

THE DOUBLE BURDEN OF MALNUTRITION IN EAST ASIA AND THE PACIFIC: EVIDENCE AND LESSONS FOR A MULTISECTORAL RESPONSE

DISCUSSION PAPER

DECEMBER 2016

Roger Shrimpton
Nkosinathi Vusizihlobo Mbuya
Anne Marie Provo



WORLD BANK GROUP
Health, Nutrition & Population

**THE DOUBLE BURDEN OF MALNUTRITION IN EAST ASIA
AND THE PACIFIC:**

Evidence and Lessons for a Multisectoral Response

Roger Shrimpton
Nkosinathi Vusizihlobo Mbuya
Anne Marie Provo

December 2016

Health, Nutrition, and Population (HNP) Discussion Paper

This series is produced by the Health, Nutrition, and Population Global Practice. The papers in this series aim to provide a vehicle for publishing preliminary results on HNP topics to encourage discussion and debate. The findings, interpretations, and conclusions expressed in this paper are entirely those of the author(s) and should not be attributed in any manner to the World Bank, to its affiliated organizations, or to members of its Board of Executive Directors or the countries they represent. Citation and the use of material presented in this series should take into account this provisional character.

The World Bank does not guarantee the accuracy of the data included in this work. The boundaries, colors, denominations, and other information shown on any map in this work do not imply any judgment on the part of the World Bank concerning the legal status of any territory or the endorsement or acceptance of such boundaries.

For information regarding the HNP Discussion Paper Series, please contact the Editor, Martin Lutalo at mlutalo@worldbank.org or Erika Yanick at eyanick@worldbank.org.

Rights and Permissions

The material in this work is subject to copyright. Because the World Bank encourages dissemination of its knowledge, this work may be reproduced, in whole or in part, for noncommercial purposes as long as full attribution to this work is given.

Any queries on rights and licenses, including subsidiary rights, should be addressed to World Bank Publications, The World Bank Group, 1818 H Street NW, Washington, DC 20433, USA; fax: 202-522-2625; e-mail: pubrights@worldbank.org.

© 2016 The International Bank for Reconstruction and Development / The World Bank
1818 H Street, NW Washington, DC 20433

All rights reserved.

Health, Nutrition, and Population (HNP) Discussion Paper

The Double Burden of Malnutrition in East Asia and the Pacific: *Evidence and Lessons for a Multisectoral Response*

Roger Shrimpton,^a Nkosinathi Vusizhlobo Mbuya,^b Anne Marie Provo^c

^a Department of Global Community Health and Behavioral Sciences, Tulane University School of Public Health and Tropical Medicine, New Orleans, USA

^b Health, Nutrition, and Population Global Practice, The World Bank, Washington, DC, USA

^c Health, Nutrition, and Population Global Practice, The World Bank, Washington, DC, USA

Paper prepared in support of The World Bank's work on nutrition in the East Asia and Pacific region with financial support from Australian Department of Foreign Affairs and Trade (DFAT)

Abstract: Global trends indicate that overlapping burdens of undernutrition and overnutrition—the double burden of malnutrition (DBM)—are the new normal (IFPRI 2014); indeed, most East Asia and Pacific (EAP) countries now have a DBM problem.

This report explores the nature of nutrition problems affecting EAP countries to understand the sectoral and system-wide actions necessary for a coordinated approach to improving nutrition.

The report (i) synthesizes evidence related to the burden of malnutrition in EAP, (ii) identifies the rationale for a multisectoral approach to DBM practitioners working across sectors in EAP, and (iii) provides an overview of the types of actions and interventions needed to address the DBM in a coordinated fashion across the life course.

Actions across health and nonhealth sectors—ranging from implementation of national-level policy measures and complemented by interventions at the community and individual levels to support behavior change—are needed to prevent escalation of overweight and obesity.

Among sectoral priority actions, the health sector plays an important role in monitoring health and nutrition outcomes, preventing and treating infectious and noncommunicable diseases associated with malnutrition, and providing interventions that affect individuals' nutrient intakes. Similarly, nonhealth sectors have expertise and resources to deliver interventions related to the underlying causes of malnutrition.

Further, systems-strengthening efforts are needed to support an environment that addresses the DBM across the life course, including increasing DBM-sensitivity of policy frameworks; leadership, coordination, and accountability; workforce capacity; and knowledge and evidence.

Reducing the DBM is fundamental to sustainable development in EAP. EAP countries must shift from dichotomized policies addressing either undernutrition or overnutrition and develop coherent frameworks to address malnutrition in all forms for all life stages.

Integrated preventive and curative interventions for undernutrition and overnutrition—implemented across the life course by multiple sectors—can forestall massive economic and human development consequences for future generations.

Keywords: nutrition, malnutrition, stunting, overweight, East Asia and Pacific

Disclaimer: The findings, interpretations, and conclusions expressed in the paper are entirely those of the authors, and do not represent the views of the World Bank, its Executive Directors, or the countries they represent.

Correspondence Details: Nkosinathi V. Mbuya, World Bank, 1818 H St N.W., Washington, DC 20433. Email: nmbuya@worldbank.org,

Table of Contents

FIGURES AND TABLES.....	VIII
ACKNOWLEDGMENTS.....	
EXECUTIVE SUMMARY.....	X
I. INTRODUCTION.....	8
II. THE MAGNITUDE AND TRAJECTORY OF THE DOUBLE BURDEN OF MALNUTRITION.....	8
III. CAUSES AND CONSEQUENCES OF THE DBM.....	14
1. CAUSES OF THE DBM.....	14
A. UNDERNUTRITION.....	14
B. OVERNUTRITION.....	17
2. CONSEQUENCES OF THE DBM.....	25
IV. ACCELERATING PROGRESS IN PREVENTING AND MITIGATING THE DBM.....	28
1. HEALTH.....	29
2. AGRICULTURE.....	31
3. SOCIAL PROTECTION.....	34
4. EDUCATION.....	35
5. PUBLIC INFORMATION.....	37
6. FINANCE.....	38
7. TRANSPORT, PUBLIC WORKS, AND URBAN AND RURAL DEVELOPMENT.....	39
8. INDUSTRY, TRADE, AND COMMERCE.....	41
V. CHALLENGES AND OPPORTUNITIES IN THE APPLICATION OF MULTISECTORAL APPROACHES TO TACKLE THE DBM.....	42
1. STRENGTHENING SYSTEMS.....	42
A. POLICY FRAMEWORKS.....	42
B. LEADERSHIP, COORDINATION, AND ACCOUNTABILITY.....	43
C. WORKFORCE CAPACITY.....	46

D. KNOWLEDGE AND EVIDENCE	47
2. SCALING UP INTERVENTIONS	50
3. PROMOTING BEHAVIOR CHANGE	51
VI. CASE STUDIES.....	51
A. INDONESIA	54
B. THAILAND	55
C. BRAZIL	57
D. FRANCE	59
VII. CONCLUSIONS AND RECOMMENDATIONS.....	61
ANNEX 1. RISK FACTORS FOR UNDERNUTRITION AND OVERNUTRITION IN EAP	66
ANNEX 2. PRIORITY INTERVENTIONS FOR THE REDUCTION OF UNDERNUTRITION AND	
OVERNUTRITION	69
REFERENCES	71

FIGURES

FIGURE 0.1 FRAMEWORK OF SECTORAL ACTIONS AND SYSTEMS-STRENGTHENING EFFORTS NEEDED FOR A MULTISECTORAL RESPONSE TO THE.....	7
DOUBLE BURDEN OF MALNUTRITION.....	7
FIGURE 1.1 CHANGES IN STUNTING PREVALENCE BETWEEN 1990 AND 2014 IN EAST ASIA PACIFIC COUNTRIES	10
FIGURE 1.2 THE STUNTING-INCOME RELATIONSHIP	11
FIGURE 1.3 CONCEPTUAL FRAMEWORK FOR THE CAUSAL ANALYSIS OF STUNTING.....	15
FIGURE 1.4 THE CAUSES OF OVERWEIGHT AND OBESITY ORGANIZED INTO CROSS-CUTTING THEMES	19
FIGURE 1.5 PERCENT OF DIETARY ENERGY DERIVED FROM CEREALS, ROOTS, AND TUBERS IN EAP SUBREGIONS (1990–2009).....	20
FIGURE 1.6 THE 10 LEADING DISEASES AND INJURIES AND 10 LEADING RISK FACTORS BASED ON PERCENTAGE OF DEATHS AND DALYS IN EAST ASIA AND PACIFIC, 2010.....	26
FIGURE 1.7 OVERVIEW OF THE INFORMAS FRAMEWORK INCLUDING “PROCESS,” “IMPACT,” AND “OUTCOME” MODULES, EACH WITH ITS MAIN RESEARCH QUESTION	49

TABLES

TABLE 1.1 DIMENSIONS OF THE DOUBLE BURDEN OF MALNUTRITION IN EAST ASIA AND PACIFIC REGION COUNTRIES.....	12
TABLE 1.2 EAST ASIA AND PACIFIC REGION COUNTRIES WITH SELECTED OVERLAPPING BURDENS OF MALNUTRITION	13
TABLE 1.3 THE WORLD HEALTH ASSEMBLY (WHA) SIX NUTRITION TARGETS	28
TABLE 1.4 PRIORITY ACTIONS FOR REDUCING THE DBM THROUGH THE HEALTH SECTOR.....	31
TABLE 1.5 PRIORITY ACTIONS FOR REDUCING THE DBM THROUGH AGRICULTURE	34
TABLE 1.6 PRIORITY ACTIONS FOR REDUCING THE DBM THROUGH SOCIAL PROTECTION	35
TABLE 1.7 PRIORITY ACTIONS FOR REDUCING THE DBM THROUGH EDUCATION.....	36
TABLE 1.8 PRIORITY ACTIONS FOR REDUCING THE DBM THROUGH PUBLIC INFORMATION	38
TABLE 1.9 PRIORITY ACTIONS FOR REDUCING THE DBM THROUGH FINANCE	39
TABLE 1.10 PRIORITY ACTIONS FOR REDUCING THE DBM THROUGH TRANSPORT, PUBLIC WORKS, RURAL DEVELOPMENT, AND URBAN PLANNING.....	40
TABLE 1.11 PRIORITY ACTIONS FOR REDUCING THE DBM THROUGH INDUSTRY, TRADE, AND COMMERCE.....	41
TABLE 1.12 COMPARATIVE EXAMPLES OF MULTISECTORAL APPROACHES TO TACKLING MALNUTRITION IN FOUR COUNTRIES.....	53

ANNEX TABLES

TABLE 1A.1 INDICATORS OF IMMEDIATE, UNDERLYING, AND BASIC DETERMINANTS OF MATERNAL AND CHILD UNDERNUTRITION (MCU) IN SELECT EAST ASIA AND PACIFIC COUNTRIES	66
---	----

TABLE 1A.2 INDICATORS OF UNDERNUTRITION, OVERNUTRITION, AND ASSOCIATED DETERMINANTS OF OVERNUTRITION AMONG STUDENTS AGES 13 TO 15 IN SELECT EAP COUNTRIES.....	68
TABLE 1A.3 THE LANCET (2013) PACKAGE OF NUTRITION-SPECIFIC INTERVENTIONS	69
TABLE 1A.4 THE LANCET (2010) PRIORITY INTERVENTIONS FOR THE PREVENTION AND CONTROL OF NONCOMMUNICABLE DISEASES	69
TABLE 1A.5 POLICY OPTIONS TO DECREASE UNHEALTHY DIET AND PHYSICAL ACTIVITY IN THE WORLD Health Organization Global Action Plan for the Prevention and Control of Noncommunicable Diseases 2013–2020	69

ACKNOWLEDGMENTS

This paper was authored by Roger Shrimpton, Nkosinathi Vusizihlobo Mbuya, and Anne Provo. The team is grateful to the peer reviewers and colleagues for their insights and contributions. The peer reviewers included Montserrat Meiro-Lorenzo, Leslie Elder, Pushina Ng'andwe, and Ashi Kathuria. This work also drew on insights from recent reports and regional and country studies produced by Bank colleagues. We would like to thank Shazia Amin for her editorial support.

Finally the team thanks Toomas Palu, Manager, Health, Nutrition, and Population Global Practice in the East Asia and Pacific Region for his guidance and support in developing the concept of this paper and advice throughout the process. The authors are grateful to the World Bank for publishing this report as an HNP Discussion Paper.

GEOGRAPHIC DEFINITIONS

Throughout the report, geographic groupings are defined as follows:

East Asia and Pacific comprises Developing East Asia and Pacific, and the Newly Industrialized Economies.

Developing East Asia and Pacific comprises Cambodia, China, Indonesia, Lao People's Democratic Republic (PDR), Malaysia, Mongolia, Myanmar, Papua New Guinea, the Philippines, Thailand, Timor-Leste, Vietnam, and the Pacific Island Countries.

The Pacific Island Countries (PICs) comprise Fiji, Kiribati, the Marshall Islands, the Federated States of Micronesia, Palau, Samoa, the Solomon Islands, Tonga, Tuvalu, and Vanuatu.

The Newly Industrialized Economies comprise Hong Kong SAR, China; the Republic of Korea; Singapore; and Taiwan, China.

EXECUTIVE SUMMARY

During this last decade, there has been widespread agreement about the importance of employing multisectoral approaches to improve nutrition outcomes. Global trends indicate that overlapping burdens of undernutrition and overnutrition—often referred to as the double burden of malnutrition (DBM)—are the new normal (IFPRI 2014); this pattern has been observed in the East Asia and Pacific (EAP) region. However, documented experience of *how* multisector programs are implemented is still quite rare, and the literature that does exist focuses almost exclusively on the reduction of maternal and child undernutrition (MCU). The challenges for EAP to apply multisectoral approaches to tackle malnutrition in all of its forms are therefore quite considerable. Fortunately, a number of opportunities can and should be harnessed to minimize complexity of addressing the DBM at various levels across multiple sectors.

This report explores the nature of the nutrition problems affecting EAP countries to understand the sectoral and system-wide actions necessary for a coordinated approach to improving nutrition. While nutritionists have a clear understanding of the need to take a multisectoral approach to tackling nutrition problems, this perspective may not be so clear to others, whether they work in the health sector, or in education, water and sanitation, agriculture, social protection, or any number of other sectors. However, these sectors have expertise and resources that can help solve nutrition problems, and they can, in turn, benefit from healthier, well-nourished populations. The report (i) synthesizes the evidence related to the burden of malnutrition in the EAP, (ii) identifies the rationale for a multisectoral approach to DBM practitioners working across sectors in the EAP region, and (iii) provides an overview of the types of actions and interventions needed to address the DBM in a coordinated fashion across the life course

In the EAP, overnutrition is rising faster than undernutrition is decreasing. The region's strong economic growth contributed to reductions in undernutrition in the 1990s, though the rate of reduction waned after the turn of the 21st century. In the absence of effective, large-scale platforms to address the immediate and underlying determinants of undernutrition, young child stunting (a form of chronic undernutrition) and low birthweight persist: Indonesia, Myanmar, the Philippines, and Vietnam are among the 34 countries that account for 90 percent of the global burden of stunting (Black et al. 2013). Smaller EAP countries have under-five stunting prevalence rates that are among the highest in the world, including Cambodia (41 percent), Lao People's Democratic Republic (Lao PDR) (44 percent), Papua New Guinea (50 percent), and Timor-Leste (58 percent) (UNICEF 2015). On the other hand, overweight and obesity are on the rise. China and Indonesia are among the 10 countries that make up over 50 percent of the global burden of obesity (Ng et al. 2014). Indonesia, Mongolia, Papua New Guinea, and Thailand have child obesity prevalence similar to many Eastern European countries (UNICEF 2015). The Pacific Island Countries and Territories (PICTs) have adult obesity rates among the highest in the world (Ng et al. 2014). Indeed, most EAP countries now have a DBM problem.

The causes of the DBM are multiple and stretch across the life course, with early undernutrition causing increased risk of overnutrition later in the life course. Inadequate dietary intake and infectious diseases among mothers and young children are the immediate causes of child stunting. Across the EAP region, appropriate maternal, infant, and young child feeding remains an issue, and improvements in this area—particularly as related to dietary diversity and nutrient quality—have strong potential to reduce the burden of stunting. Underlying factors contributing to MCU in EAP include inadequate caring practices and poor status of women, low quality and accessibility of health care

services, food insecurity and low food access, and unhygienic household environments. Food security has improved across the region in the past decade and—aside from certain countries and subpopulations—is generally believed to be less of a contributor to undernutrition in EAP than in Africa. Improvements in health care services (especially antenatal care, immunization, and vitamin A supplementation) in the region have helped reduce child mortality, yet disparities in access to health care among rural and poor populations are common and particularly acute in the Philippines, Cambodia, and Lao PDR (Acuin et al. 2011). Poor household hygiene across EAP countries continues to cause a high burden of infectious diseases and impaired nutrient absorption. Although access to safe drinking water exceeds access to improved sanitation in most countries, where improved facilities do exist, poor hygiene and handwashing practices can still undermine child growth due to tropical enteropathy (decreased nutrient absorption from repeated exposure to fecal pathogens). The majority of PICT populations use inadequate sanitation facilities with no improvement in the last decade (UNICEF and WHO 2015). Even in urban areas of EAP where the majority use improved sanitation facilities, less than 6 percent of the wastewater is properly treated and thus contaminates the urban environment by polluting ground water and rivers (World Bank and AUSAID 2013). Women’s empowerment has progressed faster in EAP than in South Asia, yet maternal factors and gender empowerment remain an underlying cause of low birthweight and stunting.

Though early life undernutrition contributes to increased risk of later life obesity, this factor alone is insufficient to explain the rapid rise in overweight/obesity in the region. The “thrifty phenotype” hypothesis posits that constrained fetal growth is associated with metabolic adaptation in preparation for an adverse environment outside the womb (Gluckman et al. 2005). During the first three months of pregnancy fetal growth is mostly by cell division; if growth is constrained, the cell nuclei are programmed for a “scarce” environment after birth. Low birthweight is associated with higher risk of central obesity in adults (Yang and Huffman 2013), and the process of young child stunting increases the susceptibility to nutrition-related non-communicable diseases (NCDs) (Darnton-Hill et al. 2004). However, recent analysis indicates that the prevalence of intra-person and intra-household DBM across eight Latin American countries is lower than or equal to expected values, given the historically high prevalence of child undernutrition (Rivera et al. 2014). These findings support the argument that metabolic adaptation should be considered as one among many of the root causes of obesity. As summarized in the UK government’s Foresight Obesity System Map, there may be as many as 100 variables that directly or indirectly affect energy balance and obesity outcomes (Butland et al. 2007). These variables can be grouped into four cross-cutting themes, namely: the biological/health environment, the economic/food environment, the sociocultural environment, and the physical/built environment. Changes in metabolic regulation, increased consumption of added sugar and highly processed foods, increased total caloric consumption, decreased physical activity, and sociocultural norms are likely important contributors to the rise in overnutrition in the EAP.

The consequences of the DBM will be catastrophic in EAP countries unless concerted action is taken soon. It has been estimated that gross national product (GNP) losses for Asia due to low adult height, driven by infant stunting, are 11 percent, year on year (Horton and Steckel 2013). Simultaneously, the global economic impact of obesity has been estimated at roughly \$2.0 trillion¹, or 2.8 percent of global gross domestic product (GDP) (Dobbs et al. 2014). With urbanization and rising incomes, the

¹ All dollar amounts in US dollars unless otherwise indicated.

problem of diet and nutrition–related NCDs is escalating. Rapidly rising rates of diabetes, high blood pressure, and high cholesterol that accompany overweight and obesity are now posing an enormous threat to the economies of the PICTs and will do the same in East and Southeast Asian countries. Tackling the problem is an urgent must, and will require that both preventive and curative measures be taken across the life course by multiple sectors.

The first priority in tackling the DBM should be to ensure optimal young child growth from conception to two years of age through the delivery of nutrition-specific and nutrition-sensitive actions to address the multiple determinants of MCU. Reducing MCU requires concerted efforts from the health, education, agriculture, industry, social protection, and water and sanitation sectors; their priority actions—while well-documented—deserve reiteration. The health sector can provide a package of appropriately targeted micronutrient supplementation and maternal, infant, and young child feeding counseling through quality antenatal, postnatal, and well child services to reduce low birthweight and stunting. Furthermore, the health sector must contribute to the prevention and treatment of acute malnutrition and infectious diseases. The education sector should ensure that adolescent girls remain in school until 18 years, and should provide nutrition-specific interventions to improve their micronutrient status, as well as promoting their health and nutrition literacy. The agriculture sector should look to support women farmers, encouraging the production of nutrient-rich foods for home consumption as well as for market. The industry and trade sectors can actively cooperate with efforts to improve fortification, and the finance sector should consider the nutrition consequences of food subsidies. The social protection sector should look to link cash transfers to poor households and young mothers—especially—with nutrition, health, and education promotion, as feasible. The public works and urban/rural development sectors should seek to improve access to clean water and reduce open defecation, thereby controlling gastrointestinal and diarrheal diseases generally, and among young mothers and infants in particular. The public information sector can contribute to improved infant and young child nutrition practices through enforcement of the International Code of Marketing of Breastmilk Substitutes (the Code).

Tackling stunting during the first 1,000 days of a child’s life is not sufficient to mitigate the DBM; multisectoral actions are needed across the life course to prevent overweight and obesity from escalating in adolescence and adulthood. These necessary actions range from implementing national-level policy measures—such as taxation, regulation, and subsidization—complemented by interventions at the community and individual levels to support behavior change. The health sector in EAP countries needs to do more to deliver primary and secondary preventive services, including providing health promotion messages and routine screening for overweight and nutrition-related NCD risk factors. Carefully considered messaging is needed to promote optimum growth (especially linear growth) in children under two years of age, and to avoid excessive weight gain subsequently. Public health efforts need to be redoubled, not only to control the marketing of breastmilk substitutes but also to protect older children from marketing of energy-dense, nutrient-poor foods and beverages (Lobstein et al. 2015). The education sector has an important role to play in nurturing the development of children, enabling them to graduate from school with adequate life skills and appropriate nutrition knowledge and habits that help them avoid risks of overweight/obesity and—consequently—NCDs in adulthood. The agriculture sector can encourage increased local production focusing on nutrient-rich fruits, vegetables, and other crops and help to better understand the nutrition implications of staple food transformations in value chains. The industry and trade sectors can support voluntary or mandatory food composition targets and portion sizes for packaged and processed foods. The social protection sector can work with nutrition specialists to understand the heterogeneity of nutrient gaps among target populations and design benefit packages

accordingly. The public works and transport sector can employ policies and design strategies that increase access to activity-promoting environments. The public information sector can regulate and enforce food labeling standards and the marketing of unhealthy foods to children. Finally, finance ministries can explore opportunities to levy taxes on unhealthy foods and beverages and review the effects of any food system subsidies on the DBM. Ultimately, these many sectors are needed to create community environments in EAP that support healthy decisions as the default.

In considering these sectoral actions, a number of important themes emerge. The health sector has an important role to play in monitoring health and nutrition outcomes, preventing and treating the infectious and non-communicable diseases associated with malnutrition, and providing interventions that can affect individuals' nutrient intakes. However, the non-health sectors have an important role to play in delivering interventions related to the underlying and basic causes of malnutrition. As the scope of interventions broadens, a number of considerations can enhance the ability of nutrition-sensitive programs to achieve impact on nutrition outcomes, including improved targeting; use of conditions to improve participation; addition of strong nutrition goals, actions, and indicators; and prioritization of women's health, social status, access to resources and empowerment, and time allocation (Ruel et al. 2013). It also becomes clear that nutrition-sensitive and nutrition-specific interventions aimed at individuals and households are essential, but that there are policy levers that non-health sectors can utilize to contribute to improved nutrition without directly intervening at the individual level.

In addition to these sectoral actions, systems-strengthening efforts are needed to support an enabling environment to address the DBM across all stages of the life course. These include increasing DBM-sensitivity of policy frameworks; leadership, coordination, and accountability; workforce capacity; and knowledge and evidence. Together these can help to improve governance of efforts to tackle the double burden of malnutrition, as shown in figure 0.1, which combines the sectoral actions and systems-strengthening efforts needed to build a multisectoral response to the DBM in East Asia and the Pacific region.

Coordinated policy frameworks are a demonstration of high-level political commitment and an essential first step in addressing the DBM. Seven EAP countries have signed on to the Scaling Up Nutrition (SUN) movement (Cambodia, Indonesia, Lao PDR, Myanmar, Papua New Guinea, Philippines and Vietnam), yet all countries seeking to develop multisectoral nutrition approaches should consider adopting the SUN framework. Whether a part of SUN or not, many EAP countries have developed national nutrition policies and plans of action that focus on MCU. A recent independent evaluation suggested that the SUN movement should recognize that most low- and middle-income countries (LMICs) have a DBM problem and begin to adapt accordingly from their exclusive focus on MCU (Mokoro 2015). In their next iterations, national nutrition policies must be revised to guide a response to malnutrition that addresses all burdens of malnutrition, and encourages greater policy coherence on nutrition across national poverty reduction; economic development; food security; water, sanitation, and hygiene (WASH); and agricultural and rural development policies.

Coordination mechanisms are needed to guide the implementation of priority interventions and can and should vary depending on the degree of national decentralization. A high-level coordinating body, at the supra-ministerial level, is recommended for centralized countries to effectively implement multisectoral programs (SUN 2010). Experience in developing such centralized approaches is already available through the SUN movement, and many EAP countries are already collaborating in such efforts to tackle young child stunting (MCU). In countries with more decentralized systems of government, coordination mechanisms will be most effective at the district or community level, while national bodies

(for example, a nutrition institute) can provide strong technical and policy support. Particularly in decentralized settings, strong civil society participation and advocacy can drive greater action and accountability for improving nutrition.

Most EAP countries do not yet have the knowledge and evidence needed to effectively target interventions and monitor progress toward reducing the DBM. The strong evidence demonstrating the effectiveness of nutrition-specific interventions—which served to mobilize the international community to address undernutrition—does not yet exist for the majority of nutrition-sensitive interventions for MCU delivered outside the health sector. Furthermore, no country in the world has successfully reduced overweight/obesity, and there is a clear need to evaluate the impact of obesity interventions to strengthen decision making. On the other hand, the double burden of malnutrition adds complexity to the work of policy makers and program managers that cannot be addressed without adequate monitoring and evaluation data. Responding to the DBM requires a better understanding of the nutritional gaps of more localized populations. As practitioners begin to identify the existence of the DBM in the EAP region, representative data (ideally at the district level) can help characterize the burdens of malnutrition and their distribution at the national, household, and individual levels. Monitoring and evaluation (M&E) systems should incorporate indicators of undernutrition and overnutrition outcomes (weight, height, waist circumference, biomarkers of micronutrient status) and exposures (food consumption, health behaviors) at the individual level. They should also be able to be linked to relevant indicators from concerned nonhealth sectors to strengthen cross-sectoral integration. Furthermore, countries need to monitor policies and programs that promote a healthy food environment. These M&E data will allow decision makers to incorporate country-specific distributions of malnutrition into the design of nutrition interventions and help advocate for increased national accountability.

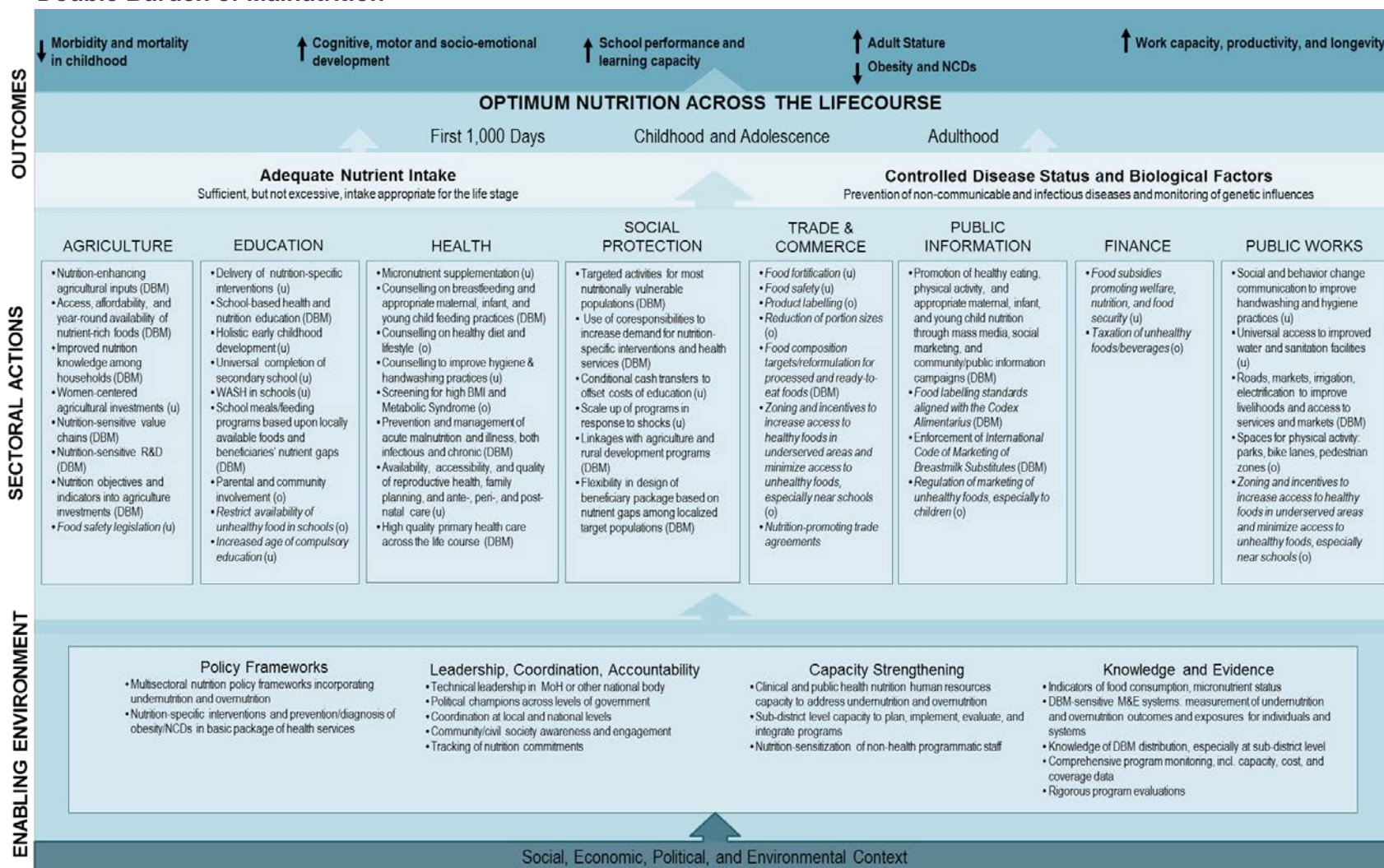
In developing a multisectoral approach to the DBM in the EAP, efforts are needed to strengthen human resource capacity to implement nutrition interventions for both under- and overnutrition; sensitize nonhealth staff to the importance of nutrition; and plan for, design, and implement initiatives at the local level. As financing to scale up nutrition interventions is made available, there is increased need to expand human resources capacity to design, deliver, and manage large-scale nutrition programs (Horton et al. 2010). The nutrition training of doctors, nurses, and midwives (as well as dietitians in some countries), who make up the great majority of workers delivering nutrition interventions globally, is characteristically poor. Country case studies in Asia concluded the nutritional knowledge of health workers is outdated, their nutrition competencies limited to clinical and curative activities, and—for nurses and midwives especially—their job descriptions do not include nutrition responsibilities (Shrimpton et al. 2013). Very often, health staff are also inequitably distributed, and the dedicated workforce is not available (in the health system especially) with the required competencies or time to provide the outreach needed to facilitate community-based nutrition services. Furthermore, health professionals globally are ill-equipped to treat obesity and associated chronic diseases. In many LMICs, education has focused on the prevention of undernutrition, and there is need to strengthen the knowledge of health professionals regarding the prevention and treatment of obesity (Dietz et al. 2015). In addition to their technical skills, health and nutrition professionals require training in behavior change communication and motivational interviewing to be able to effectively counsel individuals on the prevention of undernutrition and overnutrition. Nutrition technical assistance is required to sensitize non-health staff to nutrition and can be combined with careful consideration of the specific staff roles and responsibilities needed to maximize supply-side capacity to deliver nutrition-sensitive interventions (Levinson and Balarajan 2013). Given the many constraints to hiring and training government workers, the NGO community has an enormously important role in taking proven nutrition actions to scale.

In taking on the DBM, engagement with the private sector cannot be avoided. Significant reductions in undernutrition have been achieved with minimal interaction with the private sector. However, unlike with undernutrition, priority interventions for improving diet and preventing obesity are not found in the health sector. Food production, processing, labeling, marketing, and retailing are all key aspects of the food environment dominated by the private sector. Actions in these areas, so urgently needed to mitigate overnutrition, will not be possible without innovation in the approach to the private sector. Lessons learned from tobacco regulation and early experiences with food industry regulation make it apparent that efforts to regulate industry will not go unchallenged. In this light, the need for stronger evidence related to causes and impacts of overnutrition becomes central. Working with the private sector can be a particularly polarizing issue for many, yet it is clear that progress on the DBM will not go far without serious discussion of the incentives, partnerships, regulations, and other mechanisms that can be brought to the table to improve the nutritional value of available diets.

There are no proven country examples of coordinated multisectoral approaches to address the DBM; multisectoral efforts to reduce overweight and obesity are still in their infancy. Latin American countries have devoted considerably more time and attention to the nutrition transition and to DBM than have countries of the EAP; however, recent experience indicates that public health nutritionists in Latin America continue to struggle to coordinate existing MCU interventions with policies and programs to curb overweight/obesity. Early experience from France suggests that issues of coordination are the same when institutionalizing a multisectoral approach to overweight/obesity as the ones for MCU, and that the most important level of coordination is that of local government. For many EAP countries, external support will be necessary to build the local capacity to construct plans to tackle the problem. Where undernutrition still persists, the first priority is tackling MCU during the critical 1,000-day period from conception to two years of age. However, local plans should consider the importance of both types of malnutrition within their own communities.

Reducing the DBM is fundamental to sustainable development in EAP. The “1,000 Days” slogan has been critical in mobilizing civil society, governments, and funders to commit to reducing child stunting and break the intergenerational cycle of undernutrition in the region. With the growing double burden of malnutrition in the region, this call to action can be bolstered by a policy dialogue in which the first 1,000 days serves as a platform for comprehensive nutrition intervention, rather than the sole point of intervention. Particularly in EAP, there is a need to shift from dichotomized policies addressing either undernutrition *or* overnutrition and to develop coherent frameworks that promote healthy nutrition, addressing malnutrition in all forms for all life stages. Delivering nutrition-sensitive and nutrition-specific interventions to individuals will not be sufficient to mitigate the DBM; critical assessment and intervention is needed to address the role that food and living environments play in shaping choices and nutritional status. These actions on malnutrition are imperative; the consequences of this DBM will be catastrophic in EAP countries unless concerted action is taken soon. Luckily, mitigating the problem is an urgent but achievable task. Investing in the prevention of overnutrition and undernutrition is affordable and offers high rates of return. Integrated preventive and curative interventions for undernutrition and overnutrition—implemented across the life course by multiple sectors—can forestall massive economic and human development consequences for future generations.

Figure 0.1 Framework of Sectoral Actions and Systems-Strengthening Efforts Needed for a Multisectoral Response to the Double Burden of Malnutrition



(u) = Action important for undernutrition, (o) = Action important for overnutrition, (DBM) = Action important for both overnutrition and undernutrition, *italicized text indicates a regulatory/legislative/fiscal approach*

Source: Modified from Black et al. 2013.

I. INTRODUCTION

The purpose of this report is threefold: (i) to define the double burden of malnutrition (DBM) in East Asia and Pacific region; (ii) to highlight the rationale for taking a multisectoral approach to tackling the DBM; and (iii) to delineate what each sector can contribute to the response. While nutritionists may understand why other sectors are needed to help improve nutrition, this may not be so clear to those who work outside the health sector, be it in education, water and sanitation, agriculture or social protection, for example. Due to the multiple causality of malnutrition—both undernutrition and overnutrition—all of these sectors are needed to solve nutrition problems. This report aims to explore the nature of the nutrition problems affecting the East Asia and Pacific (EAP) region countries as well as the most effective response to those problems.

Unlike previous studies, this report seeks to operationalize the interface where different sectors can work together to solve DBM problems in the EAP region. The existence of the DBM problem in the region was first described by Gillespie and Haddad (2001), indicating the costs as well as the evidence for solutions, which for overnutrition was still very limited. A global-level review of the evidence for the causes, the consequences, and solutions of the DBM (Shrimpton and Rokx 2012) was followed by an assessment of the DBM in Indonesia with a view to better understanding the nature of the problem and the solutions needed in an Asian context (Shrimpton and Rokx 2013). Most recently an analysis of DBM trends and their consequences in nine countries in the region reviewed the drivers of the problem and the broad policies needed to manage it (Haddad et al. 2014). An Action Plan to reduce the DBM in the Western Pacific region (2015–2020) has now been developed by the Regional Office of WHO in consultation with member states (WHO 2014a), and UNICEF has incorporated overweight/obesity into its Approach to Nutrition Programming in the East Asia and Pacific Region (2014–2025).

There is growing recognition within the World Bank that the goals of ending extreme poverty and promoting shared prosperity in EAP cannot be achieved without a concerted response to the DBM. Tackling malnutrition across the heterogeneous group of EAP countries will require action beyond the health sector alone, and the World Bank has committed to taking a multisectoral approach in its response (see box 1.1). This report aims to provide World Bank staff working across EAP countries, as well as nutrition policy makers and planners in EAP countries, ideas not only on what diverse sectors can do to enhance nutrition, but how these efforts can become synergistic from the national to the local level.

II. THE MAGNITUDE AND TRAJECTORY OF THE DOUBLE BURDEN OF MALNUTRITION

The term “malnutrition” includes both undernutrition and overnutrition. Undernutrition is commonly measured as inadequate weight-for-height (wasting), as well as inadequate height-for-age (stunting), and as micronutrient deficiencies such as iron deficiency anemia. At a population level, overnutrition is often measured as excessive weight-for-height (overweight and obesity), though other measures of “fatness” do exist. Wasting is a prominent risk factor for child mortality, yet child stunting is the type of undernutrition of most concern for

policy makers; height growth not achieved during the first 1,000 days from conception to two years is largely irrecoverable, has measureable negative consequences across the life course (Victora et al. 2010), and is highly predictive of economic outcomes (Horton and Hoddinot 2014). These two forms of malnutrition, that is, overnutrition and undernutrition, are increasingly occurring together as a double burden of malnutrition (DBM), often in the same household and even in the same individual (Shrimpton and Rokx 2012). The first *Global Nutrition Report* (IFPRI 2014) described the coexistence of different forms of malnutrition as the “new normal,” with twenty-four countries having prevalence of all three forms of malnutrition (under-five stunting, anemia among women of reproductive age, and adult overweight) of more than 20 percent.

Box 1.1 World Bank East Asia and Pacific (EAP) Region: Multisectoral Strategy and Action Plan for the Double Burden of Malnutrition (2015–2020)

To better respond to the diverse and rapidly evolving nutrition challenges facing EAP countries, the World Bank initiated a comprehensive regional effort to address the double burden of malnutrition. With generous support from the Australian Department of Foreign Affairs and Trade (DFAT), the World Bank team developed the *East Asia and Pacific (EAP) Region: Multisectoral Engagement Strategy and Action Plan for the Double Burden of Malnutrition (2015–2020)* with the objective of expanding “the scale, scope, and impact of the World Bank Group’s (WBG’s) regional work program on the double burden of malnutrition, through building commitment to and capacity for multisectoral interventions involving World Bank Group staff and external clients in EAP.”

The strategy is built around the achievement of five key results, namely: (1) *improved awareness and commitment of WBG staff and management to address malnutrition*; (2) *improved coordination of nutrition activities and analyses in EAP*; (3) *increased WBG funding and management of analytical work to identify and fill nutrition-related knowledge gaps*; (4) *increased lending for operations aimed at improving nutrition*; and (5) *successful WBG adoption of innovative, multisectoral approaches to address DBM*.

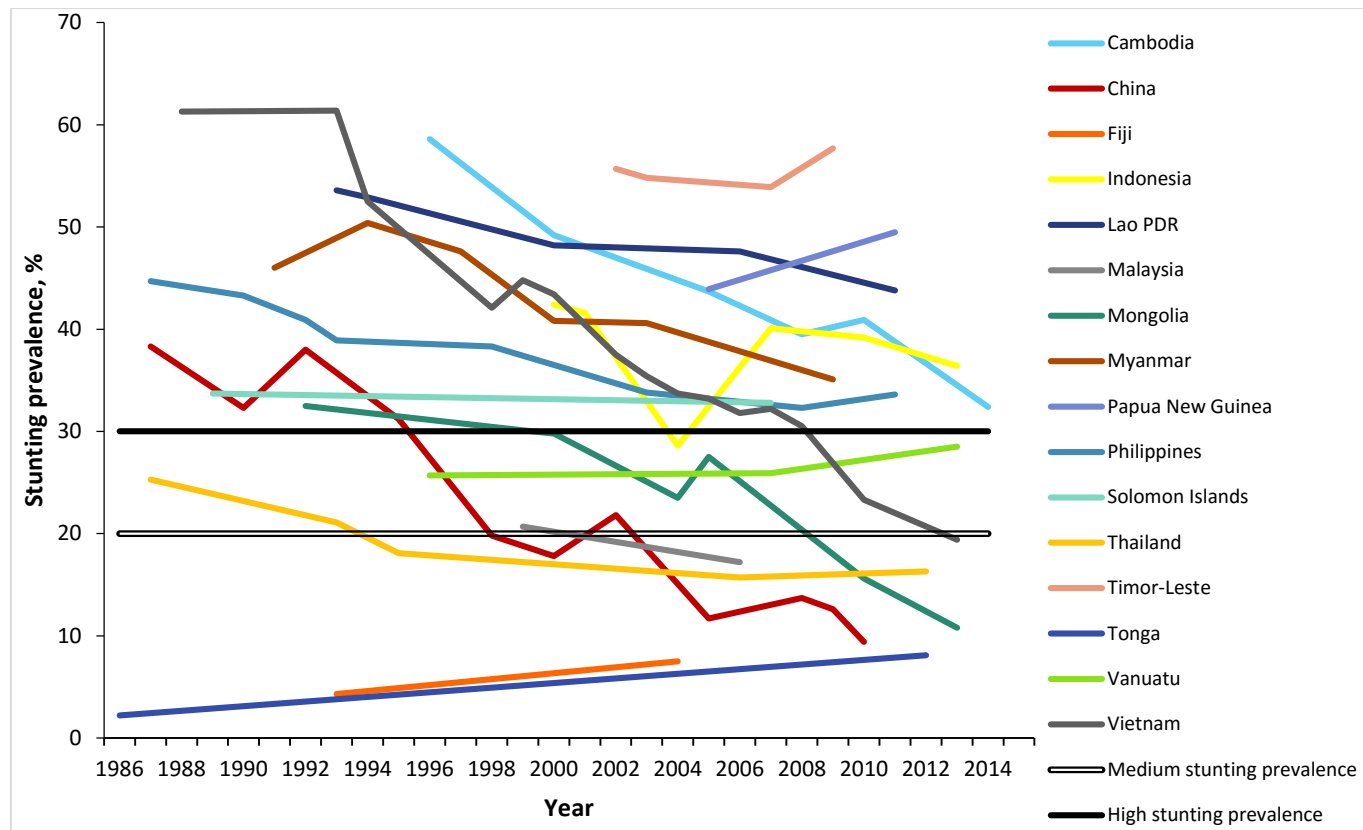
Seventy-eight countries have two forms of malnutrition, and just eighteen countries have only one form. The coexistence of overweight/obesity and iron deficiency in the same individual has been shown in children (Pinhas-Hamel et al. 2003), in women in the United States (Neymotin and Sen 2011), as well as in women in Vietnam (Lailou et al. 2014), but not consistently in women in all developing countries (Aderibigbe et al. 2014).

Both overnutrition and undernutrition are of public health significance in many EAP countries (table 1.1). In 2010, nearly one-quarter of all births in Southeast Asia and over one-fifth of all births in Melanesia were small for gestational age, that is, smaller than normal for the duration of the pregnancy (Black et al. 2013). In EAP, stunting has generally declined over the past 30 years. However, time-series analysis demonstrates that the most rapid improvements in stunting were observed in the 1980s and 1990s. Few EAP countries with sufficient data have made marked improvements since 1996 (figure 1.1). Indonesia, Myanmar, the Philippines, and Vietnam remain among the 34 countries that account for 90 percent of the global burden of stunting. Smaller EAP countries have under-five stunting prevalence among the highest in the world, for example: Lao PDR (44 percent), Papua New Guinea (50 percent), and Timor-Leste (50 percent) (UNICEF, WHO, World Bank 2016). Though EAP countries with higher GDP tend to have lower stunting prevalence, in most countries increasing national prosperity alone has not translated into significant reductions in undernutrition prevalence (figure 1.2).

Equity is a key consideration in the reduction of undernutrition. Globally, stunting prevalence in the poorest wealth quintile is nearly two and a half times that of individuals in the

highest (Black et al. 2013), a similar pattern to that of EAP countries. In the Philippines, child stunting is between three to four times higher in the poorest households than in the richest (FNRI 2008). Between 2007 and 2010 in Indonesia, stunting declined by 6 percent in the highest wealth quintile but increased by 2 percent in the poorest wealth quintile (DEPKES 2010), yet, stunting still affected over one-fifth of the wealthiest children. National-level estimates often mask significant disparities in progress on nutrition outcomes across socioeconomic groups.

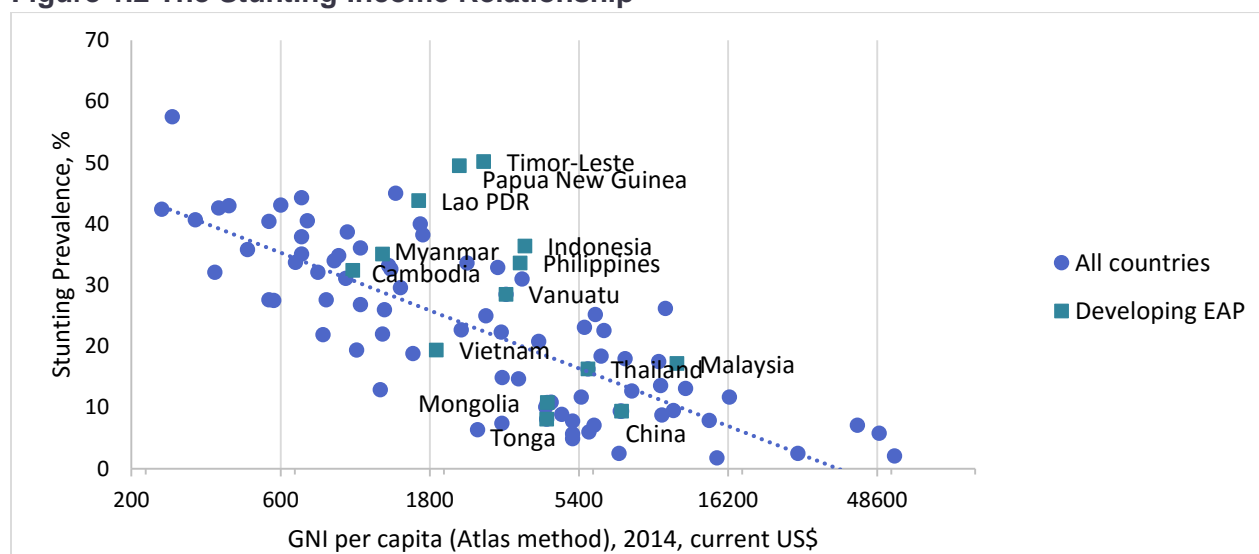
Figure 1.1 Changes in Stunting Prevalence between 1990 and 2014 in East Asia Pacific Countries



Source: World Bank 2016.

Note: Cutoffs indicate level of public health significance (High stunting $\geq 30\%$ and Medium stunting $\geq 20\%$).

Figure 1.2 The Stunting-Income Relationship



Source: World Bank 2016.

Note: Stunting prevalence for the period 2010–14 (most recent), except for Brunei Darussalam (2009), Malaysia (2006), and Singapore (2000). GNI per capita, Atlas method (current US\$) for most recent available for the period 2012–14.

Micronutrient deficiencies are common across the EAP region. Traditionally, deficiencies of vitamin A, iron, zinc, and iodine have been of greatest public health concern due to strong associations with child mortality, mental impairment, poor health, and decreased productivity. In China, Thailand, and many Pacific Island Countries (PICs)—where stunting and underweight have receded—micronutrient deficiencies remain a lingering nutritional concern. Iron deficiency is recognized as the leading cause of anemia. Nationally representative, pooled data indicate that roughly one-quarter of pregnant and nonpregnant women in East and Southeast Asia² were anemic; prevalence was higher in Papua New Guinea and the PICs, combined, where 43 percent of pregnant women and 28 percent of nonpregnant women were anemic (Stevens et al. 2013).

In many EAP countries, current estimates of adult, adolescent, and child overweight/obesity exceed global averages. Among children and adolescents (less than 20 years of age) the global prevalence of overweight and obesity combined in 2013 was 24 percent for boys and 23 percent for girls. In adults (over age 20), 37 percent of men and 38 percent women were overweight and obese globally, with higher rates in developed than in developing countries in all age groups. However, China and Indonesia are among the 10 countries that account for over 50 percent of the global burden of obesity; overweight affects more than half of adult women in a number of Pacific Island nations (88.9 percent in Samoa, 72.9 percent in Fiji, and 50.3 percent in Papua New Guinea) (Ng et al. 2014). Even among children under-five, overweight and obesity rates in Indonesia (12 percent), Mongolia (11 percent), Papua New

² Differs in definition from EAP due to inclusion of China (Macao SAR), Democratic People’s Republic of Korea, Maldives, and Sri Lanka as well as omission of Mongolia and Singapore.

Guinea (14 percent), Thailand (11 percent), and Timor-Leste (6 percent) are comparable to or exceed that of the United States (6 percent) (UNICEF 2015).

Globally, overnutrition is increasing faster than undernutrition is decreasing in LMICs, and most EAP countries have a DBM problem. Between 1980 and 2013 the worldwide prevalence of overweight and obesity combined rose by 27.5 percent in adults and 47.5 percent in children and adolescents (Ng et al. 2014). The increase in prevalence is accelerating, with over half of the rise occurring during the eight-year period from 2000 and 2008. Over the last three decades the increase in prevalence of overweight and obesity in LMICs was greater than in higher-income countries (HICs) (Finnucane et al. 2011). Obesity rates seem to have leveled off in most HICs in the last decade (Rokholm et al. 2010), although the reasons for this are not fully understood (Popkin et al. 2012). The increases in obesity prevalence are unlikely to attenuate in developing countries (Ng et al. 2014). Between 1990 and 2011, young child stunting decreased globally by 35 percent, while young child overweight increased by 54 percent (UNICEF, WHO, and World Bank 2012). Increasing child overweight has been noted in most world regions, yet in EAP, the estimated regional prevalence of young child overweight (5.5 percent) remained largely unchanged between 1990 and 2011. During the same period, prevalence of overweight and obesity in women increased significantly, reaching more than 70 percent in Oceania and 25 percent in Asia³ (Black et al. 2013). Table 1.2 categorizes a number of EAP countries with overlapping burdens of malnutrition that exceed levels of public health significance.

Table 1.1 Dimensions of the Double Burden of Malnutrition in East Asia and Pacific Region Countries

		Undernutrition		Overnutrition		
		Wasting*	Stunting*	Overweight*	Overweight (BMI≥25)**	Obesity (BMI≥30)**
		Children (<5), both sexes	Children (<5), both sexes	Children (<5), both sexes	Adults 18+, both sexes	Adults 18+, both sexes
Lower-middle-income	Cambodia (2014)	10	32	2	18	3
	Indonesia (2013)	14	36	12	24	6
	Kiribati	—	—	—	73	41
	Lao PDR (2011-12)	6	44	2	19	4
	Micronesia, Fed. Sts.	—	—	—	69	37
	Mongolia (2013)	1	11	10	50	17
	Myanmar (2009)	8	35	3	18	3
	Papua New Guinea (2009-2011)	14	50	14	61	28
	Philippines	8	30	5	24	5

³ Black and colleagues report their findings using UN sub-Region definitions.

	Samoa	—	—	—	74	43
	Solomon Islands (2006-07)	4	33	3	60	28
	Timor-Leste (2013)	11	50	2	14	2
	Tonga (2012)	5	17	8	75	43
	Vanuatu (2013)	4	28	5	68	35
	Viet Nam (2014)	7	25	4	21	4
Upper-middle-income	China (2010)	2	9	7	34	7
	Fiji (2004)	6	8	5	71	36
	Malaysia (2015)	8	18	7	38	13
	Marshall Islands	—	—	—	76	43
	Palau	—	—	—	79	48
	Thailand (2012)	7	16	11	30	8
	Tuvalu (2007)	3	10	6	73	40

Source: * Most recent available in UNICEF, WHO, and World Bank 2016; ** WHO 2015a, age-standardized estimates for 2014.

Note: Country name in bold indicates SUN country. (Year) indicates the most recent available survey year for child anthropometry as reported in UNICEF, WHO, and World Bank 2016. — = not available.

Table 1.2 East Asia and Pacific Region Countries with Selected Overlapping Burdens of Malnutrition

Typology	Overlap / Indicator group	Countries
1. Stunting, wasting, and overweight in children <5 years	Stunting only	Solomon Islands, Vietnam
	Stunting and wasting	Cambodia, Lao PDR, Myanmar, Philippines, Timor-Leste, Vanuatu
	Wasting and overweight	Thailand
	Stunting, wasting, and overweight	Indonesia, Papua New Guinea
	Below cutoff for all three indicators	China, Tuvalu
2. Stunting in children <5 years, anemia in women of reproductive age, and adult overweight	Stunting only	Vietnam
	WRA anemia only	Thailand
	Stunting in children <5 years and WRA anemia	Cambodia, Indonesia, Lao PDR, Myanmar, Philippines, Timor-Leste
	WRA anemia and adult overweight	Malaysia, Mongolia
	Stunting in children <5 years, WRA anemia, and adult overweight	Papua New Guinea, Solomon Islands, Vanuatu
Below cutoff for all three indicators	China, Tuvalu	

Source: IFPRI 2014.

Note: Countries included in the table are only those that have available data on all three indicators included in the typology. WRA = women of reproductive age. The cutoffs for placing countries in each indicator category are as follows: Children <5 years stunting ≥ 20 percent; children <5 wasting ≥ 5 percent; children <5 overweight ≥ 7 percent; WRA anemia ≥ 20 percent; and adult overweight ≥ 35 percent. These cutoffs were selected because they indicate public health significance (WHO 2010c).

III. CAUSES AND CONSEQUENCES OF THE DOUBLE BURDEN OF MALNUTRITION

1. CAUSES OF THE DBM

The causes of undernutrition and overnutrition are conceptually distinct and concern different growth processes. The most common and important type of undernutrition is maternal and child undernutrition (MCU), which relates to the growth process of the fetus from conception through two years of age. Overnutrition, though also related to tissue growth, is regulated by the process of energy balance, and weight can be gained and/or lost. Growth of the fetus in the first 1,000 days is a very different scenario: successful fetal and infant growth is an either-or process, with little or no chance of recovery if growth is not achieved. Thus, two separate conceptual frameworks are applied to assess these causes.

A. Undernutrition

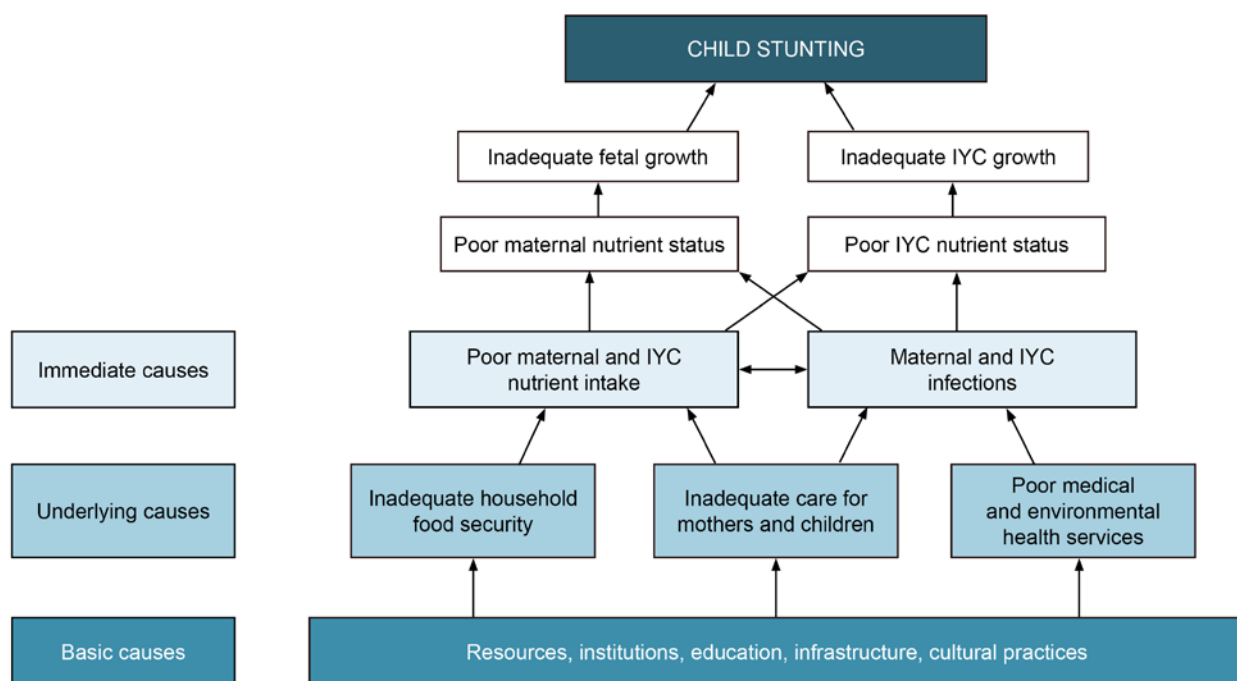
MCU has multiple causes, which can be grouped as food-, health-, and care-related.

These determinants of undernutrition operate at three levels: immediate, underlying, and basic, as first proposed by UNICEF (1990) for child undernutrition. Figure 1.2 adapts the UNICEF conceptual framework for child malnutrition for young child stunting and includes the nutritional status of the mother as well as her fetus and young child. This separation of the maternal and child aspects of nutritional status is necessary as all too often the maternal dimensions of MCU are largely ignored in nutrition policies and programs (Shrimpton 2012).

i. Immediate Factors

Immediate-level determinants of MCU include inadequate dietary intake and infectious disease, and represent nutrient intake and nutrient needs. Across EAP, appropriate maternal, infant, and young child feeding remains an issue; improvements in this area present great opportunities for stunting reduction. See annex 1 for recent country-specific figures.

Figure 1.3 Conceptual Framework for the Causal Analysis of Stunting



Note: IYC = Infant and young child

Source: Modified from UNICEF 1990.

Poor maternal nutrition is an immediate cause of inadequate fetal growth and young child stunting. Between one-third and one-half of the growth failure accrued by age two occurs in uterus (Dewey and Huffman 2009). Over half of 22 EAP countries with data had low birthweight rates of 10 percent or more, which is four times the normal rate. Food taboos, particularly during pregnancy and immediately post-partum, lead to dietary restriction and are one important cause of inadequate maternal nutrition in the region (Gillespie et al. 2004). Poor dietary diversity persists during and beyond the complementary feeding period. A monotonous diet, low in micronutrient content (for example, white rice, refined cereals, high sugar and high fat snacks, together with few vegetables, fruits, animal source foods, and fortified foods) is also common among adults in Southeast Asia (Bloem et al. 2013).

Early and exclusive breastfeeding up to six months is an important factor in promoting adequate nutritional intake and decreasing susceptibility to infection, and improvements in breastfeeding practices are needed. Among certain EAP countries, exclusive breastfeeding among children under six months ranges from 17 percent in Vietnam to 74 percent in Cambodia. Additionally, complementary feeding practices appear to be suboptimal in many EAP countries. Though complementary foods are more commonly introduced in a timely fashion, the two countries with data (Indonesia and Cambodia) indicate that the overall acceptability of children's diets (a composite indicator of adequate frequency of feeding and diversity of food groups consumed in children ages six months to two years), are remarkably low. During the period of rapid growth and development between birth and 24 months of age, a diverse diet is necessary to achieve adequate intakes of a wide variety of macronutrients and micronutrients.

ii. Underlying Factors

Underlying factors contributing to MCU in EAP include household food insecurity or low food access, inadequate care for women and children, low quality and accessibility of health care services, and unhealthy household environments. In terms of availability, food security has improved across the region in the past decade. Food balance sheets indicate growing availability of calories at the population level. The percent undernourished⁴ remains highest in Timor-Leste (38 percent) and Lao PDR (27 percent), but ranges between 8 and 16 percent across other countries in the region (annex 1). Household food insecurity is generally believed to be less of a contributor to undernutrition in EAP than in Africa. The drastic reductions in child mortality achieved by Southeast Asia are in part attributable to improvements to health care services (antenatal care, immunization, vitamin A supplementation) in the region. However, disparities in access to health care among rural and poor populations are common and particularly acute in the Philippines, Cambodia, and Lao PDR (Acuin et al. 2011).

Poor household hygiene and sanitation, as well as unsafe drinking water, contribute to the burden of infectious diseases and are an underlying cause of child stunting.

Systematic reviews have consistently shown that handwashing can result in 30 to 40 percent reductions in diarrhea in young children (Curtis and Cairncross 2003; Ejemot-Nwadiaro et al. 2012). Systematic reviews of the efficacy of hygiene and sanitation interventions on stunting show much smaller effects, however (Bhutta et al. 2008; Dangour et al. 2013). This is most probably because the modeling in these reviews is restricted to diarrhea episodes, and misses the effect of tropical enteropathy / environmental enteric dysfunction (Lunn et al. 1991; Humphrey 2009), whereby it is hypothesized that continuous ingestion of fecal bacteria causes chronic stimulation of the immune and inflammatory systems, and damage to the small intestine. The consequent malabsorption of nutrients and diversion of energy away from promoting growth to maintaining the immune response, causes 40 percent of growth faltering in children < 18 months in the Gambia, for example (Campbell et al. 2003). This helps explain why observational studies find health benefits (including stunting reduction) from improved water, occurring only when sanitation has improved, and with incremental improvements in sanitation associated with less diarrhea and additional increases in weight and height of children (Esrey 1996; Checkley et al. 2008). Access to high-quality sanitation reduced the odds of diarrhea by 13 percent, of stunting by 27 percent, and of mortality by 23 percent (Fink et al. 2011). Furthermore Spears (2013) has calculated that open defecation may explain up to 54 percent of international variation in child height, while GDP explains only 29 percent.

Though there is considerable variation across EAP countries, inadequate sanitation and hygiene persist at remarkably high levels. The East and Southeast Asian MDG regions have met the MDG target of 88 percent coverage of improved drinking water. However, Papua New Guinea was one of three countries in the world with less than 50 percent coverage of safe drinking water. High stunting amid widespread access to improved water is not surprising given the common practice of open defecation in the region. A 2013 review of 14 EAP countries found that roughly 100 million people in the region practice open defecation, with country prevalence ranging from 0 to 72 percent. Though Cambodia has reduced open defecation by nearly 42

⁴ Defined as share of population with insufficient [< 2,100 kcal] caloric intake.

percent (UNICEF and WHO 2015), it remained one of three EAP countries (also Indonesia and China) on the list of the world's 12 countries with the largest populations using open defecation (UNICEF 2013). Across MDG regions, Oceania was the only region where coverage of improved sanitation did not increase (remaining at 35 percent over the period 1990 to 2015). Progress toward the MDG targets for water and sanitation was largely met without improving access for the poorest: no EAP countries succeeded in halving the proportion of the poorest with unimproved water in rural and urban areas; only Thailand achieved this target for sanitation (UNICEF and WHO 2015).

Gender empowerment in EAP has progressed more rapidly than in South Asia, but a number of areas remain where the status of women contributes to MCU. Girls' secondary school enrollments have converged with boys at the regional level, yet Cambodia, Lao PDR, and Papua New Guinea have particularly low female-to-male enrollment ratios in secondary school. Economic disadvantage and other forms of social exclusion, such as ethnic minority status, exacerbate gender disparities. Furthermore, these gender gaps have closed primarily among the young as compared to adult populations (World Bank 2012a). Low secondary school attendance among females is associated with early age at marriage and at onset of childbearing, as well as with the prevalence of low birthweight and stunting rates seen in EAP countries (UNSCN 2010). Women have less access to productive resources—including livestock holdings and agricultural extension—than men. In Timor-Leste, Indonesia, and Vietnam, among other countries, female-headed households have less land than male-headed ones. Indonesia, in particular, performs poorly on gender equity in economic activity (Haddad et al. 2014).

iii. Basic Factors

The basic causes of MCU are generally related to poverty and lack of resources, and broader political, sociocultural, economic, and environmental factors. Poverty is a key factor underlying lack of dietary diversity and stunting in EAP. As demonstrated above, lower socioeconomic status is associated with higher stunting prevalence in a number of EAP countries. Agriculture is the foundation of income generation among the rural poor who are particularly susceptible to MCU (Khor 2008). Even in rural areas, many smallholder farmers are net buyers of food (FAO 2013), and low farm incomes result in fewer resources for food, particularly non-grain and animal source foods. Though urbanization is associated with reduced risk of undernutrition in EAP (Bloem et al. 2013), the causes of poverty and food insecurity among the urban poor have more to do with lack of income-earning opportunities, low skills development, and high food prices (Khor 2008).

B. Overnutrition

While the direct causes of overweight and obesity are an imbalance of energy intake and energy expenditure, the root causes of the rising rates of obesity are highly complex.

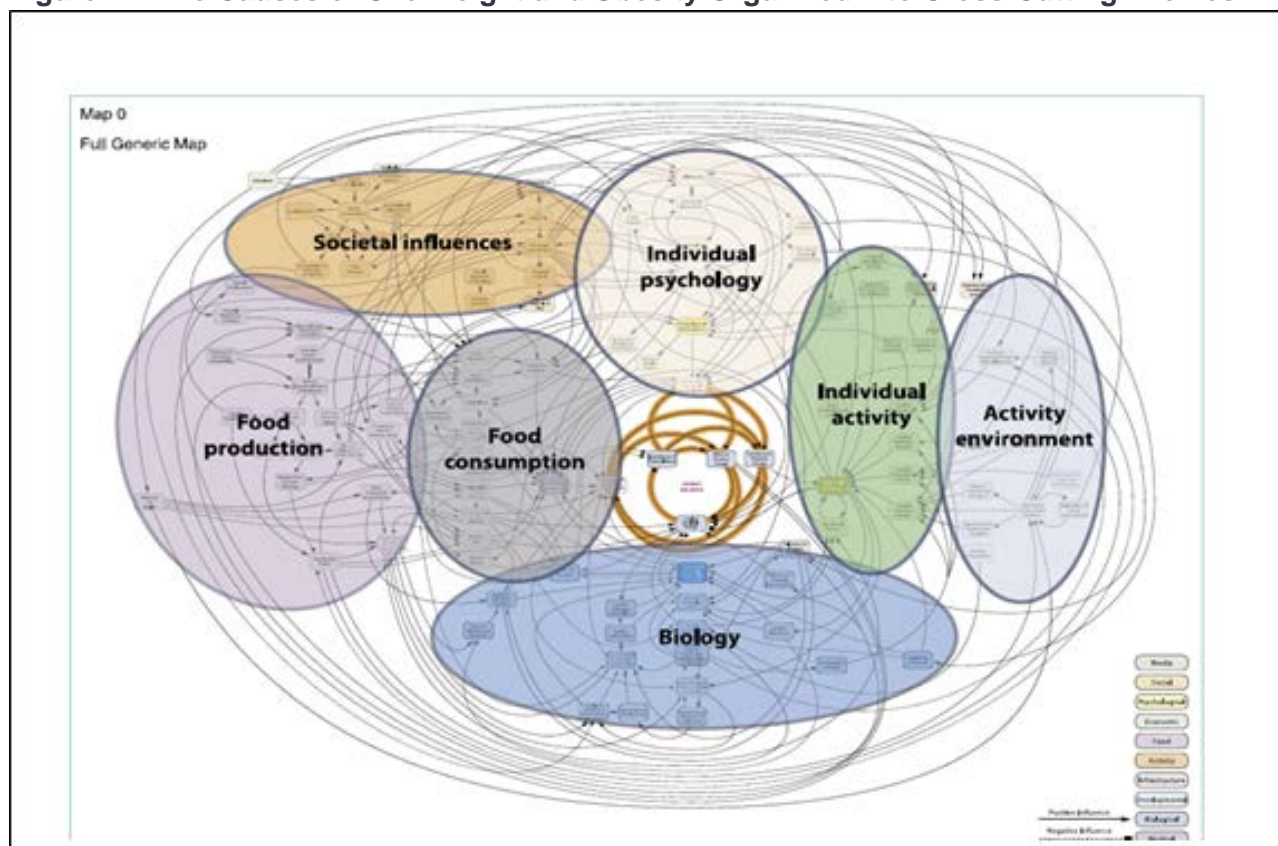
Ultimately overweight and obesity reflects eating in excess of need, and the major areas for intervention relate to reducing dietary intake and/or increasing energy expenditure. However, there is growing recognition that there are complex interactions between society, the food industry, and government that shape food environments and moderate the relationship between individual factors and diet choices. These root causes of obesity span evolutionary, biological, psychological, economic, and institutional factors, as summarized in figure 1.3. This causal map of obesity was developed by the UK government Foresight research on obesity, which identified more than 100 variables that directly or indirectly affect energy balance and obesity outcomes

(Butland et al. 2007). These many variables can be grouped into four cross-cutting themes, namely: the biological/health environment, the economic/food environment, the sociocultural environment, and the physical/built environment.

i. The Biological/Health Environment

The biological/health environment can be thought of as an individual's starting point, which includes metabolic and genetic factors and how these interact with external conditions. Although genetics may explain a large part of the intra-individual variation in obesity, that is, the “thrifty genotype,” the sudden increase in obesity prevalence in most countries during the last few decades cannot be accounted for by population genetic changes (Swinburn et al. 2011). The “thrifty phenotype” hypothesis, on the other hand, posits that constrained fetal growth is associated with adaptation or “fetal programming” in preparation for an adverse environment outside the womb (Gluckman et al. 2005). Poor nutrition during pregnancy can influence the development of the fetus both by changing its genetic make-up as well as its composition. Epigenetic changes occur during the peri-conceptual period (often before the mother even knows she is pregnant), causing modifications in gene expression. Fetal growth is mostly by cell division during this first three months of pregnancy; if growth is constrained, the cell nuclei are programmed for a “scarce” environment after birth. During the latter part of pregnancy, growth is more by cellular enlargement; poor maternal nutrition here changes the composition of the fetus being formed as well as the final birthweight, such that babies are not only smaller, but have less lean body mass. Low birthweight is associated with higher risk of central obesity in adults (Yang and Huffman 2013), and the process of young child stunting increases the proportion of fat in the body as well as the susceptibility to nutrition-related NCDs such as diabetes and high blood pressure later in the life course (Darnton-Hill et al. 2004). The “optimal” birthweight—with least risk of dying in childhood as well as developing diabetes and high blood pressure in adulthood—is around 3.5 kilograms, or roughly one standard deviation above the mean of a normal population. In consequence, even small improvements in mean birthweight can have enormous population benefits across the life course (Shrimpton 2003; WHO 2006). This life course dimension of DBM is of special concern for the EAP countries, which, despite having developed economically, still have high rates of low birthweight and young child stunting. Evidence from Latin America indicates that the prevalence of intra-person and intra-household DBM across eight countries analyzed is lower than or equal to expected values given the historically high prevalence of child undernutrition (Rivera et al. 2014). These findings suggest that metabolic adaptation should be considered as one among many of the root causes of obesity.

Figure 1.4 The Causes of Overweight and Obesity Organized into Cross-Cutting Themes



Source: Butland et al. 2007.

Diet-induced obesity is associated with a chronic low-grade systemic inflammatory state.

Inflammation, a part of the body's normal response to an injury or an infection, enables it to combat invading threats and repair damage. In obese individuals, the immune system is in a state of continuous low-grade activation as if it is looking to fight an infection or repair some tissue damage. The visceral fat deposits in the abdomen are involved in producing this inflammatory response in addition to secreting hormones such as leptin that help regulate feeding behavior and energy expenditure (Kwon and Pessin 2014). The metabolic abnormalities of obesity, including insulin resistance and type 2 diabetes, are related to this inflammatory state (Gregor and Hotamisligil 2011; Canale et al. 2013). The exact causes of the low-grade systemic inflammation of obesity are uncertain, though some think they are related to changes in gut bacteria caused by a Western diet, high in fat and refined carbohydrates (Cox et al. 2014; Nieuwdorp et al. 2014; Kotzampassi, et al. 2014).

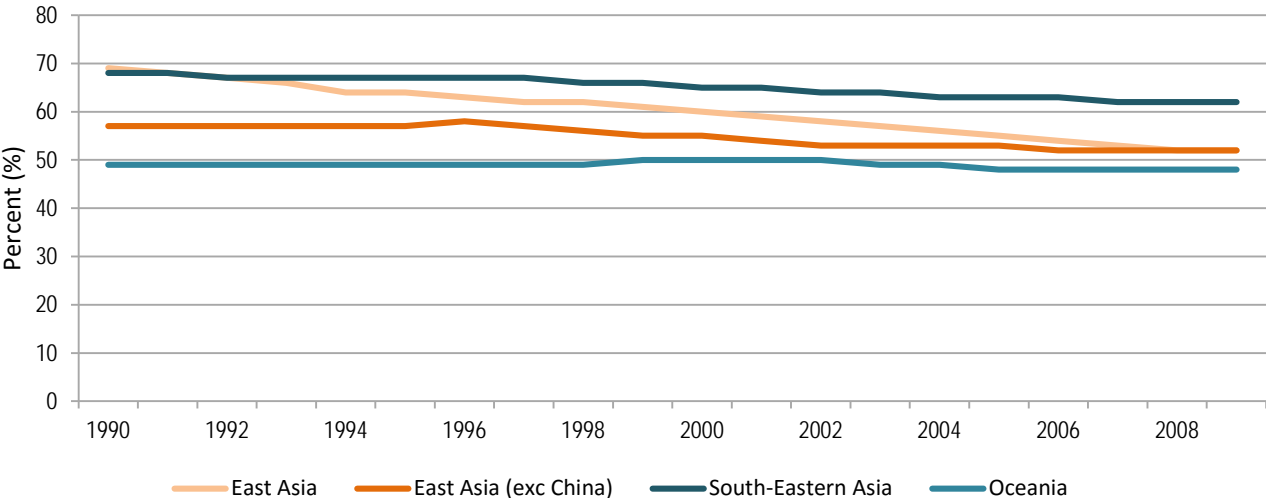
ii. The Economic/Food Environment

Economic growth over the last half century has been accompanied by increases in overweight/obesity. While the global population has increased sixfold since the industrial revolution began in Europe just over a 100 years ago, per capita income has increased ninefold (Sachs 2005). Within the EAP region, growth in GDP per capita averaged more than 6 percent annually during the last 20 years (WDI 2015). Although inequality has increased both globally as well as in most countries over the last 50 years, the bottom third are still significantly better-off (Cornia et al. 2003). Obesity rates began to increase in higher-income countries in the 1960s,

associated with an energy balance “flipping point” (Swinburn et al. 2011). As national income increases, the burden of obesity tends to shift toward lower socioeconomic groups, with this shift occurring at a lower level of income for women than for men (Monteiro et al. 2004). The crossover to higher rates of obesity than of underweight among women of low socioeconomic status groups is found at a GNP per capita of about US\$2,500, roughly the midpoint value for lower-middle-income countries. The widespread availability of cheap, energy-dense foods makes the food-insecure, urban poor in EAP particularly susceptible to overnutrition (Khor 2008).

Rising GDP has also spurred the growth of urban centers and the expansion of the middle class in EAP, two trends strongly associated with changing dietary patterns in the region. In 1950, 18 percent of Asia’s population was urban, compared with 44 percent in 2011 (United Nations 2012). Urban consumers spend a smaller share of their household expenditures on food, but have greater purchases of higher-value foods, processed foods, and foods consumed away from home (World Bank 2015). Across the region, the share of dietary energy from cereals, roots, and tubers has declined over the past 30 years (figure 1.4), as wealthier consumers increase consumption of animal proteins (meat, fish, milk, eggs), vegetables and fruits, and added oils and sugars. At the same time, total per capita caloric availability has increased across the region, with the greatest relative growth in caloric availability of noncereals (FAOSTAT 2015).

Figure 1.5 Percent of Dietary Energy Derived from Cereals, Roots, and Tubers in EAP Subregions (1990–2009)



Source: FAOSTAT2015.

Note: Data points represent averages for the three-year period beginning in each year.

Processed foods have become widely available, and their increased consumption is part of the problem. Processed foods now account for 80 percent of global food sales (World Bank 2007). Although spending is still low in developing countries (US\$143 per capita per year in lower-middle-income countries and US\$63 per capita in low-income countries), it is growing at 28 percent and 13 percent a year, respectively, in those country groups. Growth in retail sales of packaged foods in the East Asia and Pacific region is second only to Western Europe. Evidence

indicates that even the lowest-income consumers purchase processed and packaged foods in supermarkets, but the global food processors have been able to integrate into traditional markets in both urban and rural areas (FAO 2013). Ultra-processed foods seem to be a particular problem (Monteiro 2010), as they have a high glycemic index (GI) score of over 70, which means that blood sugar levels remain high for a long period after the food is eaten. Examples of high GI foods include instant noodles, doughnuts, white bread, and soda. Low GI diets can help to reduce body weight and improve blood lipid profiles (Thomas et al. 2007). All over the world ultra-processed foods are displacing unprocessed foods in the diet; in Brazil, for example, they contributed approximately a third of dietary energy in 2003 (Monteiro et al. 2011). Although dietary intake data hardly exist for the PICTs, food balance sheets suggest that imported foods have been added to the traditional fare rather than substituting for it (Hughes 2003).

Researchers increasingly question gluttony and excess caloric consumption as the sole cause of overweight and obesity. Global food production has outpaced demand; average per capita global food consumption increased 20 percent during the last 50 years, a period when total global population doubled (FAO 2002). The traditional thinking that “eating too much” and “moving too little” have caused the increases in obesity is coming under increasing scrutiny, however (Speakman et al. 2011; Taubes 2013; Dhurandhar et al. 2014). “What” is eaten is increasingly recognized to be as important as “how much” is eaten, as far as gaining weight is concerned. The lack of consumption of vegetables, fruits, and grains, as well as overconsumption of processed foods, especially those high in fat and sugar, seem to have a major role in causing the increases in adult weight in the United States (Mozaffarian et al. 2011). Many consider that obesity rates in the Pacific Island countries are due to the consumption of cheap imported meats high in fat and salt, such as turkey tails and mutton flaps, that only began to be imported in the early 1950s (Cassels 2006; Singer 2014).

There is growing evidence that increased sugar consumption is contributing to the overweight and obesity problems. Dynamic time-series analysis using data from the United States as well as 164 other countries suggests that increases in carbohydrates are most strongly and positively associated with increases in obesity prevalence, even when controlling for changes in total caloric intake and occupation-related physical activity (Rivera-Crichton and Tefft 2014). In a 165-country analysis, per capita sugar consumption was found to be strongly associated with the prevalence of diabetes mellitus, with the strongest association found in Asia (Weeratunga et al. 2014). Various systemic reviews and meta-analyses of randomized controlled trials (RCTs) and prospective cohort studies provide evidence that consumption of free sugars or sugar-sweetened beverages (SSBs) promotes weight gain in adults and children (Malik et al. 2006; Te Morenga et al. 2013). There is now sufficient evidence that reducing the consumption of sugar-sweetened beverages will reduce the prevalence of obesity and obesity-related diseases (Hu 2013). The consumption of SSBs among adolescents in most PICTs and many other EAP countries is high (Snowdon 2014), with 70 percent in Fiji consuming more than two glasses on the last school day (Wate et al. 2013); similar rates of consumption are seen in the Cook Islands and Niue, for example (See table 1A.2). The new WHO guideline confirms that adults and children should maintain a reduced intake of free sugars over the life course and recommends that intake be reduced to less than 10 percent of total energy intake. The guideline further suggests as a conditional recommendation that free sugars be reduced to less than 5 percent of total energy intake (WHO 2015b). Translating this recommendation into action at the

country level should spur substantial debate among the various stakeholders (Thow and Hawkes 2014).

iii. The Physical/Built Environment

Physical activity is the major modifiable component of energy expenditure. The amount of energy people expend on physical activity has undoubtedly decreased during the last few decades, with changing activity environment including passive means of transport and mechanization of work processes, for example. Daily energy expenditure was found to be 25 percent lower in urban adults than rural adults in the Cameroon (Assah et al. 2011). Daily occupation-related energy expenditure decreased by more than 100 calories per day over the last 50 years in the United States, accounting for a significant portion of the increase in mean body weight for women and men (Church et al. 2011). Physical inactivity is very high in PICTs and also common among Malaysians (60 percent) and Indonesians (30 percent) (Haddad et al. 2014). Though decreasing physical activity may be associated with increased body weight, the options for reducing body weight through increased energy expenditure are limited, since, for example, an extra 100 kcal of food intake requires 25 minutes of moderately fast walking by a man of 82 kilograms.

Regular physical activity has many health benefits. Inactivity greatly contributes to global mortality and morbidity, and regular physical activity is an important aspect of NCD prevention, especially for cancer (Kruk 2008). High levels of fitness protects against mortality from cardiovascular disease and diabetes at all levels of body mass index (BMI) (that is, even in those who are overweight/obese). The global recommendation is for a total of one hour per day of moderate-intensity activity, such as brisk walking, on most days of the week (WHO 2003). This is different from the widely recognized public health recommendation of half an hour a day of moderate physical activity (US Department of Health and Human Services 2008), which reduces the risk of cardiovascular disease, although it does not reduce risk for all the other NCDs. Global estimates are that about a third of adults do not get enough exercise (Hallal et al. 2012). A review of the levels of physical activity in the EAP Region has found methodological differences, such that comparisons across countries and time were not possible to make (Macniven et al. 2012). The national health survey in Indonesia found that two-thirds of children 10 to 14 years of age, and a third of adults 45 to 54 years, were not achieving half an hour a day of moderate physical activity (DEPKES 2007).

iv. The Sociocultural Environment

Human beings also have a psychological relationship with food that goes beyond a need for basic sustenance. Indeed, many attribute rising rates of obesity to neuropsychological disease (Jauch-Chara and Oltmanns 2014). Food is also often a way of relieving stress, with certain foods being used as “comfort” foods—often these are sweet foods. Food is often used as a reward, with children getting a “treat” if they behave, for example. Certain prestigious foods confer elevated status to the consumer, such as eating meat and/or drinking fine wines. These foods, which were eaten on high days and holidays in the past, are far more frequently eaten today and by a larger proportion of society.

People’s eating habits as well as their attitude toward weight are highly influenced by “social norms.” Advertising campaigns in the “media” that promote certain behaviors, and especially the consumption of specific foods and drinks are displacing social norms that had been culturally determined in the past. In the United States, the US\$11.26 billion spent on

advertising by the food, beverage, and restaurant industries in 2004 dwarfed the mere US\$9.55 million spent on communications by the federal and the state government of California on “5 a Day” (Consumers Union 2005). This situation is largely the same in most countries across the globe (Hawkes 2007).

Box 1.2 Determinants of Overweight and Obesity in the Pacific Islands

While the East Asia and Pacific region consists of countries with considerable heterogeneity, the Pacific Island Countries share a number of characteristics that make their populations particularly susceptible to growing burdens of overweight/obesity and diet-related NCDs.

Health/Biological Environment

Across Pacific Island countries, multiple NCD risk factors coexist at elevated levels, with unhealthy diets, physical inactivity, tobacco use, and alcohol misuse identified as the leading risk factors (SPC 2010). High prevalence of overweight/obesity, diabetes, and cardiovascular disease are contributing to rising avoidable deaths and disabilities. Given the understanding of the early life origins of adult disease, it is plausible that the high burden of NCDs among adults in the Pacific may be contributing to an altered epigenetic profile and increased predisposition to weight gain and NCDs among the next generation.

Physical/Built Environment

The physical environment in PICs naturally constrains food production and food security. Smaller island nations, in particular, consist almost exclusively of atolls that are largely infertile and susceptible to sea-level rise. Volcanic islands tend to be larger and mountainous, with more fertile soils and mineral deposits, which make them better suited for agricultural production (Snowdon and Thow 2013). The physical/built environment of Pacific Island countries not only hinders food production, but it also constrains the physical activity side of energy balance. Unsurprisingly, populations on remote islands face unique geographic barriers to physical activity. Moreover, common environmental conditions such as lack of footpaths and lighting, wet weather, and high temperatures create barriers to physical activity even in better-connected and urban communities (Siefken et al. 2012).

Economic/Food Environment

Economies in the PICs tend to derive income primarily from tourism, remittances, fisheries, aid, and agriculture (Barnett 2011), with the agriculture sector playing a relatively minor economic role. Food production is commonly conducted for subsistence but also for domestic and international markets. On the other hand, fisheries play a critical role in economic development, food supply, and diets (Barnett 2011). Most Pacific countries are food dependent (Hughes 2003), and leaving fisheries aside, the value of agricultural imports tends to dwarf agricultural exports from PICs. Occurring with increasing frequency and severity, climate events will continue to disrupt potential agricultural outputs and fishery development. Additional forces, such as development of nonagricultural economic sectors and market penetration of processed imported foods have served to weaken diverse, local production (Barnett 2011). While food insecurity in Southeast Asian countries is commonly associated with undernutrition, food insecurity in PICs tends to drive consumption of energy-dense, nutrient-poor foods (Barnett 2011). Imported foods such as noodles, white bread and crackers, and fatty meats are now added to the traditional diets, which consisted of large quantities of starchy roots and local fish (Hughes 2003). Importantly, fat and calories from imported foods seem have added to, rather than replace, traditional sources. Micronutrient deficiencies persist at high levels in the region precisely because these commonly consumed foods lack essential vitamins and minerals.

Sociocultural Environment

In the Pacific, social structures, values, and beliefs affect food consumption, activity, and self-image patterns and contribute to obesogenic behaviors among youth and adults. In a large, mixed-methods study of adolescents drawn from Fiji, Tonga, New Zealand, and Australia, McCabe et al. (2011) found an absence of stigma around overweight among adolescents. Families drive pressures to achieve a particular larger body type, considered ideal for both male and female adolescents, with larger youth believed to be well-respected and cared for. In Fijian and Tongan households, the best-quality, highly valued foods (such as those that are imported and scarce), and highest volume of food is given to those of relatively high status. Youth report receiving conflicting messages and engage in strategies

The widespread marketing of foods to children (overwhelmingly those high in fat, sugar, and/or salt) is a particular concern. A multicountry survey of the influence of television advertisements on children in Asia reported that advertising to children was widespread across the countries surveyed, and that while all six countries surveyed (India, Indonesia, Malaysia, Pakistan, the Philippines, and South Korea) had common food-based messages in their national nutrition guidelines, the diet actively being promoted on television in all countries ran counter to these guidelines (Escalante Cruz et al. 2004). An audit of junk food advertising in Australia (ADGP 2003) found that over 99 percent of food advertisements broadcast during children's television programming were for junk food. Furthermore, no contrasting healthy eating messages were promoted on television. In May 2010, the World Health Assembly (WHA) endorsed a resolution calling for national and international action to reduce the impact on children of marketing of foods high in saturated fats, trans-fatty acids, free sugars, or salt (WHO 2010a), yet little is known about country compliance.

2. CONSEQUENCES OF THE DBM

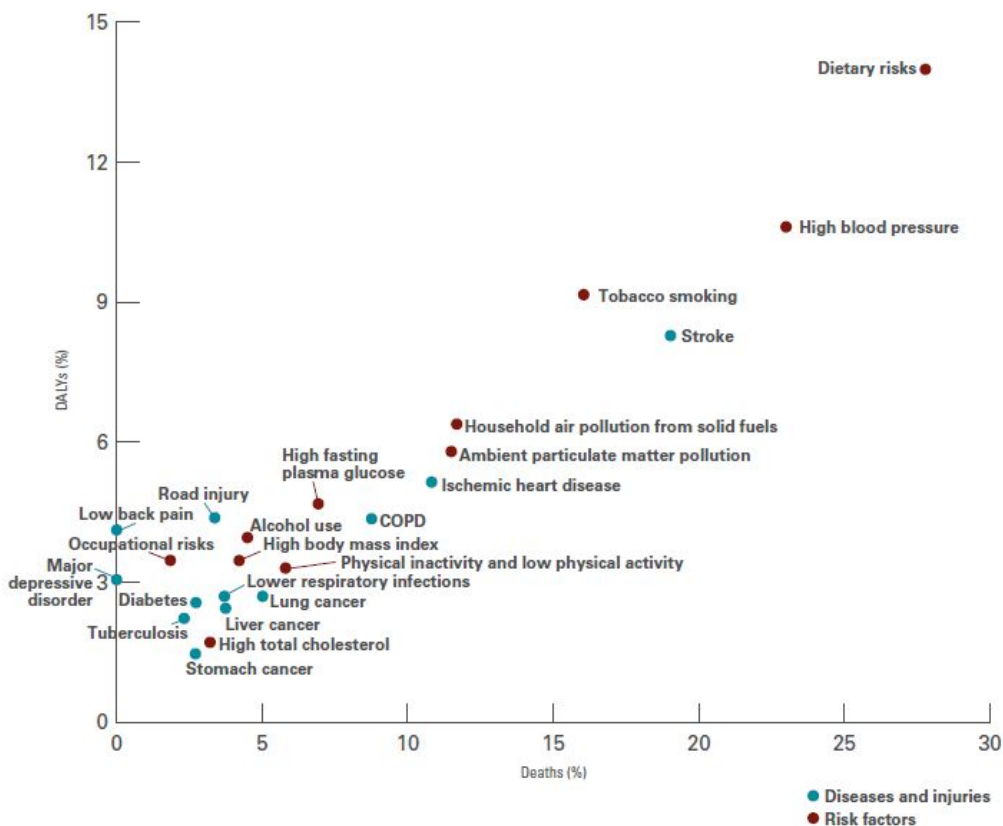
Maternal and child undernutrition (MCU) is of greatest concern as constrained growth of the fetus and infant has lifelong consequences among those who survive. The consequences of MCU include increased risks of child mortality and morbidity, and—in those who survive—decreased learning capacity and school performance, and decreased work capacity, productivity, and lifelong earnings (Victora et al. 2008). Maternal and child undernutrition in the aggregate is a cause of 3.1 million child deaths annually or 45 percent of all child deaths in 2011. Across EAP, disability-adjusted life years (DALYs) due to communicable, newborn, nutritional, and maternal causes are generally declining. However, substantial burdens persist, particularly in low- and lower-middle-income countries. In the period 1990 to 2010, DALYs due to diarrheal disease and iron-deficiency anemia actually increased by 37 percent and 9 percent, respectively, in the Philippines (IHME et al. 2013). Estimates of GNP losses for Asia due to low adult height driven by infant stunting are 11 percent, year on year (Horton and Steckel 2013). The increased risk of obesity and NCDs in adulthood as a consequence of MCU earlier in the life course is also now well recognized (Adair et al. 2013), although costs across the life course have not been computed.

The health consequences of overweight and obesity in children and adults are many, including increased risk of nutrition-related NCDs, all of which are increasing in the EAP region. These conditions include diabetes, high blood pressure, stroke, and cancer (WHO 2003). The metabolic syndrome, which comprises a group of risk factors for cardiovascular diseases (CVDs), including abdominal obesity, dyslipidemia, hypertension, and impaired glucose tolerance, increases the risk of developing CVD twofold and type 2 diabetes threefold (Eckel et al. 2010). The inflammatory state of obesity seems to play a key causal role in the development of the metabolic syndrome and type 2 diabetes especially (Holvoet 2008; Shah et al. 2008; Smith and Minson 2012). While systolic blood pressure (SBP) decreased globally, between 1980 and 2008, it rose in Oceania and East Asia (Danaei et al. 2011). Global mean total cholesterol changed little between 1980 and 2008, but it increased in East and Southeast Asia and Pacific regions while falling in the high-income region comprising Australasia, North America, and Europe (Farzadfar et al. 2011). Globally, rates of diabetes in adults have been steadily increasing since 1980 (Danaei et al. 2011), with Oceania having the largest rise, and

the highest mean Fasting Plasma Glucose (FPG) and diabetes prevalence (about 15 percent) in 2008.

Diet and nutrition factors are making increasingly important contributions to the burden of disease in EAP. As of 2010, dietary risks (including high sodium intake and lack of fruits, nuts, seeds, and whole grains) were the leading risk factor and high BMI the sixth-leading risk factor for DALYs in EAP (figure 1.4). In EAP, DALYs due to high BMI increased by 198 percent between 1990 and 2010, nearly 2.5 times the global average. Over the same period, there was nearly a 40 percent increase in the total number of DALYs caused by stroke, 75 percent increase in the number of DALYs from ischemic heart disease, and 80 percent increase in DALYs from diabetes (IHME et al. 2013). Some 83 million people in the Asia-Pacific region were estimated to have type 2 diabetes, representing almost half of the 171 million people with diabetes worldwide (Lee et al. 2007). In addition to NCDs and premature mortality, maternal overweight and hypertension have been found (in other regions) to be associated with a host of adverse outcomes for the offspring as an infant (including birthweight >4,000g, still birth, and infant mortality) and in later life (obesity, hypertension, diabetes, insulin resistance, and behavioral problems) (O'Reilly and Reynolds 2013).

Figure 1.6 The 10 Leading Diseases and Injuries and 10 Leading Risk Factors based on Percentage of Deaths and DALYs in East Asia and Pacific, 2010



Source: IHME and World Bank, Human Development Network 2013.

Because the standard BMI cutoffs used to define overweight and obesity are probably too large, the overnutrition problem in EAP is probably much greater than it appears. The World Health Organization has recommended BMI cutoffs for overweight and obesity be 23 kg/m² and 27 kg/m², respectively, in Asia, lower than the cutoffs of 25 kg/m² and 30 kg/m² used in Caucasian populations (WHO 2004). BMI is used for epidemiological purposes to assess associations between BMI within and across populations, yet Asian populations have different associations between BMI, percentage of body fat, and health risks than do European populations. In Asian populations, the risk of type 2 diabetes and cardiovascular disease is substantial at BMIs lower than the existing WHO cutoff point for overweight (25 kg/m²). More recent work has supported the use of BMI ≥ 25 as the cutoff for obesity in Asian populations (Wen et al. 2008). Indeed the population attributable fractions for cardiovascular disease in the EAP region were about three times greater using a BMI cutoff for overweight ≥ 21 (Lee et al. 2011). Another concern is that waste circumference (WC) seems to be increasing faster than BMI in China (Du et al. 2013). Some suggest a combination of WC and BMI are better for indicating health risks in Chinese adults (Hou et al. 2013) as BMI has greatest risk for hypertension and WC is more closely linked to diabetes risk. These authors conclude that central obesity, overweight, and obesity are epidemic in Chinese adults, and urgent measures are needed to prevent it.

If unmitigated, the economic burden of obesity and NCDs in EAP will be massive. The global economic impact of obesity has been estimated at roughly US\$2.0 trillion, or 2.8 percent of global GDP (Dobbs et al. 2014). Over the next 20 years, the cost of treating NCDs and cumulative output losses globally are likely to be at least US\$30 trillion and \$47 trillion, respectively, representing 48 percent and 75 percent, respectively, of global GDP in 2010 (Bloom et al. 2011). Annual overweight and obesity costs in the United States were recently estimated to be US\$147 billion, or 9 percent of health care expenditures (Finkelstein et al. 2009). The total annual direct cost of overweight and obesity in Australia in 2005 was \$A21 billion, with indirect costs of \$35.6 billion per year, resulting in an overall total annual cost of \$56.6 billion (Colagiuri et al. 2010). The out-of-pocket expenses and indirect burden of three NCDs (heart problems, hypertension, and diabetes) in Indonesia is estimated to be \$4.02 billion, with heart problems exerting the greatest economic burden on households (\$1.56 billion), followed by hypertension (\$1.36 billion), diabetes (\$0.81 billion), and stroke (\$0.29 billion). In 2020 these conditions are projected to impose an economic burden of \$5.80 billion (Finkelstein et al. 2014)⁵. The economic consequences of NCDs are already substantial and increasing in the PICTs (Anderson 2012), where they are the leading cause of death in 12 of the countries for which data are available, frequently accounting for 70 percent of all deaths. As described above, the Pacific now has some of the highest rates of obesity and diabetes in the world. This is particularly important since the government is already the main provider and financier of health services, and is fiscally constrained in how much more it can provide to the health system.

⁵ Finkelstein and colleagues report economic costs of obesity in inflation-adjusted 2012 International Dollars (Int\$).

IV. ACCELERATING PROGRESS IN PREVENTING AND MITIGATING THE DBM

Tackling the DBM requires a multisectoral approach to address the multiple determinants of malnutrition across the life course. Though multisectoral planning for nutrition dates back to the 1970s (Levinson and Balarajan 2013; Levinson and McLachlan 1999), the importance of employing multisectoral policies and interventions for improving nutrition outcomes has been widely agreed during this last decade (World Bank 2006; SUN 2010; Alderman et al. 2012; European Commission 2012). For reducing MCU, the nutrition-specific interventions (Bhutta et al. 2013) directed at immediate levels of causality are delivered mostly through the health sector, while nutrition-sensitive interventions directed at the underlying and basic levels of causality (Ruel et al. 2013) are often delivered through other sectors, such as education, agriculture, water and sanitation, and social welfare.

While intervening in the first 1,000 days is critical, addressing the double burden of malnutrition requires expanding the focus of nutrition interventions to cover the rest of the life course into adulthood. Indeed these nutrition-specific and nutrition-sensitive interventions need to be continued across the school years into adulthood and the workplace (Shrimpton and Rokx 2012). Moreover, a range of policy interventions and programs are needed to address the overall food environment. The WHO recommendations for childhood obesity prevention programs include key points that have population-wide relevance. These recommendations include the following: use a mixture of “top-down” and community-based actions, employ a range of policy instruments, establish cross-sectoral platforms and a multisectoral approach; promote interventions across a range of settings, including early childcare settings, schools, workplaces, and community organizations; and leverage legislative and financial tools to ensure availability and affordability of healthy foods and physical activity opportunities (WHO 2012).

Renewed and strong international commitment to address malnutrition in all its forms can be leveraged to build national commitment. For example, the Comprehensive Implementation Plan (CIP) on Maternal, Infant, and Young Child Nutrition (MIYCN), endorsed by the 65th World Health Assembly in May 2012, has six global nutrition targets to be reached by 2025 (table 1.3). The ICN2 Rome Declaration on Nutrition and Framework for Action (FAO 2014b) has further endorsed the CIP as well as the political declaration adopted at the UN High-Level Meeting of the General Assembly on the Prevention and Control of Non-Communicable Diseases in September 2011. International and civil society organizations can use these global nutrition targets as a platform from which to hold member states accountable for building national commitment and strengthening action.

Table 1.3 The Six World Health Assembly (WHA) Global Nutrition Targets

WHA targets
Reduce the number of children <5 who are stunted, by 40 percent
Reduce anemia in women of reproductive age, by 50 percent
Reduce low birthweight by 30 percent
No increase in childhood overweight
Increase the rate of exclusive breastfeeding in the first 6 months up to at least 50 percent
Reduce and maintain childhood wasting to less than 5 percent

Source: WHO 2014b.

These global nutrition targets and health goals can only be reached through scaled-up delivery of nutrition interventions across many sectors. Scaling up the priority nutrition-specific interventions through the health sector to cover 90 percent of the population in the 36 countries with 80 percent of the global stunted children will only reduce stunting by 20 percent (Bhutta et al. 2013), still short of the WHO CIP target for 2025. Scaling up the nutrition-sensitive interventions through other sectors is therefore required to achieve these MCU targets and perhaps as important to do so in a sustainable way. Although the evidence base doesn't yet permit precise estimation of the contribution of nutrition-sensitive interventions to stunting reduction, early indications are that social protection, agriculture, water and environment, and public health can all greatly contribute to the acceleration (Fanzo et al. 2014).

Interventions in multiple sectors and at multiple levels are also needed to reduce obesity and achieve diets and lifestyles conducive to healthy weight. The McKinsey Global Institute (MGI) used the Foresight model (figure 1.3 above) to model the impact of interventions for reducing obesity for the United Kingdom (Dobbs et al. 2014). The MGI report concluded that any single intervention is likely to have only a small overall impact on its own; rather, a systemic, sustained portfolio of initiatives, delivered at scale, is needed to address the health burden. The report concluded that a total of 74 interventions falling into 18 groups were cost-effective for society, and could reverse rising obesity and save \$1.2 billion a year for the National Health Service. While the results are restricted to the United Kingdom, the authors considered the results of the analysis could be extrapolated to other less developed economies. Modeling exercises have also demonstrated the cost effectiveness of tackling unhealthy diets, physical inactivity, and obesity in LMICs (Cecchini et al. 2010), and demonstrated that achieving the NCD 25 percent mortality reduction target by 2025 was feasible if the targets for the underlying risk factors were met (Kontis et al. 2014).

The following sections enumerate the actions that each sector can take to contribute toward reductions in the DBM. We draw upon the evidence base, including the 2008 and 2013 *Lancet* series on nutrition, the *Lancet* 2010 priority interventions for the prevention of NCDs, WHO Global NCD Action Plan (2013–2020), and World Cancer Research Fund's NOURISHING framework (see details in annex 2), and aggregate interventions by sector to promote ease of operationalization. We begin with those sectors most frequently identified for the delivery of nutrition-specific and nutrition-sensitive interventions and then discuss the role of additional sectors and highlight their role in promoting environments where nutrition-promoting behaviors are the default (Dobbs et al. 2014).

1. HEALTH

The health sector plays a central role in preventing and mitigating MCU. Reductions in MCU can be achieved largely by scaling up health sector delivery of the Lancet Series (2013) package of nutrition-specific interventions targeted at women of reproductive age, pregnant and lactating women, and young children, including micronutrient supplementation; protein-energy/complementary food supplementation for targeted populations; counseling on appropriate MIYCN; and appropriate care for acute malnutrition (Bhutta et al. 2013) (details in table 1A.3). There is a growing body of evidence that points to the importance of utilizing

existing maternal and child health services to provide comprehensive (including nutrition) support for young children as well as their parents and caregivers to ensure optimal child development (Britto et al. 2016). Improving the accessibility and delivery of quality health services—such as reproductive health and family planning, skilled birth attendance, antenatal and postnatal care, maternal mental health services, and parenting support—can contribute to improvements in the immediate and underlying determinants of MCU.

In addition to providing basic nutrition services, the health sector maintains responsibility for provision of water, sanitation, and hygiene (WASH) messages that are necessary to reduce infection and undernutrition. Optimal handwashing should form an essential component of MIYCN messages. Furthermore, health workers at community level who are trained in nutrition behavior change can also deliver messages on sanitation/feces management, treatment and safe water storage, and food hygiene. Within the Ministry of Health, intra-agency collaboration between public health, environmental health, and nutrition divisions is necessary to promote consistency and complementarity of policies, programs, and messages related to the interface between WASH and nutrition (USAID 2013).

The health sector must also take the lead in advocacy and action to prevent and treat overnutrition and NCDs. Primary and secondary prevention measures through the health system present the most affordable, realistic option for EAP countries. Growth monitoring—including stature—can allow for assessment of BMI and early identification of childhood overweight/obesity. Nutrition education interventions for improving diet in overweight/obese adults—including pregnant women—can be effective, especially if the health care providers are trained to measure BMI and/or waist circumference (Pignone et al. 2003; Ammerman et al. 2008). Lack of patient awareness of hypertension, dyslipidemia, and diabetes is common, and routine check-ups with health education can also help control these problems. Once an individual is overweight or obese, clinical intervention using multiple therapeutic modalities (behavioral therapy to reduce caloric intake and increase physical activity; pharmacotherapy, and surgical treatments) for weight reduction are needed. There is moderate quality evidence that behavioral (diet, exercise, lifestyle) and pharmacological treatments for overweight and obesity in adults lead to clinically important reductions in weight and in incidence of type 2 diabetes (Peirson et al. 2014). Dramatic declines in coronary heart disease mortality of 70 to 80 percent have been reported in Nordic countries such as Iceland (Aspelund et al. 2010) and Finland (Laatikainen et al. 2005), a quarter of which were due to pharmacological treatments. While the health system should aim to achieve 80 percent coverage in the cost-effective technologies and essential medicines for the control of NCDs (WHO 2013b), these treatment strategies should not substitute for investment in prevention.

Interventions to prevent undernutrition through the health system have some potential of exacerbating overweight/obesity. Providing additional food—in the form of balanced energy/protein food supplements—to undernourished mothers during pregnancy and their children under two years of age has no danger of increasing the risks of overnutrition later in the life course. However, promoting rapid weight gain after this critical window has been associated strongly with the risk of NCDs in adulthood (Victora et al. 2008). In settings where treatment of undernutrition has been the norm, there is a need for nutrition and health professionals to recognize that protein and caloric requirements for healthy children and mothers are significantly lower than those established for malnourished individuals. Carefully considered messaging is needed from health staff in particular (Dietz et al. 2015) to promote optimum

growth (especially linear growth) in children under two years of age, and to avoid excessive weight gain after that. Public health efforts need to be redoubled, not only to control the marketing of breastmilk substitutes, but also to protect older children from increasingly sophisticated marketing of sedentary activities and energy-dense, nutrient-poor foods and beverages (Lobstein et al. 2015).

Table 1.4 Priority Actions for Reducing the DBM through the Health Sector

Actions
Reduce micronutrient deficiencies through supplementation. Focus especially on reducing anemia through iron supplementation for women of reproductive age, pregnant and lactating women, and children 0 to 24 months
Provide nutrition counseling on appropriate maternal, infant, and young child nutrition practices
Engage in social and behavior change communication to improve handwashing and hygiene practices
Increase normal birthweight through increased access to timely, high-quality antenatal care and counseling on healthy gestational weight gain
Monitor linear growth and BMI throughout childhood and provide follow-up counseling
Improve availability, accessibility, and quality of reproductive health, family planning, and pre-, peri-, and postnatal care, parenting support, and maternal mental health services
Provide nutrition and physical activity counseling to children, adolescents, and adults
Screen for high BMI and metabolic syndrome
Prevent, treat, and manage illness, both infectious and chronic diseases
Ensure adequate nutrition supplies, including vitamin and mineral supplements, therapeutic foods, oral rehydration salts, scales, height/length boards, measuring tapes, blood/urinary diagnostics, basic medicines and therapeutics—including generics—to treat NCDs

Source: Modified from Ruel-Bergeron et al. 2013.

2. AGRICULTURE

Agriculture programs have a role to play in reducing malnutrition through access to sufficient, diverse, and nutrient-rich diets. In EAP, agriculture policies and programs tend to focus on food security through the production of cereals/staple foods (see box 1.3) and income generation through high-value export crops. While enhanced staple food productivity and agricultural incomes are necessary to meet the caloric needs of growing populations, there is a need for programs and interventions to explicitly address factors along the pathways between agricultural production and optimal nutrition⁶ (Ruel et al. 2013). Examples of nutrition-sensitive agriculture interventions for MCU include promoting production of nutrient-rich crop varieties; improving diverse homestead food production; and incorporating nutrition considerations into agricultural extension programs; and increasing women’s access to land, productive resources, and agricultural extension services. In terms of production diversification, there is strong evidence for the potential of biofortification to improve nutrition, but important gaps remain related to cost-effectiveness, bioavailability of micronutrients, cultural appropriateness, and accessibility and affordability for the poor (Kohr 2008). Biofortification should be seen as one component of a comprehensive strategy to increase micronutrient intake in the EAP. Further

⁶ Namely via the food production, agricultural income, and women’s empowerment pathways. For more information see Herforth and Harris 2014.

agricultural innovation, such as diversification of smallholder rice-based farming systems, can have a substantial impact on availability of diverse foods and—ideally—nutrition in the region (ACDI/VOCA 2012). Female-led enterprises have traditionally experienced low productivity due to their unequal access to agricultural information, training, extension services, and inputs (World Bank 2012a). Increasing women’s access to productive resources can translate into their control over income and decision-making power related to intra-household allocation of food, health, and care (Ruel et al. 2013).

There is growing recognition of the untapped potential for analysis and intervention in agricultural value chains to improve nutrition, though these approaches are in the nascent stages (Hawkes and Ruel 2011). Increased production of nutritious foods may have some independent impact on dietary consumption and on improving micronutrient status; evidence shows that nutrition education around those foods strongly enhances the effect (Berti et al. 2004). Overall, evidence for the efficacy of nutrition-sensitive agricultural interventions for improving MCU is considered weak (Masset et al. 2011), yet this may largely be due to the lack of suitability of these interventions for randomized controlled trials. However, there is still much that we know and that can be done to improve nutrition through agriculture (Pinstrup-Andersen 2013), and ongoing projects are utilizing rigorous program evaluations to better understand the agriculture-nutrition pathways.

Box 1.3 Food Security and “Cereals Fundamentalism” in East and Southeast Asia

According to the United Nations Food and Agriculture Organization (FAO) definition, “food security exists when all people at all times have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active, healthy life,” (FAO 2013). Food security is commonly understood to have four dimensions: availability, accessibility, affordability, and stability.

Traditionally, food security in many EAP countries has been defined in terms of self-sufficiency in staple grains (primarily rice) with food policy driven by “cereals fundamentalism.” Consequently, substantial public resources have been dedicated toward investments in technologies, irrigation, infrastructure, and subsidies to support staple grain production. Furthermore, governments have actively sought to manage the availability and price of rice in domestic markets and through international trade (World Bank 2015). However, food demand is shifting, with lower demand for cereals for direct consumption and more for nutrient-rich foods, including meats, fruits, and vegetables. Over time, credits, price support, and subsidies of rice and other staple foods have crowded out production of nonstaples, distorting supply and driving up price of micronutrient-rich nonstaples relative to staples (Pingali 2015). These investments are costly, and overall increases in agricultural spending in Asia can largely be accounted for as growth in spending on rice programs (Zorya and Santos 2014). At the same time, rice-centric policies have failed to address fully the environmental, natural resources, nutrition, food safety, and food consumption considerations inherent in feeding and in providing adequate nutrition to growing and increasingly urbanized populations.

A recent World Bank report (2015) urged governments in the region to adapt their approach to food security and rethink the strategic prioritization of rice at the expense of all other food commodities. Ministries of Agriculture have been slow to facilitate the changes needed for agri-food systems to adapt to modern demand. There is an urgent need to “rebalance” food security policies to fully consider agricultural productivity and diversification, food and feed trade facilitation; food safety management; multisectoral approaches to nutrition; and safety nets. EAP countries will need to critically and innovatively assess how price, income, and other agricultural supports can shift from producing ever more staple grains toward nutrition-sensitive and climate-smart agriculture aimed at eradicating poverty and food insecurity (World Bank 2015) and addressing coexisting burdens of overnutrition and undernutrition.

There is additional potential to leverage agricultural production and value chains to reduce overweight and obesity. Table 1.5 highlights priority actions in agriculture to promote optimal nutrition and reduce the DBM. Local production and year-round availability nutrient-rich foods, such as fruits and vegetables, can improve dietary diversity, potentially decreasing risk of overweight and obesity. Increasing staple food production plays an important role in ensuring the caloric sufficiency of populations; however, in many EAP countries this narrow agricultural focus may have unintended consequences. To address both sides of the DBM, interventions to enhance agricultural productivity are also needed for nutrient-rich fruits, vegetables, and pulses. In the United States for example, it was estimated that fruit production would have to rise 117 percent and vegetable production by 137 percent to meet the domestic requirements set out in the *Dietary Guidelines for Americans* (USDA 2006). As EAP countries develop and implement their own dietary guidelines, further analytical work in the agriculture sector can help to identify gaps in the availability and accessibility of nonstaple foods and subsequently expand research, input, and subsidies to include these commodities. Milled cereals are critical inputs in the production of highly processed foods, and nutrition-sensitive value-chain analyses can be used to identify the value-chain transformations of domestic staple foods and their role in the rise of obesity (Hawkes and Ruel 2011; FAO 2013; Ruel et al. 2013).⁷ The Global Panel on Agriculture and Food Systems for Nutrition (2014) highlights that food choices—framed by the local context of food availability, accessibility, affordability, and appeal—have a fundamental role in determining the quality of diets and nutritional status. Agriculture and health policies have the potential to become better aligned to promote both food and nutrition security.

Agriculture policies and programs can be linked with social safety net programs (see section IV, 3) to enhance nutrition. Food-based safety net programs can ensure livelihoods, by increasing purchasing power, or relieve deprivation. Examples of food-based safety nets include providing employment through food-for work schemes; providing food stamps, coupons, or vouchers for food purchases; or directly providing food to households and individuals (Bora and Zorya 2014). These forms of food-based social safety nets have not gained widespread popularity in Asia, where the predominant form of food-based safety net assistance has been through rice subsidies (see section IV, 6). In the United States, a federal initiative provides direct technical support to rural communities to help them increase the supply of locally produced foods and build strong local food systems as part of their community's economic action plans (USDA 2014). The Supplemental Nutrition Assistance Program (SNAP), formerly known as food stamps, helped approximately 47.6 million low-income individuals put food on the table by providing an average monthly benefit of \$133 per person in 2013. While there is evidence that linking the provision of food stamps to the purchase of fruits and vegetables in local markets leads to improved quality diets in participants (Kropf et al. 2007), evidence of improved nutrition outcomes is still weak (McCormack et al. 2010). In LMICs, homegrown school feeding (HGSF)

7. Ruel et al. 2013 describe three factors that make value chains a promising approach for tackling both sides of the DBM: (1) they focus on coordination between actors; (2) they are analytical, versatile, and solution-oriented and can be used to assess and address the bottlenecks that affect availability, affordability, acceptability, or quality of nutritious foods in a given context; and (3) they focus on the addition of economic value and can identify points before, during, and after production where nutritional and economic value can be added, or losses in nutrients prevented.

programs have been championed by the World Food Programme and implemented in a number of African countries. HGSP delivers cost-effective, government-led school feeding programs using food produced by local smallholders. These programs can contribute to reliable local agricultural livelihoods, improved school attendance for children, and increased access to food, but there is no evidence of differential nutritional impact between HGSP and traditional school feeding programs.

Table 1.5 Priority Actions for Reducing the DBM through Agriculture

Actions
Invest in women: safeguard and strengthen the capacity of women to provide for the food security, health, and nutrition of their families
Increase access, affordability, and year-round availability of nutrient-rich foods, especially fruits and vegetables
Improve nutrition knowledge among rural households to enhance consumption and production of diverse foods
Incorporate explicit nutrition objectives and indicators into agriculture investments
Promote agricultural research that explores the role of diverse crop varieties, value chains, and cross-sector synergies on nutrition
Rationalize agricultural price supports and subsidies to promote production of nutrient-rich commodities

Source: Modified from Hoberg et al. 2013.

3. SOCIAL PROTECTION

Incorporating priority nutrition actions into social protection programs can reduce MCU and enhance these programs' ability to mitigate the intergenerational transmission of poverty. Social protection mechanisms such as cash and in-kind transfers, public works, insurance, and microfinance can be made nutrition-sensitive (Marini et al. 2013). Conditional cash transfers (CCTs) are often used as the delivery mechanism to link income to co-responsibilities related to consumption of health and nutrition services. The CCT program Oportunidades (formerly Progresa) in Mexico has achieved reductions in stunting (Hoddinot and Basset 2009) and anemia (Rivera et al. 2004), and the Women, Infants, and Children (WIC) program in the United States has improved birth outcomes (Foster et al. 2010). Though evidence of a nutritional impact beyond the Americas had been weak (Lagarde et al. 2009; Manley et al. 2012), recent impact evaluation of the Pantawid CCT in Philippines demonstrated a strong, positive reduction in severe stunting (HAZ <-3) in children age 6-36 months (Kandpal et al. 2016). In the absence of hard conditions/co-responsibilities, unconditional transfers (UCTs) and other social protection programs can complement income support with the provision of 'accompanying measures' which provide nutrition education, behavior change communication, and/or 'nudges' to change nutrition practices. There is the potential in EAP publicly funded social safety net programs to play an important role in improving access to special complementary foods (Bloem et al. 2013) and fortified foods for the poor. In EAP countries where rice is the primary staple food, mandatory rice fortification may not be feasible due to the constraints of rice fortification technology; however, social safety net programs that distribute fortified rice can provide a means of reaching the poor and those at greatest nutritional risk (Codling, Fabrizio, and Rosenzweig 2015).

Cash and in-kind transfers intended to reduce undernutrition must be further refined to prevent unintended effects on overnutrition. Cash transfer programs have been found to contribute to increased overweight and obesity in mothers in Mexico (Leroy et al. 2013) and

Colombia (Forde et al. 2012) as well as in young children in Mexico (Leroy et al. 2010) and the United States (Akee et al. 2013). A variety of program design choices can help to mitigate these risks. In Mexico, ongoing program evaluations allowed for the characterization of the heterogeneity of the beneficiary population in terms of nutritional risk. Ultimately, the benefit package of supplements and counseling was modified to respond to the different nutrient gaps of urban and rural populations (Neufeld et al. 2011). Fortified milk distribution continued in remote communities with low access to services; where risk of overnutrition was high, food supplements were modified to reduce calories but retain micronutrients. Additionally, individual counseling sessions are being scaled up to promote breastfeeding, healthy complementary feeding, and the avoidance of excess weight gain in preschool-age children (Kroker-Lobos et al. 2014). Similar program modifications can be particularly relevant in middle-income countries where the double burden is now well established. Table 1.6 presents priority actions for the social protection sector to contribute to reductions in the DBM.

Many studies show that the double burden of malnutrition at the household and individual levels has poverty as a common denominator. In the United States and increasingly in middle-income countries such as Mexico, obesity is more common among the poor (Drenowski and Darmon 2005; Kroker-Lobos et al. 2014). As poor households gain access to sufficient food to meet energy requirements, poverty alleviation programs need to adapt to concerns of overnutrition. One mechanism to achieve these outcomes is through linkages between the provision of cash transfers and the purchase of nutrient-dense food, such as fruits and vegetables, which can be sold by small-scale local farmers through local farmers' markets. In the United States, the USDA nutrition assistance programs provided about US\$10 billion in support of fruit and vegetable consumption in 2005 (USDA 2008). These funds supported USDA's purchase and distribution of fruits and vegetables to schools, food banks, and other program providers through the Child Nutrition Programs, and participants' purchases in the marketplace through SNAP, WIC, and the Farmers' Market Nutrition Programs (FMNPs).

Table 1.6 Priority Actions for Reducing the DBM through Social Protection

Objectives
Target activities to the most nutritionally vulnerable populations, such as poor pregnant women, and children under 24 months
Incorporate nutrition education, parenting education, and infant and young child feeding promotion activities within accompanying measures to increase household awareness of care giving, health seeking, diet, and healthy lifestyle behaviors
Include nutrition and child health services as conditionalities/co-responsibilities in social protection interventions, e.g., growth monitoring and promotion, micronutrient supplementation, vaccination
Understand heterogeneity of nutrient gaps among target populations, and design benefit packages accordingly
Reduce the acute and long-term negative financial impacts of external financial, price, and weather shocks by scaling up programs in times of crises and by targeting shock-affected areas

Source: Modified from Marini et al. 2013.

4. EDUCATION

The relationship between good nutrition and education is a reciprocal one. Higher maternal education is associated with less maternal obesity and less stunting in her child (Lakshman et al. 2013; Leroy et al. 2014), and less-stunted children are more likely to have better cognitive function and increased educational achievements (Victora et al. 2008). Girls' completion of primary and secondary education has been shown to be one of the greatest

contributors to stunting reduction in Bangladesh and Indonesia (Semba et al. 2008), as well as in Nepal (Crum et al. 2012). Though mechanisms for these relationships are unclear (Wachs 2008), it may be that keeping girls in schools contributes to increasing economic opportunity, reducing teenage pregnancy rates, and/or improving the nutritional status of adolescents prior to marriage, all of which contribute to improved birthweights (UNSCN 2010).

The education sector can contribute to reductions in MCU through holistic early child development. Integrating early child care and development (ECCD) and nutrition programming may contribute to improved short-term and long-term gains in child development and nutrition. These programs could combine psychosocial stimulation, parenting skills, nutrition interventions focusing on micronutrients, healthy diets, and obesity prevention targeted not only at children in the 1,000 days window but into the preschool years (Ruel et al. 2013). Furthermore, recent evidence highlights the links between WASH and ECD to suggest that poor hygiene and sanitation in the physical environment may contribute to impaired nutrient absorption and inflammation, affecting linear growth, iron status, and brain development (Ngure et al. 2014). Effective coordination among researchers and program designers is needed to better establish the evidence for effective intervention in these overlapping areas.

Schools also provide a platform for the delivery of nutrition-specific and nutrition-sensitive interventions. School-going adolescent girls have been successfully enlisted to provide outreach to girls in their community who are no longer in school. In India, the provision of weekly iron–folic acid tablets together with deworming tablets every six months to 150,700 adolescent schoolgirls and non-schoolgirls reduced the overall prevalence of anemia of adolescent girls in a district from 73.3 percent to 25.4 percent in four years at a cost of US\$0.36 per beneficiary per year (Vir et al. 2008). This model was subsequently scaled up to reach 27.6 million adolescent girls in 13 states, including 16.3 million schoolgirls and 11.3 million out-of-school girls by 2011 (Aguayo et al. 2013). School feeding is a common social safety net program implemented through the education sector and are often implemented to stimulate school attendance and alleviate short-term hunger. Though often not sufficiently designed to be a nutrition intervention *per se*, these programs can serve as a platform for nutrition promotion and may improve children’s micronutrient status, growth, and cognition if properly designed. Systematic review of various school feeding programs demonstrated positive effects on schooling: children who were fed at school attended four to six more days of school per year per child and performed better in math (Kristjansson et al. 2009); however, effects on growth (in height and weight) are inconclusive. Further refining program design to include animal-source foods, fortified foods, and micronutrient powders or supplements can be effective in reducing micronutrient deficiencies (Jomaa et al. 2011). Impacts of school feeding can be enhanced if combined with complementary interventions to the quality of the school and home environment.

Table 1.7 Priority Actions for Reducing the DBM through Education

Actions
Support holistic early childhood development combining care, stimulation, and proper nutrition
Promote universal completion of secondary school among girls, using policy tools to increase age of compulsory education and conditional cash transfers to families to offset costs of education
Deliver nutrition-specific interventions (deworming, micronutrient supplementation) through school-based platforms
Ensure safe water and sanitation in the school setting

Improve school-based health and nutrition training and curricula (incorporating hygiene and sanitation, physical activity, reproductive health, self-esteem, and healthy eating habits)
Engage parents and school communities in the creation of nutrition-promoting environments, inside and outside of school
Design school feeding programs based on beneficiaries' nutrient requirements and gaps, incorporating fortified foods and supplements or limiting calories, as necessary

Source: Authors

Schools can also serve as settings for promoting healthy nutrition behaviors, preventing child obesity (Waters et al. 2011) and reducing other chronic disease risk factors and improving fitness (Flynn et al. 2006; Ho et al. 2012). Schools can become nutrition-sensitive through a number of priority actions (table 1.7 above). It is recommended that schools in the United States provide quality physical education and ensure strong nutritional standards for all foods and beverages sold in or provided by the schools, as well as ensure that food literacy and nutrition skill development is part of the curriculum (Institute of Medicine 2012). WHO has developed a “Nutrition Friendly Schools Initiative” (WHO 2007; Chiabi and Obama 2009) that includes five main components⁸ and has been piloted in West Africa (Delisle et al. 2013). With children spending a significant portion of their time in schools, the foods that are available there play an important role in shaping children’s food environments and can contribute to either the prevention or promotion of obesity. Most US states have adopted laws that regulate the availability of sugar-sweetened beverages in school settings (Mello et al. 2008), and in France and the United Kingdom vending machines have either been banned in schools or are no longer filled with sugar-sweetened beverages or processed snack foods. School feeding programs are invariably associated with increased energy intake, and must be designed carefully to meet nutrient needs of participants. These programs tend to promote faster gains in weight than in linear growth: intervention children experienced an average weight gain of 0.39 kilograms more than controls over 19 months (Kristjansson et al. 2009). Recent evidence from Latin America indicates that nontherapeutic programs in LMICs aimed at promoting weight gain in children after age two may do more harm than good (Victora and Rivera 2014). On the other side of the energy balance equation, scaling up school-based physical activity interventions for improved health outcomes and obesity mitigation among adolescents is important but difficult (Dobbins et al. 2013; van Nassau et al. 2014). Despite numerous programs, no significant changes in obesity prevalence occurred in youth or adults in the United States between 2003 and 2004 and between 2011 and 2012 (Ogden et al. 2014).

5. PUBLIC INFORMATION

No single ministry is usually responsible for all aspects of public information on food and nutrition. At the international level, the Codex Alimentarius Commission, established by FAO and WHO in 1963, develops harmonized international food standards, and guidelines and codes of practice to protect the health of consumers and ensure fair practices in the food trade. At the national level, regulatory control will be with an agency such as the Food and Drug

8. The Nutrition-Friendly Schools Initiative (NFSI) five components include a written school policy on nutrition; awareness and capacity strengthening of the school community; curriculum development and modifications; creation of a supportive school environment for optimal nutrition and health; and school nutrition and health services.

Administration (FDA) in the United States, for example. Table 1.8 describes priority actions to reduce the DBM through public information.

The promotion of breastfeeding is the single most important area of public information for MCU. Public information campaigns to promote optimal maternal, infant, and young child nutrition (MIYCN) have the potential to improve population behaviors. Though the Lancet 2008 series found mass media campaigns promoting breastfeeding to have “little or no evidence” for effectiveness (Bhutta et al. 2008), the reviewed studies predate the widespread adoption of many information and communications technologies in LMICs. After conducting substantial formative research to support the approach, large-scale public information campaigns promoting MIYCN behavior change were implemented and are under evaluation in Vietnam and Bangladesh (Sanghvi et al. 2013). These campaigns have used channels such as television, print, audio messages, Internet, and social media messages and have the potential to improve behavioral determinants of MCU. Early evidence shows that the delivery of nutrition messages using mass media can be complemented by nutrition education and outreach to be most effective (Saha et al. 2013).

Food labeling provides important nutrition information to consumers and can help to reduce overweight and obesity. Labels that describe the nutrition content of foods can, in theory, permit the discerning consumer to make more informed purchases. Evidence for the effectiveness of “front of pack” labeling is still weak, however (Campos et al. 2011). Labels are most used by educated and wealthier segments of the population. But as described in a review of the global regulatory environment, there is considerable variation of approaches and regulations in countries around the world (Hawkes 2004). WHO provides guidance in developing or adapting nutrient profile models, and based on these nutrient profiles, claims such as “low fat” or “healthy choice” on food labels and in marketing can be regulated by national food standards authorities (WHO 2011b). In all countries of Southeast Asia except Malaysia, nutrition labeling is voluntary unless nutritional claims are made (Kasapilla and Shaarani 2011). As individuals in EAP countries begin eating outside the home in greater numbers, municipalities may consider extending nutrition labeling to restaurants and ready-to-eat food retailers.

Table 1.8 Priority Actions for Reducing the DBM through Public Information

Actions
Promote healthy eating and appropriate maternal, infant, and young child nutrition
Create and enforce food labeling standards aligned with the Codex Alimentarius
Regulate marketing and advertising of unhealthy foods to children
Enforce the International Code of Marketing of Breastmilk Substitutes

Source: Authors

6. FINANCE

Fiscal policies such as subsidies and taxes can either stimulate or reduce consumption of foods and drinks. In the case of MCU, there is limited evidence of the effectiveness of staple food subsidy interventions in reducing undernutrition (Jensen and Miller 2011).

Indonesia has spent large sums subsidizing rice through the Raskin program, making it one of the largest forms of social assistance. However, critics attack staple food subsidies on the

grounds that they distort market signals, lead to shortages, promote smuggling and black market activity, or in practice are poorly targeted and disproportionately benefit the least poor (Kochar 2005). World Bank public expenditure review of Raskin corroborated these criticisms and documented that half or less of rice purchased for Raskin reaches households, and that the program was targeted so that poor households received only 25 percent of total subsidies (World Bank 2012b). Similarly, in 2005-6 only 21 percent of the subsidy through the Philippines National Food Authority rice subsidy program reached the poor (Bora and Zorya 2014). Brazil abandoned food subsidies used in the 1980s with World Bank support, largely due to lack of documented evidence of impact due to “leakage” (Musgrove 1990). The Philippines has also largely moved from poorly targeted food subsidies to more targeted cash transfer programs (Bora and Zorya 2014).

Table 1.9 Priority Actions for Reducing the DBM through Finance

Actions
Use subsidies that are effective in improving nutrition, food security, and social welfare
Levy taxes on unhealthy foods/beverages

Source: Authors.

Researchers and policy makers are devoting considerable and growing attention to the potential of fiscal policies to impact dietary habits and curb obesity. Several reviews suggest that sufficiently large taxes (from 10 to 20 percent) on high sugar, salt, and fat foods can reduce consumption, with potential to not only reduce obesity but also raise revenues (Powell et al. 2013; Thow et al. 2014.). In Poland, for example, reduced subsidies on lard and butter soon after the transition to a democratic government resulted in a rapid increase in the consumption of cheaper nonhydrogenated vegetable fat. In consequence, the ratio of dietary polyunsaturated to saturated fat increased from 0.33 in 1990 to 0.56 in 1999, and mortality from coronary artery disease dropped 28 percent (Zatonski et al. 1998). Four countries in the Pacific (Fiji, French Polynesia, Nauru, and Samoa) have imposed increased taxes or import levies on sugary soft drinks, with varying results (Thow et al. 2010). International agencies are providing support for countries considering taxation. A guide on how to develop fiscal policies for foods in relation to free market issues and the WTO in the Asian region has been developed by the regional WHO office (Lawrence 2005). The Pacific Islands regional office of FAO has also made recommendations recently that include both food taxes, as well as subsidies and facilitated credit mechanism to local farmers to improve local vegetable and fruit production (FAO 2014c). The World Bank NCD Roadmap Report lays out key considerations for Ministries of Finance seeking to undertake taxation measures and suggests that earmarking tax revenues for health promotion purposes can strengthen public support for unpopular taxation measures (2014). In addition to subsidizing production of fruits and vegetables, subsidies have been shown to be a promising measure to incentivize consumption of healthy foods. A systematic review of the use of fiscal policies found that all reviewed subsidies on healthy food (ranging between 1.8 percent and 50.0 percent) led to an increase in consumption of the targeted foods equal to at least half of the applied subsidy (Thow et al. 2014). The fiscal policies that can reduce the DBM are presented in table 1.9 above.

7. TRANSPORT, PUBLIC WORKS, AND URBAN AND RURAL DEVELOPMENT

Investments in water and sanitation services—as well as rural roads, markets, and electrification—have an important role to play in reducing undernutrition in LMICs.

Improving access to water and sanitation can make a critical contribution toward achieving the

WHA target for stunting reduction (Smith and Haddad 2014). Community-Led Total Sanitation (CLTS), a behavior change approach that mobilizes communities to undertake their own appraisal and analysis and take their own actions to become open defecation free (ODF) is being implemented in 12 countries across the region with considerable success in Indonesia, Cambodia, and Timor-Leste (UNICEF 2013). And while interventions targeting communities and households are urgently needed, coordination between public works and other sectors is necessary to ensure that improved WASH services, such as basic water, sanitation, and hygiene are also available at the institutional level. Among surveyed health facilities in Southeast Asia, 22 percent lack improved water sources in close proximity, 42 percent lack improved sanitation, and 20 percent lack soap for handwashing (UNICEF and WHO 2015). Investments in safe water and toilet facilities must also be accompanied by behavioral change communication, including for the cessation of open defecation, safe disposal of feces (especially children’s), and appropriate handwashing with soap. In the Philippines, specifically, and EAP, generally, the safe disposal of children’s feces is a neglected area of policy and programmatic intervention. Even among households with improved sanitation facilities, 73 percent reported unsafe disposal practices. Behavior change strategies should incorporate messages related to proper sanitation for children, and these themes can be integrated into ODF protocol (UNICEF et al. 2015). As the population in EAP grows and urbanizes, further investments in roads linking rural and urban areas can open up market opportunities, maximizing the benefits of good health and nutrition across geographic and economic groups (Fan et al. 2012). Rural electrification plays an important role in increasing control over productive and leisure time, especially among women (World Bank 2012a).

Table 1.10 Priority Actions for Reducing the DBM through Transport, Public Works, Rural Development, and Urban Planning

Actions
Promote universal access to improved water and sanitation facilities
Engage in social and behavior change communication to improve handwashing and hygiene practices
Develop infrastructure (roads, markets, irrigation, electrification) that can improve livelihoods and access to services and markets for rural populations
Develop spaces for physical activity: parks, bike lanes, pedestrian zones
Use zoning and incentives to increase access to healthy foods in underserved areas and minimize access to unhealthy foods, especially near schools

Source: Authors.

Transport policy and environmental design have fundamental effects on the determinants of physical activity and therefore influence the risk of obesity and other chronic diseases. Investments in roads can be harnessed as an opportunity to reduce overnutrition through inclusion of pedestrian and bike spaces in the design. Walking and biking can be encouraged by creating special bike lanes, as well as by making town centers pedestrian-only precincts. Increasing the space available for leisure activities, such as playing fields, parks, and public gardens, will also encourage more walking, running, and sports (McCreedy and Leslie 2009; Beceerra et al. 2013). Improving access to and supply of healthy foods such as fruits and vegetables through local farmers’ markets also requires the construction of roads and provision of irrigation for the small-scale farms and homesteads so they can produce these foods, as well as get them to market. Furthermore, zoning and other incentives can help encourage access to healthy foods in underserved areas and limit access to

unhealthy foods, particularly for school children. Priority actions to address both undernutrition and overnutrition through these sectors are presented in table 1.10 above.

8. INDUSTRY, TRADE, AND COMMERCE

The food industry itself can contribute to reducing undernutrition through the fortification of foods, while enhanced industry regulation can contribute to improved infant and young child nutrition. Salt iodization is perhaps one of the greatest fortification successes, with some 70 percent of households worldwide now having access to iodized salt (Zimmerman 2013), and therefore being largely protected against iodine deficiency. Public-private partnerships have the ability to incentivize food manufacturers to develop more nutritious foods and enhance their distribution (World Economic Forum 2009). Through public-private partnerships, fortified vegetable oil and wheat flour are now reaching over 70 percent of the population in West Africa, for example (Sablak et al. 2013). The SUN Business Network provides a toolkit for countries seeking to engage private sector stakeholders in national efforts to reduce MCU (Scaling Up Nutrition Business Network 2014). Though voluntary measures may have more political appeal, regulatory measures can be taken to promote breastfeeding. The International Code of Marketing of Breastmilk Substitutes (the Code) adopted by the World Health Assembly in 1981 as a “minimum requirement” to be enacted in its entirety in all countries, aims to promote safe and adequate nutrition for infants by protecting breastfeeding and ensuring appropriate marketing of breastmilk substitutes. The Code bans all advertising of breastmilk substitutes, as well as the provision of samples and gifts to mothers and health workers, and the use of health care systems to promote breastmilk substitutes. Thirty years after its endorsement, only 37 out of 199 countries reporting (19 percent) have passed laws reflecting all recommendations of the Code (WHO 2011a).

Table 1.11 Priority Actions for Reducing the DBM through Industry, Trade, and Commerce

Actions
Enact and enforce national policies on food fortification, monitor progress, and strengthen public-private partnerships as needed
Enforce the International Code of Marketing of Breastmilk Substitutes
Promote product reformulation through food composition targets (for salt, trans fats, saturated fats, and sugar) for processed foods and food service retailers aligned with WHO and national recommendations
Support voluntary or mandatory restriction of portion sizes on unhealthy foods
Regulate the marketing of unhealthy foods to children
Utilize zoning policies to promote retail of fresh fruits and vegetables and limit density of retail environments selling unhealthy foods and beverages, particularly near schools

Source: Authors.

Private sector actors play a central role in efforts to mitigate overweight and obesity and must be engaged through voluntary and regulatory measures. The McKinsey Global Institute (MGI) report identified portion control as the intervention with the highest potential impact on those it modeled for obesity control (Dobbs et al. 2014). The report concluded that new collaborations are needed within the food and beverage industry and between industry and government, and that there is no straightforward and simple road map for delivering industry levers. Some could be delivered through industry self-regulation, but in some cases industry cannot or will not change without government regulation. To date, public regulation and market intervention are the only evidence-based mechanisms proven to prevent harm caused by unhealthy commodity industries (Moodie et al. 2013). Food composition targets for salt, trans

fats, saturated fats, and sugar can be developed for both packaged and processed foods and food service retailers. The WHO has identified regulations to reduce trans fats as a “best buy” to prevent NCDs at the population level, and such regulatory strategies have been employed at the municipal (New York City) and national (Argentina, Peru, Denmark) levels. New York City employed a phased approach to trans fat limitations, first urging restaurants and food suppliers to voluntarily eliminate foods high in trans fats before enacting the regulatory mandate (Trezza and Bonilla-Chacin 2014). Government regulation should be considered particularly in the case of marketing unhealthy foods to children, and additional efforts are needed to enforce these measures. An accountability framework has been proposed to guide government and food industry engagement to address unhealthy food environments as part of a broader government-led strategy to address obesity and diet-related NCDs (Kraak et al. 2014). For governments pursuing fortification strategies for undernutrition, it is worth noting that increased adiposity (or fatness) is associated with a reduced response to iron fortification in women and children from countries experiencing the nutrition transition (Zimmerman et al. 2008). Table 1.11 presents priority actions for engaging the private sector to reduce the DBM.

V. CHALLENGES AND OPPORTUNITIES IN THE APPLICATION OF MULTISECTORAL APPROACHES TO TACKLE THE DBM

The challenges of applying multisectoral approaches to tackle the DBM are considerable.

While the importance of employing multisectoral approaches for improving nutrition outcomes has been widely agreed during this last decade, documented experience of how multisector programs are implemented is still quite rare, (Shekar et al. 2012; Garret and Natalicchio 2011; Levinson and Balarajan 2013) and what exists has focused on MCU. However, a number of opportunities can and should be harnessed to address the complexity of addressing the DBM at multiple levels across multiple sectors.

1. STRENGTHENING SYSTEMS

In scaling up the delivery of DBM interventions, systems-strengthening efforts are needed to integrate the full spectrum of public health nutrition concerns into policies and programs. In addition to developing appropriate institutional arrangements and sectoral interventions, undernutrition and overnutrition considerations must be incorporated into systems-wide efforts related to policy frameworks; leadership, coordination, and accountability; workforce capacity; and knowledge and evidence.

A. Policy Frameworks

An overarching policy framework is needed to promote policy coherence for nutrition across sectors. The Global Nutrition Policy Review conducted in 2009–10 indicated that countries in the Southeast Asia region had national policies that most frequently addressed undernutrition rather than obesity and diet-related NCDs. Experience from implementing the National Plans of Action for Nutrition (NPAN), which stemmed from the first International Conference on Nutrition (ICN), suggested that strategies from different sectors could be best grouped into the four pillars: Sustainable Food Security, Food Safety, Healthy Lifestyle, and Nutrition (Nishida et al. 2003). However, recent experience implementing this overarching DBM policy framework found national innovation was limited due to the development of food-centric (as opposed to nutrition-centric) plans. Furthermore, development of a national plan of action does not guarantee financial commitment to nutrition. While many countries report having

national multisectoral nutrition plans, it seems that very few of these are actually being implemented at any scale (WHO 2013a).

Developing an overarching national nutrition plan is both a challenge and an opportunity.

The principle of “plan multisectorally, implement sectorally, and review multisectorally” is one that is supported by all reviews and guidance on multisectoral approaches. Developing a national plan can help build a common sense of purpose, a crucial step underlying more effective and efficient coordination. It can help create a common language for discussion, an understanding of the points of view of other partners, shared interpretations of the evidence, and often trust among professionals from different agencies. Advocates that work to build such a shared vision need not be limited to the most senior decision makers but can include upper- and middle-level managers (program or unit directors), as well as academics and advisers who can facilitate developing such a plan. Their role is to put forth the vision and devote the effort, energy, and creativity that are necessary to get partners to work together. Following plan development, periodic joint progress review of implementation national nutrition plans can further engender a shared sense of purpose and strengthen common vision.

B. Leadership, Coordination, and Accountability

Accelerating progress in nutrition through multisectoral approaches will require building leadership at the national and local levels.

Nutrition has been identified as a “chosen issue,” meaning that champions are required to put it on the policy agenda (Garret et al. 2011). Moreover, the implementation of multisectoral approaches for MCU improvement demands strong and sustained support from high levels of government (Levinson and Balarajan 2013), and this is no different for overnutrition. Giving high-profile leaders—such as prime ministers and mayors—a central role in driving initiatives has been shown to be a key factor in bringing different actors together to collaborate toward NCD prevention goals (Meiro-Lorenzo et al. 2011).

Creating the right institutional arrangements is both a challenge and an opportunity.

Working multisectorally can require fairly profound organizational changes to the ways sectors work (Levinson and Balarajan 2013). This effort goes beyond simple coordination: it implies that the institutions involved will change their ways of operating and linking with others, as well as how they think and work together. Although this may require some extra effort up front, with the right facilitation and creation of a joint vision and understanding, the results are well worth it. It is widely agreed that it is most critical that cross-sector planning be done together so that implementation can be done better separately. When considering how to approach the DBM, EAP countries can draw upon the experience of countries that have joined the SUN movement. The SUN framework (SUN 2010) calls on all partners to scale up efforts against malnutrition, by, among other things: (1) developing a coordinated, multistakeholder approach, mobilizing key stakeholders to generate inclusive country ownership; and (2) using the “Three Ones” (that is, one agreed overarching policy framework, one national coordinating authority, one agreed national monitoring and evaluation system). Seven EAP countries are involved in SUN (Cambodia, Indonesia, Lao PDR, Myanmar, Papua New Guinea, Philippines and Vietnam), all countries seeking to develop multisectoral nutrition approaches should consider adopting the SUN principles. Although focused on MCU, the recent SUN evaluation suggested that the SUN movement should recognize that most LMICs have a DBM problem and begin to adapt accordingly (Mokoro 2015).

Coordination mechanisms are needed to guide the implementation of priority interventions and can and should vary depending on the degree of national decentralization. A high-level coordinating body, at the supra-ministerial level, is recommended for centralized countries to effectively implement multisectoral programs (SUN 2010). Experience in developing such centralized approaches is already available through the SUN movement, and many EAP countries are already collaborating in such efforts to tackle young child stunting (MCU). In countries with more decentralized systems of government, coordination mechanisms will be most effective at the district or community level, and national bodies (that is, nutrition institutes) can provide strong technical and policy support.

Convergence of interventions across sectors serves to target the same geographic populations with a diverse package of nutrition-sensitive and nutrition-specific interventions without the need for complex integration. The impact of the various packages of interventions assumes that all are delivered together. Rather than joint program implementation, the various sectors converge their program interventions to be delivered together as a package. This process helps ensure that impacts are adding together to greater effect for target populations (Levinson and Balarajan 2013). In this regard, community-based programs may be of particular importance, especially if they have the essential elements of community ownership, adequate population coverage, targeting, and central support for supplies and training (Mason et al. 2006). In a typical community-based program, community “mobilizers” take on the task of looking after households in their neighborhood, allowing whole communities to be mapped and covered. Well-run community-based nutrition programs costing about \$5 per household per year can achieve an annual reduction of child undernutrition rates of 1.5ppts a year. To ensure such impact, a certain level of intensity of effort has to be ensured, with optimal ratios of not more than 20 mobilizers per facilitator, and not more than 20 households per mobilizer. If these levels of intensity of effort are not ensured with a sufficiently wide coverage, it should be expected that no impact will be seen at the population level, and the resources invested will be largely lost.

A key challenge for scaling up such community-based programs lies in institutionalizing and mainstreaming community participation (Lehmann and Sanders 2007). The most difficult aspect is ensuring the ongoing supportive supervision of the community mobilizers by health staff that carry out the outreach and facilitate their work (Hill et al. 2014). To date, the largest and most successful such program is the Brazilian Family Health Program, which has integrated 250,000 community health workers into its health services and institutionalized community health committees as part of municipal health services (Harris and Haines 2010). Community-based approaches are now being seen as the way forward for tackling obesity and NCD-related health issues in the United States (Institute of Medicine 2012) and beyond (Gaziano et al 2015).

The first *Global Nutrition Report* presents a strong case for greater accountability for nutrition. Of the 99 countries that have data on all four of the six WHA CIP target indicators (stunting, wasting, overweight, and anemia), only one—Colombia—is on track to meet all four targets by 2025. The report also has a section on the coverage of five nutrition-specific

interventions or practices.⁹ Only 37 countries have data on all five programs or practices, and 69 countries have no data on any of them (IFPRI 2014). Improvements to these monitoring and

Box 1.4 Community-Driven Development for Improved Nutrition in East Asia and Pacific

What is CDD?

Community-driven development (CDD) is an approach that emphasizes community control over planning decisions and investment resources and has a key operational strategy for the delivery of services (Wong 2012). CDD operates on the philosophy that community participation in local development upholds basic citizen's rights and can often lead to better use of resources to meet the needs of local communities. Communities and local institutions are empowered to take the lead in identifying and managing community investments in small infrastructure or service delivery. When operating well, CDD programs provide a platform that can improve targeting, cost efficiency, service quality, transparency, and accountability of sector programs.

Where has a CDD approach been used to address malnutrition?

In Indonesia, the National Program for Community Empowerment (PNPM Mandiri) has been supported by the World Bank for over a decade and benefits over 45 million poor people. The program provides performance-based block grant funds to support communities in reaching 12 targets related to health and education. The PNPM Generasi Program, operating in rural areas, focuses on many of the same targets as traditional cash transfer programs with the village as the recipient of the funds. Villagers are empowered to own and manage the monitoring of program indicators and can receive performance bonuses based on their progress toward improving health and education indicators relative to other subdistricts within the same district. In an impact evaluation conducted between 2007 and 2010, the program had a statistically significant impact on child (zero to three years) underweight, with a 10 percent reduction from baseline levels (Olken et al. 2011).

What makes CDD a promising approach to address the DBM?

CDD operations inevitably require an approach combining multiple disciplines and sectors. CDD programs draw on expertise from the national to the subdistrict level. Community members are mobilized to identify the key context-specific determinants of malnutrition and intervene appropriately. Through their participatory nature, CDD projects foster social inclusion and provide women the opportunity to engage in decision making at the local level.

evaluation aspects of policies and programs for undernutrition and overnutrition can foster national responsibility for improving nutrition and strengthen the international community to hold governments accountable to improve nutrition.

The potential for achieving results is even greater when civil society organizations and communities themselves are integrated into national plans to scale up nutrition. These groups play a pivotal role in mobilizing community members and strengthening government accountability to address the double burden of malnutrition. Due to their familiarity with the needs and realities of communities affected by malnutrition, civil society organizations play an important role in advocating for policies and programs that align with local needs. These organizations have access to communities and grassroots networks that are able to raise

9. The five nutrition-specific interventions covered are as follows: (1) early initiation of breastfeeding; (2) exclusive breastfeeding of infants under six months; (3) continued breastfeeding up to 12 months; (4) vitamin A supplementation of preschool-age children; and (5) iron-folic acid supplementation of pregnant women for more than 90 days.

awareness of nutrition within the country. Furthermore, access to data and strong local programs can galvanize community efforts to hold their governments accountable. In East Asia and the Pacific, a number of countries have decentralized the delivery of health and nutrition services (the Philippines, Indonesia, Timor-Leste, for example). Decentralized service delivery can be coupled with community-driven development approaches to improve nutrition (see box 1.4). Civil society organizations can play an important role in providing support in the implementation of local programs or connecting target populations with services. The SUN movement, in particular, recognizes the key role of civil society in building public will and accountability to achieve nutrition goals; these organizations can be key allies due to their function outside the political system.

C. Workforce Capacity

Strengthening nutrition capacity is perhaps the greatest and most urgent challenge. As financing to scale up nutrition is made available, there is increased need to expand the human resources capacity to design, deliver, and manage large-scale nutrition programs (Horton et al. 2010). Doctors, nurses, and midwives (as well as dietitians in some countries) make up the great majority of workers currently entrusted to deliver nutrition interventions globally. In West Africa the nutrition training of these health professionals was found to be particularly poor (Sodjinou et al. 2014), and a similar situation is likely to exist in most LMICs. Country case studies in Asia concluded the nutritional knowledge of health workers is outdated, their nutrition competencies limited to clinical and curative activities, and—for nurses and midwives especially—their job descriptions do not include nutrition responsibilities (Shrimpton et al. 2013). Such a situation is hardly a surprise, however: even in the United States and the United Kingdom the nutrition content of nurses' and medical doctors' training is considered outdated and inadequate. Very often, health staff are also inequitably distributed; shortages and inappropriate skill-mixes are especially common at lower levels of the system. In most countries studied, there isn't the dedicated workforce available (in the health system especially) with the required competencies or time to provide the outreach needed to facilitate community-based nutrition services. Indeed, most donor-funded efforts to support community-based nutrition programs use NGOs rather than formal health system capacity to reach their short-term objectives. Given the many constraints to hiring and training government workers, the NGO community has an important role in taking proven nutrition actions to scale.

Efforts to improve nutrition capacity need to provide support to frontline health workers and volunteers who encounter the DBM at the individual and household level. Globally, health professionals are ill equipped to treat obesity and associated chronic diseases. In many LMICs, education has focused on the prevention of undernutrition, and there is a need to strengthen the knowledge of health professionals regarding the prevention and treatment of obesity (Dietz et al. 2015). Nearly a decade ago, Dewey (2006) presented to the UN Standing Committee on Nutrition, recommendations on actions needed at the individual and family levels to mitigate the DBM.¹⁰ Strengthening DBM capacity will require increased investments in the

10. The key actions include (1) prioritize food and care for pregnant and lactating women and their infants; (2) breastfeed exclusively for six months and continue breastfeeding for two years or more; (3) follow guidelines for complementary feeding and care practices for infants and young children; and (4) emphasize food group diversity, responsive feeding and eating, and adequate physical activity throughout the life cycle.

curricula of national nutrition institutes to allow them the flexibility to adapt their professional training to include shifting nutrition burdens. Across all cadres, DBM messages needed to be integrated into on-the-job and workforce development trainings to refresh the skills of current practitioners. Frontline community health workers (CHWs) have the potential to improve population health, extend the reach of health systems, and address both sides of the DBM. CHWs have been shown to contribute to improved child nutrition, promotion of breastfeeding, care for acutely malnourished children, reduction of micronutrient deficiencies, and improved control and reduction of noncommunicable diseases (Perry et al. 2014). In addition to their technical skills, health and nutrition professionals and volunteers require training in behavior change communication and motivational interviewing to be able to effectively counsel individuals on the prevention of overnutrition (Dietz et al. 2015) and undernutrition.

In developing multisectoral approaches to the DBM, countries should not necessarily seek to develop cadres of nutrition specialists outside the health sector. Championing nutrition is an unappealing value proposition when nonhealth ministries are asked to invest their own limited human resources to become technical nutrition specialists. Strong nutrition technical assistance is required to sensitize nonhealth staff to nutrition and can be combined with careful consideration of the specific staff roles and responsibilities needed to maximize supply-side capacity to deliver nutrition-sensitive interventions (Levinson and Balarajan 2013). This issue has perhaps been most widely considered with regard to the growing demand for nutrition-sensitive agriculture extension services. Integrating nutrition into agriculture extension and advisory services has important training and resource considerations in the areas of higher education, specialist development, and sectoral burden (Fanzo et al. 2013). Countries will have to assess the existing resources in each sector and harness these appropriately. In Zambia, for example, the focus of district-level agriculture and nutrition staff cross-trainings are to improve localized, cross-sectoral understanding and coordination between government agriculture and health staff, rather than ask these ministries to deliver the other's specific messages (IFPRI and Concern Worldwide 2011).

D. Knowledge and Evidence

Enhancing monitoring and evaluation and adapting to the DBM is an enormous priority and a great opportunity. With the rise of the double burden of malnutrition, program implementers must do a better job of monitoring changes in nutritional epidemiology and working with technical advisors to adapt programs accordingly (Garmendia et al. 2013). Nearly all global nutrition commitments give priority to M&E, albeit with little orientation about how to do it. Although monitoring and evaluation of undernutrition programs are carried out at different frequencies and use varied data collection methods, they must all have the same overall logic (UNICEF 1991). Monitoring checks whether interventions are being implemented properly, it informs planning and programming, is typically concerned with “inputs” and “outputs” and is done frequently. Evaluation, on the other hand, identifies if interventions are having the desired effect and looks at “outcomes” and “impact.” Evaluation is conducted far less frequently, perhaps once every three to five years. Impact indicators are increasingly included in national surveys, such as the Demographic Health Surveys (DHS), and to date have mostly considered MCU risk factors, outcomes, and impacts.

For monitoring and evaluating multisectoral approaches to DBM, overnutrition outcome and impact indicators and cross-sectoral indicators will need to be included in nutrition surveys. Indicators of overnutrition, including BMI, waist circumference, adiposity, and

potentially other metabolic syndrome indicators such as blood lipids and blood pressure should be incorporated, as appropriate. Furthermore, incorporating risk factors for overweight and obesity—such as those found in the US Behavioral Risk Factor Surveillance System and the WHO STEPS—into national household surveys, such as DHS, will allow program managers and policy makers to better understand country-specific causes of and risk factors for obesity at the individual level. This information is of growing availability in the PICs but is relatively scarce in other countries across the region. In working with other sectors, the relevant indicators used can be incorporated into M&E systems to ensure coherence across sectors (WHO 2013a).

Evaluations of the effectiveness of large-scale nutrition programs are very few and mostly of poor quality. From the 61 identified large-scale nutrition projects developed in the last 30 years, just 32 had evaluations that could be extracted, allowing case studies to be developed for 21 (Mason et al. 2013). Just 11 of these allowed an analysis of the relationships between outcomes measured (yearly rate of reduction in child underweight), coverage of interventions, and intensity of resources. The relative effects of individual component interventions could not be assessed with the data available. Strengthening collaborations between donors, researchers, and program implementers from the implementation phase can improve documentation of the impact and effectiveness of large-scale programs.

There is an increasing recognition of the need to shift from an emphasis on monitoring inputs and outputs (“traditional M&E”) to monitoring outcomes (Adhikari and Bredenkamp 2009). Monitoring outcomes can allow nutrition program managers to understand if their investments are achieving the expected results. Inputs, outputs and intermediate, real-time outcomes should be monitored regularly, that is, monthly through supervision at individual or clinic level. Moving up the system, monitoring becomes more aggregated and less frequent, for example, quarterly review at the district level, semi-annual review at the regional level, and yearly at national level. Most often, monitoring data come from the routine reporting via health monitoring and information systems, drawn from individual health records in the health sector. To verify this “patient” database, it is common to do cluster surveys at the district level, usually using randomly chosen clusters of households to interview community members in their households. These are used almost universally for checking young child immunization rates, but these cluster surveys—conducted annually at district level—can provide complementary sources of nutrition outcome and impact information.

To mitigate overweight and obesity, additional tools are needed to monitor the food environment and promote national accountability. Traditional M&E indicators related to input, output, outcomes, and impact at the individual level are required. However, tracking progress on overweight/obesity calls for additional assessments of the policy and infrastructure components of healthy food environments. A global network of public interest advocates and researchers, called INFORMAS, has been established (Swinburn et al. 2013) to monitor, benchmark, and support public and private sector actions to create healthy food environments and reduce obesity, NCDs, and their related inequalities. INFORMAS has created a framework (figure 1.6) and tool that can be used to evaluate national implementation of best practices and provide practical, prioritized recommendations for further government action. These measurements are needed to establish risk factors for overweight and obesity that move beyond individual-level food consumption and physical activity choices and include a broad range of environmental exposures.

A proposal has been developed for a **Global Monitoring Framework (GMF) for the Comprehensive Implementation Plan (CIP) on Maternal, Infant, and Young Child Nutrition (MIYCN)** (WHO 2014c). The GMF has a core set of indicators to be reported on by all countries, and an extended set of indicators countries can draw upon to design national nutrition surveillance systems fitting their specific epidemiological patterns and program decisions. Four types of indicators allow the GMF to monitor the results' pathway toward the global nutrition targets: (1) primary outcome indicators that measure progress toward the six global nutrition targets; (2) intermediate outcome indicators that monitor how specific diseases and conditions on the causal pathways affect countries' trends toward the six targets; (3) process indicators that monitor program- and situation-specific progress; and (4) policy environment and capacity indicators that measure the political economy and capacity within a country. The GMF contains a wide suite of indicators for undernutrition, yet the outcome and process indicators for overweight/obesity are less well defined.

Figure 1.7 Overview of the INFORMAS Framework including “Process,” “Impact,” and “Outcome” Modules, Each with Its Main Research Question

Organizations	Processes	Public sector policies and actions				Private sector policies and actions		
		How much progress have (international, national, state, and local) governments made toward good practice in improving food environments and implementing obesity/NCD prevention policies and actions?				How are private sector organizations affecting food environments and influencing obesity/NCD prevention efforts?		
Food Environments	Impacts	Food composition	Food labeling	Food promotion	Food provision	Food retail	Food prices	Food trade & investment
		What is the nutrient composition of foods and nonalcoholic beverages?	What health-related labeling is present for foods and nonalcoholic beverages?	What is the exposure and power of promotion of unhealthy foods and nonalcoholic beverages to different population groups?	What is the nutritional quality of foods and nonalcoholic beverages provided in different settings (e.g., schools, hospitals, & workplaces)?	What is the availability of healthy and unhealthy foods and nonalcoholic beverages in communities and within retail outlets?	What is the relative price and affordability of “less healthy” compared to “healthy” foods, meals, & diets?	What are the impacts of trade and investment agreements on the healthiness of food environments?
Popul	Outco	Population diet			Physiological & metabolic risk factors		Health outcomes	

What is the quality of the diet in different populations?

What are the burdens of obesity and other risk factors?

What are the burdens of NCD morbidity and mortality?

Source: Swinburn et al. 2013.

2. SCALING UP INTERVENTIONS

The interventions to tackle the DBM can only achieve impact if they reach scale—a particular challenge given the dearth of guidance. A 30-year old seminal paper by Myers (1984) offers the greatest insight, especially in its description of three mechanisms of going to scale: explosion, association, and expansion. The most effective approach to “scale up” nutrition interventions (be they nutrition-sensitive or nutrition-specific) to achieve full coverage will depend on the complexity of delivery of the various interventions.

Scaling up through explosion is for the least complex interventions. This mechanism often bypasses the pilot stage and goes to scale immediately with one intervention model. This model can then try to adapt and accommodate to local situations as best possible, but is essentially a “top-down” process of implementation. Perhaps the best example is mass distribution of vitamin A capsules during semi-annual child health days, achieving over 80 percent coverage almost immediately.

Scaling up by association is more linear, and achieved by adding the coverage of several similar intervention approaches in different areas, gradually modifying or improving them toward the desired intervention model. More complex nutrition-specific interventions should be scaled through this more gradual approach. For example, breastfeeding promotion and counseling for complementary feeding can be improved through the use of standardized protocols in all health facilities and by improved management, supportive supervision, and regular refresher training. League tables can be constructed to rank facilities by performance indicators and can be reviewed at periodic regional meetings. The best-performing facilities can serve as models, where staff from other facilities can receive refresher courses. Such an approach can be implemented in all districts simultaneously, although it will require some time before results are visible.

Going to scale through expansion is best suited to the most complex interventions, often involving various sectors acting together. This typically involves starting small in a pilot project and building the intervention model based on local conditions and then growing incrementally, learning by doing, and adjusting as expanding. The nutrition-sensitive interventions developed through agriculture, education, and social protection sectors are likely to be the most complex, especially if they are to be coordinated with other sector interventions at the district level and below. For this reason, these integrated multisectoral approaches are better scaled up slowly to begin with, and should be monitored and evaluated very closely.

The Nepal Multi-Sectoral Nutrition Plan (MSNP) provides an example of how to scale up multisectoral nutrition programs through these three approaches (Shrimpton et al. 2014). The various sectoral packages of interventions provided through health, WASH, agriculture, and education are all being taken to scale independently in a top-down fashion in each sector, with varying numbers of districts. Six districts have been chosen for the initial process of convergence; over five years, the number of districts will be expanded to reach 72 total districts.

The Ministry of Home Affairs, which provides support to local governments, is responsible for bringing together the sectoral inputs.

3. PROMOTING BEHAVIOR CHANGE

Changing behaviors is critical for nutrition improvement (for both undernutrition and overnutrition) and an opportunity for meaningful cross-sectoral collaboration. The traditional approaches to behavior change have relied predominantly on conscious mechanisms such as education and personal responsibility. The sector concerned provides the information, be it through posters or labels on food packages, and relies on the public to internalize the information and make their own personal choices. These choices vary widely across the spectrum of over- and undernutrition, including, for example, for a mother to exclusively breastfeed a newborn baby; for a child not to drink sugary soft drinks; or for an adult to take a brisk walk for 20 minutes each day.

The MGI report (Dobbs et al. 2014) developed a behavioral change framework with four types of mechanisms: inform, enable, motivate, and influence.

- The *inform* mechanism not only deals with the availability of information, but also its “architecture” or how it is made available. Food labels, for example, can be color-coded like traffic signals to ease comprehension, and medical doctors can make it clear to their patients that unless weight is lost, the risks of diabetes or a heart attack are greatly increased.
- The *enable* component relates to ensuring options for behavior change are available. “Enabling” can refer to practices such as providing healthy food options on a canteen menu, and enacting the practice of “rooming in” in maternity homes—allowing newborn babies to stay with their mothers so they are breastfed and not bottle fed by a nurse. Another example is making available spaces to walk or take exercise, such as a park or a gymnasium.
- The *motivate* component concerns encouraging individuals to consciously change their behavior, be it by setting personal goals or through group commitments (such as in Weight Watchers), and even through material incentives from employers for adopting healthy behaviors.
- The *influence* component encompasses the choice architecture, which includes changing (or reducing) portion sizes of unhealthy foods and relative pricing (taxes) on such foods. The practice of “priming” is a part of “influence.” Priming includes associating certain foods with children’s favorite cartoon characters and creating “social norms” whereby certain behavioral choices are portrayed as being “cool” by famous sport stars and celebrities, for example.

VI. CASE STUDIES

There are no case studies of “successful” multisectoral programs that have prevented or mitigated the DBM. Latin American countries have devoted considerably more time and attention to the nutrition transition and the DBM than those in EAP; however, a recent symposium on the DBM in Latin American indicates that those responsible for public health nutrition continue to struggle to coordinate existing MCU interventions with policies and programs to curb overweight/obesity (Rivera et al. 2014).

Prior studies of malnutrition and multisectorality cover distinct facets of these issues.

Nearly a decade ago, FAO (2006) pioneered case studies of the DBM in six developing countries (China, Egypt, India, Mexico, the Philippines, and South Africa). These case studies described the problem but not programs to tackle DBM. The World Bank carried out an assessment of the DBM in Indonesia (Shrimpton and Rokx 2013), as well as a study of the successful Thailand National Nutrition Programme (Heaver and Kachondam 2002). Studies of multisectoral nutrition approaches for tackling MCU have included case studies from Senegal and Colombia (Garret and Natalicchio 2011) as well as Peru, Brazil, and Bangladesh (Levinson and Balarajan 2012). The description of population-based approaches to childhood obesity prevention (WHO 2012) featured a childhood obesity prevention approach from France.

This section draws on various sources to construct a picture of how different sectors have contributed to resolving nutrition problems in specific country situations.

The development of multisectoral nutrition approaches in four countries is summarized in table 1.12. Three of these (Indonesia, Thailand, and Brazil) have large-scale multisectoral nutrition programs that have been constructed over the last few decades to tackle MCU principally, while the fourth country (France) is the first example of a country that is taking to scale a multisectoral approach to tackling overweight and obesity.

Table 1.12 Comparative Examples of Multisectoral Approaches to Tackling Malnutrition in Four Countries

	Countries			
	Indonesia	Thailand	Brazil	France
Name & objective	1,000 HPK to address MCU	NNP to address poverty and MCU	SISAN/BFP to address poverty and MCU	EPODE to reduce/prevent childhood obesity
Target population	Children 0 to 5 years and their pregnant and lactating mothers	Children 0 to 5 years and their pregnant and lactating mothers	Children 0 to 7 years and their pregnant and lactating mothers	Children 0 to 12 years
Sectors involved and institutional arrangements	<ul style="list-style-type: none"> -Ministries of Planning, Social Welfare Coordination, Health, Social Welfare, Home Affairs, Agriculture, Education, Public Works -Weak overarching coordination mechanisms at national and district levels 	<ul style="list-style-type: none"> -Ministries of Health (MOH), Education, Agriculture, and Interior, and National Nutrition Institute -National Nutrition Committee -Local governments implementing national development plan to meet "basic minimum needs" 	<ul style="list-style-type: none"> -Ministries of Health, Education, and Social Welfare are principal actors -National-level bodies for articulating policies (CONSEA) as well as implementation (CAISAN) -Municipal councils 	<ul style="list-style-type: none"> -Central coordination in MOH Paris - Mayor's Office with local project manager -Local steering committees
Delivery platforms	<ul style="list-style-type: none"> -Posyandu (community health and nutrition posts) -Health centers -Village councils 	<ul style="list-style-type: none"> -Local governments (district to village) and community mobilization -Health centers and community health and nutrition posts 	<ul style="list-style-type: none"> -Family health program (PSF) -Family fund program (BFP) -Schools -Small farms 	<ul style="list-style-type: none"> -Crèches, health clinics, sports facilities, local cultural associations, supermarkets, school catering services, school recreation facilities, local parks
Interventions	<ul style="list-style-type: none"> -Counseling on maternal, infant, and young child feeding -Deworming and vitamin A capsules -Iron tablets for mothers - Conditional block grants to village councils -Conditional cash transfers to poor households 	<ul style="list-style-type: none"> -Social mobilization and community participation -Iron tablets and antenatal care for mothers -Counseling on maternal, infant, and young child feeding -Growth monitoring, vitamin A capsules for children, and deworming -Supplementary feeding for malnourished children (including use of vouchers) -Hygiene and sanitation -Poultry rearing and home gardens 	<ul style="list-style-type: none"> -Counseling on maternal, infant, and young child feeding -Deworming and vitamin A capsules -Immunizations -Iron tablets for mothers -Conditional cash transfers -School meals -Infrastructure grants for small farmers 	<ul style="list-style-type: none"> -Local media campaigns -Advocacy and social mobilization -Capacity building and coaching -Support for monitoring and evaluation

		Countries			
		Indonesia	Thailand	Brazil	France
Evidence of impact		<ul style="list-style-type: none"> -Selected districts, both underweight and stunting reductions achieved as well as increased participation in education and health services -Severe malnutrition eliminated -National stunting rates remain high, BUT young child overweight and obesity rates are also high 	<ul style="list-style-type: none"> -Impressive reductions in child underweight rates, and severe malnutrition eliminated -Stunting still exists, and overweight and obesity rates are rising 	<ul style="list-style-type: none"> -Significant impact on poverty reduction -Improved breastfeeding rates -Impressive reduction in young child stunting rates -Overweight and obesity rates rising 	<ul style="list-style-type: none"> -Pilot study—40% improvement -First 10 French towns—10% improvement -16 Belgian towns—22% improvement

Source: Authors

Note: HPK = Hari Pertama Kehidupan (1,000 First Days of Life) NNP = National Nutrition Programme; SISAN = the Brazilian National Food and Nutrition Security System; BFP = Bolsa Familia Programme; EPODE = Ensemble Prévenons l'Obésité Des Enfants (Let's Prevent Childhood Obesity Together).

A. INDONESIA

The “National Movement to Accelerate the Reduction in Undernutrition in Indonesia during the First 1,000 Days of Life” (1,000 HPK), is the SUN movement in Indonesia and was launched by the president in 2013. The goals of the 1,000 HPK are the six CIP targets for 2025. Nutrition-specific and nutrition-sensitive interventions are delivered by health, education, social welfare, family planning, and public works sectors, among others, under the guidance of the national social sector coordinating body (Menko Kesra) and national Ministry of Planning (Bappenas). Guided by a policy framework (Menko Kesra 2012) and implementation guidelines, the 1,000 HPK articulates the broad roles of key sectors and stakeholders in the nationwide effort to improve maternal and child nutrition. Capacity and coordination mechanisms of nutrition programs at district level are weak, especially since the responsibility for delivery of social services was decentralized to the district level in 2000 (WHO 2010b). In consequence, although the provinces and districts are encouraged to ensure that their food and nutrition plans reflect the contributions of all key sectors to stunting reduction, and all 33 provinces have food and nutrition plans, only 10 percent of districts have done so.

The principal delivery platform of the 1,000 HPK is the Posyandu: the community health and nutrition post. The Family Welfare Movement, *Pemberdayaan Kesejahteraan Keluarga*, (PKK), sponsored by the Ministry of Home Affairs through the village council, runs the Posyandu. The Posyandu cadre was initially developed by the Family Nutrition Improvement Program (UPGK) implemented from 1975 to 1990 across Indonesia. Using 56,000 Posyandu posts, this program reached some 17 million children (80 percent) (Jennings et al. 1991). The UPGK saw the virtual elimination of severe protein-energy malnutrition (as it was then called). After 1990, the Community Health and Nutrition (CHN) program changed the orientation of Posyandu to nutrition counseling instead of growth monitoring to detect severe undernutrition. CHN received World Bank funding but was only developed in five focus provinces; it struggled with issues of decentralization, and couldn't be properly evaluated (World Bank 2001).

The first National Action Plan for Food and Nutrition (RANPG) was developed for 2001–05 to meet Indonesia’s national commitment to the Millennium Development Goals (MDGs)

and especially the MDG for poverty reduction, which included nutrition targets. RANPG conceptualization included five pillars (community nutrition, food access, food safety and quality, clean and healthy behaviors, and food and nutrition institutions) largely following the structure for national nutrition programs as agreed at the First International Conference on Nutrition (ICN1) in Rome (WHO and FAO 1992). The RANPG 2011–2015 contains a situation analysis that is organized according to the five pillars of ICN1, which are also the five strategies of the plan. An analysis of the proposed activities shows just how “food-biased” the plan is. Of approximately 100 indicators listed for the various activities, community nutrition has 18 percent, food access has 59 percent, food quality and safety 11 percent, and clean and healthy lifestyles also 11 percent, and food and nutrition institutions 9 percent.

Since 2000, central ministerial-level and donor support has largely focused on selected districts. The 1,000 HPK is now concentrating in 64 districts in 11 provinces. In these districts, the Health, Family Planning, Social Welfare, Home Affairs, Public Works, and Agriculture Ministries are collaborating in a variety of ways through district-level local governments. The Ministry of Health is supporting the delivery of counseling on maternal, infant, and young child feeding, both by PKK volunteers at Posyandu as well as in health clinics, together with the delivery of vitamin A capsules, iron tablets, Sprinkles, and deworming. Conditional cash transfers are being tested in two districts of two provinces, targeted at the poorest households and linked to education and health service conditionality (World Bank 2012c). Block grants are being provided to village councils in the rural areas of five provinces through the National Community Empowerment Program—Health and Smart Generation (PNPM Generasi). The Generasi program uses a facilitated community decision-making process to allocate block grant funds to target 12 health and education indicators. Communities work with facilitators, as well as health and education service providers, to improve access to and use of health and education services.

Although national stunting levels are hardly decreasing, with about a third of young children affected, there is evidence of greater improvements in the selected areas of 1,000 HPK. After 30 months of implementation, Generasi had a positive impact on all 12 health and education indicators it was designed to address. Moreover, the program has reduced stunting by 10 percent compared to controls (Olken et al. 2011). Generasi has the potential to become even more effective with the likely inclusion of water and sanitation targets in the expansion of Generasi community block grants program, currently supported in the 64 districts through Millennium Challenge Corporation funding. Some attention to the problem of young child overweight and obesity is needed, however, as the prevalence in children under-five is already 12 percent (DEPKES 2013), which is greater than many developed countries.

B. THAILAND

Since its inception in the early 1990s, the National Nutrition Programme (NNP) was framed as part of the National Economic and Social Development Plan (NESDP). The NESDP aimed at ensuring “basic minimum needs” (BMN) were met for all of the population, and a set of indicators for seven basic sets of needs (including Food and Nutrition, Health and Education, Housing and Sanitation, Family Planning, and Participation) was used to link national financial commitments to improvement in these indicators. Nutrition was thus made a development priority and an investment in the country’s future rather than just a welfare expenditure. No single agency was the lead for the NNP, and a National Nutrition Committee

chaired by the deputy prime minister was established. In addition, a National Nutrition Institute was created in the University of Mahidol (INMU) to act as technical support and to facilitate capacity building (Heaver and Kachondam 2002). Managing the NNP through a series of committees rather than by a single agency encouraged a wide variety of interest groups to feel that nutrition was their business. Even the National Nutrition Committee moved between departments without affecting the program. Using national nutrition investment plans (rather than policy statements unlinked to resource commitments) helped generate a national vision of what needed to be done, with each implementing agency fully aware of its responsibilities.

Key sectors included the Ministries of Health, Education, Agriculture, and Interior, and the University Bureau. Through the Ministries of Health and Interior there was massive community mobilization across the country as part of the primary health care program, which involved three pillars, namely community manpower, organization, and financing (Jennings et al. 1991; Tontisirin and Winichagoon 1999). Communities were involved in assessing BMN, as well as planning to improve these by committing their own resources to supplement earmarked central government funds. Poverty alleviation funds were also targeted at the poorest areas in the form of income and employment generation projects. Community manpower was provided through a nationwide system of village health communicators (VHCs) and village health volunteers (VHVs), with ratios of 1 VHC to 100 to 200 households, and 1 VHV to 10 VHCs. Local government personnel—from the health or agriculture sector—used centrally produced materials to train volunteers on a yearly basis. Community volunteer activities included growth monitoring and promotion, with quarterly sessions linked with mass distribution of vitamin A capsules and deworming. Children with inadequate growth were given supplementary feeding, including food coupons. The volunteers also encouraged mothers to receive regular antenatal check-ups and promoted health and nutrition behaviors such as adequate breastfeeding and complementary feeding, children immunization, as well as use of oral rehydration salts. In addition to the primary health care program, local authorities also had to plan to improve primary and secondary education coverage as well as clean water and sanitation coverage. The school nutrition program included school lunches, food production, nutrition education, and maternal literacy campaigns. Home and community food production was also supported and linked to improving the complementary feeding practices.

The NNP was very successful at improving child undernutrition, such that severe malnutrition was eliminated and underweight in preschool children reduced from 51 percent in 1980 to 20 percent in 1990, and below 10 percent in 2006 (Chavasit et al. 2013). There were no formal evaluations of the NNP, so it is neither possible to attribute impact nor identify program components as most important, yet there is no doubt of its important contribution to success. The management information system of the NNP was based on the successive aggregation of the BMN package of indicators from village to district to province level (Tontisirin and Winichagoon 1999). Central resource allocation was linked to provincial-level BMN indicators, which included nutrition. Provincial committees chaired by governors and consisting of sectoral representatives convened meetings for the annual planning of each province based on BMN indicators. Thailand now has a DBM problem, however, as undernutrition hasn't been completely dealt with and overnutrition has become established (Winichagoon 2014). While low birthweight and stunting rates are lower than in the past, they still are at approximately 10 percent; issues related to teenage pregnancy, micronutrient deficiencies (iron and iodine), and insufficient breastfeeding are likely causes. Obesity and

overweight are already affecting about 33 percent of adults and nearly 10 percent of young children.

Obesity and NCDs were included in the 10th NESDP in 2009. In 2010, the National Food Committee, chaired by the prime minister, developed the Strategic Framework for Food Management in Thailand (SFFM). The SFFM is currently implemented through three committees: (1) Food Security throughout the Food Chain; (2) Food Quality and Safety; and (3) Linking Food, Nutrition, and Health. This last committee addresses NCDs as a priority issue. The current strategies under the National Food Committee are comprehensive. They focus on the links among agriculture, food, nutrition, and health with the ultimate goal of achieving food and nutrition security and prosperity for the country. It is early to say whether there are any positive results of these initiatives, but efforts to control marketing of processed foods, for example, have not yet been effective, and food labeling is not well established. Added sugar was found to be 13.8 percent of total dietary energy intake among Thai adolescents, and 60 percent of this came from sugar-sweetened beverages (Promdee et al. 2007). Thai Health Promotion Foundation (ThaiHealth) has also begun to focus on food and nutrition issues. ThaiHealth is funded entirely from a dedicated 2 percent additional tax on the sale of tobacco and alcohol. ThaiHealth's main focus has been on reducing alcohol and tobacco consumption as well as reducing road accidents, while additional activities include the promotion of exercise and efforts to reduce dietary health risks. ThaiHealth has worked in cooperation with the Office of the Basic Education Commission to inform participating schools that abstaining from one bottle of carbonated beverage a day for one month would reduce a child's weight by one kilogram. Other evidence shows that schools that did not sell carbonated beverages reduced consumption of carbonated beverages per child sevenfold, compared to schools that sold carbonated beverages. The campaign was effective, and in 2008 all schools became carbonated beverage free (Galbally et al. 2012).

C. BRAZIL

The Bolsa Familia Programme (BFP) is part of the Brazilian National Food and Nutrition Security System (SISAN), which has evolved over the last two decades to become a very effective large-scale multisectoral nutrition program. The principal sectors participating in SISAN include the Ministries of Social Development, Health, and Education. At national level SISAN is overseen by the National Council on Food and Nutrition Security (CONSEA). CONSEA is a deliberative body that is linked to the President's Office; two-thirds of its members represent civil society. Coordination and implementation of SISAN is carried out by an interministerial chamber on food and nutrition security (CAISAN), which is located in the Ministry of Social Development (Chmielewska and Souza 2011). The BFP targets mothers and children of poor families across Brazil, and had some 12 million families and 48 million beneficiaries in 2010 (Lindert et al. 2007). BFP conditionalities stipulate either school attendance for children age 5 to 18 or regular health check-ups for mothers and their children under five years of age. At the municipal level, councils and committees oversee the conditionality requirements of BFP, with the creation of registries of poor families ("cadastro unico"), which is required for a family to become BFP beneficiaries.

The delivery platforms at the municipal level are family grants that are dispensed through the banking system, based on the family's participation in the cadastro unico. The conditionality of the BFP as related to the health system includes regular pre- and postnatal care, growth monitoring, immunization, and participation in nutrition education seminars. These

services are provided largely through the Family Health Programme (Programa de Saude da Familia or PSF) of the Ministry of Health. Together, a doctor, nurse, nurse auxiliary, and four to six community health workers (CHWs) comprise a multidisciplinary family health support team working in health units in defined geographic areas covering no more than 5000 residents (Harris and Haines 2010). There are some 250,000 CHWs. These CHWs must live in the area where they work, are responsible for up to 120 families in a defined area, and conduct home visits to each family once a month. The PSF provides primary care services in 95 percent of all 5,564 municipalities, covering 55 percent of the population or some 85 million people. Coverage of PSF is not universal as it targets poorer areas. Most recently the PSF has included a nutritionist in the family health support teams to strengthen nutrition capacity (Jaime et al. 2011). SISAN also includes the school meal program (Programa Nacional de Alimentação Escolar or PNAE) through the Ministry of Education, and the Food Acquisition Programme (FAP) through the Ministry of Social Development. There is a requirement that 30 percent of food used in schools be locally produced; the Ministry of Agriculture oversees the production, with funds transferred to municipal governments. The FAP focuses primarily on small farm families, gives special attention to native fruits, and places a high premium on diversified production and consumption by small producer families. School meals are required to be healthy, incorporating fruits and vegetables produced by local farmers, and minimizing the use of ultra-processed foods.

The interventions delivered through the various delivery platforms of SISAN including the BFP, PSF, FAP, and PNAE are largely targeted at mothers and their children in poor families. The BFP monthly cash transfers range from US\$7 to US\$45 per family depending on eligibility (very poor or moderately poor). The health conditionality means that BFP beneficiaries will most likely be PSF clients. The PSF CHWs' primary concern is maternal and child health: they provide counseling on maternal, infant, and young child feeding; ensure adherence to micronutrient supplementation and immunization; and provide guidance on oral rehydration in the treatment of diarrhea. Increasingly CHWs are involved in curative care, triage, referral to the health unit, and health promotion for chronic diseases.

Impact of the various component parts of SISAN has been quite remarkable in the last decade. The BFP contributed to poverty reduction with those on less than US\$1.25 a day falling from 25.6 percent in 1990 to 4.8 percent in 2008. Estimates are that BFP contributed about 35 percent in the reduction of the extreme poverty gap. Although there is limited rigorous evidence that BFP improved nutrition outcomes (Martins et al. 2013), there is considerable ecological evidence that BFP contributed to national-level reductions. National stunting rates in young children fell from 37.1 percent in 1974–75 to 7.1 percent in 2006–07, with the steepest decline in the last 10 years of that period (Monteiro et al. 2010). In the northeast of Brazil, the prevalence of child undernutrition fell by one-third between 1986 and 1996 and by three-quarters between 1996 and 2006 (Lima et al. 2010). The improvements in the first period were associated largely with improvements in maternal schooling and in water and sanitation coverage, whereas in the second period increasing purchasing power of poorer families as well as maternal schooling were the strongest associations. Quite remarkably the median duration of breastfeeding in Brazil increased from 2.5 months in 1970 to 14.0 months in 2006–07 (Victoria et al. 2011). Furthermore, it seems likely that PSF has also contributed to the dramatic decreases in Brazil's infant mortality in the last few decades (Aquino et al. 2009).

The challenge facing SISAN now is to control increases in overweight and obesity. Half of the adult population is overweight and obese, and the prevalence of excess weight is now three times greater than that of undernutrition (Conde and Monteiro 2014). An intersectoral strategy for obesity prevention and control has been developed (CAISAN 2014), and municipalities will be progressively supported to implement these interventions through the component parts of SISAN. The strategy has six components, namely: (1) increasing the availability and access to appropriate healthy food (fruits and vegetables); (2) education, communication, and information, with a “Reference Framework for Food and Nutrition Education” and a “Food Guide” providing guidance; (3) promotion of healthy lifestyles through schools or the workplace, with healthy menus and opportunities for physical exercise; (4) food and nutrition surveillance; (5) comprehensive health care for the obese and overweight; and (6) regulation and control of food quality and safety, including marketing. It is still early to know whether the strategy will be effective, but there is already evidence that the PSF is contributing to the control of cerebrovascular and heart diseases (Rasella et al. 2014).

D. FRANCE

The “Ensemble Prévenons l'Obésité Des Enfants” (EPODE) was first developed in France in 2003 to reduce the prevalence of obesity in children under 12 years of age. The institutional arrangements in EPODE include central coordination in the Ministry of Health in Paris, which liaises with the office of the Mayor in the participating cities and includes a local project manager and a collaborating local steering committee. EPODE is a large-scale, coordinated, capacity-building approach for communities to implement effective and sustainable strategies to prevent childhood obesity (Borys et al. 2011).

EPODE is designed to involve all relevant local stakeholders in an integrated and concrete prevention program that facilitates the adoption of healthier lifestyles in everyday life (Van Koperen et al. 2013). The delivery platforms include local crèches, health clinics, sports facilities, cultural associations, supermarkets, restaurants, school catering services, school recreation facilities, and local parks and gymnasiums. The activities developed and supported include advocacy and social mobilization through local media campaigns, and capacity building and coaching of local actors, as well as monitoring and evaluation of these activities.

The sale of sugary soft drinks and vending machines were also banned in all schools across France. A tax on sugary soft drinks was introduced in 2012, leading companies to make demands at the EU for evidence of the impact of such taxes. The resulting study found that food taxes achieve a reduction in the consumption of the taxed products and, in some cases, product reformulation to reduce sugar, salt, and fat levels of the product. The study also found that product substitution takes place, both through an increase in the consumption of cheaper brands as well as of nontaxed or less-taxed product substitutes. However, the extent to which such changes in consumption lead to public health improvements is still considered inconclusive (Ecorys 2014).

The initial evaluations of the first 10 EPODE cities have produced encouraging results with 10 to 20 percent reductions in child obesity prevalence (Romon et al. 2009). EPODE now extends to nearly 1.8 million inhabitants in 167 French cities, 20 cities in Spain, and 8 cities in Belgium. In June the first EPODE Mayors' Club European Congress was held. Success to date is measured by a large field mobilization in the pilot cities and by the encouraging evolution of the BMI of children in pilot cities in France (European Public Health Alliance 2014).

VII. CONCLUSIONS AND RECOMMENDATIONS

The countries within the EAP region are extremely heterogeneous with regard to both the causes of malnutrition, as well as the specific burdens of malnutrition which predominate at the population level. The particularities spurring the rise of the DBM in EAP are largely the same as those in other regions, but they also vary considerably across EAP countries. Gender roles seem important in many countries, with low completion of secondary school by girls as well as high teenage pregnancy rates in many Pacific as well as East Asian countries. Many of the Pacific Island countries are small island states with good income from tourism industries, but very little local food production, leaving them dependent on imported foods, which is usually cheap due to subsidies in the country of origin. But many other causes are also surprisingly high, including open defecation in many East Asia and Pacific countries. One common issue affecting all EAP countries is a total lack of recognition of the problem. Malnutrition is understood as acute malnutrition (kwashiorkor or marasmus), which has largely receded, but there is little or no apprehension of the importance of stunting, much less that the harmful effects of overweight and obesity are already present with BMI >22. Thus the DBM is largely an unperceived problem. There are very few countries globally that have established effective interventions either for overweight alone or the DBM, and as such lessons learned will need to be constructed locally, drawing on global policy guidance and lessons from global literature as it emerges.

The double burden of malnutrition (DBM) is increasingly affecting EAP, with overnutrition increasing faster than undernutrition is decreasing. The region's strong economic growth contributed to reductions in undernutrition that were largely unmaintained after the turn of the 21st century. Without targeted, large-scale platforms to address the immediate and underlying determinants of undernutrition, young child stunting and/or low birthweight persist, commonly affecting between 10 and 40 percent of young children. On the other hand, overweight and obesity are affecting over half of adults in a number of countries. Thus, most EAP countries now have a DBM problem. The causes of this DBM are multiple and stretch across the life course, with early undernutrition causing increased risk of overnutrition later in the life course. Infections and food shortages, poor caring practices and unequal access to health services, low maternal health and early childbearing, and poor hygiene and sanitation services contribute to the burden of MCU. Simultaneously, unhealthy and processed foods pervade food environments across the region, contributing to an overnutrition burden caused as much by inadequate quality of diets as excess consumption and insufficient physical activity later in the life course.

These multifaceted determinants indicate that tackling the DBM problem demands a multisectoral response involving many sectors beyond health. The first priority should be to ensure optimal young child growth from conception to two years of age. This requires concerted effort from the health, education, agriculture, industry, social protection, and water and sanitation sectors; their priority actions—while well-documented—deserve reiteration. The health sector must ensure that low birthweight rates are brought down by improved antenatal care and that infant feeding practices are improved through better postnatal and well-child care. The education sector should ensure that adolescent girls remain in school until 18 years and are prepared for parenthood prior to leaving school. The agriculture sector should support women farmers, encouraging the production of nutrient-rich foods for home consumption as well as for market. The water and sanitation sector should seek to control gastrointestinal and diarrheal

diseases especially, and among young mothers and their infants in particular. The social protection sector should look to link cash transfers to household with poor families and young mothers especially, with health and education promotion where feasible.

However, tackling stunting during the first 1,000 days is not enough to mitigate the DBM: much must also be done across the life course to prevent overweight and obesity from escalating before and into adulthood. As no single sector alone can solve the problem of undernutrition, neither can health-centric interventions reverse the growing trend of overnutrition. Multiple sector contributions are needed, and necessary actions range from higher-level policies to creating supportive community environments and supporting individuals to change their behaviors. National-level political support—through taxation, regulation, and/or subsidization—is necessary to ensure social environments that support healthy decisions as the default. Interventions are needed beyond the realms of “self will” to ensure that physical activity is facilitated and easily available and access to quality diets is affordable, and that unhealthy products and habits are not promoted through the media. The education sector has an important role to play in nurturing the development of children who graduate from school with adequate life skills and appropriate habits that help them avoid these risks in adulthood. The health sector, particularly in EAP countries, needs to do more to deliver the messages and screening that can contribute to primary and secondary prevention, particularly for adults.

In considering these sectoral actions, a number of important themes emerge. The health sector has an important role to play in monitoring health and nutrition outcomes, preventing and treating the infectious and noncommunicable diseases associated with malnutrition, and providing interventions that can affect individuals’ nutrient intakes. However, the nonhealth sectors play an important role in delivering interventions related to the underlying and basic causes of malnutrition. As the scope of interventions broadens, a number of considerations can enhance the ability of nutrition-sensitive interventions to achieve impact on nutrition outcomes. These include improved targeting, use of conditions to improve participation; addition of strong nutrition goals, actions, and indicators; and prioritization of women’s health, social status, access to resources and empowerment, and time allocation (Ruel et al. 2013). It also becomes clear that nutrition-sensitive and nutrition-specific interventions aimed at individuals and households are essential, but that there are policy levers that nonhealth sectors can utilize to contribute to improved nutrition without directly intervening at the individual level.

To achieve these interventions across the life course, multisectoral approaches with effective coordination and accountability mechanisms are needed. Many EAP countries have developed national nutrition policies and plans of action that focus on MCU. In their next iterations, these policies must be leveraged to guide a response to malnutrition that is coordinated not only across sectors, but also in response to both burdens of malnutrition. In a centralized sectoral system, this coordination should be at the supra-ministerial level, guided by an agreed multisectoral framework for action, and with high-level political support. In the growing number of decentralized government systems in the region, coordination mechanisms need to be created at the local government level, and local mayors or chiefs encouraged to become champions. Experience in developing such centralized approaches is already available through the SUN movement, and many EAP countries are already collaborating in such efforts to tackle young child stunting (MCU). Where appropriate, the plans and interventions need to be broadened to include overweight/obesity. Coordination is especially important for planning and

committing funds, so that sectors can get on with implementation to achieve their agreed sectoral responsibilities. Both Brazil and Thailand controlled MCU with their own national funding rather than by relying on donor support.

Efforts to create such multisectoral approaches to tackle MCU should initially be focused and convergent in a few selected districts with encouragement for local leaders to take up the challenge. Convergence requires special effort at the local government level.

Considerable external support will be needed initially for capacity building and to construct monitoring and evaluation tools; experience, once it is gained, can be spread—again with considerable external support. Experience from Brazil and Thailand showed that linking the transfer of earmarked sectoral funds from central to local government level for sectors to implement, together with local government funds, helped ensure local-level implementation. Linking social protection through conditional cash transfers together with primary health care through community-based workers, and education completion in local schools helped ensure the convergence of effort and acceleration of impact. Targeting the most poverty-affected districts and households meant that universal convergence of all sector inputs is not needed, so effort and resources can be economized.

Multisectoral approaches for tackling the overweight and obesity dimensions of the DBM are still in their infancy, but early experience from France suggests that issues of coordination are the same, and that local government plays a critical role in driving efficiency and results. For many EAP countries, external support will be necessary to build local capacity to construct plans that tackle the problem. Where undernutrition still persists, the first priority is tackling MCU during the critical 1,000-day period from conception to two years of age. However, local plans need to consider the importance of both sides of malnutrition within the community; where community nutrition outreach exists, these efforts can become more relevant to the DBM by strengthening the delivery of nutrition messages across the life course.

The Thai Ministry of Health is expanding a successful initiative to employ community volunteers to address MCU so that their work includes collaboration with subdistrict hospitals to promote health and nutrition extending from antenatal care to elderly populations. But tackling overweight and obesity essentially requires prevention during childhood and adolescence, and for this the school is the priority setting. Ensuring that all school meals are healthy, and that children learn the importance of healthy eating and good nutrition in the classroom while also getting sufficient exercise has to become universalized across communities.

The double burden of malnutrition adds complexity to the work of public health nutrition researchers, policy makers, and program designers, which cannot be addressed without adequate monitoring, evaluation, and effectiveness data. As practitioners begin to identify the existence of the DBM in EAP, representative data (ideally at the district level) will allow

characterization of the burdens of malnutrition and their distribution at the national, household, and/or individual levels. Understanding the shifting burdens of malnutrition will require that monitoring and evaluation systems adapt to capture indicators of programmatic impact on both undernutrition and overnutrition at the individual level. Furthermore, countries need to monitor policies and programs that promote a healthy food environment. These M&E systems are desperately needed and will allow decision makers to incorporate country-specific distributions into the design of nutrition interventions. To that end, further research is needed (1) to identify

efficacious interventions that promote healthy (linear) growth without exacerbating overweight/obesity, and (2) to conduct large-scale evaluations of the programs and policies that incorporate these approaches to determine effectiveness. Providing evidence on the costs and benefits of malnutrition and associated interventions will facilitate policy makers' ability to prioritize nutrition intervention.

In taking on the DBM, engagement with the private sector cannot be avoided. Significant reductions in undernutrition have been achieved with minimal interaction with the private sector. Unlike undernutrition, the priority interventions for improving diet and preventing obesity are not found in the health sector. Food production, processing, labeling, marketing, and retailing are all key aspects of the food environment, which the private sector dominates. Actions in these areas, so urgently needed to mitigate overnutrition at the population level, will not be possible without innovation in the approach to the private sector. Private sector preferences for voluntary measures or self-regulation must be balanced against the need to monitor compliance and use sanctions to achieve impact. Lessons learned from tobacco regulation and early experiences with food industry regulation make it apparent that efforts to regulate industry will not go unchallenged. Working with the private sector can be a particularly polarizing issue for many, yet it is clear that progress on the DBM will not go far without serious discussion of the incentives, partnerships, regulations, and other mechanisms that can be brought to the table to improve the nutritional value of available diets. A proposal for a new Global Convention to Protect and Promote Healthy Diets was made in May 2014 by Consumers International and the World Obesity Federation. Its objective is to "protect current and future generations from avoidable, diet-related ill health by providing a health promoting food environment through a framework of dietary protection and promotion measures to reduce continually and substantially the prevalence of diet-related disease." By committing states to adopt comprehensive food policies that result in a healthy food environment, the convention would improve transparency in decision making and favor a greater involvement of people in shaping the food systems they depend on (De Schutter 2015).

Reducing the DBM is fundamental to sustainable development in EAP. The "1,000 Days" slogan has been critical in mobilizing civil society, governments, and funders to commit to reducing child stunting and break the intergenerational cycle of undernutrition in the region. With the growing double burden of malnutrition in the region, this call to action can be bolstered by a policy dialogue in which the first 1,000 days serves as a platform for comprehensive nutrition intervention, rather than the sole point of intervention. Particularly in EAP, there is a need to shift away from dichotomized policies addressing either undernutrition *or* overnutrition, and to develop coherent policies that promote healthy nutrition, addressing malnutrition in all forms for all life stages. Delivering nutrition-sensitive and nutrition-specific interventions to individuals will not be sufficient to mitigate the DBM; critical assessment and intervention is needed to address the role that food and living environments play in shaping choices and nutritional status.

Breaking the intergenerational cycle of malnutrition is fundamental to sustainable development in EAP. Good nutrition is fundamentally self-sustaining, with benefits flowing across one's own life course and on to the next generation (IFPRI 2014). Action on malnutrition is imperative: the consequences of this DBM will be catastrophic in EAP countries unless concerted action is taken soon. Overnutrition threatens to compound the already-significant social and economic burden of undernutrition. With increasing urbanization and incomes, diet- and nutrition-related NCDs are escalating, and rates of diabetes, high blood pressure, and high

cholesterol that accompany overweight and obesity are on the rise. Mitigating the problem is an urgent—but achievable—task. Investing in the prevention of overnutrition and undernutrition is affordable and offers high rates of return. Failure to develop integrated preventive and curative interventions for undernutrition and overnutrition—implemented across the life course by multiple sectors—will place an enormous economic burden on EAP countries and thwart the potential and prosperity of future generations.

ANNEX 1. RISK FACTORS FOR UNDERNUTRITION AND OVERNUTRITION IN EAP

Table 1A.1 Indicators of Immediate, Underlying, and Basic Determinants of Maternal and Child Undernutrition (MCU) in Select East Asia and Pacific Countries

	Cambodia	Indonesia	Lao PDR	Myanmar	Papua New Guinea	Philippines	Solomon Islands	Timor-Leste	Vanuatu	Vietnam
Care and feeding indicators (%)										
Exclusive breastfeeding <6 months (2009–13)	74	42	40	24	56x	34x	74x	52	40x	17
Introduction to solid, semi-solid, or soft foods, 6 to 8 months (2009–13)	88	91	52	76	—	90x	—	82	68x	50
Minimum acceptable diet, 6 to 23 months (2009–13)	24	37	—	—	—	—	—	—	—	—
Vitamin A supplementation, full coverage ¹ (2013)	90	82	87	—	—	89	—	40	—	—
Households with adequately iodized salt (2009–13)	—	58	—	69	92	45x	—	60x	23x	45
Maternal/reproductive health indicators (%)										
Women age 20 to 24 married by age 18 (2005–13)	18	17	35	—	21	14	22	19	21	9
Women, age 20 to 24 who gave birth before age 18 (2009–13)	7	7	18	13x	14x	53x	15	9	13	3
Women receiving at least 4 ANC visits (2009–13)	59	88	37	73 x	55 x	78	65x	55	—	60
Maternal education (%)										
Female secondary school net attendance ratio (2008–13)	45	54	45	59	—	70x	30 x,y	48	26 y	84
Food insecurity indicators² (%)										
Undernourished in total population (2011–13)	15	9	27	—	—	16	—	38	—	8
Dietary energy supply from cereals, roots, and tubers (2009–11)	72	70	72	52	—	60	67	70	47	60
Hygiene and illness										
Population with access to improved drinking water sources (2012)	71	85	72	86	40	92	81	70	91	95
Population with access to improved sanitation facilities (2012)	37	59	65	77	19	74	29	39	58	75
Treatment diarrhea with oral rehydration salts (2009–13)	34	39	42	61	—	55	38x	71	48	47

Source: UNICEF 2015, unless otherwise noted. Data refer to most recent year available during the period specified in the row heading.

Note: x = data refer to years or periods other than those specified in the row heading; y = data differ from the standard definition or refer to only part of a country; — = not available. Full coverage with vitamin A supplements is reported as the lower percentage of 2 annual coverage points (i.e., lower point between semester 1 [January to June]

and semester 2 [July to December] of 2013). Data are only presented for vitamin A supplementation priority countries. 2. Food insecurity data are from FAO 2014a. 3. Percent undernourished refers to the FAO data regarding share of population with insufficient (<2,100 kcal) caloric intake.

Table 1A.2 Indicators of Undernutrition, Overnutrition, and Associated Determinants of Overnutrition among Students, Ages 13 to 15 in Select EAP Countries

	Year	Percentage of students who were underweight (<-2SD from median for BMI by age and sex)			Percentage of students who were overweight (>+1SD from median for BMI by age and sex)			Percentage of students who were obese (>+2SD from median for BMI by age and sex)			Percentage of students who usually drank carbonated soft drinks one or more times per day during the past 30 days			Percentage of students who were physically active for a total of at least 60 minutes per day on 5 or more days during the past 7 days			Percentage of students who went to physical education (PE) class on 3 or more days each week during this school year			Percentage of students who spent 3 or more hours per day during a typical or usual day doing sitting activities		
		Total	M	F	Total	M	F	Total	M	F	Total	M	F	Total	M	F	Total	M	F	Total	M	F
Cook islands	2011	0.4	0.2	0.7	58.5	58.2	58.9	24.3	29.9	19.0	61.5	59.7	63.6	39.7	44.3	34.5	26.7	29.5	23.4	37.4	36.0	38.9
Fiji	2010	13.8	18.2	9.8	19.2	17.9	20.4	5.2	5.9	4.5	—	—	—	33.4	37.1	30.0	30.0	31.6	28.5	26.9	29.4	24.6
Indonesia ¹	2007	—	—	—	1.3	1.6	1.0	—	—	—	—	—	—	—	—	—	—	—	—	33.6	32.8	34.2
Kiribati	2011	0.3	0.5	0.1	39.8	31.9	46.4	8.2	7.8	8.5	22.3	18.4	25.6	26.8	32.8	21.9	33.7	35.5	32.2	14.2	15.2	13.4
Malaysia	2012	8.9	10.7	7.3	23.7	25.3	22.2	9.6	11.4	8.0	31.3	34	28.6	21.7	28.3	15.2	26.6	29.3	24.1	42.7	41.9	43.5
Mongolia	2013	2.8	2.7	2.8	11.5	11.3	11.7	1.6	2.4	0.8	33.8	36.7	30.8	37.6	40.6	34.5	7.1	7.6	6.4	40.7	38.0	43.4
Myanmar	2007	—	—	—	5.1	4.0	6.0	0.7	0.6	0.7	—	—	—	—	—	—	—	—	—	—	—	—
Nauru	2011	0.0	0.0	0.0	44.5	40.0	48.9	16.7	17.8	15.7	—	—	—	14.7	17.5	12.0	—	—	—	33.4	31.3	35.6
Niue ²	2010	0.0	0.0	—	56.7	60.3	—	29.7	39.9	—	77.3	73.9	—	31.5	41.4	—	27.8	35.8	—	34.5	25.7	—
Philippines	2011	11.8	14.6	9.3	10.2	11.3	9.3	2.8	3.1	2.5	42.2	42.1	42.3	13.9	14.8	13.1	22.2	19.9	24.4	32.3	29.8	34.6
Solomon islands	2011	3.5	5.4	1.5	20.0	17.6	22.4	2.2	1.5	2.9	45.1	46.4	42.5	27.2	30.0	25.1	40.0	38.5	38.6	26.8	27.1	27.8
Thailand ³	2008	—	—	—	3.4	4.7	2.1	—	—	—	32.1	35.1	29.4	—	—	—	—	—	—	37.6	37.7	37.4
Tonga	2010	0.2	0.3	0.0	58.7	59.8	57.6	21.1	23.9	18.1	56.3	55.0	57.6	25.1	24.9	25.2	23.8	22.4	24.8	28.8	28.2	29.5
Vietnam	2013	18.6	21.5	16.2	6.1	8.3	4.3	0.6	1.3	0.0	34.6	39.5	30.4	18.2	23.7	13.2	5.5	5.5	5.5	35.0	33.8	36.0

Source: WHO and CDC Global School-Based Student Health Survey, most recent available for the period 2009-2015.

Note: M = Male, F = Female.

1. Indonesia survey includes 93.5 percent children ages 13 to 15, but 3.9 percent children 12 or under, and 2.7 percent children 16 or older; overweight defined as above 95th percentile for BMI by age and sex. 2. Separate percentages not calculated for females due to small ($n < 20$) numbers. 3. The question on soft drink consumption refers to consuming a soft drink beverage 2 or more times per day in the past 30 days.

ANNEX 2. PRIORITY INTERVENTIONS FOR THE REDUCTION OF UNDERNUTRITION AND OVERNUTRITION

Table 1A.3 The Lancet (2013) Package of Nutrition-Specific Interventions

Interventions
Maternal micronutrient supplementation
Calcium supplementation to at-risk mothers
Maternal balanced energy protein supplementation
Universal salt iodization
Promotion of early and exclusive breastfeeding for 6 months and continued breastfeeding for up to 24 months
Appropriate complementary feeding education in food-secure populations and additional complementary food supplements in food-insecure populations
Vitamin A supplementation between 6 and 59 months of age
Preventive zinc supplements between 12 and 59 months of age
Management of moderate acute malnutrition
Management of severe acute malnutrition

Source: Bhutta et al. 2013

Table 1A.4 The Lancet (2010) Priority Interventions for the Prevention and Control of Noncommunicable Diseases

Priority	Interventions
1. Tobacco use	Accelerated implementation of the WHO Framework Convention on Tobacco Control
2. Dietary salt	Mass media campaigns and voluntary action by food industry to reduce consumption
3. Obesity, unhealthy diet, and physical inactivity	Mass media campaigns, food taxes, subsidies, labeling, and marketing restrictions
4. Harmful alcohol intake	Tax increases, advertising bans, and restricted access
5. Cardiovascular risk	Combination of drugs for individuals at high risk of NCDs

Source: Cecchini et al. 2010

Table 1A.5 Policy Options to Decrease Unhealthy Diet and Physical Inactivity in the World Health Organization Global Action Plan for the Prevention and Control of Noncommunicable Diseases 2013–2020

<i>Objective 3. To reduce modifiable risk factors for noncommunicable diseases and underlying social determinants through creation of health-promoting environments</i>
Implement the WHO Global Strategy on Diet, Physical Activity, and Health
Increase consumption of fruits and vegetables
Provide more convenient, safe, and health-oriented environments for physical activity
Implement recommendations on the marketing of foods and nonalcoholic beverages to children
Implement the WHO global strategy for infant and young child feeding
Reduce salt intake
Replace trans fats with unsaturated fats
Implement public awareness programs on diet and physical activity
Replace saturated fat with unsaturated fat
Manage food taxes and subsidies to promote healthy diet

Source:WHO 2013b

Table 1A.6 World Cancer Research Fund NOURISHING Framework to Promote Healthy Diets and Reduce Obesity

N	Nutrition label standards and regulations on the use of claims and implied claims on foods
O	Offer healthy foods and set standards in public institutions and other specific settings
U	Use economic tools to address food affordability and purchase incentives
R	Restrict food advertising and other forms of commercial promotion
I	Improve nutritional quality of the whole food supply
S	Set incentives and rules to create a healthy retail and food service environment
H	Harness supply chain & actions across sectors to ensure coherence with health
I	Inform people about food & nutrition through public awareness
N	Nutrition advice and counselling in health care settings
G	Give nutrition education and skills

Source: Hawkes et al. 2013

REFERENCES

- ACDI/VOCA. 2012. "Nutrition Integration Fact Sheet: Rice." [http://acdivoca.org/sites/default/files/attach/legacy/site/lookup/factsheet_rice/\\$file/factsheet_rice.pdf](http://acdivoca.org/sites/default/files/attach/legacy/site/lookup/factsheet_rice/$file/factsheet_rice.pdf). Accessed March 28, 2014.
- Acuin, C. S., G. L. Khor, T. Liabsuetrakul, E. Achadi, T. T. Htay, R. Firestone, Z. A. Bhutta. 2011. "Maternal, Neonatal, and Child Health in Southeast Asia: Towards Greater Regional Collaboration." *The Lancet* 377: 516–25.
- Adair, L. S., C. H. Fall, C. Osmond, A. D. Stein, R. Martorell, M. Ramirez-Zea, H. S. Sachdev, D. L. Dahly, I. Bas, S. A. Norris, L. Micklesfield, P. Hallal, C. G. Victora, and the COHORTS Group. 2013. "Associations of Linear Growth and Relative Weight Gain during Early Life with Adult Health and Human Capital in Countries of Low and Middle Income: Findings from Five Birth Cohort Studies." *The Lancet* 382 (9891): 525–34.
- Aderibigbe, O. R., P. T. Pisa, H. H. Vorster, and S. H. Kruger. 2014. "The Relationship between Iron Status and Adiposity in Women from Developing Countries: A Review." *Critical Reviews in Food Science and Nutrition* 54 (5): 553–60.
- ADGP (Australian Divisions of General Practice). 2003. "What Are We Feeding Our Children? A Junk Food Advertising Audit." Canberra: ADGP. <http://www.sfu.ca/medilab/426/readings/junkfoodadaussie.pdf>). Accessed January, 23 2015.
- Adhikari, S. K., and C. Bredenkamp. 2009. "Moving towards an Outcomes-Oriented Approach to Nutrition Program Monitoring: The ICDS Program." Health, Nutrition, and Population (HNP) Discussion Paper 49483, World Bank, Washington, DC.
- Aguayo, V. M., K. Paintal, and G. Singh. 2013. "The Adolescent Girl's Anemia Control Program: A Decade of Programming Experience to Break the Inter-Generational Cycle of Malnutrition in India." *Public Health Nutrition* 16 (9): 1667–76.
- Akee, R., E. Simeonova, W. Copeland, A. Angold, and E. J. Costello. 2013. "Young Adult Obesity and Household Income: Effects of Unconditional Cash Transfers." *American Economic Journal: Applied Economics* 5 (2): 1–28.
- Alderman, H., L. Elder, A. Goyal, A. Herforth, Y. T. Hoberg, A. Marini, J. Ruel-Bergeron, J. Saavedra, M. Shekar, S. Tiwari, and H. Zaman. 2013. *Improving Nutrition through Multisectoral Approaches*. Washington, DC: World Bank Group.
- Ammerman, A, M. Pignone, L. Fernandez, K. Lohr, A. D. Jacobs, C. Nester, T. Orleans, N. Pender, S. Woolf, S. F. Sutton, L. J. Lux, and L. Whitener. 2008. "Counseling to Promote a Healthy Diet." *Systematic Evidence Review* 18. Rockville, MD: Agency for Healthcare Research and Quality.
- Anderson, L. M., T. A. Quinn, K. Glanz, G. Ramirez, L. C. Kahwati, D. B. Johnson, L. R. Buchanan, W. R. Archer, S. Chattopadhyay, P. Geetika, G. P. Kalra, D. L. Katz, and Task Force on Community Preventive Services. 2009. "The Effectiveness of Worksite Nutrition and Physical Activity Interventions for Controlling Employee Overweight and Obesity: A Systematic Review." *American Journal of Preventive Medicine* 37 (4): 340–57.

- Anderson, I. 2012. "The Economic Cost of Non-Communicable Diseases in the Pacific Islands: A Rapid Stocktake of the Situation in Samoa, Tonga, and Vanuatu." Washington, DC: World Bank.
- Assah, F. K., U. Ekelund, S. Brage, J. C. Mbanya, N. J. Wareham. 2011 "Urbanization, Physical Activity, and Metabolic Health in Sub-Saharan Africa." *Diabetes Care* 34 (2): 491–96.
- Aquino, R., N. F. de Oliveira, and M. L. Barreto. 2009. "Impact of the Family Health Program on Infant Mortality in Brazilian Municipalities." *American Journal of Public Health* 99 (1): 87–93.
- Aspelund, T., V. Gudnason, B. T. Magnusdottir, K. Andersen, G. Sigurdsson, B. Thorsson, L. Steingrimsdottir, J. Critchley, K. Bennett, M. O'Flaherty, and S. Capewell. 2010. "Analysing the Large Decline in Coronary Heart Disease Mortality in the Icelandic Population Aged 25–74 between the Years 1981 and 2006." *Plos One* 5 (11): e13957.
- Baker, P. and S. Friel. 2014. "Processed Foods and the Nutrition Transition: Evidence from Asia." *Obesity Reviews* 15: 564–77.
- Barnett, J. 2011. "Dangerous Climate Change in the Pacific Islands: Food Production and Food Security." *Regional Environmental Change* 11: 229–37.
- Becerra, J. M., R. S. Reis, L. D. Frank, F. A. Ramirez-Marrero, B. Wells, E. A. Cordero, F. M. Paz, C. Crespo, V. Dujon, E. Jacoby, J. Dill, L. Weigand, and C. M. Padin. 2013. "Transport and Health: A Look at Three Latin American Cities." *Cadernos de Saude Publica* 29 (4): 654–66.
- Berti, P. R., J. Krasevec, and S. Fitzgerald. 2004. "A Review of the Effectiveness of Agriculture Interventions in Improving Nutrition," *Public Health Nutrition* 7: 599–609.
- Bhutta, Z. A., T. Ahmed, R. E. Black, S. Cousens, K. G. Dewey, E. Giugliani, B. A. Haider, B. Kirkwood, S. S. Morris, H. P. Sachdev, M. Shekar, and the Maternal and Child Undernutrition Study Group. 2008. "What Works? Interventions for Maternal and Child Undernutrition and Survival." *The Lancet* 371: 417–40.
- Bhutta, Z. A., J. K. Das, A. Rizvi, M. F. Gaffey, N. Walker, S. Horton, P. Webb, A. Lartey, R. E. Black, Lancet Nutrition Interventions Review Group, and Maternal and Child Nutrition Study Group. 2013. "Evidence-Based Interventions for Improvement of Maternal and Child Nutrition: What Can Be Done and at What Cost?" *The Lancet* 382: 452–77.
- Black, R. E., C. G. Victora, S. P. Walker, Z. A. Bhutta, P. Christian, M. de Onis, M. Ezzati, S. Grantham-McGregor, J. Katz, R. Martorell, R. Uauy, and Maternal and Child Nutrition Study Group. 2013. "Maternal and Child Undernutrition and Overweight in Low-Income and Middle-Income Countries." *The Lancet* 382: 427–51.
- Bloem, M. W., S. de Pee, L. T. Hop, N. C. Khan, A. Lailou, R. Moench-Pfanner, D. Soekarjo, Soekirman, J. K. Solon, C. Theary, and E. Wasantwisut. 2013. "Key Strategies to Further Reduce Stunting in Southeast Asia: Lessons from the ASEAN Countries Workshop." *Food and Nutrition Bulletin* 34: S8–16.
- Bloom, D. E., E. T. Cafiero, E. Jané-Llopis, S. Abrahams-Gessel, L. R. Bloom, S. Fathima, A. B. Feigl, T. Gaziano, M. Mowafi, A. Pandya, K. Prettnner, L. Rosenberg, B. Seligman, A. Z. Stein,

and C. Weinstein. 2011. *The Global Economic Burden of Noncommunicable Diseases*. Geneva: World Economic Forum.

Bly, J. L., R. C. Jones, and J. E. Richardson. 1986. "Impact of Worksite Health Promotion on Health Care Costs and Utilization. Evaluation of Johnson & Johnson's Live for Life Program." *Journal of the American Medical Association* 256: 3235–40.

Bora, S., and S. Zorya. 2014. "Targeted Social Safety Nets to Ensure Food Security." In *Rice in the Shadow of Skyscrapers: Policy Choices in a Dynamic East and Southeast Asian Setting*, ed. D. Dawe, S. Jaffee, and N. Santos. Rome: FAO.

Borys, J. M., Y. Le Bodo, S. A. Jebb, J. C. Seidell, C. Summerbell, D. Richard, S. De Henauw, L. A. Moreno, M. Romon, T. L. Visscher, S. Raffin, B. Swinburn, and EEN Study Group. 2011. "EPODE Approach for Childhood Obesity Prevention: Methods, Progress and International Development." *Obesity Reviews* 13: 299–315.

Britto, P.R., S.J. Lye, K. Proulx, A.K. Yousafzai, S.G. Matthews, T. Vaivada, R. Perez-Escamilla, N. Rao, P. Ip, L.C.H. Fernald, H. MacMillan, M. Hanson, T.D. Wachs, H. Yao, H. Yoshikawa, A. Cerezo, J.F. Leckman, Z.A. Bhutta, and the Early Childhood Development Interventions Review Group. 2016. "Nurturing Care: Promoting Early Childhood Development." *Lancet* [epub ahead of print]. 2016 Oct 3. pii: S0140-6736(16)31390-3.

Butland, B., S. Jebb, P. Kopelman, K. McPherson, S. Thomas, J. Mardell, and V. Parry. 2007. *Foresight. Tackling Obesity: Future Choices—Project Report*. London: UK Government, Office for Science.

CAISAN (Câmara Interministerial de Segurança Alimentar e Nutricional). 2014. *Estratégia intersectorial de prevenção e controle da obesidade: recomendações para estados e municípios*. Brasília: Ministério do Desenvolvimento Social e Combate à Fome.

Campbell, D. I., M. Elia, and P. G. Lunn. 2003 "Growth Faltering in Rural Gambian Infants Is Associated with Impaired Small Intestinal Barrier Function, Leading to Endotoxemia and Systematic Inflammation." *Journal Nutrition* 133 (5): 1332–38.

Campos, S., J. Doxey, and D. Hammond. 2011. "Nutrition Labels on Pre-Packaged Foods: A Systematic Review." *Public Health Nutrition* 14 (8):1496–506.

Canale, M. P., S. M. de Villahermosa, G. Martinho, V. Rovella, A. Noce, A. de Lorenzo, and N. Di Daniele. 2013. "Obesity-Related Metabolic Syndrome: Mechanisms of Sympathetic Overactivity." *International Journal of Endocrinology* 2013: 1–12.

Cassels, S. 2006. "Overweight in the Pacific: Links between Foreign Dependence, Global Food Trade, and Obesity in the Federated States of Micronesia." *Globalization and Health* 2 (10).

Cecchini, M., F. Sassi, J. A. Lauer, Y. Y. Lee, V. Guajardo-Barron, and D. Chisholm. 2010. "Tackling of Unhealthy Diets, Physical Inactivity, and Obesity: Health Effects and Cost-Effectiveness." *The Lancet* 376 (9754): 1775–84.

Chavasit, V., V. Kasemsup, and K. Tontisirin. 2013. "Thailand Conquered Undernutrition Very Successfully, but Has Not Slowed Obesity." *Obesity Reviews* 14 (Suppl 2) 98–105.

Checkley, W., G. Buckley, R. H. Gilman, A. M. Assis, R. L. Guerrant, S. S. Morris, K. Mølbak, P. Valentiner-Branth, C. F. Lanata, R. E. Black, and the Childhold Malnutrition and Infection Network. 2008. "Multi-Country Analysis of the Effects of Diarrhoea on Childhood Stunting." *International Journal of Epidemiology* 37: 816–30.

Chiabi, A., and M.-T. Obama. 2009. "Nutrition-Friendly Schools Initiative (NFSI): Another Brainstorming Strategy." *Clinics in Mother and Child Health* 6: 1155–56.

Chmielewska, D., and D. Souza. 2011. "The Food Security Policy Context in Brazil." International Policy Centre for Inclusive Growth (IPCIP) Country Study 22. Brasilia: United Nations Development Programme (UNDP).

Church, T. S., D. M. Thomas, C. Tudor-Locke, P. T. Katzmarzyk, C. P. Earnest, R. Q. Rodarte, C. K. Martin, S. N. Blair, and C. Bouchard. 2011. "Trends over 5 Decades in U.S. Occupation-Related Physical Activity and Their Associations with Obesity." *Plos One* 6: e19657.

Codling, K., C. Fabrizio, and J. Rosenzweig. 2015. "Identifying Appropriate Delivery Options for Fortified Rice." In *Scaling Up Rice Fortification in Asia*. Eds. Sight and Life and World Food Programme. Basel: Sight and Life.

Colagiuri, S., C. M. Y. Lee, R. Colagiuri, D. Magliano, J. E. Shaw, P. Z. Zimmet, and I. D. Caterson. 2010. "The Cost of Overweight and Obesity in Australia." *Medical Journal of Australia* 192: 260–64.

Conde, W. L., and C. A. Monteiro. 2014. "Nutrition Transition and Double Burden of Undernutrition and Excess of Weight in Brazil." *American Journal of Clinical Nutrition* 100: 1617S–22S.

Consumers Union. 2005. "Out of Balance: Marketing of Soda, Candy, Snacks and Fast Foods Drowns Out Healthful Messages." San Francisco: Consumers Union.

Cornia, G. A., T. Addison, and K. Sampsa, 2003. "Income Distribution Changes and Their Impact in the Post-World War II Period," UNU-WIDER Research Paper, United Nations University–World Institute for Development Economic Research.

Corpeleijn, E., W. H. Saris, and E. E. Blaak. 2009. "Metabolic Flexibility in the Development of Insulin Resistance and Type 2 Diabetes: Effects of Lifestyle." *Obesity Reviews* 10: 178–93.

Cox, A. J., N. P. West, and A. W. Cripps. 2014. "Obesity, Inflammation, and the Gut Microbiota." *The Lancet Diabetes and Endocrinology* 3 (3): 207–13.

Crum, J., J. M. Mason, and P. Hutchinson. 2012. "Analysis of Trends in Nutrition of Children and Women in Nepal." Kathmandu: UNICEF.

Curtis, V., and S. Cairncross. 2003. "Effect of Washing Hands with Soap on Diarrhoea Risk in the Community: A Systematic Review." *The Lancet: Infectious Disease* 3 (5): 275–81.

Danaei, G., M. M. Finucane, Y. Lu, G. M. Singh, M. J. Cowan, C. J. Paciorek, J. K. Lin, F. Farzadfar, Y.-H. Khang, G. A. Stevens, M. Rao, M. K. Ali, L. M. Riley, C. A. Robinson, M. Ezzati, and the Global Burden of Metabolic Risk Factors of Chronic Diseases Collaborating Group (Blood Glucose). 2011. "National, Regional, and Global Trends in Fasting Plasma

Glucose and Diabetes Prevalence Since 1980: Systematic Analysis of Health Examination Surveys and Epidemiological Studies with 370 Country-Years and 2•7 Million Participants.” *The Lancet* 377 (9765): 568–77.

Danaei, G., M. M. Finucane, J. K. Lin, G. M. Singh, C. J. Paciorek, M. J. Cowan, F. Farzadfar, G. A. Stevens, S. S. Lim, L. M. Riley, M. Ezzati, and the Global Burden of Metabolic Risk Factors of Chronic Diseases Collaborating Group (Blood Pressure). “National, Regional, and Global Trends in Systolic Blood Pressure Since 1980: Systematic Analysis of Health Examination Surveys and Epidemiological Studies with 786 Country-Years and 5•4 Million Participants.” *The Lancet* 378: 31–40.

Dangour, A. D., L. Watson, O. Cumming, S. Boisson, Y. Che, Y. Velleman, S. Cavill, E. Allen, and R. Uauy. 2013. “Interventions to Improve Water Quality and Supply, Sanitation and Hygiene Practices, and Their Effects on the Nutritional Status of Children.” *Cochrane Database of Systematic Reviews* 8 (CD009382).

Darnton-Hill, I., C. Nishida, and W. P. T. James. 2004. “A Life Course Approach to Diet, Nutrition and Prevention of Chronic Disease.” *Public Health Nutrition* 7 (1A): 101–21.

Delisle, H. F., O. Receveur, V. Agueh, and C. Nishida. 2013. “Pilot Project of the Nutrition-Friendly School Initiative (NFSI) in Ouagadougou, Burkina Faso and Cotonou, Benin, in West Africa.” *Global Health Promotion* 20 (1): 39–49.

DEPKES. 2007. *Riset Kesehatan Dasar Laporan Nasional 2007*. Badan Penelitian dan Pengembangan Kesehatan. Jakarta: Departemen Kesehatan, Republik Indonesia.

———. 2010. *National Report on Basic Health Research, Riskesdas, 2010*. Jakarta, Indonesia. As analyzed at http://www.who.int/nutgrowthdb/database/countries/who_standards/idn_dat.pdf?Ua=1.

———. 2013. *Riset Kesehatan Dasar Laporan Nasional 2013*. Badan Penelitian dan Pengembangan Kesehatan. Jakarta: Departemen Kesehatan, Republik Indonesia.

De Schutter, O. 2015. “Towards a Framework Convention on Healthy Diets.” *SCN News* 41: 94–98,

Devereux, S., J. Marshall, J. MacAskill, and L. Pelham. 2005. “Making Cash Count: Lessons from Cash Transfer Schemes in East and Southern Africa for Supporting the Most Vulnerable Children and Households.” Brighton, UK: Institute of Development Studies.

Dewey, K. G. 2006. “Tackling the Double Burden of Malnutrition.” *SCN News* 32. www.unscn.org/layout/modules/resources/files/scnnews32.pdf. Accessed April 4, 2015.

Dewey, K. G., and S. L. Huffman. 2009. “Maternal, Infant, and Young Child Nutrition: Combining Efforts to Maximize Impacts on Child Growth and Micronutrient Status.” *Food and Nutrition Bulletin* 30 (2 Suppl): S187–89.

Dietz, W. H., L. A. Baur, K. Hall, R. M. Puhl, E. M. Taveras, R. Uauy, and P. Kopelman. 2015. “Management of Obesity: Improvement of Health-Care Training and Systems for Prevention and Care.” *The Lancet*; doi: 10.1016/S0140-6736(14)61748-7.

- Dhurandhar, E. J., and S. W. Keith. 2014. "The Aetiology of Obesity beyond Eating More and Exercising Less." *Best Practice and Research Clinical Gastroenterology* 28: 533–44.
- Di Nicolantonio, J. J. 2015. "The Cardiometabolic Consequences of Replacing Saturated Fats with Carbohydrates or Ω -6 Polyunsaturated Fats: Do the Dietary Guidelines Have It Wrong?" *Open Heart* 1: e000032.
- Dobbs, R., C. Sawers, F. Thompson, J. Manyika, J. Woetzel, P. Child, S. McKenna, and A. Spatharou. 2014. "Overcoming Obesity: An Initial Economic Analysis." London: McKinsey Global Institute.
- Dobbins, M., H. Husson, K. Decorby, and R. L. Larocca. 2013. "School-Based Physical Activity Programs for Promoting Physical Activity and Fitness in Children and Adolescents Aged 6 to 18." *Cochrane Database of Systematic Reviews* 2 (CD007651).
- Du, T., X. Sun, P. Yin, R. Huo, C. Ni, and X. Yu. 2013. "Increasing Trends in Central Obesity among Chinese Adults with Normal Body Mass Index, 1993–2009." *BMC Public Health* 13 (327): 1–8.
- Eckel, R. H., K. G. Alberti, S. M. Grundy, and P. Z. Zimmet. 2010. "The Metabolic Syndrome." *The Lancet* 375 (9710): 181–83.
- Ecorys. 2014. *Food Taxes and Their Impact on Competitiveness in the Agri-Food Sector*. Rotterdam, the Netherlands: European Competitiveness and Sustainable Industrial Policy (ECSIP) Consortium.
- Escalante de Cruz, A., S. Phillips, M. Visch, and D. B. Saunders. 2004. "The Junk Food Generation: A Multi-Country Survey of the Influence of Television Advertisements on Children." Kuala Lumpur: Consumers International.
- Esrey, S. A. 1996. "Water, Waste, and Well-Being: A Multi-Country Study." *American Journal of Epidemiology* 143 (6): 608–23.
- Estruch, R., E. Ros, J. Salas-Salvadó, M. I. Covas, D. Corella, F. Arós, E. Gómez-Gracia, V. Ruiz-Gutiérrez, M. Fiol, J. Lapetra, R. M. Lamuela-Raventos, L. Serra-Majem, X. Pintó, J. Basora, M. A. Muñoz, J. V. Sorlí, J. A. Martínez, M. A. Martínez-González, and PREDIMED Study Investigators. 2013. "Primary Prevention of Cardiovascular Disease with a Mediterranean Diet." *New England Journal of Medicine* 368 (14): 1279–90.
- European Commission. 2012. *Communication from the Commission to the European Parliament and the Council. Enhancing Maternal and Child Nutrition in External Assistance: An EU Policy Framework*. Brussels: European Commission.
- European Public Health Alliance. 2014. "EPODE—Together Let's Prevent Childhood Obesity." <http://www.ephah.org/a/3149>. Accessed October 26, 2014.
- Fan, S., P. Menon, and J. Brzeska. 2013. "What Policy Changes Will Reverse Persistent Malnutrition in Asia?" *European Journal of Development Research* 25: 28–35.

Fanzo, J., Q. Marshall, J. Wong, R. I. Merchan, M. I. Jaber, A. Souza, and N. Verjee. 2013. *The Integration of Nutrition into Extension and Advisory Services: A Synthesis of Experiences, Lessons, and Recommendations*. Lindau, Switzerland: Global Forum for Rural Advisory Services.

Fanzo, J., S. Curran, R. Remans, V. Mara, J. S. Briseno, D. Cisewski, G. Denning, and P. Fracassi. 2014. "Simulating Potential of Nutrition-Sensitive Interventions." New York: Columbia University, Earth Institute, Center on Globalization and Sustainable Development.

FAO (Food and Agriculture Organization). 2002. *World Agriculture: Towards 2015/2030*. Rome: FAO.

———. 2003. *Nutrition Country Profiles—Laos*. Rome: FAO.

———. 2006. *The Double Burden of Malnutrition: Case Studies from Six Developing Countries*. Rome: FAO.

———. 2013. *The State of Food and Agriculture in the World: Food Systems for Better Nutrition*. Rome: FAO.

———. 2014a. *Statistics: Food Insecurity Indicators*. <http://www.fao.org/economic/ess/ess-fs/ess-fadata/en/>.

———. 2014b. *Second International Conference on Nutrition: Rome Declaration on Nutrition*. Rome: FAO.

———. 2014c. *Sustainable Economic Development via Strengthened Linkages: Tourism Sector Options for Improving Tourism and Agriculture Linkages*. Samoa: FAO Sub-Regional Office for the Pacific Islands.

Farzadfar, F., M. M. Finucane, G. Danaei, P. M. Pelizzari, M. J. Cowan, C. J. Paciorek, G. M. Singh, J. K. Lin, G. A. Stevens, L. M. Riley, M. Ezzati, and the Global Burden of Metabolic Risk Factors of Chronic Diseases Collaborating Group (Cholesterol). 2011. "National, Regional, and Global Trends in Serum Total Cholesterol since 1980: Systematic Analysis of Health Examination Surveys and Epidemiological Studies with 321 Country-Years and 3.0 Million Participants." *The Lancet* 377: 578–86.

Fink, G., I. Günther, and K. Hill. 2011. "The Effect of Water and Sanitation on Child Health: Evidence from the Demographic and Health Surveys 1986–2007." *International Journal of Epidemiology* 40 (5): 1196–204.

Finkelstein, E. A., J. Chay, and S. Bajpal. 2014. "The Economic Burden of Self-Reported and Undiagnosed Cardiovascular Diseases and Diabetes on Indonesian Households." *PLoS ONE* 9 (6): e995572.

Finkelstein, E. A., J. G. Trogon, J. W. Cohen, and W. Dietz. 2009. "Annual Medical Spending Attributable to Obesity: Payer- and Service-Specific Estimates." *Health Affairs* 28 (5): w822–w831.

Finucane, M. M., G. A. Stevens, M. J. Cowan, G. Danaei, J. K. Lin, C. J. Paciorek, G. M. Singh, H. R. Gutierrez, Y. Lu, A. N. Bahalim, F. Farzadfar, L. M. Riley, M. Ezzati, and the

Global Burden of Metabolic Risk Factors of Chronic Diseases Collaborating Group (Body Mass Index). 2011. "National, Regional, and Global Trends in Body-Mass Index Since 1980: Systematic Analysis of Health Examination Surveys and Epidemiological Studies with 960 Country-Years and 9.1 Million Participants." *The Lancet* 377: 557–67.

Fisher, J. O., and L. L. Birch. 1999. "Restricting Access to Foods and Children's Eating." *Appetite* 32 (3): 405–19.

Flynn, M. A., D. A. McNeil, B. Maloff, D. Mutaswanga, M. Wu, C. Ford, and S. C. Tough. 2006. "Reducing Obesity and Related Chronic Disease Risk in Children and Youth: A Synthesis of Evidence with 'Best Practice' Recommendations." *Obesity Reviews* Suppl 1: 7–66.

FNRI (Food and Nutrition Research Institute). 2008. *7th National Nutrition Survey: Philippines, 2008: Initial Results*. www.ndap.org.ph/files/upload/7th-National%20Nutrition%20Survey.pdf.

Forde, I., T. Chandola, S. Garcia, M. G. Marmot, and O. Attanasio. 2012. "The Impact of Cash Transfers to Poor Women in Colombia on BMI and Obesity: Prospective Cohort Study." *International Journal of Obesity* 36 (9): 1209–14.

Foster, E. M., M. Jiang, and C. M. Gibson-Davis. 2010. "The Effect of the WIC Program on the Health of Newborns." *Health Services Research* 45 (4): 1083–104.

Garmendia, M. L., C. Corvalan, and R. Uauy. 2013. "Addressing Malnutrition While Avoiding Obesity: Minding the Balance." *European Journal of Clinical Nutrition* 67: 513–17.

Garrett, J. L., and M. T. Ruel. 2005. "The Coexistence of Child Undernutrition and Maternal Overweight: Prevalence, Hypotheses, and Program and Policy Implications." *Maternal and Child Nutrition* 1 (3): 185–96.

Garrett, J. L., L. Bassett, and F. J. Levinson. 2011. "Principles and a Conceptual Model for Working Multisectorally. In *Working Multisectorally in Nutrition: Principles, Practices and Case Studies*, ed. J. L. Garret and M. Natalicchio. Washington, DC: International Food Policy Research Institute (IFPRI).

Garret, J. L., and M. Natalicchio. 2011. *Working Multisectorally in Nutrition: Principles, Practices and Case Studies*. Washington, DC: International Food Policy Research Institute (IFPRI).

Gaziano, T. A., S. Abrahams-Gessel, C. A. Denman, C. M. Montana, M. Khanam, T. Puoane, and N. S. Levit. 2015. "An Assessment of Community Health Workers' Ability to Screen for Cardiovascular Disease Risk with a Simple, Non-Invasive Risk Assessment Instrument in Bangladesh, Guatemala, Mexico, and South Africa: An Observational Study." *Lancet Global Health* 3: e556–63.

Gillespie, A., H. Creed-Kanashiro, D. Sirivongsa, D. Sayakoummane, and R. Galloway. 2004. "Consulting with Caregivers: Using Formative Research to Improve Maternal and Newborn Care and Infant and Young Child Feeding in the Lao People's Democratic Republic." Health, Nutrition, and Population Discussion Paper, World Bank, Washington, DC.

Global Panel on Agriculture and Food Systems for Nutrition. 2014. "How Can Agriculture and Food System Policies Improve Nutrition?" Technical brief, Global Panel on Agriculture and Food Systems for Nutrition, London, UK.

- Gluckman, P. D., M. A. Hanson, and C. Pinal. 2005. "The Developmental Origins of Adult Disease." *Maternal and Child Nutrition* 1: 130–41.
- Gregor, M. F., and G. S. Hotamisligil. 2011. "Inflammatory Mechanisms in Obesity." *Annual Review of Immunology* 29: 415–45.
- Grieve, H., J. Busch-Hallen, and J. Hawtin. 2013. "Opportunities for Development Partners to Strengthen Food and Nutrition Security Policy to Prevent the Double Burden of Malnutrition in South East Asia and the Pacific." Policy Brief, Menzies School of Health Research, Darwin, Australia.
- Haddad, L., L. Cameron, and I. Barnette. 2014. "The Double Burden of Malnutrition in SE Asia and the Pacific: Priorities, Policies, and Politics." *Health Policy and Planning*. First published online October 15, 2014.
- Hallal, P., L. Andersen, F. Bull, R. Guthold, W. Haskell, and U. Ekelund. 2012. "Global Physical Activity Levels: Surveillance Progress, Pitfalls, and Prospects." *The Lancet* 380: 247–57.
- Harris, M., and A. Haines. 2010. "Brazil's Family Health Program." *BMJ* 341: c4945.
- Hawkes, C. 2004. *Nutrition Labels and Health Claims: The Global Regulatory Environment*. Geneva: World Health Organization (WHO).
- . 2007. *Marketing Food to Children: Changes in the Global Regulatory Environment*. Geneva: World Health Organization (WHO).
- Hawkes, C., and M. Ruel. 2011. "Value Chains for Nutrition. 2020 Conference: Leveraging Agriculture for Improving Nutrition and Health." 2020 Conference Paper 4, International Food Policy Research Institute (IFPRI), Washington, DC.
- Hawkes, C., J. Jewell, and K. Allen. 2013. "A Food Policy Package for Healthy Diets and the Prevention of Obesity and Diet-Related Noncommunicable Diseases: the NOURISHING Framework. *Obesity Reviews* 14 (Suppl 2): 159-68.
- Heaver, R., and Y. Kachondam. 2002. "Thailand's National Nutrition Program: Lessons in Management and Capacity Development." Health, Nutrition, and Population Discussion Paper, World Bank, Washington, DC.
- Herforth, A, and J. Harris. 2014. "Understanding and applying primary pathways and principles. Brief #1. Improving nutrition through agriculture technical brief series." Arlington, VA: USAID/Strengthening Partnerships, Results, and Innovations in Nutrition Globally (SPRING) Project.
- Hill, Z., M. Dumbaugh, L. Benton, K. Kallander, D. Strachan, A. Ten Asbroek, J. Tibenderana, B. Kirkwood, and S. Meek. 2014. "Supervising Community Health Workers in Low-Income Countries: A Review of Impact and Implementation Issues." *Global Health Action* 7: 24085.
- Ho, M., S. P. Garnett, L. Baur, T. Burrows, L. Stewart, M. Neve, and C. Collins. 2012. "Effectiveness of Lifestyle Interventions in Child Obesity: Systematic Review with Meta-Analysis." *Pediatrics* 130 (6): e1647–71.

- Hoberg, Y. T., A. Herforth, M. Shekar, and A. Goyal. 2013. "Improving Nutrition through Agriculture and Rural Development." In *Improving Nutrition through Multisectoral Approaches*, 55–105. Washington, DC: World Bank.
- Hoddinott, J., and L. Bassett. 2009. *Conditional Cash Transfer Programs and Nutrition in Latin America: Assessment of Impacts and Strategies for Improvement*. Santiago: United Nations Food and Agriculture Organization (FAO).
- Holvoet, P. 2008. "Relations between Metabolic Syndrome, Oxidative Stress, and Inflammation and Cardiovascular Disease." *Verh K Acad Geneesk Belg* 70 (3): 193–219.
- Horton, S., M. Shekar, C. McDonald, A. Mahal, and J. K. Brooks. 2010. "Scaling Up Nutrition. What Will It Cost?" Directions in Development Series, World Bank, Washington, DC.
- Horton, S., and R. Steckel. 2013. "Malnutrition: Global Economic Losses Attributable to Malnutrition 1900–2000 and Projections to 2050." In *The Economics of Human Challenges*, ed. B. Lomborg. Cambridge, UK: Cambridge University Press.
- Horton, S., and J. Hoddinot. 2014. "Benefits and Costs of the Food and Nutrition Targets for the Post-2015 Development Agenda: Post-2015 Consensus." Food Security and Nutrition Perspective Paper, Copenhagen Consensus Center.
- Hou, X., J. Lu, J. Weng, L. Ji, Z. Shan, J. Liu, H. Tian, Q. Ji, D. Zhu, J. Ge, L. Lin, L. Chen, X. Guo, Z. Zhao, Q. Li, Z. Zhou, G. Shan, Z. Yang, W. Yang, W. Jia and the China National Diabetes and Metabolic Disorders Study Group. 2013. "Impact of Waist Circumference and Body Mass Index on Risk of Cardiometabolic Disorder and Cardiovascular Disease in Chinese Adults: A National Diabetes and Metabolic Disorders Survey." *Plos ONE* 8 (3): e57319.
- Hu, F. B. 2013. "Resolved: There Is Sufficient Scientific Evidence That Decreasing Sugar-Sweetened Beverage Consumption Will Reduce the Prevalence of Obesity and Obesity-Related Diseases." *Obesity Reviews* 14: 606–19.
- Hughes, R. G. 2003. *Diet, Food Supply and Obesity in the Pacific*. Manila: World Health Organization Regional Office for the Western Pacific.
- Humphrey, J. H. 2009. "Child Undernutrition, Tropical Enteropathy, Toilets, and Handwashing." *The Lancet* 374: 1032–35.
- IFPRI (International Food Policy Research Institute). 2014. *Global Nutrition Report 2014: Actions and Accountability to Accelerate the World's Progress on Nutrition*. Washington, DC: IFPRI.
- IFPRI (International Food Policy Research Institute) and Concern Worldwide. 2011. "Rationale, Model & Implementation in Mumbwa District." RAIN Project Brief 1. https://www.concern.net/sites/default/files/media/page/rain_brief_no_1_nov_2011_1.pdf. Accessed March 30, 2015.
- Institute for Health Metrics and Evaluation (IHME), Human Development Network, World Bank. 2013. *The Global Burden of Disease: Generating Evidence, Guiding Policy*. East Asia and Pacific Regional Edition. Seattle: IHME.

Institute of Medicine. 2012. *Accelerating Progress in Obesity Prevention: Solving the Weight of the Nation*. Washington, DC: The National Academies Press.

Jauch-Chara, K., and K. M. Oltmanns. 2014. "Obesity—A Neuropsychological Disease? Systematic Review and Neuropsychological Model." *Progress in Neurobiology* 114: 84–101.

Jaime, P. C., A. C. F. Silva, A. M. C. Lima, and G. A. Bortolini. 2011. "Ações de alimentação e nutrição na atenção básica: a experiencia de organização no governo Brasileiro." *Reviews Nutrition* 24 (6) 809–24.

Jennings, J., G. Gillespie, J. Mason, M. Lotfi, and T. Scialfa. 1991. "Managing Successful Nutrition Programmes." Nutrition Policy Discussion Paper 8, United Nations Standing Committee on Nutrition (UNSCN), Geneva.

Jensen, R. T., and N. H. Miller. 2011. "Do Consumer Price Subsidies Really Improve Nutrition?" *Review of Economic Statistics* 93 (4): 1205–23.

Jomaa, L., E. McDonnell, and C. Probart. 2011. "School Feeding Programs in Developing Countries: Impact on Children's Health and Educational Outcomes." *Nutrition Reviews* 69: 83–98.

Kandpal, E., H. Alderman, J. Friedman, D. Filmer, J. Onishi and J. Avalos. 2016. "A Conditional Cash Transfer Program in the Philippines Reduces Severe Stunting." *Journal of Nutrition* 146 (9) 1793-800.

Kasapilla, W., and S. M. D. Shaarani. 2011. "Harmonisation of Food Labelling Regulations in Southeast Asia: Benefits and Implications." *Asia Pacific Journal of Clinical Nutrition* 20 (1): 1–8.

Kochar, A. 2005. "Can Targeted Food Programs Improve Nutrition? An Empirical Analysis of India's Public Distribution System." *Economic Development and Cultural Change* 54 (1): 203–35.

Kohr, G. L. 2008. "Food-Based Approaches to Combat the Double Burden of Malnutrition among the Poor: Challenges in the Asian Context." *Asia Pacific Journal of Clinical Nutrition* 17 (S1): 111–15.

Kontis, V., C. D. Mathers, J. Rehm, G. A. Stevens, K. D. Shield, R. Bonita, L. M. Riley, V. Poznyak, R. Beaglehole, and M. Ezzati. 2014. "Contribution of Six Risk Factors to Achieving the 25×25 Non-Communicable Disease Mortality Reduction Target: A Modelling Study." *The Lancet* 384 (9941): 427–37.

Kotzampassi, K., E. J. Giamarellos-Bourboulis, and G. Stavrou. 2014. "Obesity as a Consequence of Gut Bacteria and Diet Interactions." *ISRN Obesity* 651895: 1–8.

Kraak, V. I., B. Swinburn, M. Lawrence, and P. Harrison. 2014. "An Accountability Framework to Promote Healthy Food Environments." *Public Health Nutrition* 17 (11): 2467–83.

Kristjansson, B., V. Robinson, M. Petticrew, B. MacDonald, J. Krasevec, L. Janzen, T. Greenhalgh, G. A. Wells, J. MacGowan, A. P. Farmer, B. Shea, A. Mayhew, P. Tugwell, and V.

- Welch. 2009. "School Feeding for Improving the Physical and Psychosocial Health of Disadvantaged Students" (Review). The Cochrane Library.
- Kroker-Lobos, M. F., A. Pedroza-Tobias, L. S. Pedraza, and J. A. Rivera. 2014. "The Double Burden of Undernutrition and Excess Body Weight in Mexico." *Am J Clin Nutr* 100 (suppl): 1652S–8S.
- Kropf, M. L., D. H. Holben, J. P. Holcomb, Jr., and H. Anderson. 2007. "Food Security Status and Produce Intake and Behaviors of Special Supplemental Nutrition Program for Women, Infants, and Children and Farmers' Market Nutrition Program Participants." *Journal of the American Dietetics Association* 107 (11): 1903–08.
- Kruk, 2008. "Regular Physical Activity Is an Important Aspect of NCD Prevention, Especially for Cancer." *Asian Pacific Journal of Cancer Prevention* 8 (3): 325–38.
- Kwon, H., and J. E. Pessin. 2014. "Adipokines Mediate Inflammation and Insulin Resistance." *Front Endocrinology (Lausanne)*. 4 (71): 1–13.
- Lawrence, M. 2005. *Using Domestic Law in the Fight against Obesity: An Introductory Guide for the Pacific*. Manila: World Health Organization Regional Office for the Western Pacific
- Labbok, M. H. 2012. "Global Baby-Friendly Hospital Initiative Monitoring Data: Update and Discussion." *Breastfeeding Medicine* 7: 210–22.
- Lagarde, M., A. Haines, and N. Palmer. 2009. "The Impact of Conditional Cash Transfers on Health Outcomes and Use of Health Services in Low- and Middle-Income Countries." *Cochrane Database Systematic Review* (4): CD008137.
- Laillou, A., E. Yakes, T. H. Le, Wieringa, B. M. Le, R. Moench-Pfanner, and J. Berger. 2014. "Intra-Individual Double Burden of Overweight and Micronutrient Deficiencies among Vietnamese Women." *Plos One* 9 (10): e110499.
- Lakshman, R., J. Zhang, J. Zhang, F. S. Koch, C. Marcus, J. Ludvigsson, K. K. Ong, and T. Sobko. 2013. "Higher Maternal Education Is Associated with Favourable Growth of Young Children in Different Countries." *Journal of Epidemiology and Community Health*. 67 (7): 595–602.
- Laatikainen, T., J. Critchley, E. Vartiainen, V. Salomaa, M. Ketonen, and S. Capewell. 2005. "Explaining the Decline in Coronary Heart Disease Mortality in Finland between 1982 and 1997." *American Journal of Epidemiology* 162 (8): 764–73.
- Lee, C. M., S. Colagiuri, M. Ezzati, and M. Woodward. 2011. "The Burden of Cardiovascular Disease Associated with High Body Mass Index in the Asia-Pacific Region." *Obesity Reviews*. 12: e454–e459.
- Lee, C. M., R. R. Huxley, T. H. Lam, A. L. Martiniuk, H. Ueshema, W. H. Pan, T. Welborn, M. Woodward, and the Asia Pacific Cohort Studies Collaboration. 2007. "Prevalence of Diabetes Mellitus and Population Attributable Fractions for Coronary Heart Disease and Stroke Mortality in the WHO South-East Asia and Western Pacific Regions." *Asia Pacific Journal of Clinical Nutrition* 16 (1): 187–92.

- Lehmann, U., and D. Sanders. 2007. *Report on Community Health Workers: What Do We Know about Them? Evidence and Information for Policy*. Geneva: WHO, Department of Human Resources for Health.
- Leroy, J. L., P. Gadsden, T. González de Cossío, and P. Gertler. 2013. “Cash and In-Kind Transfers Lead to Excess Weight Gain in a Population of Women with a High Prevalence of Overweight in Rural Mexico.” *The Journal of Nutrition* 143 (3): 378–83.
- Leroy, J. L., P. Gadsden, S. Rodríguez-Ramírez, and T. G. de Cossío. 2010. “Cash and In-Kind Transfers in Poor Rural Communities in Mexico Increase Household Fruit, Vegetable, and Micronutrient Consumption but Also Lead to Excess Energy Consumption.” *The Journal of Nutrition* 140 (3): 612–17.
- Leroy, J. L., J. P. Habicht, T. González de Cossío, and M. T. Ruel. 2014. “Maternal Education Mitigates the Negative Effects of Higher Income on the Double Burden of Child Stunting and Maternal Overweight in Rural Mexico.” *The Journal of Nutrition* 144 (5): 765–70.
- Levinson, F. J., and Y. Balarajan. 2013. *Addressing Malnutrition Multi-Sectorally: What Have We Learned from Recent International Experience?* New York: UNICEF.
- Levinson, F. J., and M. McLachlan. 1999. “How Did We Get Here? A History of International Nutrition.” In *Scaling up Scaling Down: Overcoming Malnutrition in Developing Countries*, ed. T. Marchione. Amsterdam: Gordon and Breach.
- Lieberman, S. S. 2002. *Decentralization and Health in the Philippines and Indonesia: An Interim Report*. Washington, DC: World Bank.
- Lindert, K., A. Linder, J. Hobbs, and B. de la Briere. 2007. “The Nuts and Bolts of Brazil’s Bolsa Familia Program: Implementing Conditional Cash Transfers in a Decentralized Context.” Social Protection Discussion Paper 0709, World Bank, Washington, DC.
- Lobstein, T., R. Jackson-Leach, M. L. Moodie, K. D. Hall, S. L. Gortmaker, B. A. Swinburn, W. P. T. James, Y. Wang, and K. McPherson. 2015. “Child and Adolescent Obesity: Part of a Bigger Picture.” *The Lancet*. 385 (9986): 2510–20.
- Lunn, P. G., C. A. Northrop-Clewes, and R. M. Downes. 1991. “Intestinal Permeability, Mucosal Injury, and Growth Faltering in Gambian Infants.” *The Lancet* 338 (8772): 907–10.
- Macniven, R., A. Bauman, and M. Abouzeid. 2012. “A Review of Population-Based Prevalence Studies of Physical Activity in Adults in the Asia-Pacific Region.” *BMC Public Health* 12: 41 (1–12).
- Malik, V. S., B. Schulze, and F. B. Hu. 2006. “Intake of Sugar-Sweetened Beverages and Weight Gain: A Systematic Review.” *American Journal of Clinical Nutrition* 84: 274–88.
- Manley, J., S. Gitter, and V. Slavchevska. 2012. “How Effective Are Cash Transfer Programmes at Improving Nutritional Status? A Rapid Evidence Assessment of Programmes’ Effects on Anthropometric Outcomes.” London: University of London. Institute of Education, Social Science Research Unit, EPPI-Centre

- Marini, A., H. Alderman, and M. Shekar. 2013. "Improving Nutrition through Social Protection." In *Improving Nutrition through Multisectoral Approaches*, 107–29. Washington, DC: World Bank.
- Martins, A. P. B., D. S. Canella, L. G. Baraldi, and C. A. Monteiro. 2013. "Cash Transfers in Brazil and Nutritional Outcomes: A Systematic Review." *Review Saude Publica* 47 (6): 1159–71.
- Mason, J. B., D. Sanders, P. Musgrove, Soekirman, and R. Galloway. 2006. "Community Health and Nutrition Programmes." Chapter 56 In *Disease Control Priorities in Developing Countries*, 2nd edition Edited by Dean T Jamison, J.G. Breman, A.R. Measham AR, G. Alleyne, M. Claeson, D.B. Evans, P. Jha, A. Mills, P. Musgrove, Washington, DC: World Bank.
- Mason, J. B., J. White, and J. Crum. 2013. "Part II, Effectiveness of Large-Scale Nutrition Programmes: Evidence and Implications." In *Essential Nutrition Actions: Improving Maternal New-Born Infant and Young Child Health and Nutrition*. Geneva: World Health Organization (WHO).
- Masset, E., L. Haddad, A. Cornelius, and J. Isaza-Castro. 2011. *A Systematic Review of Agricultural Interventions That Aim to Improve Nutritional Status of Children*. London: University of London, Institute of Education, Social Science Research Unit, EPPI-Centre.
- McCabe, M. P., H. Mavoia, L. A. Ricciardelli, J. T. Schultz, G. Waqa, and K. F. Fotu. "Socio-Cultural Agents and Their Impact on Body Image and Body Change Strategies among Adolescents in Fiji, Tonga, Tongans in New Zealand, and Australia." *Obesity Reviews* 12 (Suppl. 2): 61–67.
- McCormack, L. A., M. N. Laska, L. I. Larson, and M. Story. 2010. "Review of the Nutritional Implications of Farmers' Markets and Community Gardens: A Call for Evaluation and Research Efforts." *Journal of the American Dietetic Association* 110 (3): 399–408.
- McCreedy, M., J. G. Leslie. 2009. "Get Active Orlando: Changing the Built Environment to Increase Physical Activity." *American Journal of Preventive Medicine* 37 (6 Suppl 2): S395–402.
- Meiro-Lorenzo, M., T. L. Villafana, and M. N. Harrit. 2011. "Effective Responses to Non-Communicable Diseases: Embracing Action beyond the Health Sector." HNP Discussion Paper, World Bank, Washington, DC.
- Mello, M. M., J. Pomeranz, and P. Moran. 2008. "The Interplay of Public Health Law and Industry Self-Regulation: The Case of Sugar-Sweetened Beverage Sales in Schools." *American Journal of Public Health* 98 (4): 595–604.
- Menko Kesra. 2012. *Policy Framework: National Movement on Accelerating Nutrition Improvement within the Framework of the First Thousand Days of Life*. Jakarta: Menko Kesra.
- Millstone, E., and T. Lang. 2003. *The Atlas of Food. Who Eats What Where and Why*. London: Earthscan Publications.
- Mokoro Limited. 2015. *Independent Comprehensive Evaluation of the Scaling Up Nutrition Movement: Final Report*. Oxford, UK: Mokoro, Ltd.
- Monteiro, C. A., E. C. Moura, W. L. Conde, and B. M. Popkin. 2004. "Socioeconomic Status and Obesity in Adult Populations of Developing Countries: A Review." *Bulletin of WHO* 82: 940–46.

- Monteiro, C. A. 2010. "The Big Issue Is Ultra-Processing (Commentary)." *World Nutrition* 1 (6): 237–69.
- Monteiro, C. A., R. B. Levy, R. M. Claro, I. R. de Castro, and G. Cannon. 2011. "Increasing Consumption of Ultra-Processed Foods and Likely Impact on Human Health: Evidence from Brazil." *Public Health Nutrition* 14 (1): 5–13.
- Moodie, R., D. Stuckler, C. Monteiro, N. Sheron, B. Neal, T. Thamarangsi, P. Lincoln, S. Casswell, and the Lancet NCD Action Group. 2013. "Profits and Pandemics: Prevention of Harmful Effects of Tobacco, Alcohol, and Ultra-Processed Food and Drink Industries." *The Lancet* 381 (509): 670–79.
- Mozaffarian, D., T. Hao, E. B. Rimm, W. C. Willett, and F. B. Hu. 2011. "Changes in Diet and Lifestyle and Long-Term Weight Gain in Women and Men." *New England Journal of Medicine* 364: 2392–404.
- Musgrove, P. 1990. "Do Nutrition Programs Make a Difference? The Case of Brazil." *International Journal of Health Services* 20 (4): 691–715.
- Myers, R. G. 1984. "Going to Scale." A paper prepared for the Second Inter-Agency Meeting on Community-based Child Development. New York: UNICEF.
- Ngure, F. M., B. M. Reid, J. Humphrey, M. N. Mbuya, G. Pelto, and R. Stoltzfus. 2014. "Water, Sanitation, and Hygiene (WASH), Environmental Enteropathy, Nutrition, and Early Child Development: Making the Links." *Ann N.Y. Acad. Sci.* 1308: 118–28.
- Neufeld, L. M., C. Steta, J. Rivera, A. Martinez Valle, R. Grados, S. Uriega, and V. H. López. 2011. "Evaluation for Program Decision Making: A Case Study of the Oportunidades Program in Mexico." *The Journal of Nutrition* 141: 2076-83.
- Neymotin, F., and U. Sen. 2011. "Iron and Obesity in Females in the United States." *Obesity* 19 (1): 191–99.
- Nieuwdorp, M., P. W. Gilljamse, N. Pai, and L. M. Kaplan. 2014. "Role of the Microbiome in Energy Regulation and Metabolism." *Gastroenterology* 146 (6): 1525–33.
- Nishida, C., T. Mutru, and R. Imperial Laue . 2003. "Strategies for Effective and Sustainable National Nutrition Plans and Policies." In *Modern Aspects of Nutrition, Present Knowledge and Future Perspective. Forum Nutr. Basel, Karger* 56: 264–66.
- Ng, M., T. Fleming, M. Robinson, B. Thomson, N. Graetz, C. Margono, E.C. Mullany, S. Biryukov, C. Abbafati, S.F. Abera, J.P. Abraham, N.M. Abu-Rmeileh, T. Achoki, F.S. AlBuhairan, Z.A. Alemu, R. Alfonso, M.K. Ali, R. Ali, N.A. Guzman, W. Ammar, P. Anwari, A. Banerjee, S. Barquera, S. Basu, D.A. Bennett, Z. Bhutta, J. Blore, N. Cabral, I.C. Nonato, J.C. Chang, R. Chowdhury, K.J. Courville, M.H. Criqui, D.K. Cundiff, K.C. Dabhadkar, L. Dandona, A. Davis, A. Dayama, S.D. Dharmaratne, E.L. Ding, A.M. Durrani, A. Esteghamati, F. Farzadfar, D.F. Fay, V.L. Feigin, A. Flaxman, M.H. Forouzanfar, A. Goto, M.A. Green, R. Gupta, N. Hafezi-Nejad, G.J. Hankey, H.C. Harewood, R. Havmoeller, S. Hay, L. Hernandez, A. Husseini, B.T. Idrisov, N. Ikeda, F. Islami, E. Jahangir, S.K. Jassal, S.H. Jee, M. Jeffreys, J.B. Jonas, E.K. Kabagambe, S.E. Khalifa, A.P. Kengne, Y.S. Khader, Y.H. Khang, D. Kim, R.W. Kimokoti, J.M.

Kinge, Y. Kokubo, S. Kosen, G. Kwan, T. Lai, M. Leinsalu, Y. Li, X. Liang, S. Liu, G. Logroscino, P.A. Lotufo, Y. Lu, J. Ma, N.K. Mainoo, G.A. Mensah, T.R. Merriman, A.H. Mokdad, J. Moschandreas, M. Naghavi, A. Naheed, D. Nand, K.M. Narayan, E.L. Nelson, M.L. Neuhaus, M.I. Nisar, T. Ohkubo, S.O. Oti, A. Pedroza, D. Prabhakaran, N. Roy, U. Sampson, H. Seo, S.G. Sepanlou, K. Shibuya, R. Shiri, I. Shiue, G.M. Singh, J.A. Singh, V. Skirbekk, N.J. Stapelberg, L. Sturua, B.L. Sykes, M. Tobias, B.X. Tran, L. Trasande, H. Toyoshima, S. van de Vijver, T.J. Vasankari, J.L. Veerman, G. Velasquez-Melendez, V.V. Vlassov, S.E. Vollset, T. Vos, C. Wang, X. Wang, E. Weiderpass, A. Werdecker, J.L. Wright, Y.C. Yang, H. Yatsuya, J. Yoon, S.J. Yoon, Y. Zhao, M. Zhou, S. Zhu, A.D. Lopez, C.J. Murray, and E. Gaikodo. 2014. "Global, Regional, and National Prevalence of Overweight and Obesity in Children and Adults during 1980–2013: A Systematic Analysis for the Global Burden of Disease Study 2013." *The Lancet* 384: 766–81.

Ogden, C. L., M. D. Carroll, B. K. Kit, and K. M. Flegal. 2014. "Prevalence of Childhood and Adult Obesity in the United States, 2011–2012." *Journal of the American Medical Association* 311 (8): 806–14.

Olken, B. A., J. Onishi, and S. Wong. 2011. *Indonesia's PNPM Generasi Program: Final Impact Evaluation Report*. Jakarta: World Bank.

O'Reilly, J. R., and R. M. Reynolds. 2013. "The Risk of Maternal Obesity to the Long-Term Health of the Offspring." *Clin Endocrinology* 78: 9–16.

Peirson, L., J. Douketis, D. Ciliska, D. Fitzpatrick-Lewis, M. U. Ali, and P. Raina. 2014. "Treatment for Overweight and Obesity in Adult Populations: A Systematic Review and Meta-Analysis." *CMAJ Open* 2 (4): E306–17.

Perry, H. B., R. Zulliger, and M. M. Rogers. 2014. "Community Health Workers in Low-, Middle-, and High-Income Countries: An Overview of Their History, Recent Evolution, and Current Effectiveness." *Annual Review of Public Health* 35: 399–421.

Pignone, M. P., A. Ammerman, L. Fernandez, C. T. Orleans, N. Pender, S. Woolf, K. N. Lohr, and S. Sutton. 2003. "Counselling to Promote A Healthy Diet in Adults: A Summary of the Evidence for the US Preventive Services Task Force." *American Journal of Preventive Medicine* 24: 75–92.

Pingali, P. 2015. "Agricultural Policy and Nutrition Outcomes—Getting Beyond the Preoccupation with Staple Grains." *Food Security* 7: 583–91.

Pinhas-Hamel, O., R. S. Newfield, I. Koren, A. Agmon, P. Lilos, and M. Phillip. 2003. "Greater Prevalence of Iron Deficiency in Overweight and Obese Children and Adolescents." *International Journal of Obesity* 27: 416–18.

Pinstrup-Andersen, P. 2013 "Nutrition-Sensitive Food Systems: From Rhetoric to Action." *The Lancet* 382 (9890): 375–76.

Popkin, B. M., L. S. Adair, and S. W. Ng. 2012. "Global Nutrition Transition and the Pandemic of Obesity in Developing Countries." *Nutrition Reviews* 70 (1): 3–21.

Powell, L. M., J. F. Chriqui, T. Khan, R. Wada, and F. J. Chaloupka. 2013. "Assessing the Potential Effectiveness of Food and Beverage Taxes and Subsidies for Improving Public Health:

A Systematic Review of Prices, Demand and Body Weight Outcomes.” *Obesity Reviews* 14: 110–28.

Promdee, L., J. Trakulthong, and W. Kangwantrakul. 2007. “Sucrose Consumption in Thai Undergraduate Students.” *Asia Pacific Journal of Clinical Nutrition* 16 (Suppl 1): 22–26.

Rasella, D., M. O. Harhay, M. L. Pamponet, R. Aquino, and M. L. Barreto. 2014. “Impact of Primary Health Care on Mortality from Heart and Cerebrovascular Diseases in Brazil: A Nationwide Analysis of Longitudinal Data.” *BMJ* 349: g4014.

Richard, S. A., R. E. Black, R. H. Gilman, R. L. Guerrant, G. Kang, C. F. Lanata, K. Mølbak, Z. A. Rasmussen, R. B. Sack, P. Valentiner-Branth, W. Checkley, and the Childhood Malnutrition and Infection Network. 2014 “Catch-Up Growth Occurs after Diarrhoea in Early Childhood.” *The Journal of Nutrition* 144 (6): 965–71.

Riera-Crichton, D., and N. Tefft. 2014. “Macronutrients and Obesity: Revisiting the Calories in, Calories Out Framework.” *Economics and Human Biology* 14: 33–49.

Rivera, J. A., L. S. Pedraza, R. Martorell, and A. Gil. 2014. “Introduction to the Double Burden of Undernutrition and Excess Weight in Latin America.” *American Journal of Clinical Nutrition* 100 (suppl): 1613S-6S.

Rokholm, B., J. L. Baker, and T. I. A. Sorensen. 2010. “The Levelling off of the Obesity Epidemic Since the Year 1999—A Review of Evidence and Perspectives.” *Obesity Reviews* 11: 835–46.

Romon, M., A. Lommez, M. Tafflet, A. Basdevant, J. M. Oppert, J. L. Bresson, P. Ducimetière, M. A. Charles, and J. M. Borys. 2009. “Downward Trends in the Prevalence of Childhood Overweight in the Setting of 12-Year School- and Community-Based Programs.” *Public Health Nutrition* 12 (10): 1735–42.

Ruel, M. T., H. Alderman, and the Maternal and Child Nutrition Study Group. 2013. “Nutrition-Sensitive Interventions and Programs: How Can They Help to Accelerate Progress in Improving Maternal and Child Nutrition?” *The Lancet* 382 (9891): 536–51.

Ruel-Bergeron, J., L. Elder, and A. Herforth. 2013. “Improving Nutrition through Health” In *Improving Nutrition through Multisectoral Approaches*, 107-129. Washington, DC: World Bank Group.

Saadeh, R. J. 2012. “The Baby-Friendly Hospital Initiative 20 Years on: Facts, Progress, and the Way Forward.” *Journal of Human Lactation* 28 (3): 272–75.

Sablah, M., S. K. Baker, J. Badham, and A. De Zayas. 2013. “FAN the SUN Brighter”: Fortifying Africa Nutritionally (FAN)—the Role of Public-Private Partnership in Scaling Up Nutrition (SUN) in West Africa.” *The Proceedings of the Nutrition Society* 72 (4): 381–85.

Sachs, J. D. 2005. *The End of Poverty: How We Can Make it Happen in Our Lifetime*. London: Penguin Books.

Saha, K. K., R. Rawat, A. Khaled, T. Sanghvi, K. Afsana, R. Haue, S. Siraj, M. T. Ruel, and P. Menon. 2013. “Behavior Change Counseling by Frontline Health Workers and a Mass Media

Campaign Improved Complementary Feeding Practices More Than Mass Media Alone in Rural Bangladesh.” *FASEB J* 27: 243–45.

Sanghvi, T., A. Jimerson, N. Hajeebhoy, M. Zewale, and G. H. Nguyen. 2013. “Tailoring Communication Strategies to Improve Infant and Young Child Feeding Practices in Different Country Settings.” *Food and Nutrition Bulletin* 34 (3S): S169–S180.

Sarkar, H. 2014. “Climb Stairs, Cut Calories: Southeast Asia Fights Flab.” Reuters, US. <http://www.reuters.com/article/2014/06/09/uk-health-southeast-asia-obesity-idUSKBN0EK0NH20140609>. Accessed April 18, 2014.

Scaling Up Nutrition Business Network. 2014. “Scaling Up Nutrition: Guide to Business Engagement.” www.sunbusinessnetwork.org/sun-resources/guide-to-business-engagement/. Accessed March 30, 2014.

Secretariat of the Pacific Community (SPC). 2010. *PIN—Pacific Islands NCDs: Promoting a Healthier Pacific*. Noumea: Secretariat of the Pacific Community.

Semba, R. D., S. de Pee, K. Sun, M. Sari, N. Akhter, and M. W. Bloem. 2008. “Effect of Parental Formal Education on Risk of Child Stunting in Indonesia and Bangladesh: A Cross-Sectional Study.” *The Lancet* 371 (9609): 322–28.

Shah, A., N. Mehta, and M. P. Reilly. 2008. “Adipose Inflation, Insulin Resistance and Cardiovascular Disease.” *The Journal of Parenteral and Enteral Nutrition* 32 (6): 638–44.

Shekar, M., L. Elder, H. Alderman, A. Goyal, A. Herforth, Y. T. Hoberg, A. Marini, J. Ruel-Bergeron, J. Saavedra, M. S. Tiwari, and H. Zaman. 2012. “Improving Nutrition through Multi-Sectoral Approaches.” Working Paper, World Bank, Washington, DC.

Shrimpton, R., 2003. “Reducing Childhood Mortality in Poor Countries: Preventing Low Birthweight and Reduction of Child Mortality.” *Transactions of the Royal Society of Tropical Medicine and Hygiene*. 97: 39–42.

———. 2012. “Global Policy and Programme Guidance on Maternal Nutrition: What Exists, the Mechanisms for Providing It, and How to Improve Them?” *Paediatric and Perinatal Epidemiology* 26 (Suppl. 1): 315–25.

Shrimpton, R., and C. Rokx. 2012. “The Double Burden of Malnutrition: A Review of Global Evidence.” Health, Nutrition, and Population Discussion Paper, World Bank, Washington, DC.

———. 2013. “The Double Burden of Malnutrition in Indonesia.” Report 76192-ID, World Bank, Jakarta.

Shrimpton, R., S. J. Atwood, D. Sanders, and J. B. Mason. 2013. *An Overview and Regional Perspective on the Assessment of Nutrition Capacity of National and Mid-Level Personnel Carried Out in Three Asian Countries*. Bangkok: UNICEF/European Union.

Shrimpton, R., J. Crum, S. Basnet, S. Mebrahtu, and P. Dahal. 2014. “Documenting the Process of Developing the Nepal Multi-Sector Nutrition Plan and Identifying Its Strengths and Weaknesses: Report of a Research Project.” Kathmandu, Nepal: UNICEF/European Union.

- Siefken, K., R. Macniven, G. Schofield, A. Bauman, and T. Waqanivalu. 2012. "A Stocktake of Physical Activity Programs in the Pacific Islands." *Health Promotion Int* 27:197–207.
- Singer, M. 2014. "Following the Turkey Tails: Neoliberal Globalization and the Political Ecology of Health." *Journal of Political Ecology* 21: 437–47.
- Sodjinou, R., W. K. Bosu, N. Fanou, L. Déart, R. Kupka, F. Tchibindat, and S. Baker. 2014. "A Systematic Assessment of the Current Capacity to Act in Nutrition" in West Africa: Cross-Country Similarities and Differences." *Glob Health Action* 7 (24763).
- Smith, L., and L. Haddad. 2014. "Can Improving the Underlying Determinants of Nutrition Help Meet the WHA Targets?" In *Global Nutrition Report 2014: Actions and Accountability to Accelerate the World's Progress on Nutrition*. Washington, DC: International Food Policy Research Institute (IFPRI).
- Smith, M. M., and C. T. Minson. 2012. "Obesity and Adipokines: Effects on Sympathetic Overactivity." *The Journal of Physiology* 590 (8): 1787–801.
- Snowdon, W. 2014. "Sugar-Sweetened Beverages in Pacific Island Countries: Problems and Solutions?" *Pacific Health Dialogue* 20 (1): 43-46.
- Snowdon, W., and A. M. Thow. 2013. "Trade Policy and Obesity Prevention: Challenges and Innovation in the Pacific Islands." *Obesity Reviews* 14 (Suppl 2): 150–58.
- Speakman, J. R., D. A. Levitsky, D. B. Allison, M. S. Bray, J. M. de Castro, D. J. Clegg, J. C. Clapham, A. G. Dulloo, L. Gruer, S. Haw, J. Hebebrand, M. M Hetherington, S. Higgs, S. A. Jebb, R. J. Loos, S. Luckman, A. Luke, V. Mohammed-Ali, S. O'Rahilly, M. Pereira, L. Perusse, T. N. Robinson, B. Rolls, M. E. Symonds, and M. S. Westerterp-Plantenga. 2011. "Set Points, Settling Points and Some Alternative Models: Theoretical Options to Understand How Genes and Environments Combine to Regulate Body Adiposity." *Disease Models and Mechanisms* 4: 733–45.
- Spears, D. 2013. "How Much International Variation in Child Height Can Sanitation Explain?" Water and Sanitation Policy Research Working Paper 6351, World Bank, Washington, DC.
- Stevens, G., M. Finucane, L. De-Regil, C.J. Paciorek, S.R. Flaxman, F. Branca, J.P. Peña-Rosas, Z.A. Bhutta, M. Ezzati and the Nutrition Impact Model Study Group (Anaemia). 2013. "Global, Regional and National Trends in Haemoglobin Concentration and Prevalence of Total and Severe Anemia in Children and Pregnant and Non-Pregnant Women for 1995–2011: A Systematic Analysis of Population-Representative Data." *The Lancet Global Health* 1: e16–25.
- Swinburn, B., G. Sacks, K. D. Hall, K. Mcpherson, D. T. Finegood, M. L. Moodie, and S. L. Gortmaker. 2011. "The Global Obesity Pandemic: Shaped by Global Drivers and Local Environments." *The Lancet* 378: 804–14.
- Swinburn, B., G. Sacks, S. Vandevijvere, S. Kumanyika, T. Lobstein, B. Neal, S. Barquera, S. Friel, C. Hawkes, B. Kelly, M. l'abbé, A. Lee, J. Ma, J. Macmullan, S. Mohan, C. Monteiro, M. Rayner, D. Sanders, W. Snowdon, C. Walker, and the INFORMAS Network. 2013. "INFORMAS (International Network for Food and Obesity/Non-Communicable Diseases Research, Monitoring and Action Support): Overview and Key Principles." *Obesity Reviews* Suppl 1: 1–12.

- SUN (Scaling Up Nutrition). 2010. "Scaling Up Nutrition: A Framework for Action." http://scalingupnutrition.org/wp-content/uploads/2013/05/sun_framework.pdf. Accessed October 30, 2014.
- Taubes, G. 2013. "The Science of Obesity: What Do We Really Know about What Makes Us Fat? An Essay by Gary Taubes." *BMJ* 346: 1–5.
- Te Morenga, L., S. Mallard, and J. Mann. 2012. "Dietary Sugars and Body Weight: Systematic Review and Meta-Analyses of Randomised Controlled Trials and Cohort Studies." *BMJ* 345: e7492.
- Trezza, C., and M. E. Bonilla-Chacin. 2014. "Governance of Multisectoral Interventions." In *Promoting Healthy Living in Latin America and the Caribbean: Governance of Multisectoral Activities to Prevent Risk Factors for Non-Communicable Diseases*, ed. M. E. Bonilla-Chacin. Directions in Development Series, World Bank, Washington, DC.
- Thomas, D., E. J. Elliott, and L. Baur. 2007. "Low Glycaemic Index or Low Glycaemic Load Diets for Overweight and Obesity." *Cochrane Database of Systematic Reviews* 3: CD005105.
- Thow, A. M., S. Downs, and S. Jan. 2014. "A Systematic Review of the Effectiveness of Food Taxes and Subsidies to Improve Diets: Understanding the Recent Evidence." *Nutrition Reviews* 72 (9): 551–65.
- Thow, A. M., and C. Hawkes. 2014. "Global Sugar Guidelines: An Opportunity to Strengthen Nutrition Policy." *Public Health Nutrition* 17 (10): 2151–55.
- Thow, A. M., C. Quesada, L. Juventin, R. Kun, N. Khan, and B. Swinburn. 2010. "Taxing Soft Drinks in the Pacific: Implementation Lessons for Improving Health." *Health Promotion International* 26 (1): 55–64.
- Tontisirin, K., and P. Winichagoon. 1999. "Community-Based Programs: Success Factors for Public Nutrition Derived from the Experience of Thailand." *Food and Nutrition Bulletin* 20 (3): 315–30.
- UNICEF. 1990. *Strategy for Improved Nutrition of Children and Women in Developing Countries*. New York: UNICEF.
- . 1991. "A UNICEF Guide for Monitoring and Evaluation: Making a Difference?" <http://preval.org/documentos/00473.pdf>. Accessed January 26, 2015.
- UNICEF, WHO, and World Bank. 2016. "Levels and Trends in Child Malnutrition: UNICEF-WHO-World Bank Joint Child Malnutrition Estimates." New York: UNICEF.
- . 2015. "Levels and Trends in Child Malnutrition: UNICEF, WHO, and World Bank Joint Child Malnutrition Estimates." New York: UNICEF.
- UNICEF. 2013. *Community-Led Total Sanitation in East Asia and Pacific: Progress, Lessons, and Directions*. Bangkok: UNICEF East Asia and Pacific Regional Office.
- UNICEF. 2015. *State of the World's Children Report*. New York: UNICEF.

UNICEF, Water and Sanitation Program (WSP), and World Bank Group. 2015. "Child Feces Disposal in Philippines." <http://www.wsp.org/sites/wsp.org/files/publications/WSP-Philippines-CFD-Profile.pdf>. Accessed April 20, 2015.

UNICEF and WHO. 2015. *Progress on Sanitation and Drinking Water—2015 Update and MDG Assessment*. Geneva and New York: WHO-UNICEF Joint Monitoring Programme for Water Supply and Sanitation.

United Nations. 2012. *World Urbanization Prospects—The 2011 Revision*. New York: United Nations Department of Economic and Social Affairs, Population Division.

———. 2014. *Millennium Development Goals Report, 2014*. New York: United Nations.

UNSCN (United Nations Standing Committee on Nutrition). 2010. "Maternal Nutrition," In *Progress in Nutrition*, chapter 3. Geneva: UNSCN.

USAID. 2013. *Integrating Water, Sanitation, and Hygiene into Nutrition Programming*. Washington, DC: USAID WASHPlus Project.

USDA (US Department of Agriculture), Economic Research Service. 2006. "Possible Implications for U.S. Agriculture from Adoption of Select Dietary Guidelines, ERR-31." http://www.ers.usda.gov/media/860109/err31_002.pdf. Accessed March 20, 2015.

USDA (US Department of Agriculture). 2008. *Increasing Fruit and Vegetable Consumption through the USDA Nutrition Assistance Programs: A Progress Report*. Alexandria, VA: United States Department of Agriculture Food and Nutrition Service.

———. 2014. "Obama Administration Announces Additional Support to Help Communities Boost Local Food Economies." News release 0114.14. Washington, DC: USDA. <http://www.usda.gov/wps/portal/usda/usdahome?contentid=2014/06/0114.xml>. Accessed January 14, 2015.

US Department of Health and Human Services. 2008. *Physical Activity Guidelines for Americans*. Washington, DC: US Department of Health and Human Services.

Van Koperen, T. M., S. A. Jebb, C. D. Summerbell, T. L. S. Visscher, M. Romon, J. M. Borys, and J. C. Seidell. 2013. "Obesity Prevention: Characterizing the EPODE Logic Model: Unravelling the Past and Informing the Future." *Obesity Reviews* 14: 162–170.

Van Nassau, F., A. S. Singh, E. Cerin, J. Salmon, W. van Mechelen, J. Brug, and M. Chinapaw. 2014. "The Dutch Obesity Intervention in Teenagers (DOIT) Cluster-Controlled Implementation Trial: Intervention Effects and Mediators and Moderators of Adiposity and Energy Balance-Related Behaviours." *International Journal of Behavioral Nutrition and Physical Activity* 11: 158.

Victora, C. G., L. Adair, C. Fall, P. C. Hallal, M. Martorell, L. Richter, H. S. Sachdev, and the Maternal and Child Undernutrition Study Group. 2008. "Maternal and Child Undernutrition: Consequences for Adult Health and Human Capital." *The Lancet* 371: 340–57.

Victora, C. G., E. M. L. Aquino, M. C. Leal, C. A. Monteiro, F. C. Barros, and C. L. Szwarcwald. 2011. "Maternal and Child Health in Brazil: Progress and Challenges." *The Lancet* 377: 1863–76.

- Victora, C. G., M. de Onis, P. C. Hallal, M. Blössner, and R. Shrimpton. 2010. "Worldwide Timing of Growth Faltering: Revisiting Implications for Interventions." *Pediatrics*. 125 (3): e473–80.
- Victora, C. G., and J. A. Rivera. 2014. "Optimal Child Growth and the Double Burden of Malnutrition: Research and Programmatic Implications." *American Journal of Clinical Nutrition* 100 (suppl): 1611S–12S.
- Vir, S. C., N. Singh, A. K. Nigam, and R. Jai. 2008. "Weekly Iron and Folic Acid Supplementation with Counseling Reduces Anemia in Adolescent Girls: A Large-Scale Effectiveness Study in Uttar Pradesh, India." *Food and Nutrition Bulletin* 29 (3): 186–94.
- Wachs, T. D. 2008 "Mechanisms Linking Parental Education and Stunting." *The Lancet*. 371: 280–81.
- Wate, J. T., W. Snowdon, L. Millar, M. Nichols, H. Mavoia, R. Goundar, A. Kama, and B. Swinburn. 2013. "Adolescent Dietary Patterns in Fiji and Their Relationships with Standardized Body Mass Index." *International Journal of Behavioral Nutrition and Physical Activity* 10: 45.
- Waters, E., A. de Silva-Sanigorsky, B. J. Hall, T. Brown, K. L. Campbell, Y. Gao, R. Armstrong, L. Prosser, and C. D. Summerbell. 2011. "Interventions for Preventing Obesity in Children." *Cochrane Database Systematic Reviews* 12: CD001871.
- Weeratunga, P., S. Jayasinghe, Y. Perera, G. Jayasena, and S. Jayasinghe. 2014. "Per Capita Sugar Consumption and Prevalence of Diabetes Mellitus—Global and Regional Associations." *BMC Public Health* 14: 186.
- Wen, C. P., T. Y. D. Cheng, S. P. Tsai, H. T. Chan, H. L. Hsu, C. C. Hsu, and M. P. Eriksen. 2008. "Are Asians at Greater Mortality Risks for Being Overweight than Caucasians? Redefining Obesity for Asians." *Public Health Nutrition* 12 (4): 497–506.
- WHO (World Health Organization). 2003. "Diet, Nutrition and the Prevention of Chronic Diseases." WHO technical report series 916. Geneva: WHO.
- . 2004. "Appropriate Body-Mass Index for Asian Populations and Its Implications for Policy and Intervention Strategies." *The Lancet* 363 (9403): 157–63.
- . 2006. "Promoting Optimal Fetal Development: Report of a Technical Consultation." Geneva: WHO.
- . 2007. "Nutrition-Friendly Schools Initiative (NFSI)." http://www.who.int/nutrition/topics/nutrition_friendly_schools_initiative/en/. Accessed November 20, 2014.
- . 2010a. "Set of Recommendations on the Marketing of Foods and Non-Alcoholic Beverages to Children." Geneva: WHO.
- . 2010b. *The Landscape Analysis—Indonesian Country Assessment*. Geneva: WHO.

- . 2010c. *Nutrition Landscape Information System (NLIS) Country Profile Indicators: Interpretation Guide*. Geneva: WHO.
- . 2011a. *Country Implementation of the International Code of Marketing of Breast-Milk Substitutes: Status Report 2011*. Geneva: WHO.
- . 2011b. “Nutrient Profiling: Report of a WHO/IASO Technical Meeting.” Geneva: WHO.
- . 2012. *Population-Based Approaches to Childhood Obesity Prevention*. Geneva: WHO.
- . 2013a. *Global Nutrition Policy Review: What Does It Take to Scale Up Nutrition Action?* Geneva: WHO.
- . 2013b. *Global Action Plan for the Prevention and Control of Non-Communicable Diseases 2013–2020*. Geneva: WHO.
- . 2014a. *Action Plan to Reduce the Double Burden of Malnutrition in the Western Pacific Region (2015–2020)*. Manila: WHO Regional Office for the Western Pacific.
- . 2014b. *Comprehensive Implementation Plan on Maternal, Infant and Young Child Nutrition*. Geneva: WHO.
- . 2014c. *Indicators for the Global Monitoring Framework on Maternal, Infant and Young Child Nutrition*. Geneva: WHO.
- . 2015a. *Global Health Observatory Data Repository: Overweight and Obesity*. Geneva: WHO.
- . 2015b. *Guideline: Sugars Intake for Adults and Children*. Geneva: WHO.
- Winichagoon, P. 2014. “Scaling Up a Community-Based Program for Maternal and Child Nutrition in Thailand.” *Food and Nutrition Bulletin* 35 (2 Suppl): S27–33.
- Wong, S. 2012. “What Have Been the Impacts of World Bank Community-Driven Development Programs? CDD Impact Evaluation Review and Operational and Research Implications.” Social Development Working Paper, World Bank, Washington, DC.
- World Bank. 2001. “Implementation Completion Report—Third Community Health and Nutrition Project.” (Report 22959), World Bank, Washington, DC.
- . 2006. “Repositioning Nutrition as Central to Development: A Strategy for Large-Scale Action.” *Directions in Development Series*, World Bank, Washington, DC.
- . 2007. *World Development Report 2008: Agriculture for Development*. Washington, DC: World Bank.
- . 2012a. *Toward Gender Equality in East Asia and the Pacific: A Companion to the World Development Report*. Washington, DC: World Bank.
- . 2012b. “Raskin Subsidized Rice Delivery.” Social Assistance Program and Public Expenditure Review 3, World Bank, Jakarta.

———. 2012c. “PKH Conditional Cash Transfer.” Social Assistance Program Public Expenditure Review 6, World Bank, Jakarta.

———. 2014. “NCD Roadmap Report.” Washington, DC: World Bank.

———. 2016. World Development Indicators. World Bank. Available: <http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators>.

World Bank, and AUSAID. 2013. *East Asia and the Pacific Region Urban Sanitation Review: A Call for Action*. Washington, DC: World Bank.

World Economic Forum. 2009. *The Next Billions: Business Strategies to Enhance Food Value Chains and Empower the Poor*. Geneva: World Economic Forum.

Yang, Z., and S. L. Huffman. 2013. “Nutrition in Pregnancy and Early Childhood and Associations with Obesity in Developing Countries.” *Maternal and Child Nutrition* 9 Suppl 1:105-19.

Zatonski, W. A., A. J. McMichael, and J. W. Powles. 1998. “Ecological Study of Reasons for Sharp Decline in Mortality from Ischaemic Heart Disease in Poland Since 1991.” *British Medical Journal* 316: 1047–51.

Zimmerman, M. B. 2013 “Iodine Deficiency and Excess in Children: Worldwide Status in 2013.” *Endocrinology Practice* 19 (5): 839-46.

Zimmermann, M. B., C. Zeder, S. Muthayya, P. Winichagoon, N. Chaouki, and R. F. Hurrell. 2008. “Adiposity in Women and Children from Transition Countries Predicts Decreased Iron Absorption, Iron Deficiency and Reduced Response to Iron Fortification.” *International Journal of Nutrition* 32 (7): 1098–104.

Zorya, S., and N. Santos. 2014. “Improving the Quality of Agricultural Public Expenditures in Asia.” In *Rice in the Shadow of Skyscrapers: Policy Choices in a Dynamic East and Southeast Asian Setting*, ed. D. Dawe, S. Jaffee, and N. Santos. Rome: Food and Agriculture Organization (FAO).

Global trends indicate that overlapping burdens of undernutrition and overnutrition—the double burden of malnutrition (DBM)—are the new normal (IFPRI 2014); indeed, most East Asia and Pacific (EAP) countries now have a DBM problem. This report explores the nature of nutrition problems affecting EAP countries to understand the sectoral and system-wide actions necessary for a coordinated approach to improving nutrition. The report (i) synthesizes evidence related to the burden of malnutrition in EAP, (ii) identifies the rationale for a multisectoral approach to DBM practitioners working across sectors in EAP, and (iii) provides an overview of the types of actions and interventions needed to address the DBM in a coordinated fashion across the life course. Actions across health and nonhealth sectors—ranging from implementation of national-level policy measures and complemented by interventions at the community and individual levels to support behavior change—are needed to prevent escalation of overweight and obesity. Among sectoral priority actions, the health sector plays an important role in monitoring health and nutrition outcomes, preventing and treating infectious and noncommunicable diseases associated with malnutrition, and providing interventions that affect individuals' nutrient intakes. Similarly nonhealth sectors have expertise and resources to deliver interventions related to the underlying causes of malnutrition. Further, systems-strengthening efforts are needed to support an environment that addresses the DBM across the life course, including increasing DBM-sensitivity of policy frameworks; leadership, coordination, and accountability; workforce capacity; and knowledge and evidence. Reducing the DBM is fundamental to sustainable development in EAP. EAP countries must shift from dichotomized policies addressing either undernutrition or overnutrition and develop coherent frameworks to address malnutrition in all forms for all life stages. Integrated preventive and curative interventions for undernutrition and overnutrition—implemented across the life course by multiple sectors—can forestall massive economic and human development consequences for future generations.

ABOUT THIS SERIES:

This series is produced by the Health, Nutrition, and Population Global Practice of the World Bank. The papers in this series aim to provide a vehicle for publishing preliminary results on HNP topics to encourage discussion and debate. The findings, interpretations, and conclusions expressed in this paper are entirely those of the author(s) and should not be attributed in any manner to the World Bank, to its affiliated organizations or to members of its Board of Executive Directors or the countries they represent. Citation and the use of material presented in this series should take into account this provisional character. For free copies of papers in this series please contact the individual author/s whose name appears on the paper. Enquiries about the series and submissions should be made directly to the Editor Martin Lutalo (mlutalo@worldbank.org) or HNP Advisory Service (healthpop@worldbank.org, tel 202 473-2256).

For more information, see also www.worldbank.org/hnppublications.



1818 H Street, NW
Washington, DC USA 20433

Telephone: 202 473 1000
Facsimile: 202 477 6391
Internet: www.worldbank.org
E-mail: feedback@worldbank.org