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Assessing the Effectiveness of Agri-Food Value Chain Interventions Aimed at Enhancing Consumption of Nutritious Food by the Poor: Conceptual Framework

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The LANSA Review of Agri-Food Value Chain Interventions papers have been produced to provide context for LANSA's work. It should be noted these are living/ evolving papers, not intended for publication or citation at this time.

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Abstract

South Asia has experienced rapid economic growth, yet it still has the highest rate of child malnutrition in the world, and half the population is undernourished. Besides children, undernutrition among women and adolescent girls is also a major concern. The lack of progress in solving undernutrition, in all its guises, reflects in part the complexity of factors involved.

There is increasing interest in the links between agriculture and nutrition outcomes in consumers who derive some or all of their food through markets. Seeing that many households rely on food purchases for all or part of their nutrient intake, attention is being given to the scope for developing and improving the functionality of agri-food value chains for better nutrition. Also, many households in South Asia rely on market purchases seasonally or year round, for some or all of their dietary needs. For these people, access to food depends upon how the food markets function.

This paper lays out a conceptual framework to guide the analysis of value chain-based interventions aimed at enhancing the intake of micronutrient-dense foods in South Asia under the LANSA research programme. It describes in broad detail how this framework is employed to undertake a series of case studies of value chain-based interventions aimed at increasing consumption of nutrient-dense foods in Bangladesh, India and Pakistan. The conceptual framework specifically focuses on understanding the effectiveness of interventions in enhancing the performance of food markets in terms of the availability, affordability, acceptability and consumption of nutritious foods by the poor on a sustained basis, with particular emphasis on infants and women of child-bearing age. The ultimate aim is to identify the most effective strategies for ensuring that nutritious foods get to the poor and are eaten and draw lessons that can inform policy in the region.

I Background

Given the persistence of undernutrition as well as the growing recognition of the ‘hidden hunger’ associated with micronutrient deficiencies, nutrition has emerged as a priority in the political and development agendas of the countries of South Asia. Thus, FAO estimates suggest that approaching 295 million in South Asia go hungry, while in excess of 60 per cent of preschool age children in India (for example) are deficient in Vitamin A (Akhtar et al. 2013).

The lack of progress in solving undernutrition, in all its guises, reflects in part the complexity of factors involved. The phenomenon of rapid rates of national economic growth and persistent poverty and hunger in India, where agriculture – essentially food production – is a major economic sector, is a glaring illustration of this complexity. Agriculture in India is poorly configured towards positive direct impacts on food security (Pritchard et al. 2014). Food security is not an end in itself, of course, but is a means to other ends, such as nutritional sufficiency and finally health. The ability of the poor to access a varied diet comprised of nutritious foods is critical (Ecker et al. 2011: 6), but nutritional outcomes are also decisively affected by caring practices, health, sanitation, and empowerment of women, among other things. Within this broad range of determinants, food is part of the picture, and there is clearly a need for investments to boost agricultural productivity, to prevent the global and regional escalation of food prices in the face of demand expansion due to population growth and rising incomes, and to boost farm incomes (Ruel et al. 2013).

While agricultural growth has been shown to reduce levels of hunger (Hoddinott et al. 2013), reflecting the strong association with calorie intake, the link from agricultural growth to dietary diversity and intake of micronutrients is considerably weaker, especially in South Asia (Headey 2012: 14-15). For this reason, it is widely recognised that efforts to boost agricultural productivity need to be accompanied not only with a wider focus on making food systems nutrition-sensitive but also with complementary initiatives specifically targeted at increasing consumption of nutritious foods (Ruel et al. 2013). Globally, much of the emphasis on efforts to integrate better agriculture and nutrition have focused on farm households, which in the context of countries where a large proportion of the poor have agriculture as their main source of livelihood, as in South Asia, is clearly appropriate. Examples include the promotion of kitchen/home gardens (Girard et al. 2012; Le Cuziat and Mattinen 2011; Masset et al. 2012) and the production for on-farm consumption of bio-fortified crops (for example, orange-fleshed sweet potato) (Bouis et al. 2011)

There is increasing interest, however, in the links between agriculture and nutrition outcomes in consumers who derive some or all of their food through markets (Henson et al. 2013). These might include individuals in producer households that are not self-sufficient in food for some or all of the year, rural non-farm and landless households, and urban households. In the case of urban households as an illustration, while overall rates of poverty and stunting are generally lower than in rural areas, they may be high (and even higher) for the poorest. In Bangladesh, for example, rates of stunting in urban slums are not only twice as high as in wealthier neighbourhoods but also 44 per cent higher than in rural areas as a whole (Ahmed et al. 2012: 34).

Seeing that many households rely on food purchases for all or part of their nutrient intake, attention is being given to the scope for developing and improving the functionality of agri-food value chains for better nutrition (see, for example, Hawkes 2009; Hawkes and Ruel 2011; Hawkes et al. 2012; Henson et al. 2013; Mazur et al. 2011). At the same time, it is being increasingly recognised that private sector players (at all scales, from large-scale food processors to informal sector traders and processing operations) have a critical role to play, not only because they operate at scale and bring know-how, reach and financial and other resources, but also because of their existing involvement in markets for food. It is this specific facet of efforts to address the problem of undernutrition in the South Asia region that Pillar 2.2 of LANSA focuses on.

This paper lays out a conceptual framework to guide the analysis of value chain-based interventions aimed at enhancing the intake of micronutrient-dense foods in South Asia under the LANSA research programme. Further, it describes in broad detail how this framework is employed to undertake a series of case studies of value chain-based interventions aimed at increasing consumption of nutrient-dense foods in Bangladesh, India and Pakistan. The conceptual framework specifically focuses on understanding the effectiveness of interventions at enhancing the performance of food markets in terms of the availability, affordability, acceptability and consumption of nutritious foods by the poor on a sustained basis, with particular emphasis on infants and women of child-bearing age. The ultimate aim is to identify the most effective strategies for ensuring that nutritious foods get to the poor and are eaten, drawing lessons that inform policy in the region.

2 Food-based approaches and the role of value chains

2.1 The nature of food-based approaches

Poor households tend to rely on low-cost sources of food calories, typically cereals and starchy tubers (Bouis et al. 2011), which lack micronutrient density. Even as poor people in developing countries become less poor, the phenomenon of ‘nutrition transition’ means that diets change but do not necessarily improve in nutritional quality (Drewnowski 1997; Popkin 2001). As a consequence, there is a high prevalence of micronutrient deficiencies, especially of zinc, iodine, vitamin A, iron and folates which can even be exacerbated by ‘development’, particularly among migrants from rural to urban areas who undergo significant livelihood and lifestyle changes. While the health consequences of these deficiencies are specific, such as the relationship between vitamin A and blindness or zinc deficiency and increased prevalence of diarrhoea, micronutrient malnutrition has much broader impacts on maternal and child health, including perinatal and infant mortality, reduced mental capacity, stunting, low birth weight, immune system deficiencies, etc. Thus:

Clinical research, intervention trials, and biochemical studies have confirmed the wide-ranging impact of VMDs [vitamin and mineral deficiencies] on the following: immune function, brain and nervous system development, psychomotor development and cognition, skeletal development and growth, integrity and functioning of the epithelial and endothelial (e.g., gastrointestinal [GI] tract) systems, health and functioning of the eyes, and muscular performance. (Sanghvi et al. 2007: 167)

Furthermore, it is well established that the health and development of children is crucially affected by the nutritional status not only of pregnant and lactating women, but also of women prior to their becoming pregnant. As a result, concern with the micronutrient deficiencies among women of child-bearing age, and in particular, adolescent girls, has been increasing. The link from maternal health to the subsequent health of children is very clear.¹

Food-based approaches to reducing undernutrition focus on promoting consumption of nutritious foods by those who are undernourished (Gopalan and Tamber 2003). However, while there is clinical evidence (see, for example, Gibson 2011) that the nutritional status of those who are deficient in micronutrients can be improved markedly through the consumption of foods that are rich in micronutrients (fruit and vegetables, dairy products, meat, poultry and fish), many of these foods are inaccessible to the poor due to lack of physical availability and/or high prices (Miller and Welch 2013). The challenge, therefore, is to ensure that the proven efficacy of certain patterns of food consumption is translated into effective food-based interventions that rely (at least to some extent) on market mechanisms to produce and deliver food to the populations that most need it. The conceptual framework which follows outlines some of the challenges involved in moving from food efficacy to effective interventions.

¹ Summaries of the evidence on this and the importance of micronutrient deficiencies in general can be found in many documents (for example Amaglo et al. 2012; Bhutta et al. 2013; Sanghvi et al. 2007).

2.2 The role of value chain actors

It is now well-established that improving the micronutrient content of the diets of undernourished people will not simply occur as a result of rising incomes. Furthermore, increasing the overall availability of nutrient-dense foods, for example through increasing production, does not necessarily lead to increased consumption of these foods by those that most need them. Agricultural interventions that focus both on increasing the production of nutrient-rich foods and nutrition awareness programmes do appear to be effective in improving the nutrition status of beneficiary households (Le Cuziat and Mattinen 2011). However, as the poor increasingly rely on market purchases to meet some or all of their food needs, attention needs to focus on how to make these markets work better in terms of linking agriculture through to consumers and delivering nutrient-dense foods in ways that engender sustained consumption. As Hawkes and Ruel (2011: 2) argue:

If the agricultural sector is to play a more effective role in improving nutrition by increasing the access, acceptability, and quality of diets, there needs to be a greater focus on what happens between production and consumption (including in producer households). This new focus will require the engagement of not only the agriculture sector, but also the other sectors involved, and approaches are needed to help overcome inter-sectoral barriers, which create disincentives to closer cooperation. One way of addressing these issues is through the adoption of ‘value-chain’ concepts.

The concept of a ‘value chain’ recognises that the linkages between the many activities and actors involved in bringing a product or service from production through to consumption may create interdependencies such that what happens at one point in the chain has non-trivial consequences for actors and activities at other points in the chain. When this arises (and it is not necessarily the case), a ‘whole chain’ perspective is needed to understand and manage these interdependencies.² The performance of the value chain as a whole may depend on both the performance of each of the links and also on the way activities are coordinated along the chain and how chain requirements are communicated to the different actors. When such coordination is required, the need for such practices has to be communicated and the use of such practices rewarded. For this reason, in addition to physical products, a range of resources flow (multi-directionally) along value chains including payments, information, technical assistance, technologies, investments and credit (World Bank 2003).

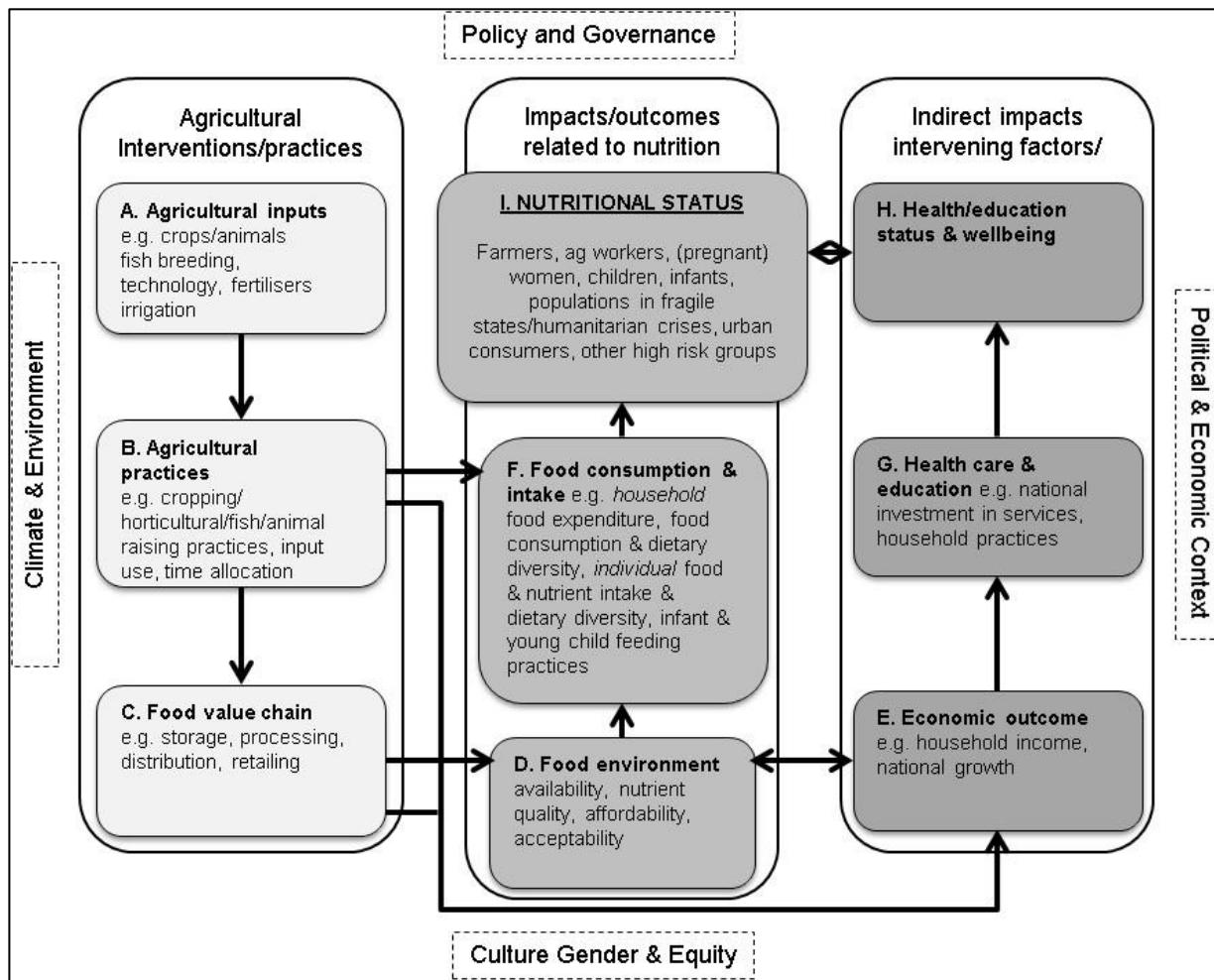
Viewing the value chain in this way has two important consequences. The first is that in many market situations the success of one firm will depend upon the activities of other firms. This point has been emphasised by writers coming from different theoretical backgrounds, including market systems approaches and business innovation. The contention is being made clearly by the influential “Beyond the Pioneer” report, which looks at the barriers to businesses reaching scale (Koh et al. 2014). While the competitiveness and growth opportunities of businesses will depend in part on their internal resources, they will also be influenced by the performance of the value chains which they operate. This argument links into the LANSA cross-cut on systems of innovation, which also focuses on the need for simultaneous innovations to drive change. Second, the potential for value chain communication and coordination will vary, and particularly so with respect to size of firm. Large firms may have the capacity to create value linkages that respond to their needs, using their market power and their resources to provide both positive and negative sanctions to actual and potential value chain ‘partners’. Smaller firms

² Note that some researchers do not consider consumers to be direct actors in the food chain because they do not conduct activities that add or create value (Hawkes and Ruel 2011). However, for our purposes, food consumers are the vital link at the end of the chain whose expenditure and demand preferences drive the chain, and whose nutritional interests are paramount.

have neither the power nor the resources to shape value chains in this way. They may be more dependent upon market institutions to bring order to markets and facilitate inter-firm collaboration (Elliott et al. 2008). The importance of rules and regulations (formal and informal) in shaping markets in facilitating market interactions then points to the significance of the second LANSA cross-cut, the role of the state and its capacity and willingness to promote effective markets for nutritious food.

To the extent that value chains need to be restructured in order that they work better, analysis focuses on the potential drivers of change; efforts to enhance the functioning of value chains will fail unless they appropriately direct and/or enhance the required drivers of change. This requires that attention is given to the concentration of power within the value chain, the distribution of risk and the capacity of actors along the chain to bring about changes in the way the chain operates, and to benefit there from. Critical here is the ability to mobilise financial, technical and other resources. This emphasises that the changes required in value chain functioning and the nature and level of the required drivers of change are context-specific.

Figure 1. Linkages between agriculture and nutrition



Source: Hawkes et al. (2012: 12) with minor modifications.

A number of researchers have adopted a value chain approach to analysing the development and functionality of agri-food value chains for better nutrition (see, for example, Hawkes 2009; Hawkes and

Ruel 2011; Hawkes et al. 2012; Henson et al. 2013; Mazur et al. 2011). Applying the value chain concept to integrating better agriculture and nutrition recognises the need to examine all stages of the chain from production through to consumption. Thus, within the context of efforts more broadly to integrate better agriculture and nutrition, the focus is on elements C, D and F in **Figure 1**; what happens between the farm and food consumption. However, it is important to question the directionality of the arrows in **Figure 1**. The Figure characterises relationships as moving from agriculture towards nutrition. This is very much the logic aimed at improving the nutrition-sensitivity of agricultural interventions. However, it is far from easy to make agricultural interventions nutrition-sensitive when the potential beneficiaries (from the nutrition point of view) are located beyond the farm gate.

Agricultural interventions tend to be primarily focused on maximising farm incomes, and given the complexity of post-farm gate value chains, it is difficult to find a way of linking farm-level activities to consumption. But if such a link is not made, then the nutritional benefits (in terms of mitigating the nutritional deficiencies of those whose livelihoods and health are most at risk) have to be identified and secured. For this reason, it is equally valid for an agriculture-nutrition approach to start with nutritional deficiencies and work backwards towards the requirements of food value chains through markets and towards producers and input businesses. One insight that the value chain perspective offers is that different ways of creating and delivering nutrient-rich foods to the undernourished have markedly different implications for the organisation of value chains. This will be discussed further below.

Recognising the engagement of the poor in food markets and the role of agri-food value chains, by implication, leads to a focus on the role of businesses (which can variously be large or small, formal or informal, national or international) in the delivery of nutrient-dense food. Thus, as outlined in two recent authoritative papers in the *Lancet* (Gillespie et al. 2013; Ruel et al. 2013) it highlights the potential role of the private sector in efforts to combat undernutrition:

The share of food and health care purchased through the market is increasing steadily, at all levels of income. This increase has partly taken place because malnutrition exists at all income quintiles and because companies are looking to the base of the pyramid — i.e., to the poorest socioeconomic groups — to expand market share if the initial market size is large enough. *Private sector involvement in food and health-care choices goes well beyond the large multinational food and pharmaceutical companies.* Agri-food businesses, medium-scale and small-scale processors of staple foods, and private health networks now have an active involvement in the production, marketing, and consumer choice in the purchase of food and other nutrition-relevant goods and services. (Gillespie et al. 2013: 558, emphasis added)

The authors proceed by outlining a series of factors considered key to maximising the potential contribution of the private sector to improving nutrition status while minimising the risk to vulnerable populations:

- 1) understand the bottlenecks that the private sector could help overcome; 2) incentivise positive roles and the development of business models that support them; 3) regulate ongoing activities for potential risks to nutrition, with strong monitoring processes; 4) be transparent about the role of the private sector in the policy process and any potential conflicts of interest; and 5) independently evaluate public-private partnership activities and make the data and analyses publicly available.

They also point to the very limited analysis of the contributions the private sector can make to reduced undernutrition in practice (Gillespie et al. 2013: 558)

However, although the private sector is now even more important in the national nutrition system, too few independent and rigorous evaluations have been done of the effectiveness of involvement of the commercial sector in nutrition.

This puts the emphasis on the need for rigorous research into the effectiveness of agri-food value chains in terms of the delivery of nutrient-dense foods to those that are undernourished in a manner that engenders sustained consumption. This is the focus of Pillar 2.2 of LANSA.

It is important to recognise, however, that food-based approaches, in and of themselves, may not be effective at achieving positive nutritional impacts in target populations, in that the overall nutritional status of these groups and their physical and mental development is enhanced on a sustained basis. Thus, food-based approaches need to be adopted as part of a broad-based strategy that simultaneously addresses all determinants of micronutrient deficiencies. Pillar 2.2, therefore, must be seen as examining one component of a broad-based strategy towards improved micronutrient nutrition — enhanced access to, and consumption of, nutrient-dense foods by vulnerable population groups.

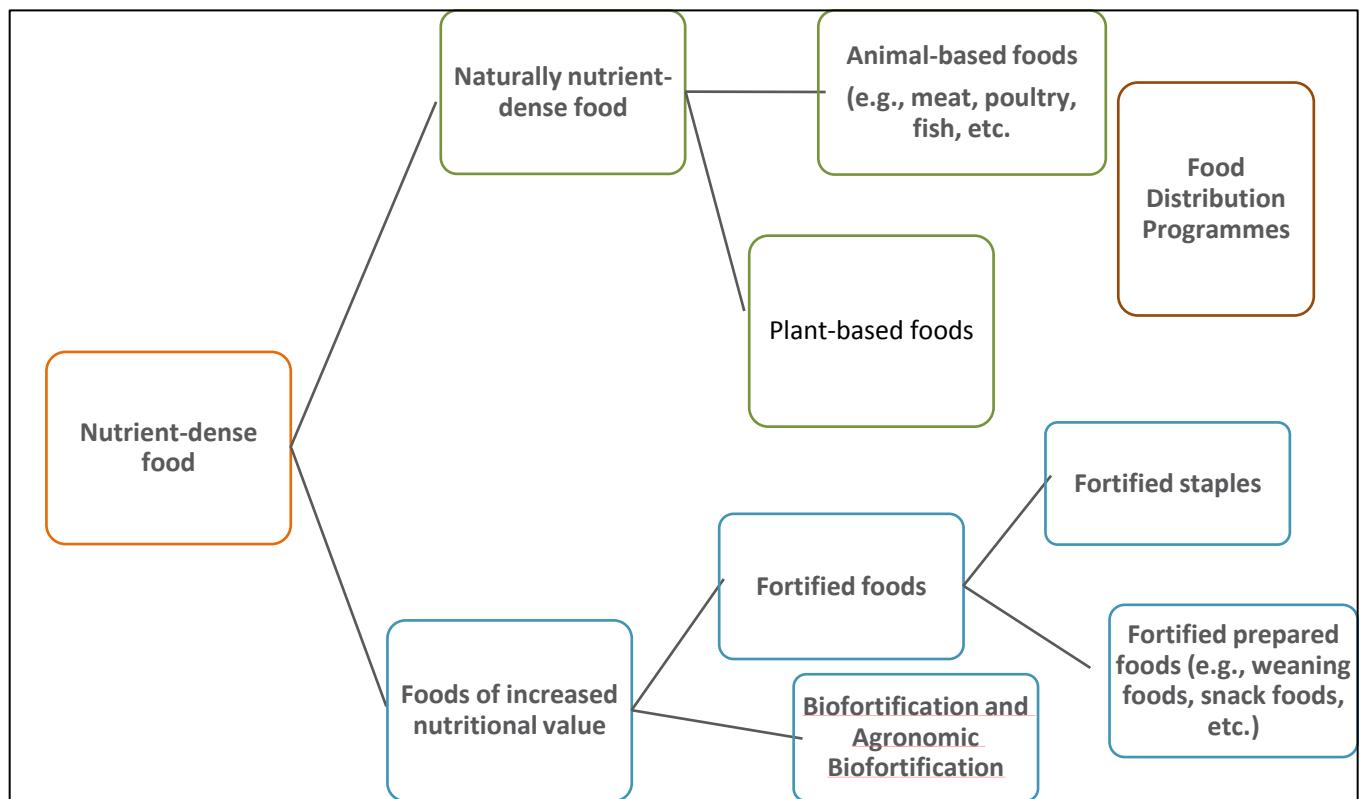
3 Pathways to improved nutrition through agri-food value chains

Food value chains are extremely heterogeneous, and there are multiple potential food-based approaches to combating malnutrition. Here we are interested in interventions along the value chain that are directed at bringing about sustained increased consumption of nutrient-dense foods that are sourced through markets.

Figure 2 identifies three key ways in which value chain-based interventions can contribute to enhanced nutrition among the poor. The first is by **enhancing access to, and consumption of, foods that are naturally rich in micronutrients**, such that overall diet diversity increases. These include fresh foods, such as fruit and vegetables, meat, fish, dairy products, as well as pulses. Fresh foods, in particular, are generally lacking in the diets of low-income households (Ruel et al. 2013).

Despite the fact that value chains are evolving in developing countries, with the emergence of industrial-scale food manufacturers and supermarkets, foods such as fruit and vegetables, milk and meat, that are important sources of micronutrients, continue to be accessed primarily through traditional value chains (Gomez and Ricketts 2013; Guarin 2013), including in South Asia. Gomez and Ricketts (2013) argue that this persistence of traditional value chains relates to their ability to offer lower prices, flexibility in product standards and convenience to poor consumers, given their location. While recognising the preponderance of traditional value chains in many developing countries, the emergence of ‘modern’ value chains for processed and packaged foods can also present opportunities to increase consumption by the poor of foods that are naturally nutrient-dense (for example, milk and dairy products). Perhaps the greatest opportunities in this regard relate to value chains whereby industrial food processors are linked to traditional distribution and retail systems (Gomez and Ricketts 2013) or even public distribution systems (see below).

Figure 2. Classification of agri-food value chain-based interventions towards improved nutrition



While many value chain-based interventions focus on enhancing production and/or reducing post-harvest losses of food that are naturally rich in micronutrients, these usually have the primary objective of increasing farm incomes and/or on-farm consumption. These interventions can result in such foods becoming more available to the poor post-farm gate. However, they rarely focus directly on the various challenges along the value chain that impede consumption of nutrient-dense foods by the poor, such as post-harvest losses in terms of food quality and/or quantity.

The second key route through which increases in the supply and consumption of nutrient-dense foods can be achieved, and hence where value chain-based interventions can be employed, is in the **production and distribution of foods with increased nutritional value** (see, for example, Chen et al. 2013). This strategy focuses on a single food, the micronutrient content of which is sufficient to increase markedly the intake of the target population and to address a specific nutritional deficiency. In some cases, this strategy is targeted at the population as a whole, and in others to meet the needs of a particular sub-group (for example, pregnant women, children or those with severe acute malnutrition).

In the case of staple crops, a key route to the enhancement of nutritional value is biofortification whereby the plant is bred to naturally synthesise micronutrients or their precursors (Hotz and McClafferty 2007). Examples include golden rice, quality protein maize and wheat, and zinc-enhanced wheat. An alternative approach is agronomic fortification whereby inputs such as fertiliser are used to boost the micronutrient content of the crop, such as high zinc wheat.

With staple foods, which are subject to some form of processing, and prepared foods, the micronutrient content can be enhanced by fortification, whereby micronutrients are added to the food during manufacture (Sablal et al. 2011). Examples of commonly fortified staple foods include wheat flour, cooking oils and salt. Foods can be fortified on a voluntary basis by food manufacturers or required by law as part of national fortification programmes (Horton et al. 2008). Both biofortification and fortification tend to be employed at the population level, such that they are designed to enhance the nutrient intake of all consumers. Alternatively, however, prepared foods can be designed and manufactured to meet the needs of particular population sub-groups. Examples include weaning mixes for infants and ready-to-use therapeutic foods (RUTFs) directed at those who have severe acute malnutrition. Other prepared foods which are fortified to meet the micronutrient needs of particular age groups are also observed, for example those produced by Grameen Danone Foods Limited (GDFL) in Bangladesh.

Cutting across strategies that focus on foods that are naturally nutrient-dense and producing and distributing foods of increased nutritional value is the potential role of **food distribution** programmes as a means of promoting access by the poor to more nutritious foods and/or targeting particular groups, such as those with severe malnutrition. For example, various forms of public distribution systems are seen in Bangladesh, India and Pakistan that make (fortified and unfortified) staples available to the poor at subsidised prices. Similar but more targeted initiatives include school feeding programmes. Distribution systems, often involving both public and private sector actors, are employed to target populations suffering acute malnutrition, as in the case of RUTFs.

The focus of Pillar 2.2 of LANSA is on these various types of interventions, exploring the specific value chain challenges associated with each, and the efficacy of interventions at various levels of the value chain at alleviating such challenges. Across all of these forms of interventions, attention is given to the functioning of the value chains in terms of bringing about increased and sustained consumption of the target nutrient-dense foods.

4 Conceptual framework

The focus of Pillar 2.2, as described above, is the role of value chain-based interventions in promoting sustained increases in the consumption of nutrient-dense foods by those who are undernourished in South Asia, with the aim of drawing general policy recommendations and guidance. Specifically, it assesses the efficacy of existing interventions along various agri-food value chains in South Asia, evaluating how successful these have been, identifying where challenges have been faced, and if and how these have been addressed. In so doing, the key themes/foci are:

- The role of food-based approaches in combating micronutrient deficiencies, such that the focus is on foods that are micronutrient-dense, whether naturally rich in micronutrients or because of specific efforts to enhance their micronutrient content.
- Population groups that derive some or all of their foods through markets, such that value chains are involved in the production, processing, storage and/or distribution of the food.
- Infants and women of child-bearing age, in particular, for whom micronutrient deficiency has been shown to have significant and long-term human developmental consequences.

- The role of businesses, in all their forms, in bringing about sustained increases in consumption of nutrient-dense foods by those who are deficient in micronutrients.

The LANSA programme as a whole emphasises the importance of three cross-cutting themes:

- **Gender:** In the case of Pillar 2.2, the primary focus is on the nutritional impact of value chains and value chain-based interventions on women. At the same time, attention is given to the role of women as purchasers, preparers and consumers of food within households.
- **Fragility:** There are particular challenges associated with value chains in the context of fragility. Pillar 2.2 will assess the effectiveness of value chain-based interventions taking account of the various dimensions of fragility, such as environmental and political fragility, in which the target value chains operate.
- **Innovation:** A key focus of Pillar 2.2 is identification of innovative value chain-based interventions in terms of the actors involved, approaches to addressing value chain challenges, etc.

This section lays out a conceptual framework for the analysis to be undertaken under Pillar 2.2 of LANSA. This framework aims to engender a common understanding and approach to the examination of value chain-based interventions across the study countries, such that the findings of the various case studies are comparable and policy recommendations and guidance can be generalised and defined for the region as a whole.

The conceptual framework starts by setting out the key outcomes that value chains need to achieve in order to bring about improvements in the micronutrient intake of those who are currently deficient, through sustained increased consumption of nutrient-dense foods. Thus:

- **Outcome 1 - Food must be safe to eat on a sustained basis:** The target food has to be safe at the point of delivery to the target population. Microbiological contaminants in food are associated with diarrhoeal diseases, which can inhibit nutrient absorption and reduce the propensity to eat. Unsafe food may have harmful effects that offset any nutritional benefits from consumption. Naturally-occurring toxicants such as mycotoxins can have significant acute and chronic adverse health effects. For example, aflatoxins are associated with stunting in children. Such food-borne hazards can be naturally-occurring in foods and/or be introduced by contamination or adulteration: agrochemical abuse in farming can cause high levels of residues; urban air pollution can contribute to toxic levels of heavy metals in otherwise ‘healthy’ foods (Poole, Marshall and Bhupal 2002). Furthermore, they can develop along the value chain during processing, storage, distribution and/or preparation.
- **Outcome 2 - Food must be nutrient-dense at the point of consumption:** The target food must be a significant source of the micronutrients in which consumers are deficient at the point it is delivered to the consumer and given the amount that they can reasonably be expected to consume on a sustained basis. There is potential for loss of nutrients along the value chains during processing, storage, distribution and/or preparation due to spoilage, adulteration, inappropriate handling or preparation methods, etc.

- **Outcome 3 - Food must be consumed in adequate amounts on a sustained basis to bring about the desired nutritional outcomes:** The target food has to be actually consumed by those that need it and in sufficient quantities over time to meet their nutritional needs on an ongoing basis. In turn, this requires that the food reaches the consumer; this will not necessarily be households but rather target individuals within households (for example infants, women of child-bearing age, etc.). This may require that specific population groups are targeted or, where targeting is not feasible, that broad population-based approaches include the target groups.³

The emphasis here is on the viability of market approaches in enabling the purchase and consumption of foods that will reduce undernutrition by the population groups most in need of them. While efficacy trials may establish that ingesting specific quantities of particular foods will enhance the nutritional status of those who are deficient in respective nutrients, the market challenge is to find a viable way of reaching populations in need with an affordable, high-quality, product that they are willing to purchase. The gap between potential and outcome can be large. For example, efforts to promote the production and marketing of a biofortified crop may fail to bring about appreciable improvements in the nutrient intake of target populations because the nutrient content of the crop degrades along the value chain, the target consumers cannot afford to buy it or consumers do not like it. Thus, the focus of Pillar 2.2 is on value chain-based interventions that are effective in practice: they achieve Outcomes 1 to 3 above.

Achieving Outcomes 1 to 3 on a sustained basis is dependent on, and can be seen as, the result of, meeting two sets of requirements simultaneously. First, the consumption side — the households in which the target population group resides must choose to eat the target food. Second, the business/supply-side — there must be incentives for actors along the value chain to produce, process and distribute the food in such a way that the target consumers are able and willing to choose the target food. Combined, this suggests the need for sustainable business models that bring the collection of necessary incentives for actors along the value chain from producers through to consumers.

From **Figure 3** it is evident that the objective is to design and implement value chain-based interventions that reside in Quadrant D. Here, foods are presented to consumers that they are able and willing to buy on an on-going basis, and there are sufficient incentives for businesses in the markets with which the target consumer households engage to supply such foods to consumers. Thus, interventions in Quadrant D will bring desired nutrition outcomes that are sustained through viable business incentives. One of the key aims of Pillar 2.2 of LANSA is to identify interventions lying in Quadrant D and to assess how they can be applied more widely and at scale.

³ (Bhutta et al. (2013: 454), for example, suggest that it is difficult to target the diets of adolescent girls and offer the option of food fortification as a way of reaching broad sections of the population, including adolescent girls.

Figure 3. Requirements for sustained nutritional outcomes from value chain-based interventions

		Consumer Choice	
		No	Yes
Sustainable Business Model	No	A	B
	Yes	C	D

At the other extreme, there is no interest in interventions that lie in Quadrant A of **Figure 3**; here the consumer households are not willing to buy the target food, and thus there will be no nutritional impact, and there is no sustainable business model. While the possibility exists that interventions could be designed to overcome both of these problems, the level of uncertainty about what would be required to achieve this would be high, and so would the associated degree of risk.

The regions of **Figure 3** that potentially raise the most important and interesting research questions are Quadrants B and C. On the one hand, interventions in Quadrant B, while bringing the desired nutritional outcomes, are not sustainable since the necessary business incentives are missing. Conversely, interventions in Quadrant C, while being based on sustainable business models, will not bring the desired nutritional outcomes as consumer households will not choose to purchase and consume such foods. The key question with interventions in these quadrants is how to bring about a shift into Quadrant D, by developing and implementing sustainable business models that incentivise businesses (in the case of Quadrant B) or by enhancing the ability and willingness of consumer households to purchase the target food (in the case of Quadrant C). A vital concern for Pillar 2.2 of LANSA is how to bring about these shifts in interventions in an effective manner.

Having defined the two key requirements for food-based strategies to bring about increased and sustained consumption of nutrient-dense food, the nature of each of these two requirements and their constituent parts are now described in detail.

4.1 Ensuring target consumer households choose nutrient-dense food

Strategies aimed at increasing consumption of nutrient-dense foods through market-based pathways will only work if they both enable and incentivise decision-makers in consumer households to purchase the target food. In some cases this might be the consumers themselves, as in the case of snack foods or food purchased and consumed at places of work. However, more commonly this will be the (normally female) adults in the households responsible for food purchase and preparation.

Taking Hawkes and Ruel (2011) as the starting point, a series of five requirements can be defined for the target food to be purchased and consumed in target households. Conversely, these can be seen as the first set of constraints or obstacles to be overcome for a food-based intervention to be effective at bringing about sustained consumption of nutrient-dense foods:

- **Requirement 1 - Nutrition Awareness:** Consumers and/or household purchasers of food must be aware of the benefits of improved nutrition for themselves and/or members of their household. Furthermore, they must be aware of the nutritional benefits of a more diverse diet and/or the nutritional benefits of greater consumption of nutrient-dense foods. If consumers and purchasers of food are unaware of the benefits of improved diet and nutrition, they will not value foods on the basis of their nutrient-density.
- **Requirement 2 – Signalling:** Consumers and/or households purchasers of food must be able to distinguish foods that are nutrient-dense from those that are not. The nutrient content of food is typically ‘credence characteristic’; it cannot be identified by the consumer and/or purchaser even post-consumption. This can act not only to undermine the willingness to purchase nutrient-dense foods (especially if they cost more than less nutrient-dense alternatives), but also to create the opportunity for counterfeits and fraudulent claims to emerge in the market. In such circumstances, consumers must rely on visible cues to infer the nutrient content of the food, which might include the physical appearance of the food and traditional beliefs about foods that are ‘good’ or ‘bad’ nutritionally, and also labels and claims made by food suppliers. The ability of food suppliers to indicate that their food is nutrient-dense and to distinguish this from foods of less nutritional value is termed ‘signalling’. The ability to signal is of particular importance in the case of foods with increased nutrient content (for example, those that have been fortified) and are visually and organoleptically indistinguishable by consumers and/or purchasers (Poole, Martínez-Carrasco Martínez and Vidal Giménez 2007). While reliable mechanisms can be implemented to signal the nutritional value of foods to consumers, such as the development of trusted brands or use of private certification systems, these tend to be expensive.
- **Requirement 3 - Availability:** Purchasers of the food, whether consumers themselves or those responsible for food purchasers in the household, must be able to procure the food in locations that are physically accessible and socially acceptable. Ideally, this will be where they habitually shop, or at least in locations which are sufficiently easy to access, for example where they work, live or shop for other goods or services, such that the additional costs of shopping for food are minimised. This suggests a focus of interventions of markets frequented by the poor in particular locations.
- **Requirement 4 - Affordability:** Purchasers of food, whether consumers themselves or those responsible for food purchases in the households, must be able and willing to buy the food, given its nutritional and other attributes. On the one hand, they must have sufficient disposable income to purchase foods that are more nutrient-dense, which typically cost more than less nutritious staples. On the other, they must be willing to pay for foods that are more nutritious, which can be impeded by low nutritional awareness overall, and also by the inability to distinguish foods on the basis of their nutritional value. Furthermore, the costs of meeting many of the other food choice requirements, for example signalling and availability, can add costs such that nutrient-dense foods are rendered less affordable.
- **Requirement 5 – Acceptability:** Nutrient-dense foods, aside from their nutritional value, must be acceptable to consumers and/or purchasers of food on the basis of their physical appearance, organoleptic qualities, ease of preparation and social and cultural norms, given prevailing tastes, consumption patterns, preparation practices, etc. While differences in these other characteristics can help in distinguishing nutrient-dense foods from less nutritious

alternatives, they can also raise significant problems with acceptability. Thus, willingness to pay will tend to be diminished if consumers and/or purchasers are required to trade-off enhanced nutritional value for different (and less acceptable) taste or more lengthy preparation.

These five factors will determine whether or not consumers and/or household purchasers of food will actually purchase and consume nutrient-dense foods made available on the market. As noted in various places above, these requirements are inter-related in complex and often conflicting ways. Thus, while it might be possible to make nutrient-dense foods physically available in markets frequented by the poor, this might require the use of new and more costly distribution systems. Similarly, the problems of signalling the nutrient content of foods are well-recognised and suppliers of nutritionally-enhanced food products in particular have developed reliable mechanisms to overcome these. However, these mechanisms are often costly.

At the same time as ensuring that target households choose nutrient-dense foods, such that the desired nutritional benefits are achievable in practice, it is necessary to safeguard that the necessary incentives are in place for businesses to meet these requirements. Thus, attention needs to be given to the design and implementation of sustainable business models, to which attention now turns.

4.2 Ensuring incentives are in place for businesses along the value chain

Critical to an understanding of the functioning of agri-food value chains, in general and for nutrient-dense foods in particular, is their role in the creation and capture of ‘value’ and its distribution among the actors along the chain. The incentive for actors along the value chain to create this value — produce the food and maintain and/or enhance its nutrient content along the value chain — will depend on their ability to capture a sufficient part of this worth. While Requirements 1 to 5 have an important role to play in this regard, how value chains are organised and how the different actors along the chain interact also play a crucial role. Indeed, certain basic requirements have to be met for the chain to function well, regardless of how it is structured; these same requirements apply for short chains serving local markets and long ones moving food to urban areas, to value chains that are highly fragmented, and to informal chains as well as those with a high degree of vertical coordination.

For businesses (of all types and sizes) to invest in the provision of nutrient-dense foods to the poor, the level and flows of costs and returns have to be sufficiently attractive in the context of the associated risks and uncertainties. This requires that actors along the value chain derive enough revenue from selling nutrient-dense foods (including, but not necessarily exclusively, to targeted populations) to sustain approaches to sourcing, processing, storing and distributing that meet Requirements 1 to 5 as detailed above.

Work at IDS has shown that businesses frequently encounter problems when trying to market nutrient-dense foods. Three common problems found with businesses and nutrition in West Africa, but which are relevant to South Asia, are presented in **Box 1.**⁴

⁴ These challenges are, in fact, frequently faced by bottom-of-the-pyramid strategies in many sectors, as discussed by Koh et al. (2014).

Box I. Barriers impeding business investment in nutrient-dense foods for the poor and how these can be addressed through policy

Consumer demand for nutrient-dense foods is low, reflecting the lack of awareness about nutrition and the nutritional value of specific foods. Public nutrition awareness campaigns can help overcome this constraint by focusing on general nutrition education and/or promoting specific products. Low demand can also be offset through public distribution, where businesses don't have to convince consumers to buy the products.

Developing markets for nutrient-dense foods entails high costs and risks, since new business models must address the needs of the poor, distribute to where they are located and convince them to buy these products. Success is not guaranteed, and imitators may quickly enter the market once a product has achieved penetration. Grants to defray start-up costs or advanced market commitments from public distribution systems in order to enable companies to reach scale rapidly (and hence reduce costs) are potential solutions.

The nutritional value of foods is largely invisible and impacts on health aren't seen until long after consumption. This makes it difficult for businesses to capture the value from selling more nutrient-dense foods. On the one hand, consumers have to be convinced that foods really have the benefits that are claimed for them. On the other hand, it is easy for businesses to make false claims so that bad products drive out good. This problem might be addressed through regulation and standards, but this depends upon the effectiveness of public and/or private enforcement.

Source: Anim-Somuah et al. (2013)

There must be incentives for actors along the value chain to supply any nutrient-dense food in such a manner that it is available, acceptable and affordable to the poor, and the nutritional benefits of the product can be communicated to them effectively. This requires that value chain actors from producers through to retailers can source the required inputs, produce and/or manufacture the food, store and distribute it in a manner that preserves its nutritional value along the chain. Furthermore, these operations must be undertaken in the context of value chains with which the poor engage, including actors that might be positioned in the formal or informal sectors, and done in a manner that keeps costs low, maintains or enhances consumer acceptability, etc.

There are a further four inter-related requirements associated with the business models needed to meet Requirements 1 to 5 simultaneously and at scale. These are as follows:

- **Requirement 6 - Capturing Value:** The challenges of creating and capturing value in agri-food value chains are made particularly complex by the characteristics of the nutrients themselves, and most notably their credence nature. Thus, with the exception of foods used for the treatment of acute malnutrition, the positive effects of nutrient-dense foods are not evident in the short term or even easily attributable to the food consumed over time. This creates clear scope for mis-selling; indeed, in many such contexts, there is a tendency for falsely differentiated products to effectively drive out genuine products (Akerloff 1970). Thus, mechanisms are needed for actors along the value chain to be able to capture a sufficient share of the value they create through their own contributions to the production, processing, storage and/or distribution of nutrient-dense foods.

- **Requirement 7 – Sufficient Incentives along the Value Chain:** The value chain having captured a sufficient proportion of the value associated with nutrient-dense foods, it is necessary that this is distributed to actors along the chain so as to incentivise their individual contributions to meeting Requirements 1 to 5. This recognises the dependency of the functioning of the value chain as a whole to the actions of each individual actor, whether involved in production, processing, storage and/or distribution.
- **Requirement 8 – Value Chain Coordination and Governance:** The need for actors at each level of the value chain to capture sufficient value so as to incentivise the actions they are required to undertake is recognised by Requirement 8. In many cases, however, the actions of actors along the chain are inter-dependent and/or require efficient coordination, as in sharing of information, alignment of business strategies and implementation of joint promotional activities. Thus, the chain as a whole may not function well in meeting Requirements 1 to 5 simply because one actor fails to undertake a particular action, or this action is undertaken in a manner or at a time that is incompatible with the actions of other actors in the chain. Thus, there is also a need for the coordination of actors along the value chain, and for there to be sufficient incentives for this to occur.
- **Requirement 9 – Managing, Costs, Risk and Uncertainty:** There can be significant costs, and related risk and uncertainty, associated with efforts to develop, commercialise and supply nutrient-dense foods, especially in the context of the challenges associated with markets serving the poor. Mechanisms are needed to reduce and/or offset these costs and the level of risk and uncertainty, and to share these equitably among actors along the value chains. There is a key role for public policy and for engagement between businesses and the public sector in achieving this.

This set of nine requirements for the success of food-based approaches targeted at population groups that derive a substantive proportion of their food through markets can seem daunting. The task for businesses is to identify and implement models that minimise the most prominent challenges in particular contexts, and for public policy to support them in their endeavours.

4.3 Facilitating innovation and investment in value chains for nutrient-dense foods

The role of value chain-based interventions in promoting the consumption of nutrient-dense foods by those with micronutrient deficiencies is to bring about changes in the way markets are operating, such that the nine requirements outlined above are met. In so doing, the focus is on engendering new business models through processes of innovation and investment by actors along the value chain that result in sustained consumption of nutrient-dense foods by the poor by incentivising the necessary appropriate actions by actors along the value chains on an ongoing basis.

Importantly, such innovation is a continuing process, and has significant public good aspects; successful (and unsuccessful) changes in product and marketing strategies by businesses along the value chain reveal effective ways in which markets for nutrient-dense foods directed at the poor can be exploited while bringing nutritional benefits to those who are undernourished. Thus, there is a *prima facie* case for public engagement and investments aimed at supporting business innovation in this context.

There are two clear strategies that interventions can take to address the nine requirements outlined above and, in so doing, promote consumption of nutrient-dense foods by those with micronutrient deficiencies:

1. By promoting initiatives among the pathways identified in Section 3, such that some problematic requirements are avoided altogether.
2. By reducing or offsetting the costs, risks and uncertainties faced by businesses engaged in markets for nutrient-dense foods directed at the poor.

With respect to the first strategy, the extent to which the nine requirements impact upon businesses engaged in markets for nutrient-dense foods varies considerably across the pathways described in Section 3. For example, mandatory fortification avoids many of the acceptability, availability and affordability challenges associated with foods with increased nutritional value, such that many consumers are even unaware that the food has been fortified. In contrast, when fortification is voluntary, the fortified product has to be differentiated from non-fortified substitutes and a justification made to consumers as to why they should buy it, especially where they have to pay extra (see, for example, GAIN and World Bank Institute 2008). Similarly, focusing on nutritionally-enhanced foods that remain very similar to existing foods may minimise acceptability problems. In some cases, clear indicators of the (enhanced) nutritional value of a food are available to consumers and/or can be used as signals. For example, biofortified crops that are high in pro-Vitamin A (for example, orange-fleshed sweet potato and golden rice) have an orange colour. Alternatively, segregated distribution systems might be available (for example, through clinics or schools), such that the nutritionally-enhanced product is effectively segregated from non-enhanced substitutes.

Meeting the challenges associated with markets for nutrient-dense foods directed at the poor may require innovations in many aspects of the product, such as how it is produced, processed, stored and distributed. For example, utilising small and informal distributors may require that the product is shelf stable. Similarly, the limited budget of the poor may require that the product is made available in small quantities, necessitating reduced package sizes and/or the use of cheaper packaging materials. This emphasises that efforts to by-pass these inter-related challenges may require that attention is given to all aspects of the product and actions along the entire length of the associated value chain. At the same time, the relative advantages and disadvantages of value chains that depend more or less on formal or informal sector actors and localised or more extensive markets are important issues.

Where challenges meeting the nine requirements are difficult to avoid through the choice between the alternative pathways in Section 3, interventions will necessarily need to focus on ways in which the costs, risk and uncertainties faced by businesses can be reduced or offset. In this regard, there may be a role for collective action on the part of the private sector, public-private partnerships and/or public actions and policy. Examples include public nutrition awareness campaigns (whether having a general nutrition focus or being directed at particular nutrient-dense foods), grants or subsidies for innovative businesses, public distribution channels, forms of advanced market commitment, etc.

It might be that multiple strategies exist for avoiding or offsetting the challenges faced in meeting the nine requirements laid out above. A key focus of Pillar 2.2 is the identification of which strategies work best in particular situations; for particular target populations, particular types of food, particular markets used by the poor and particular policy contexts. In so doing, a specific focus is on identifying the role of public actions and policy; where public investment is justified and where it provides the greatest return

in terms of improving the functioning of value chains and in bringing about increased consumption of nutrient-dense foods by those with micronutrient deficiencies.

5 Implementing the conceptual framework

The conceptual framework outlined above aims to provide a structured and consistent way in which to turn the value chain approach into a practical tool for addressing the key questions to be addressed by Pillar 2,2, namely:

- To identify the challenges that impede the impact of agri-food value chains in terms of facilitating consumption of nutrient-dense foods by the poor, and specifically target population groups that are micronutrient deficient
- To identify ways in which these challenges can be overcome effectively through interventions along agri-food value chains
- To make recommendations for policy actions that can facilitate and/or support efforts to alleviate challenges along agri-food value chains towards increasing consumption of nutrient-dense foods by the poor, and specifically target population groups that are micronutrient deficient

At the same time, there are broader questions over the relative merits of the alternative food-based pathways outlined above at bringing about desired nutritional outcomes, and the circumstances under which one or other might be cost-effective and efficacious.

5.1 Selection of case studies

To address the above questions, the conceptual framework will be applied to the analysis of a series of case studies that will permit synthesis and comparison in and across the four study countries. The unit of analysis for this research will be value chain interventions; instances of interventions along agri-food value chains that have been successful at bringing about increased consumption of nutrient-dense foods by the poor, and especially target population groups that are micronutrient deficient. As outlined above, in so doing the focus is on consumers who derive some or all of the nutrient-dense foods of interest through markets.

To guide the identification of a pool of potential value chain-based interventions from which the case studies will be selected, the following inclusion criteria were specified:

- The intervention's primary aim is to increase consumption of nutrient-dense food in target population groups beyond the farm gate and, if not possible, at least to increase the access of nutrient-dense food to such populations.
- The nutrient-dense food reaches target population groups through value chains involving the private, public and/or not-for-profit sectors. Thus, the focus is on markets for nutrient-dense foods and the role of businesses along the associated value chains.

- The intervention is beyond the ‘proof of concept’ or experimental phase, such that the focus is on interventions that have been applied and demonstrated to bring about increased consumption and/or access to nutrient-dense foods in practice.

It is anticipated that around three case studies will be undertaken in each study country, and that these will be selected so as to permit comparison within and across these countries — for example, consumption and/or access to nutrient-dense foods, target population groups, etc.

5.2 Analysis

Application of the conceptual framework and analysis of each of the case studies will proceed through a standard sequence of stages. The first stage aims to **identify the basic characteristics of the intervention** and, in particular define what it is designed to achieve. Thus:

- What is the target nutrient-dense food?
- What are the nutritional qualities of this food and the expected nutritional outcomes?
- What is the target population and how and why was this selected?
- What evidence is there that the intervention has been successful in achieving the three core outcomes outlined in Section 4: 1) food is safe to eat on a sustained basis; 2) food is nutrient-dense at the point of consumption; and 3) food is consumed in adequate amounts on a sustained basis to bring about the desired nutritional outcomes?

The second stage focuses on **diagnosis of the value chains on which the interventions are directed**. Thus, Pillar 2.2 will consider both successful interventions in order to understand how and why they work, and also interventions that fall short of meeting Requirements 1 to 9 in order to identify the obstacles encountered and how they might be made more successful:

- In the case of successful interventions, what made them possible? Further, what obstacles had to be overcome to make them effective; if there were no obstacles, then would no intervention have been required?
- In addition, in the case of unsuccessful interventions, what remaining obstacles prevented the food from being produced and consumed by target populations? What difficulties were faced in addressing these remaining obstacles? These remaining obstacles might be related to the nature of the interventions themselves, but also to other factors.

The first step in the analysis is to examine the nature of the value chain before the intervention was applied in order to identify the degree to which the nine requirements outlined in Section 4 were satisfied, and the particular challenges faced in meeting each of these requirements. This analysis is undertaken in the context of a full understanding of the structure and *modus operandi* of the value chain, and how this has been changing over time.

Importantly, Requirements 1 to 9 do not necessarily apply in all cases. For example, acceptability is not an issue for interventions that aim to increase consumption of nutrient-dense foods that are already widely consumed. Therefore, the first step is to identify which of the nine requirements apply in the

specific case being considered, where they are relevant, and whether they have been addressed by the intervention.

At the heart of the value chain approach is the understanding that things that happen in one point in the chain may have consequences at other points in the chain. Thus, the cause of a value chain problem may originate at a place other than where its effects become evident. The analysis of the degree to which Requirements 1 to 9 are met, therefore, must focus not only on what obstacles exist, but also where in the value chain these originate.

The third stage of the analysis focuses on **solutions to the identified value chain problems**. Thus, what strategies have been employed along the value chains in order to promote consumption of nutrient-dense foods in target population groups? Again, the focus here is both on successful and unsuccessful strategies; interventions that have and have not managed to overcome or offset the failure to meet Requirements 1 to 9. In so doing, this third stage of the analysis aims to identify how to promote the delivery and consumption of nutrient-rich products in terms of the mechanisms through which these products can be produced, processed and distributed to the poor in ways that make them likely to be purchased and consumed.

In looking to solutions to the obstacles identified in Stage 2 of the analysis, key questions include:

- Which obstacles are overcome (and related to which of the Requirements 1 to 9) and how? Such interventions typically involve communication along the value chain and the introduction of changes at various points in the chain. Thus, how are these introduced, or why are they not introduced?
- Where in the value chain lie the most effective solutions to the identified obstacles? The fact that the cause of a value chain problem may originate at a place other than where its effects become evident also has consequences for the design of solutions. Very often, resolving value chain problems means an actor at one point in the chain taking steps to promote (or provoke) changes at other points. For example, if poor quality inputs make food processing less efficient and more expensive, a food processor may push for improvements upstream in production or storage. Furthermore, from a value chain perspective, the focus may not only be on the activities of individual firms but on the linkages between firms and where improved linkages between actors along the chain increase the scope for problem resolution.
- Which approaches to the alleviation of obstacles along the value chain present the most effective and cost-efficient solutions in particular contexts? For example, particular forms of value chains in terms of the number and size of actors at particular levels of the chain, level and forms of linkage between actors at different levels of the chain, etc. Again, this might involve actions directed at particular actors in the chain (including at different levels to where the ultimate impact is observed) and efforts to change or reinforce chain linkages.

Fourth, the analysis must focus on the ultimate **impact of the interventions** being studied. There are few (if any) examples of rigorous assessments of value chain-based programmes and policies aimed at bringing nutrition outcomes and impacts (Ruel et al. 2013), let alone whether they are cost-effective. This makes it difficult for policy-makers charged with making the best strategic decisions within available resources in order to address micronutrient malnutrition (Chen et al. 2013).

While the central focus of efforts to assess the impact of the interventions must be on the extent to which they bring about nutritional improvements in target populations (see below), attention also must be given to the costs and benefits of different value chain strategies. Thus, which value chain strategies are easiest and least costly to implement, and also bring appreciable nutritional improvements?

While the ultimate aim of value chain-based strategies directed at nutrient-dense foods is on bringing positive nutritional impacts (in terms of nutrient and health status as well as physical and mental development), this is a difficult performance measure to apply to such strategies and is certainly beyond the scope of Pillar 2.2 of LANSA. Thus, the ultimate nutritional impact on target populations will reflect the ways in which the overall diet changes as a result of a particular value chain strategy, given the status of other determinants of nutrition and health status. For this reason, a more direct measure of the effectiveness of value chain-based strategies is more appropriate and employed here:

- To what extent does the intervention improve the performance of the value chain in terms of Outcomes 1 to 3? Thus, how far does it lead to increased consumption of safe and nutrient-dense food by population groups that are micronutrient deficient?

In addressing this question, while the primary focus will be on infants, women of child-bearing age and adolescent girls, attention will be given to poor people in South Asia who are micronutrient deficient in general.

There is a clear need for efforts to be put into the assessment of value chain-based interventions, and in particular the role of the public sector in promoting and/or facilitating these. The need for such research extends well beyond policy-makers in the public sector, however. There is great uncertainty within the private sector as to where it has a role to play in engaging with the nutrition of the poor, and as to which business models work in particular contexts. At best, this makes businesses wary of getting involved in nutrition-oriented chains, and at worst, it means they keep out altogether. Thus, two related and important additional measures of performance of the case study interventions are relevant.

- To what extent is the intervention successful at overcoming barriers to the involvement of businesses (large/small, formal/informal, profit-oriented or social enterprises) in value chains for nutrient-dense foods directed at the poor?
- To what extent has the public sector been instrumental in the success of the intervention in terms of alleviating value chain obstacles to meeting Requirements 1 to 9 and in achieving Outcomes 1 to 3?

The limited budget of Pillar 2.2 of LANSA makes it impossible to undertake a rigorous impact assessment of all of the case study interventions. Thus, the analysis of impact will be largely dependent on data available from the interventions themselves, and so on the extent (and how) they measure their impact, with LANSA itself only undertaking its own impact assessment on one intervention per country. That being said, a question to be addressed by the research is:

- To what degree (and how) do interventions assess their effectiveness in the context of this defined measure?

Finally, a process of **comparison and synthesis** of the findings on individual interventions must be undertaken. Ideally, the analysis will move beyond the assessment of particular interventions and be able to draw more specific conclusions about the most effective and appropriate interventions, the

effectiveness of different food-based strategies in particular circumstances and the limitations of value chain interventions. Further, a key assertion of Pillar 2.2 of LANSA is that, despite the focus on businesses and markets in the supply of nutrient-dense foods to the poor, there is a significant role for public policy and public-private collaborations. These policies may come from national governments, bilateral and multilateral donors and/or NGOs, all of whom support value chain-based initiatives aimed at bringing dietary and nutritional improvements among the poor in South Asia. The truth of this assertion will need to be verified by the analysis of the case study interventions taken as a whole.

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