

OVERVIEW OF NUTRITION SENSITIVE FOOD SYSTEMS: POLICY OPTIONS AND KNOWLEDGE GAPS

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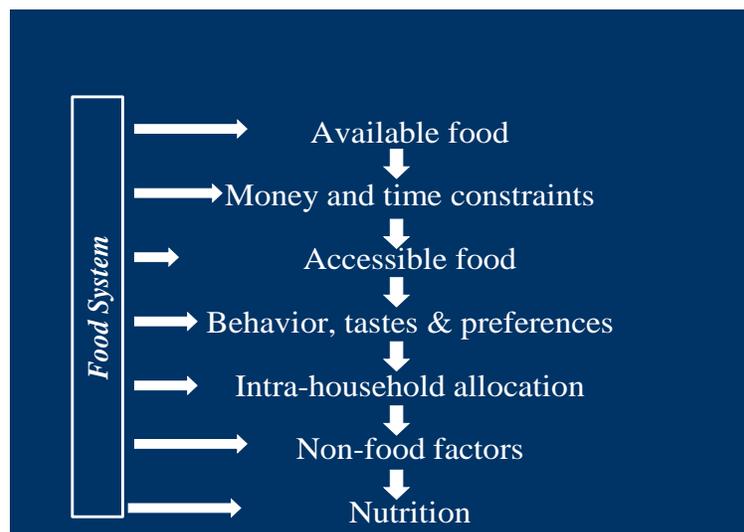
1. INTRODUCTION

Food systems are complex networks of individuals and institutions that provide food for everyone on the planet. They determine the availability, affordability and nutritional quality of the food supply, and influence the amount and combination of foods that people are willing and able to consume (FAO, 2013).

Food systems that effectively and explicitly incorporate nutrition objectives into their overall goals, strategies and implementation may be called “nutrition sensitive”. These systems aim to improve human nutrition using a variety of policy instruments and relevant causal pathways. However, the degree of nutrition sensitivity achieved within a given food system depends on how well its promotion aligns with other food system priorities - namely meeting and generating economic demand and production goals - as well as expected behavioral responses by actors such as consumers, producers and traders.

There are multiple pathways through which the food system affects human nutrition. Understanding these pathways and how they operate is essential to designing agricultural and other food system policies to achieve nutrition goals.

Figure 1. Generic food system to nutrition pathway



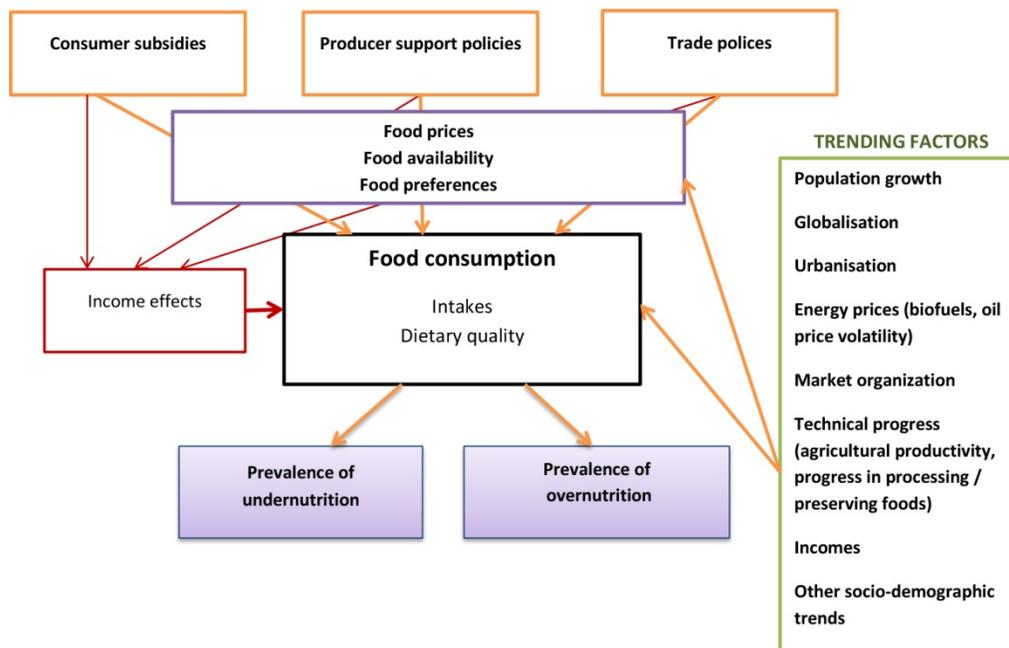
Source: Pinstrup-Andersen, 2012

First, most policies which use food systems to impact nutrition outcomes do so through two pillars of food security: (1) what foods are available to targeted households, and (2) the degree to which those households can access those foods. However, ensuring availability of and access to sufficient food to meet dietary needs is necessary but not sufficient to assure good nutrition. The nutrition effect of changes in food security depends on several other components of the pathway, including household and individual behaviour. Thus, merely pursuing changes in food availability and access will not result in the desired nutrition effects. The complete pathway – from availability to individual nutrition outcome - must be understood to help guide the food system for nutritional benefits. Figure 1 provides a simple

illustration of the most basic, generic pathway steps that may be influenced by the food system to impact nutrition.

Second, while policy changes in agriculture offer very promising opportunities for improving nutrition, today’s globalized context also requires looking beyond this sector to ensure consideration of the wide range of components which comprise most modern food systems. Over the past 20 years, food systems have been influenced by inter-related changes in incomes, trade liberalization, technology, urbanization and the increased work-force participation of women. Processed foods now account for 80% of global food sales, the prevalence of supermarkets has risen markedly in developing countries, and a large variety of semi-processed and processed products are available to the vast majority of consumers. As a result, current influences on food consumption and subsequent opportunities to increase nutrition-sensitivity of food systems extend far beyond agriculture (Mazzocchi, Shankar & Traill, 2012, see Figure 2).

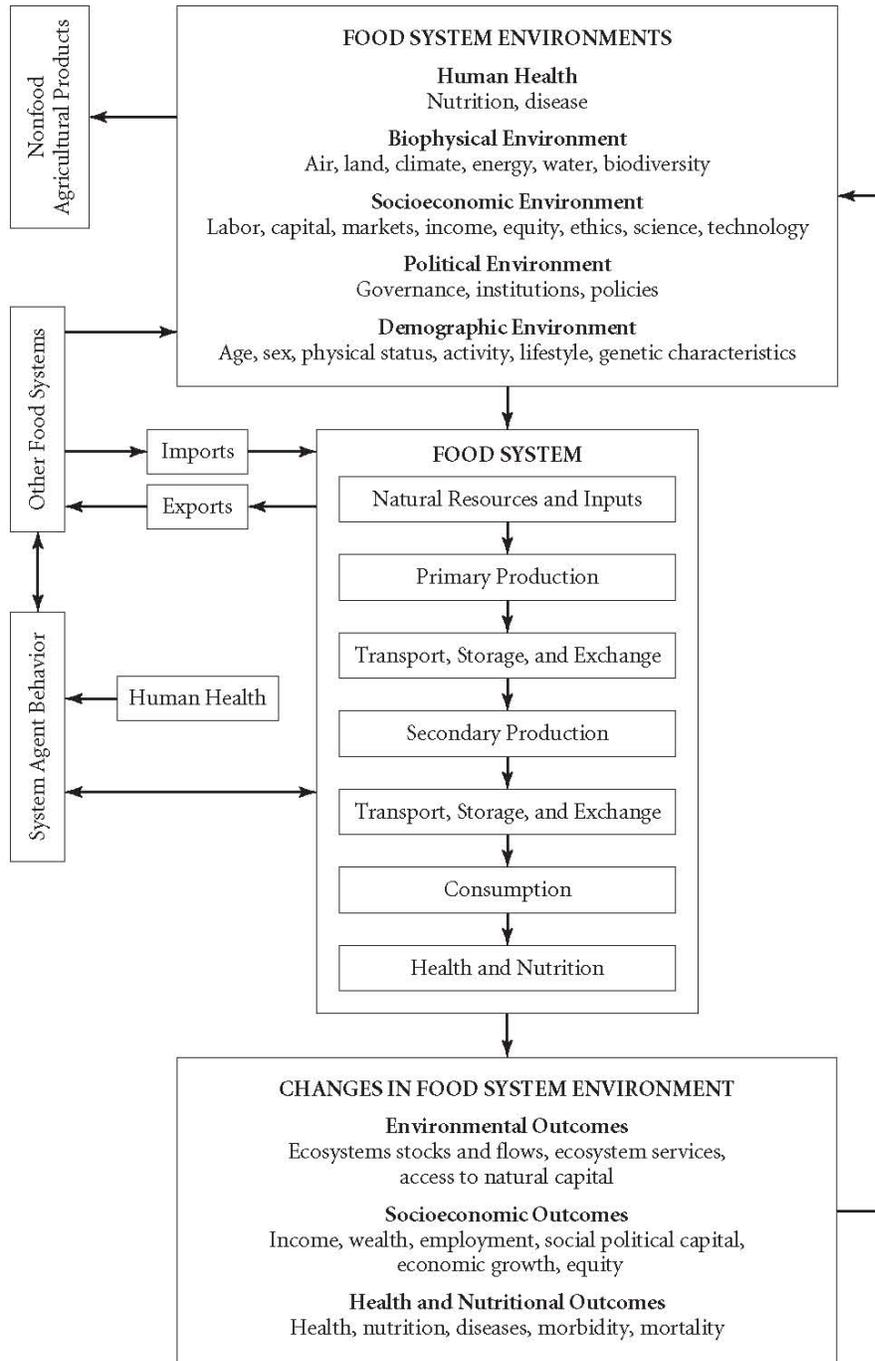
Figure 2. Influences on food consumption over the past 2 decades



Source: Mazzocchi, Shankar & Traill, 2012

Third, socioeconomic and political environments as well as the demographic characteristics of the target population also play a role. Figure 3 maps both distal and proximate components of food systems, providing an illustration of the multiple pathways through which they can affect human nutrition.

Figure 3. Conceptual framework of food systems



Source: Pinstrup-Andersen & Watson, 2011

This brief provides an overview of how the nutrition-sensitivity of food systems can be increased. The first section catalogues policies which impact nutrition – inadvertently or deliberately - via food systems. The second section discusses mediating variables which can increase or decrease the efficacy of those

policies. The third section cites gaps in the knowledge base used to inform current discussions of nutrition-sensitive food systems.

2. POLICIES WHICH IMPACT NUTRITION THROUGH FOOD SYSTEMS

Policies which impact nutrition outcomes via the food system are listed below. Some are deliberately nutrition sensitive, while others may affect nutrition inadvertently, for better or for worse.

- **Policies which promote dietary diversity among rural populations** are deliberately nutrition sensitive and are essential to improving nutrition in low-income countries where the economy remains agriculture-based and consumption of energy, protein, fat and micronutrients may be below recommended levels. In these contexts semi-subsistence farms and traditional local markets are often the anchors of the food system and diets consist of one or two carbohydrate-based staples. Policies which promote dietary diversity provide incentives and support for the following: production, marketing and consumption of nutritious, low-input, short duration crops which do not interfere with (and ideally compliment) staple crop production cycles; cultivation of home gardens; and production, marketing and consumption of animal source foods. Each of these strategies aims to improve intake patterns through increased availability and/or accessibility. The former is achieved by expanding the immediate availability of high-nutrient foods, the latter via income effects which – hopefully – result in increased purchase of high-nutrient foods.
- **Industrial fortification policies** have long been recognized as an important strategy for increasing the micronutrient content of available foods. They do not require compliance on the part of individual consumers and, when delivered via a vehicle that is regularly consumed by the target population (e.g. salt, flour, milk or bread), they have the potential to maintain nutrient stores very efficiently. However, depending on the choice of vehicle, nutrient in question, and fortification method, implementation may increase the price of the vehicle and make it less affordable to those who need it most. In addition to overcoming this challenge, successful fortification policies must also include a regulatory structure to ensure accountability. This is especially necessary when more than one producer is creating the fortified product (e.g. private sector salt iodization).
- **Biofortification programmes** aim to increase micronutrient availability in staple crops themselves. This approach differs from policies promoting dietary diversity and is most appropriate in low-income country contexts where the ability to cultivate or afford sufficient volumes of fruits, vegetables and animal source foods to meet nutrient requirements is low. Biofortification may also be a better choice than industrial fortification in rural areas where access to markets and commercially fortified products is poor. Evidence to date indicates that biofortification is cost-effective after an initial research outlay (Meenakshi et al., 2010; Stein et al., 2008; Stein, Sachdev & Qaim, 2008; Qaim, Stein & Meenakshi, 2007). However its success depends in large part on farmers' adoption of fortified seed and consumers' acceptance of the biofortified product, as well as their willingness to pay a higher price if necessary. If they are, these programmes also promise high returns in regards to sustainability, as once a biofortified crop has been introduced, its additional costs are zero. This is because there is no price

difference between a biofortified crop and its unfortified equivalent. In contrast, both industrial fortification and micronutrient supplementation programmes incur the same costs year after year.¹

- **Policies which strengthen the food supply chain** reduce waste and losses caused by deficits in storage, transportation and other food system activities. Such policies can range from direct investments in cold chain storage and other infrastructure to initiatives which aim to increase working capital and provide training to smallholders. The former deliberately and explicitly improve nutrition by protecting the nutrient value of food and reducing food safety risks. The latter serves a number of nutrition-related functions, not least of which are (1) improving safety and quality standards for locally produced and consumed foods and (2) increasing market viability of locally produced foods.
- **Policies to improve the nutrient content of processed foods**, which for the most part are not designed with nutrition goals in mind, offer many opportunities for improving nutrition. Technological innovations that may be used in the creation of reduced energy and controlled-portion size products include sugar substitutes, fat replacers, addition of fiber, use of chemical additives produced by biotechnology, new production methods, and different food packaging strategies. Designing foods that promote satiety or suppress appetite are active areas of research, and many food products with reduced energy density or controlled portion size are already being marketed successfully. However, such opportunities must be viewed in the context of consumer demand, which in turn may be influenced by the industry. As mentioned above and below, the success of nutrition sensitive policies depends on how well they align with other food system priorities - namely meeting and generating economic demand and production goals. This caveat is especially important in the context of the profit-driven processed foods industry. Future commercial success of these types of products also hinges on government regulations and the knowledge and attitudes of health professionals. For example, the link between sugar sweetened beverages and obesity has been challenged, with implications for both public policy and consumer opinion (Welsh et al., 2011, Sylvetsky et al., 2012, Nicklas & O’Neil, forthcoming).
- **Research and technology** may generate an economic surplus by improving productivity of land, water or labour, not only in agriculture but in other parts of the food system. Depending on supply and demand, elasticities and market structure, conduct and performance, the surplus may result in higher incomes (in cash or kind) for farmers, traders and other food system agents, lower prices for consumers, or a combination of the two. For example, policies which prioritize a portfolio of food crops as opposed to R&D of a single commodity are essential to fulfilling agriculture’s role as a source of income and food for smallholders and other members of the rural sector. To date, many crops which are high in micronutrients have been all but ignored by research. Increased attention to production diversity can correct distortions created by conventional R&D agendas; it may also lead to increased dietary diversity and reduction of micronutrient deficiency (Herforth, Jones & Pinstруп-Andersen, 2012).
- **Public and private investments in the food marketing sector** may alter the nutritive quality of available foods for better or worse. For example, penetration of super and mega-market

¹ These approaches are not mutually exclusive. Biofortification can be used as a complement to industrial fortification and/or supplementation.

companies throughout the developing world has increased availability of animal source foods, fruits, and vegetables and has been instrumental in establishing food safety standards and increasing access to cold chain storage. However these companies have also increased the availability of highly processed foods of minimal nutritional value (Popkin, Adair & Ng, 2011). Encouraging positive outcomes while discouraging negative ones will require innovation, as given the status quo, trade-offs are inevitable wherever investment goals are subsumed to nutrition goals. As mentioned above and below, the food system is profit driven and as a result stakeholder incentives to increase nutrition sensitivity are, for the most part, weak. Supermarkets and other major investors will continue to facilitate the consumption of highly processed, low-nutrient foods as long as it pays to do so. Turning trade-offs into “win-wins” which increase compatibility between market signals and improved nutrition is essential to reversing this trend.

- **Trade liberalization** increases opportunities for foreign investment in domestic food systems and impacts relative prices. As such, it has increased availability and accessibility of a wide range of items. From an economic perspective, this has implications for food sovereignty, not least of which are increased opportunities for growth and obviating the need to achieve national food self-sufficiency through own production. From a nutrition perspective, trade liberalization implies increased presence of both higher nutrient foods and highly-processed lower-nutrient products. For example, FAOSTAT food supply data indicate an increase in calorie availability of 25 percent for vegetables, 20 percent for vegetable oil, 31 percent for meat and 45 percent for sugar between 1992 and 2007 in LDCs (Mazzocchi, Shankar & Traill, 2012). Trade liberalization almost surely played a substantial role in these changes. Depending on the nutrition status of the population in question, the net effect of trade liberalization may thus be positive (e.g. the reduction in undernutrition is greater than any increases in overconsumption) or negative (e.g. overconsumption is greater than any reductions in undernutrition).
- **Direct food aid and food assistance programmes** target food-insecure populations. Food aid increases total food availability but is often criticized for being carbohydrate-based and thus providing insufficient macro and micro-nutrients. In addition, food aid programmes have historically been criticized for operating outside the parameters of target populations’ food systems, primarily because of the impact created by a sudden influx of imported food on local markets. This includes depressed prices for domestic products with subsequent negative effects on farmers, most of whom are smallholders with children at risk of malnutrition. Local and regional procurement of food aid is now endorsed for some contexts (Lentz et al., 2012). In contrast, food assistance programmes can be designed to include conditionalities that, in effect, increase accessibility to high-nutrient food. For example beneficiaries of the US Women, Infants and Children (WIC) and the UK’s Healthy Start Programmes are prohibited from purchasing energy-dense foods of minimal nutritional value with their vouchers. In these cases, general food system availability may remain unchanged, as highly processed foods are still sold in U.S. markets where participants shop. But the strict eligibility criteria for foods purchased via the assistance programme reduces participants’ incentive to purchase and consume them.
- **Commodity specific policies** aim to influence access to a particular food. For example, taxes on highly processed foods of minimal nutritional value have been implemented in parts of the US and Europe. In theory, these policies should, like food assistance programmes, reduce accessibility by increasing the price paid by consumers for certain types of foods. Changes in relative prices are also important. Lower prices for one food commodity relative to the price of

another will usually increase consumption of the former and reduce consumption of the latter. Unit-cost reducing technological change in food production, processing and marketing as well as commodity-specific taxes and subsidies and trade restrictions such as export restrictions and import duties are examples of policy interventions that may change relative prices. Before such commodity-specific policies are proposed, it is important to clearly specify the nutrition problem to be solved: Is it dietary energy deficiencies, nutrient deficiencies or obesity and related chronic diseases?

3. EFFICACY OF NUTRITION-SENSITIVE POLICIES

The policy options listed above make assumptions about various causal pathways. These include the assumption that increased purchasing power will lead to improved nutrition outcomes; the assumption that generating employment opportunities for women will lead to improved nutrition outcomes; and the assumption that one type of malnutrition takes precedence over another within a given population.

For politicians and other high-level decision makers, these assumptions are necessary for conceptual frameworks and moving agendas forward. But in terms of solid policy formulation, they can create pitfalls which reduce efficacy. This section cites ways to ensure these underlying assumptions hold true, maximizing the chances that nutrition-sensitive policies achieve their goals. The focus is primarily poor country contexts.

3.1) Increasing the likelihood that increased purchasing power leads to improved nutrition outcomes

Many nutrition-sensitive food system based policies rely partially or wholly on increased income to improve nutrition. However it is important to note that in these scenarios the pathways are long and winding. Increased purchasing power does not automatically lead to improved dietary intake. This is especially important in poor-country contexts where budget constraints are major and many families face competing priorities regarding use of increased income. In some cases, consuming higher quality food may take a backseat to the purchase of necessities such as kerosene, firewood, fertilizer, and seeds, as well as healthcare costs or education fees.

Increased purchasing power is more likely to lead to improved nutrition outcomes in contexts where the risk of shocks is relatively low. As such, social protection instruments and initiatives to improve labour demand, wages and access to productive resources (e.g. credit) are key. In rural areas, strategies which emphasize generation of an economic surplus through improving productivity of land, water or labour are also important. These approaches are common elements in economic development discourse and are increasingly included in most agricultural and rural development plans. At the most basic level, they provide an important foundation for poverty reduction. In so doing, they increase the likelihood that nutrition-sensitive policies targeting smallholders and other actors in local and regional food systems will bear fruit.

At a more proximate level, changes in the food system may change the gender-specific income control as well as the composition of household incomes (cash or production for own consumption), and the cash flow over time. Those changes will, in turn, influence household food behavior and the extent to which access is converted to acquisition. It is also likely to influence the allocation of food within the

household. Food-system policies which are designed to improve women's purchasing power and budget control are more likely to result in improved nutrition than those which do not target women specifically. This is because the resources and income flows that women control have been shown to have disproportionately positive impacts on health and nutrition security (World Bank/ IFPRI, 2007).

3.2) Increasing the likelihood that generating employment opportunities for women will lead to improved nutrition outcomes

Since increasing women's income and budget control is likely to increase the portion of household incomes dedicated to food, nutrition-sensitive projects and policies often seek to empower women and improve their wellbeing by attempting to generate employment opportunities for women. However, these initiatives can backfire because food-system based employment (just like other types of employment) affects time allocation in ways that can have a negative impact on nutrition. For example, some food system practices make breastfeeding, which is critically important during the first six months of life, very difficult either because employment takes the lactating mother away from the baby for long periods or because the employment activities are otherwise incompatible with breastfeeding. More generally, employment schemes in rural areas can reduce the amount of time women spend on child care, cooking, fetching water and firewood and agricultural work, all of which are directly related to nutrition.

Given these potentially high opportunity costs, nutrition-sensitive policies (food-system based and otherwise) should always consider their net effect on women's time allocation, as introducing new demands for women's work may actually increase poor nutrition outcomes. One way to avoid this is through the introduction of labour-saving and productivity-enhancing technologies for the work traditionally done by women. These include herbicides to replace weeding, improved equipment for home-based food processing, and better access to water and fuel. When possible and appropriate, these technologies should be introduced in conjunction to employment schemes targeting women. Childcare facilities, again where possible and appropriate, are another consideration which can help make food-system (and other) employment schemes for women truly nutrition-sensitive.

3.3) Increasing the likelihood that all forms of malnutrition are addressed

Even where malnutrition has historically been a problem of deprivation, overweight and obesity are now on the rise. This is due in part to the changes in global and national food systems cited above, including penetration of supermarkets throughout the developing world and the freer flow of food trade, leading to availability of new foods and beverages. These changes have resulted in critical benefits, including reduced waste, improved sanitation, and reducing the negative effects of seasonality. However, there have also been adverse effects, not least of which are increased prevalence of overweight and obesity (Popkin, Adair & Ng, 2011).

As a result, most low-income countries are now faced with a multiple burden of malnutrition where undernutrition and micronutrient deficiencies may be found together with overweight and obesity. This makes the selection of price-related and other policies difficult. For example, taxes on vegetable oil and other commonly consumed, high calorie products may reduce the risk of obesity among middle- and high-income people while adversely affecting total energy intake in low-income population groups. If these foods are highly preferred by low-income households, such taxes may also reduce purchasing power and the consumption of other foods which are beneficial for nutrition such as fruits and

vegetables. Conversely, subsidies on staples may release purchasing power that could be used to acquire foods of lesser or negative nutrient value. Alternative approaches include increasing productivity and lowering unit-costs of production and marketing as well as price subsidies for high-nutrient foods such as fruits, vegetables and animal source foods.

3.4) Using nutrition education to ensure that nutrition-sensitive policies have the desired effect

While not explicit in any of the assumptions cited at the beginning of this section, improved knowledge is an important underlying component of any nutrition-sensitive policy or intervention, and food system-based programming is no exception. Improved knowledge regarding nutrition and its relations to the food system is needed for all food system agents, including consumers, farmers, traders and policy-makers. That said, nutrition education for consumers has been a commonly used tool in the past which has met with only limited success. As might be expected, free-standing nutrition education programmes will only be successful where lack of knowledge is the most limiting factor for good nutrition. Educational efforts with all the right messages may be of no value if the new knowledge cannot be implemented because of time or income constraints. On the other hand, increased incomes, improved production diversity or reduced pressures on time may be of little or no nutrition value in the absence of the relevant knowledge. In most cases, nutrition education should be combined with other efforts to remove constraints to good nutrition.

4. ADDRESSING KNOWLEDGE GAPS

In order to advance action to improve the nutrition sensitivity of food systems, three knowledge gaps should be addressed.

4.1) How to take action across sectors and disciplines?

To be successful, food-based nutrition-sensitive actions must be multi-sectoral and multidisciplinary, integrating food and non-food nutrition relevant factors. This means collaboration among relevant ministries (e.g. agriculture, health, social protection, women's affairs), and among experts from different disciplines (e.g. nutrition, economics, health, and agriculture). The rhetoric which advocates such action is plentiful but successful implementation is very limited. There is an urgent need for an in-depth discussion of how to make such action happen both at the national and international levels, in which practical experience and conceptual innovation should be merged.

4.2) What are the nutrition impacts of large-scale food system initiatives?

Almost all the assessments of the nutrition impact of food system activities have focused on small-scale projects and the findings have been inconclusive or of very limited value. There is an urgent need to assess the nutrition effects of large-scale food system initiatives such as technological change, land grabbing, climate change, water management improvements in agriculture, agricultural subsidies as well as non-food interventions related to sanitation, drinking water, hygiene and health programmes.

Specific topics which could provide substantial contributions to the literature as well as provide guidelines for policy design include:

- 1) A review of the evidence of the nutrition impact of technological change in agriculture and prospects for strengthening this impact;
- 2) A review of existing evidence of how land acquisition in sub-Saharan Africa has and may be expected to affect nutrition and guidelines for nutrition sensitive land acquisition;
- 3) Expected nutrition impact of climate change and guidelines for nutrition sensitive adaptation and mitigation in the food system;
- 4) Designing nutrition sensitive water management systems for the food system;
- 5) A review of the evidence of the nutrition effect of agricultural subsidies in the United States and implications for future food system subsidies in both high- and low-income countries;
- 6) A review of the evidence about the link between diversity in agricultural production (different foods as well as food vs. non-foods) and diet diversity of smallholder farm families;
- 7) Illustrations of successful integrated food and non-food interventions and guidelines for the design and implementation of future interventions;
- 8) A review of the evidence about how women's time scarcity and allocation influence the nutrition effects of food systems; and
- 9) The nutrition effects of increasing consumption of processed food by low-income families in developing countries and guidelines for the processing sector and government interventions.

4.3) How to make nutrition sensitive incentives compatible with economic incentives?

Efforts to enhance nutrition impact should never forget that the food system is primarily profit-driven. To be successful, nutrition-sensitive policies should thus aim to change either economic demand or production possibilities or both. This is because nutrition sensitive food system initiatives will succeed only if their outcomes are compatible with market signals reflecting the behavior of consumers, producers, processors, and traders. As such, more innovation and advocacy is needed to identify “win-wins” which provide nutrition sensitive incentives to food system actors compatible with economic incentives. At the most fundamental level, the relationship between nutrition and economic growth should be seen as a win-win: A malnourished labor force results in low productivity; while improving nutrition outcomes increases productivity and economic growth. More specifically, many of the food system policies listed above imply win-wins. These include:

- Labor saving technological change: Changes in food production technology that reduce demands on women's time have been shown to improve nutrition by increasing time available for child care, food preparation, accessing clean drinking water, etc. They also improve the well-being of women. In turn, labor saving technological change in activities traditionally performed by

women *outside* the food production system leaves more time available for food system activities. These include food production per se, but also better and more food processing as well as increased income generation through formal and informal food-system based employment.

- Agricultural research and other production-related productivity improvements: These reduce the unit-costs of production which, in turn, cause incomes of farmers to increase and food prices to decrease, both of which have positive nutrition and economic growth effects. The Green Revolution is a case in point. Farmer incomes increased while wheat and rice prices dropped significantly.
- Crop diversification: Efforts to increase diversity in food production result in lower production risks and better nutrition. Crop diversification also contributes to ecosystem health, and in some cases is good business as demand for both horticulture and animal source foods is rising.

These win-win examples demonstrate how the addition of nutrition sensitivity as a policy goal need not reduce economic efficiency. In other cases, where win-wins are not possible, the trade-offs may come at the expense of lower economic growth but are likely to be highly compatible with pro-poor development goals such as empowerment, equity and social welfare.

Analyses that take a political economy approach, as well as contributions from the private sector and active policy makers can help increase recognition of opportunities where the potential for win-wins is high. They can also advocate for nutrition in cases where trade-offs might occur.

5. CONCLUSION

As food systems around the world grow in complexity and evolve under the influence of globalization, a plethora of both supply and demand-side policy options have become available to increase nutrition sensitivity. However, sustained success also requires increased buy-in on the part of those working in agriculture and other sectors key to food systems. Identification of “win-wins” that make nutrition incentives compatible with economic incentives is essential to this buy-in. Further research on multi-sectoral collaboration as well as assessing the nutrition impacts of large-scale food system initiatives is also needed. In addition, policy makers must recognize that many of the assumptions that are often made about some of the most common causal pathways are more likely to hold if certain conditions are met. First, food system-based policies which work to reduce malnutrition via increased purchasing power will stand a better chance of success when implemented within a broader pro-poor context that includes social protection and other measures to reduce risk. Second, nutrition-sensitive policies (food system-based and otherwise) that introduce new demands for women’s work should be either net neutral or net positive in regards to time allocation, as otherwise poor nutrition outcomes may actually increase. Third, nutrition education should be combined with other efforts to improve nutrition, as educational efforts with all the right messages may be of no value if time or income constraints prevent the information from changing the behavior of the target population.

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