



DINA ADVOCACY BRIEF

Nutrition Modeling for Better Decision-Making: Turning Data into Actionable Evidence for Policies and Programs

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The potential of nutrition modeling

Decision-makers face increasingly complex nutrition challenges, including the coexistence of undernutrition, micronutrient deficiencies, overweight, and obesity, often within the same countries, communities, households, and even individuals. To address these challenges, they must make difficult choices about how to allocate limited resources, which nutrition-specific and nutrition-sensitive interventions to prioritize for the greatest potential impact, and how to target programs to reach the populations most in need. The use of modeled evidence is increasingly important for answering critical policy and program questions.

The Nutrition Modeling Consortium

Facilitated by the Micronutrient Forum, the [Nutrition Modeling Consortium](#) brings together nutrition policymakers, programmers, modelers, and researchers to strengthen the use of modeled evidence to answer pressing nutrition policy and program questions at the subnational, national, and global level.



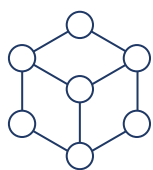
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Nutrition modeling is the systematic use of quantitative methods to explore relationships between biological, social, economic, and environmental factors, interventions, and nutrition-related outcomes. Nutrition modeling encompasses a broad range of methods and applications, from statistical modeling and optimization to machine learning, and can be applied at the individual, household, population, or systems level.

For decision-makers, nutrition modeling can transform existing data into insights to inform important policy and program decisions. Models can estimate the consequences of inaction to strengthen the investment case, identify populations at greatest risk, and simulate the impact of interventions before they are implemented. They can also help select the most appropriate combination of interventions, estimate the effectiveness, cost, and cost-effectiveness of interventions, and support evaluation and course correction of ongoing programs. These strengths are particularly important in low- and middle-income countries, where decision-makers often face data and resource scarcity, and where development funding is increasingly constrained.

Despite these widely acknowledged strengths, the potential of nutrition modeling is not being fully realized. Models are often developed and applied in silos, which can produce seemingly conflicting results. Models designed or implemented without sufficient engagement from stakeholders risk misalignment with the questions, timelines, and political processes that drive decisions. Limited national capacity to develop, interpret, and apply models and their outputs further constrains uptake and use. Additionally, modelers sometimes fail to clearly communicate their methods, assumptions, limitations, and findings in clear and transparent ways that enable appropriate use of results.

Addressing these challenges will require moving beyond the development of individual tools toward a more coordinated nutrition modeling ecosystem centered on the needs of end-users.



Nutrition modeling tools to support policy and program decisions

A variety of existing tools can be used to address questions across the policy and program cycle and inform decision-making. The examples provided here illustrate the breadth of nutrition modeling, ranging from established software to web-based platforms, interactive dashboards, and reproducible workflows.



What are the health and human capital consequences of malnutrition, and what is the case for investment?



Example tools:

The Cost of Inaction Tool
The Cost of Not Breastfeeding
The Cost of the Double Burden



What are the drivers of malnutrition, what actions could improve nutrition outcomes, and by how much?



Example tools:

Exemplars in Global Health
Intake Monitoring, Assessment, and Planning Program (IMAPP)
The Lives Saved Tool (LiST)
Optifood
Optima Nutrition



Which nutrition problems, populations, or geographic areas should be prioritized?



Example tools:

Global Dietary Database (GDD) micronutrient models
Interactive Village-Level Nutrition Dashboard
Local Burden of Disease
Micronutrient Action Policy Support (MAPS)
Modelling and Mapping Inadequate Micronutrient Intake (MIMI)



How should limited resources be allocated?



Example tools:

Cost of the Diet
Enhance
Micronutrient Intervention Modeling (MINIMOD)
Optima Nutrition
Optimus



How should a specific policy or program be designed, assessed, or adjusted?



Example tools:

DietSolve
Optifood
School Meals Planner (SMP) Plus

Data scarcity and implications for nutrition modeling

Many countries lack recent, nationally representative data on upstream sociocultural, political, and environmental risk factors for malnutrition and downstream markers of food availability, accessibility, and affordability, dietary intake, and anthropometric and biochemical indicators of nutritional status. Further, existing data may have insufficient sample sizes or survey designs to allow subnational or population-specific estimates needed for targeted decision-making.

In this context of data scarcity, methodological advances can help make better use of available information to derive actionable insights. For example, modeling could improve the ability to make population inferences using administrative data and offer the potential to combine sparse individual-level information with more widely available household-level data to generate more granular estimates. However, these methods require further development, testing, and external validation to become reliable enough for policy and program decision-making. Ultimately, modeling complements and relies on—rather than replaces—primary data collection, which should remain a top priority and be budgeted accordingly. The question is not whether modeled or empirical data are preferable, but which combination is sufficient (and feasible given resource constraints) to generate evidence required to answer a particular policy or program question in a specific context.

Focusing on harmonization, complementarity, and model sequencing

A growing number of nutrition models are available, but decision-makers have difficulty deciding which model(s) to use—in which order and at what stage of the policy and program cycle—and how to interpret potential differences in results. Models addressing similar or related questions may use different definitions, datasets, minimum input requirements, assumptions, and analytical methods, resulting in disparate estimates. While these differences may not always represent error, they can undermine confidence in modeled evidence.

Many available models are complementary, but they are often used in isolation. One model might quantify the health and economic consequences of failing to address malnutrition, while another determines how a fixed budget could be allocated across interventions to maximize impact. Used sequentially, these models could support different stages of decision-making across the program cycle. However, users may lack the information or capacity needed to identify

and act on these complementarities. A publicly available, regularly maintained repository describing existing models, including their purpose, assumptions, data requirements, comparative advantages, appropriate uses, and complementarities (or redundancies), could help decision-makers select and sequence models according to their needs and improve confidence in results.

Moving from modeled evidence to policy and program action

Models are more likely to inform action when policy and program questions are developed with decision-makers and affected stakeholders, and when modeling is embedded in the processes through which policies, programs, and budgets are developed and reviewed. Analyses should be synchronized with national strategy updates, budget cycles, or other policy windows to provide timely information for decision-making. Results are likely to be underutilized if modeling exercises are poorly timed, lack stakeholder involvement, fail to address contemporary and context-specific needs, or overlook the political conditions that enable their use. Technical results should also be presented in user-friendly formats—with transparent communication about limitations and uncertainty—to enable end-users to make concrete choices.

Policymakers across geographic contexts often seek answers to similar questions, such as:

- What is the economic case for investing in nutrition?
- Which combinations of interventions generate the greatest impact?
- How much should be invested, and in what sequence?
- Which measures are most useful for tracking nutrition progress and outcomes across sectors?



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Strengthening local capacity for nutrition modeling

Local ownership and capacity building are essential. Complex, single-purpose models that are applied infrequently create dependence on external technical assistance and impede the development of sustained national expertise. Strengthening the ability of national research institutions and other trusted technical bodies to develop, adapt, govern, interpret, and communicate models and their results can institutionalize capacity and connect technical evidence more closely with policy and program decisions. Capacity investments should extend beyond one-off training to mentorship, documentation, interoperable workflows, and long-term institutional partnerships.

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A new era for nutrition modeling

Nutrition modeling must evolve to reflect the complexity of contemporary nutrition challenges. Most existing models address individual forms of malnutrition or specific interventions. Far fewer can assess the combined contribution, synergies, and trade-offs of interventions across sectors such as agriculture, social protection, health, education, and water, sanitation, and hygiene. End-users need approaches that can accommodate multisectoral strategies to alleviate multiple forms of malnutrition. In addition, many models are premised on incremental change and may not produce reliable results in the face of major shocks, while other models make assumptions that do not hold across contexts. These challenges must be confronted to improve trust in and uptake of nutrition models.

Artificial intelligence (AI) creates additional opportunities. AI-assisted tools may make modeling more accessible by helping users interact with models, integrating suitable information from multiple sources, and translating technical results into decision-relevant information. However, these opportunities are not without risk. The use of AI in nutrition decision-making must be accompanied by safeguards, including data validation and standards, acknowledgment of uncertainty, prevention of unfounded extrapolation beyond available evidence, and traceability from outputs back to their underlying sources.



Priorities for action

Realizing the potential of nutrition modeling requires investment not only in data collection and advancing modeling techniques, but also in the processes and systems that enable models to be trusted, integrated, applied, interpreted, and sustained. Priorities for action include:

1. **Make modeling responsive to local needs.** Begin with priority policy and program questions identified through stakeholder engagement and embed modeling within government planning, budgeting, program design, monitoring, and evaluation processes.
2. **Strengthen and sustain national and regional capacity.** Strengthen the ability of modelers and decision-makers in low- and middle-income countries to use, develop, and adapt models and to interpret, communicate, and apply modeled evidence, including through training and partnerships.
3. **Prioritize harmonization.** Document similarities and reconcile differences in existing models and support decision-makers to select and sequence appropriate models to fit their identified needs.
4. **Improve transparency and good practices.** Provide accessible information on analytical approaches, data requirements, assumptions, strengths, and limitations. Strengthen standards for data and model validation and for uncertainty assessment, and conduct transparent model comparison exercises where appropriate.
5. **Enhance the data landscape for nutrition modeling.** Define data requirements for different modeling applications, facilitate access to standardized model-ready data, establish approaches for assessing and communicating data quality and fitness for purpose, and strengthen collaboration among data collectors, data owners, modelers, and decision-makers.
6. **Invest in methodological innovation.** Advance approaches that integrate and triangulate multiple data sources and models, create models that accommodate multisectoral interventions, synergistic approaches, and multiple forms of malnutrition, and responsibly harness AI including machine learning.
7. **Solidify the link from evidence to action.** Align analyses with policy windows, improve communication of results, document cases in which modeling has influenced decisions (or where it failed to, and why), and evaluate model predictions against observed program and policy outcomes.

Looking ahead

As countries confront malnutrition in multiple forms alongside tighter resources and changing data landscapes, the need to extract greater value from available evidence will only grow. Nutrition modeling can help meet these challenges. Achieving that potential will require a shift from individual tools and analyses toward a coordinated, transparent, country-centered modeling ecosystem in which models are developed and applied in response to prioritized policy and program questions, and national institutions have the capacity to use models and modeled evidence alongside empirical data to inform action.

The Nutrition Modeling Consortium provides a mechanism for addressing the challenges and advancing the priorities identified in this brief. The Consortium's purpose is not to promote specific models or approaches, but to strengthen the collective ability of the nutrition community to match context-specific questions with appropriate data and models to generate actionable insights. Success should be judged by the extent to which countries access, interpret, and sustainably apply modeled evidence to make better policy and program decisions.



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