. For example, the slide at right reported the predicted effects on maternal anemia of alternative levels of fortification of wheat flour, again by macro-region. The slide also reports the measured performance of that program over time.

Finally, the dietary adequacy results generated by this model, and the functional outcomes generated in collaboration with LiST, can be used alone or in combination with program cost data (i.e. using the MINIMOD cost model).



MINIMOD MN Intervention Program Cost Model:

The cost model estimates the costs of specific MN interventions, and combinations of those interventions, and considers a variety of types of costs, including start-up, fixed, variable, private sector, and caregiver/household costs, depending on the intervention program. It also generates the marginal (or incremental) costs of adding an MN intervention to an existing platform, or the costs of developing/implementing a completely new program or delivery platform. As with the nutrition benefits model, the cost model allows program costs to vary over space and time. Converting cost data provided by another organizations (e.g. UNICEF) to cost data that the model can actually use can be challenging because program implementation cost data are usually measured, analyzed, and interpreted differently.

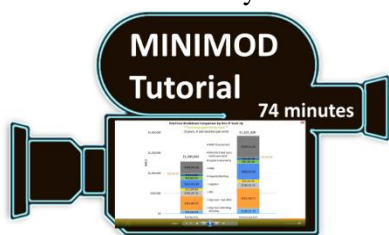
MINIMOD Economic Optimization Model:

This final model combines the results of the nutrition benefits model and the cost model, and identifies the economically optimal combinations to MN intervention programs, over space and time. In other words, it selects the combinations of programs that provide the maximum MN benefits for a given the amount of available funding, or, the lowest-cost combination of MN intervention programs that can achieve a given MN objective. The model achieves efficiency gains by shifting resources among alternative intervention programs, across spatial units, and over time.

Operationally, the economic optimization model also allows for assessing the effect of uncertainty in the estimation of nutritional benefits and programmatic costs. More specifically, the nutrition benefits model provides estimates of average MN intake and also standard errors. Likewise, the cost model also provides best-guess estimates of MN intervention program costs, and these can be varied in the model to capture analysts' uncertainty around estimated costs. The economic optimization model 'sees' the uncertainty associated with both the estimated benefits and the estimated costs, and samples from both distributions 1,000 times in order to assess the extent to which alternative combinations of estimated benefits / costs affect model results; the results of these simulations are reported in terms of 95% confidence intervals.

Perhaps more importantly, the simulations allows the user to assess the robustness of the policy recommendations are with respect to uncertainty. In most cases analyzed to date, uncertainty related to nutritional benefits and to program costs have *not* changed the portfolios of cost-effective MN program interventions suggested by the economic optimization model. In other words, while there is a lot of scientific uncertainty associated with estimating the nutritional benefits and the costs associated with alternative MN intervention programs, this scientific uncertainty does not necessarily translate into uncertainty regarding the core policy messages that are derived from the MINIMOD tool.

The *simplified* MINIMOD tool is actually a very sophisticated modeling tool, and is comprised of the same three models (nutrition benefits, costs, economic optimization) contained in the full MINIMOD tool. The fundamental difference is that the simplified MINIMOD tool makes use of secondary data, and hence can be used in settings where detailed dietary intake and biomarker data are not available. Eventually, there will be a web-based graphical



user interface (GUI) that will run the simplified MINIMOD tool, and which will be accessible to non-technical but trained users. Finally, the [PPP](#) includes a pilot demonstrating the possibility of using secondary data to estimate children’s vitamin A needs, and the benefits and costs of alternative vitamin A intervention programs. It also identifies the economically optimal vitamin A intervention programs over space and time. The patterns in the results are very similar to those in the full MINIMOD tool.

For a Power Point-based tutorial of the full and simplified versions of the MINIMOD tool, click on the video icon above.

[Q&A and Discussion Link](#)

Establishing Tool Linkages: MINIMOD and Optima Nutrition

Steve Vosti (University of California) and Nick Scott (Burnet Institute)



This presentation describes an experiment comparing the results of the MINIMOD and Optima tools when each was run to address similar MN policy questions. The exercise provided MINIMOD with the opportunity to explore the capabilities of Optima Nutrition, using the Cameroon data that MINIMOD had previously used. The objective was to identify differences and complementarities between the Optima Nutrition and MINIMOD modeling tools in terms of the tools’ inputs and assumptions, results and policy implications.

A MINIMOD team member was trained in use of the Optima tool, then prepared the required secondary and other data and used it in the national and subnational contexts of Cameroon. Selected results were compared at the national and macro-regional levels, with a focus on vitamin A supplementation. The comparisons could then be used to identify areas where Optima results may help inform MINIMOD simulations, and vice-versa. The [PPP](#) provides preliminary results from using the Cameroon data, and highlights the cross-model benefits of creating linkages between the Optima Nutrition and MINIMOD tools; see below.

[Q&A and Discussion Link](#)

Enhancing Optima Using MINIMOD

- Identify baseline MN intake (perhaps from secondary sources), and hence ‘needs’
- Introduce additional measures of program impact / success
- Refine MN intervention program costs
- Allocate the Optima budget identified as needed to meeting MN needs, e.g. identify most-cost effective vitamin A delivery mechanism(s), in addition to vitamin A supplements, over time and space
- Provide a ‘sounding board’ for effectiveness and cost-effectiveness estimates that emerge from Optima
- Potentially refine some Optima input parameters and methods, and rerun to assess sensitivity of results to the data sources and methods used to estimate input parameters

Insights Optima Nutrition Can offer MINIMOD

- Given a national nutrition budget and national health objectives, what proportion of the budget should be allocated to micronutrient interventions generally, and how to prioritize among them?
- Reveals tradeoffs associated with allocating resources to micronutrient-specific interventions, e.g. when we optimize to minimize maternal and/or child anemia, what are the impacts on other nutrition outcomes we care about?

Day 1 Final Remarks - Homework

Gilles Bergeron, The Sackler Institute

Participants were asked to review and provide feedback on the following documents prior to returning the next day.

1. **Tool Matrix:** Review and provide general feedback, including what else needs to be included, and/or eliminated. If the information for a given tool is not yet complete, the modeling teams were asked to fill in those gaps.
2. **NMC Visualizer:** Review and provide general feedback, and describe where each modeling tool fits into the visual.

November 9 – Day Two Proceedings

Session 3 Continued -- Clinic

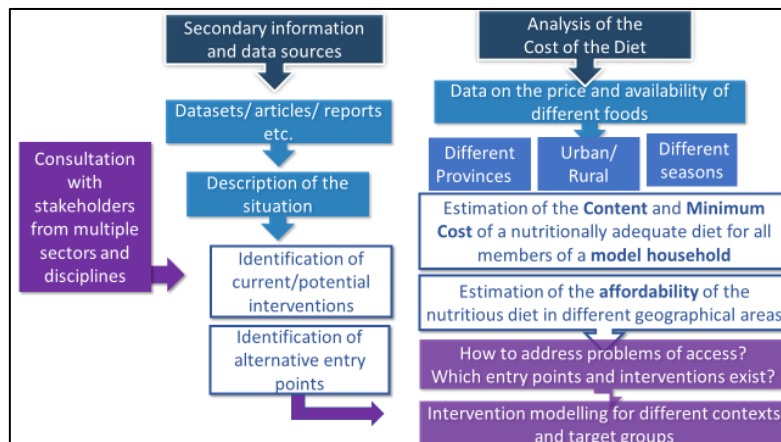
Fill the Nutrient Gap (FNG) / Cost of the Diet (CotD) Tutorial

Saskia de Pee, (World Food Program) and Frances Knight (London School of Hygiene and Tropical Medicine and World Food Program)



The Cost of Diet tool essentially identifies whether a nutritious diet would be available in a given context; what the lowest possible cost of this diet would be; and what proportion of the population would be able to afford it. WFP routinely uses the CotD in conjunction with the FNG tool, and they are therefore presented together in this section.

Modeling is used to assess how a nutritious diet *could* be made more affordable, via changes in the food system, to make more nutritious foods available or make local foods more nutritious, or other sectors (health and social protection in particular) to improve purchasing power and access to nutritious foods. The CotD tool was developed by Save the Children UK in 2012, and use was typically linked to household economic data using the Household Economy Analysis (HEA) tool.



One important way that the CotD is being used globally is by the WFP as part of the Fill the Nutrient Gap (FNG) situation analysis for decision making process. There are plans to develop an open source version of the CotD tool, which should make the software more agile and able to meet the evolving user needs. The software can be downloaded from the [Cost of the Diet website](#).

The FNG process aims to identify barriers to adequate nutrient intake and involves a wide range of sectors and stakeholders to ensure a shared understanding and commitment to prioritizing context-appropriate nutrition-specific and nutrition-sensitive interventions. The purpose of the FNG is threefold:

1. Identify nutrient gaps for different target groups in specific contexts
2. Identify barriers to adequate nutrient intake (availability and access to nutritious foods and nutrients)
3. Establish consensus about on-going and potential interventions to improve nutrient access for specific target groups, adapted to the local context

The two primary components of the FNG analysis are: 1) a review of often 100-200 secondary sources of data and information on availability, physical and economic access and choices of nutritious foods, and 2) linear programming using the CotD tool, which acts as a ‘reality check’, allowing users to see whether a nutritious diet can be composed using locally available foods, what the cost would be, and how that cost relates to what people currently spend on food (i.e. affordability). Affordability is estimated using household (HH) expenditure data, and comparing it to the cost of various diets. See slide at top right for the issues covered under each component. The application of FNG in a wide variety of countries has been documented and is available at the following link: [FNG Summary Reports](#).

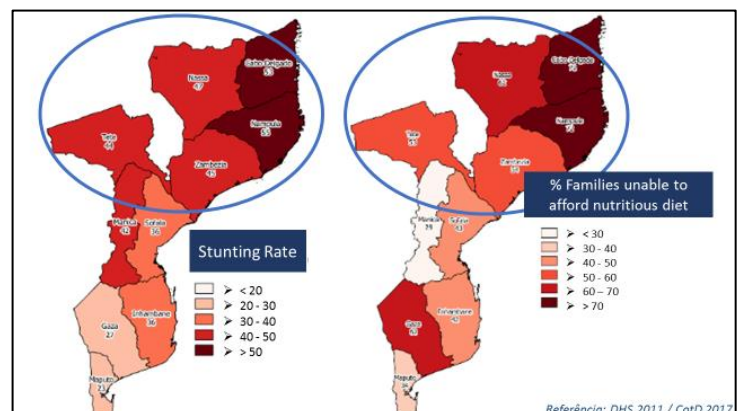
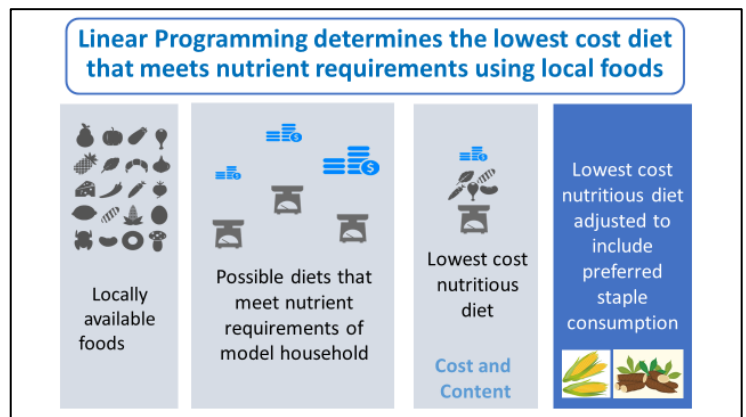
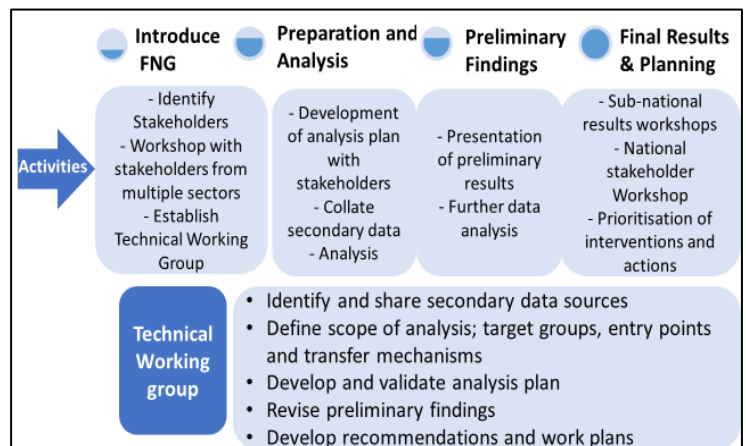
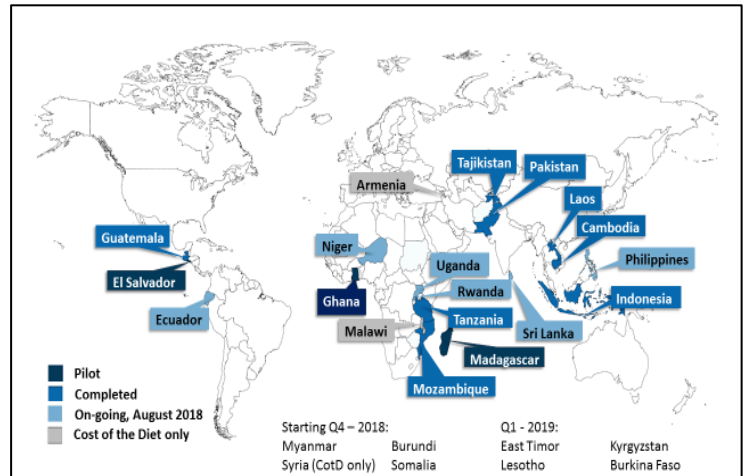
The countries where the CotD and/or FNG processes have been done or are on-going are displayed in the slide at top right. The timeline, topics of investigation and analysis can vary widely from country to country and are defined and paid for by a group of country-based stakeholders (e.g. WFP, the national government development partners, NGOs, etc.). By bearing the burden of cost, WFP has found that stakeholder commitment to the process, and its results, are more resolute.

A variety of constraints can be applied during modeling with the CotD tool, e.g. specifying an energy-only or macronutrient diet, and always generating the ‘lowest cost diet’ that meets those needs. A technical working group is established at the multi-sectoral stakeholder workshop, and that group takes the lead in identifying the data sources, defining the scope of the analysis, developing the analysis plan and reviewing/revising the findings, see second slide at right for details.

The modeling tool generates the lowest cost nutritious diet (based on food available at local markets), see third slide at right. Importantly, the ‘nutritious diet’ is not necessarily what people are currently eating, and is not intended to be used to form food-based recommendations. It is instead used to find the lowest possible cost (nutritious) diet, and assists in identifying ways that could make the selected diet more affordable. Seasonal differences (of food availability and pricing) are considered and accommodated by the analysis.

The CotD tool is able to estimate the costs of nutritious diet of various HH members, e.g. adolescent girl, breastfeeding woman, etc. based on their individual nutrient needs and local food availability, which is then used to estimate the percentage of households that would not be able to afford the identified nutritious diet or other constrained diets, e.g. energy-only diets. This estimate of affordability is based on food prices and availability and spendable income. See slide at bottom right displaying the percentage of families that *would not be able to* afford the nutritious diet, alongside stunting rates by province in Mozambique.

Solutions identified by stakeholders and modelled using the CotD might include improving availability of nutritious foods (via agricultural systems), MN supplementation (via health systems); improving *access* to nutrients / fortification (via food systems); or improving purchasing power (via social protection).



Referência: DHS 2011 / CotD 2017

The interventions that will have the greatest possible impact on the cost of nutritious diets are identified for each target group, (see slide at top right), and the impact of that intervention on the cost *and affordability* of a nutritious diet at HH level can be estimated at the sub-national level, see slide at bottom right. Note: the model focuses only on costs incurred by the HH to meet the nutrient needs of their different members, not the cost of delivering the intervention.

While the benefits of using the CotD described above are significant, the ‘nutritious diet’ identified is often not realistic in terms of current dietary patterns. It is important that stakeholders understand that the analysis is not designed to develop dietary guidelines or recommendations, and that a ‘preferred’ selection of nutritious foods will likely be more expensive.

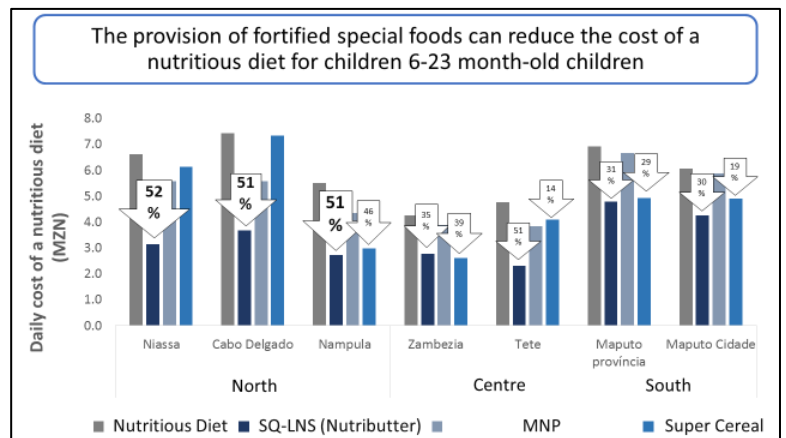
For a tutorial using the actual CotD software, click on the video icon at below. The tutorial takes the user step-by-step through the process of generating the results described above.



Modeling interventions to improve nutrient access: specialised targeted foods

| Target group | Intervention | Transfer modality | Possible entry points |
|-------------------------|-------------------------------------|-------------------------------|---|
| 6-23 month-old children | Super cereal + | Voucher In-kind Markets | <ul style="list-style-type: none"> Health Social Protection Markets (Private sector) |
| | SQ-LNS (Nutributter) | | |
| | Multiple micronutrient powder (MNP) | | |

CotD 2017



Optifood Tutorial

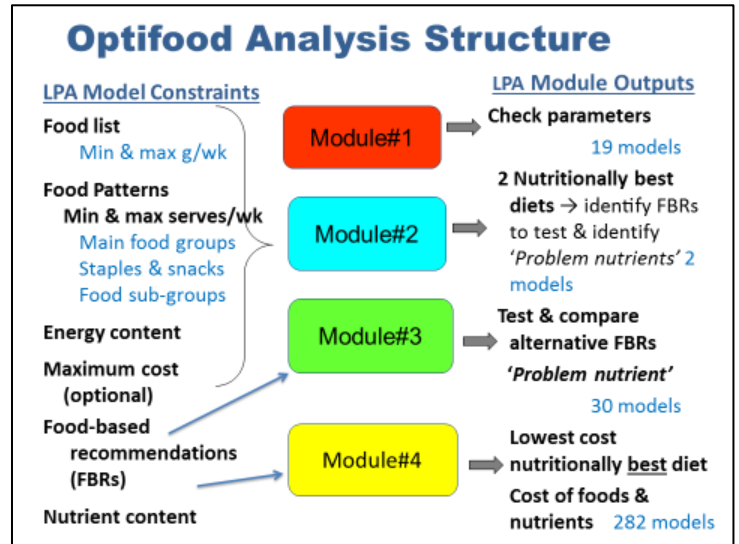
Elaine Ferguson, London School of Hygiene and Tropical Medicine



Optifood was developed to guide decisions when designing food-based recommendations and interventions that will simultaneously take into account multiple nutrients. It has three purposes:

1. To help formulate, test and compare alternative food based recommendations (FBRs) for a specific target group
2. To help identify “problem nutrients” (i.e. those that are difficult to achieve using local foods) in a given context
3. To identify the lowest cost nutritionally ‘best’ diet, the most expensive food sources of nutrients in that diet, and the most expensive nutrient requirements to achieve

The tool has a food composition table (with close to 2,000 foods) as well as recommended nutrient intakes built into the software, but the user can substitute these for their own food composition data or nutrient intake recommendations if desired.



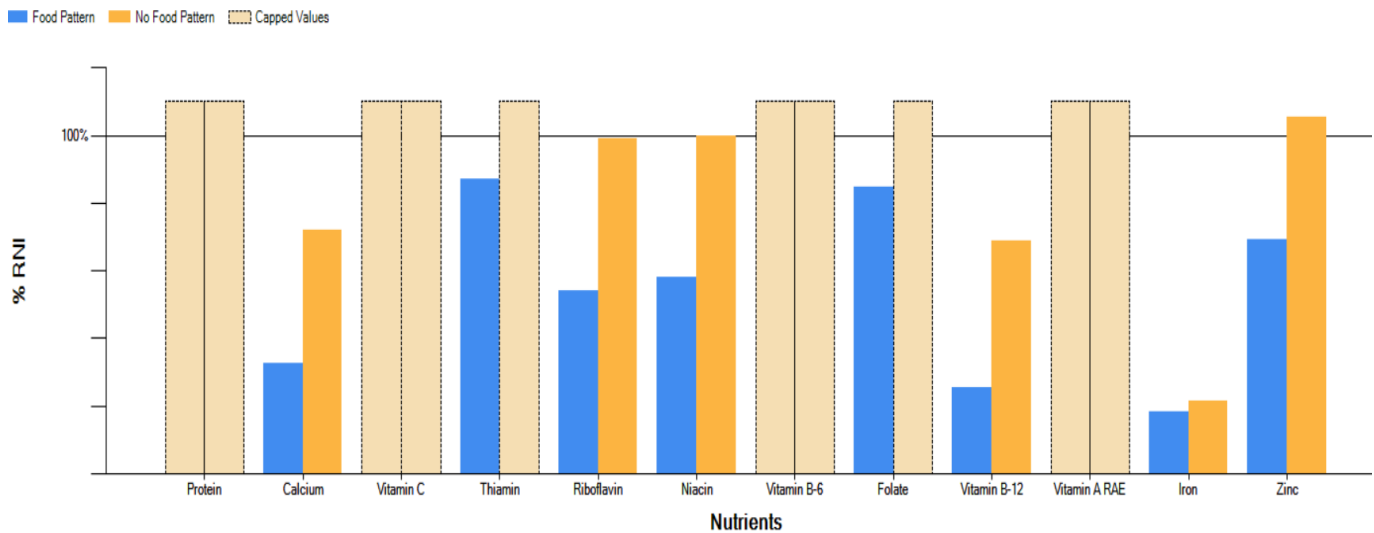
The structure of Optifood is modular (see slide above), and it uses constraints (minimums and maximums) for grams per week for all foods in the food list and food patterns, and an equality constraint for the modelled diet’s energy content in order to ensure that it generates a ‘realistic’ diet, as opposed to CotD, which is more focused on the cost of a ‘nutritious’ diet.

The outputs include the two nutritionally best diets (module 2); a comparison of alternative FBRs (module 3), identification of the problem nutrients (modules 2 & 3); and the lowest cost, nutritionally best diet, along with the cost of foods and nutrients to identify the most costly nutrients (module 4). It should be noted that the energy content is generally fixed at 100% (to make the diets comparable).



The 50 minute tutorial at left reviews all of the information summarized here, and demonstrates use of the software to generate the outputs listed above. In one example, modeling for ‘problem nutrients’ in Tanzania, and targeting non-pregnant, non-lactating women, module 2 examines the nutrient content of the nutritionally best diet expressed as a percentage of the reference nutrient intake (RNI), see graph on the next page. The blue is the nutritionally best diet aiming to conform to the current average food patterns, and yellow is the one that does not aim to conform to average food patterns but remains within the range of current food patterns.

This gives the user an idea of the nutrient requirements that can and can *not* be met with the foods being modeled, e.g. calcium, B-12 and iron do not meet the requirements. It also shows that if the user moves away from the average food patterns, they can increase calcium, riboflavin, iron, and several others, suggesting that FBRs and behavior change communication (BCC) may be able to help the target group meet that nutrient requirement. Iron, on the other hand, probably can’t be met with local foods, so something has to change in the food system (or agriculture system) to help the target group meet that requirement.



Module 2 can also provide insights into the ‘type’ of FBRs by food group, food sub-group or foods and which foods contribute high proportions of various nutrients in the modelled diet. Module 3 selects diets that have either a maximized or minimized content for each nutrient of interest, (i.e. simulates the tails of nutrient intake distributions), with the goal of selecting a set of FBRs that shift the lower tail of the intake distribution (i.e., minimized values) to 65% or 70% RNI, which is considered adequate for that nutrient (i.e. a low percentage of the population will be at risk of inadequate intakes). Initially, module 3 is run without testing a FBR to provide comparative data, after which individual FBRs are tested by introducing minimum level constraints at the food group, sub group or food levels (e.g. constraint to ensure all modelled diets include ≥ 7 servings of fruit per week). Finally, up to eight of these FBRs can be selected to systematically test all combinations of them (i.e. up to 247 sets of FBRs).

The user can then compare across all of the FBRs, using the criteria of 1) feasibility, 2) number of nutrients that achieved $\geq 65\%$ or 70% of their RNI in the minimised diets, 3) % nutrients contributed for nutrients $< 65\%$ RNI and 4) cost (if modelled). Essentially, it gives the user a way to compare all of the different combinations, and to justify the final set of FBRs chosen. Once a set of FBRs are chosen, they should be tested in the community. This process is the very first step towards designing a behavior change intervention or for informing the development of national / regional specific food-based guidelines. If a program is successful in changing behaviors towards consuming diets that follow the set of FBRs in the prescribed amounts, one would be fairly certain to have a low percentage of the population at risk of inadequacy for nutrients that achieved $\geq 65\%$ or 70% of their RNI in the minimised diets.

Module 4 is the cost module, and it allows the user to identify the cost of the nutritionally *best* diet, and the cost of each food selected in that 7-day diet. It also can be used to determine the most expensive nutrient requirements to achieve, if they are achievable. If the user wanted to reduce the cost of a nutritionally adequate diet, they could use these data to search for ways of providing cheaper food sources of these nutrients.

There was no Q&A and Discussion. Questions were instead posed intermittently throughout the tutorial.

Linking Optifood and FNG / CotD

Frances Knight, London School of Hygiene and Tropical Medicine and World Food Program



Optifood and the CotD are both tools that can model diets; however, they are used for very different purposes. While the CotD

can demonstrate the extent to which poverty, food prices and food access affects the ability of a HH (or individual) to meet nutrient needs; Optifood determines the extent to which nutrient needs can be met using realistic diets (based on local foods) for specific target groups. The tools have very different outputs, yet can be used in a complementary fashion (see slide at top right).

Optifood can be used either before, as part of, or as follow-up to the FNG process with stakeholders. In Guatemala, for example, Optifood was used in all three stages, and was run simultaneously with CotD to help identify: nutrient gaps, best local food sources that could be used to improve nutrient intake, and interventions to improve access to specific nutrients. In different geographical areas of Guatemala, Optifood showed iron, zinc and calcium to be the most common problem nutrients. These were also identified as ‘limiting nutrients’ in the CotD analysis.

The difference between the CotD and the Optifood analyses is that unless the food supply is extremely poor, diets modeled using the CotD will always meet 100% of the requirement of each nutrient. Alternatively, Optifood does the best that it can within the dietary pattern constraints established using consumption data and using foods that are available locally. This means that Optifood diets may be nutritionally sub-optimal but are more likely to reflect what is actually achievable in terms of local practices and dietary patterns. On the other hand, the CotD diets show what it would take for the local population to achieve nutrient adequacy in terms of food intake and diet cost. In the different geographical regions from the Guatemala analysis, the best local food sources of nutrients were similar across both modeling tools.

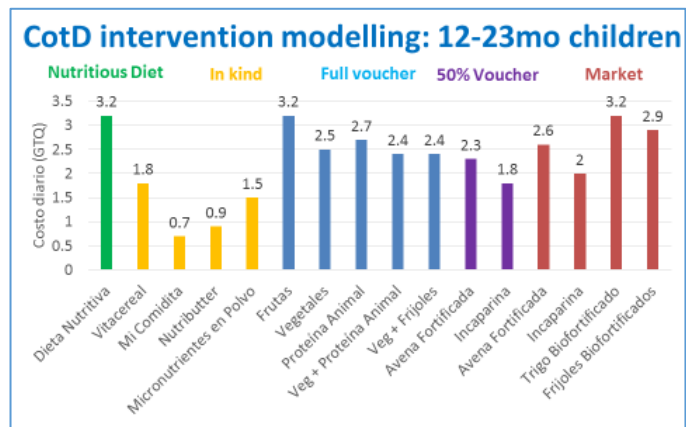
Finally, the second slide above depicts the cost of a nutritious diet (identified by CotD) across a variety of interventions (in kind, full voucher, etc.), and shows how they can reduce the ultimate cost to the HH. The modeling helped stakeholders to begin considering the kinds of interventions they could consider and then prioritize. In many cases, Optifood could again be applied to assist in designing these identified interventions and tailoring them to the local context.

Essentially, the CotD can identify and model *potential* interventions to improve access to nutritious diets, and the next step is to conduct analysis for the design of what these interventions should include and how they should be delivered. It is worth noting that BCC should be part of *every* intervention and not listed as its own intervention, as is often the case. If the intervention involves introducing a MN powder, there must be an element of education that accompanies the introduction of this product. In this context, Optifood is uniquely placed to explore how FBR interventions would sit as part of a local diet and in development of BCC messages.

[Q&A and Discussion Link](#)

Outputs used to design or inform programmes and policy; and for advocacy

| | |
|---|---|
| <p style="text-align: center;">Cost of the Diet</p> <ul style="list-style-type: none"> • Nutrient gaps in local food systems • Economic constraints to nutrition • Availability & affordability of nutritious foods • Modelling economic and nutritional potential of potential interventions <p style="text-align: center;">Advocacy, informing policy and prioritisation of nutrition interventions</p> | <p style="text-align: center;">Optifood</p> <ul style="list-style-type: none"> • Nutrient gaps in local food systems for specific groups • Identification of Food-based recommendations • Modelling nutritional potential of interventions in context of local diet <p style="text-align: center;">Informing policy, Design of individual interventions</p> |
|---|---|



Session 4: Pilot Planning

Pilot Planning Discussion

Megan Bourassa, The Sackler Institute



There are two important products / activities that the Consortium members have discussed over the course of the last two meetings: 1) the Decision Tree and 2) the co-locating of several tools in one country. The Consortium had initially planned to pilot each of these activities in the near future, and this session provided an opportunity to discuss and plan those initiatives.

1. The Decision Tree:

The presenter posed three questions to launch the discussion:

- Does the Decision Tree get them to a reasonable 'answer'/tool?
- Does it cover their questions?
- Is it user friendly and in plain language?

Key outcomes from Q&A and Discussion:

As noted earlier in this document, due to the complexities and challenges discussed, it was decided to halt development of the Decision Tree. Instead, it was decided that the NMC Visualizer offers more benefits and is more suitable to the Consortium's interest in mapping the various tools and demonstrating the relationships between one another.

2. Co-locating several tools in one country:

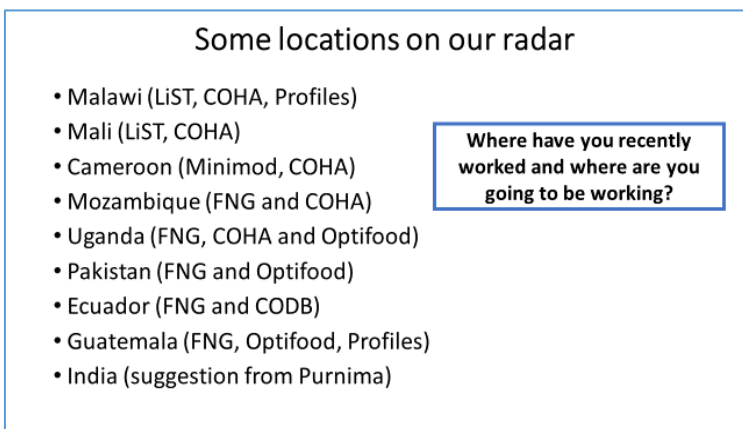
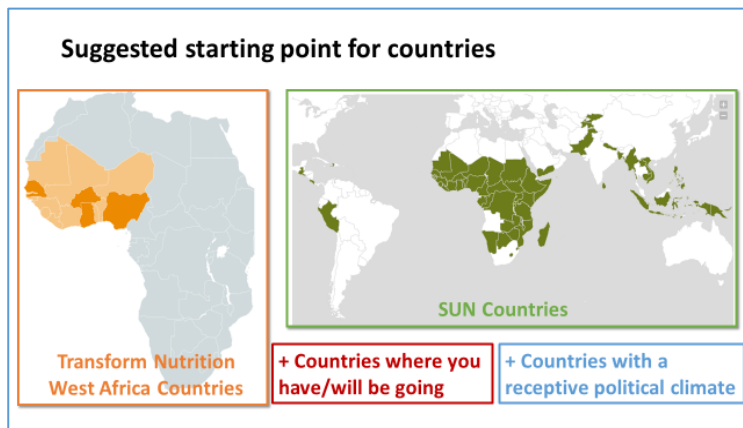
The presenter posed three questions to launch the discussion:

- What can be learned by using multiple tools in one place?
- Will this help clarify how the tools complement each other?
- Does it help advocate for policy change?

In selecting a country for the pilot, it will be important to select a country with the following criteria: conducive policy environment, in-country staff that are interested / committed to working with the Consortium, plentiful data, small and homogeneous character, and tools already being used in that country. Some of the countries that meet these criteria appear in the two slides at above.

Key Outcomes from Q&A and Discussion:

- Before pursuing funding for the pilot, it is important that this group is clear about the purpose of this initiative. What are the objectives? What are the indicators of success? What will the end product be? Who will write it up? Who is the intended audience?
- The NMC Visualizer exercise could be of assistance in getting the in-country pilot started as it be helpful in planning the collaboration.
- The NMC should ensure that the cost (of the pilot) is not exorbitant in relation to the outputs / outcomes. It should be a 'right-sized' effort for the result being sought.
- Applying all (or several) of the tools in one country is a major endeavor. An alternative plan might be to visit a country as a group, make pitches for each tool, and take the country team through a process of selecting which



tools would be suitable to their circumstances and when. This could bring enormous learning to the Consortium as it would help build an algorithm for how to help countries through the decision making process.

Finally, in addition to the country criteria listed at the beginning of this section, pilot countries should:

- Have ‘traction’ in the country already, i.e. one or more modeling tools should already be working there for some length of time, thus saving on the enormous start-up costs normally incurred when beginning from zero.
- Be working on a national nutrition strategy with SUN (19 SUN countries have just done their budget analysis).
- Be a place where the ‘double burden’ is an issue, since this is a growing challenge in so many countries.
- Have LiST already operating, or be able / interested in conducting its modeling process there, since so many of the NMC tools rely on LiST’s outputs.
- Have cost data available, since several of the modeling tools have costs as a pre-requisite.
- Have an opportunity to make an impact. It would be a missed opportunity if the pilot is done in a place where the government is unlikely to apply the results.
- Have a relationship with an academic institution that would receive capacity building to implement.

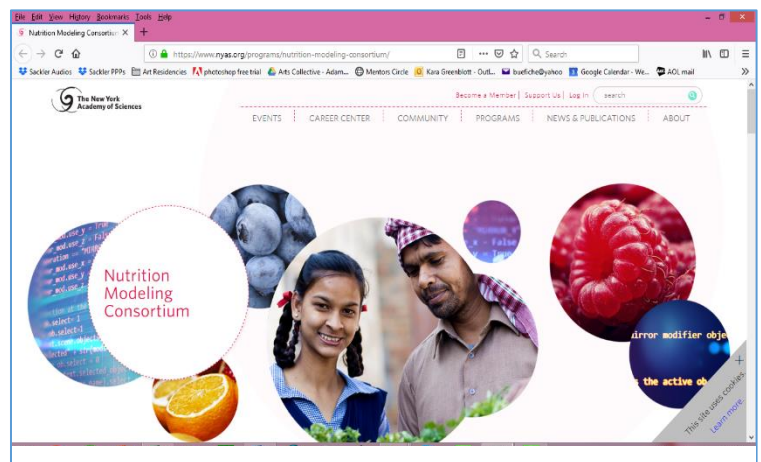
Q&A and Discussion

Session 5: Communication Hub Overview of Consortium Webpage

Gilles Bergeron, The Sackler Institute

At the February NMC meeting, a draft website was presented. An updated version has now gone live and is accessible at www.nyas.org/NMC.

The site contains the history of the partnership; the NMC mandate; how the Consortium works together; details on each one of the modeling tools that’s involved; future and past events/trainings as well as initiatives such as the NMC Visualizer; and a variety of resources produced by both the Consortium and the individual members. Participants were asked to review the website and direct any feedback or requested additions/changes to the Sackler team. The site is currently live, but it is not yet searchable using google and other search engines.



Q&A and Discussion Link

Meeting Summary, Conclusion and Next Steps

Gilles Bergeron, The Sackler Institute



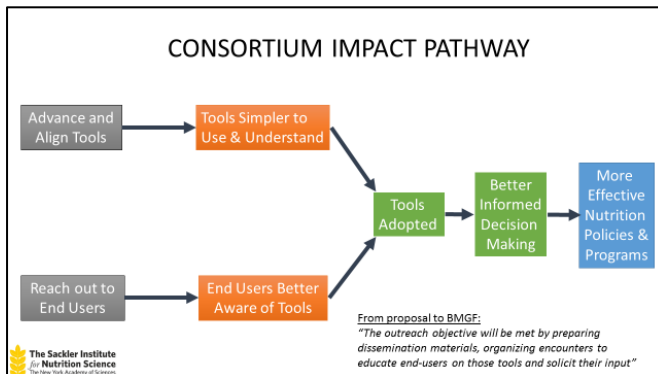
The goal that was established for this meeting was to get to know one another better, as a way of working towards improved collaboration. During these two days, the group has achieved and exceeded expectations on this front, with the following ‘next steps’ to be elaborated in the coming months:

Tutorials: Several tools were presented using a detailed, tutorial format, and there are several more that will present via Web-Ex over the coming months. The Sackler team will start scheduling the on-line tutorials within the days that follow this meeting. If attendance is difficult, members will be able to access the on-line videos afterwards, at their own convenience. The modeling teams that will hold ‘virtual’ tutorials include: OMNI, PROFILES, IMAPP, MAPS, COH, GHCC, GBD, and Nutrition for Child Development.

Decision Tree and NMC Visualizer: Due to the complications and challenges detailed earlier in this document, the Decision Tree initiative will no longer be pursued. Instead, it was decided that the NMC Visualizer offers more benefits and is more suitable to the Consortium’s interest in mapping the various tools and demonstrating the

relationships between one another. The Visualizer offers the added benefit of advancing a conceptual framework that models the entire field of nutrition, goes significantly beyond the UNICEF conceptual framework of the 1990s.

Outreach to in-country users: The Sackler team will continue to conduct interviews with individuals from countries where tools have already been applied. As was done for this meeting, this data will be analyzed, with the goal of enhancing our understanding of the users’ perspective on these tools, including barriers to use and facilitating factors. The interview data will also contribute to a compendium of case studies, currently under development, documenting the experiences in applying the tools from a wide variety of countries. Finally, the NMC will prioritize outreach to end users via the dissemination of publications (e.g. the two-page briefs on each tool), and in-person presentations at upcoming conferences, e.g. the Latin American Society of Nutrition (SLAN) meeting the following week.



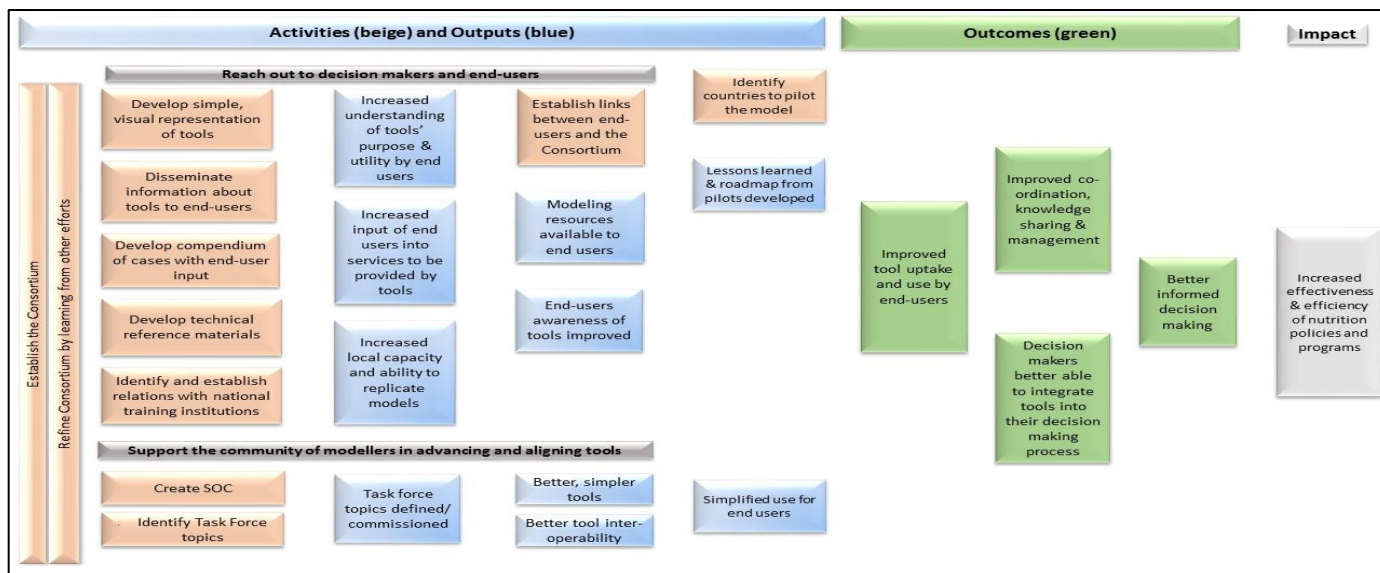
Other work packages / initiatives: Modeling the impact of MMS on Antenatal and Postnatal Outcomes is another work package that has been suggested, and which will be discussed further at a later date. The NMC is open to other suggestions for work package ideas that might emerge through contact with in-country users.

Added Value and the Impact Pathway: At several points during the course of this two-day meeting, participants were reminded of, and reflected upon, the following question: ‘What is the added value of this Consortium?’ It was suggested that moving forward, group members should make an effort to ‘notice’, ‘brainstorm’ and ‘document’ what would *not* have taken place had this Consortium *not* formed and endeavored to work collaboratively?

Participants cited some of the achievements as: ‘changing the nature of the discussion in some countries’; ‘broadening the conceptual framework of nutrition’; and ‘making it easier for countries to find / identify all of the nutrition modeling options at their disposal’. These are ‘intermediate steps’ towards the Consortium’s end goal of contributing to more effective nutrition policies and programs, see the NMC Impact Pathway in the slide above.

The Impact Pathway, along with its more detailed version, (which appeared in the initial proposal to BMGF), has been used to verify progress on activities and outcomes at each of the NMC meetings to date, see detailed pathway below. The next meeting of the NMC will be a ‘virtual’ meeting, tentatively scheduled for October of 2019, with the final meeting scheduled for the end of the grant, February 2020. A second virtual meeting may be added during the summer of 2019 to provide an additional opportunity for dialogue and measuring of progress.

[Q&A and Discussion](#)



Organizer and Participant List

Scientific Organizing Committee (SOC)

Gilles Bergeron, The Sackler Institute for Nutrition Science
Megan Bourassa, The Sackler Institute for Nutrition Science
Purnima Menon, International Food Policy Research Institute (participated via Web-Ex)
Lynnette Neufeld, Global Alliance for Improved Nutrition
Ellen Piwoz, The Bill & Melinda Gates Foundation (participated via Web-Ex)
Rahul Rawat, The Bill & Melinda Gates Foundation

Participants

Saima Ahmed, The Sackler Institute
Saskia de Pee, World Food Program
Reina Engle-Stone, University of California, Davis (participated via Web-Ex)
Elaine Ferguson, London School of Hygiene and Tropical Medicine
Filomena Gomez, The Sackler Institute
Marelize Gorgens, The World Bank (participated via Webcam)
Edward Joy, London School of Hygiene and Tropical Medicine
Nick Kassebaum, University of Washington / Institute for Health Metrics and Evaluation
Shannon King, Johns Hopkins Bloomberg School of Public Health
Frances Knight, London School of Hygiene and Tropical Medicine
Carol Levin, University of Washington
Homero Martinez, Nutrition International
Rodrigo Martinez, Economic Commission for Latin America and the Caribbean
Tim Robertson, Johns Hopkins Bloomberg School of Public Health
Nick Scott, Burnet Institute
Kavita Sethuraman, previously FHI 360
Kendra Siekmans, SUN Movement
Christopher Sudfeld, Harvard T.H. Chan School of Public Health
Roos Verstraeten, IFPRI/Transform Nutrition (participated via Web-Ex)
Steve Vosti, University of California, Davis
Neff Walker, Johns Hopkins Bloomberg School of Public Health
Monica Woldt, JSI Research and Training Institute, Inc. / USAID Advancing Nutrition

Project Coordination / Scientific writing:

Kara Greenblott, Nzinga International
Saskia Osendarp, Osendarp Nutrition / The Sackler Institute

Excused:

Alicia Carriquiry, Iowa State University
Rafael Flores-Ayala, Centers for Disease Control and Prevention
Luz Maria de Regil, Nutrition International
Banda Ndiaye, Nutrition International
Meera Shekar, The World Bank
Patrizia Fracassi, Scale Up Nutrition
Rebecca Heidkamp, Johns Hopkins University
Jakub Jan Kakietek, The World Bank
Lindsay Allen, University of California, Davis
David Wilson, BMGF

Acronyms

| | |
|-----------------|--|
| AHN | Agriculture, Health and Nutrition (Academy) |
| BCC | Behavior Change Communication |
| BMGF | Bill & Melinda Gates Foundation |
| CotD | Cost of Diet tool |
| DHS | Demographic and Health Survey |
| ECLAC | Economic Commission for Latin America and the Caribbean |
| FANTA | Food and Nutrition Technical Assistance |
| FAO | Food and Agriculture Organization |
| FBR | Food-Based Recommendations |
| FNG | Fill the Nutrient Gap tool |
| GHCC | Global Health Cost Consortium |
| GUI | Graphical User Interface |
| HH | Household |
| HIV | Human Immunodeficiency Virus |
| IFPRI | International Food Policy Research Institute |
| IMAPP | Intake Modeling, Assessment and Planning Program |
| IMPACT | International Model for Policy Analysis of Agricultural Commodities and Trade |
| IDSi | International Decision Support Initiative |
| IYCF | Infant and Young Child Feeding |
| LiST | Lives Saved Tool |
| LMICs | Low and Middle Income Countries |
| MAPS | Micronutrient Action Policy Support |
| MDGs | Millennium Development Goals |
| MINIMOD | Micronutrient Intervention Modeling Project |
| MMS | Multiple Micronutrient Supplementation |
| MN | Micronutrient |
| MNF | Micronutrient Forum |
| MOU | Memorandum of Understanding |
| NCD | Non-Communicable Diseases |
| NMC | Nutrition Modeling Consortium |
| NYAS | New York Academy of Science |
| PPP | Power Point Presentation |
| RCT | Randomized Controlled Trials |
| RNI | Recommended Nutrient Intake |
| SAM | Severe Acute Malnutrition |
| SDGs | Sustainable Development Goals |
| SEEMS-Nutrition | Strengthening the Economic Evaluation of Multi-Sectoral Strategies for Nutrition |
| SOC | Scientific Organizing Committee |
| SUN | Scaling Up Nutrition movement |
| SLAN | Latin American Society of Nutrition |
| TB | Tuberculosis |
| WASH | Water, Sanitation and Hygiene |
| WFP | World Food Program |
| WHO | World Health Organization |
| WRA | Women of Reproductive Age |