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# FUTURE of FOOD

Shaping the Global Food System to  
Deliver Improved Nutrition and Health

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Foreword by Dr. Jim Yong Kim



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BEETLE CLUB

## FOREWORD

Every person on the planet must have a daily diet that is safe, nutritious and affordable. And so a vibrant, productive and resilient food system is vital if we are to end extreme poverty by 2030 and boost shared prosperity for the poorest 40 percent of the population in developing countries.

Despite progress made in recent years toward reaching these goals, daunting challenges remain. Every day, 795 million people go hungry; one in four people in Sub-Saharan Africa and one in six in South Asia do not consume their minimum dietary energy needs. Over 165 million children under five are stunted due to chronic malnutrition, which will have life-long consequences and prevent them from achieving their full potential. For each of them, their families, and their countries this is tragic; for society, it is nothing less than a medical and an economic emergency.

While more than 2 billion people are not getting all the vitamins and minerals necessary for their growth and healthy development, another 2 billion people are struggling with the challenges of being overweight or obese—many of them in developing countries. These staggering numbers represent real and growing long-term consequences for people, economies, and our collective future.

It is clear that tackling such significant challenges will require us to transform our food

system and to do this by working across multiple sectors—and by helping countries adapt to the perils of climate change.

This report helps point the way forward by highlighting potentially transformative food system advances. There are many good examples of individual interventions that are being implemented in diverse settings that countries can adopt, adapt and apply to their specific circumstances.

As the report makes clear, no one-size plan fits all when it comes to transforming food systems. Countries need to tailor the combination of interventions with different packages required in low-, middle- and high-income countries. Our challenge now is to combine sound policies, regulations, and knowledge with targeted investments to help shape a global food system that delivers a nutritious, safe and affordable diet for all in a sustainable way.

This is a mission in which we must succeed if we are to end extreme poverty and boost shared prosperity in just 15 years.



Jim Yong Kim  
President, The World Bank Group

This paper is third in a series. The first, *Ending Poverty and Hunger by 2030: An Agenda for the Global Food System*, released at the 2015 Spring Meetings of the World Bank and International Monetary Fund, outlined the overall agenda. That paper called for action on climate-smart agriculture, improving nutritional outcomes, strengthening value chains and creating jobs, while improving market access for poor farmers. The second, *Shaping a Climate-Smart Global Food System*, distributed at the 2015 Annual Meetings, focused on climate-smart agriculture. This third paper focuses on how the food system can deliver improved nutrition and health for better lives and well-being. It presents a set of nutrition-sensitive interventions that countries can adopt, adapt, and apply to their circumstances (table 1).

## Key messages:

- Malnutrition and food-borne diseases impose large current and future human, economic, fiscal, and social costs on countries. Key among these is child stunting that has life-long consequences, reducing cognitive development and lifetime earnings of individuals, and undermining the future competitiveness of countries.
- Reducing these costs requires multisector approaches. Governments often look to the health sector for interventions and solutions. However, the potential of food systems to leverage change and mitigate adverse nutrition and health impacts is frequently overlooked. This paper focuses on measures that can be, and have been, taken in food systems to improve nutrition and health.
- Shaping food systems to deliver improved nutrition and health requires a combination of improved knowledge, sound policies, regulations, and investments across the production-to-consumption continuum. The goal is to stimulate behavioral change in food producers, post-harvest handlers, food processors, food distributors, and consumers. As the link between food systems and household nutrition and health passes primarily through women, greater consideration of this gender dimension is needed across all interventions.
- No one size fits all. Countries need to tailor the combination of interventions to suit their specific needs. Moreover, different combinations of actions are needed across low- middle- and high-income countries. There is a growing body of experiential and empirical evidence from which countries can draw to apply to their own circumstances.

The three sections of this paper focus on, respectively, *why* the global food system needs to concentrate more on delivering improved nutrition and health; *what* types of food system interventions can deliver improved nutrition and health; and *how* the agenda can best be implemented.



## Why does the global food system need to focus on delivering improved nutrition and health?

**Despite significant progress the world continues to bear a triple burden of malnutrition. These three burdens are related, but distinctly different, problems<sup>1</sup>: energy deficiencies (hunger),<sup>2</sup> micronutrient deficiencies (hidden hunger),<sup>3</sup> and excessive net energy intake and unhealthy diets<sup>4</sup> (overweight/obesity).<sup>5</sup>** Despite significant progress, 795 million people still are not getting the minimum dietary energy needs.<sup>6</sup> The majority of these people are in Sub-Saharan Africa, in which 1 in 4 people are hungry; and in South Asia, in which 1 in 6 people are hungry. More than 2 billion people are deficient in key vitamins and minerals<sup>7</sup> that are necessary for growth, development, and disease prevention.

Globally, over 2 billion people are overweight or obese, two-thirds of whom live in developing countries.<sup>8</sup> This issue clearly is not just a developed country problem.

Energy and micronutrient deficiency are contributors to the **165 million children under 5 who are stunted** and cannot grow to achieve their full potential. Globally, this number is equivalent to approximately 1 in 4 children under 5 years, with an even more concentrated situation in Sub-Saharan Africa and South Asia (1 in 3 children). Arguably child stunting is one of the biggest development challenges. If not addressed it will profoundly undermine our ability to end poverty and promote shared prosperity.

Many factors contribute to these outcomes. Among them, the food system—the set of institutions, resources, stakeholders, and behaviors involved in the production, transformation, delivery, sale, and consumption of food—plays a significant role. Our food system must shift from being part of the problem to becoming a greater part of the solution.

**Malnutrition imposes large human, economic, fiscal, and social costs.** Malnutrition leads to maternal and child mortality, child stunting, poor learning capacity, lost productivity and incomes for adults, high health costs, and slower economic growth. It also can perpetuate poverty in affected populations.

- **Higher mortality rates.** Child undernutrition increases susceptibility to infection and chronic diseases and accounts for approximately 45 percent of all child deaths.<sup>9</sup> Iron and vitamin A deficiencies increase maternal morbidity and mortality.<sup>10</sup> Over the last several decades, overweight and obesity-linked deaths, including from cardiovascular diseases and diabetes, have increased significantly.<sup>11</sup>
- **Lower current and future labor productivity.** Smallholder farmers, especially women farmers, often are among the population segments with the highest incidence of malnutrition. Malnourished farmers are less able to undertake strenuous physical work both on and off farms, thus substantially reducing current labor productivity.<sup>12</sup> Malnutrition can leave children stunted with life-long consequences. It reduces their cognitive development and learning capacity which can diminish their lifetime earnings by 10 percent or more and substantially reduce future labor productivity.<sup>13</sup>
- **Unaffordable health care costs.** Economically, obesity worldwide is associated with a total economic cost of US\$2 trillion.<sup>14</sup> The combined medical costs to treat diet-related, non-communicable diseases are projected to increase by

US\$48 billion–66 billion annually in the United States, and by £1.9-2 billion/year in the UK by 2030.<sup>15</sup> Such costs would overwhelm the fiscal condition of most developing countries and potentially divert public spending from other productive pro-poor investments. Nevertheless, these countries are precisely those in which obesity rates are expanding, thus adding to the triple burden of malnutrition.

- **Lower overall competitiveness, economic growth, and poverty reduction.** Recent estimates from Africa and Asia show that 11 percent of GNP is lost every year due to poor nutrition.<sup>16</sup> Analysis in Guatemala also shows that individuals who received nutritional care as children and were not stunted at age 3 were 33 percentage points less likely to reside in poverty as adults.<sup>17</sup> Stunting of children can undermine the future competitiveness of countries, an effect that may be amplified with the shift to a more knowledge intensive and digital world. Malnutrition and slowed poverty reduction are interlinked in that poverty also contributes to perpetuate malnutrition.

**Contaminated food also contributes to poor health outcomes and impacts 1 in 10 people globally each year.** An estimated 420,000 people die each year from contaminated food, 30 percent of whom are children under 5 years, with the highest death rates occurring in Sub-Saharan Africa and Asia.<sup>18</sup> The many sources and forms of contaminated food include poor production, post-harvest, and/or storage practices. Consumed in high doses, aflatoxins can lead to serious illness and even death in both human beings and



animals. Some reports estimate that aflatoxins cause 5 percent–30 percent of all liver cancer in the world<sup>19</sup> and are associated with growth retardation and immunosuppression.<sup>20</sup> Increased human health risks also are caused by the misuse of antibiotics in livestock and aquaculture. Evidence is growing that animal-to-human spread of microbial-resistant bacteria reduces the human body’s responsiveness to antibiotics.<sup>21</sup> Irrigation water, which is crucial for increasing crop yields, also carries the potential of negative health effects. Stagnant water creates breeding sites for mosquitos and other insects that transmit diseases such as malaria and schistosomiasis. Irrigation water also can contain heavy metals and other contaminants, some of which result from agricultural practices.

Other major factors such as HIV and AIDS and zoonotic diseases also impact human health and are intertwined with the food system. Given space constraints, this paper does not explicitly address these issues and instead focuses only on food system-related nutritional and health impacts from food contamination and malaria.

**Climate change, to which agriculture contributes, may worsen nutrition and health.** Agriculture and land use change accounts for approximately 25 percent of total greenhouse gas (GHG) emissions, which contribute to elevating atmospheric CO<sub>2</sub> and global

temperatures. Higher global temperatures are projected to lower crop yields and food availability in the poorest countries and to shift the composition of consumption to a pattern that is associated with negative health implications, such as a disproportionately lower consumption of fruits and vegetables.<sup>22</sup> Furthermore, even in grains and pulses, elevated atmospheric CO<sub>2</sub> levels are shown to lower the concentrations of zinc, iron,<sup>23</sup> and protein in some crops, making the crops themselves less nutritious.<sup>24</sup> Thus, efforts to reduce GHG emissions through a more climate-smart agriculture would support balanced dietary intake, nutrition, and health.<sup>25</sup>

**Urbanization, income growth, and other factors are contributing to a “dietary transition” in many low and middle-income countries that is affecting opportunities and risks for human health and nutrition.** The change often features a shift in diet composition (with a reduced caloric share of staple cereals and increased consumption of animal products, vegetable oils, and fruits and vegetables), increased consumption of processed foods, and increased out-of-home consumption. With greater intake of protein and micronutrients, this shift can contribute to improved dietary balance. However, poor eating habits also may emerge resulting in excessive consumption of foods and beverages high in saturated fat, sugar, and salt, as in many high-income countries.<sup>26</sup>



## What types of interventions in the food system can deliver improved nutrition and health?

**Feeding every person, every day, everywhere, with a safe, nutritious, and affordable diet requires interventions beyond those needed to raise incomes.** Ensuring the production of sufficient quantities and diversity of food remains fundamental. Ensuring production is a necessary input for diversified food consumption, particularly by nutritionally vulnerable population groups, including women and children. Higher agricultural production growth has been shown to reduce stunting when initial levels of production are low.<sup>27</sup> For the poorest countries, income growth helps reduce the prevalence of calorie deficiency, and in most of these countries, agricultural growth plays a key role in this income growth.<sup>28</sup> However, as prevalence rates decline, undernutrition becomes less responsive to income growth, and impacts are much smaller for lower levels of growth.<sup>29</sup> As noted above, income gains alone are far from sufficient to end undernutrition. Multisectoral nutrition-specific<sup>30</sup> and

nutrition-sensitive interventions are needed. This includes interventions in food systems, social protection, health systems, and water and sanitation.<sup>31</sup> The focus of this paper is making nutrition-sensitive interventions in the food system (table 1).

**A strategic shift that mainstreams nutritional considerations and outcomes in agricultural and food security strategies is needed.** Many developing countries have had success in reducing the incidence of hunger, typically through measures to increase production of selected staple grains and manage their price volatility. Nevertheless, these food security strategies have contributed less to reducing child stunting and population-wide micronutrient deficiencies and even have shown trending toward higher obesity.<sup>32</sup> Public investment, price supports, input subsidies, and stored public stocks typically have been directed to support staple grains and export crops that are

important for their economic value and to prevent widespread food shortages. In many developing countries, supporting primarily staple grains and export crops has created an uneven playing field with most public support going to only a portion of the farming sector.

Consequently, farmers engage less with foods that do not benefit from large support levels, which include fish, fruits, vegetables, and pulses; even when consumer demand has increased. A more crop/commodity-neutral strategic framework is needed. Furthermore, efforts need to be stepped up to promote the diversity of production as well as consumption<sup>33</sup> by strengthening farmers' knowledge, advisory and regulatory services, market infrastructure and connectivity, and the overall investment enabling environment for these traditionally under-supported foods that are important for nutrition (table 1). In addition, as the link between food systems and household nutrition and health pass primarily through women, greater consideration of this gender dimension needs to be reflected across all interventions. A focus on reducing both energy and micronutrient deficiencies in children under age two is needed to help reduce stunting. With very high prevalence rates in low and middle income countries, food system interventions need to give this issue greater attention.

### **Spectrum of food system interventions to reduce energy deficiency (hunger)**

**Increase crop, livestock, and aquaculture productivity and resilience, and fishery sustainability to ensure availability of sufficient**

**calories, particularly in poor countries.**

Increasing adoption of improved crop and livestock technology and access to inputs, improving animal health, reducing gender inequality, improving water management and its sustainable use, strengthening land governance and reducing land degradation, strengthening farmer skills and knowledge, and improving aquaculture production practices all can help raise productivity in poor countries.<sup>34</sup> In addition, effective management of capture fisheries can improve sustainability. Greater investments in international and national agricultural research can facilitate development of a new generation of climate-smart technologies for improved climate-resilience and lower GHG emissions.<sup>35</sup>

**Reduce net taxation of agriculture, and facilitate trade.**

Lowering direct and indirect taxation of agriculture at national and local levels strengthens the incentives to increase production and sales, and raises purchasing power of poor farmers through higher incomes. As per capita incomes grow, countries tend to tax agriculture less. Price policies vary greatly across developing countries and across products, offering additional scope to reduce net taxation of agriculture in some countries. Improved marketing information, infrastructure, and low tariffs and taxes can facilitate intra-national, regional, and international trade to help that ensure food moves from surplus to deficit areas.

**Reduce food loss through improved supply/demand coordination and storage.**

The range of estimates for food loss varies widely.<sup>36</sup> The Food and Agriculture Organization of the United Nations (FAO) estimates an

**TABLE 1:** Spectrum of Interventions in the Food System to Deliver Improved Nutrition and Health

Objectives	Producers	Post-harvest handlers, processors, and distributors	Consumers
<b>Reduce energy deficiency (hunger)</b>	<ul style="list-style-type: none"> <li>■ Increase crop, livestock, and fisheries productivity and resilience to ensure availability of sufficient calories, particularly in poor countries (K, I, P)</li> <li>■ Reduce net taxation of agriculture, and facilitate trade (P, K, R, I)</li> </ul>	<ul style="list-style-type: none"> <li>■ Reduce food loss through improved supply/demand coordination and storage (K, I)</li> </ul>	<ul style="list-style-type: none"> <li>■ Support home-grown school feeding programs (K, I, R)</li> <li>■ Ensure policy consistency to reduce food price volatility (P)</li> <li>■ Support public campaigns to reduce food waste (K)</li> </ul>
<b>Reduce micro-nutrient deficiency (hidden hunger)</b>	<ul style="list-style-type: none"> <li>■ Align producer price and production policies to shifting consumer demand (P, R)</li> <li>■ Promote more diversified crop/farm enterprise production systems, including through homestead gardens (K, P, R, I)</li> <li>■ Integrate balanced diet and nutrition modules in agricultural extension (K, I)</li> <li>■ Increase discretionary income-earning opportunities and promote labor saving technologies for women (K, I)</li> <li>■ Increase research and development on more nutrient-rich crops (I)</li> <li>■ Support development of biofortified crops (I)</li> <li>■ Promote micronutrient fortified fertilizers (K, P)</li> </ul>	<ul style="list-style-type: none"> <li>■ Promote food fortification (R)</li> </ul>	<ul style="list-style-type: none"> <li>■ Expand nutrition education and demonstration in schools (K)</li> <li>■ Expand home-grown school feeding designed to deliver micronutrients (K, I)</li> <li>■ Promote the dissemination of dietary guidelines (to combat micronutrient deficiency) (K)</li> </ul>
<b>Reduce excessive net energy intake and unhealthy diets (over-weight/obesity)</b>		<ul style="list-style-type: none"> <li>■ Improve food labeling (R)</li> <li>■ Restrict food and beverage advertising, especially to children (R)</li> <li>■ Limit specific dietary factors (such as trans fats) (R)</li> <li>■ Reduce subsidy biases for processed foods (P)</li> </ul>	<ul style="list-style-type: none"> <li>■ Seek and support consumer engagement in regulatory and program development (K, I)</li> <li>■ Tailor dietary guidelines (specifically to combat overweight and obesity) (K, R)</li> <li>■ Reduce subsidy biases for foods high in salt, oil, and sugar; consider the use of taxes to influence consumer behavior (P)</li> </ul>
<b>Improve food safety (health)</b>	<ul style="list-style-type: none"> <li>■ Apply regulatory knowledge and enhance measures to address the misuse of pesticides (K, R, I)</li> <li>■ Control and reduce antibiotic use in livestock and aquaculture (K, R, I)</li> <li>■ Mitigate any negative impacts on human health from irrigation infrastructure (K, I, R)</li> </ul>	<ul style="list-style-type: none"> <li>■ Control aflatoxin (K, R, I)</li> <li>■ Modernize food safety regulations and oversight (K, R, I)</li> <li>■ Support private operator food safety management (R, K)</li> <li>■ Upgrade hygiene and management of informal markets (I, K)</li> </ul>	

*Note:* Public policy and investment levers are notated in the parentheses. Explanation: K = Knowledge, including education and training; P = Fiscal and/or trade policy; R = Regulations; I = Investment. Table 1 is not intended to be exhaustive but indicative of entry points.

8 percent post-harvest handling and storage loss of cereals in Africa, whereas self-reported post-harvest losses for maize show lower estimates of 1.4–5.9 percent.<sup>37</sup> Losses for more perishable products are higher. FAO estimates milk losses ranging from 7 percent to 21 percent in Ethiopia, Tanzania, and Uganda.<sup>38</sup>

In some contexts, losses are very significant, especially quality losses. Reducing these losses requires more attention. Food losses occur throughout the value chain, including during production, harvest, handling, storage, processing, and logistics. Food losses result from multiple factors, and the mix of interventions needed will vary depending on local circumstances. In low-income countries, losses can be reduced—sometimes substantially—through better timing of planting and harvesting; improved post-harvest techniques; upgrading storage facilities and their management; and investments in rural infrastructure, market linkages, cold chains, and other logistical services.

**Support home-grown school feeding programs.** School feeding programs in developing countries—both school meals and take-home rations—are popular and widespread. The objectives of these programs are to encourage children’s school enrollment, attendance, and educational performance. Use of crops and livestock products procured from smallholder farmers who live near schools should be encouraged to serve as a market outlet and strengthen the local economy.<sup>39</sup> For example, Brazil’s school feeding program is mandated by law to procure at least 30 percent of its food directly from local family farmers and rural family

enterprises. It also is important to establish nutritional guidelines outlining the nutrient requirements for meals to ensure that the feeding program adequately addresses the goals of the program.

**Ensure policy consistency to reduce food price volatility.** Policy uncertainty or untimely food market interventions by governments exacerbate the price effects of seasonal differences in production. As has been observed in many developing countries, these interventions can dampen farm production, investment, and private sector storage; and negatively affect consumers. At the global level, food price volatility periodically has been exacerbated by sudden ad hoc restrictions on exports among important global suppliers, as well as by ad hoc reductions in import tariffs in net importing countries. In 2006–08, these types of measures accounted for 45 percent of the sharp increase in world rice prices and 30 percent of the increase in world wheat prices.<sup>40</sup>

**Support public campaigns to reduce food waste.** High levels of food waste occur, particularly in high income, and to a lesser extent in middle income, countries due to excess supply and/or the behavior of consumers and retailers.<sup>41</sup> According to FAO, every year, consumers in rich countries waste almost as much food (222 million tons) as the entire net food production of Sub-Saharan Africa (230 million tons).<sup>42</sup> Significant gains in rich countries can be made through influencing consumer behavior, reducing portion sizes at home and in restaurants, and developing markets for produce that is discarded because the products do not meet grade standards on size, shape,

or appearance.<sup>43</sup> Recently, France passed legislation that bans supermarkets from discarding unsold foods and instead requires them to donate unsold foods to charities and food banks.

### **Spectrum of food system interventions to reduce micronutrient deficiency (hidden hunger)**

#### **Align producer price and production policies with shifting consumer demand.**

Aligning farmer incentives to respond to changing market demands can spur a respective supply response and help raise incomes of poor farmers. Aligning incentives includes: (a) removing price policies that are biased against production of high-value non-cereal crops in favor of cereals. Such policies disincentivize farmers to produce non-cereal crops. These disincentives can lead to elevated prices for non-cereal foods and result in poor dietary diversity; and (b) removing restrictions on land use tied to specific crops.

**Promote a more diversified crop/farm enterprise production systems, including through homestead gardens.** Many small-scale farmers engage in monocropping, including of staple grains. The resulting household diet often lacks sufficient nutrient diversity and contributes to poor nutritional outcomes. When small farm households produce a more diverse set of foods (for example, fruits and vegetables, legumes, milk, eggs, and fish) and receive nutrition awareness training, the result often is greater dietary diversity,<sup>44</sup> higher micronutrient intake,<sup>45</sup> and positive impacts on the nutritional status of children in the household.<sup>46, 47</sup> Analysis

in Nigeria shows that production diversity had a larger effect on dietary diversity than income gains.<sup>48</sup> A combination of interventions are needed to improve food production and consumption diversity: improve nutrition literacy; remove land use restrictions and price policy biases toward cereal crops; promote homestead gardens; and promote higher productivity of nutrient dense crops, fish farming, and livestock.<sup>49, 50</sup>

#### **Integrate balanced diet and nutrition modules in agricultural extension.**

Agriculture extension workers need to strengthen messages regarding production and consumption of nutritious foods,<sup>51</sup> informed by improved knowledge of dietary requirements at various stages of the life cycle. Simple nutrition messages around specific crops can be effective if they are targeted to the farmers who grow the crops, and are packaged with seed delivery or other pertinent information about the crop.<sup>52</sup> Improving the gender balance among agricultural extension workers will help improve the delivery of services that meet the needs of women farmers. As demonstrated in Mozambique,<sup>53</sup> close coordination between agriculture and health sector staff at all levels can be effective. In India,<sup>54</sup> communicating messages from multiple sources—agricultural extension workers, health workers, and village-level workers—helped enhance the impacts on consumption and nutrition. The range of channels available to expand coverage include radio, print media, television shows, and information-and-communication-technology-(ICT)-enabled tools such as cell phones and videos.<sup>55</sup>

#### **Increase discretionary income earning opportunities and promote labor saving**

**technologies for women.** Making education, labor markets, and civil engagement as accessible to women as men is particularly important to improve nutrition of the women themselves and their children. The most relevant aspects of women's empowerment for nutrition are (a) increasing women's access to and control over resources—primarily incomes, (b) increasing women's decision-making power related to food purchase and preparation; and (c) reducing time and labor constraints. Decision making on household income and expenditure controlled by women has a significantly greater positive effect on child nutrition and household food security than income controlled by men.<sup>56</sup> Additionally, labor saving technologies are needed to enable women to earn more income without compromising on breastfeeding and meal preparation time.<sup>57</sup>

**Increase research and development on more nutrient-rich crops** (use nutrient content as one of the criteria in plant breeding). The nutrient content varies greatly across varieties of the same crops. For example, certain varieties of rice contain 2.5 times more iron than the average variety—enough to make a significant nutritional contribution.<sup>58</sup> Increasing nutrient content has not been a commonly used criterion for plant breeding except in very special cases such as biofortification. The traditional focus of plant breeding research has been on increasing the yield of staple crops—mainly rice, wheat and maize—and their resistance to pests and diseases, and tolerance to droughts, and floods. Breeding needs to be expanded to include a focus on nutrient content to improve access to nutrient-rich foods and to a broader set of crops. Expanded breeding research

will have significant impacts. For example, the Nigerian national agricultural research system and the CGIAR's International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) jointly developed a sorghum variety that has triple the amount of iron compared to average values while exhibiting high yields and drought resilience.<sup>59</sup>

**Support the development of biofortified crops** (use nutrient content as the main criterion for plant breeding). Biofortification is a purposeful effort to breed plants to improve the nutrient content while not compromising on traditionally valued traits such as yields, resilience, and taste. Efforts are underway to add nutrient-dense traits to traditional staple crops including maize, rice, millet, beans, and cassava. In case studies, consumption of biofortified Vitamin A-rich orange sweet potato increased Vitamin A intake and dietary diversity among children;<sup>60</sup> yellow or golden cassava with high levels of beta-carotene increased Vitamin A intake in children;<sup>61</sup> biofortified orange maize in Zambia increased serum B-carotene concentrations in children aged 4–8 years;<sup>62</sup> and iron-biofortified millet improved the iron status of adolescent girls.<sup>63</sup> Biofortification offers a promising approach to help address micro-nutrient deficiencies, especially for people currently consuming an undiversified cereal-based diet.

**Promote micronutrient fortified fertilizers.** Supplementing fertilizers with zinc, iodine, and selenium can increase the nutrient content of food grown in soils that are low in these micronutrients. In Turkey, applying zinc as a fertilizer to the soils doubled or tripled the zinc content of cereal grains.<sup>64</sup>

Finland's supplementation of fertilizers with selenium increased selenium levels of the food produced, enhancing the selenium status in children and adults who consumed these crops.<sup>65</sup> In China, adding iodine to irrigation water decreased iodine deficiency and lowered infant mortality.<sup>66</sup> Improving farmer and consumer knowledge, reducing tax or import tariffs on micronutrient fortified fertilizers, and including these fertilizers in ongoing input-subsidy programs in areas with micronutrient-deficient soils can increase their use.

**Promote food fortification.** Food (or industrial) fortification—adding micronutrients (vitamins and minerals) to foods, including to milk, during processing—can help reduce malnutrition.<sup>67</sup> Food fortification has a long history of use in industrialized countries, and its use is growing in a number of developing countries.<sup>68</sup> Fortification has taken numerous forms including universal fortification mandated by law, targeted fortification for vulnerable groups, and market-driven voluntary fortification. Food fortification regulations are necessary as part of national food safety and public health policies to ensure the benefits of fortification. In most countries, the Ministry of Health leads industrial food fortification. However, because it relates to the processing of food, fortification typically also requires the cooperation of the Ministry of Agriculture or food safety agencies.

**Expand nutrition education and demonstration in schools.** The purpose of nutrition education in schools is to help students obtain nutrition-related knowledge and skills and to develop healthy dietary habits for

life. School-based nutrition education must be culturally appropriate.<sup>69</sup> The effectiveness of these programs is related to (a) quality of implementation, (b) educational rigor of the program and its integration within mainstream curricula (for example, reading, and science), and (c) positioning of school-based efforts within the context of broader educational and community efforts. Successful programs tend to involve family and the rest of the community. These programs also extend to issues beyond food preparation, preservation, and storage to cover social and cultural dimensions of food and eating; as well as self-esteem and body image messages—all of which affect food choices.<sup>70</sup>

**Expand home-grown school feeding programs designed to deliver micronutrients.**

Some school feeding programs are designed intentionally to deliver micronutrients to help solidify early childhood development gains and deliver important nutrients to a population that does not readily consume them elsewhere. Some programs use premixed packages of micronutrients that enhance the nutritional value of meals, and fortified products or biofortified produce that are enriched with essential nutrients such as Vitamin A or iron.<sup>71</sup> Some school meals also are designed to add dietary diversity.

**Promote the dissemination of dietary guidelines**

(to combat micronutrient deficiency). FAO and World Health Organization (WHO) promote the use of balanced dietary guidelines. Over 100 countries have developed dietary guidelines, including 5 countries in Sub-Saharan Africa. Most guidelines encourage variety and increased intake of plant foods, especially vegetables



and fruit, and reduced consumption of solid fats, salt and sugar. Recently, some countries have included considerations to promote and protect traditional food or promote diets that are considered to be more environmentally sustainable.<sup>72</sup> Evidence on the impacts of implementing these guidelines is still limited. Measures need to be taken to ensure that balanced dietary guidelines are disseminated via multiple channels to increase uptake and adherence by the consumers.

### **Spectrum of food system interventions to reduce excessive net-energy intake and unhealthy diets (overweight/obesity)<sup>73</sup>**

**Improve food labeling.** Food labels, particularly on packaged and processed foods, play an important role in consumer protection by conveying safety information and nutritional content. Over time, breadth and visibility of labeled content has evolved in parallel with improved scientific understanding, changing societal attitudes, and commercial needs. International labeling guidelines are provided under the Codex Alimentarius.<sup>74</sup> Nevertheless, significant differences among national food labeling requirements remain, especially with regard to nutritional content.<sup>75</sup> Whether nutritional labeling can influence dietary habits and behavior<sup>76</sup> depends on the clarity of the information and consumers' awareness. In Thailand, considerable effort has gone into raising consumer knowledge. Research there has experimented with the use of symbols and color codes to convey positive and negative nutrient content. Some countries, including Chile, have sought to actively discourage consumption of products with a high content of sugar,

salt, and/or fat by requiring warnings on the front of packages. Many countries, including Singapore, have supported “healthy choice” symbols on packaged food labels and restaurant menus.

**Restrict food and beverage advertising, especially to children.** To combat the rising rates of obesity among children and the wider population, over the past decade, a growing number of countries have undertaken measures to curb the commercial promotion of foods high in salt, sugar, and fat, especially to children.<sup>77</sup> The United States Federal Trade Commission reports that, in 2006, the food industry spent approximately \$870 million on marketing to children under the age of 12 and over \$1 billion on marketing to adolescents.<sup>78</sup> The majority of advertising (63 percent) was spent to promote carbonated beverages, breakfast cereals, and restaurant foods. Some countries, including Denmark, Latvia, and Mexico, have worked with industry to develop codes for “responsible” marketing to children. Other countries have adopted laws that prohibit various forms of food product advertising to children through television, internet, videogames, and product placements. France has taken a different approach. It requires that all television advertising of foods high in salt, sugar, and fat include messages about good dietary habits, including what to eat and what to avoid.

**Limit specific dietary factors (such as trans fat).** Over concerns about food-related non-communicable diseases, as of 2014, 6 European Union countries (Austria, Denmark, Hungary, Iceland, Norway, and Switzerland) limited trans fatty acids through regulation, while others (for example, the

Netherlands) use voluntary, self-regulation measures.<sup>79</sup> In 2014 the U.S. Food and Drug Administration determined that partially hydrogenated oils, the primary dietary source for trans fat in processed food, are not “Generally Recognized as Safe” (GRAS)<sup>80</sup> in human food.<sup>81</sup> In 2014, as part of its Food Code, Argentina enacted a law that limits trans fatty acids in processed foods to 2 percent of the total of vegetable oils and margarines for direct consumption, and 5 percent of other foods.<sup>82</sup> Across multiple countries, policies aimed at reducing trans fatty acids in food have been associated with significant reductions in trans fatty acid levels in the food supply with likely positive public health effects.<sup>83</sup>

### **Reduce subsidy biases for processed foods.**

From 1995 to 2013, the United States government provided US\$19.2 billion in subsidies for corn sweeteners, corn starch, and soy oils—common ingredients in processed foods, while subsidies for apples, the only fresh fruit or vegetable that received an appreciable subsidy, was only US\$0.7 billion.<sup>84</sup> These differences, along with other factors, contribute to reduce the consumer price of corn sweeteners, corn starch, and soy oils relative to fresh fruits and vegetables. In the U.S., fruits and vegetables represent 41 percent of the total recommended dietary consumption. Nevertheless, in 2011–13, public spending on fruits and vegetables—subsidies; research, education, and extension; nutrition assistance programs; and administration—was approximately only 15 percent of total food group spending.<sup>85</sup> Correspondingly, the average U.S. resident consumed less than 50 percent of the recommended amount of fruits and vegetables.

### **Seek and support consumer engagement in regulatory and program development.**

Effective consumer engagement and representation plays a very important role in identifying food-related problems and solutions and ensuring the development of competitive and safe food systems. Consumer engagement and representation can take multiple forms, including regular consumer research, appointment of consumer representatives to scientific or other committees, holding public hearings on proposed regulations, and interactions with/support for formal consumer organizations. Influential consumer organizations and consumer representation in scientific committees are much more common in North America and among EU Member States than in developing countries, although this pattern is emerging elsewhere, including in Brazil and India.

### **Tailor dietary guidelines specifically to combat overweight and obesity.**

The general advice seen in most dietary guidelines is to encourage variety and increased intake of plant foods, especially vegetables and fruit; and to reduce consumption of solid fats, salt, and sugar. This advice is valid whether a country suffers mainly from undernutrition issues or overnutrition. However, in societies in which overweight and obesity are the predominant nutritional concerns, dietary guidelines need to be adjusted to specifically target obesity. For the first time, the 2015–20 dietary guidelines for the U.S. included a specific target to reduce sugar intake to less than 10 percent of an individual’s daily calories. The 2014 Brazilian dietary guideline target the country’s increasing obesity levels. It has moved away from the traditional approach of daily recommended portions of

basic food groups to instead espouse 10 evidence-based principles. They include limiting consumption of processed foods; avoiding consumption of ultraprocessed foods; developing culinary skills so that consumers can prepare meals with fresh ingredients without having to rely on quick and convenient processed foods; and eating in clean, quiet, and comfortable environments; whenever possible in the company of others.<sup>86</sup>

**Reduce subsidy biases for foods high in salt, oil, and sugar; and consider the use of taxes to influence consumer behavior.**

Large consumer subsidies of cooking oil and sugar in the Middle East and North Africa likely have contributed to high levels of obesity in the Region. These programs are major pillars of the countries' social protection policies. Thus, any reforms face huge political challenges even when these subsidies are known to be a heavy burden on public finance, are largely untargeted, and likely are linked to negative nutrition consequences. However, in some countries, incremental reforms are happening. Mexico introduced a 10 percent tax on sugar-sweetened drinks, which reduced sales by 12 percent after one year.<sup>87</sup> The long-term consumption impact of this policy is not yet clear. Nevertheless, encouraged by the Mexican experience, other countries including South Africa and United Kingdom are following suit.

**Spectrum of interventions to improve food safety (health)**

**Apply regulatory and knowledge-enhancing measures to address the misuse of pesticides.** When used correctly, pesticides are a labor-saving technology that can

contain pest populations and improve crop yields, quality, and storability. The misuse of pesticides—including improper mixing, dosing and timing; unsafe application, handling, and storage; and the use of highly toxic or persistent chemicals—can harm environmental, human, and animal health. A combination of approaches can lead to more judicious use of pesticides. These approaches include (a) training farmers in the techniques of integrated pest management in which natural control measures are emphasized; (b) making technical changes in how pesticides are formulated or applied (for example, pesticide-coated seeds); (c) removing existing pesticide subsidies and support the development of markets for organically grown produce; and (d) strengthening the enforcement of national regulatory systems for pesticide use and distribution.

**Control and reduce antibiotic use in livestock and aquaculture.**

The extensive use of antimicrobial drugs has become a threat to public health from the overuse and misuse of antibiotics, including in food animals. Human beings are at risk due both to the potential presence of superbugs in meat and fish, and to the general migration of superbugs into the environment, where they can transmit their genetic antibiotic immunity to other bacteria, including those that make people sick. There is great variability across countries in antibiotic use in food animals. For example, in 2008, Chile used significantly more antibiotics than Norway per kilogram of salmon produced.<sup>88</sup> WHO's 2015 Global Action Plan on Antimicrobial Resistance spells out the country-level actions needed to improve awareness and understanding of antimicrobial resistance, strengthen knowledge

and the evidence base, reduce the incidence of infection, optimize the use of antimicrobial medicines in human and animal health, and corresponding investment.<sup>89</sup>

**Mitigate any negative impacts on human health from irrigation infrastructure.**

Irrigation infrastructure helps boost agricultural productivity, especially in areas such as Africa, where expanding irrigation has the potential to increase production by more than 50 percent.<sup>90</sup> However, irrigation also can facilitate water-borne diseases, including malaria. In some cases, the prevalence of malaria has increased as a consequence of increased standing water from irrigation schemes.<sup>91</sup> Poor canal water management can increase malaria transmission, and mitigating measures should be put in place.<sup>92</sup> In addition, including water quality considerations in decisions on irrigation placement and design, and improved agricultural practices can help avoid heavy metals and other contaminants in irrigation water.

**Control aflatoxin.** There is no single solution to the aflatoxin problem. A holistic and integrated approach is required based on creating awareness, providing training and education, and mainstreaming good practice and technologies into value chains and regulatory and policy frameworks/capabilities. CGIAR's International Institute of Tropical Agriculture (IITA), in partnership with the U.S. Department of Agriculture (USDA), is introducing an adapted biocontrol product called aflasafe™ in Kenya and Nigeria through using native micro-flora. Field testing of aflasafe™ in Nigeria has produced highly positive results: aflatoxin contamination of maize and groundnut

consistently was reduced by 80 percent–90 percent. Native atoxigenic strains have been isolated from Kenya and are ready for further evaluation to be developed into a product.

**Modernize food safety regulations and oversight.**

A modern set of food safety laws, regulations, and compliance enforcement mechanisms is critical to protect consumers, develop local food markets, and facilitate trade.<sup>93</sup> Food laws should lay out responsibilities of different agencies within the government, and of the private sector in the event of an emergency, core principles for ensuring safe food, and the penalties for infractions. These laws need to be supplemented by a range of regulations that provide implementation guidance for inspectors and for private operators; and specific rules on cross-cutting issues, such as additives, chemical contaminants, and packaging, or in relation to certain types of products, such as fortified and organic foods. Food safety regulatory reforms are trending toward emphasizing preventive measures and promoting behavioral changes and away from resorting to end-product compliance enforcement. Although national standards are trending toward equivalence with CODEX and other established international standards, challenges remain around small enterprises that cannot pay the high compliance costs and ensuring that such costs do not position high-nutrient foods out of reach for poor consumers.<sup>94</sup>

**Support private operator food safety management.**

There is growing recognition—in both developed and developing countries—that the primary responsibility for ensuring safe food lies with the private sector, including farmers, post-harvest handlers, processors,

food distributors, and restaurants.<sup>95</sup> Still, governments can use various instruments to guide and support changes in behavior and practices that impact how well food safety hazards are addressed. Regulations prescribe or restrict certain practices (for example, in relation to food facilities, record-keeping, and use of chemicals or additives).<sup>96</sup> Formal training and certification programs targeting small and medium enterprises (SMEs) impart knowledge about safe food handling and build a professional identity and ethic that can be instrumental in changing the behavior of individuals employed in firms, even in the absence of public scrutiny. For food companies that come into direct contact with consumers, the public disclosure of risk profiles can be a powerful means to influence behavior. An example is to visibly post the food safety inspection grades of restaurants, as do many cities, including Singapore, Shanghai, and New York. For informal sector operators, such as street food vendors or informal market sellers, programs involving food safety awareness raising and/or the upgrading of marketplace

sanitary conditions can mitigate the risks faced by lower income consumers.<sup>97</sup>

**Upgrade hygiene and management of informal markets.** In much of Africa and Asia, informal (“wet”) markets continue to be the most important source of animal products and fresh fruit and vegetables for poor people.<sup>98</sup> Maintaining these markets—or upgrading them with improved infrastructure and sanitary conditions—needs to be an integral part of any food retail modernization effort. A recent study shows that policy approaches aiming to suppress the informal sector generally are ineffective; in some cases, these approaches actually decrease the quality and safety of food. Similarly, food and nutrition policies that simply ignore the informal sector may fail to have effects for low-income populations. Thus, there is a need to upgrade based on introducing modern equipment such as upgraded counters, installing sanitation facilities, training on food safety and hygiene standards and on promoting behavioral change.<sup>99</sup>





## How can the food system agenda for improved nutrition and health best be implemented?

**Countries need to implement a set of actions tailored to their needs.** Policies need to target food producers, post-harvest handlers, processors, food distributors, and consumers across low- middle- and high-income countries to address the specific challenges of energy deficiency, nutrient deficiency, excessive net-energy intake and unhealthy diets, and food safety issues that each country faces (figure 1). The overall objective across all countries is the same: to feed every person, every day, everywhere with a safe, nutritious, and affordable diet. Achieving this objective will require a tailored set of policies and investments by country.

- **Low-income countries.** Forty-seven percent of the total population in low-income countries lives below the US\$1.90 per day poverty line; 27 percent of the total population are food energy deficient;

38 percent of children under 5 are stunted caused partly by both energy and micro-nutrient deficiencies; and almost 5 percent of the total population are obese. In these countries, efforts are required most at the food producer and processor levels (table 2). In extremely poor countries with low initial levels of food production, income gains and food production growth will be vitally important to reduce energy deficiency and child stunting. Reducing policy uncertainty and/or avoiding poorly-timed food market interventions can help reduce food price volatility benefiting both producers and consumers. Increasing diversity of crop and farm enterprise production patterns, expanded use of home-stead gardens, development and adoption of labor-saving technologies for women, biofortification, and the use of micronutrient fortified fertilizers all can help.

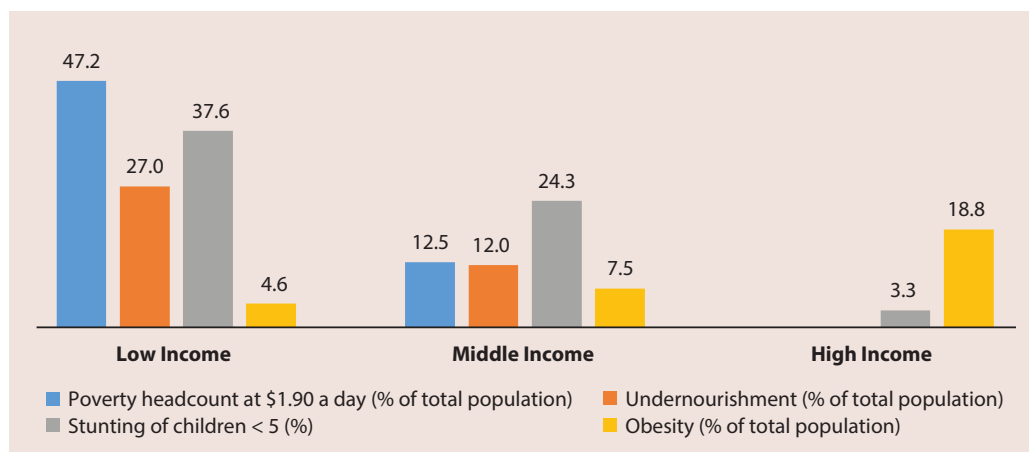
As the distance between producers and consumers widens, and the food value chain becomes more complex, action also is needed beyond the farm. Maintaining food quality and reducing quantity loss across the value chain, food fortification, and improving storage to preserve nutrient value become increasingly important. Food safety and health can be improved through using pesticides more optimally, designing and managing irrigation schemes that do not cause an increase in water-borne diseases like malaria, and putting in place basic post-harvest food safety standards and regulations that address risks associated with staple foods (such as aflatoxin in cereals and groundnuts) and improving hygienic conditions and practices in informal markets.

- **Middle-income countries.** Approximately 12 percent of the total population in middle-income countries live below the \$1.90 per day poverty line; 12 percent of the total population are food energy deficient; 24 percent of children under 5 are stunted; and almost 8 percent of the total population are obese. Variation across middle-income countries is large. For example, in Egypt less than 5 percent of the population are food energy deficient, whereas 22 percent of the children under 5 are stunted, and approximately 28 percent of the population are obese. In India, the respective incidences are 15 percent, 40 percent, and 3 percent. A context-specific customized set of actions is needed to address the different situations although, in most cases, a balanced focus is needed across all three sets of actors (table 2).

Producer-level aspects relevant for low-income countries also apply to middle-income countries. As per capita income rises, producer price and production policies need to align with shifting consumer demand. Growth in animal product consumption intensifies livestock production and heightens risks such as the misuse of antibiotics and contamination of foods at farm level. Urbanization and industrialization bring increased risk from environmental sources such as contaminated soil and water. The scope of food safety laws needs to be expanded; public food safety monitoring, inspection, surveillance, and laboratory testing need to be strengthened; input subsidies that induce soil and groundwater pollution need to be realigned to minimize the negative impact on both plant and animal health; private sector food safety systems need to be strengthened, including facility and management system upgrades; and traceability and recall systems need to be developed to help identify and isolate food-borne disease outbreaks. Better information on dietary choices, and health awareness can move social norms on eating in a healthier direction. Finally, reducing subsidies for oils, sugar, and salt can help address the rising obesity challenge many middle-income countries face.

- **High-income countries.** No aggregate data exist for the share of the total population living below the \$1.90 per day poverty line in high-income countries, but extreme poverty rates likely are very small. Fewer than 5 percent of the population are energy deficient; 3 percent of children under 5 are stunted; while almost 19

**FIGURE 1:** Challenges of Ending Poverty, Undernourishment, Stunting, and Obesity Vary Across Low-, Middle-, and High-Income Countries (%)



Source: World Development Indicators; Ng and others. “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.” *Lancet* 384 (2014): 766–81; UN Population Division data.

Note: For each developing country, the respective obesity data from Ng and others are weighted by the share of the population above and below 20 years old; and, within regions, by the population of each country. There is no data available on poverty headcount and undernourishment for high-income countries.

**TABLE 2:** Different Attention Is Needed at Food Producer, Processor/Distributor, and Consumer Levels across Low-, Middle-, and High-Income Countries

	Low income countries	Middle income countries	High income countries
<b>Producers</b>	***	**	*
<b>Post-harvest handlers, processors, distributors</b>	**	**	**
<b>Consumers</b>	*	**	***

Note: Asterisks indicate the relative priorities for attention; 6 asterisks are assigned to each country group.

percent of the total population are obese. Most attention is needed at processor, distributor, and consumer levels (table 2) to address the increasing challenge of obesity. In high-income countries, consumer awareness is generally higher and consumer advocacy combines consider-

ations of safety, wellness, and ethical considerations that go beyond nutrition and health to encompass concerns like the environmental impact of diets and animal welfare. Food regulatory provisions are more refined in these countries, reflecting both scientific advancement and



strong corporate interests from large food companies. Food safety responsibility is placed largely on the private sector—with performance and compliance motivated by technical, professional, commercial (such as brand reputation) and legal/regulatory factors. Labeling and other transparency measures are important tools to help consumers make their food choices. Restricting specific dietary factors (for example, trans fat) can improve food nutrient content. Reducing subsidies biased to processed foods relative to fresh foods can change relative prices and influence dietary choice. Seeking and supporting consumer engagement in regulatory and program development processes can help to identify food-related problems and solutions, and ensure the development of competitive and safe food systems. Restricting advertising of non-nutritious/unhealthy food and beverages, especially to children, is another important tool in the fight against obesity.

**Leadership and governance.** Shaping country food systems for improved nutrition and health requires strong leadership. Some leaders have emerged from their direct exposure to the realities of malnutrition, and others through capacity building and training courses.<sup>100</sup> Effectiveness requires thinking multisectorally to ensure alignment of sectoral actions with common nutrition and health objectives.<sup>101</sup> Bangladesh, Brazil, Chile, China, and Thailand are examples of countries that have made significant progress in improving nutrition and health outcomes. Some of their progress was driven by rapid economic growth, but countries also experimented with and implemented a

combination of multisectoral interventions, some of which have proved successful.

**Increase the focus on women.** The connection from food systems to nutrition and health outcomes passes primarily through women. Yet, women have less access to and control over assets, inputs, services, and finance than do men. As the child bearers and child care providers, women play the critical role in the health of infants, and are often responsible for producing the food, purchasing it, processing it, and preparing the meals. Thus, any effective program to improve household nutrition and health must address gender inequalities. This issue cuts across the actions in table 1 beyond the specific action listed (i.e. increasing discretionary income earning opportunities and promoting labor saving technologies for women). Policies and programs need to abandon a gender-blind approach and instead expand women's role and engagement in areas around (a) decisions about agricultural production, (b) access to and decision making power over productive resources, (c) control over use of income, (d) leadership in the community, and (e) time use.

**Facilitate multiagency and multisectoral collaboration.** Implementing the food system linked nutrition and health agenda requires collaboration across government ministries, such as the Ministries of Agriculture, Health, Industries, Education, Rural Development, and Women Affairs. It requires cross-sectoral collaboration within and across development partners; civil society; research institutions; and private sector food producers, post-harvest handlers, processors, distributors, and consumers. Following an

institutional review,<sup>102</sup> Tanzania established a High-Level Committee on Nutrition chaired by the Prime Minister's Office. The committee comprised nine key ministries, development partners, nongovernmental organizations, faith-based organizations, private sector, and tertiary educational institutions. In Brazil, both the National Council on Food and Nutrition Security and the Inter-ministerial Chamber on Food and Nutrition Security are multistakeholder entities. The multisectoral nature of nutrition and health, and the ability of the food system to contribute need to be reflected in national and local institutional structures, and in complementary development plans to better inform public budget allocations.

**Better understand and address political economy factors.** Shifting biased consumer food policies and production subsidies away from traditional staples in low- and middle-income countries, and from processing ingredients such as corn sweeteners, corn starch, and soy oils in high-income countries, to a more crop-neutral policy and subsidy system has both winners and losers. Entry points for moving forward include (a) better understanding the nutrition and health costs of current policies and the gap between a country's agricultural and nutrition/health policy objectives, (b) increasing the voice of broader stakeholder groups (for example, consumers, nutritionists, researchers) in agricultural policy dialogue; and (c) understanding who will be the winners and losers from policy shifts, and creating options for bargained compromises (such as compensation or adjustment support for losers).

In addition, to avoid conflicts of interest, food regulatory agencies, which become increasingly important as per capita incomes increase, should be public entities funded by government, and not rely on private company user fees. Clear dietary guidelines drawing on nationally recognized nutrition and medical researchers, academics, and practitioners can help guide the regulatory agencies. Dietary guidelines vary across countries (and over time). Given the growing concern about rising obesity,<sup>103</sup> perhaps a global guideline on healthy diets could help develop a clearer consensus to inform subsequent national regulations on certain foods.

**Monitor and evaluate.** Continually building the evidence base on the impact of food system actions on nutrition and health outcomes is necessary. New survey data that collect both farm-level production and nutrition-related data are providing more opportunities to build the evidence base, as reflected in the recent special issue of the *Journal of Development Studies* on "Farm-Level Pathways to Improved Nutritional Status."<sup>104</sup> Government programs, particularly those financed by development partners, need to increasingly use more common sets of metrics to measure nutritional and health-related outcomes through food system interventions, such as dietary diversity. A larger knowledge stock of impacts can help inform future government budget and donor fund allocations, and the design of programs for higher future impacts.

**Strengthen partnerships.** Global partnerships such as the UN Zero Hunger Challenge;

the Scaling Up Nutrition initiative; the South Asia Food and Nutrition Security Initiative, the Global Agriculture and Food Security Program; the Global Panel on Agriculture and Food Systems for Nutrition; and the Nutrition for Growth Summit, which was held in conjunction with the London Olympics and will be continued at the Rio Olympics in 2016, increasingly are paying attention to nutrition and health outcomes.

There is growing attention to these issues. Civil society has been an early supporter and implementer of this agenda. Building on growing interest, there are efforts to mobilize a Global Chef's Network to help drive change in the food system. Multilateral development banks, bilateral agencies, and foundations increasingly are integrating nutrition and food safety aspects into the agriculture programs they support. The World Bank has increased the share of agriculture projects with an explicit focus on nutrition from 12 percent in 2012 to 27 percent in 2015. Improving food and nutrition security is one of CGIAR's three system level outcomes, and the focus of its global research programs on agriculture for nutrition and health, and on livestock and fish, which provide new data, evidence, and technologies. More support is needed to strengthen country level planning and prioritization of nutrition aspects in country agricultural development plans, and ensure that global efforts consolidate, rather than fragment, efforts and financing. Growing interest and partnerships need to be sustained and deepened, and this paper provides potential entry points for action to help jointly shape the global food system to deliver improved nutrition and health.

**A Call for Action.** The human and economic costs of malnutrition and foodborne diseases are large and disproportionately impact poor people. Child stunting is unconscionably high. Concerted multisectoral actions are needed to combat malnutrition in all its forms. The urgency is reflected in the Sustainable Development Goals with their call to end hunger by 2030. The food system provides energy and nutrients that people require to advance economically and socially. It has a key role to play in global efforts to improve nutrition and health. Our food system must shift from being part of the problem to becoming a greater part of the solution. The world needs a food system that can feed every person, every day, everywhere with a safe, nutritious, and affordable diet. Progress will require behavioral change by all actors from food producers to consumers.

The paper outlines the spectrum of actions that countries can take in the food system to improve nutrition and health through a combination of improved knowledge, sound policies, regulation, and investments (table 1). There are many tested solutions, but no one size fits all. Countries need to tailor the combination and form of interventions to their own circumstances. Doing so will require leadership, a greater focus on the needs of women, more collaboration between institutions and sectors, learning and innovation, and broad partnerships. Working together we can help shape the global food system to deliver improved nutrition and health for the benefit of both current and future generations.

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