Nutrition Modeling Tools for Advocacy, Decision-Making & Costing

A Workshop to support Adoption & Utilization

April 27 - 28, 2017
World Trade Center

The New York Academy of Sciences

Micronutrient FORUM

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This report was written by Kara Greenblott, under a consulting contract with The Sackler Institute for Nutrition Science, and in collaboration with the Micronutrient Forum.

Executive Summary

On April 27-28, 2017, The Sackler Institute for Nutrition Science and the Micronutrient Forum (MNF) convened a two-day technical consultation to review eight nutrition modeling tools that are used for advocacy, program decision-making and costing by low- and middle-income countries. During discussions at MNF meetings in recent years, participants have cited impressive examples of how these tools were used to advocate for increased funding for nutrition (nutrition advocacy); and in addition, to improve nutrition *outcomes*, given a specified budget (allocative efficiency). Despite the existence of these noteworthy cases, the vast majority of national nutrition programs do *not* utilize nutrition modeling tools to design or to manage national (or sub-national) nutrition programs, hence demand, uptake and utilization are not widespread.

The objective of the meeting was to examine the purpose of these modeling tools and how they are being used; uncover challenges to their uptake and utilization as well as clarify what can be done to enable and sustain their uptake in low and middle income countries; and explore the possibility of working collaboratively towards broader and more routine use of the tools in the future.

The meeting brought together 25 modelers, providers of technical assistance, donors and country-based users of the modeling tools. They shared details of the tools' data requirements, purposes and functions, and provided examples of where and under what circumstances they have been used to assist countries in answering nutrition-related questions.

The group concluded that it would be useful to continue to meet in the future, and to develop a series of products to increase understanding of the tools, and promote their uptake. These products include: 1) **Multi-dimensional mapping** (linking tools to phases of in-country advocacy, decision making and costing processes), and noting which policy questions each tool is capable of addressing; 2) Conducting a **Fit-for-Purpose assessment**, describing what each tool 'can' and 'can't' do; 3) Developing a '**casebook**' of modeling experiences to provide countries with concrete examples of what these tools are capable of doing; and, 4) Writing a **white paper and/or technical briefs** to share learning from this meeting. In addition, participants arrived at the following conclusions:

Shift to demand-driven: To date, uptake of a given tool is primarily determined by the modelers and the donor agencies that support them, based on countries *they* prioritize. A shift to demand-driven uptake is needed, which requires in-country actors to have a big-picture understanding of *all* of the tools on offer, as well as the respective policy questions that they can answer.

Complementarity: While the tools are too complex and fragmented for *technical* integration, there is ample opportunity for complementarity. They could, for example, 'tag team' with one another, whereby one tool generates outcomes that can be used for a separate purpose by handing over the results to a second tool, e.g. run Optima Nutrition for Cameroon to determine the level of financial resources that should go to addressing micronutrient deficiencies (generally), then use the MINIMOD tool to cost-effectively allocate those resources across micronutrient intervention programs over space and over time.

Harmonization: There is a clear need for increasing uniformity on several fronts, e.g. language/terminology; assumptions (including nutrient requirements); and foundational research used as a basis for the tools. During this meeting, for example, it was discovered that the term 'target' had very different interpretations among modeling teams. Regular exchanges to work on harmonization, where relevant, would reduce confusion at the levels of both global and in-country users.

Institutionalization: Increasing uptake and utilization will depend heavily on the extent to which a global institutional 'home' can be established to serve as a repository for existing and future tools, and for the identification and training of national counterparts.

Funding: Sequence is important. The advocacy-oriented tools may need to be spearheaded with funding from external platforms, with a follow-on progression towards more endogenous fundraising for latter phases (costing, optimization, etc.) Ideally, an independent funding mechanism would allocate monies to a country *irrespective* of the tool that they choose, and facilitate a shift towards other tools when necessary.

Additional resources are needed to develop and manage a more integrated community of nutrition modelers. The sequence of funding is also important. Advocacy-oriented tools, e.g., PROFILES modeling, may need to be prioritized and funded exclusively from external sources, with follow-on modeling activities (costing, optimization, etc.) funded from a mix of sources, and increasingly emanate from national budgets

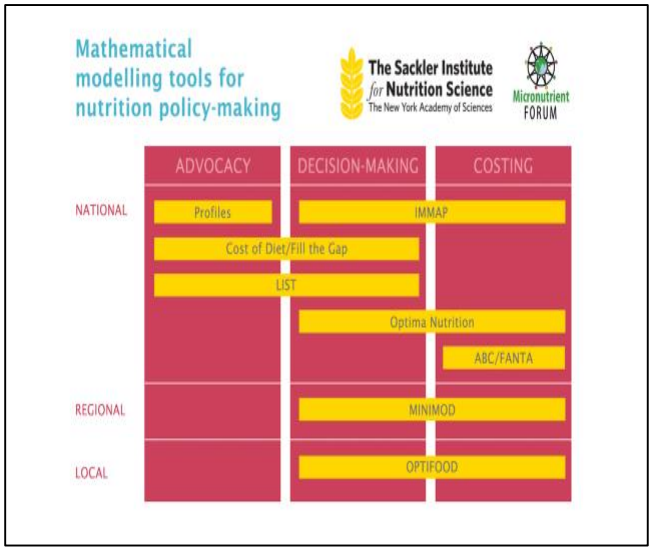
Finally, the group agreed that a global, **nutrition modeling 'consortium'** has a vital role to play in packaging these tools to external actors; and brokering knowledge, expertise and capacity building efforts for countries that demonstrate interest and a commitment to using them. The meeting participants made initial plans to present at the next **SUN global gathering and MNF meeting**, where global and national policy-making actors will be congregated. It is the intention of this group that the current, two-day consultation be the beginning of a continuous dialogue towards developing a more complete, integrated, and effective set of nutrition modeling tools; understanding and bridging the utilization gap; and promoting widespread and systematic uptake of these modeling tools.

APRIL 27, 2017 – Day One Proceedings

Opening Remarks and Meeting Objectives - *Gilles Bergeron, The Sackler Institute*

Planning for this meeting, and the purpose behind it, have been under discussion for more than a year. The objectives of this two-day consultation are as follows:

1. Review the purpose and approach used for each of the nutrition modeling tools under discussion;
2. Examine how each tool is currently being used;
3. Uncover possible challenges to their uptake;
4. Identify technical assistance modalities that could improve access and use;
5. Identify additional research that may improve the collective utility of these tools; and,
6. Inspire the creation of a "task force collective" to advance the usefulness of the tools.



The question to address is not 'Which tool is the best?', but instead 'Which is most appropriate for a given circumstance?' To facilitate that discussion, and assist in meeting the objectives listed above, a preliminary mapping of the tools was developed across three overarching utility categories: Advocacy, Program Decision Making and Costing (at right).

Origin of this Meeting: *Lynnette Neufeld, Micronutrient Forum* (MNF)

At the MNF meetings held over the last several years, participants have described notable examples of how these nutrition modeling tools are used towards improved, evidence-informed advocacy, decision making and costing. However, given that these tools have not been widely available to all countries, the vast majority of national nutrition programs do *not* utilize them for advocacy, program decision making and costing. There is, in fact, an enormous gap between the potential that these tools offer and the extent to which they are actually used in the countries and contexts where we work.

With this in mind, and in the context of additional funding provided by The Gates Foundation; MNF and The Sackler Institute began to consider how they might make a substantial contribution to filling the gap between availability and utilization of these tools. This two-day consultation is a gathering of nutrition experts who are intimately familiar with the nutrition modeling tools under discussion, and have used them in a wide variety of contexts. It is our hope that this meeting represents the first in a series of steps towards bridging the utilization gap, and enabling broader and more routine use of these tools for policy and programming.

Session 1: Brief Overview of the Tools

LiST (Lives Saved Tool), *Rebecca Heidkamp*

The origins of LiST are in the Lancet 2008 Series for Child Survival; it was built as a tool for answering the question: 'What would be the impact if we expanded coverage of the interventions that are known to be effective?' LiST is positioned as a program planning/decision making tool, though it is often used for evaluation and advocacy as well.

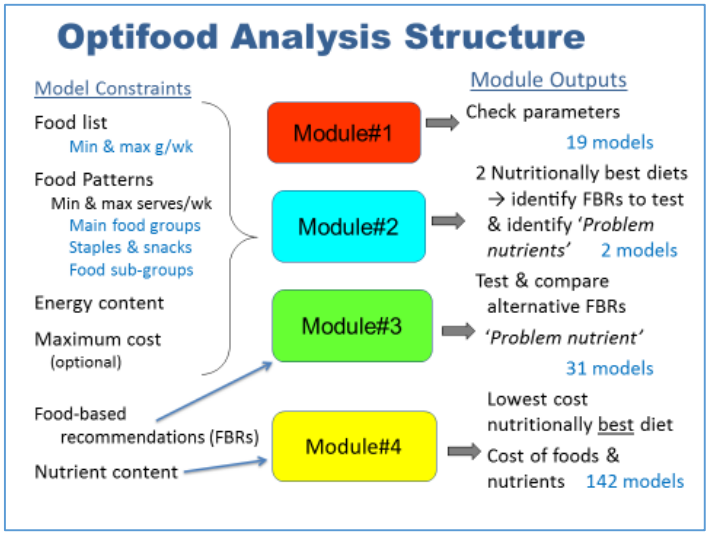
LiST takes the changes in coverage of one or more interventions, and provides the relevant cause-specific changes in mortality, as well as changes in population-level risk factors for stunting and wasting. Currently, LiST includes more than 70 maternal, newborn and child health and nutrition (MNCH&N) interventions, which can be modeled individually or in combination. Interventions are included when there is sufficient evidence for cause-specific mortality, and when they can be feasibly implemented in low-income countries. LiST does *not* take into account contextual factors, infrastructure, feasibility or costing. A key assumption is that distal factors (e.g. income, maternal education, etc.) may affect mortality through changes in coverage and/or risk factors and be captured in the tool. LiST's complementary tools can do modeling on a sub-national basis; produce costing estimates; and generate 'missed opportunities' to show where coverage is low and could potentially be maximized for increasing lives saved.

In the last two years, an investment was made to update LiST for increased use in the nutrition community specifically. New effect estimates were included based on new or updated evidence related to nutrition interventions and some specific nutrition outcomes (Low Birth Weight (LBW) and maternal anemia) were included in the tool. All of the World Health Assembly (WHA) targets are now included in LiST with the exception of overweight due to a lack of effective interventions.

LiST (1) Q&A and Discussion link

Optifood, *Elaine Ferguson, London School of Hygiene and Tropical Medicine*

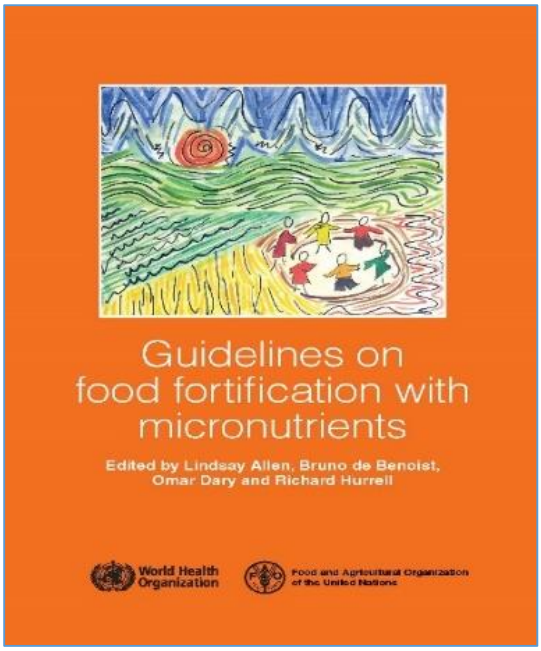
Optifood is a linear programming tool that was designed to guide decisions for food-based recommendations (FBRs), and takes into account multiple nutrient requirements simultaneously. Optifood can be used to inform (and test) FBRs for behavior change programming; to assess nutritional adequacy of local food environments; and to determine affordability of a nutritious diet for specific target groups at the individual (not household (HH)) level. Optifood also has the ability to identify 'problem nutrients' (i.e. those whose requirements are difficult to acquire using local foods), and the most expensive nutrients and food sources in a given diet.



Optifood utilizes 'minimum' and 'maximum' constraints on the main food groups, food sub-groups, the number of staples and snacks in the diet, and grams of individual foods selected per week. It has an equality constraint for energy, and a maximum constraint on the cost of a diet (optional). Its outputs, given user-designated constraints, include: the nutritionally 'best' diets, in module #2; the diets with the highest and lowest nutrient contents possible, in Module #3; and the lowest-cost, nutritionally best diet, in Module #4.

Optifood (1) Q&A and Discussion link

Intake Modelling and Prediction Program (IMAPP), *Alicia Carriquiry, Iowa State University*



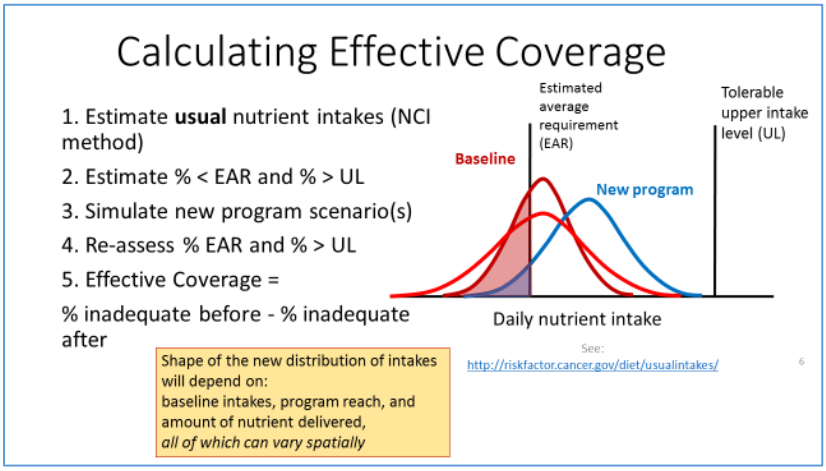
The motivation for developing IMAPP was to provide an easy-to-use tool to aid in implementing the 2006 World Health Organization (WHO) / Food and Agriculture Organization (FAO) Guidelines on Food Fortification with Micronutrients. It's usable by almost anyone (i.e. dietary assessment knowledge not necessary), based on the most up-to-date evidence, and is accompanied by a comprehensive users guide.

IMAPP looks at current consumption patterns of certain foods that might be used as 'vehicles' for fortification and provides the user with the optimal amount of a nutrient to add for a targeted prevalence of inadequacy. It estimates how much nutrient you need to add to a food vehicle to achieve that prevalence. The user chooses a vehicle and a fortificant, and advances from there. Alternatively, IMAPP can calculate what is needed to simply 'close the nutrient gap'. It can also estimate the population at risk of inadequate or excessive intakes using Estimated Average Requirements (EARs) and Upper Levels (ULs). At the moment, IMAPP operates at the level of the individual, but plans to explore the HH level in the future.

IMAPP (1) Q&A / Discussion link

MINIMOD, *Steve Vosti, University of California, Davis*

MINIMOD was developed to improve the coherence and efficiency of national and sub-national micronutrient intervention programs. Even though micronutrient needs vary spatially, most micronutrient programs are national in nature. This, combined with short time frames for decision making, often leads to a lack of coordination among programs, significant inefficiencies, low impact and poor targeting.

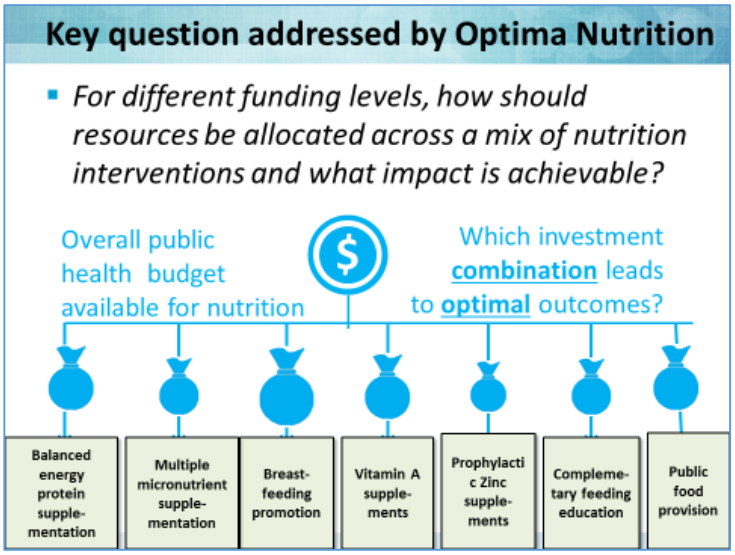


MINIMOD is a mathematical modeling tool that can identify cost-effective solutions to specific micronutrient-related problems. Model results are intended to dovetail with what policymakers need to make their decisions. The tool defines success in various terms, depending on stakeholder priorities. One particular definition of success that has been adopted is the change in effective coverage, i.e., the % of individuals with *in*adequate dietary intake who achieve adequate intake because of a micronutrient program or collection of programs (see right). The tool also includes a calculation for supplemental intake, i.e., % of individuals who receive more than a specified amount of *additional* micronutrient intake from combined programs. And following collaboration with LiST, MINIMOD can also calculate the number of child deaths averted by an intervention, or collection of interventions. Finally, it includes an economic optimization tool that can calculate the costs of an intervention per child reached or per child effectively covered. MINIMOD (1) Q&A / Discussion link

Optima Nutrition, *Jakub Kakietek, World Bank*

No power point available

Optima Nutrition was designed to address a persistently challenging question for the nutrition community: Given a specified amount of funding, how could we allocate it in a way that maximizes nutrition outcomes in the most cost effective manner possible? In a sense, Optima gets at the same issues as MINIMOD, but perhaps has more breadth and less depth.

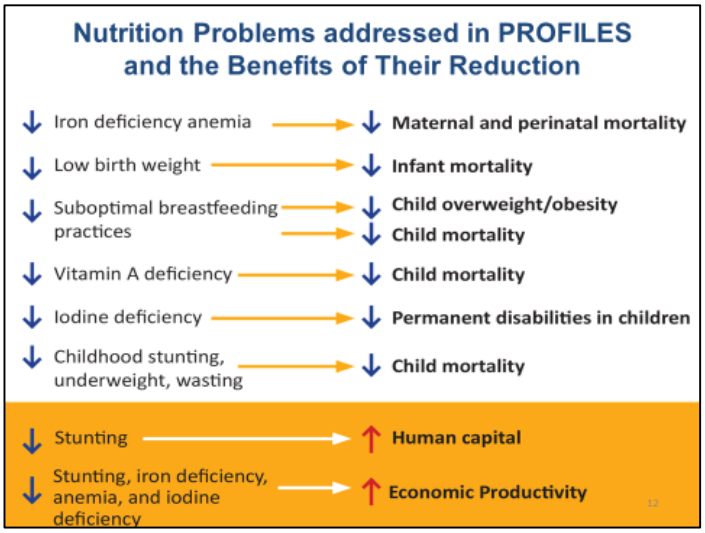


To date, Optima has been used in 11 countries to help them: estimate the cost of scaling up interventions; assess which of those interventions are the most cost-effective (in terms of cost per outcome achieved); and derive the economic benefits from those investments. Its principle use is for resource allocation optimization. Optima is currently focused on stunting; tracks under-fives only; and tracks risk factors that contribute to stunting and mortality. The underlying framework for Optima is based on the LiST framework.

Optima Nutrition (1) Q&A / Discussion link

PROFILES, Kavita Sethuraman, FANTA III

PROFILES is a tool for evidence-based, nutrition advocacy. Nutrition advocacy is a deliberate process for igniting change; promoting accountability for nutrition; and strengthening nutrition governance.



PROFILES was created in the early 1990s to raise awareness among policymakers regarding the consequences of malnutrition in terms of key development outcomes, e.g. child mortality and economic productivity. It is a set of computer-based models in Excel that calculate the consequences of malnutrition *not* improving over a defined time period, as well as the benefits of improved nutrition over the same period, including lives saved, disabilities averted, human capital gains, and economic productivity gains.

PROFILES has been used in more than 30 countries and is always used as part of a longer, in-country advocacy process that relies on consensus building and wide participation of national stakeholders. For optimal use, it should be applied at five-year intervals to allow changes to take place between applications. To date, PROFILES has been used exclusively at the national (not *sub*-national) level and it does not include a costing tool.

PROFILES (1) Q&A / Discussion link

Cost of the Diet (CotD), *Frances Knight, World Food Program (WFP)*

The CotD tool is a linear programming method and software tool that was developed by Save the Children UK out of the recognition that financial constraints on food access are a major reason for poor diets. First and foremost, it's a tool for advocacy; but increasingly, it's being used to conduct affordability analysis and intervention modeling as part of the Fill the Nutrient Gap (FNG) methodology developed by WFP and partners.

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CotD models the lowest cost, nutritionally-adequate diet for model HHs; and, within those HHs, individual target groups such as lactating women, 12-23 month-old children or adolescent girls. It shows how the cost of a nutritious diet and/or incomes can vary between regions of a country and affect the affordability of meeting nutrient needs using locally-available foods. It also shows the varying costs of achieving an adequate diet for different HH members, depending on the nutrient requirements of each member.

When used for FNG analysis, CotD includes local staples consumption and any taboo foods, and provides outputs at both the HH and individual level. It does not take into account restrictions on food and consumption patterns (i.e. minimum and maximum serving sizes and patterns), and therefore does not necessarily result in realistic diets. For this reason it is used as more of an advocacy tool and to illustrate how cash-transfer programs may impact HH food security. The visual (at right) shows how CotD was used to identify the overall cost of a nutritious diet for HHs in urban Punjab (Pakistan) during the summer months, and the difference in the cost of meeting nutrient needs between members of the HH. Importantly, it highlights how in this case, the adolescent female was the most expensive family member in terms of meeting her nutrient needs using local foods.

CotD Outputs: Individual and household-level diet costs

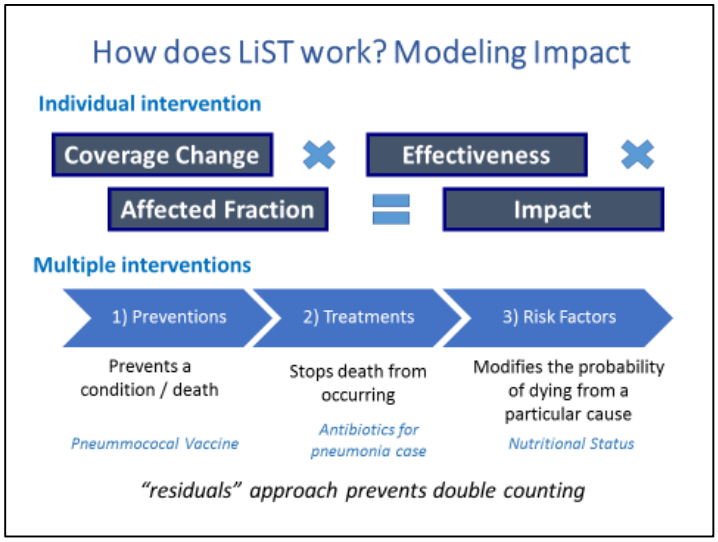
	Summer (214 Days)		
	Daily Cost	No. of Foods	Food Groups
1 x Child (either sex) 12-23 months	21.57	8	6
1 x Child (either sex) 6-7 years	43.17	6	6
1 x Female 16-17 years	124.75	8	6
1 x Woman, 30-59y, 60 kg, moderately active (1 x Lactation, 7-12 months)	91.43	10	7
1 x Man, 30-59y, 60 kg, moderately active	72.39	7	5
1 x Woman, >60y, 55 kg, moderately active	77.66	6	5
Total	430.96	18	9

CotD (1) Q&A / Discussion link

Session 2: Tools that Support Advocacy and Decision Making

LiST, Rebecca Heidkamp, Johns Hopkins University

LiST is about modeling changes in coverage and uses the formula described in the visual (at right) to do so. The primary output is mortality, though it also produces outputs for stunting, wasting, breastfeeding practices, birth outcomes and maternal anemia. LiST generates user-defined scenarios in order to conduct comparisons.



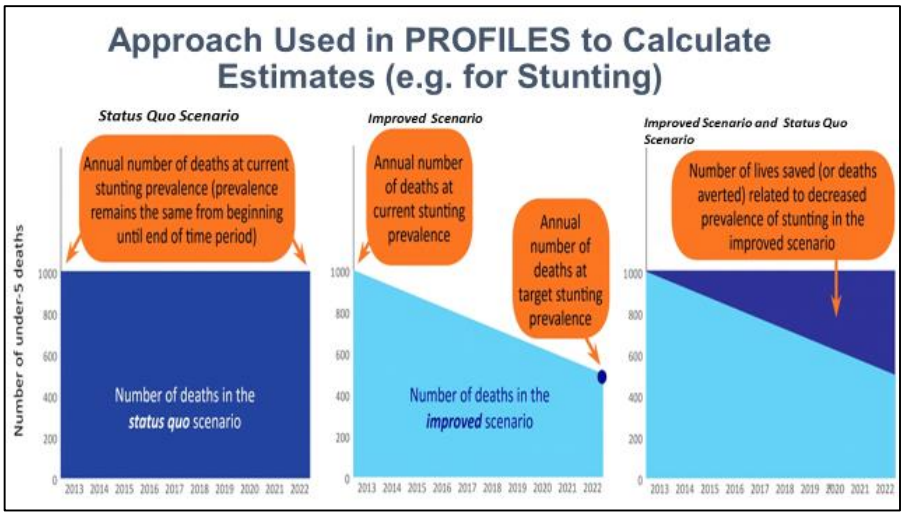
Essentially, LiST can be used for two purposes:

- *Pro*spective (planning): What if we changed coverage by X% over Y years? How does that affect nutrition risk factors and lives saved?
- *Retro*spective (attribution): We measured X change in coverage or risk factors; which specific interventions

contributed most to lives saved? And, if we changed stunting by Y%, we can reduce mortality by Z%.

Examples from Malawi and Cameroon, among others, are found in the power point linked above. Finally, due to a lack of data on nutrition-sensitive interventions, LiST does not have a plethora of nutrition-sensitive interventions in its portfolio. It is also heavily dependent on the general availability of data, and data quality.

LiST (2) Q&A / Discussion link



PROFILES, *Kavita Sethuraman, FANTA III*

PROFILES is similar in approach and purpose to LiST, though it uses a facilitated, multi-stakeholder process to generate inputs and to frame outputs. Targets and timeframes are set through stakeholder workshops and guided by the PROFILES team to ensure that they are ambitious, but realistic. PROFILES is used for advocacy; it is not a planning tool. Benefits of the PROFILES approach include: it addresses a range of different nutrition problems individually; it's flexible and allows the user to choose the specific nutrition problem they would it to deal with; and it's imbedded in a broader advocacy process in the country, i.e. an advocacy planning workshop follows the data generation to develop an advocacy plan and delegate roles for implementation.

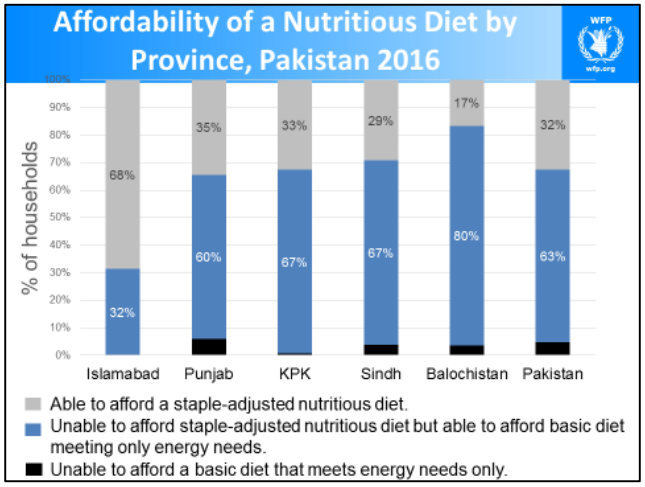
PROFILES essentially works off two scenarios:
Status Quo Scenario: there is *no* change in prevalence for 10 years, except for population size and structure.
Improved Scenario: For the same number of years as in the *Status Quo Scenario*, prevalence is reduced by a specified percentage that is identified by PROFILES workshop participants (local stakeholders).

PROFILES generates the number of lives saved related to the improved scenario (indicated by the dark blue area in the far right of the graph). To avoid double counting, PROFILES does not try to aggregate co-existing cases of malnutrition, (i.e. where a child is stunted, wasted and vitamin A deficient at the same time). Examples of how PROFILES has been used for nutrition advocacy in Bangladesh and Uganda are found in the power point link above.

PROFILES (2) Q&A / Discussion: None

Cost of Diet, Saskia de Pee, World Food Program

The CotD is used as part of the FNG to: 1) strengthen nutrition situation analysis linked to decision-making about specific target groups in specific contexts; and, 2) establish consensus on cost-effective and context-specific policy and programmatic strategies which improve nutrient intake through improved access to nutritious foods. CotD models for key target groups at the individual and HH levels.

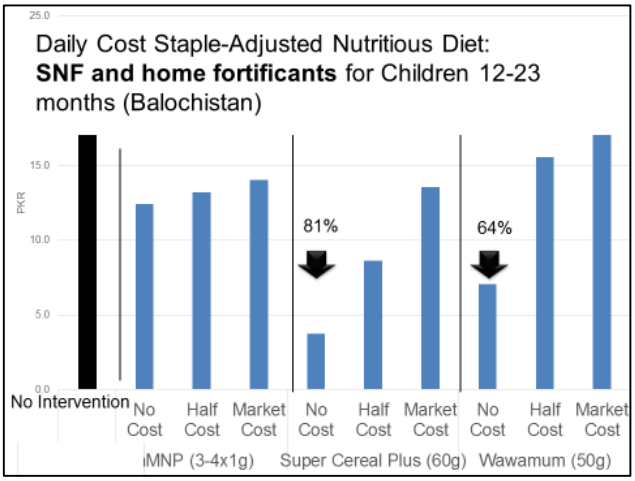


Much like PROFILES, the process starts by defining the focus of the analysis (target groups, seasons, geography, etc.); the nutrition problem being addressed; the policy and program context of health, food security and social protection systems; the contextual factors affecting local access, availability, consumption and preferences for/against nutritious foods; and finally, barriers to improving nutrient intake. Then CotD is used to conduct the affordability analysis (of nutritious diets) and ultimately, the intervention

modelling analysis, identifying the extent to which different nutrition-specific and -sensitive interventions could improve access to nutritious diets at a lower cost to households.

CotD has been used to demonstrate that affordability is a major constraint to meeting nutrient needs and that meeting nutrient needs is more costly than meeting energy needs. It provides insights into what 'meeting nutrient needs' means in terms of costs and how different sectors can contribute to meeting these needs. As such, it is an important advocacy tool to demonstrate the implications of poverty.

The visual (at right) shows how CotD was used to demonstrate the percentages of HHs able and unable to afford diets specified by the user, across five provinces of Pakistan and nationally. This leads to discussions about entry-points for improving food access, such as cash-based transfers, biofortification, homestead food production, and provision of specialized nutritious foods (SNFs) and home fortificants. For the latter, the CotD can model the cost reduction (to the HH) of achieving a nutritious diet, across three scenarios: in-kind provision (e.g. health or social protection sectors) at no cost, or market-based access at subsidized or commercial cost (bottom right).



CotD (2) Q&A / Discussion link

Session 2 Panel Discussion: LiST, PROFILES & CotD

A summary of the topics discussed during the panel discussion are listed below. A more detailed narrative of questions, answers and commentary appear at the following link: Panel Discussion: LiST, PROFILES & CotD

Inputs to a process: These tools have the potential to support different phases in a country's advocacy, program planning/decision making and costing processes. They are not a substitute for any of those processes, but instead provide key *inputs* to them.

Framework and link to policy instruments: Agreement and understanding are needed regarding where each tool fits within the advocacy, program planning /decision making and costing processes. Are there gaps that none fill? And conversely, where is there overlap? A mapping of the tools linked to the specific phases of advocacy, decision making and costing would be helpful. In particular, it could be useful to map out what questions each tool is capable of answering and which policy instruments are those questions tied to. In addition, the mapping should include data, resource and time requirements, and if possible, delineate where and when in the decision process these tools can be used, as well as what they can and cannot deliver.

Natural progression: There may be a natural progression from advocacy (LiST, PROFILES, etc.) to costing and economic optimization tools (MINIMOD, IMAPP, etc.). Thus, where countries are still trying to get nutrition on the national agenda, and that have not yet committed to SUN, the advocacy tools might have more utility. Whereas countries that are further along in their process, and already have a funded, national nutrition program, might be more concerned with improving efficiencies and modeling ways to get more nutrition for their money.

Funding: The sequencing noted above is important. The initial advocacy phase may need to be spearheaded with funding from external platforms, and follow a progression towards more endogenous fundraising efforts for latter phases, e.g. program decision making and costing. Matched funding may be appropriate, reflecting a joint decision process between donors and country representatives. Ideally, an independent, flexible pot of money could be established to help a country fund application of their chosen tool, and assist them to shift directions to a *different* tool if that's what was deemed necessary. Currently, funding is tied to specific tools, so countries only receive financial support if they choose a tool that has funding to give.

Shift to demand driven: In-country actors need to have a big-picture understanding of *all* of the tools on offer, as well as their respective purposes, so that they are in a better position to choose what makes sense for them in a given circumstance. To date, countries are often using the tools whose developers are first to arrive. So those tools with the teams, resources and interest in a given country, are often the ones that are utilized by that country. This is problematic and we need to find an approach whereby what drives the decision on which tool to use is based on the informed choices of the countries themselves.

Capacity: Training should focus *not just* on operating the modeling software, but should develop capacity to know what nutrition-related questions to ask; what scenarios need to be modeled; and how to interpret results in a way that advances advocacy and decision making goals. These aspects are vital, and often *more* challenging for in-country users than the actual application of the tool.

Communities: These tools utilize a very top down approach and, by design, do not attempt to incorporate the interests, roles and responsibilities of stakeholders at the *community* level. The next step would include detailed program planning and formative research (for any prioritized interventions), and this would include community-based consultations. The training of district- and community-based journalists (by PROFILES) was cited as an example of how we might better involve the community level and help mobilize them around nutrition issues.

Defining success: We can't expect these tools to prompt immediate, large-scale changes, but we can nudge progress at the margins. We need to be realistic in how we define success: it's about changing the dialogue and seizing the moment to influence the way policymakers think about the objectives and targets they set for themselves. For example, when did 'cost effectiveness' emerge in the dialogue in a particular country? If it more/less coincides with the presence/utilization of a tool, then maybe that tool had some influence. It's vital that we monitor these subtle indicators of success or ensure that there is a continuous dialogue with the users so that *they* can assess the utility of the tools and what they need going forward.

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Expected Outputs from this Meeting and Recap from Day One

Expected outputs, Mireille Mclean, Sackler Institute

In addition to this report, it is expected that a white paper will be submitted for publication by a peer-reviewed journal. The content of that paper will be determined at this meeting, by the scientific and policy-making experts in this room. What are the messages that are emerging from this technical consultation with regards to these tools and how they should be used? How will we continue this dialogue beyond this meeting? Day two of this meeting will focus on the current 'demand' for these tools. It will examine the perspective of users from Ethiopia and Tanzania, as well as the donor community. A webpage for this consultation has been established, which will be populated with relevant documents as the dialogue progresses: http://micronutrientforum.org/decision-making-tools/

Recap of Day One, *Lynnette Neufeld, Global Alliance for Improved Nutrition*

The overarching goal of this meeting is to increase utilization of these nutrition modeling tools. So how do we go from where we are now (some tools being used in some places), to more systematic uptake and utilization of the tools? In addition to the report and white paper that will come out of this meeting, the organizing committee would like to produce a work plan indicating other products that could be generated in the future, e.g. a technical brief, a research agenda, further technical consultations, etc. Ultimately, we want the country offices of our organizations and our in-country partners (government and civil society) to be empowered to use a more systematic process for developing and modifying nutrition policies.

Session 3: Tools with the Primary Purpose of Determining/Optimizing Interventions

IMAPP, *Lindsay Allen, University of California, Davis*

IMAPP is for assessment and program planning/decision making. The primary outputs of IMAPP are: estimated usual intake distributions of nutrients, and selected foods or food groups; prevalence of inadequate and excessive intakes; intake 'gaps' given desired target prevalence of inadequacy e.g. 15%; and, individual-level usual nutrient intake estimates.

The user must provide the individual-level of daily intake of nutrients and food vehicles, along with estimated bioavailability of selected nutrients and the target prevalence of inadequacy. IMAPP provides pre-loaded**,** *harmonized* Dietary Reference Intakes (DRIs) -- EARs and ULs -- and the form of the nutrient appropriate to compute adequacy and excess.

Very importantly, IMAPP uses:

- The EAR cut-point method to estimate prevalence, which was recommended in the WHO/FAO Fortification Guidelines;
- The full probability method for inadequate iron intake prevalence, since the distribution of iron requirements is skewed;
- The Institute of Medicine's (IOM's) recommended approach to using UL; and,
- The IOM-recommended approach to plan intake of groups.

In the opinion of the IMAPP team, planning based on EARs is much more appropriate than using the WHO/FAO Recommended Nutrient Intakes (RNIs). Analyses or tools that plan for a low prevalence of the population not meeting their RNIs will substantially overestimate nutrient gaps and the amount of fortificant required. Likewise, planning for the average intake of the population to be at the RNI or RDA would leave about 30% of individuals with inadequate intakes. For this reason, the 'precision of estimates' was raised as an important topic for future debate and discussion.

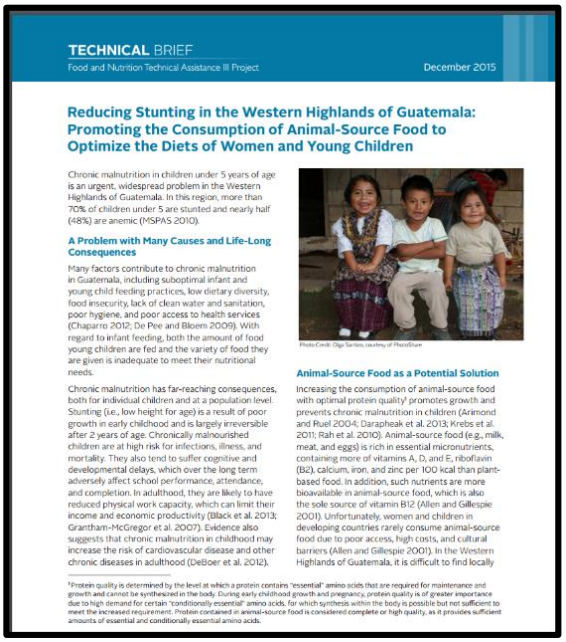
IMAPP (3) Q&A / Discussion:

Optifood, *Elaine Ferguson, London School of Hygiene & Tropical Medicine and Frances Knight, WFP*

Optifood has been used in 18 countries and aims to address three questions:

1. Is it possible to meet nutrient requirements for key target groups using local foods according to the current dietary pattern?
2. Is it possible to meet nutrient requirements using feasible and acceptable FBRs based on local foods? What FBRs would ensure dietary adequacy? And will existing dietary recommendations ensure dietary adequacy?
3. How can we strengthen or design interventions to improve dietary adequacy?

For the Smiling project (in Vietnam, Cambodia, Thailand, Indonesia and Laos), Optifood identified the 'problem nutrients' for each country, and for specific target groups (e.g. children of various age groups and pregnant and lactating women). Alternative micronutrient intervention strategies were analyzed for each country to inform stakeholder meetings. It's worth mentioning that getting the 'right' people to attend the training on use of the tool posed a significant challenge.



TECHNICAL BRIEF

Food and Nutrition Technical Assistance III Project

December 2015

Reducing Stunting in the Western Highlands of Guatemala: Promoting the Consumption of Animal-Source Food to Optimize the Diets of Women and Young Children

Chronic malnutrition in children under 5 years of age is an urgent, widespread problem in the Western Highlands of Guatemala. In this region, more than 70% of children under 5 are stunted and nearly half (48%) are anemic (MSPAS 2010).

A Problem with Many Causes and Life-Long Consequences

Many factors contribute to chronic malnutrition in Guatemala, including suboptimal infant and young child feeding practices, low dietary diversity, food insecurity, lack of clean water and sanitation, poor hygiene, and poor access to health services (Chaparro 2012; De Pee and Bloem 2009). With regard to infant feeding, both the amount of food young children are fed and the variety of food they are given is inadequate to meet their nutritional needs.

Chronic malnutrition has far-reaching consequences, both for individual children and at a population level. Stunting (i.e., low height for age) is a result of poor growth in early childhood and is largely irreversible after 2 years of age. Chronically malnourished children are at high risk for infections, illness, and mortality. They also tend to suffer cognitive and developmental delays, which over the long term adversely affect school performance, attendance, and completion. In adulthood, they are likely to have reduced physical work capacity, which can limit their income and economic productivity (Black et al. 2013; Grantham-McGregor et al. 2007). Evidence also suggests that chronic malnutrition in childhood may increase the risk of cardiovascular disease and other chronic diseases in adulthood (DeBoer et al. 2012).

Animal-Source Food as a Potential Solution

Increasing the consumption of animal-source food with optimal protein quality[1] promotes growth and prevents chronic malnutrition in children (Arimond and Ruel 2004; Darapheak et al. 2013; Krebs et al. 2011; Rah et al. 2010). Animal-source food (e.g., milk, meat, and eggs) is rich in essential micronutrients, containing more of vitamins A, D, and E, riboflavin (B2), calcium, iron, and zinc per 100 kcal than plant-based food. In addition, such nutrients are more bioavailable in animal-source food, which is also the sole source of vitamin B12 (Allen and Gillespie 2001). Unfortunately, women and children in developing countries rarely consume animal-source food due to poor access, high costs, and cultural barriers (Allen and Gillespie 2001). In the Western Highlands of Guatemala, it is difficult to find locally

[1]Protein quality is determined by the level at which a protein contains "essential" amino acids that are required for maintenance and growth and cannot be synthesized in the body. During early childhood growth and pregnancy, protein quality is of greater importance due to high demand for certain "conditionally essential" amino acids, for which synthesis within the body is possible but not sufficient to meet the increased requirement. Protein contained in animal-source food is considered complete or high quality, as it provides sufficient amounts of essential and conditionally essential amino acids.

Several other examples from Indonesia, Cambodia, Uganda and Guatemala are described in the power point link above. A detailed description of the work in Guatemala can be found in a technical brief produced by FANTA (click visual at right for link). *Optifood (3) Q&A / Discussion:*

MINIMOD, *Reina Engle- Stone, University of California, Davis*

MINIMOD includes a 'nutrition benefits model', which can be used alone or in combination with the costing function and the economic optimization tool, to select among interventions or to 'optimize' a single intervention. The nutrition benefits model uses dietary data from the target population (24 hour recall) to model usual dietary intakes while taking into account the distribution of intakes, the number of individuals with low intake, and the effects of different interventions.

In some cases, MINIMOD looks at single micronutrients, but more recently it's been used to examine combinations of micronutrients with a single outcome, e.g. mortality among children, using estimates from LiST. Simulating the effect of different program scenarios, MINIMOD uses the concept of "daily intake equivalent", for example in combining the effect of high dose Vitamin A supplements with fortification. Given recent reductions in funding for vitamin A supplementation in Cameroon, MINIMOD is currently being used to examine the effects of fortifying a second food vehicle (in addition to the current oil fortification program) on the prevalence of inadequate and excessive vitamin A intakes among children. Wheat flour, sugar and bouillon cubes are being considered as complementary food vehicles, while keeping the oil fortification program constant. This modeling is done by sub-regions of the country, and can indicate where both the benefits and risks might be concentrated.

MINIMOD is housed within the University of California - Davis, and the results and refinements are communicated back and forth to trained representatives in the country where it's being applied. Moving to a scenario where it is actually run *in*-country could be complicated, since in the model's current form, the user would need to have command of SAS. In addition, capacity is required to generate the right questions and interpret results.

MINIMOD (3) Q&A / Discussion

LiST, *Rebecca Heidkamp, Johns Hopkins University*

One of the most important attributes of LiST is that it models within the context of a large mix of health interventions, not just nutrition. LiST is a deterministic tool; the user defines the scenarios, asks the questions and determines how LiST will be used to answer those questions. Users can change any aspect of the tool, including adding or removing interventions, and adjusting effect estimates for use in a local context.

In Malawi, LiST was applied for a planning exercise with the Ministry of Health (MoH) and the statistics office. The MoH already had a draft, five-year strategic plan (2014 - 2020), which included some very ambitious (draft) targets. The LiST team helped them model two time horizons (five years and ten years) to reach those targets and included three different sets of interventions. They assessed the effect of making some minor changes/additions to their plan, such as adding balanced protein-energy supplementation for women with low body mass index (BMI). This supplemental package was called the nutrition-specific 'plus' (NS+).

The modeling found that while adding maternal and child health (MCH) interventions alone didn't have any effect on stunting, once the water, sanitation and hygiene (WASH) interventions were added, stunting started to decline. Further modeling showed that their current strategy would *not* allow them to meet their stunting targets by the end of their five-year plan, but that by using the NS+ package, they would get much closer to their targets.

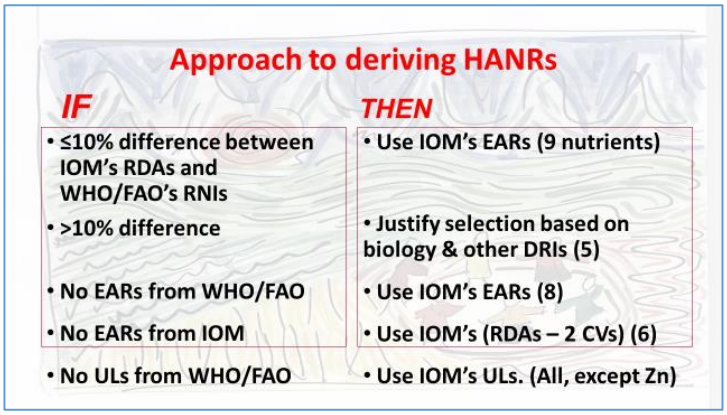
LiST has a 'missed opportunities' tool, which demonstrates how an outcome would be effected by scaling up interventions that to date had not been sufficiently considered, such as complementary feeding and the introduction of zinc supplements. There is also a costing function which generates outputs costs, number of services, and resource requirements for a given level of coverage. A wide range of guides and tutorials appear in the 'Training' section of the LiST website: http://www.livessavedtool.org/training

LiST (3) Q&A / Discussion

Session 3 Panel Discussion

A summary of the topics discussed during the panel discussion is listed below. A more detailed narrative of questions, answers and commentary appear at the following link: Session 3 Panel Discussion

RNIs/RDAs versus EARs:



IMAPP: Estimating nutrient intake gaps and planning dietary interventions using the RNIs and RDAs will substantially overestimate the amount of nutrients that need to be added. Therefore, the IMAPP tool uses, and strongly suggests that others use, the harmonized EARs developed for the IMAPP software.

In order to achieve an accurate estimate of the proportion of individuals in a group with intakes below their own requirements, we need to look at the proportion of individuals in that group with intakes below the EAR. This is a more realistic indicator (than RNI and RDA) for planning purposes. The IMAPP team used the approach shown in the table above to develop Harmonized Average Nutrient Requirements (HANRs).

Optifood: The Optifood tool addresses this dilemma by simulating the tails of the distribution. Its designers initially wanted to look at the EARs, but there wasn't enough information on EARs (for all nutrients) at the time it was developed, so instead they arbitrarily selected 65% of the RNI. This is done to avoid the tail sitting at the RNI; it may be slightly below the EARs, but they still feel that it results in a very low portion of the population being at risk of inadequate intake. Essentially, what Optifood is doing is testing the lower tail of different FBRs and trying to get a set of recommendations that will bring that lower tail of each nutrient to about 65% of the RNI. This figure (65%) can be changed at the discretion of the user.

CotD: The CotD is different in purpose and objectives, and therefore doesn't deal with this issue in the same way. CotD selects the combination of foods that will have exactly the RNI value, and determines the cost of that combination. It does *not* assume that people will consume more or less of this, and it does *not* assume there will be a normal distribution around the specified target. Instead it purports that this selection of foods contains the specified RNI; it comes at a projected cost; and people either can or cannot afford it. Optifood is *not* trying to provide dietary advice.

It was generally concluded that since CotD is *not* being used to provide dietary recommendations, its approach to this dilemma makes sense, as long as the purpose of the tool, (and limits of its application), are clearly understood by the user. Participants did suggest, however, that the CotD team might consider changing the term 'target' to the term 'level' (or something similar) since most people envision a 'target' as something you aim for, and in this case, that interpretation is not correct.

Breastmilk: Are people using breast milk values? And if so, where from?

Optifood: For Optifood, breast milk is modeled as a quality constraint, and it always models a specified amount of breast milk in the diet. In terms of the nutrient content of the breast milk, it uses default levels in the model, but the user can change the nutrient levels if there is information on the nutrient value of breast milk from that country. They do occasionally look at the sensitivity of the tool's conclusions when modeling for different levels of breast milk.

CotD: Similarly, CotD assumes a specified level of breast milk consumption using the same food composition table values (breast milk in developing countries), so the tool does not model anything that would displace that

recommended amount of breast milk. Furthermore, when modeling is done using the CotD tool, they sometimes include a child that's *not* breastfed, just to see what the effect is in meeting the requirements for the breastfed versus the non-breastfed child.

MINIMOD: For Cameroon, they have information on the micronutrients that are in the breastmilk in that country. And to simulate the effects of programs, they have gone through the process of calculating, 'if the mother's intake increases by X%, then what might be the effect on breast milk?' There is more information for some micronutrients than others, and in some cases, like vitamin A, it has very little impact. For B12, there are all sorts of methodological / technical problems in measuring it, so they try to use biomarkers that are collected to put into the model.

Validation: "If I had my dream, what would I validate my tool against?"

MINIMOD: In Cameroon, MINIMOD has made predictions of what will happen in the macro-regions under study, both in terms of adequate diet, and more functional outcomes. These predictions could, therefore, be tested. It's not likely that they would be exact, but they would likely show the relative paths and align with the differences between regions. Some small amount of testing is being done, but only in few regions and on a minor scale.

Optifood: For the problem nutrients that Optifood identifies, perhaps some kind of biochemical assessment could be used to validate them. In terms of the simulations of dietary intake, if there's good dietary data, you could look at whether the models are simulating those upper and lower intake tails. This has been discussed, and could actually be done every time the modeling is run, but hasn't been done to date.

IMAPP: IMAPP is easier to validate, at least in some regards. The assessment part, (the estimation of usual intake), has already been validated, and works well. But the *planning* part has not been validated, so the question remains as to whether the assumptions being made to move distributions really hold true.

LiST: Validation is fairly straightforward for LiST. Historical data can be used to compare to the predictions that LiST generates. It would be useful to do this systematically in a few countries.

CotD: Since the purpose of CotD is really advocacy, it's not as clear what it should be validated against.

Finally, it was widely agreed that when any prediction or estimate is produced, the user should be obligated to state the confidence interval related to that figure, so that the audience understands the level of certainty with which the statement is being made.

Session 4: Costing and Optimization Tools

MINIMOD, *Steve Vosti, University of California, Davis*

In Cameroon, funding for vitamin A supplementation (via Child Health Days (CHDs)) is on the decline. MINIMOD is being used to address this challenge using the following steps: 1) Identify the most cost-effective strategy for meeting children's vitamin A requirements over time; and, 2) Suggest one pathway for getting there.

In the 'business as usual' scenario, vitamin A supplementation effectively covers approximately 12.9 million children at an average of $2.93/child-year effectively covered. MINIMOD is used to model the introduction of two new interventions: fortified bouillon cubes and bio-fortified maize, both of which are delivered through markets. Both of these new interventions require start-up investments, and only begin generating benefits in Year 4. Importantly, MINIMOD shows extreme spatial disparities in cost-effectiveness between the north, south, and cities of Cameroon, suggesting an opportunity to shuffle resources to improve cost effectiveness.

The optimization tool looks at the nutritional benefits and costs associated with all the possible combinations of interventions, and finds the one that effectively covers the same number of children as the current benchmark

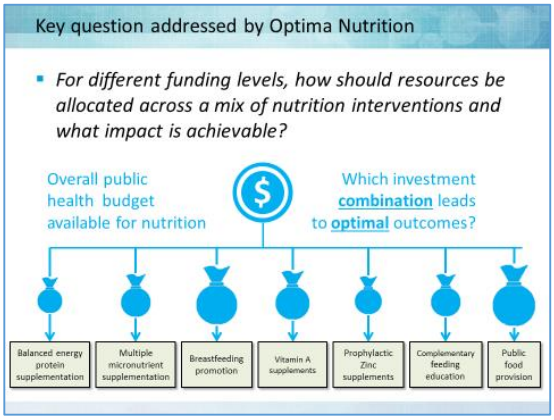
(business as usual), and does so in the most cost-effective manner. It finds that *if* Cameroon introduces the vitamin A fortified bouillon cubes and shuffles the allocation of resources between macro-regions, the same level of effective coverage can be achieved at a cost of $1.63/child-year effectively covered, a 44% savings in total cost. In step 2, MINIMOD explores one policy pathway for arriving at this scenario, and ultimately proposes investments in the oil fortification and bouillon cube programs which allow replacements of the high dose supplement distribution in certain (but not all) regions, and increase efficiency of the national vitamin A portfolio. As shown here, MINIMOD can be used to identify programmatic pathways for transitioning to more cost effective strategies, with 'business as usual' often being the worst case scenario.

MINIMOD (4) Q&A / Discussion

Optima Nutrition, *Jakub Jan Kakietek, World Bank*

No power point provided.

Optima is still under development and has limited experience within the realm of nutrition. Details on the application and learning from using Optima for HIV programming can be found in the power point presentation on Improving Allocative Efficiency in HIV with Optima.



Like MINIMOD, Optima can answer the question: For different funding levels, how should resources be allocated across a mix of nutrition interventions, and what impact is achievable? The principal difference is that MINIMOD is focused on micronutrient supplementation, and Optima deals with a range of health interventions. Optima does have some ethical, logistical and economic constraints; and since little is known empirically about the relationship between cost and coverage, the tool must make certain assumptions.

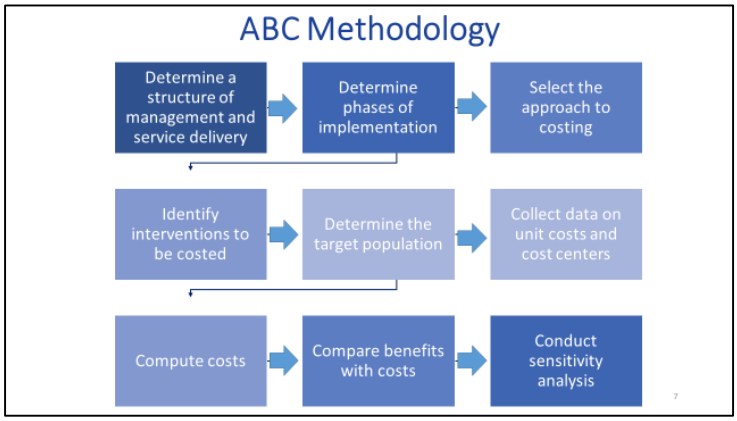
Optima works by considering: 1) disease burden; 2) interventions / delivery modes and their costs and effects; and, 3) targets and constraints (ethical, logistics and financial). In Bangladesh, Optima is being used to show how the current volume of nutrition resources can be shuffled between interventions (and/or between geographic zones) to achieve reduced stunting. Similarly, Optima produced an 'investment cascade' demonstrating how stunting can be *further* reduced over time as investments in nutrition increase.

Optima (4) Q&A / Discussion: None

Activity-Based Costing (ABC), *Kavita Sethuraman, FANTA III*

The modeling done with the ABC method was a direct follow-on to the advocacy FANTA was already doing in countries using PROFILES. Since PROFILES doesn't cover costing, ABC was applied as a complement. In this context, ABC was used to estimate the cost of implementing a comprehensive set of nutrition interventions, and then work through a collaborative process with a technical advisory committee of in-country stakeholders to select interventions; determine a management structure; obtain unit costs; and then disseminate the results to advocate for acquiring the necessary resources. This participatory process ensures that in-country stakeholders can explain and stand by the numbers when they are discussed with policy-makers.

While the ABC method is often used later in a country's program planning process, FANTA primarily uses it for advocacy purposes (i.e. acquiring the nutrition resources that are needed). All steps for costing (at right) are done within a facilitated, participative process, including involvement by local health economists.



In Guatemala, nutrition costing was undertaken first, and then followed by PROFILES. This was because the consequences of malnutrition were already largely understood, and in-country stakeholders felt strongly that they needed to know the *cost* of the government's prioritized nutrition interventions at scale. The government was not transparent with cost information, and this made it necessary to collect primary, time-use data at a very detailed level. Since then, they have used the resulting cost data to advocate to government and civil society for an increase in resource allocation for nutrition in Guatemala. The power point presentation above includes a description of ABC applied in Bangladesh.

FANTA / ABC (4) Q&A / Discussion

Session 4 Panel Discussion: MINIMOD, Optima Nutrition & ABC

A summary of the topics discussed during the panel discussion are listed below. A more detailed narrative of questions, answers and commentary appear at the following link: Session 4 Panel Discussion

Integration between tools: While it may be tempting to consider possibilities for technical integration between these tools (to combine their strengths and fill gaps); it was generally agreed that they are too complex and fragmented to 'integrate' one inside another. However, there is ample opportunity for them to 'tag team' with one another, whereby one tool might generate outcomes that can be addressed in greater detail by handing over the first tool's results to another tool. You could, for example, run Optima Nutrition for Cameroon, to identify the level of funding required to address micronutrient deficiencies, then use the MINIMOD tool to cost-effectively allocate those funds across micronutrient interventions (over space and time).

Harmonization: Countries will use these tools for different for purposes, and it's our responsibility to ensure that differences in outputs are *not* caused by using differing sources of data/assumptions (e.g. from outdated research) or lack of harmonized methods (e.g. the dilemma raised by IMAPP in Session 3). For instance, tools like Optima and PROFILES use LiST for estimating effect sizes, and while LiST is constantly updated, we have to make sure that these new LiST versions are being integrated in the other tools. In contrast, it's also important that the tools aren't harmonized to the extent that they all use the exact same approaches and potentially replicate the same mistakes. Some variety in approach is key to keeping a healthy tension between the teams and tools, and allow them to reality check one another. A semi-annual meeting to work on harmonization, where relevant, would be useful.

Harmonization of unit costs: This is a complex topic that requires ongoing debate and discussion. Several participants pointed to the need for collecting detailed, primary time-use data where secondary data are lacking. This was recently done in Malawi by the HIV modeling consortium, and FANTA Guatemala for nutrition. What's more important is to focus on the *marginal* costs of turning an intervention on and off at the national or sub-national level. Finally, how to attribute the costs of equipment and personnel in the case of multiple interventions is a challenge.

Other participants suggested that we should be careful about going too far into the minutia of time-use costing since these details can disappear when delivering the big-picture conclusion to the Minister of Health or Finance. There are always 'ranges' attached to cost and cost-effectiveness estimates, but is it important to identify situations in which the uncertainty regarding costs do not alter the core programmatic messages that we deliver to decision-makers.

An example from the HIV modeling consortium lent yet another perspective. They found it useful to go back to the literature on time use, which shows that people are very inaccurate when reporting how they spent their time. The consortium concluded that since a wide variety of health-related services are delivered by the same facility (e.g. antenatal care, WASH, HIV services), it's better *not* to parcel out time spent on each activity, and *instead* consider how adding one additional staff person can improve delivery of the *combination* of services. In this vein, they looked at Zimbabwe and considered two options: 1) comparing *unit* costs over time; and, 2) comparing cost *functions* over time, examining whether the shape of that cost function curve changes. After much deliberation, they decided on the latter option, due primarily to the challenges associated with time-use costing.

Cost-coverage relationship: More data is needed on cost-coverage relationships. Conventional wisdom asserts that costs are higher at the front of an intervention, and then they scale down as a project moves outward in time. However, there is a serious lack of empirical data to back this up, especially in nutrition. If we want to invest in getting more accurate cost information, *this* (not 'time use') is where we should put our money. This topic should also be tabled for further debate and discussion.

Common sense: Models can only give the user mathematical optimization; they don't deliver common sense. Ultimately, humans are needed to interpret the results (in the context of the political reality) and adjust as needed for policymakers. Sometimes common sense takes creativity: When MINIMOD was used in Cameroon, modeling showed that vitamin A supplementation should be done in the north only, and other vehicles would do more effective job in the south and in cities. The Cameroonians thought that this would be politically unacceptable to the regions that would lose that intervention. The Nigerians, who were also at the table, advised: "Just buy them a new road", i.e. find a trade-off intervention beyond the nutrition arena at a fraction of the 'cost savings', appeasing the population in that area, and allowing for overall efficiency gains across the country.

Accommodating affordability constraints: Complementary feeding education programs, in and of themselves, do not lead directly to a reduction in stunting. This only happens if the target group is food-secure and can *afford* to change the behaviors recommended by that education intervention. Do the tools account for this important 'affordability' constraint? In a crude way, they do since with some tools the user can input the percentage of the population that is food insecure, and assume that this portion of the population needs to be supplemented in order to receive the benefits of education.

Translating effect sizes: These tools derive their effect sizes and coefficients from randomized controlled trials, which we assume will have the same effectiveness for large-scale national nutrition programs. This is not necessarily the case. So in effect, these tools may be too optimistic in their resulting estimates. It was noted that in LiST, the user can change the effect values, though it does take a more sophisticated user to do this.

Perspectives from Country Implementers

Tanzania, *Joyceline Kaganda, Tanzania Food and Nutrition Centre*

Tanzania used **PROFILES** to create awareness about nutrition problems within the country, and to mobilize resources around those needs. This was mostly done this at the highest levels of government, but it was also used to request a 10% contribution from the business community towards the new, national five-year nutrition plan. While it's been very useful, there has been difficulty translating the tool's results into a vernacular that makes sense to some audiences, such as the business community. Interpretation is challenging and that's where they need help. **LiST** has also been very useful in Tanzania, but like PROFILES, if country teams are going to maximize use of this knowledge, they will need to understand it better. While (in-country) technical people grasp the content, other audiences have difficulty.

Finally, the Tanzania National Bureau of Statistics has begun working with WFP to apply the **FNG/CotD**. They are excited to see this analysis and to learn: which nutrients are needed; where the gaps are; and how sub-regions compare, so that they can apply this knowledge to the national plan. In general, they would like to see a more bottom-up approach for these tools, rather than the existing tendency, which is very top-down.

Ethiopia, *Ferew Lemma, Federal Ministry of Health, Ethiopia*

It's worth noting that there are many cultural issues that affect diet in Ethiopia, making it very challenging to work on dietary issues. For example, there are 80-plus ethnic groups with varying dietary patterns and habits, and for 220 days per year, there are fasting requirements. Furthermore, intra-HH food distribution has women and children consuming relatively fewer animal-source foods.

Only a few of the modeling tools have been used in Ethiopia. **Optifood** is being used with the recent food consumption survey data; **PROFILES** was used for advocacy and costing; and another tool, the **Cost of Hunger** framework was used and showed that Ethiopia is losing 16% of GDP due to health problems. Unless in-country stakeholders understand the tools better, it's very difficult for Ethiopia to decide which tool suits them and which to choose. Improved coordination between external and in-country stakeholders is also needed. Currently, Ethiopia requires assistance with two pressing issues:

1) The Iron Saga: Ethiopia had a food consumption survey of 8,000 people and found that they were not eating enough iron. Then a micronutrient survey (5,000 people) was done and found that there was no iron deficiency and anemia was not a problem. Then the Demographic and Health Survey (DHS) showed that anemia had gone up in women and children. The public health institute is recommending *not* to fortify with iron, but the MoH is suggesting that they *do* fortify with iron. This conflicting information has caused significant confusion regarding what actions to take.

2) Optimizing the budget: They did some financial tracking to determine how much money was spent over the past three years, and how much is in the coffers for the *next* three. Now they need assistance selecting which interventions will be most cost effective based on their context and programming experiences. MINIMOD is planning to help with this task.

Monica Woldt, FANTA III

In Guatemala, **ABC**, **PROFILES**, **Optifood**, **CotD** and **LIST** have all been used. They have helped bring Guatemala from the early stages of recognizing that there is a nutrition problem, to today, where there is multi-sectoral ownership of the problem and the pressing questions revolve around 'what to do', 'how to do it', and 'how much it will cost'.

The Ministry of Finance is a key FANTA partner in Guatemala. As such, they recently articulated that one of their critical needs is to generate a 'budgetary structure' for allocating funds to the national strategy to prevent chronic malnutrition. They want this to include setting targets in annual operational plans, monitoring of activities and budget expenditures, and a decision making process based on results generated by the monitoring system. They also shared their need for improved inter-institutional coordination, and guidance on how to more effectively reach families with integrated approaches. Stunting has decreased in Guatemala by only 0.5 percentage points per year over the past 30 years, and at this rate, it will take almost 100 years for Guatemala to eliminate stunting. There is significant pressure on the nutrition community to show the president, and other government leaders and stakeholders, that nutrition interventions are having an 'impact'. There is fear that if impact is not shown, high-level decision makers will lose interest in investing in nutrition.

Open Discussion following Country Implementers

Group Presentations: How to Facilitate the Tools' Adoption and Use?

The meeting participants were divided into three groups and asked to address the three topics listed below. The groups spent one hour discussing their assigned topic and reported back to plenary following the breakout.

Group 1: Identifying the barriers:

Questions to address:

What are the main barriers to adoption (e.g. multiplicity, complexity, sub-optimal technical assistance), and are they the same across contexts? What is the research agenda?

Summary of discussion:
The group identified six key barriers to adoption and use of the tools:

1. ***Data:*** Challenges include data availability (e.g. micronutrient intake, cost data, etc.), as well as methods for data collection, which are cumbersome. Also, taking sub-national data and trying to apply it nationally (and vice versa) can be problematic.
2. ***Ease of use:*** For some tools, the user interface can be challenging, and often there is no user guide or manual to assist unfamiliar users.
3. ***Capacity:*** These tools are complex, which is a positive attribute in many respects; however, it also means that there is a need for a pool of technical experts that are skilled in training on their use. At the moment, there isn't enough capacity to meet the substantial demand for training. Perhaps there is a role for a consortium of universities to build that capacity among users.
4. ***Technical aspects:*** The issue/dilemma around reference values and RNIs (raised by IMAPP in Session 3) appears to be a significant technical barrier. Whose role is it to harmonize use of these methods? Should WHO or FAO be engaged here?
5. ***Timing:*** There is a need for clarification on exactly when each tool should be brought into the policy-making process (i.e. mapping their use) and how each should be prioritized.
6. ***Landscape of the modeling tools***: There is a lack of knowledge and understanding about each tool, as well as a lack of clear/consistent messaging regarding their purpose and uses. Before this meeting, most of the participants didn't even know that all of these tools existed.

Group 2: Strategies for enhancing adoption:

Questions to address:
Is there a need for centralized support for the use of these modeling tools? If so, what are the various options for organizing support (e.g. core team of technicians in each country? Scaling Up Nutrition (SUN)-sponsored central unit that carries out consultancies on request? Community of Practice?). What would be a sustainable funding structure? What is the research agenda?

Summary of discussion:
The group first attempted to clarify the topic itself. They decided to address a combination of both 'adoption' *and* 'utilization' issues for the tools:

Adoption strategies: To facilitate adoption, the consortium should: map them according to their purpose and stage in a country's various processes; describe pros and cons of each; list assumptions they incorporate; clarify data requirements and timing required to apply the tool; identify synergies between tools; and explain their stage of development (already widely used, or still under development).

Furthermore, the group articulated a distinction between *short-* and *long-* term goals: In the short term, they thought that this global group (or 'consortium') should play the role of brokering knowledge and access to the tools. They viewed this as a very achievable short-term goal. In the longer term, they thought that there should be full access and capacity to use the tools located at country level.

Utilization: To facilitate '*utilization'* of the tools, the group listed three recommendations:
1. Enhance user-friendliness using the graphical user interface (GUI).
2. Enhance the capacity (at country level) for using the outputs of the tools, especially in terms of advocacy.
3. Provide clear recommendations on country team composition in terms of skills and expertise.

Next steps:
1. Once these are completed (or simultaneously), the group recommended shifting from leadership on *development* of the tools, to leadership on *implementation*, i.e. bringing the users into this conversation.
2. The question was posed: Can the MNF play a role? Should the MNF be a clearing house for the mapping exercise, and/or other aspects of future work?

3. Make a plan for 'marketing' of these tools and sharing what's been discussed and learned at this meeting with *other* global stakeholders. Perhaps we should present at the next SUN global gatherings or World Bank meetings where relevant policy makers are already gathered?

Group 3: Providing Clarity:

Questions to address:

Will mapping the tools (on a continuum) provide clarity to the existing portfolio of tools and enhance adoption? Are there gaps (or overlap) across that continuum that should be addressed? If so, how? What is the research agenda?

Summary of discussion:

There was broad agreement that a mapping of the various modeling tools would be a useful exercise to both: 1) tool developers and providers of technical assistance, and 2) country-level users. The mapping exercise should:

1. Document each tool, its objectives, and the 'questions' it's designed to address. The HIV modeling consortium came up with six key policy questions and pointed to the tool(s) that answered them.[1]
2. List what each tool 'can' and 'can't' do. This kind of 'Fit-for-Purpose' assessment was also done by the HIV modeling consortium, along with descriptions of the 'strengths' and 'weakness' of each.
3. Include a decision tree or flow chart that takes the user through a process of answering questions related to their needs (and where they are in their processes), and points them towards the appropriate tool(s).
4. Consider the time frame that the country is limited to for getting their questions answered (e.g. budget submission deadlines, national planning meeting dates, etc.). Consider the data they have available; and the funding they have access to (to finance application of the tool).
5. Include a taxonomy of interventions, recognizing that intervention names (and what they include), e.g. social and behavioral change (SBC), behavior change communication (BCC), may vary between countries.
6. Harmonize / standardize definitions of terms, such as 'optimization' and 'targets' (which are currently used differently between tools), and metrics (e.g. unit cost data[2]) so that there is less confusion when comparing inputs and outputs of the tools. Also, clarify the use of terms such as 'tools' versus 'models'[3].
7. Describe intended users for a given tool and list skills/expertise that users should have. Also acknowledge that there are users of the tools, and then there are users of the results of the tools. These are two distinct groups.
8. Recognize in-country capacity and *where* countries are in their processes. Delineate the types of capacity building on offer and/or usually needed to apply each tool.
9. Separate the tools into level 1 (widely used) and level 2 (more experimental).
10. Consider categorizing them into 1) those with a purpose of raising more money for nutrition (advocacy), and 2) those with the purpose of getting more nutrition for their money (improved decision making, costing and economic optimization).
11. Acknowledge and clarify that these tools can assist in solving specific problems, but they are always part of a larger process and should not be used in isolation.
12. Develop a 'casebook' of examples on how each tool has been used in various countries, and what changed as a result. This can give newer countries food-for-thought and concrete examples of applications. Consider the possibility of extending the 'closing date' of a tool's utilization to a year after the final report is completed so that an evaluation can take place assessing what has changed as a result.
13. Make clear which tools have been validated and how.
14. Describe where tools have been applied in, or linked to, other sectors, e.g. agriculture, social protection, etc.

Research Agenda:

1. Define what 'success' looks like for these tools. As noted earlier, consider that big changes take time and realistic goals might include tracking 'monies allocated to nutrition prior application of the tool in a given

1 A Delphi process was used by the HIV modeling consortium and it took them approximately six months to construct their mapping/inventory of models.

2 The Global Health Cost Consortium is currently working to develop a unit cost reference database for HIV and TB. The nutrition consortium should tap into this ongoing effort. https://ghcosting.org/pages/about/why_GHCC

3 This document uses the term 'modeling tools' (or 'tools' for short) to describe the eight tools presented. Some teams have referred to their tools as 'models', which may lead to confusion when marketing the tools to new audiences.

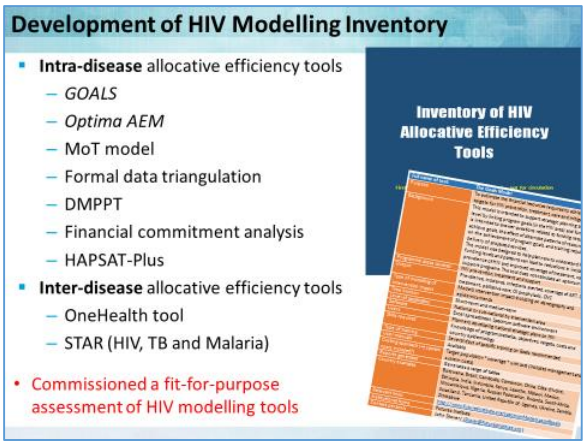
country' versus 'monies allocated to nutrition X years after application of the tool in that country'. Specific indicators of success are needed.

2. Examine differences in input data. Do some tools use outdated or poor quality sources of data? Should there be an effort to harmonize data sources and assumptions? Are we being transparent where there are differences in data sources and assumptions? Consider and discuss the issues raised by the IMAPP team (with regards to the reference values and RNIs) and their assertion that other tools may be overestimating results.
3. Engage software engineers to 'look under the hood' of each and examine the mathematical foundations, etc. and hopefully eliminate some of the bugs that still exist.
4. Gather feedback from in-country users to better understand their challenges related to uptake of the tools, utilization of the tools, and utilization of the results generated by the tools.
5. Compare and document specificity and confidence levels in results of the various tools.
6. Examine whether there are any gaps not covered by the existing eight tools. If there are gaps, explore whether developers should modify one or more tools to fill those gaps.

Learning from the HIV Modeling Consortium,

Marelize Gorgens, World Bank

The discussions during these two days very much resemble the conversations that took place among HIV modelers four to five years ago. The Global HIV Modeling Consortium[4] developed a modelling tool 'inventory', which identified how each tool works; where they've been applied; their strengths and weaknesses; data requirements; and tech support available. The consortium also did a 'Fit for Purpose Assessment,' which answered the question: Which tools answer which policy and program questions best? The purpose was to facilitate a shift from a supply-driven environment, to one that is intentionally demand-driven and puts the countries in charge. To do this, capacity is absolutely essential. The work done by the HIV Modeling Consortium has shown that by improving the *allocation* of funding, lifesaving benefits can be achieved, *even* when budgets are reduced.



Other Collaboration within the HIV consortium:

- Developing principles of good modeling.
- Reviewing each other's modeling structures, comparing results across tools.
- Harmonizing terms and parameters, where feasible.
- Creating joint working groups to agree on costing definitions and costs (e.g. Global Health Cost Consortium)
- Facilitating partnerships between in-country universities and global partners to increase the capacity for training users.

Other learning from the HIV consortium experience:

4 There is also a global modeling consortium for TB called TB Modeling & Analysis Consortium TB MAC: http://tb-mac.org/

- There are limits on how much resources can be shifted or reallocated within countries since there may not be sufficient absorption capacity.
- Lack of data should not stop countries from adopting a tool since the tools themselves have the ability to catalyze interest in collecting new data.
- In-country users don't like a 'black box' approach of having the analysis done externally. A GUI, where they enter data directly, facilitates confidence in the data at the country level and allows them to enter and make changes themselves, and understand how the tool works.
- Modelers and users of the tools need to learn to present results in ways that make sense to the *end*-user, e.g. Minister of Health or Finance, and not necessarily in a way that *we* are comfortable with (see cartoon at right).

Summary of Perspectives from the Global Community

The following themes emerged from the presentations by Meera Shekar (World Bank), Ellen Piwoz (Gates Foundation), and Patrizia Fracassi (SUN). For specific comments by each, click on the following link: Detailed perspectives from each presenter

Mapping: It would be useful to conduct a three dimensional mapping of the modeling tools across the various themes noted in the previous section. The mapping should *also* include: which tools work well together via complementing (rather than competing), and tag-teaming; who is the target audience for each; which were developed to acquire more money for nutrition (i.e. nutrition advocacy), and which are for getting more nutrition for the money (allocation efficiency).

Fit-for-Purpose assessment: The idea of a 'Fit-for-Purpose' assessment should be explored so that we are improving the demand side for these tools and not continuing to push them from the supply side.

Harmonization: We are often using the same terms but with different interpretations. There's a clear need for improving uniformity on several fronts, e.g. language/terms; assumptions; and foundational research used as a basis for the tools.

Institutionalization: Ultimately, if these tools are going to be useful for the long-term, then they need to be institutionalized both at the global level, and in each of the countries where they are used. This is not just about training an NGO; it's about finding an institutional home with an organization that is committed to the tool.

Collaboration: This group should coordinate with, and leverage the knowledge of, the Global Health Cost Consortium (on unit cost data); and the HIV and TB Modeling Consortia (lessons learned). It would also be useful to expose our tools to experts from other sectors, request feedback, and similarly, explore what other sectors are doing around modeling.

Casebook: Creating a 'casebook' of nutrition modeling experiences would be helpful in both promoting the tools and helping countries to better understand what the tools are capable of by way of concrete examples.

Staying current and dynamic: It's important that developers keep the tools updated with findings from current research; none of these tools should be considered static. There is a concern that the tools may produce conflicting conclusions if some are based on outdated evidence. For example, the drivers of mortality have changed dramatically over the years and new studies are regularly showing new connections.

Uncertainty: It's important that tools are clear about the levels of certainty with which results are generated; however, not all modeling uncertainty leads to policy uncertainty. We tend to focus too much, and circle around, the questions we haven't yet answered. In some cases, we already have the answers that policy makers most need.

Let's identify situations in which we can stay out of the minutia and focus on big-picture messages for policy makers.

Functionality: By continuing to meet, we could create opportunities for the tools' engineers to 'look under the hoods' of each other's tools, and learn from one another with respect to their software platforms and functionality.

SUN Global Gathering: We should use the next Gathering to begin 'marketing' our tools (and the conclusions from this meeting) to the stakeholders present there. We should consider presenting a 'casebook' study, or something that shows concrete examples on what these tools can accomplish. The Global Gathering will provide an opportunity for early collaboration with interested countries. In this regard, we need to be ready to clarify what we can provide to them in order to facilitate demand-driven uptake of the tools.

Staying Flexible: Countries with modeling experience, are often frustrated with the lack of coordination/harmonization at global level. They need us to be more unified and organized among ourselves so that the messaging they receive is clear. For those who are starting fresh with these tools, they want to know the basics about who can do what and where. Our community needs to stay flexible and meet each country where they are in terms of understanding and in-country processes.

Capacity Building: Building in-country capacity is extremely important. This ensures that in-country teams can adapt the inputs, assumptions and parameters as they go, and do follow-on modeling if new questions arise. Having a GUI and in-country capacity is crucial to sustainability of the tools. This is required not only at the *technical* team level, but also for the *communication* teams. Since the amount of external/global support received by a country can vary dramatically, it would be helpful to complement that learning by constructing a mechanism for countries to learn from one another, i.e. country-to-country.

Dissemination and Next Steps, *Gilles Bergeron, Sackler Institute*

The group was polled to gauge the level of interest for advancing dialogue beyond this meeting. The group expressed broad agreement and commitment for moving forward, with the first step being the creation of a secretariat, which would lead the formation and functioning of a nutrition modeling consortium. Following the release of this meeting report, the group discussed the possibility of submitting a white paper to the International Union of Nutritional Science's (IUNS) - International Congress on Nutrition (ICN) in Buenos Aires in October.

Two possible roles that the secretariat (and consortium) might have are: 1) responding to inquiries from countries who are interested in utilizing the tools, and 2) developing a research agenda to address persistent questions / challenges in relation to the tools. The Sackler Institute offered to document the above-mentioned agreements and fundraise on the group's behalf.

Dissemination and Next Steps, Continued: *Lynette Newfield, MNF*

This group should have a more robust discussion about publication and presentation opportunities. It's likely to be too late for submission of a white paper to the IUNS-ICN, but perhaps our messaging could be inserted into another, already approved presentation where there is an obvious fit.

There are many other venues for sharing. Two upcoming venues include the SUN Global Gathering and the next MNF meeting. The MNF meeting would be an excellent space for reaching the 'developer and facilitator/technical assistance' audience, both at the global and country level.

For both of these venues, the group should brainstorm about the specific messaging to bring to the MNF meeting in terms of advocating for a shift from supply- to demand-driven uptake of the tools. Finally, having heard about the development of the HIV Modeling Consortium, it makes sense for the steering committee of this meeting to have a longer, more detailed discussion with Marelize Gorgens (World Bank) to see what other lessons might be gleaned.

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Acronyms

ABC	Activity-Based Costing
BCC	Behavior Change Communication
BMI	Body Mass Index
CHD	Child Health Day
CotD	Cost of Diet tool
DHS	Demographic and Health Survey
DRI	Dietary Reference Intake
EAR	Estimated Average Requirements
FANTA	Food and Nutrition Technical Assistance
FAO	Food and Agriculture Organization
FBR	Food-Based Recommendations
FNG	Fill the Nutrient Gap tool
GUI	Graphical User Interface
HANRs	Harmonized Average Nutrient Requirements
HH	Household
IMAPP	Intake Modelling and Prediction Program
IOM	Institute of Medicine
IUNS-ICN	International Union of Nutritional Science's - International Congress on Nutrition
LBW	(Low Birth Weight (LBW)
LiST	Lives Saved Tool
MCH	Maternal and Child Health
MINIMOD	Micronutrient Intervention Modeling Project
MNCH&N	Maternal, Newborn and Child Health and Nutrition
MNF	Micronutrient Forum
MoH	Ministry of Health
NS+	Nutrition-Specific 'Plus'
RNI	Recommended Nutrient Intake
SBC	Social and Behavioral Change
SNFs	Specialized Nutritious Foods
SUN	Scaling Up Nutrition movement
UL	Upper Level
WASH	Water, Sanitation and Hygiene
WFP	World Food Program
WHA	World Health Assembly
WHO	World Health Organization