Review of Agri-Food Value Chain Interventions

Review of Agri-Food Value Chain Interventions Aimed at Enhancing Consumption of Nutritious Food by the Poor: Pakistan

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About this paper
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.

About LANSA
Leveraging Agriculture for Nutrition in South Asia (LANSA) is an international research partnership. LANSA is finding out how agriculture and agri-food systems can be better designed to advance nutrition. LANSA is focused on policies, interventions and strategies that can improve the nutritional status of women and children in South Asia. LANSA is funded by UK aid from the UK government. The views expressed do not necessarily reflect the UK Government’s official policies. For more information see www.lansasouthasia.org
Acronyms

CMAM  Community Based Management of Acute Malnutrition
FATA  Federally Administered Tribal Areas
GAIN  Global Alliance for Improved Nutrition
IDS   Institute of Development Studies
INGO  International Non-Government Organisation
LANSA Leveraging Agriculture for Nutrition in South Asia
MI    Micronutrient Initiative
NGO   Non-Government Organisation
PARC  Pakistan Agriculture Research Council
PSQCA Pakistan Standards and Quality Control Authority
RUTF  Ready-to-Use Food
SNP   School Nutrition Program
USC   Utility Store Corporation
WFP   World Food Programme
I Introduction

How can agriculture play a more effective role in improving nutrition in countries with a high burden of hidden hunger, and where an increasing proportion of the poor sources its food from the market? There is a need to understand how linkages between the farm and the consumer can be made to work for nutrition goals. This review paper examines the case of Pakistan which has a relatively productive agricultural sector but which has experienced high and resilient rates of under-nutrition. A promising perspective, in this regard, is the concept of value chains, which highlights the multiple ways in which producers and consumers are linked through a variety of processes, interactions and stakeholders. Moreover, value chain-based approaches have been popular development interventions in agricultural and food systems.

In Pakistan, 44 per cent of children under the age of five are stunted while 15 per cent are wasted and 32 per cent are underweight (NNS, 2011). According to World Health Organisation classifications Pakistan falls in the ‘very high’ range for severity of malnutrition for all three figures (de Onis and Blössner, 1997). The incidence of micronutrient deficiency is also alarmingly high with half of the population of children under 5 suffering from anaemia and vitamin A deficiency, while 39 per cent are deficient in zinc (NNS, 2011). Policy in Pakistan has not been effective in tackling ‘hidden hunger’ or micronutrient undernourishment as evidenced by these statistics. In fact micronutrient deficiency has worsened over a ten year period for children under five and non-pregnant mothers on all counts aside from iodine deficiency (NNS 2011).

While approximately 45 per cent of the labour force is involved in agriculture, over three-quarters of the households are net buyers of wheat or wheat-flour, the main staple food (World Bank 2010, based on 2005-6 PSLM). Many agricultural households depend on market purchases for some part of their food consumption because of the specialisation in the agricultural economy. There is a core of the poorest that, besides the market, also rely on various non-market interactions with other household through social networks, patronage ties and charity. But elements of this moral economy of food also intersect with markets at various points. Those who provide food assistance from their own stocks to food-insecure relatives are themselves likely to be sourcing food from the market (Gazdar, 2015).

The aim of the present review, which forms part of the larger value chains component within LANSA, is to identify existing and potential cases of agri-food value chain interventions in Pakistan which might play a role in improving nutrition outcomes though the delivery of nutrient-dense foods to undernourished consumers. The value chain approach adopted in this review focuses on post-farm gate consumption and channels through which food moves from farms to markets and on to households. The identified cases will then be taken up for more detailed empirical study to analyse advantages, drawbacks and constraints of various approaches, and to come up with ways in which the nutrition impact of agri-food value chain interventions might be optimised.

Section 2 introduces the concept of value chains, the classification of various value chain interventions
used throughout this paper, and the framework that the research follows. Section 3 describes the methodology of the review. The findings of the review are presented in Section 4, and are further analysed thematically in Section 5. The findings of the review and their analysis are then used in Section 6 to identify specific value chain interventions for detailed case study. Section 7 offers conclusions based on the review and topics for further investigation in the case studies.

2 Concepts

2.1 Value chains

Pathways frameworks which trace the linkage between agriculture and nutrition point to two sets of contributions which agriculture can make to improve nutrition (Gillespie et al. 2012; Hawkes and Ruel 2006). First, increased agricultural productivity is known to have led to higher levels of consumption through the greater availability of nutritious foods. Second, higher incomes for farm households increase their ability to acquire food and non-food inputs needed for improved nutrition.

The conditions underlying these historical pathways, however, are known to be changing. It can no longer be assumed, if it ever could be, that higher levels of output of nutritious foods will effortlessly translate into improved diets for the under-nourished. It is increasingly recognised, for example, that the majority of the poor derive some or all of their food not through self-production but through markets (Henson et al. 2013). Moreover, it is not self-evident if or how agricultural innovation will automatically lead to greater availability and higher consumption of nutrition foods among the poor. 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 value chain, according to Hawes and Ruel (2011: 3) is “a supply chain in which value is added to the product as it moves through the chain. It is described by the series of activities and actors along the supply chain, and what and where value is added in the chain for and by these activities and actors.” The concept of a ‘value chain’ recognises interdependencies between the activities and actors involved in bringing a product from production through to consumption. Although there is often an overlap between them, it can be helpful to distinguish between the use of value chains as an analytical perspective on the one hand, and the design and execution of value chain-based interventions on the other.

2.2 Analytical perspective versus intervention

Virtually any set of economic activities can be usefully studied using a value chains perspective. Tracing the transition and transformation of a product across a variety of processes of value creation, through
the actions of and interactions between multiple actors, has proven to be a source of insight into otherwise complex systems of production and delivery. The value chain concept is sufficiently flexible to accommodate market transactions, non-market transfers and exchanges, and the movement of a product within and across economic entities. It allows for a graphic mapping of nodal points and transitions, and is particularly advantageous in identifying incentives, bottlenecks and constraints economic, technological, organisational, and behavioural in production and consumption. The concept can help an understanding of modern systems of production and marketing, traditional and informal arrangements, as well as combinations of the two.

The standard economic toolkit is well-equipped for dealing with instantaneous transactions and exchanges, as well as system-wide equilibrium and disequilibrium. Goods and services might be exchanged through a variety of market and non-market based institutions. The main focus of the standard economic approach is on prices and quantities of instant exchanges as well as economy-wide levels of price and output. The economic toolkit can also deal with processes within organisations such as firms. The value chain perspective has the advantage of linking together processes which might straddle various markets, non-market arrangements, and interactions within a firm as well as across firms, into a coherent sequence.

Applying the value chain approach to the study of a particular product can highlight what happens across various institutional settings, even across jurisdictions, from the point of start to a finishing point. In the case of a physical good the starting point might be a raw material while the end point might be a retail outlet. Seeing the entire sequence as one can help to identify specific processes where efforts might be directed to obtain changes that are considered desirable. The change in question might be increased income for some segments of the value chain, more effective consumer protection, higher overall output, or lower prices. Value chain interventions are activities directed at segments of a value chain, or along its entire length, to achieve particular economic or social objectives.

Value chain interventions clearly depend on value chain analysis of particular products or sets of products, and involve the application of investments or innovations to these value chains. While the value chain perspective can be applied very widely across production and delivery interactions and systems, value chain interventions typically focus on business processes. This distinction is particularly important from the point of view of the present review because of the need here to understand on the one hand existing formal and informal value chains which link agriculture with nutrition (i.e. applying a value chains perspective), and on the other hand to learn lessons from existing agri-food value chain interventions.

The problem or change that the present review (and the broader Pillar 2.2 study to which this review contributes) focuses on is the reduction in hidden hunger through the greater consumption of nutrient-dense foods. This paper aims to fill an evidence gap in Pakistan by reviewing existing and past agri-food value chain interventions and their possible impacts on nutrition. Products which are selected for in-depth case study will then be examined using a value chain analytical perspective to draw implications for intervention design and policy.

2.3 Classification of interventions
Table 1: Types of nutrient-dense foods – and types of value chain interventions (generic)

<table>
<thead>
<tr>
<th>Types of nutrient-dense foods</th>
<th>Types of value chain interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Naturally nutrient-dense</td>
<td>Business-driven actions</td>
</tr>
<tr>
<td>Animal-based (e.g. meat, poultry, milk etc.)</td>
<td>Supply chain, regulatory action - health and safety, standards</td>
</tr>
<tr>
<td>Plant-based (e.g. fruits and vegetables)</td>
<td>Supply chain, regulatory action - health and safety, standards</td>
</tr>
<tr>
<td>Fortified</td>
<td>Marketing, subsidy, regulatory action - standards, mandate</td>
</tr>
<tr>
<td>Fortified staples (e.g. iron-fortified wheat flour)</td>
<td>Delivery, subsidy, retail, regulatory action - standards, mandate</td>
</tr>
<tr>
<td>Fortified prepared foods (e.g. weaning foods, snack foods, etc.)</td>
<td>Delivery, subsidy, retail, regulatory action - standards, mandate</td>
</tr>
<tr>
<td>Biofortified (e.g. wheat, rice etc.)</td>
<td>Delivery, subsidy, retail, regulatory action - standards, mandate</td>
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</table>

The range of ways that nutrient-rich foods can mitigate micronutrient deficiencies within households is diverse. Table 1 classifies the types of nutrient-dense foods that this review is concerned with and the types of value chain interventions that are commonly seen within each category of nutrient-dense food. This classification borrows from nutrition literature and provides a framework for understanding the specific challenges and benefits involved in following a particular type of intervention for a certain type of food.

Types of nutrient-dense foods

**Naturally nutrient-dense foods.** One of the leading ways of increasing nutritional intake is to enhance access to and consumption of foods that are naturally rich in micronutrients. These include animal based foods such as meat, fish and dairy products and plant-based foods, such as fruits and vegetables, pulses. Foods such as fruit and vegetables, milk and meat are important sources of micronutrients, but these foods are commonly lacking in the diets of low-income households (Ruel et al. 2013). The big challenge for strategies aimed at increasing dietary diversity is the need to ensure that such foods are available and affordable to those that most need them. There may be considerable
competition for nutrient rich foods and poor local consumers frequently lack the resources to buy them in sufficient quantities, as they are not affordable or are not accessible, that is they are sold on to more distant markets.

**Foods of increased nutritional value.** Given that foods that are naturally rich in micronutrients are expensive, one strategy for delivering nutrition is to add micronutrients to foods products. There are various ways in which this can be done. First, nutrients can be added to staple products. The most prevalent strategy in this area is food fortification, and in particular mandatory fortification of staple products such as wheat flour, cooking oils and salt. This strategy has the advantage of building on existing widely-acceptable products distributed through well-established value chains. Fortified products have the potential to reach some of the most nutritionally deficient populations, but maintaining consistent levels of fortification and keeping prices below other non-fortified substitutes are some of the barriers this approach faces.

Food fortification is also carried out on a voluntary basis, this process is typically business driven and is based on marketing differentiated products. For this approach to be successful it is important for fortified food brands to convince consumers of the nutritional benefits of the product and for consumers to have confidence in their claims. Many of these products are targeted towards specific consumer groups such as children or women. There are also a wide variety of foods that are specially formulated and prepared to meet particular nutritional needs. Examples include complementary foods for infants and Ready-to-use Therapeutic Foods (RUTFs) directed at those who have severe acute malnutrition.

A second route to enhancing the nutritional value of staples is biofortification, this involves breeding plants so that they naturally synthesise micronutrients or their precursors (Hotz and McClafferty 2007). Examples include golden rice and quality protein maize and wheat. Where biofortified and unfortified products are, in practice, more or less indistinguishable it may be difficult to create efficient markets.

**Types of value chain interventions**

**Business-driven actions.** These types of interventions are led by public as well as private sector actors that are interested in promoting certain types of business initiatives. For naturally nutrient-dense foods these interventions work to improve the supply and quality of the food and link producers to the market better, therefore intervention activities involve strengthening the supply chain. For foods of increased nutritional value these interventions focus on the marketing of their products to ensure that consumers are aware of the nutritional benefits of the product. Interventions for fortified foods can also involve providing a subsidy for these foods.

Regulatory action acts as an outside force or as part of the intervention for both naturally nutrient-dense foods and foods of increased nutritional value. Regulation for naturally nutrient-dense foods is concerned with health and safety as these foods are perishable. With regards to dairy products there are also government standards which these products have to adhere to.
For foods of increased nutritional value regulatory action interventions ensure that fortification standards are set for various products, this involves identifying which micronutrients products should be fortified with and to what level, this is especially the case for staples and biofortified products. For these two types of foods regulatory action can involve setting the mandate for fortification, which is determining if it is obligatory and who is under obligation to follow fortification standards. Mandate and standard setting is not typically required for fortified prepared foods, apart from ensuring that advertising claims are accurate.

**Food distribution.** A second category of intervention is food distribution which is a vehicle through which nutrient-dense foods are delivered to the consumer. This type of intervention acts as a form of subsidy and focuses on promoting access by the poor to more nutritious foods and/or targeting particular population segments, for example those with severe acute malnutrition, or those thought to be vulnerable to malnutrition. The emphasis on targeting consumption through distribution may be combined with value chain initiatives to promote, for example, local sourcing of products. This is seen particularly with interventions involving naturally nutrient-dense foods which work to strengthen linkages along the supply chain while providing a subsidy and focusing on delivery.

Various public initiatives across the region make nutrient-dense foods, especially fortified staples, available to the poor at subsidised prices. Similar but more targeted initiatives include school feeding programmes. Distribution systems, often involving both the public and private sector actors may be particularly effective in targeting populations known to face particular nutritional problems, as well as a means of reaching populations for whom distribution costs are a disincentive for market-oriented actors. At the same time, hybrid public-private models also exist (for example, local resellers working in particular communities) and these may help to defray the costs of public distribution. However, these themselves can be costly to operate and suffer from distortions (Bruyeron et al. 2010).

In these types of interventions regulatory action plays a similar role in food distribution value chains as it does in business-driven interventions. Government involvement along the value chain can act on health and safety as well as standards of naturally nutrient-dense foods. While for foods of increased nutritional value there is more of a focus on standards and mandate.

The different routes through which food-based interventions reach target populations vary quite considerably. Some require expensive and multiple interventions along the value chain to succeed, while others focus on specific parts of the chain. Nevertheless, the different value chain challenges can all be linked to the degree that these interventions meet both the social challenge of mitigating undernutrition and the business challenge of creating sustainable business models. The full-length case studies that will be chosen as a result of this analysis of in-country interventions will examine how these challenges are resolved (or not resolved) in particular interventions.

### 3 Review Methodology

The review was compiled primarily through searches of publicly available documents. Initial keyword
searches were conducted using terms relating to ‘value chains’ and ‘Pakistan’. Those interventions were excluded that did not concern local agriculture. Targeted internet searches were conducted on specific organisations that are known to undertake value chain interventions. Where relevant, organisations were contacted and asked to share programme documents and impact and evaluation documents to supplement publicly available information.

A defined set of inclusion criteria was applied to select from amongst the population of identified interventions. First, whether the intervention’s primary aim was to increase consumption of nutrient-dense food in target populations beyond the farm-gate and, if not, whether the intervention could still be expected to increase the supply of nutrient-dense food to such populations. Second, whether the focal food reached target population groups through value chains involving the private, public and/or not-for-profit sectors. Third, whether the intervention was beyond the ‘proof of concept’ or experimental phase.

This process yielded few interventions that had specific nutrition objectives or that were focused on the end consumer, but instead resulted in the identification of numerous donor-driven value chain interventions that aimed to improve the livelihoods of producers. These results highlight that the value chains approach has traditionally been used as a development tool to improve rural livelihoods rather than as a means to connect agriculture to improving nutrition outcomes.

As a result searches were then refined to include specific types of nutrient-dense food that this review is concerned with (see Table 1). This included key word searches on ‘biofortification’, ‘fortified foods’, ‘meat’, ‘poultry’, ‘dairy development’, ‘weaning foods’, as well as ‘school feeding programmes’, ‘government food programmes’ (Table2). Within the category of fortified foods, once specific food products were identified, general internet searches were conducted into companies that were involved in the manufacturing and selling of the product. These searches were supplemented by personal communication with manufacturers and processors requesting additional information and confirming publically available information.

This material was augmented by information from interviews conducted with 21 key stakeholders in the agriculture and nutrition policy sector. Stakeholders working in the federal and provincial governments and in local and international NGOs were asked to provide details of any value chain interventions that they were aware of that that worked to improve the nutrition of the poor in the country.

The inventory of value chain-based interventions does not aim to be comprehensive in that it does not present a complete inventory of every value-chain intervention in Pakistan. Rather, in compiling these reviews the aim has been to identify a representative cross-section over a specific period of time (in 2013 and 2014) of interventions that is indicative of the main approaches and/or focal foods, and that highlights instances of innovation.
4 Findings

The methodology outlined above yielded a total of 24 interventions representing a range of value chain activities that have the potential to bring nutrient-dense foods to poor consumers (Table 3). Most of the value chain interventions found in our review were business-driven – only four could be classified as food distribution programmes. This is not surprising, given the close association of the value chains concept with business processes. In this section we organise the finding of our review in accordance with the framework proposed in Section 2.
increased nutritional value

| Fortified staples (e.g. iron-fortified wheat flour) | 2 cereals  
| Fortified prepared foods (e.g. weaning foods, snack foods, etc.) | 2 milk  
| Biofortified (e.g. wheat, rice etc.) | 1 complementary food  
| | 1 biscuit  
| | 2 school feeding |

4.1 Business-driven initiatives

The dairy sector accounted for the highest number (seven) of value chain interventions in Pakistan. Non-dairy naturally nutrient-dense foods such as poultry, meat, and fruits and vegetables had five interventions. There were eight value chain interventions in foods of increased nutritional value, all save one in fortified foods.

Naturally nutrient-dense foods: dairy

Dairy products, particularly milk, form an important part of the diet in Pakistan. Milk is one of the few nutrient-dense foods that is widely consumed across income classes, either by itself or in other preparations such as milky tea. Livestock rearing is an important sub-sector within agriculture and accounts for a high share of value added in the sector. Consumers have historically accessed milk either from their own farm animals, through reciprocal exchange, or through traditional value chains around unprocessed fresh milk sold at specialised shops and delivery agents. This began to change 1980’s with the introduction of locally-produced UHT milk in the market. Most of the dairy value chain interventions covered in the present review relate to the production of processed (UHT) milk.

Nearly all of the dairy interventions included in this review are implemented in Punjab and Sindh and involve activities such as establishing village milk collection centres, providing cooling tanks, strengthening livestock extension services, and involve technical and enterprise training for farmers. The Dairy Hub is a typical intervention in this regard. It started as a joint project in 2009 between the packaging firm Tetra Pak and three established food companies (Engro, Haleeb, and Nestle Pakistan). The project claims to bring safe, hygienic and easily accessible milk to consumers. The project aimed to develop the dairy sector through improving the production and collection of milk, with the idea that better quality and increased quantity of milk supply will lead to higher demand of Tetra Pak’s aseptic packaging.

The intervention worked to create dairy hubs. These hubs usually include 20 villages located within a 15-20 Km radius, 800-1,000 farmers and a total of up to 10,000 cows/buffalos. The hubs established
village milk collection (VMC) points and laboratories for testing milk, farmers were registered to sell their milk at their local VMC and receive bonuses for good quality. The hubs and VMCs hired people from the local community, two dairy hubs have been established which only employ women. The programme provided milk machines to farmers and field services and collaborated with the University of Veterinary and Animal Science (UVAS) and Livestock and Dairy Development Departments for technical support. Dairy Hubs work to integrate various actors along the value chain and create linkages between producers, suppliers and packagers of milk.

Engro, a large food company, has had a dairy hub since 2009. An assessment of the hub showed a positive impact on milk production and collection. Milk collection increased from 400 litres to 8,500 litres per day within one year and animal health improved as animals were vaccinated against various diseases and de-wormed. While the Dairy Hub project is a commercial collaboration between private sector companies, two of its participants, Engro and Haleeb are also involved in two other value chain interventions which have received donor funding. These projects support established business processes of these companies but emphasize social policy goals such as increasing the income of women dairy farmers.

**Naturally nutrient-dense foods: meat, poultry, and others**

Of the five non-dairy interventions relating to naturally nutrient-dense foods two (Save the Calf and Fruit and Vegetable Development Project) were focused on providing technical assistance to farmers to improve productivity. Another two involved providing inputs (egg-producing chicks) to rural beneficiaries, particularly women. One of the five (Lahore Meat Processing Complex) involved the setting up of a more complex value chain linking producers and consumers. The first four projects (those providing technical assistance or inputs) were aimed primarily at improving livelihoods of farmers, with the additional benefit of increasing the supply of nutrient-dense foods in local and national markets. The more complex value chain was aimed improving the supply of higher quality meat to urban consumers.

**Fortified foods**

Commercially available fortified foods in the review include wheat, edible oil, milk, complementary food, and biscuits. The products included in this review represent a selection of foods whose main inputs are sourced from the Pakistani agriculture sector and are either marketed directly to poor consumers or are sold in quantities and packaging that allow them to be affordable to populations from lower income brackets.

In Pakistan there is a range of commercially-available fortified edible oil products as fortification of edible oil/ghee with vitamin A was mandated by the West Pakistan Pure Food Rules of 1965 and this provision has been retained in the Pure Food Rules in all provinces (Gaffey et al., 2014). The Utility Store Corporation (USC), a government owned organisation which works to sell food items to poor segments of society at prices lower than market, sells its own oil, which is sourced from various manufactures, packaged and USC branded and then distributed through USC retail outlets. This fortified product is specifically targeted towards populations from lower income groups and therefore has been
Two previous wheat flour fortification interventions have been included in the review. Both explicitly aimed to improve iron deficiency in women and girls. One operated in an earthquake-affected region in the country while the other was a national project which retailed its wheat flour through the USC at the same price as non-fortified wheat flour to ensure that the product was accessible to all segments of society.

Both these projects were led by INGOs, namely Micronutrient Initiative (MI) and Global Alliance for Improved Nutrition (GAIN), respectively, but are no longer operational. In July 2005, GAIN, along with technical assistance from the Micronutrient Initiative and in partnership with the Nutrition Wing in the Ministry of Health, initiated a wheat flour fortification programme. With commitment from the flour mill industry GAIN trained mill staff and laboratory technicians on fortification, provided the premix and created quality assurance/quality control manuals and management information systems and began to fortify wheat flour with iron and folic acid (B9).

The project was envisioned to have two phases; the first started in July 2005 and was completed in 2010 while the second phase of the project aimed to start in May 2010 and was expected to end in April 2013. This project aimed to increase fortified wheat flour consumption and to reduce iron deficiency, anemia, in women from 25.5 per cent to 20 per cent and in children under five from 36 per cent to 28 per cent.

To increase the accessibility and affordability of wheat flour for all segments of society the Ministry of Health signed an MoU with the Utility Store Corporation, whereby iron fortified wheat flour was sold to consumers at the same price as regular flour in Islamabad, Lahore, Karachi and Peshawar. GAIN also launched a social marketing campaign and developed a fortified wheat flour logo.

By the end of the first phase of the project more than 12.7 million people had access to fortified wheat flour and 125 flour mills were equipped for fortification and workers were trained. The standards for fortified wheat flour were approved by Pakistan Standards and Quality Control Authority (PSQCA), but the project did not enter its second phase as mandatory fortification legislation was not passed. Since October 2013 GAIN renewed its efforts to fortify wheat and has worked with the Punjab Government on issues of legislation, capacity development and quality control.

GAIN’s project ended as they were supplying free pre-mix with the understanding that mandatory fortification legislation would be implemented, but this did not happen and millers were not incentivized to pay for the pre-mix as sufficient demand had not been created for the fortified wheat flour (Technical Resource Facility, 2012). Currently there are still efforts underway to push for mandatory fortification of wheat flour (Gaffey et al., 2014).

There is also an established and expanding market for locally-produced fortified foods in which major food companies (some of which are active in the dairy value chains) are the main players. Nestlé fortified products are important in this regard and have been included in the review. Questions have been raised about the social and environmental ethics of Nestlé’s supply (Martindale, 2013) and specifically there has
been controversy over Nestlé’s promotion of its own breast milk substitutes in Pakistan (Balch, 2014). Given the company’s large presence and range of fortified products in the country, it is important to retain their interventions in this review. Nestlé sells fortified powdered milk under a range of different labels in Pakistan such as Nido Fortified and Nido Bunyad, both of which are targeted towards children. Nestlé also sells Cerelac, infant cereal, to children between the ages of six months to three years of age. All three products are sold in sachets at prices less than 25 rupees. Nestlé generally targets marketing activities of its products in smaller towns to ensure easy accessibility and visibility of its product.

Haleeb foods, a local company, sold iron fortified dairy liquid in tetra packaging at 20 rupees for 250 ml. Their brand GroAur, which loosely translates into ‘grow more’, was promoted as addressing the nutritional needs of children, but is currently not on the market since the Punjab Food Authority took action against the brand. Dairy liquids have reduced fat and therefore by PSQCA standards cannot be classified as milk. They are sold at a price lower than UHT milk and loose milk and are marketed to those segments of the population that may not be able to afford UHT milk. GroAur was the first brand within the dairy liquid category that sold a fortified product. Fortification interventions in the dairy sector are linked to business processes developed under the dairy value chains discussed above.

Tiger Biscuits were introduced in the market by Continental Biscuits Limited, a local company that has a joint venture with Kraft. Marketing activities for Tiger biscuits have specifically targeted school children. While Tiger is marketed as a nutritious biscuit, the company introduced Tiger Max which offered greater nutritional value. Tiger Max was sold in larger packs at for 15 rupees for 57g compared to Tiger which retails at 30g for five rupees. Tiger Max was taken off the market as consumers were not willing to pay more for the fortified biscuit.

In Pakistan biofortification is still a relatively new intervention. HarvestPlus along with the National Agriculture Research Council in Pakistan have begun biofortifying wheat with zinc; however the project is still in its test phase. The wheat variety aims to be released for cultivation for the 2015-16 Rabi (winter) crop.

4.2 Food Distribution Programmes

While value chain interventions are conventionally thought to work on business processes, this review also includes public sector systems for the distribution of nutritious foods to the poor. Unlike some other countries in the region (notably India) where the public sector plays an active role in food distribution, its role in Pakistan has been limited. The government implemented a wide scale school feeding programme, Tawana Pakistan, which was designed to improve the nutritional status of primary school aged girls 5-12 years and was implemented in rural areas of 29 of the poorest districts of Pakistan. The programme ran between 2002-2005, and through community participation, provided students with freshly cooked mid-day meals made from locally available food items.

WFP has run a number of school feeding programmes to address undernutrition and improve school enrolment, especially of girls. Programmes have typically provided staples to school children as take home rations including edible oil, wheat flour, dates, and complementary cereal, in addition to providing
The World Food Programme (WFP) is a key actor involved in food distribution in Pakistan; the organisation generally operates in emergency response situations or emergency-affected areas. One of its interventions is part of Community Based Management of Acute Malnutrition (CMAM), where they distribute a locally produced nutrient-dense chickpea-based Ready-to-Use Food (RUTF) to suit the nutritional needs of moderately malnourished children. WFP also produces and distributes a similar product which is given to prevent malnutrition.

The United States Department of Agriculture funded a school feeding programme in the district of Ghotki in Sindh, called the School Nutrition Programme (SNP). The programme was implemented by Land O’Lakes International Development, which is a division of Land O’Lakes Inc., a large agri-food company in the United States. The programme aimed to improve the nutrition and increase attendance of children in primary schools in the district, by providing school-going children and teachers in the district with 200 ml of fortified UHT milk and a 40g pack of fortified biscuits five days a week. Prior to the project 20 per cent of girls were enrolled in primary school in Ghotki; the region faces chronic food insecurity and high rates of undernutrition amongst children. During the six years of the programme SNP fed more than 202,000 children and 4,000 teachers in over 2,000 primary schools.

An assessment found that beneficiary children grew an average of five inches and gained more than 13 pounds in the last two years of the programme. It was found that the intervention helped reduce endemic stunting and wasting. The success of SNP led the government to replicate this programme and continue to feed 115,000 girls in six districts after the programme ended.

Aside from school feeding the programme also trained 300 people working in 10 milk processing plants on a range of quality processing standards and provided in-depth guidance to 500 small dairy farmers and producers during their visits on good farm management practices and obtaining quality milk from their livestock. SNP also coordinated with the government to provide children with de-worming tablets and incorporated a number of complementary efforts to improve regular attendance by providing benches, school bags, stationery and sports equipment to students. In addition the intervention included a community awareness component on the environment and the importance of recycling, as well as a component on awareness about personal hygiene, health and sanitation. The programme saw school enrolment increase 118 per cent, and attendance increase 45 – 90 per cent.

The processed products that SNP and WFP distributed were especially manufactured for their respective programmes and were not intended for sale on the open market distinguishing them from the differentiated business driven fortified products.

5 Analysis

Many of the value chain interventions in Pakistan do not focus on the consumer-end of the chain. Half of the interventions do not have specific nutrition objectives and most do not measure nutrition outcomes. Many of the business driven initiatives excluding fortification of staples that have a nutrition focus tend
to target higher-income consumers, while interventions involving food distribution target those that are in need of food assistance. The fortified foods have to manage issues of demand creation for their products and are also strongly affected by regulation. The linkages with agriculture of these interventions vary with naturally nutrient dense interventions have a stronger connection than fortified products. Sustainability of interventions is an issue of those that are donor-driven as they have a programme life-span; while government led initiatives have to deal with willingness and capacity. The following sub-sections provide a more detailed analysis of these issues as they relate to interventions included in the review.

5.1 Nutrition improvement as objective

Half of the interventions included in the review do not have specific nutrition objectives, while all interventions involving foods of increased nutritional value and food distribution had improving nutrition as a goal. Of those that target nutrition, even fewer measure the effect of their interventions on nutrition outcomes.

None of the interventions that involve naturally nutrient-dense foods included in this review has specific post-farm gate nutrition objectives, but nutrition objectives are often viewed as an outcome of the intervention or a secondary objective. Amongst these interventions three do mention nutritional improvement as an objective but view it as a by-product of other activities and not as a focal element of the intervention. None of these interventions measure the impact of their activities on nutrition. Tetra Pak’s Dairy Hub intervention aims to integrate the value chain to improve livelihoods while also boosting nutrition outcomes and the Pakistan Agriculture Research Council (PARC) poultry intervention in Federally Administered Tribal Areas (FATA) expects that the intervention will help mitigate protein deficiency by improving the supply of eggs and chicken in the rural market, while the Backyard Poultry intervention also states that it will improve the health status of women through improved poultry production. There are opportunities for these types of interventions to have a more clear focus on nutrition post-farm gate rather than expect improved nutrition to arise out of other activities.

Interventions involving foods of increased nutritional value on the other hand are inherently focused on improving the nutrition of consumers. The business driven fortified interventions included in the review that are private sector lead and funded all have improved nutrition of a target population as their objective. However none have publicly available assessments of the impact of consuming their product on the nutritional outcomes of their target population. Conducting such assessments can be costly, time consuming and would realistically be beneficial to private sector companies only if their consumers had a certain level of nutrition awareness, whereby publically sharing positive assessment outcomes would result in increased sales.

Large private sector companies such as Nestlé can afford to have all their products go through a nutrition profiling system and therefore products such as Nido Fortified and NidoBunyad can claim to target the specific nutritional needs of a particular age bracket of children. However ethical concerns over Nestle’s supply chain and marketing activities has called into question their commitment to improving nutrition through the sale and consumption of their products versus their interest in profit
(Baloch, 2015).

The school feeding programmes included in the review had improving school attendance and nutrition, particularly of girls as their stated objectives and as a result, unlike other interventions, they measured the impact of their programme on nutrition.

5.2 Targeting

Nutrient-dense foods, whether naturally nutrient-dense or foods with enhanced nutritional value, tend to be more expensive and therefore targeting low-income undernourished consumers amongst the business driven interventions can pose a challenge which food distribution programmes are able to overcome.

Business driven interventions that are concerned with naturally nutrient-dense foods generally use innovation along the value chain and capacity building to achieve the overall objective of improving the agriculture sector while also improving the livelihoods of producers. They therefore do not focus on targeting the supply of food to specific segments of the population, and some of the products these interventions are concerned with are likely to exclude low income consumers. The main product of the dairy value chains, for example, is UHT milk which sells at a higher price than unprocessed milk. In a similar manner the poultry and meat interventions which work to increase the supply in the market are focused on promoting a product which many low income consumers cannot afford to consume on a sustained basis and therefore are not able to realise the nutritional value of these products.

Fortified packaged foods included in the review are designed to address the nutrition of children and are marketed towards them or their mothers. These private sector led initiatives face challenges in aligning their business interests with those of improving nutrition amongst low-income consumers. Foods of additional nutrient value tend to be more expensive as they have undergone an additional processing stage, as is seen with Nestle’s products and Tiger Max.

To tackle this challenge companies involved in the dairy sector such as Haleeb Foods have started producing dairy drinks, which have less milk solids than real milk, but as a result can be sold at a price below loose milk in TetraPak packaging, sealing it from contaminants. GroAur is one such product which is fortified with iron, and is sold to lower income households.

Fortified staples are consumed by a wide-segment of the population and are more likely to be consumed by women and girls within the household as opposed to other more expensive foods which typically would first go to the males in the family. Therefore the two wheat flour fortification initiatives explicitly aim to reduce iron deficiency in women and children, with MI’s intervention specifically stating that they aim to improve maternal health, though it was not apparent that they targeted marketing activities to these groups, as is the case with the USC edible oil. With regards to targeting low-income populations, the process of fortification increases the cost of wheat flour and to ensure that low-income populations consume the nutritionally enhanced product either a subsidy needs to be introduced or consumers need to be convinced of the benefit and bear the additional cost.
By contrast, food distribution programmes such as school feeding programmes are seen to function as social safety nets as they essentially transfer the value of the food provided to the children on to the household. These programmes have, by their design, an element of targeting, which is a general feature of social protection programmes. Since the point of delivery of school feeding programmes is the government school, its beneficiaries are children from relatively low income households.

5.3 Demand creation

For business driven initiatives to be successful at selling fortified products to lower income consumers their interests need to align with consumer needs. To expect consumers to pay an additional sum for fortified products they need to have a certain level of nutritional awareness about the benefits of the product. This is reflected by the case of Tiger Max, which was taken off the market as consumers were not willing to pay more of the fortified product. Tiger Max further highlights that marketing a nutritious product at a price that those in most need of the fortification can afford and signalling its value to consumers is integral to its success. Therefore products such as Nestle often target higher SEC’s as certain levels of nutritional awareness exists amongst those segments of the population. Further business-driven naturally nutrient-dense interventions such as those involving UHT milk, have only been able to capture a small percentage of the milk market as they are not able to compete with relatively low prices of loose (unprocessed) milk.

Mandatory fortification addresses issues of demand, which arise as a result of low consumer awareness around nutrition, as well as targeting and processing costs. In the absence of mandatory fortification INGO-driven wheat flour fortification initiatives adopted other strategies to address these same issues, such as running awareness campaigns and providing free premix. But even with these strategies these interventions had to deal with concerns around private sector commitment and costs, capability and capacity of both internal and external quality control and the enforcement and monitoring of quality and safety standards – factors which eventually have a bearing on demand.

5.4 Regulation

Regulation is an important aspect of most of the value chain interventions included in the review. For naturally nutrient-dense foods, especially milk, there are certain quality and safety standards that the product has to meet before it can be sold on the open market. For dairy liquids, regulation has resulted in the Punjab the Food Authority removing GroAur and other similar products from shelves as they believe these dairy drinks are being advertised as milk. On the other hand private sector actors say there is a need to lobby the government to create special standards for dairy drinks. Further analysis needs to be done to determine whether dairy drinks, both fortified and unfortified, are actually nutritious products that should target lower income populations on the basis of their nutritional value and as a replacement to milk. In other provinces across the country such regulatory bodies are not active or in existence.

With regards to fortification of staples, literature suggests that there are inadequate regulatory
monitoring systems which deal with compliance, quality control and licensing (Pakistan Ministry of Health, 2005 and Pakistan Planning Commission, 2012) and in fact analysis of oil/ghee samples revealed that there were a wide variety of fortificants of low quality (Bhutta, 2003). With respect to USC oil different oil/ghee manufacturing companies across the country manufacture and package the oil according to the requirements of USC; two of these manufactures were contacted and through personal communication they confirmed that USC edible oil is fortified with vitamin A and D according to the Pakistan Standards and Quality Control Authority (PSQCA).

Specifically for wheat flour fortification, previous successful programmes have operated on a small scale but the success of a national level intervention will hinge on ensuring that there is state willingness, regulation is set across the provinces, and implementation occurs properly. A scoping study of food fortification in Pakistan found that current barriers to effective fortification of food staples include a lack of mandatory legislation laws, limitations of food inspectors in terms of quantity and capacity, and the absence of standardized protocols for inspection and collection of food samples (Gaffey et al., 2014). Laboratories also have limited capacity to test samples for micronutrient content, monitoring and enforcement lacks coordination and clarity on institutional roles, and there are erratic penalties for non-compliance, in some cases fines are less than the costs associated with fortification (Gaffey et al., 2014).

5.5 Agricultural linkages

Of the 24 agri-food value chain interventions included in the review some have strong links to agriculture, but weak nutrition linkages, such as the naturally nutrient-dense interventions, while others have strong nutrition focus but weak agricultural linkages, such as the food fortification interventions. By this we mean that naturally nutrient-dense interventions commonly intervene at the agriculture stage of the chain while fortification occurs at the processing stage, which is removed from agricultural practice. Activities along one part of the chain cannot be understood, of course, in isolation from other parts and activities along the chain, initiatives such as mandatory fortification will have a bearing on production, and motivate actors along the chain in different ways. The contrast between interventions in naturally nutrient-dense foods and food fortification with respect to their respective agricultural linkages shows that thus far there are no salient models of interventions which focus both on income generation among poor producers and directly on the consumption of nutrient-dense foods.

5.6 Sustainability

There are contrasting patterns with respect to the sustainability of various agri-food value chain interventions in Pakistan. Those business-driven interventions which were initiated by the private sector proved themselves to be sustainable through the market mechanism. The story of dairy value chains emerging along the marketing strategy of a packaging manufacturer is a case in point. These interventions have been successful in creating further demand and capturing increasing market share for their product in innovative ways. By contrast, the sustainability of government led interventions – whether business-driven or public distribution programmes – depend on institutional strength and political commitment. . The national Tawana school feeding programme, for example, underwent
changes in design and was ultimately closed down prematurely. While some evaluations found the programme to have a positive impact, allegations that there were breaches in governance processes marred the public image of the intervention, and led to an erosion of political support for it. Other interventions which have been donor/INGO driven have also not been sustained beyond their project lifespans. An example of this is the United States Department of Agriculture funded school feeding programme, SNP, which despite being successful in achieving improved nutrition outcomes ended as the programmed drew to a close. The sustainability of business-driven but government or donor-led interventions, such as those in food fortification, depend also on sustained political commitment – for the provision of subsidy as well as for the enactment and enforcement of regulation.

6. Selection of case studies

The foregoing review (particularly Section 5) has identified themes and issues which will need to be addressed in order to enhance the contribution of agriculture to nutrition improvement through value chain interventions in Pakistan. This understanding needs to be deepened further with a more detailed examination of foods where value chain interventions might play a particularly promising role. Our Pillar 2.2 work in LANSA proposes to engage with selected existing or proposed value chain interventions through in-depth mixed methods case studies in order to both highlight problems in design and implementation in those cases, and also to draw out broader policy lessons for future value chain interventions in general.

Our review above has shown that while some value chain interventions have nutrition as an explicit objective, others are primarily concerned with increasing household incomes and treat nutrition as a secondary goal. In the selection of case studies, therefore, it will be important to pay attention to those value interventions which give primacy to nutrition, or to those interventions which have the potential for improving the consumption of nutrient-dense foods to the priority population. We propose to focus on Infant and Young Child Feeding (IYCF) as a high priority concern within nutrition.

It is established that the first 1,000 days of a child’s life, beginning at conception, are the most important in determining their nutrition outcomes throughout their lifetime [ref]. It is also established that the first six months after birth infants are to be exclusively breastfed. Infant and Young Child Feeding (IYCF), also known as complementary feeding between the ages of 6 to 24 months, is regarded a critical period for the introduction of nutrient-rich foods (including fortified foods, naturally nutrient-dense foods and manufactured complementary feeds) into the diet. By ensuring that children of that age group are consuming nutrient-rich food agri-food value chains have the potential to make an important contribution to improving nutrition outcomes in Pakistan.

To ensure consumption of these commodities it is important to place these agri-food value chains in the context of IYC households and examine the factors that determine IYCF, such as understanding the specifics about IYC caregiving, rational behind decision-making around feeding and other social and environmental factors that may influence IYCF (Pelto and Armar-Klemesu 2011; Pelto et al. 2013). Therefore examining IYC diets along with studying relevant nutrient-rich agri-food value chains has the potential to help align business models, market factors and household decision-making behaviour to improve the diets of IYCF.

Pakistan has large deficits compared with prescribed IYCF standards (Table 4). Over 6 per cent of the 6-23 month olds did not consume any form of milk, and under a quarter (22.2 per cent) consumed more
than four food groups in 24 hours preceding the survey. Under two-thirds had the minimum required number of meals in that period, and only 15 per cent had a diet which complied with three or more IYCF practices. Under half the 6-23 month olds had a Vitamin A rich food, and around a third had food that was rich in iron. There were stark differences between urban and rural areas, with children in the former being better fed, and there was a striking contrast for all elements of IYCF practice between children from the poorest and the richest wealth quintiles. The contrast between wealth groups suggests that household purchasing power, or the affordability of nutrient-dense foods, might be among the most important determinants of IYCF deficits in the country.

Table 4: IYCF practices of 6-23 month olds, by category

<table>
<thead>
<tr>
<th>Child or household category</th>
<th>Per cent complying with prescribed IYCF practice</th>
<th>Per cent who consume Rich in Vitamin A</th>
<th>Rich in iron</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Breast milk, milk, or milk product</td>
<td>4+ food groups¹</td>
<td>Minimum meal frequency</td>
</tr>
<tr>
<td>Sex</td>
<td>Male</td>
<td>93.6</td>
<td>24.2</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>93.6</td>
<td>20.1</td>
</tr>
<tr>
<td>Urban or rural</td>
<td>Urban</td>
<td>95.1</td>
<td>30.5</td>
</tr>
<tr>
<td></td>
<td>Rural</td>
<td>92.9</td>
<td>18.6</td>
</tr>
<tr>
<td>Wealth quintile</td>
<td>Poorest</td>
<td>91.8</td>
<td>11.9</td>
</tr>
<tr>
<td></td>
<td>Richest</td>
<td>95.7</td>
<td>38.7</td>
</tr>
<tr>
<td></td>
<td>All</td>
<td>93.6</td>
<td>22.2</td>
</tr>
</tbody>
</table>

- Food groups: a. infant formula, milk other than breast milk, cheese or yogurt or other milk products; b. foods made from grains, roots and tubers, including porridge and fortified baby food from grains; c. vitamin A-rich fruits and vegetables (and red palm oil); d. other fruits and vegetables; e. eggs, f. meat, poultry, fish and shellfish (and organ meats); g. legumes and nuts.
- Nonbreastfed children age 6-23 months are considered to be fed with a minimum standard of 3 infant and young child feeding practices if they receive other milk or milk products at least twice a day, receive the minimum meal frequency, and receive solid or semisolid foods from at least 4 food groups not included the milk or milk products food group.

Source: Demographic and Health Survey 2012-13, Tables 11.6 and 11.7

Actual complementary feeding practices for 6-23 month olds show that non-breastfeeding children had greater recourse to infant formula and non-breast milk, but had similar patterns of consumption otherwise. The most prevalent foods given to infants and young children were grain based preparations which normally do not include nutrient-dense foods. The second most prevalent food in both groups was ‘other milk’ – including fresh unprocessed milk, or various forms of processed milk from dairy animals. Fortified baby foods which might be a reliable source of nutrients were consumed by only 15 per cent of the 6-23 month olds.

Table 5: Children aged 6-23 months consuming complementary food – breastfeeding and non-breastfeeding children

<table>
<thead>
<tr>
<th>Food category</th>
<th>Breastfeeding children</th>
<th>Non-breastfeeding children</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infant formula</td>
<td>3.6</td>
<td>12.9</td>
</tr>
<tr>
<td>Other milk</td>
<td>41.4</td>
<td>72.7</td>
</tr>
<tr>
<td>Fortified baby foods</td>
<td>15.5</td>
<td>14.6</td>
</tr>
<tr>
<td>Food made from grains</td>
<td>69.7</td>
<td>79.8</td>
</tr>
<tr>
<td>Vitamin A rich fruit/vegetable</td>
<td>18.8</td>
<td>20.6</td>
</tr>
</tbody>
</table>
A better understanding of value chains in grains, specifically wheat, milk and fortified baby foods can help to identify the types of interventions and policies which can lead to improvements in the consumption of nutrient-dense foods by those that most need it. Grains, because these dominate complementary foods (70 per cent from breastfeed infants and 80 per cent for non-breastfed infants between the ages of 6-23 months), and there are existing and proposed programmes for enhancing their nutrient density. Milk because it is the main nutrient-dense food in infant and young children diets (41 per cent from breastfeed infants and 73 per cent for non-breastfed infants between the ages of 6-23 months), and fortified baby foods because there is a well-established value in the private sector, and there are potential lessons to be learnt from a public policy perspective. Using value chains as an analytical tool not only helps uncover how market based approaches to delivering food can be strengthened but may also highlight where subsidies and social protection programmes are required.

Preliminary investigation based on a review of literature and selected key informant interviews on the three agri-food value chains have helped identify more specific research questions for each case study. A brief description of the agri-food value chain and the related research questions is provided below.

The three case studies will address a number of generic research questions driven by the agri-food system framework outlined by Henson and Humphrey (2015). These include:

- To what extent are these market-based interventions in agri-food value chains successful at bringing about increased and sustained consumption of nutrient-dense foods by IYC in Pakistan?
- What are the most prominent challenges faced in the effective implementation of market-based interventions?
- Which types of market-based intervention in agri-food value chains offer the greatest prospects to achieve substantive and sustained consumption of nutrient-dense foods by low income IYC at scale?
- What are the implications for policy-makers?
- How well do these interventions work in the context of fragility; meaning weak willingness and/or capacity of government to support such initiatives and/or to promote increased consumption of nutrient-dense foods by the poor?
- In what ways are gender considerations critical to the functioning and/or success of the interventions, and to what extent have these been considered in the design and/or implementation of the intervention?
- To what degree and what forms of innovation along the agri-food system are critical to the success of the intervention?

Naturally nutrient-dense foods – milk

Within Pakistan the livestock sector accounts for 55.4 per cent of agriculture which is the single largest sector. Livestock contributed 11.9 per cent of national GDP during 2012-13 (Ministry of Finance 2015), making it an important part of the economy. Within livestock milk production has a significant role to play as Pakistan is the fourth largest milk producer in the world (FAOSTAT, 2015).

Milk is available in numerous forms in the market in Pakistan with varying nutritional quality. In addition the way it is prepared and consumed can have a significant bearing on how safe and nutritious it is. Milk can be powdered, packaged UHT form and fresh. Fresh animal milk from cows, buffalos as well as goats is consumed. Fresh milk is often sold in open containers in raw unpasteurized form, this method of
selling milk allows for adulteration; typically milk is mixed with water. Whereas UHT milk is processed and sealed so it is considered safer to drink, but is significantly more expensive and is often thought of being less nutritious as it not fresh.

This case study will seek to understand the opportunities to distribute safe and low cost milk to the poor, by specifically studying whether efforts to promote pasteurised packaged milk leads to increased consumption of safe milk for low income households. It will examine whether certain business models better serve low income households and how best to mitigate possible adverse effects of each of these models.

**Fortified staples – wheat flour**

According to the 2010 Agricultural Census of Pakistan, farms devoted 42 per cent of their total crop area to wheat. In Pakistan wheat is the main staple food, and therefore the government has an interest in ensuring the adequate supply of the product across the country and is involved in price setting, procurement, storage, and milling of wheat. As a result wheat flour fortification is viewed as a promising initiative to help improve nutritional outcomes, but close co-operation with the government and millers is necessary for such an initiative to be successful.

This case study will examine historical wheat flour fortification interventions as well as proposed programmes to specifically study the sustainability of such an intervention, issues relating to regulation, scaling-up and targeting.

**Business driven initiatives - manufactured, fortified baby cereal**

This case study will examine various local agri-food value chain business models for fortified baby cereals, examining them for their effectiveness in reaching low-income IYC households. One of the largest actors in this sector is Nestle. They manufacture a complementary fortified cereal which is enriched with iron, vitamins A & D, iodine and probiotics called Cerelac. The cereal is targeted towards children between the ages of 6 to 24 months. It is typically consumed by higher SECs (A to C), but is also sold in single serving (25g) sachets for 13 – 18 rupees which are consumed by SEC D. Cerelac is marketed as a convenient complementary feeding solution that meets the nutritional requirements of IYC.

Nestle procures the wheat, acquires the premix for fortification, processes and packages the commodity. Nestle then markets the product to doctors and mothers. Nestle adopts market based strategies which include product placement to increase the consumption of the product in small towns and which promote the cereal to healthcare professionals.

The government is an important actor in terms of a regulator, specifically the Pakistan Standards and Quality Control Authority (PSQA) formulates, promotes and supports compliance with national standard specifications in various industrial and service areas, including agriculture and food.

This case study has some elements which are common to the above two. Like the dairy value chain study it provides an opportunity to examine a market-driven initiative and the potential for the resulting product to have wider outreach among the target population. The product in question is also likely to be subject to, like fortified wheat, to the application of policy-driven standards and mandates.
Demand and supply side issues

Three in-depth comparable case studies of these agri-food value chains will be conducted. The case studies will focus on demand-side factors that affect the consumption of nutrient-dense foods and supply-side factors that determine the effectiveness of various business models with regards to delivering nutrient-dense IYC foods to poor households.

The framework proposed by Henson and Humphrey (2015) to analyse the nutrition implications of agri-food value chains sets out a number of dimensions which can be broadly seen as dealing with consumption and production issues respectively. On the consumption side the key dimensions are:

Requirement 1 - Nutrition Awareness: Household purchasers of food must be aware of the benefits of improved nutrition for members of their household, in this case IYC.

Requirement 2 – Signaling: Since the nutrient content of food is not a visible characteristic, signaling as such becomes important. Sometimes fortified foods are labeled incorrectly, leading consumers to believe that the food contains more nutrients than they do, and therefore branding is important. Often the physical appearance and traditional beliefs about foods that are 'good' or 'bad' nutritionally are what consumers use to determine whether food is considered nutritious.

Requirement 3 - Availability: Poor undernourished households need to have easy access to markets, or markets where nutrient-rich foods are sold.

Requirement 4 - Affordability: Nutrient-rich foods have to be affordable to poor undernourished households, while in actuality they are often more expensive – fortifying staples increases their price, manufactured packaged products cost more, naturally nutrient-dense foods such as animal based proteins are not affordable to many households

Requirement 5 – Acceptability: Foods must be considered acceptable to feed IYC which is of determined by social and cultural norms, tastes, consumption patterns, preparation practices and the time available to the caregiver.

Moving further back along the agri-food system from the diet of the consumer to the selection of the commodity to the seller of the product this research follows Henson and Humphrey’s (forthcoming) supply-side requirements. They lay out four requirements that business models need to satisfy in order to ensure the successful supply of nutrient-dense foods.

Requirement 6 - Capturing Value: This refers to the mechanisms needed for actors along the value value chains 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: 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.

Requirement 8 – Value Chain Coordination and Governance: Actions of actors along the chain are often interdependent and/or require efficient coordination when this does not happen the chain as a whole may not function well thus, there is also a need for the coordination of actors along the value chain and governance of the chain to ensure that all actors are performing their required tasks in their prescribed manner.
Requirement 9 - Managing Risk and Uncertainty: There can be significant 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. There is a key role for public policy and for engagement between businesses and the public sector in achieving this.

7 Conclusion

This review has compiled twenty-four agri-food value chain interventions which aim to increase the consumption of nutrient-dense foods or increase their supply to post-farm gate poor populations, especially women and girls. This paper provides a descriptive overview of the actors and activities involved in these interventions, and provides an analysis of the characteristics and challenges of the various agri-food value chain approaches, with the objective of providing insight into the potential of food-based value chain approaches in tackling undernutrition. The review provides the basis for an empirical analysis which will examine the ability of three of these interventions to address undernutrition. The rationale for the selection of these three case studies and a broad overview of them has also been provided.

From the interventions included in this review the following has been noted:

*The value chain approach is still largely being utilised as a tool to improve livelihoods in Pakistan with some examples of interventions connecting this approach to pre-farm gate consumption.*

Interventions involving naturally nutrient-dense foods generally focus on the producer and not the post-farm gate consumer, although they also work to increase the supply of these foods. Naturally nutrient-dense agri-food value chains in this review include numerous dairy interventions which involve a range of actors from donors, to the government to the private sector. Most are focused on improving the supply and quality of dairy products, however there is scope for these interventions to incorporate objectives around post-farm gate consumption by poor populations, this would include low-income rural non-farm, landless and urban households.

*Agri-food value chains interventions which have a focus on providing nutrient-dense foods to poor consumers could have a greater focus on distribution and utilising those channels through which the poor access food.*

Interventions typically do not work with informal food industries, which are the value chains that the poor are more likely to engage with and is an area that would benefit from a focus on food safety and nutritional quality, though with this being said, if food products are placed in local ‘kiriyana stores’ there is a higher chance of the poor consuming them. In addition, food distribution programmes aim to ensure that their product reaches poor consumers, though majority of these interventions are project based and involve international actors, affecting their long term sustainability.

*Fortified staples have a strong potential to address undernutrition amongst target populations, but require the right processes and policy in place.*

The wheat flour fortification interventions included in the review specifically aimed to improve the nutrition of women and girls, though interventions require coordination and monitoring along the value chain for them to be successful. The regulatory framework still needs to be build up and monitoring and enforcement need to be strengthened, however some of these issues can be resolved through investment in the process (Gaffey et al, 2014). In addition, such activities do not yet cover chakkis (micro-mills) which is where a significant percentage of wheat in the country is milled. Biofortification of wheat in Pakistan may bypass some of these issues but it is still in its nascent stages and the success of the intervention is yet to be determined.
Private sector led interventions need to devise strategies to market and sell their fortified products to consumers in lower income groups.

Fortified non-staple foods included in the review are private sector led interventions. These products are marketed to a range of segments of the population and are only affordable to lower income brackets when they are sold in their smallest packaging. Brands like GroAur that do not target the highest socio-economic category but advertised to nutrition-conscious mothers are selling a product that cannot be classified as milk. Tiger Max, was sold at a higher price than its non-fortified counterpart, perhaps reflecting additional costs associated with fortification as well as where demand for such products actually lie.

These conclusions will refine the analytical lens for the upcoming case study work to help determine what the potential is of the selected agri-food value chain interventions to deliver nutrient dense foods to low income populations through IYCF. The desk-based review will provide the foundation for the empirical case-study work and serve as a guide to the agri-food value chain intervention landscape in Pakistan.

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## Annex: Summary of agri-food chain interventions

### Business-driven: naturally nutrient-dense - dairy

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Aim</th>
<th>Primary Beneficiaries</th>
<th>Description / Key Activities</th>
<th>Expected Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dairy Hub: A Community Dairy Development Programme</strong> (2009)</td>
<td>Develop the dairy sector so that better quality and quantity of milk supply will lead to higher demand of Tetra Pak’s packaging</td>
<td>Smallholder local dairy farmers</td>
<td>Hubs set up to include 20 villages in a 15-20 Km radius, covering 800-1,000 farmers and 10,000 cows. Register farmers, test milk, provide chilling machines, and establish VMCs</td>
<td>To bring safe, hygienic and easily accessible milk to consumers through cooperation with dairy processes and better economies of scale</td>
</tr>
<tr>
<td><strong>Dairy Project</strong> (July 2011 - July 2014)</td>
<td>Designed to improve the production of dairy products and increase dairy farmers’ income</td>
<td>Dairy farmers and livestock technicians including women</td>
<td>Capacity building, extension services and awareness campaigns</td>
<td>Expected to improve livelihoods of those working in the dairy sector and also increase the supply of dairy products in the market</td>
</tr>
<tr>
<td><strong>Establishment of Milk Processing Plants in District Layyah and Sialkot</strong> (2006-2011)</td>
<td>Increase the quantity and quality of milk production</td>
<td>Farmers, processors and consumers</td>
<td>Create farmers’ organisations in 1,000 villages, establishing milk centres, chilling centres and powder milk plants</td>
<td>Expected to improve incomes by increasing quantity and quality of milk</td>
</tr>
<tr>
<td><strong>Haleeb Value Chain Project (HVCP)</strong> (2008)</td>
<td>Increase the incomes of 6,000 women dairy</td>
<td>Women dairy farmers</td>
<td>Capacity building of women farmers to improve milk productivity and quality, as well as</td>
<td>Economic empowerment of women in dairy sector</td>
</tr>
<tr>
<td>Model Farm and Farm Cooling Tanks (FCTs) Programmes (2006-)</td>
<td>Farmers</td>
<td>Improve market linkages. Women were also provided with equipment and collection centres facilities.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PDDC and partners from private sector</td>
<td>Model Farm and Farm Cooling Tanks (FCTs) Programmes (2006-)</td>
<td>Increase the supply of safe and affordable milk beyond the farm gate.</td>
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<tr>
<td></td>
<td>Increase the supply of safe and affordable milk beyond the farm gate</td>
<td>Facilitate linkages between farmers, processors and consumers. Increase milk production by improving farm management, milk collection and marketing.</td>
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<td></td>
<td></td>
<td>Expected that an increase in the supply of milk will result in more affordable milk for all segments of society, especially the poor.</td>
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<tr>
<td>Plan Pakistan and EU</td>
<td>Establish milk collection centres, engage in social mobilisation, provide feed, fodder and veterinary services and run family nutrition programme. Create a cadre of female livestock extension workers and female village milk collectors to provide training and services to milk producers’ doorsteps. Support the establishment of small village-level businesses. Engro provided 60 chillers and</td>
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<td>Expected that the post farm-gate consumption of dairy products will increase due to the improvement in production and quality.</td>
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<tr>
<td>Women Empowerment through Livestock Development (WELD) (2011-2013)</td>
<td>Small livestock farmers</td>
<td>Improve 15,000 dairy farmers’ incomes by 50%.</td>
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<tr>
<td>USAID, MEDA and Engro Foundation</td>
<td>Milk producers predominately women</td>
<td>Mitigate the effects of increases in food prices and increase household food security.</td>
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</table>
agreed to buy milk suppliers’ product at competitive rates

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Business-driven: naturally nutrient-dense - non-dairy

<table>
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<th>Intervention</th>
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<tbody>
<tr>
<td>Lahore Meat Processing Complex Punjab Agriculture and Meat Company</td>
<td>Establishment of backward linkages with certified farms, provision of mechanical processing facilities, storage, value addition of allied products and quality compliance</td>
<td>Improve the supply of safe and healthy meat beyond the farm-gate</td>
</tr>
<tr>
<td>Save the Calf (2010) PAMCO owned by Government of Punjab</td>
<td>- Farmers are provided technical support, animal health facilities, e-tagging and cash incentives to ensure the survival of male calves until a suitable slaughtering</td>
<td>Increase the supply of disease-free meat in the commercial</td>
</tr>
<tr>
<td>Backyard Poultry Breeding and Culture (2009- ) PARC</td>
<td>Provision of 15,000 of highly productive chicks to rural women poultry farmers</td>
<td>Expected that the supply of meat and eggs will increase in the rural market and living standards and the health</td>
</tr>
<tr>
<td><strong>High Egg Producing Rural Chicken Livelihood Improvement &amp; Poverty Alleviation in FATA PARC</strong></td>
<td>To address worsening protein deficiency in remote rural areas</td>
<td>Poor residents of FATA</td>
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<tr>
<td><strong>Fruit and Vegetable Development Project (FVDP) (2005-2013)</strong> ACIAR, Government of Pakistan with international and local organizations</td>
<td>Increase the production of quality fruits and vegetables to ensure sustainable supply in market</td>
<td>Community involved in fruit and vegetables cultivation</td>
</tr>
</tbody>
</table>
## Food distribution programme: naturally nutrient-dense

<table>
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<tr>
<td><strong>Tawana Pakistan (2002-2005)</strong> Government of Pakistan and NGOs</td>
<td>Improve nutritional status of girls and increase enrolment and nutrition awareness in 29 of the poorest districts in the country</td>
<td>Primary school girls aged 5-12 years</td>
<td>Girls were provided with freshly prepared, locally sourced, nutritious midday meals at school. School committees were formed which included mothers, community members, teachers and students who were responsible for planning and preparing the meals. Training sessions on nutrition awareness were also conducted in the community</td>
<td>Nutritional outcomes of girls who received the intervention improved</td>
</tr>
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<tr>
<td><strong>Commercial Wheat Flour Fortification Project</strong></td>
<td>Fortify wheat flour with iron to improve the maternal health and reduce iron deficiency in women and girls</td>
<td>Population of Earthquake-affected areas of Khyber Pakhtunkhwa</td>
<td>Fortification of wheat flour, worked with the Mill Association to spread information about the importance of fortification. Educated and assisted millers to procure premix and install microfeeders. Trained staff and ensure quality control. Worked with health workers to spread awareness about the product.</td>
<td>Benefited about half million people</td>
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<td><em>(2007-)</em></td>
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<tr>
<td>MI in partnership with WFP, implemented with flour millers and health workers</td>
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<tr>
<td><strong>Pakistan Wheat Flour Fortification Project</strong></td>
<td>Fortify wheat flour with iron to reduce anaemia in women from 25.5% to 20% and in children under five from 36% to 28%</td>
<td>45% of the population, with a specific focus on women and children under the age of five</td>
<td>125 flour mills were equipped and workers trained, GAIN provided premix, PSQCA approved standards for fortified wheat flour, social marketing campaign was launched; a MoU was signed with USC and fortified wheat flour was</td>
<td>More than 12.7 million people had access</td>
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<td><em>(2005-2010)</em></td>
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<tr>
<td>Funded by GAIN and implemented by Ministry of Health, flour millers and USC</td>
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<tr>
<td><strong>Utility vegetable cooking oil</strong>&lt;br&gt;Utility Store Corporation (USC)</td>
<td>Sell vitamin A and D fortified cooking oil at a price lower than market</td>
<td>General population</td>
<td>Own branded fortified cooking oil called retails at a lower price than oil found in the market</td>
<td>Increase the consumption of fortified cooking oil</td>
</tr>
<tr>
<td><strong>Cerelac</strong>&lt;br&gt;Nestle Pakistan</td>
<td>Sell baby cereal to children</td>
<td>Children between the ages of 6 months - 3 years of age</td>
<td>Cerelac is targeted to a variety of age groups and is sold at lower prices in sachets. Awareness campaigns targeted to health care professionals</td>
<td>Addressed the nutritional needs of children</td>
</tr>
<tr>
<td><strong>GroAur dairy drink</strong>&lt;br&gt;Haleeb Foods Ltd.</td>
<td>Sell iron fortified dairy drink to children</td>
<td>General population, specifically targeting children</td>
<td>GroAur is iron fortified dairy drink, sold in smaller sizes, especially targeted towards mothers who are concerned about their children’s nutritional wellbeing</td>
<td>Fulfil iron-nutritional needs of children</td>
</tr>
<tr>
<td><strong>Nido fortified milk</strong>&lt;br&gt;NidoBunyad (2009)&lt;br&gt;Nido Fortified&lt;br&gt;Nestle Pakistan</td>
<td>Sell fortified milk powder to children</td>
<td>Children between the ages of 1-12 years</td>
<td>Fortified milk powder that meets the nutritional requirements of particular age groups of children. Nido is available in sachets</td>
<td>Address the nutritional needs of children</td>
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</tbody>
</table>
| **Tiger Biscuits**  
*Tiger: 1993*  
*Tiger Max: 2012*  
Continental Biscuits Ltd. | **Focus to improve nutrition** | **General population, specifically targeting children** | **Tiger is of milk and wheat. Tiger Max contains additional vitamins and minerals. Sold in various packages to target different income groups. Marketing campaign targets school children, emphasizing the importance of energy** | **Provide energy and nutrition to children** |
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<td><strong>Zinc Wheat (2010-2018)</strong></td>
<td>Development of zinc biofortified wheat seed with the objective of addressing zinc deficiency in the country</td>
<td>General population</td>
<td>Plant breeding for wheat biofortified variety with high zinc. First wheat seed will be released in 2015</td>
<td>Expected that after 10 years wheat will be consumed by 100 million people in country – the seed variety provides 20% more zinc than other commonly grown varieties</td>
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<tr>
<td><strong>RUTFs – Wawa Mum, Acha Mum</strong></td>
<td>Improve nutrition of children in emergency response situations that are moderately or acutely malnourished</td>
<td>Children between the ages of 6 to 59 months in emergency response situations</td>
<td>Locally manufactured chickpea based RUTF. WFP contracts manufacturers in emergency-affected regions then distributes and transports the product. The product wraps a day’s worth of vitamins and nutrients into a single 50g pack</td>
<td>Reduce malnutrition in emergency-struck areas</td>
</tr>
<tr>
<td><strong>Pakistan School Feeding Programme</strong></td>
<td>Increase enrolment through on-site feeding and take home rations, improve nutrition and health status of children and pregnant and lactating women</td>
<td>Primary school going children in conflict and disaster-affected areas</td>
<td>School children were provided high energy biscuits in school and with take home rations including fortified edible oil, fortified wheat flour, dates and blended food, depending on the programme. Each programme also involved community nutrition programmes</td>
<td>Save lives, avert hunger and reduce malnutrition amongst vulnerable populations</td>
</tr>
<tr>
<td><strong>School Nutrition Programme (SNP)</strong></td>
<td>Improve nutrition and attendance of children in</td>
<td>Primary school children</td>
<td>Provided teachers and children with fortified milk and biscuits. Trained</td>
<td>Assessments found that the intervention helped reduce</td>
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<tr>
<td>(2003-2009) USDA, Land O’Lakes</td>
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</table>
and Government of Sindh primary schools in the district Ghotki more than 4,000 teachers and school supervisors on the handling, storage safety and quality assessments of milk stunting and wasting as well as improving school enrolment and attendance