The Double Burden of Malnutrition: Research Agenda for Reversing Global Trends

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Abstract

The double burden of malnutrition (DBM) is becoming more prevalent throughout the world, but most alarming is the fact that it is also prevalent in lower-income countries, those with limited research and policy funding. To that end, a number of research gaps have been identified related to the biology, research methodologies/data systems, and programs and policies that could be improved to best address the DBM across the globe, especially in diverse settings with limited resources. Clearly, understanding the biology of the DBM is fundamental to developing policies, but research needs to become more interdisciplinary and communicate better with policymakers. At the same time, research methods need to become more innovative, and data systems must advance to accommodate new research methods and approaches. Filling these gaps will allow for broad and effective policies to be implemented through both public and private groups, an area that could be leveraged through transparent public-private engagement and programs. Without novel and integrated approaches to research, efforts to reverse the DBM will be limited. Therefore, the time has come for truly cooperative and collaborative efforts on all fronts to work together and promote the health of future generations across the globe.

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The urgency of the double burden of malnutrition (DBM) was made abundantly clear at the international symposium hosted by the IAEA/UNICEF/WHO in December 2018. Apart from the immediate impact of the DBM on global health, the long-term effect of the DBM on future generations, in both health and economic development terms, is great. Considering the development of human capital, it is without doubt that an increasing prevalence of diet-related noncommunicable diseases will negatively affect all aspects of human capital through influences at conception, during gestation, childhood, and adulthood. To reverse the DBM and address the fundamental drivers and outcomes, it is necessary to build a multisectoral, coordinated, and innovative research agenda that builds on existing knowledge and advances research in all parts of the globe. For example, integrating new techniques to measure risk factors or health outcomes with national surveys allows for such data to be shared across agencies and countries. Perhaps most im-

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portant, a new research agenda is needed to support implementation and policy by bridging the evidence from biology to interventions, including policy implications for countries and governments.

Research Gaps and the DBM

During the symposium, a number of research gaps were identified that should be filled to reduce the DBM globally. However, it is clear that a key avenue to address such gaps rests in advancing implementation science [1] that advocates for systematic evaluations of research and programs to best determine what works and what does not and adjust protocols and agendas sooner rather than later. Such an approach would strengthen existing food aid or supplementation programs, as well as policies and programs to improve maternal diet and household consumption of nutrient dense foods. What remains is to bridge the gaps identified and advance research agendas using implementation science that build on existing programs and promote public-private engagement (PPE) to enhance future work to reverse the DBM.

Advancing Research in the Biology of the DBM

Research on the biology of the DBM has advanced a number of important programs and initiatives as described throughout these proceedings. However, more is to be done as most of the existing research has focused on one form of malnutrition, such as stunting, obesity, or micronutrient deficiencies, conditions that do not exist in isolation. Thus, gaps in research need to incorporate or be sensitive to how their area may be related to or benefit from other areas of research to best understand drivers of the DBM.

Two particular areas of biological research that can be expanded and integrated into existing research or programs include using alternatives to stunting or composite indexes of nutritional status as the primary outcomes of program evaluations in national surveys or research. Simply, given the large number of factors and conditions that contribute to growth retardation, stunting is not sufficient to evaluate programs that use a single factor (e.g., nutritional supplements, improved sanitation, etc.) to influence nutritional status when other factors, including dietary diversity, maternal education, anemia, could be integrated into a composite outcome that may better inform the effectiveness of a program or intervention. As well, given the intricate relationship between growth, body composition, diet, and future risk of chronic diseases, relying on traditional anthropometric techniques

such as height, weight, and mid-upper arm circumference may be inadequate to fully inform the nutrition and policy community. In addition, it would be important to include measures of body composition that could account for metabolic load as contributing factor to the development of obesity or chronic diseases. Examples of other gaps identified that can be solved with coordinated responses and planning include:

- Conducting research on physical activity, sanitation, and food safety as part of a whole and not as isolated actions.
- Including the adolescent period as a window of opportunity in research on the first 1,000 days to promote preconception health that can affect fetal growth and metabolic load.
- Expanding the use of the Minimum Dietary Diversity for Women to national surveys to improve the understanding of dietary patterns in diverse settings.
- Integrating epigenetic and microbiome protocols in surveys and parallel research projects to expand the knowledge gained from existing programs.
- Expanding the use of biomarkers for environmental toxins and food contaminants in staple foods.

Research Methodologies and Data Systems

The DBM is a complex problem that is ultimately caused by a confluence of social, environmental, and biological factors that result in the coexistence of under- and overnutrition within the same individuals, households, communities, and regions. Therefore, to reverse current trends, there must be an integration of innovative research and programs that are focused on the DBM. Simply, embracing an interdisciplinary approach to the DBM will prove more fruitful than traditional “siloe” research and programs given the complex nature of the DBM, especially in low-income settings. Also, concurrent wasting and stunting could be integrated as a single category of analysis by using a tool to identify highest risk children in nutrition programs. In these very proceedings, Haisma and others provided an insightful approach to defining child growth and development using a multidimensional index that incorporates variables from across disciplines [1]. Finally, given the rapid development of “omics” research, along with work on epigenetics and the microbiome, data systems must be developed to support and accommodate these areas of research to advance the knowledge of how such research informs the biology and policies of the DBM. Other areas to consider are as follows:

- Expanding the use of stable isotope techniques to assess body composition in national surveys.

- Ensuring adequate measures of breastfeeding.
- Improving the evaluation of exclusive breastfeeding promotion and complementary feeding programs.
- Improving dietary intake methods through combined surveys (i.e., food diary with food frequency questionnaire) or innovative methods (e.g., wearable cameras).

Policies, Programs, and PPE to Address the DBM

Given the myriad of complexities that influence the DBM and the intricate aspects of research, programs, and policies designed to understand how to prevent the DBM, forward-thinking and multidisciplinary approaches are warranted. Research should remain cognizant of the policy context in which the DBM occurs and policies need to consider the most salient research results, both positive and negative. Nonetheless, through improved communication and cooperation among academics, UN agencies, NGOs and private groups, and PPEs, research can be better integrated with programs and policies and vice versa. Examples of integrated programs include the following:

- Improving the evaluation of PPEs to develop innovative methodologies and metrics to assess food security and nutritional status and the role PPEs have in improving such metrics.
- Improving the communication of key biological outcomes to policy makers to bridge interactions between the nutrition sector and other relevant sectors through shared outcomes (e.g., poverty reduction, social protection, or healthy foods).
- Strengthening the relationship between health systems and research communities to develop double-duty actions for nutrition (e.g., baby-friendly hospitals and supporting breastfeeding).

In summary, building and strengthening capacity to develop and implement effective interventions and data systems is the cornerstone of future programs and agendas that can reverse the DBM. Moreover, developing new methods or partnering with existing agendas to expand novel methodologies will greatly enhance the research portfolio required to reverse the DBM.

Advancing Research to Reverse the DBM

The primary goal of academic research is to advance knowledge that will benefit humankind. Yet, it is time for academics to create stronger and broader alliances with other groups, such as governmental ministries, UN agencies, PPEs, and NGOs, and vice versa, beyond what

has already been in existence for decades to best advance research and programs that will fully address and potentially reverse the DBM throughout the world. For many of the ideas presented, both at the symposium and in these proceedings, the goals can be achieved relatively easily with only modest changes to protocols or policies, but often the greatest challenge exists in the implementation of novel or interdisciplinary research and programs. Therefore, the agents of change are the very people or groups who conduct the research or develop the policies and as such, they should assume the responsibility to be true agents of change by acting in transparent and collaborative manners to reverse the DBM across the globe.

Conclusions

In conclusion, the global community has witnessed tremendous and considerable work designed to improve the nutritional status and health of children and adults over the past 50–60 years. At the same time, this work has been eclipsed by epidemiological and nutrition transitions that have resulted in a reduction in undernutrition and an increase in overnutrition, placing stress on existing health care systems, especially in lower-income countries. Thus, it is time to adjust traditional research and intervention strategies to consider how collaborative and interdisciplinary work, coupled with productive PPEs, can inform and advance innovative approaches to promote optimal dietary intake, physical activity, and reproductive health to prevent all forms of malnutrition.

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Author Contributions

D.H.: conceptualized the overall design of the manuscript and contributed to writing of the final manuscript and approved the final draft.

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