

VALUE CHAINS FOR NUTRITION IN SOUTH ASIA: WHO DELIVERS, HOW, AND TO WHOM?



IDS Bulletin

Transforming Development Knowledge

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Photographer Nigel Poole.

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Value Chains for Nutrition in South Asia: Who Delivers, How, and to Whom?

Editors **Mar Maestre and Nigel Poole**

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Introduction: Value Chains for Nutrition in South Asia: Who Delivers, How, and to Whom?

Mar Maestre and Nigel Poole

Abstract There is currently much talk of the private sector role in nutrition, and whether the state can better ‘shape’ the market to deliver nutritional outcomes. This article introduces an issue of the *IDS Bulletin* which presents research findings in this area developed by the consortium of research partners under the Leveraging Agriculture for Nutrition in South Asia (LANSA) programme. It is the first attempt at nutrition-oriented whole value chain research in South Asia, studying the supply and demand side of the agri-food chain. It explores existing (or potential) agri-food value chain pathways to deliver nutritious foods to vulnerable populations in South Asia, as well as the role that both public and private actors have, in enhancing these value chains. It provides evidence on what is working and what is not; policy recommendations for the role and use of market-based interventions for nutrition-related challenges; and suggests a new agenda for research.

Keywords: agri-food value chains, malnutrition, private sector, South Asia, vulnerable populations, markets, public–private partnership, post-farmgate, food policy, food systems.

1 Introduction

Malnutrition is a global challenge with huge social and economic costs. Malnutrition refers to both undernutrition and overnutrition. The Committee on World Food Security (CFS 2009: 1) defines food security as ‘when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food’. Food security – commonly understood as ‘freedom from hunger’ – is sometimes wrongly conflated with nutrition security. Nutrition security means ‘access by all people at all times to the adequate utilisation and absorption of nutrients in food, in order to be able to live a healthy and active life’ (Wüstefeld 2013: 10). Malnutrition results from ‘deficiencies, excesses or imbalances in the consumption of macro- and/or micronutrients. It may be an outcome of food insecurity, or it may relate to non-food factors, such as inadequate care practices, health services; or unhealthy environment’ (FAO 2008: 3). Lack of nutrition security has irreversible consequences

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on vulnerable populations (infants, adolescent girls, pregnant and lactating women).

One in three people are affected, and virtually every country on this planet is facing a serious public health challenge due to malnutrition. The number of chronically undernourished people in the world is estimated to have increased from 777 million in 2015 to 815 million in 2016, thus bucking recent trends towards better global food security and nutrition (FAO 2017). Additionally, many countries are dealing with a 'triple burden' of malnutrition with energy and micronutrient deficiencies, coexisting with rising rates of overweight and obesity. This shows a move towards highly processed, caloric-dense foods high in oils, fats, sugar, and salt. The changing roles of women, the primary carers of children, is also a key intra-household driver, not necessarily leading to nutritional gains for their families (Balagamwala and Gazdar 2013). Malnutrition is a complex challenge, impacted by the agri-food, health, and care systems, often at the same time (Gillespie and van den Bold 2017).

Given this multisectoral nature of nutrition, recent attempts have been made to link the agriculture and nutrition realms to improve the food side of this challenge. In South Asia in particular, agriculture has a crucial role in the livelihoods and income of most of the poor and rural populations. However, it still accounts for 40 per cent of the world's undernourished populations (Maestre, Poole and Henson 2017; Rao, Motukuri and Bhavani 2017). Agricultural growth has been shown to reduce levels of hunger, with no evidence on reduction of malnutrition (Hoddinott 2013); however, much of this research has focused on increasing the supply or productivity of agricultural crops (Dubé, Pingali and Webb 2012; Ecker, Breisinger and Pauw 2012; Ruel and Alderman 2013; Webb and Kennedy 2014).

Evidence also shows that it is difficult for increased agricultural growth to be translated into increased and sustained dietary diversity and reduction in malnutrition, especially in South Asia (Headey 2012), evidenced in the South Asian Paradox (Rao *et al.* 2017). Others have tried to encourage poor agricultural households to grow and consume more nutrient-rich foods, or to improve their income to enable better access to food, though it does not ensure that the extra income will be spent on diverse and nutritious diets, or that nutritious home produce will be consumed by nutritionally vulnerable populations, or consumed in sufficient quantities to improve nutrition and health (Berti, Krusevec and FitzGerald 2004; Girard *et al.* 2012; Masset *et al.* 2012). Recent research shows that efforts to improve nutrition by boosting agricultural productivity should be accompanied by nutrition-sensitive interventions, including targeting increased consumption of specific nutrient-rich foods, and social interventions such as behavioural change campaigns or advocacy (Pandey, Mahendra Dev and Jayachandran 2016).

Furthermore, women, key actors within this food system, tend to be chronically disempowered, weakening further the links between

agriculture and nutrition (Rao *et al.* 2017). Targeting interventions towards women can enhance impact not only through the direct impact on women's health and education but also through increasing the control of women over household expenditure, food purchases and feeding practices, and through promoting time- and labour-saving activities (Gillespie, Harris and Kadiyala 2012; Webb 2013; Rao *et al.* 2017). Gender and household-level analyses are crucial to understanding these pathways, in addition to gender preferences and consumption patterns. Herforth (2013), and Herforth and Harris (2014) identify women's empowerment, expenditures, and time/energy use specifically as having an important bearing for their own nutritional outcomes and those of their children.

So as to better link the two realms of agriculture and nutrition, and move beyond agricultural production, one must also look at the role that markets have in linking agriculture and nutrition as a source of nutritious foods. Research shows that low-income consumers rely on markets to buy their food seasonally or year round. The share of purchased food in total food consumption currently constitutes around 70–80 per cent of the food consumed in countries such as Indonesia or Vietnam. Agri-food value chains are integral to these markets, with large numbers of actors interacting with different perspectives and levels of power. Main players can be large companies or the public sector, but they often include informal sector operators and small- and medium-sized enterprises (SMEs) (Reardon *et al.* 2015). Access to food then depends, amongst other issues, upon how well or not these food markets function. Businesses tend to face very specific challenges when operating in these contexts, and often require a supportive environment to overcome them. The linkages and coordination between the different market players in the agri-food value chains will play a key role in this. There is a growing interest amongst policymakers, researchers, and practitioners in understanding how to use value chains to help reduce rates of chronic undernutrition and link agricultural production and nutrition better, and how to use markets to better deliver nutrient-rich foods to vulnerable populations.

This issue of the *IDS Bulletin* aims to address this research gap by analysing what are the existing (or potential) agri-food value chain pathways to deliver nutritious foods from agriculture to vulnerable populations in South Asia, as well as the role of both public and private actors, in making these value chains more effective towards achieving sustained increased consumption of nutrient-rich foods by undernourished communities (Humphrey and Zuberi 2015). Here, nutrient-rich foods are those that, if consumed in adequate quantities (water, sanitation, and health (WASH) conditions, which also affect nutritional status not considered) are likely to improve the nutritional status of individuals who are undernourished.

The research articles follow a common conceptual framework (Maestre *et al.* 2017) developed under the research programme Leveraging

Agriculture for Nutrition in South Asia (LANSA). In addition, we welcome one practitioner's viewpoint that offers insights on the usefulness of the framework on the ground, discussing the challenges and opportunities it offers. The *IDS Bulletin* presents the findings from four years of research in this area, written by the LANSAs consortium of research partners, from different countries (Afghanistan, Bangladesh, India, Pakistan, UK, and USA). It examines multiple agri-food value chain pathways, including mandatory fortification, public distribution, social enterprises, and private business models, amongst others, to assess different scenarios for better sustained delivery of nutrient-rich foods. It is the first attempt at nutrition-oriented whole chain research in South Asia. It provides evidence on what is working and what is not; policy recommendations for the role and use of market-based interventions for nutrition-related challenges; and suggests a new agenda for research.

2 The research

LANSA is a six-year multi-institutional research programme consortium in South Asia focusing on Afghanistan, Bangladesh, India, and Pakistan. The core question of the LANSAs programme is: 'How can South Asian agriculture and related food policies and interventions be designed and implemented to increase their impacts on nutrition, especially the nutritional status of children and adolescent girls?'

Research under LANSAs is structured under three pillars which map fundamental, underlying, and immediate determinants of nutrition: first, the context and enabling environment linking agri-food systems to nutritional status; second, the policies and programmes which enhance the nutritional outcomes of agri-food value chains; and third, the nature of agricultural interventions which foster better nutritional outcomes. Consideration has also been given to three cross-cutting themes of gender, environmental and political fragility, and institutional and social innovation. The research findings presented in this issue of the *IDS Bulletin* are an element of this broad research programme, specifically looking, within the second pillar, at two questions:

- What are the existing (or potential) agri-food value chain pathways to deliver nutritious foods from agriculture to nutritionally vulnerable consumers? Who are the key actors engaged in these?
- What public and private actions are needed to strengthen the impacts of these agri-food value chains on nutrition in South Asia?

The research completed a series of country reviews mapping the pathways for agri-food value chain interventions in Afghanistan (Poole, Echavez and Rowland 2016), Bangladesh (Sirajul Islam *et al.* 2017), India (Parasar and Bhavani 2016), and Pakistan (Gazdar and Zuberi 2016). The pathways mapped aimed to, or had the potential to, increase the consumption or supply of nutrient-dense foods to poor and nutritionally vulnerable populations in general, and specifically to women and children. These reviews showed some of the common challenges faced in distributing different products to undernourished

consumers, and set out the basis for our empirical analysis examining how these pathways attempted to address undernutrition. The majority of the value chains had no specific nutrition outcomes, and in those that included one, nutritional concerns were generally secondary to boosting incomes and employment.

Following these reviews, each country analysed at least two agri-food value chains within these pathways, selected from the reviews. The scenarios were selected on the basis of having a high potential to deliver nutrient-dense products to targeted populations, either given the product of the selected value chain (currently liked and consumed by the target population), or the potential of the distribution channel (reaching the target population). All illustrate different pathways for private or public sector interventions – including large-scale mandatory fortification in Pakistan (Ansari, Mehmood and Gazdar, this *IDS Bulletin*), small-scale voluntary fortification of products in Bangladesh (Agnew and Henson, this *IDS Bulletin*), and India (Parasar and Bhavani RV, this *IDS Bulletin*), public–private distribution schemes in India (Bhavani RV and Parasar, this *IDS Bulletin*), or exploration of nutrient-dense value chains such as dairy in Pakistan (Ansari *et al.*, this *IDS Bulletin*), Bangladesh (Kabir, Islam and Reza, this *IDS Bulletin*) and Afghanistan (Poole, this *IDS Bulletin*).

For each scenario, the research generated evidence through interviews with key stakeholders, the target population, and other experts; focus group interviews; and quantitative studies with the consumers in the targeted areas. While the work in Afghanistan followed a different rhythm because of the insecure research environment, we are able to present an analysis of a value chain development project that was primarily aimed at women’s economic empowerment in the dairy value chain.

The research engaged with international stakeholders through two regional online discussions. The first discussion, held in February 2015, presented the different pathways for research and highlighted the interest from stakeholders in the topic (Humphrey and Zuberi 2015), with over 70 different contributions. The second, in April 2017, had 91 contributions, and provided an opportunity for key stakeholders to review the framework and initial findings of the research, discuss regional and country-specific scenarios, and share thoughts on wider systems challenges, as well as ways forward to work together.

The case studies from LANSAs provide useful lessons that can inform and enrich food security and nutrition policies and serve as examples for public/private sector partnerships. (Participant from the e-discussion, April 2017)

3 Private sector engagement with the food system and nutrition

Food systems are changing rapidly and becoming more globalised, with impacts on availability, affordability, and acceptability of food (Popkin, Adair and Ng 2012; Popkin 2014; Gillespie and van den Bold 2017). Food systems, of which an individual value chain is one part,

encompass other non-private sector actors (government, donors, civil society, and any other public or private institution engaged) and the broader context, including governance, rules (formal and social), and approaches to gender or the business environment, and indeed the natural environment. All of these elements affect how value chains operate (Global Panel on Agriculture and Food Systems for Nutrition 2016). For food systems to be more sustainable and better deliver healthy foods, one must understand the value chain (Allen and de Brauw 2017). The consequence of this is that policymakers are increasingly looking to agri-food value chains and the private sector for new ways to address nutrition-related challenges. Amid this, public-private partnerships or multi-stakeholder platforms are gaining recognition as potential vehicles to drive solutions towards reducing malnutrition (Hoddinott, Gillespie and Yosef 2015).

Private sector engagement in development has been prominent for a while, with the debate shifting from the polar question of 'the state or the market' to one of how the state can better 'shape' the market to deliver developmental outcomes (Thorpe and Wach 2015). In theory, public-private partnerships can leverage their resources and achieve more than each sector would alone. Both the Scaling Up Nutrition Movement (SUN) and the Global Alliance for Improved Nutrition (GAIN) follow this approach. On the other side, there are still many who are suspicious of the role the private sector can have in nutrition, given some of the problematic interactions in the past with some firms constantly violating the International Code of Marketing of Breast-Milk Substitutes (ICMBMS) (Save the Children 2013; Hoddinott *et al.* 2015). Other tensions when engaging with the private sector arise as some researchers and health professionals argue that markets and the private sector are a major contributing factor to overnutrition, pushing populations to buy (and consume) more and worse. This so-called 'nutrition transition' (Popkin 1998), where people have less time to cook and more disposable income, and are thus relying on more processed foods, is leading to increasing intake of calories often from sugars and fats, and to the aforementioned double burden of undernutrition and overnutrition experienced at individual, household, and national level. While it has different impacts on rural and urban areas, it is increasingly impacting both areas negatively (Popkin *et al.* 2012; Kleinert and Horton 2015). Despite the debate on how to engage with businesses, there are few assessments on which to base a judgement about realistic expectations of the private sector (Hoddinott *et al.* 2015; Maestre *et al.* 2017).

In this context, a number of authors have developed frameworks to help understand the market pathways linking agriculture with nutrition, and the conditions for these to work effectively from supply and demand perspectives (Hawkes, Turner and Waage 2012; Traill *et al.* 2014; Gelli *et al.* 2015; Kanter *et al.* 2015; Global Panel on Agriculture and Food Systems for Nutrition 2016; Maestre *et al.* 2017). These frameworks offer wholesome analytical lenses to map all actors and activities involved in food production to consumption, enabling complex food systems;

identifying potential entry points for interventions with a focus on existing market actors' incentives and capabilities; assessing the limitations of private actions; and through better coordination, to improve targeting of certain products or nutritional awareness campaigns.

Traditionally, food chain analyses have focused on the supply side and have been reticent about consumers as actors integrated within the chain (Hawkes and Ruel 2011), and surprisingly have also failed to acknowledge the essential link to nutrition and health (Poole 2013). Understanding how food supply and demand are linked is important for the successful delivery of nutritious products, as these pathways rely heavily on well-functioning markets, distribution systems, and on consumer awareness of the value of nutrition. A market systems perspective, similarly to the food systems perspective, positions value chains as central to the market, and also includes in its analysis all stakeholders and the context that influence the market. The difference between a market system and a food systems perspective is that market systems always place the market transaction (or value chain) at the centre of the analysis, whether this is related to food or not. Overall, all elements included in food and market systems approaches will affect how value chains operate, but value chain approaches may fail to reflect (Thorpe and Reed 2016). Given the lack of research in this area, in this issue of the *IDS Bulletin*, we focus on the role of agri-food value chains for nutrition within the broader system mentioned.

The conceptual framework developed as part of this research (Maestre *et al.* 2017) can be used to assess the effectiveness of post-farmgate agri-food value chains aimed at improving the nutrition intake of vulnerable groups, by linking the demand and supply sides of the value chain. It integrates the value chain concepts with agriculture and nutrition, and identifies key outcomes and requirements for value chains to be successful at delivering substantive and sustained consumption of nutrient-dense foods by individual consumers and households. The value chain focus may limit the assessment to only one type of food rather than a sustainable delivery of diverse products. However, it is an important step in the systems analysis that allows the researcher to assess business strategies and incentives in an effort to understand further how policymakers or practitioners can better work with or influence them to have more sustainable, healthy, and nutritious impacts on the population.

The framework argues that for a value chain to be sustainable and deliver healthy diets, it must achieve three outcomes to improve nutrition for the consumer, which are that (i) food must be safe to eat; (ii) food must be nutrient-dense at the point of consumption; and (iii) food must be consumed in adequate amounts on a sustained basis. These outcomes will depend on meeting two sets of requirements simultaneously, one from the demand side and the other from the supply side.

From a consumer perspective, following Hawkes and Ruel (2011), the framework considers five requirements to assess how the food is

purchased and consumed (nutrition awareness, signalling, availability, acceptability, and affordability). Gender relations, time use, male and female roles and responsibilities, and nutrition survey data by age and gender will be key areas to assess impact. From a supply perspective, critical to an understanding of the functioning of agri-food value chains, is their role in the creation and capture of 'value' and its distribution amongst the actors along the chain. Distribution of incentives, value chain organisation, and management of costs, risks, and uncertainty will also be important. These same requirements apply to short chains serving local markets and long chains moving food to urban areas, to chains that are highly fragmented, and to informal chains, as well as those with a high degree of vertical coordination. Finally, the last requirement, as highlighted by several of the articles in this *IDS Bulletin* (Parasar and Bhavani RV; Ansari *et al.* on wheat fortification), is an existing – or the potential for policymakers to shape – appropriate institutional environment that will enable the better delivery of nutritious foods. Overall, these three outcomes would be affected not only by the value chain actors but by the broader macroeconomic context in which the chain operates, and by the consumer, including issues such as the governance of a country, economic policy, culture, approaches to gender, as well as the climate and environment. These impact both the way in which value chains operate and their outcomes in terms of nutrition.

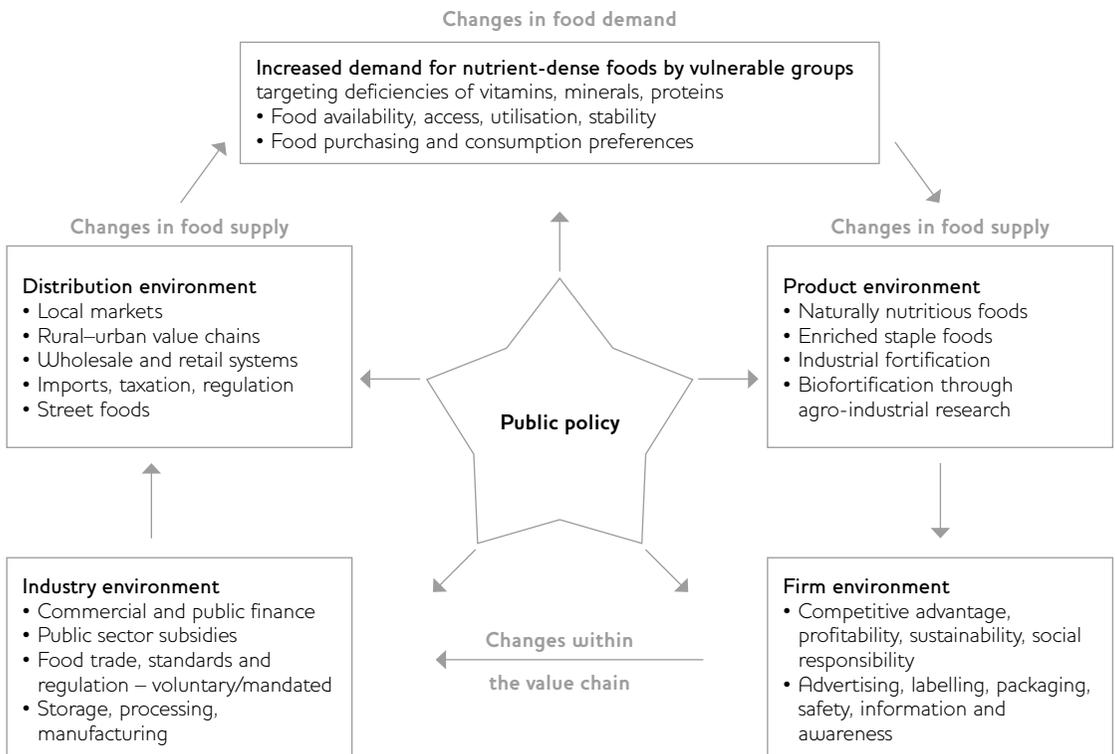
Janoch *et al.* close this *IDS Bulletin* with an article that offers a new perspective on the framework by identifying the most effective ways to influence nutrition through value chains, based on the international non-governmental organisation (NGO) CARE's experience working in food and nutrition security. They argue that a value chain approach can be useful in impacting nutrition as long as the value chain selection and subsequent activities follow an understanding of the diets of the target population and is combined with a strong gender focus. Risk is also hugely important for value chain management (Poole 2017). Beyond gender and risk, there is scope for agri-food value chain analyses to be extended to cover environmental issues and labour conditions.

This research focuses only on one dimension of the challenge, which is the distribution–consumption link. Conceived to promote the analysis of impacts of agri-food chains on poor and nutritionally vulnerable populations, the framework and focal questions can serve equally to assess the impact of food chains in economies where overnutrition is a growing burden. The new 'nutrition transition', as mentioned previously, is now increasingly well documented, with undernourished children coexisting with overweight and obese adults, and now we might also add overweight children (the 'triple burden'). These analyses are increasingly urgent, and not just in advanced economies. See, for example, recent research which shows the deleterious effect on food choices and consumers' health of supermarket sales and strategies in Kenya (Demmler *et al.* 2017).

4 Impact pathways and policy linkages for improved nutrition

Strong value chains and strong businesses are important for improving livelihoods, food security, and nutrition (Hawkes and Ruel 2011; de Brauw, Gelli and Allen 2015). Value chains are made up of different private sector intermediaries (ranging from multinationals to SMEs, formal or informal sector, local and international) which bring inputs produced in cities or towns to agricultural producers and food produced by farmers to rural and urban consumers. Sometimes value chains also include public sector or civil society actors. Weak links along the value chain may disrupt this flow. A lack of inputs, or inability to access inputs – such as seeds and fertilisers – or physical and financial impediments to accessing inputs faced by smallholders, can weaken the value chain upstream. A lack of processing, milling, cold storage, and transportation, and energy supplies necessary for these functions, can sever value chains midstream. Poor transportation infrastructure and (tele-) communications can make it too costly for smallholders to sell their produce downstream to urban consumers and can contribute to greater food losses and waste. Poor information systems exclude many smallholders from perceiving market opportunities and responding to market preferences. The value chain concept offers an analytical approach to explore the business and

Figure 1 Agri-food pathways and policy linkages for improved nutrition



Source Adapted from Maestre et al. (2017).

intersectoral linkages, to assess the potential contribution of the private sector towards public nutrition objectives and to identify incentives, bottlenecks, and constraints in production and consumption.

It originated in Porter's works on business strategy whereby competitive advantage might be achieved by adding value (Porter 1985) which itself was rooted in industrial organisation theory: how the arrangements between firms which make up an industry are structured, how the firms interrelate, and what the implications are for the firms and other industry stakeholders. Major firms also apply value chain concepts to their own business enterprises. As a recent press release by the International Fund for Agricultural Development mentions, on behalf of Mars Incorporated, IFAD is working within a value chain framework to contribute to the Sustainable Development Goals (IFAD 2017). Unilever is another agri-food business that expresses its responsibilities in terms of value chains of 'millions of people', from enhancing the livelihoods of smallholder farmers to improving the health and nutrition of existing and new consumers (Unilever 2017).

There are multiple possible interventions or pathways to improve value chains and the performance of constituent businesses in such a way that they deliver good quality nutritious food to undernourished people. Figure 1 shows these pathways. We identify three core routes to link different value chain actors, markets, and households. We believe that by assessing them, we can start to unpack the best strategies to make them more effective.

- 1 **Changes in food demand:** by enhancing access to, and consumption of, foods that are naturally rich in micronutrients, the dietary diversity of the household increases. These include fresh produce, such as fruit and vegetables, meat, fish, dairy products, and pulses.
- 2 **Changes in food supply:** increasing supply of nutritious foods by reducing costs and waste, and increasing yields and economic returns. Producing and distributing foods with increased nutritional value, either naturally nutritious foods (such as fruit and vegetables) or via biofortification or industrial fortification because of mandatory regulation or voluntary practice by business.
- 3 **Directly improving the value chain:** the interface between supply and demand, through business innovations or systems improvements, often involving both private and public sectors – improving infrastructure, removing other distribution barriers, or designing directly subsidised food distribution programmes by the government, donors, or other stakeholders.

Figure 1 illustrates the distribution–consumption linkages between the different levels in the food chain, from consumer nutrient requirements, through product demand and supply, new product development, firm strategy, the industry or market environment, distribution systems, and consumption of nutritious foods by vulnerable population groups.

Product flows are depicted cyclically to emphasise demand for and delivery of nutritious foods to consumers. Also, often interventions targeting the different changes work together to increase their impacts, such as changes in food supply combined with food demand, or improvements in the chain. They focus on the interdependent relation between the consumer and the supplier. The articles in this *IDS Bulletin* feature scenarios from several of these pathways, highlighting the challenges and opportunities each one offers, as well as the areas where policymakers can intervene.

In addition, the complexity of market institutions in many developing countries requires a deep understanding of the political and social conditions in which business takes place, in addition to technical production and consumption issues, before interventions can be designed. Such analytical approaches are often conceived as market or systems perspectives. Through LANSAs research, Poole *et al.* (2016) found evidence that a lack of storage infrastructure in Afghanistan created a seasonal export–import market for domestically produced tomatoes between Afghanistan and Pakistan, but that the underlying determinant of agri-business between Nangarhar (Afghanistan) and Peshawar (Pakistan) is governed by an ‘agri-mafia’. Such social and political factors condition market functions, value addition, and the distribution of benefits amongst value chain actors, and have been cross-cutting to the research.

5 Agri-food value chain pathways in South Asia: what can we learn?

South Asia is the focus for the research, not least because nearly half of the world’s undernourished population is found in South Asia (Maestre *et al.* 2017). There has been variable performance in terms of nutritional improvement within and between states, but the overall persistence of malnutrition where agriculture employs 60 per cent of the labour force is puzzling.

5.1 Changes in food supply

5.1.1 Incentives to fortify food

What makes markets for nutrition particularly complex is the overlap of the common challenges at the bottom of the pyramid (BoP), such as the high costs of distribution, with the specific requirements for nutrition, such as reaching the most vulnerable populations, educating consumers, motivating them to alter behaviours, and providing a guarantee of the ‘invisible’ nutritional quality, or ‘credence characteristics’, of foods (Nelson 1970). Recent research argues that businesses will rarely voluntarily address nutrition-related challenges or be successful at addressing public nutrition objectives without some degree of public support or advocacy, and a favourable institutional environment (Maestre *et al.* 2014; Humphrey and Robinson 2015).

The first three articles in this *IDS Bulletin* explore the role of businesses or government in targeting interventions to change the food supply by voluntarily fortifying some of their products or implementing policies

to incentivise private actors to do so. Food fortification is thought of as a popular pathway to ensure that consumers get the right nutrients, either via voluntary or mandatory processes. Examples are governments mandating certain cereals, such as wheat, to be fortified or private companies selling micronutrient powder or fortified products within their range, such as biscuits or milk. However, these types of initiatives have mixed outcomes.

Parasar and Bhavani RV (this *IDS Bulletin*) start with an analysis of two different business models in India aiming to develop nutrient-rich products – Tiger biscuits, an iron-fortified biscuit sold by Britannia Industries Ltd (BIL), and Amulspray, a dairy-based product manufactured by the Gujarat Cooperative Milk Marketing Federation Ltd (GCMMF). They assess the business strategy and incentives that led these two companies to produce and distribute the products, and identify entry points for policymakers. Interestingly, they find that both companies opt to enrich their products (voluntary fortification) pursuing different incentives, which leads BIL to stop producing its product, with no explanation given. Both companies have the potential to deliver nutrient-rich products targeted to poor and nutritionally vulnerable populations, but it will be their choice to do so, at the risk of losing competitiveness, or market share; and with no guarantees that the target population will consume the product in the quantities required. In both cases, a different institutional environment could enable them to produce and distribute healthier products which are targeted towards nutritionally vulnerable consumers. Likewise, the institutional environment could promote greater consumer awareness and support healthier, more nutritious product development.

Next, Agnew and Henson (this *IDS Bulletin*) explore a similar question by analysing the case of Grameen Danone Foods Ltd (GDFL), a social enterprise that specifically aims to bring about improvements in the micronutrient status of poor and nutritionally vulnerable children in Bangladesh through the sale of fortified yogurt. This case also illustrates the challenges faced when distributing nutrient-dense foods to poor populations. Most important is that even a business that has been able to draw on the collective experience and resources of Groupe Danone and Grameen Enterprises is yet to secure its long-term sustainability, even after more than ten years of operations.

To explore food fortification from another angle, Ansari *et al.* (wheat fortification, this *IDS Bulletin*) explore the potential of donor- or government-driven fortification, by looking at wheat flour in Pakistan, finding, as they name it, 'a case study of technocratic optimism in the face of stubborn institutional constraints'. The study finds that the wheat system is characterised by not one but several alternative value chains, while fortification interventions attempt to intervene in only one of them, making it unsuccessful. This highlights how well-intentioned public policy might fail if the voice of the most vulnerable populations is not taken into account when designing it.

6 Changes in food demand

6.1 Distributing foods with increased nutritional value

Public distribution systems raise an interesting debate with risks of creating dependency, unsustainable value chains, or removing agency from the consumer. However, they have also been proven to be one of the most effective pathways to reduce undernutrition, when financing and supportive policies are available. Bhavani RV and Parasar (this *IDS Bulletin*) explore the food distribution value chain of the Supplementary Nutrition Programme (SNP) under the Integrated Child Development Services (ICDS) scheme of the Government of India in two states (Telangana and Tamil Nadu). They show how public delivery can be implemented differently (companies, farmers' groups, cooperatives, state-owned enterprises).

Both ICDS models are shown to engage community groups, often as vegetable growers, which supports the community at the same time. There are other examples in India and in the region, as in Bangladesh, where the government and donors run a school distribution programme (the School Meal Initiative), where local vegetable growers are linked to the value chain. It showcases how citizen participation can be integrated into the value chain. Besides ensuring promotion of local foods and increasing local income when possible, such linkages also contribute to efficient operation of different aspects of the value chain. States may choose between different models based on their capabilities, willingness, and local milieu, but it is clear that when all stakeholders are engaged (i.e. the community growing vegetables and cooking, the private sector providing supplies, the government having a clear directionality and funding), initiatives tend to be more successful.

6.2 Increasing the consumption of nutrient-rich products (dairy value chain)

Increasing the production and distribution of naturally nutrient-rich foods to lead to an increased consumption is another traditional approach. In Pakistan and Bangladesh, there have been dairy-related value chain interventions over the past years, with the aim of increasing the production and consumption of dairy products. However, these too have had unsuccessful results.

Ansari *et al.* (this *IDS Bulletin*) examine the dairy value chain over the last 20 years in Pakistan. Dairy has been the subject of many policy and donor interventions which, unfortunately, have ultimately failed to live up to the promise of acting as a bridge between farmers and consumers. Instead, they led to the introduction of non-dairy products and imported raw materials. It shows how, for any business-driven value chain intervention to have a pro-nutrition impact, it is important to make that nutrition objective explicit in the design. Similar to the voluntary fortification cases, in the absence of a strong public policy-led focus on agri-nutrition linkages, such interventions should not be expected to deliver pro-nutrition outcomes.

Poole (this *IDS Bulletin*) explores the dairy value chain in Afghanistan in an article that integrates, in a challenging context, the cross-cutting

themes of gender, environmental and political fragility, and institutional and social innovation. The article discusses a dairy value chain intervention implemented by the NGO Afghanaid, which represents a common approach to economic development and women's empowerment. Given the key role women play in agriculture and nutrition, there is an important series of lessons for future directions in pro-nutrition value chain development. It shows that building local pro-nutrition value chains from a rudimentary baseline to address domestic demand, in markets penetrated by imports from neighbouring countries, involves overcoming significant constraints. The author finds that foundations exist to adopt an explicit pro-nutrition focus to future dairy value chain development, but effectiveness will depend in the first instance on further public-NGO partnerships, with the longer-term aim of demonstrating to private sector value chain entrepreneurs the attractiveness of the business proposition.

Kabir *et al.* (this *IDS Bulletin*) present the findings from an exploration of milk consumption in Bangladesh, showing a clear difference amongst consumer groups. Echoing to some extent the dairy sector in Afghanistan, high rates of consumption by rural milk producers of milk from their own production were found, while only 20 per cent of rural non-producers and 23 per cent of urban non-producers consume milk regularly. This shows that market linkages between agriculture and nutrition are often weak, and information and incentives must focus on consumers themselves and the different value chains through which consumers access their food for them to be effective. Similarly, there are lessons for the development of small-scale private intermediary enterprises within strengthened value chains.

7 Changes within the value chain: interface between supply and demand

All the articles, in one way or another, discuss the interface between supply and demand, either through innovations across the chain or in the private and public models used to distribute food. Ansari *et al.* (wheat and dairy, this *IDS Bulletin*) show in both their cases the risk of promoting innovations in specific value chains without including nutrition as a specific goal, and of ignoring the markets that often deliver food to poor populations. There are other ways of improving the chain, for example with cold storage or improving storage and transportation, not discussed in this *IDS Bulletin*. Janoch *et al.* (this *IDS Bulletin*) close the issue, arguing that any value chain approach should always be combined with a strong gender focus and a risk assessment. Both aspects are key throughout the entire value chain, including the interface of the supply and demand.

The articles and the online discussions held show that there is a gap between the understanding of the incentives and capacities that the informal sector and SMEs can have to strengthen the system, and how governments can engage with them more effectively.

8 Conclusion

This set of articles, together, allows us to compare the different pathways and warn against the assumption that increasing the supply of certain products will directly lead to increased consumption. It highlights how, in South Asia, interventions or policies that try to enhance these pathways often struggle because of a mix of supply, distribution, marketing, and consumption challenges. In other words, agri-food value chain interventions must address the needs of businesses (of all types and sizes) to develop sustainable models, while also contributing to improved diets. This process often involves trade-offs. For example, strategies such as developing new distribution systems, good quality packaging, or brand development will raise costs, undermining the fundamental requirement that poor and nutritionally vulnerable populations can buy the products. Public distribution systems may overcome some of these challenges while facing sustainability and dependency issues.

The articles also explore the potential of looking at the value chain to understand the roles and limitations that public and private actors have in better delivering healthy diets. Efforts to overcome these interrelated challenges may require focus on all aspects of the product, consumer behaviour, and actions along the length of the value chain, as well as the systems in which they operate. Failing to do so will result in a clash between the efficacy of certain foods to target malnutrition and the effectiveness of their use in practice. Many products and approaches have been demonstrated to reduce undernutrition, but ensuring that high-quality food products are eaten voluntarily on a sustained basis is evidently more complex.

Demand dynamics are critical, as is the need to move beyond consumer awareness into food preferences, time availability, and food suppliers. On this, there remain some important research gaps, such as understanding the gendered aspects of access to food (mobility, time availability, or agency amongst others), household decision-making, and food utilisation (around food expenditure, types of foods purchased, or who gets to eat it). To successfully engage with the private sector, policymakers, practitioners, and others should aim to understand the different consumer-related barriers to food choice and access to nutrient-dense foods (lack of availability, affordability, acceptability, or poor quality of the produce), as often consumers know the nutritional benefits of certain products but this awareness in itself is insufficient: products may be too expensive, not available during certain periods, or too complicated to prepare.

This *IDS Bulletin* points to the need for a stronger government role in shaping these agri-food value chain pathways so that they can achieve public health objectives by delivering better nutrient-rich foods to vulnerable groups. Perhaps the key to sustainable food systems is a ‘food sovereignty’ approach, and sub-national decentralised planning, management, and procurement. This calls for awareness at all levels of

decision-making within the different actors – public, private and civil society – for the promotion of nutrition-sensitive agri-food value chains. There is not one solution, but there is space for policymakers and practitioners to set nutrition as a priority and use this framework and these recommendations as a starting point. By looking at the limits of what business can and cannot achieve in a given market environment, this *IDS Bulletin* provides insights to policymakers about how to create an appropriate institutional environment that shapes how these value chains operate for the benefit of nutritionally vulnerable target groups.

References

- Allen, S. and de Brauw, A. (2017) 'Nutrition Sensitive Value Chains: Theory, Progress, and Open Questions', *Global Food Security* (advance online publication), <https://doi.org/10.1016/j.gfs.2017.07.002> (accessed 8 November 2017)
- Balagamwala, M. and Gazdar, H. (2013) 'Agriculture and Nutrition in Pakistan: Pathways and Disconnects', *IDS Bulletin* 4.3: 66–74, <http://bulletin.ids.ac.uk/idsbo/article/view/236> (accessed 8 November 2017)
- Berti, P.R.; Krasevec, J. and FitzGerald, S. (2004) 'A Review of the Effectiveness of Agriculture Interventions in Improving Nutrition Outcomes', *Public Health Nutrition* 7.5: 599–609
- CFS (Committee on World Food Security) (2009) *Report of the 35th Session of the Committee on World Food Security*, Rome: Food and Agriculture Organization of the United Nations (FAO)
- de Brauw, A.; Gelli, A. and Allen, S. (2015) *Identifying Opportunities for Nutrition-Sensitive Value-Chain Interventions*, IFPRI Research Brief 21, Washington DC: International Food Policy Research Institute
- Demmler, K.M.; Klasen, S.; Nzuma, J.M. and Qaim, M. (2017) 'Supermarket Purchase Contributes to Nutrition-Related Non-Communicable Diseases in Urban Kenya', *PLoS ONE* 12.9: e0185148
- Dubé, L.; Pingali, P. and Webb, P. (2012) 'Paths of Convergence for Agriculture, Health, and Wealth', *Proceedings of the National Academy of Sciences of the United States of America* 109.31: 12294–301, doi:10.1073/pnas.0912951109 (accessed 8 December 2017)
- Ecker, O.; Breisinger, C. and Pauw, K. (2012) 'Growth is Good, but is Not Enough to Improve Nutrition', in S. Fan and R. Pandya-Lorch (eds), *Reshaping Agriculture for Nutrition and Health: An IFPRI 2020 Book*, Washington DC: International Food Policy Research Institute
- FAO (2017) *The State of Food Security and Nutrition in the World 2017: Building Resilience for Peace and Food Security*, Rome: Food and Agriculture Organization of the United Nations
- FAO (2008) *An Introduction to the Basic Concepts of Food Security*, Food Security Information for Action: Practical Guides, EC–FAO Food Security Programme, Food and Agriculture Organization of the United Nations, www.fao.org/docrep/013/al936e/al936e00.pdf (accessed 8 December 2017)
- Gazdar, H. and Zuberi, S. (2016) *Review of Agri-Food Value Chain Interventions Aimed at Enhancing Consumption of Nutritious Food by the Poor: Pakistan*, LANSAs Working Paper 7, Brighton: Leveraging Agriculture

- for Nutrition in South Asia (LANSA), www.researchcollective.org/Documents/LANSA_Working_Paper_Value_Chains_Pak.pdf (accessed 8 October 2017)
- Gelli, A. *et al.* (2015) *Value Chains and Nutrition: A Framework to Support the Identification, Design, and Evaluation of Interventions*, IFPRI Discussion Paper 01413, Washington DC: International Food Policy Research Institute, http://a4nh.cgiar.org/files/2012/07/Value_chains_and_nutrition_A_framework_to_support_the_identification_design_and_evaluation_of_interventions.pdf (accessed 13 December 2017)
- Gillespie, S. and van den Bold, M. (2017) 'Agriculture, Food Systems, and Nutrition: Meeting the Challenge', *Global Challenges* 1.3, doi:10.1002/gch2.201600002 (accessed 8 December 2017)
- Gillespie, S.; Harris, J. and Kadiyala, S. (2012) *The Agriculture–Nutrition Disconnect in India: What Do We Know?* IFPRI Discussion Paper 01187, Washington DC: International Food Policy Research Institute
- Girard, A.W.; Self, J.L.; McAuliffe, C. and Olude, O. (2012) 'The Effects of Household Food Production Strategies on the Health and Nutrition Outcomes of Women and Young Children: A Systematic Review', *Paediatric and Perinatal Epidemiology* 26.S1: 205–22, doi:10.1111/j.1365-3016.2012.01282.x (accessed 8 December 2017)
- Global Panel on Agriculture and Food Systems for Nutrition (2016) *Food Systems and Diets: Facing the Challenges of the 21st Century*, London: Global Panel on Agriculture and Food Systems for Nutrition
- Hawkes, C. and Ruel, M.T. (2011) 'Value Chains for Nutrition', Paper 4 prepared for the IFPRI 2020 International Conference 'Leveraging Agriculture for Improving Nutrition and Health', 10–12 February, New Delhi, India, www.fao.org/fsnforum/sites/default/files/discussions/contributions/Value-Chains-for-Nutrition.pdf (accessed 17 December 2017)
- Hawkes, C.; Turner, R. and Waage, J. (2012) *Current and Planned Research on Agriculture for Improved Nutrition: A Mapping and a Gap Analysis*, Report for DFID, London and Aberdeen: Leverhulme Centre for Integrative Research on Agriculture and Health and Centre for Sustainable International Development, http://r4d.dfid.gov.uk/pdf/outputs/misc_susag/lcirah_mapping_and_gap_analysis_21aug12.pdf (accessed 13 December 2017)
- Headey, D. (2012) 'Turning Economic Growth into Nutrition-Sensitive Growth', *2020 Conference Brief* 6, Washington DC: International Food Policy Research Institute, www.ifpri.org/publication/turning-economic-growth-nutrition-sensitive-growth-1 (accessed 13 December 2017)
- Herforth, A. (2013) *Synthesis of Guiding Principles on Agriculture Programming for Nutrition*, Rome: Food and Agriculture Organization of the United Nations (FAO)
- Herforth, A. and Harris, J. (2014) *Understanding and Applying Primary Pathways and Principles*, Arlington VA: USAID/Strengthening Partnerships, Results, and Innovations in Nutrition Globally (SPRING) Project
- Hoddinott, J. (2013) 'The Economic Cost of Malnutrition', in M. Eggersdorfer *et al.* (eds), *The Road to Good Nutrition: A Global Perspective*, Basel: Karger

- Hoddinott, J.; Gillespie, S. and Yosef, S. (2015) *Public-Private Partnerships and the Reduction of Undernutrition in Developing Countries*, IFPRI Discussion Paper 01487, Washington DC: International Food Policy Research Institute
- Humphrey, J. and Robinson, E. (2015) 'Markets for Nutrition: What Role for Business?', *IDS Bulletin* 46.3: 59–69, <http://bulletin.ids.ac.uk/idsbo/article/view/101> (accessed 20 November 2017)
- Humphrey, J. and Zuberi, S. (2015) 'Markets for Nutrition', *LANSAPolicy Brief 2*, Brighton: Leveraging Agriculture for Nutrition in South Asia, <https://opendocs.ids.ac.uk/opendocs/handle/123456789/12157> (accessed 8 October 2017)
- IFAD (2017) 'UN Agency IFAD and Mars Incorporated Commit to Working Together to Improve the Livelihoods of Smallholder Farmers in Developing Countries', International Fund for Agricultural Development, press release, 18 September, www.ifad.org/newsroom/press_release/tags/p53/y2017/47401925 (accessed 8 October 2017)
- Kanter, R.; Wall, H.L.; Tak, M.; Roberts, F. and Waage, J. (2015) 'A Conceptual Framework for Understanding the Impacts of Agriculture and Food System Policies on Nutrition and Health', *Food Security* 7.4: 767–77, doi:10.1007/s12571-015-0473-6 (accessed 8 December 2017)
- Kleinert, S. and Horton, R. (2015) 'Rethinking and Reframing Obesity', *The Lancet* 385.9985: 2326–28
- Maestre, M.; Poole, N. and Henson, S. (2017) 'Assessing Food Value Chain Pathways, Linkages and Impacts for Better Nutrition of Vulnerable Groups', *Food Policy* 68: 31–39, doi:10.1016/j.foodpol.2016.12.007 (accessed 8 December 2017)
- Maestre, M.; Robinson, E.; Humphrey, J. and Henson, S. (2014) *The Role of Businesses in Providing Nutrient-Rich Foods for the Poor: A Case Study in Tanzania*, IDS Evidence Report 52, Brighton: IDS
- Masset, E.; Haddad, L.; Cornelius, A. and Isaza-Castro, J. (2012) 'Effectiveness of Agricultural Interventions that Aim to Improve Nutritional Status of Children: Systematic Review', *BMJ* 344: d8222, doi:10.1136/BMJ.D8222 (accessed 8 December 2017)
- Nelson, P. (1970) 'Information and Consumer Behavior', *Journal of Political Economy* 78.2: 311–29
- Pandey, V.L.; Mahendra Dev, S. and Jayachandran, U. (2016) 'Impact of Agricultural Interventions on the Nutritional Status in South Asia: A Review', *Food Policy* 62: 28–40, doi:10.1016/j.foodpol.2016.05.002 (accessed 8 December 2017)
- Parasar, R. and Bhavani, R.V. (2016) *Review of Agri-Food Value Chain Interventions Aimed at Enhancing Consumption of Nutritious Food by the Poor: India*, LANSAPolicy Working Paper 8, Brighton: Leveraging Agriculture for Nutrition in South Asia (LANSAPolicy), https://assets.publishing.service.gov.uk/media/596398f1e5274a0a59000159/India_Value_chain_country_review_Final_5.pdf (accessed 8 October 2017)

- Poole, N. (2017) *Smallholder Agriculture and Market Participation*, Rugby, UK and Rome: Practical Action and Food and Agriculture Organization of the United Nations (FAO)
- Poole, N. (2013) 'Value Chain Perspectives and Literature: A Review', *Food Chain* 3.3: 199–215, doi:10.3362/2046-1887.2013.019 (accessed 8 December 2017)
- Poole, N.; Echavez, C. and Rowland, D. (2016) *Stakeholder Perceptions of Agriculture and Nutrition Policies and Practice: Evidence from Afghanistan*, LANSAs Working Paper 9, Chennai, India: Leveraging Agriculture for Nutrition in South Asia (LANSAs), MS Swaminathan Research Foundation
- Popkin, B.M. (2014) 'Nutrition, Agriculture and the Global Food System in Low and Middle Income Countries', *Food Policy* 47: 91–96, doi:10.1016/j.foodpol.2014.05.001 (accessed 8 December 2017)
- Popkin, B.M. (1998) 'Urbanization and the Nutrition Transition', *Health* 1: 5–21
- Popkin, B.M.; Adair, L.S. and Ng, S.W. (2012) 'Global Nutrition Transition and the Pandemic of Obesity in Developing Countries', *Nutrition Reviews* 70.1: 3–21, doi:10.1111/j.1753-4887.2011.00456.x (accessed 8 December 2017)
- Porter, M.E. (1985) *Competitive Advantage: Creating and Sustaining Superior Performance*, New York NY: Macmillan
- Rao, N.; Motukuri, B. and Bhavani, R.V. (2017) 'Gender, Agriculture, and Nutrition in South Asia: Conceptualising the Links', *LANSAs Research Brief* 7, https://opendocs.ids.ac.uk/opendocs/bitstream/handle/123456789/13419/LANSAs_Gender_Agriculture_Nutrition_Conceptualising.pdf?sequence=1&isAllowed=y (accessed 17 December 2017)
- Reardon, T. *et al.* (2015) 'Transformation of African Agrifood Systems in the New Era of Rapid Urbanization and the Emergence of a Middle Class', in O. Badiane and T. Makombe (eds), *Beyond a Middle Income Africa: Transforming African Economies for Sustained Growth with Rising Employment and Incomes*, ReSAKSS Annual Trends and Outlook Report 2014, Washington DC: International Food Policy Research Institute
- Ruel, M.T. and Alderman, H. (2013) 'Nutrition-Sensitive Interventions and Programmes: How Can They Help to Accelerate Progress in Improving Maternal and Child Nutrition?', *The Lancet* 382.9891, doi:10.1016/S0140-6736(13)60843-0 (accessed 8 December 2017)
- Save the Children (2013) *Superfood for Babies: How Overcoming Barriers to Breastfeeding Will Save Children's Lives*, London: Save the Children, www.savethechildren.org.uk/sites/default/files/images/Superfood_for_Babies_UK_version.pdf (accessed 8 October 2017)
- Sirajul Islam, M. *et al.* (2017) *Review of Agri-Food Chain Interventions Aimed at Enhancing Consumption of Nutritious Food by the Poor: Bangladesh*, LANSAs Working Paper 12, Leveraging Agriculture for Nutrition in South Asia (LANSAs), https://assets.publishing.service.gov.uk/media/59647f3c40f0b60a44000152/Review_of_agri_food_Bangladesh_final.pdf (accessed 8 October 2017)

- Thorpe, J. and Reed, P. (2016) *Addressing Market Constraints to Providing Nutrient-Rich Foods: An Exploration of Market Systems Approaches*, IDS Evidence Report 172, Brighton: IDS
- Thorpe, J. and Wach, E. (2015) 'Introduction: Changing Perspectives in Business and Development', *IDS Bulletin* 46.3: 1–6, <http://bulletin.ids.ac.uk/idsbo/article/view/96> (accessed 20 November 2017)
- Trail, W.B.; Mazzocchi, M.; Shankar, B. and Hallam, D. (2014) 'Importance of Government Policies and Other Influences in Transforming Global Diets', *Nutrition Reviews* 72.9: 591–604
- Unilever plc (2017) *Inclusive Business*, London/Rotterdam: Unilever plc/Unilever NV, www.unilever.com/sustainable-living/enhancing-livelihoods/inclusive-business/index.html (accessed 18 December 2017)
- Webb, P. (2013) *Impact Pathways from Agricultural Research to Improved Nutrition and Health: Literature Analysis and Research Priorities*, Rome and Geneva: Food and Agriculture Organization of the United Nations (FAO) and World Health Organization (WHO)
- Webb, P. and Kennedy, J. (2014) 'Impacts of Agriculture on Nutrition: Nature of the Evidence and Research Gaps', *Food and Nutrition Bulletin* 35.1: 126–32
- Wüstefeld, M. (2013) 'Food and Nutrition Security', paper presented at the UNSCN Meeting of the Minds, Nutrition Impact of Food Systems, Geneva, 25 – 28 March, Standing Committee on Nutrition, www.unscn.org/files/Annual_Sessions/UNSCN_Meetings_2013/Wustefeld_Final_MoM_FNS_concept.pdf (accessed 13 December 2017)

Private Business-Driven Value Chains and Nutrition: Insights from India^{*†}

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Abstract Despite rapid economic growth, undernutrition rates in South Asia remain among the highest in the world. It is also seen that both rural and urban populations in developing countries are increasingly dependent on markets for food. This makes examining the potential of different agri-food models to deliver nutritious foods relevant. This article examines the value chains of two fortified foods manufactured by private sector business in India using the conceptual framework in Maestre, Poole and Henson (2017), to understand their potential to reach economically poor households. We find that both value chains have potential but are unsuccessful in reaching nutritionally vulnerable populations. In both cases, a favourable institutional environment can enable them to have a pro-nutrition and pro-poor focus. A proactive state role and regulation are called for to provide the necessary institutional environment to ensure that private business-led value chains focus on enhanced intake of nutritious food by low-income households.

Keywords: value chains, pro-nutrition, private sector, markets, fortification, institutional environment, regulation.

1 Introduction

South Asia is one of the hotspots of undernutrition, housing about 35 per cent of the world's undernourished population (FAO, IFAD and WFP 2015). The region also suffers from the triple burden of malnutrition, i.e. high prevalence of undernutrition and micronutrient deficiency, and increasing prevalence of obesity (Gómez *et al.* 2013; Popkin, Adair and Ng 2012). The trend is also observable in India, with 36 per cent of children under five years of age underweight, 58 per cent anaemic, 23 per cent of women (15–49 years) underweight, 21 per cent obese, and 53 per cent anaemic (GoI 2017).

All key actors have a role to play to address this problem: the state, private business, and civil society. Further, large populations in both rural and urban areas of developing countries are seen to be increasingly



Table 1 Packaged processed food in India

	% of population spending on packaged processed food		Share of packaged processed food in total food expenditure (%)	
	Urban	Rural	Urban	Rural
All	86.3	80.3	5.4	4.0
Lowest MPCE class	76.4	67.0	3.0	2.8
Highest MPCE class	90.9	81.4	7.2	5.1

Source NSSO (2014).

dependent on markets for food (Reardon 2015; Maestre *et al.* 2017). In India, about 86 per cent of urban and 80 per cent of rural consumers buy packaged processed food. A large majority of the population, including those in the lowest monthly per capita consumer expenditure (MPCE) class, access packaged processed food. Access to packaged processed foods increases with rising incomes and urbanisation. Expenditure on processed foods by an average urban consumer was double that of a rural consumer (NSSO 2014) (see Table 1).

Assessing the effectiveness of post-farmgate agri-food value chains and the role of private sector business in making nutritious food available particularly to poor and nutritionally vulnerable households becomes important in this context. Diets in lower income groups are generally dominated by cereals and lack dietary diversity (Nithya and Bhavani 2016). Location of population is one of the factors to take into account. Urban areas tend to have better markets and infrastructure than rural areas, sometimes facilitating better access to nutritious food. Regionally isolated communities such as indigenous tribal groups may face the problem of access to diverse food round the year, in addition to affordability due to poverty; for instance, in India, about 45 per cent of tribal children <5 years of age are underweight against the national average of 35 per cent for all children (GoI 2017).

The private sector, both traditional (e.g. local retail shops) and modern (e.g. supermarkets) has been gaining importance in deciding India's food security (Reardon and Minten 2011). For the food industry, rural and low-income populations represent a big market: '*companies are looking to the base of the pyramid – i.e. to the poorest socioeconomic groups – to expand market share*' Gillespie *et al.* (2013: 558). Traditional food value chains facilitate access to foods rich in micronutrients for urban low-income people and for the majority of rural people (Gómez and Ricketts 2013). However, Gelli *et al.* (2015) argue that low levels of nutrition awareness, poor signalling mechanisms, and restricted/expensive distribution outlets, limit the ability of the private sector to respond

with nutrient-dense products for mass consumption. Also, easy access to packaged foods high in sugar content is triggering an unhealthy nutrition transition, leading to the problem of obesity (Relton, Strong and Holdsworth 2012; Rodrigues *et al.* 2017). For companies to be able to produce and distribute diverse and healthy products, embedding nutrition in their core business strategy emerges as a key requirement (ATNI 2016a).

Fortification of food through biofortification and industrial fortification is one of the pathways to address malnutrition caused by micronutrient deficiency (Bouis and Saltzman 2017; Gelli *et al.* 2015; Maestre *et al.* 2017); it is a means for the food industry to have a nutrition focus. Fortified food products can be segregated broadly into foods that are widely consumed by the general population (*mass fortification*), foods designed for specific population subgroups (*targeted fortification*), and voluntary fortification by manufacturers of food products (*market-driven fortification*) (Lindsay *et al.* 2006).

This article examines agri-food value chains of two fortified food products in India, with the objective of understanding their potential to reach economically poor households (Parasar and Bhavani RV forthcoming 2018a, 2018b). These are, iron-fortified Tiger biscuits manufactured by Britannia Industries Ltd (BIL) and Amulspray, a dairy-based product manufactured by Gujarat Cooperative Milk Marketing Federation Ltd (GCMMF). The potential and limits for private sector business to have a nutrition focus and reach poor households are examined using the framework developed by Maestre *et al.* (2017). The framework is purposefully designed to assess individual value chains and does not take into account issues of dietary diversity. It is a good starting point to assess products that are nutrient-dense and have no adverse impact on health. The aim of this article is to assess the value chain strategies followed by the two companies and understand what is required for private business to have a nutrition focus.

Section 2 describes the methodology, followed by separate sections on the business organisation and value chain of the two products and a discussion around each in terms of consumer and producer requirements. This is followed by a discussion combining aspects of the two value chains. The concluding section summarises the findings and makes recommendations targeted at practitioners and policymakers.

2 Methods

A desk review and interviews were the approaches followed for the collection of information on the two value chains. In the case of Amulspray, qualitative and quantitative assessment surveys were also undertaken.

The study commenced with a desk review to collect information from secondary sources of information, viz. published reports and the official websites of the two companies manufacturing the products. This was

followed by interviews with key informants. For Tiger biscuits, we had a Skype interview with Vinita Bali, former CEO of BIL and a phone interview with a company official. Unfortunately, in spite of repeated attempts, it was not possible to meet any of the officials in person. Published papers based on efficacy trials of the iron-fortified biscuits were also reviewed.

In GCMME, we interviewed the managing director and deputy general manager (marketing) at their corporate head office in Anand, Gujarat. After analysing secondary data and discussing with GCMME's executives, we identified eastern India as a potential region for fieldwork since the region was indicated to be deficient in milk production, making it an important market for Amulspray. The state of Odisha in east India was purposefully selected for primary-level qualitative assessment and subsequently quantitative survey, to assess the reach of Amulspray to poor households, and to understand the enablers and constraints from a household perspective. The first exercise was undertaken in Bhubaneswar (the state capital), the neighbouring city of Cuttack, and surrounding rural and peri-urban areas; actors along the value chain (distributors (1), wholesalers (2), retailers (10) and consumers (17)) were interviewed. This was followed by a quantitative survey of 400 households across the three districts. The sampling details are discussed in Section 4.3.

The information collected was analysed using the framework discussed in Maestre *et al.* (2017) on how the two value chains reach the three desired outcomes (food safety, food being nutrient-dense at point of consumption, and food being consumed in adequate amounts on a sustained basis); and the different requirements from consumer and supplier perspectives.

3 Tiger biscuits

3.1 BIL and the biscuit industry

BIL is a reputable company in the Indian food industry. Incorporated in the late nineteenth century, the company went public in 1978 and today manufactures a wide range of products including biscuits, breads, cakes, and dairy-related products. These are targeted at all consumer segments – premium, mid-range, and mass. BIL had a turnover of US\$1.3bn in 2015–16.¹ According to media reports,² it served 1.4 million outlets directly and 4.5 million outlets through wholesale distribution. Around 55 per cent of its products are fortified (DFID 2011) and all products are trans-fat-free.

Biscuits are of different types and are manufactured by a range of producers, from large companies to small bakeries in the informal sector. BIL and Parle Products Pvt. Ltd, both local Indian companies, are among the two large players in the biscuit industry, followed by companies such as ITC Foods, Priya, Anmol, and Horlicks.³ Biscuits are a popular packaged food at the bottom of the pyramid (BoP); about 35 per cent of the biscuits produced were reported to be consumed by income groups earning less than US\$25 a month (Jarvis and

Magarinos 2008). Tiger biscuits are categorised as *glucose biscuits*; they are affordably packaged and priced and targeted at the BoP, while other product categories such as cookies and *cream biscuits* are targeted at middle-income or premium segments of the market. Furthermore, biscuits can be fortified economically, making them a nutritious product with which to target poor households. As mentioned previously, iron-fortified Tiger biscuits are the product of BIL being studied. Although a glucose biscuit, the choice was determined by it being a micronutrient-enriched zero trans-fat product that can address micronutrient deficiency.

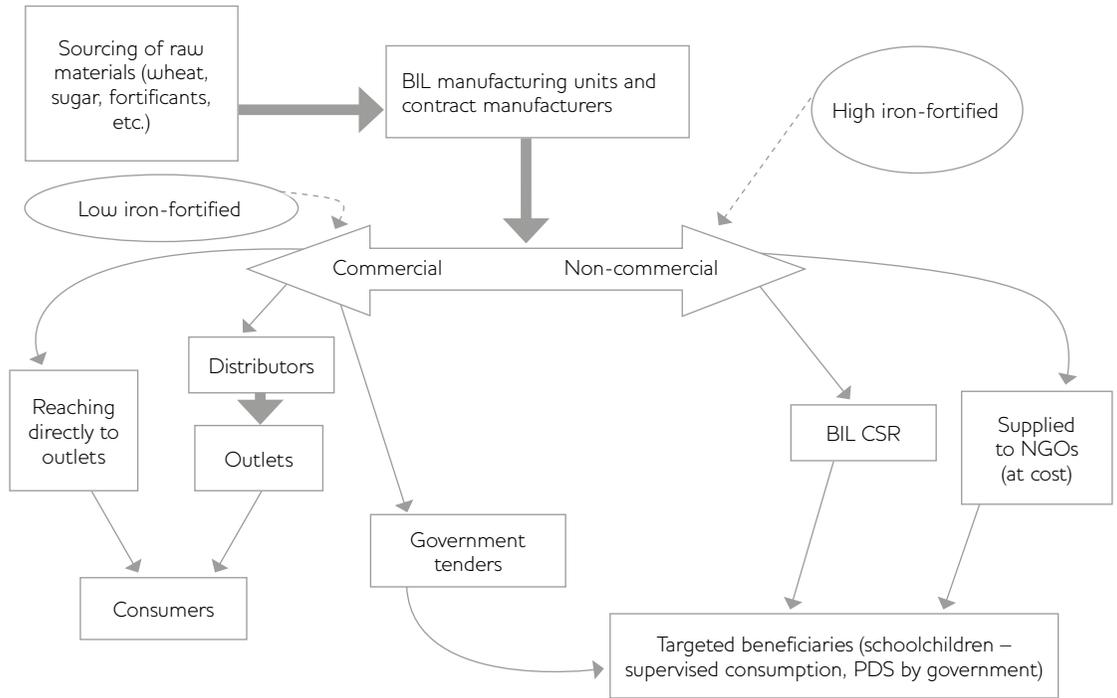
3.2 Iron-fortified Tiger biscuits

In the early 2000s, BIL began manufacturing iron-fortified biscuits for the UN World Food Programme under a corporate social responsibility (CSR) initiative. The fortification idea was taken forward to the commercial line of production by CEO Vinita Bali, who was at the helm from 2009–14. BIL came up with tag lines such as ‘*Swasth Khao, Tan-Mann Jagao*’, meaning: ‘Eat Healthy, Awaken your Body and Mind’ (Parasar and Bhavani RV forthcoming, 2018a).

The company’s decision to add micronutrients to their products came from the recognition that for poor households ‘cereal-based biscuits were a cheap source of calories that could also be nutritionally beneficial’ (Jonathan 2014). In 2007, the company developed two variants of Tiger biscuits – high iron-fortified (5mg of elemental iron per biscuit) and low iron-fortified (0.3mg of elemental iron per biscuit). The high iron-fortified biscuit, a product developed together with the Global Alliance for Improved Nutrition (GAIN), was distributed with midday meals (MDMs) in schools in Hyderabad City. The programme operated as a pilot public–private–non-governmental organisation (NGO) partnership model, with the government of Andhra Pradesh State, BIL, and Naandi Foundation, targeting children for supervised consumption of the fortified biscuits (Bhagwat *et al.* 2014). There were also pilots led by other NGOs. The low iron-fortified biscuits were sold directly in the market through regular commercial channels (*market-driven fortification*). The additional cost of fortification was reportedly minimal at INR0.06 per kg (Jarvis and Magarinos 2008). This was absorbed by the company with no increment in market price of the biscuit.

In 2014–15, following review and reformulation of its products by the company as a part of regular company practice, BIL stopped producing the high iron-fortified variant. The company website now shows three different kinds of Tiger biscuits – Glucose, Butter Krunch (two flavours), and Kreemz (two flavours). Tiger Glucose, it says, is ‘fortified with 25 per cent of daily growth nutrients like iron, calcium and vitamins’; no nutritional information is provided for the other two variants of Tiger biscuit.⁴ The official interviewed had indicated that with changes in focus and marketing strategies, the company may not necessarily promote them as micronutrient-rich/health biscuits. As a practice, all companies in a highly competitive sector such as food products would reformulate, re-strategise, and promote products on a regular basis to

Figure 1 Illustration of BIL's iron-fortified Tiger biscuits distribution chain



Source Authors' own, based on qualitative assessment.

retain their consumer segment, attract new segments, and maintain visibility. In her interview, Bali had also indicated this. The focus of such an exercise would be decided by market trends and the management's priorities. It seems the company is focusing more now on 'disruptive innovation' and higher penetration in the rural market segment.⁵

3.3 Value chain

BIL has its own manufacturing facility and also sources an equal share from contract manufacturers. It has two distribution channels, one reaching outlets directly and the other through a distributor network. BIL has also participated in government tenders for distribution of biscuits under state-mandated food distribution programmes such as the Public Distribution System (PDS). The low iron-fortified biscuit was sold through this channel; the high iron-fortified biscuits manufactured for supervised consumption by children in government schools was supplied through NGOs at cost of production for distribution under a public-private-NGO partnership model – see Figure 1.

Efficacy trials confirmed the positive effects of consumption of both variants of Tiger biscuits: an efficacy trial on the consumption of the high iron-fortified variant reported increments in blood haemoglobin levels (Maharaj, Passi and Aeri 2014). Another study on the efficacy of consumption of low and high iron-fortified biscuits in rural areas of

Karnataka State concluded that both variants significantly increased body weight and haemoglobin levels in schoolgoing children (Bal *et al.* 2014). At the time of this study, the supervised consumption value chain under the public–private partnership (PPP) model was on hold; the company official contacted could not say whether it would be resumed.

3.4 Discussion

Tiger brand biscuits is a potential vehicle for increasing intake of micronutrients. Efficacy trials substantiated the positive impact of intake of the iron-fortified product on reduced levels of anaemia. The biscuits are manufactured for the mass consumer segment and sold at an affordable price with limited margins in large volumes (Hills *et al.* 2012). A study of the distribution of high iron-fortified biscuits as an ‘add on’ to the hot cooked food provided as MDMs highlighted the importance of *targeted fortification* of food to enhance micronutrient intake by schoolgoing children. According to the same study, other options such as supplementation of micronutrients through capsules face challenges of compliance and coverage (Bhagwat *et al.* 2014); by joining up with a state-led food distribution programme, they also have the potential to target nutritional intake to vulnerable households (as shown in Bhavani RV and Parasar, this *IDS Bulletin*).

Following the conceptual framework outlined in Maestre *et al.* (2017), when looking at the three outcomes for the nutrient-dense product to be successful, one finds that as a standardised packaged food product, it fulfils the first two outcomes of being safe and nutrient-dense at the point of consumption. Adequacy of consumption is assured under the *targeted fortification* approach but not under *market-driven fortification*. Further, examining the five consumer requirements of *availability*, *affordability*, *awareness*, *signalling*, and *acceptability*, one finds that the first two are satisfied with the product being available in affordable packets at a multitude of outlets, and reaching the mass consumer segment. Nutrition awareness and signalling are achieved under the *targeted fortification* approach but not guaranteed under *market-driven fortification*.

The *targeted fortification* ensures the quantity of intake and protects the consumer/beneficiaries from overdose. However, unsupervised consumption under a market-driven value chain cannot ensure the adequacy of consumption and may also risk overdose by the consumer. It is important to fix a lower level of fortification of food in such arrangements, as seen in the case of Tiger biscuits. *Acceptability* in terms of taste is a determining factor; the formulation of the product was done in consultation with the National Institute of Nutrition, Hyderabad, and several rounds of trials/testing were undertaken before it was launched.

Maestre *et al.* (2017) also outline five supply-side requirements, viz. ‘capturing value’, ‘distribution of incentives along the value chain’, ‘coordination and governance’, ‘managing costs, risk and uncertainty’, and ‘appropriate institutional environment’. BIL’s officials were not accessible in order to discuss current business strategy; therefore, it is

not possible to comment on the company's supply-side requirements. The limited information base of BIL is a constraint that could not be overcome. Nevertheless, the production of fortified biscuits seemed sustainable, as indicated by Bali during the Skype interview. An article reported that in fortifying its biscuits, BIL saw 'the fulfilment of two of its goals – tackling nutrition issues in the country and building a sustainable business model'.⁶

For the low iron-fortified biscuit, the cost to the company was minimal, as stated previously, indicating operational feasibility of the initiative. This was backed by strong commitment from the top management. Bali mentioned during the Skype interview that addressing malnutrition should not be CSR as mandated by the Companies Act but the '*corporate responsibility*' of the food industry.

Recent reports as mentioned previously indicate a change in BIL's positioning of the Tiger brand biscuits and that it will be the vehicle for BIL's thrust on rural markets (Law 2016). This may be a consequence of shareholders/promoters' perception that a loss of market share is due to the focus on nutrition and related marketing strategies (Shashidhar 2015). A supportive institutional environment supporting fortification to address malnutrition may perhaps have helped continue the thrust.

4 Amulspray

4.1 The business organisation

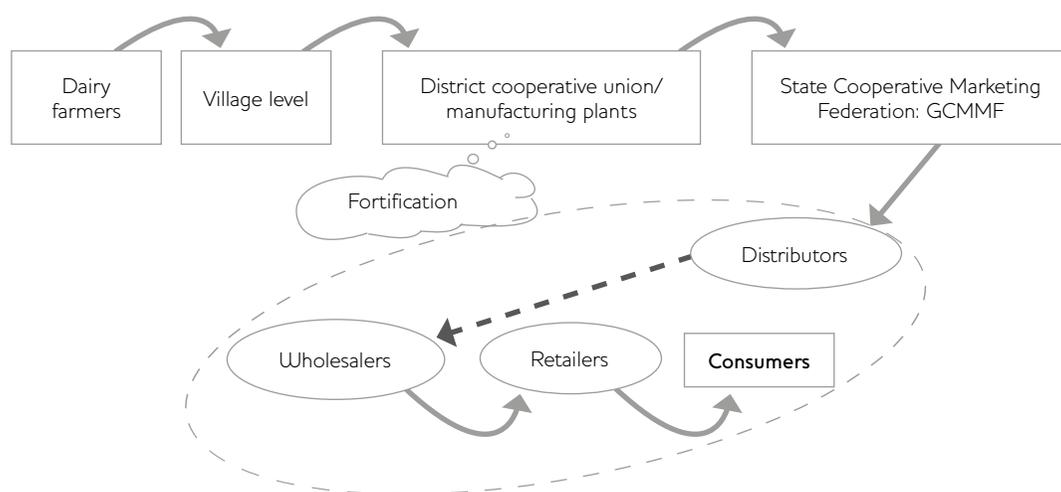
Amul is an established brand in the Indian dairy industry, selling a range of dairy products manufactured and marketed by GCMMF, a federation of dairy cooperatives, with 6.8 million producer members and a turnover of US\$4.1bn.⁷ GCMMF has state-of-the-art manufacturing facilities and is one of the first dairy companies in India to get ISO 2200:2005 and ISO 9001 certification. Besides liquid milk, the company manufactures a range of milk products – dairy whitener, infant food, butter, cheese, ghee, and ice cream.

4.2 Amulspray

Amulspray is an 'infant milk substitute' formulated using World Health Organization (WHO) guidelines. In the 1950s, GCMMF forayed into a market with a prominent presence of multinational brands such as Glaxo Baby Food. Amulspray is enriched with essential micronutrients – vitamins A, D, K, B group, C; and the minerals calcium, magnesium, phosphorus, iron, copper, manganese, and zinc, to supplement the recommended dietary intakes for children. Being a child and infant food, it does not contain any other edible component such as cereals. In the initial years, it was promoted as an ideal substitute for mothers' milk; this was criticised by NGOs and child health activists.

The company subsequently changed strategy and highlighted the importance of breastfeeding in its campaigns. In 1992, the Government of India banned all kinds of promotion and advertisements for infant foods. The Infant Milk Substitutes, Feeding Bottle and Infant Food Regulation of Production, Supply and Distribution Act (1992) and

Figure 2 Illustration of value chain for Amulspray



Source Authors' own, based on qualitative assessment.

Amendment Act (2003) – the IMS Act – prohibits any kind of promotion for foods intended to be consumed by children below two years of age.

All packets of Amulspray now state: 'Mother's milk is best for your baby'. The product is available in seven packages of different weights, ranging from 1,000g at INR357 (£4.1) to 13.5g at INR5 (6 pence), targeting different customer segments (Parasar and Bhavani RV forthcoming, 2018b).

4.3 Value chain

Small dairy farmer producers are at the base of the value chain of the product. The milk procured is used for manufacturing a diverse range of dairy products. Figure 2 illustrates the actors in the Amulspray distribution value chain – state-level head cooperative office, distributors, wholesalers, retailers, and consumers. Depending on the area, the distributor-wholesaler-retailer may be just one actor.

The smaller sachets of Amulspray are targeted at lower income groups. Amulspray is distributed in a fixed weekly pattern along with other Amul products to the value chain actors. The company's business strategy has always focused on 'value for many and value for money',⁸ enabling it to establish a wide market reach.

WWStore owners closer to rural areas said that about 10–30 per cent of households use Amulspray for feeding children. While other brands are also present in some of these areas, Amulspray is still used by a few households, especially in the lower income group.

There are people who add both Amulspray and other packaged child food together to feed the child. (Retailer catering to villages near Utara, Bhubaneswar)⁹

Table 2 Distribution of sample households by district

District	No.	%
Khurda	120	30
Koraput	137	34.3
Mayurbhanj	143	35.7

Source Authors' own, based on the Population Census (Gol 2011).

Table 3 Distribution of sample households by location

Location	No.	%
Urban	71	17.8
Rural	242	60.5
Tribal	87	21.7

Source Authors' own, based on the Population Census (Gol 2011).

Though the formulation was produced as a complementary feed for infants, it came to be consumed more by older children and as a dairy whitener by adults, as revealed during the course of interviews with different respondents; for example:

We use it at breakfast and for preparing tea... for various purposes, children, adults all of us have it. I have three children; the older two have Amulspray while the youngest has Lactogen. (Customer in Bhubaneswar, Odisha)¹⁰

The quantitative survey of 400 households was undertaken across three districts of Odisha, to assess the reach of Amulspray and understand the dietary pattern of children between six months and five years. One district each in central, north, and south Odisha were purposefully selected to produce a sample distribution that covered rural, urban, and tribal households. The proportion of population was based on the Census (GoI 2011) – see Table 2. The samples for tribal households were selected only from the tribal population-dominated districts of Mayurbhanj and Koraput; urban households were randomly selected from slums and identified low-income pockets in the districts (Table 3).

The survey revealed that about 21 per cent of the children are fed with Amulspray (Table 4).

The quantitative survey reaffirmed the findings of the qualitative assessment regarding the major uses of Amulspray. About 61 per cent of the population surveyed use Amulspray for tea, 16 per cent use it with breakfast cereal, 34 per cent use it for making desserts during feasts, and about 33 per cent do not use it at all (Table 5).

Table 4 Percentage of children (6 months–<5 years) consuming Amulspray

	Location			Total
	Urban	Rural	Tribal	
Yes	19.7	21.9	18.4	20.8
No	80.3	78.1	81.6	79.3
Total	100	100	100	100

Source Authors' own, primary survey (2016).

Table 5 Household share in different uses of Amulspray (%)

Uses of Amulspray	Location			Total
	Urban	Rural	Tribal	
Tea	64.8	63.2	50.6	60.8
Dessert	49.3	36.8	11.5	34.3
Breakfast cereal	16.9	20.2	10.3	16.8
Milk	11.3	6.6	3.4	6.8
Other	0	0	2.3	0.5
Not used	29.6	27.7	49.4	32.8

Source Authors' own, primary survey (2016).

Given the wide acceptance of the Amul brand, Amulspray is perceived as an essential product and often acts as an indicator of price level for consumers, to determine their purchase from a particular shop. Hence, Amulspray is also often sold at lower prices with very limited margins for the retailers, in order to attract customers.

Buyers usually enquire about prices of few products like Amulspray, sugar, and oil and then choose the shop to buy their monthly groceries. (Shopkeeper at Unit 4 Bazaar, Bhubaneswar)¹¹

4.4 Discussion

As in the case of the iron-fortified Tiger biscuits, Amulspray fulfils the desired outcomes of being safe and nutrient-dense at the point of consumption. But the third outcome, adequacy of consumption, cannot be ensured; in fact, the major finding was that it is used less as a children's food. In terms of consumer-side requirements, 'availability' and 'affordability' for poor people are ensured through convenient packaging and market outreach. Amulspray is the lowest priced children's food available in the market; for example, 400g of Nestlé's 'Nan' (an infant food) costs around £5.30, whereas 1,000g of Amulspray costs only £4.10.

Table 6 Consumer perception about the price of Amulspray

Price perception	Location			Total
	Urban	Rural	Tribal	
Cheap	36.5	26.4	22.7	27.5
Cost-effective	46	47.7	39.4	45.8
Expensive	15.9	21.8	34.8	23.2
Very expensive	1.6	4.2	3	3.5
Total	100	100	100	100

Source Authors' own, primary survey (2016).

No *awareness* and *signalling* initiatives are undertaken, given the prohibition on promotion of infant foods; this may be one of the reasons for the low usage as complementary food for children.

There is wide *acceptability* of the product, even though it is not being used by consumers for the purpose indicated. The qualitative survey revealed that people were aware of Amulspray being a food for children, though the uses have changed. Being a naturally nutrient-dense product from a reputable company, it has credibility and is also available in remote locations. However, with the prohibition on promotion of infant foods and an influx of other players in the market, Amulspray has lost its product perception and market share as a children's food. It was found during the qualitative assessment that other baby food brands follow covert promotion practices (e.g. having doctors/shopkeepers recommend them).

There are challenges in rebranding Amulspray to regain the perception that it is a food for children. Amul once tried a new product, Instant 1 and 2 for older children, but it did not take off in the absence of dedicated promotion/marketing teams that other children's food manufacturers have. However, the product *per se* does not have price competition in the market; only 2.7 per cent of surveyed households found it expensive or very expensive (Table 6).

Amulspray's use in the preparation of tea and desserts seem to be the main sales driver for the product. The quantitative survey also revealed that the regular consumption of milk by children aged between six months and two years is very limited.

In terms of the business requirements, *capturing value* is constrained by the ban on the promotion of infant foods. *Distribution of incentives* is under stress with value chain actors interviewed during the qualitative assessment expressing a decline in margins (Parasar and Bhavani RV forthcoming, 2018b). Every year, GCMMF tries to increase its sales; however, since the suppliers are small milk producer members of the dairy cooperative, there cannot be a reduction in the procurement price of milk; market saturation seems to be squeezing their margins.

A decline in the international price of skimmed milk powder¹² and an influx of liquid milk made from powder into the market has increased the competition for Amulspray, in the non-children's food segment, which is its main sales driver; this could become a challenge for sustainability if the trend continues.

The company has an established distribution network, and an extensive range of Amul products are distributed with regular periodicity. At the back end, raw milk is sourced from farmers who are long-term members of GCMME. This enables effective *coordination and governance* of the value chain; the wide range of Amul products provides a good incentive for the actors to engage with the value chain. It was found that retailers sell Amulspray at very low (even nil) margins to retain their customers. While this can work in the short term, it poses a challenge for the long term regarding sustainability of the value chain and availability of the product itself.

The study of Amulspray highlights how a cost-effective product for consumption targeted at low-income populations faces challenges in sustaining its credibility as a complementary food for children in the face of an influx of other competitors, in a scenario where none of them can legally promote their products. Neither availability nor affordability seem to be key influencing factors; even though other companies charge a higher price for their products, they are able to make them more desirable for consumers. Public policy can play an important role in creating an enabling *institutional environment* to overcome these constraints and *manage costs, risks, and uncertainty*; this will allow low-income consumers to benefit from the lower priced Amulspray. While poverty may be an important reason for not buying dairy products, there are other drivers (such as covert marketing and consumer awareness) which also influence consumer decisions. Given the ban on the promotion of infant foods, it should be difficult for new entrants to penetrate the market, but other brands have established their presence. Therefore, it is also important to examine the covert methods of market penetration discussed previously, which influence consumer decisions.¹³ The prohibition on the promotion of food for infants below two years is an important aspect of the *institutional environment* requirement on the supply side, determining the lack of promotion of the product.

5 Assessment of the two value chains

Amulspray presents an example of how a value chain can be helpful in increasing intake by poor consumers in a milk-deficient region, though not necessarily children: the cooperative supports the livelihoods of producer farmers as well. Amul can re-brand the product by manufacturing similar low-cost milk powder for older children. GCMME can promote products in this segment where there is no restriction, and reach a larger number of poor households.

Iron-fortified Tiger biscuits are an example of a private business value chain that can be leveraged for tackling hidden hunger. But it is a

product in an industry that seems to perceive a clear division between *mass* consumption and the *health and wellness* segments. Taste is seen as an important criterion for *acceptability*:

The health and wellness category of foods is primarily consumed by choice, not compulsion. The primary reason is taste. If it is not tasty, it will not be sold. Consumers may cut down on the frequency of consumption, but will not give up on taste. (Mayank Shah, executive, Parle Products (Nair-Ghaswalla 2012))

It is well argued that taste (*consumer acceptability*) is an important criterion for sustenance of food value chains. But there seems no evident reason for the change in the pro-nutrition focus of iron-fortified Tiger biscuits, other than business motives *vis-à-vis corporate responsibility* to address undernutrition. Going by the evidence from the efficacy trials, a thrust on branding iron-fortified Tiger biscuits as a nutritious product for the *mass* segment supported by nutrition awareness could perhaps have sustained the initiative and shown impact, without a major compromise on market share and profits.

Research suggests that it is not realistic to expect businesses to voluntarily address BoP distribution-related challenges without some degree of public support or a favourable institutional environment (Maestre *et al.* 2014). The absence of mandatory fortification regulation could be seen as a lacuna. Civil society can play a role in generating awareness and advocacy, influencing better social branding of businesses that aim to support, collaborate, and coordinate with efforts to combat malnutrition.

Both cases illustrate the importance of policy in leveraging commercial agri-food value chains to have a pro-nutrition and pro-poor focus. They are required to provide the *institutional environment* where more businesses are motivated to have nutritional targets (GloPan 2014). For instance, a policy requiring the mandatory iron fortification of biscuits may have sustained iron-fortified Tiger biscuits. The *institutional environment* includes the role of government agencies to facilitate informed choices by consumers to buy nutrient-dense food. In the absence of appropriate policy guidance, private business-led agri-food value chains may even pose challenges for public health.

In the case of iron-fortified Tiger biscuits, the absence of mandatory fortification or similar regulation made its withdrawal easy. In Amulspray's case, the ban on the promotion of infant foods has largely influenced it being used only as a dairy whitener, but affordable to poor households, even as new entrants have captured the infant food segment. Interventions on consumer awareness about fortification and even labelling using audiovisual and mass communication channels to reach illiterate populations could facilitate better informed choices by poor consumers. The India Spotlight Index Report of the Access to Nutrition Foundation highlights that the government has to play a key role 'in encouraging companies to scale up their efforts to solve the country's severe malnutrition challenge' (ATNI 2016b).

Governments can choose from options such as mandatory fortification, to increased consumer awareness, and increased engagement with private actors. Mandatory fortification, while important, has to keep abreast of changes in nutrition status and consumer needs, and be modified as required. The Government of India is taking measures in this direction. In 2017, the Food Safety and Standards Authority of India (FSSAI)¹⁴ released standards for the fortification of different foods and set up a Food Fortification Resource Centre portal. These measures indicate the government's acknowledgement of the role of market-driven value chains, and the need for an appropriate institutional environment to ensure their effective impact and in the desired directions.

6 Conclusion

The article has discussed the business models of two different fortified products and the challenges in their reaching poor households. Both value chains fulfil most of the requirements listed in the framework discussed in Maestre *et al.* (2017). The products of both companies have penetrated markets across urban and rural India, often seen as a big challenge for BoP products; using both traditional and modern value chains, these products are found in small shops, big retail chains, and also on online shopping platforms. The reach of the value chains and the nutritional content of the products indicate the potential to leverage them for enhanced nutritional intake by low-income and nutritionally vulnerable households.

However, the business rationale and business environment seem to be limiting their having a definite nutritional focus. This falls under the requirement of *institutional environment* for value chains that is influenced by formal and informal factors in the framework discussed in Maestre *et al.* (2017). A government role is called for here in creating the required institutional environment, and to reorient the value chains to target increased nutritional intake by the BoP.

In the case of iron-fortified Tiger biscuits, an enabling institutional environment could have ensured the continuity of an initiative that was showing potential to impact at scale. In Amulspray's case, it is governed by the international ban on the promotion of infant foods reinforced by the national legislation. This has led to its limited use as a complementary food and to alternative uses. But it is an accessible and affordable product that can get a thrust with better nutrition awareness. State support for initiatives to enhance consumer awareness about nutrition and packaged food can also facilitate informed choices by consumers, and will create a favourable *institutional environment* for businesses to focus on nutrition.

The BoP is a large market for the private sector in developing countries. It is imperative in this context that the state plays a proactive role in providing an enabling institutional environment that encourages private business to have a nutrition focus and promote public health at large.

Notes

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- † The authors are grateful to the editors of this issue of the *IDS Bulletin* and two anonymous referees for their very useful feedback and comments on earlier drafts of the article.
- 1 <http://britannia.co.in/about-us/overview>.
- 2 www.thehindubusinessline.com/catalyst/britannias-battle-for-market-share/article9449608.ece.
- 3 www.wlivenews.com/top-10-best-biscuit-making-companies-and-leading-brands-in-india.html.
- 4 <http://britannia.co.in/products/tiger/tiger-glucose>.
- 5 http://britannia.co.in/images/newsmedia/zoom/Britannia_to_invest_900cr_on_new_plants_Innovation.jpg.
- 6 www.thehindubusinessline.com/companies/fortified-biscuits-britannia-bakes-a-plan-for-a-healthy-business/article6423558.ece.
- 7 www.amul.com/m/organisation.
- 8 <http://retail.economicstimes.indiatimes.com/news/food-entertainment/grocery/amul-expanding-processing-capacity-distribution-reach/49970690>.
- 9 Qualitative survey, 2015.
- 10 Qualitative survey, 2015.
- 11 Qualitative survey, 2015.
- 12 www.globaldairytrade.info/en/product-results/skim-milk-powder/.
- 13 'Many companies continue with impunity to violate the code which aims to protect breastfeeding and optimal feeding of infants under two' – Marc van Ameringen in 'Can the Private Sector Help Combat Hunger and Malnutrition?', *Huffington Post*, April 2014, www.huffingtonpost.com/marc-van-ameringen/can-the-private-sector-he_b_4725802.html.
- 14 <http://ffrc.fssai.gov.in/fortification/index.jsp>.

References

- ATNI (2016a) *Access to Nutrition Index – Global Index 2016*, Utrecht: Access to Nutrition Foundation
- ATNI (2016b) *Access to Nutrition Index – India Spotlight Index 2016*, Utrecht: Access to Nutrition Foundation
- Bal, D. *et al.* (2014) 'Effect of Supplementation with Iron Fortified Biscuits on the Hemoglobin Status of Children in Rural Areas of Shimoga, Karnataka', *Indian Journal of Pediatrics* 82.3: 253–59
- Bhagwat, S.; Sankar, R.; Sachdeva, R.; Joseph, L. and Sivaranjani (2014) 'Improving the Nutrition Quality of the School Feeding Program (Mid-Day Meal) in India through Fortification: A Case Study', *Asia Pacific Journal of Clinical Nutrition* 23 (Suppl 1): S12–S19
- Bouis, H.E. and Saltzman, A. (2017) 'Improving Nutrition through Bio-Fortification: A Review of Evidence from HarvestPlus, 2003 through 2016', *Global Food Security* 12: 49–58

- DFID (2011) *The Use of Nutrition Products for the Prevention and Treatment of Undernutrition*, London: Human Development Resource Centre, Department for International Development
- FAO, IFAD and WFP (2015) *The State of Food Insecurity in the World 2015. Meeting the 2015 International Hunger Targets: Taking Stock of Uneven Progress*, Rome: Food and Agriculture Organization of the United Nations
- Gelli, A. *et al.* (2015) *Value Chains and Nutrition: A Framework to Support the Identification, Design, and Evaluation of Interventions*, IFPRI Discussion Paper 01413, Washington DC: International Food Policy Research Institute
- Gillespie, S. *et al.* (2013) 'The Politics of Reducing Malnutrition: Building Commitment and Accelerating Progress', *The Lancet* 382: 552–69
- GloPan (2014) *How Can Agriculture and Food System Policies Improve Nutrition?* Technical Brief, London: Global Panel on Agriculture and Food Systems for Nutrition
- GoI (2017) *National Family Health Survey 4 (2015–16): India Fact Sheet*, New Delhi: Ministry of Health and Family Welfare, Government of India
- GoI (2011) *Census of India 2011 Provisional Population Total, Paper 2 (1)*, Government of India, http://censusindia.gov.in/2011-prov-results/paper2/prov_results_paper2_ori.html (accessed 13 October 2017)
- Gómez, M.I. and Ricketts, K.D. (2013) *Food Value Chain Transformations in Developing Countries: Selected Hypotheses on Nutritional Implications*, ESA Working Paper 13-05, Rome: Agriculture Development Economics Division, Food and Agriculture Organization of the United Nations (FAO)
- Gómez, M.I. *et al.* (2013) *Post-Green Revolution Food Systems and the Triple Burden of Malnutrition*, ESA Working Paper 13-02, Rome: Agricultural Development Economics Division, Food and Agriculture Organization of the United Nations (FAO)
- Hills, G.; Russell, P.; Boronovi, V.; Doty, A. and Iyer, L. (2012) *Shared Value in Emerging Markets: How Multinational Corporations are Redefining Business Strategies to Reach Poor or Vulnerable Populations*, Washington DC: FSG
- Jarvis, M. and Magarinos, B. (2008) *Britannia, Naandi and GAIN: A Public–Private Partnership for Delivering Nutrition through Fortification in India*, Business Innovation to Combat Malnutrition Case Study Series, Washington DC and Geneva: World Bank Institute (WBI) and Global Alliance for Improved Nutrition (GAIN)
- Jonathan, G. (2014) *100 Great Business Leaders: Of the World's Most Admired Companies (100 Great Ideas)*, Singapore: Marshall Cavendish International (Asia) Pte Ltd
- Law, A. (2016) 'Britannia: Turns to the Rural Market for a Bigger Bite', *Hindu Business Line*, 8 August, www.thehindubusinessline.com/companies/britannia-turns-to-the-rural-market-for-a-bigger-bite/article8960389.ece (accessed 13 October 2017)
- Lindsay, A.; Benoist, B.; Dary, O. and Hurrell, R. (2006) *Guidelines on Food Fortification with Micronutrients*, Geneva: World Health

- Organization (WHO) and the Food and Agriculture Organization of the United Nations (FAO)
- Maestre, M.; Poole, N. and Henson, S. (2017) 'Assessing Food Value Chain Pathways, Linkages and Impacts for Better Nutrition of Vulnerable Groups', *Food Policy* 68: 31–39
- Maestre, M.; Robinson, E.; Humphrey, J. and Henson, S. (2014) *The Role of Businesses in Providing Nutrient-Rich Foods for the Poor: A Case Study in Tanzania*, IDS Evidence Report 52, Brighton: IDS
- Maharaj, R.; Passi, S.J. and Aeri, B.T. (2014) 'Efficacy of Iron Fortified Food/Supervised Iron Folic Acid (IFA) Supplementation on the Hemoglobin Status of Pregnant Women from Urban Slums of Delhi, India', *Asian Journal of Multidisciplinary Studies* 2.10: 8–14
- Nair-Ghaswala, A. (2012) 'Healthy but Not Wealthy', *The Hindu*, 13 September, www.thehindubusinessline.com/news/variety/healthy-but-not-wealthy/article3889091.ece (accessed 13 October 2017)
- Nithya, D.J. and Bhavani, R.V. (2016) 'Do Dietary Diversity Indices Reflect the Nutritional Status of School-Aged Children?', *Indian Journal of Nutrition and Dietetics* 53.4: 405–16
- NSSO (National Sample Survey Organisation) (2014) *Household Consumption of Various Goods and Services in India 2011–12*, New Delhi: Ministry of Statistics and Programme Implementation, Government of India
- Parasar, R. and Bhavani, R.V. (forthcoming, 2018a) 'A Case Study of Tiger Biscuits in India', LANSa Working Paper, Leveraging Agriculture for Nutrition in South Asia (LANSa)
- Parasar, R. and Bhavani, R.V. (forthcoming, 2018b) 'A Case Study of Amulspray in India', LANSa Working Paper, Leveraging Agriculture for Nutrition in South Asia (LANSa)
- Popkin, B.M.; Adair, L.S. and Ng, S.W. (2012) 'NOW AND THEN: The Global Nutrition Transition: The Pandemic of Obesity in Developing Countries', *Nutrition Reviews* 70.1: 3–21
- Reardon, T. (2015) 'The Hidden Middle: The Quiet Revolution in the Midstream of Agri-Food Value Chains in Developing Countries', *Oxford Review of Economic Policy* 31.1: 45–63
- Reardon, T. and Minten, B. (2011) *The Quiet Revolution in India's Food Supply Chains*, IFPRI Discussion Paper 01115, New Delhi: International Food Policy Research Institute
- Relton, C.; Strong, M. and Holdsworth, M. (2012) 'Plastic Food Packaging Encourages Obesity', *BMJ* 344e: 2824
- Rodrigues, V.M. et al. (2017) 'Nutritional Quality of Packaged Food Targeted at Children in Brazil: Which Ones Should be Eligible to Bear Nutrient Claims?', *International Journal of Obesity* 41: 71–75
- Shashidhar, A. (2015) 'A New Recipe', *Business Today*, 8 November, www.businesstoday.in/magazine/cover-story/bt-500-india-most-valuable-companies-2015-britannia-rank-61/story/224940.html (accessed 13 October 2017)

Business-Based Strategies for Improved Nutrition: The Case of Grameen Danone Foods*

Jessica Agnew and Spencer Henson¹

Abstract There is increasing interest in the role that businesses can play in promoting the consumption of nutrient-dense foods as part of strategies to reduce the prevalence of micronutrient deficiencies in developing countries. To date, however, there has been little in-depth analysis of the extent to which viable business opportunities exist for nutrient-dense foods in the context of markets catering to communities. Furthermore, whether businesses can deliver sustainable improvements in the nutrition of poor populations at scale is not yet evident. This article examines the case of Grameen Danone Foods Ltd, a social enterprise that specifically aims to bring about improvements in the micronutrient status of poor children in Bangladesh through the sale of fortified yogurt. The article examines the degree to which this business has been successful at establishing a viable market for fortified yogurt amongst poor communities, and the challenges it has faced in trying to achieve this.

Keywords: nutrition, micronutrient deficiency, markets, business, Bangladesh, food-based approaches.

1 Introduction

Globally, there are an estimated 2 billion people with micronutrient deficiencies (FAO 2013). The most severe deficiencies are evidenced by clinical markers; for example, night blindness in the case of vitamin A deficiency. Furthermore, sub-clinical deficiencies can retard child growth and development resulting in severe health issues, such as the stunting of children. This 'hidden hunger' not only contributes to 1.1 million child deaths annually (Black *et al.* 2013), but also imposes economic constraints on low- and middle-income countries due to low educational attainment, reduced productivity, and constrained income-earning capacity (Bailey, West and Black 2015). Accordingly, addressing the persistent and severe level of micronutrient deficiencies is of critical public health importance at a global level, and particularly in sub-Saharan Africa and South Asia.

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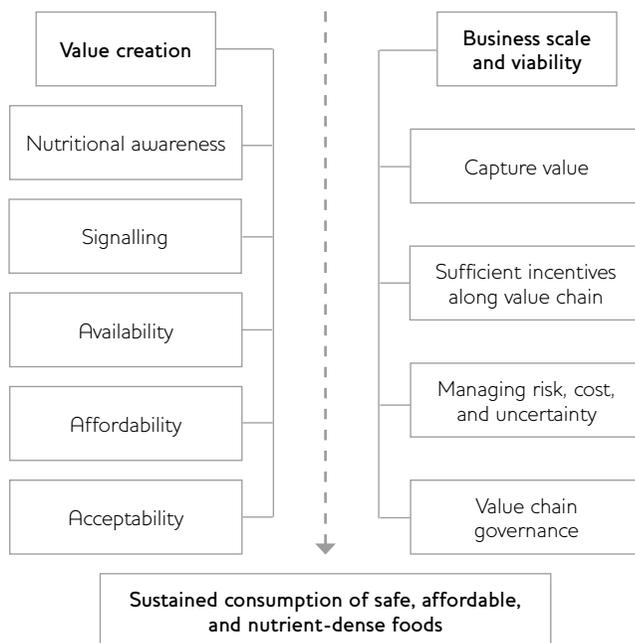
There is considerable evidence that a poor diet is the primary cause of nutritional deficiencies, resulting from insufficient intakes and poor absorption of micronutrients (von Grebmer *et al.* 2014). Thus, food-based strategies, including the fortification of widely consumed processed foods and the enhancement of the micronutrient content of commonly consumed staples through biofortification, have been promoted as a viable approach to enhancing the micronutrient status of populations (Gibson 2011). However, whilst a number of nutritionally enhanced foods have been found to be efficacious in reducing micronutrient deficiencies, there are considerable challenges in achieving sustained consumption of these foods by poor communities (Henson and Humphrey 2015; Humphrey and Robinson 2015).

Food-based interventions are typically implemented and/or funded by governments, bilateral or multilateral donors, or non-governmental organisations (NGOs). Such initiatives, however, tend to be focused on specific population groups, targeted according to their socioeconomic status, situation, and/or geographical location. It is increasingly recognised that actions by the public and/or civil society sectors can rarely achieve scale and sustainability at the level of populations (Gillespie *et al.* 2013). Recognising that the majority of poor communities procure some or all of their food through markets, there is increasing attention to the role of businesses in bringing about the increased consumption of nutrient-dense foods by deficient populations (Humphrey and Robinson 2015).

There are increasing examples of efforts by businesses to market nutrient-dense foods to poor populations, from multinational corporations (MNCs) to micro and small enterprises (MSEs) operating across the formal and informal sectors of sub-Saharan Africa and South Asia (Humphrey and Robinson 2015). Various types of businesses are selling complementary foods for infants, ready-to-use therapeutic foods (RUTFs), fortified processed foods, and biofortified staples.² There are many questions, however, about the sustainability of these businesses and under what circumstances, and the extent to which they are able to bring about improvements in the nutrient intake of poor populations at scale. The fact that many of these questions remain unanswered reflects the paucity of in-depth studies of businesses engaged in markets for nutrient-dense foods directed at poor populations.

This article begins to address this research gap by reporting the results of an in-depth case study of Grameen Danone Foods Ltd (GDFL). A social enterprise established as a joint venture between Groupe Danone and Grameen Enterprises, GDFL manufactures and distributes a fortified yogurt called Shokti+ to poor consumers, predominantly in rural areas of Bangladesh. When GDFL first started marketing Shokti+, consumers were not familiar with the product offering, particularly the concept of 'fortified'. This particular case, therefore, has the potential to provide valuable insights into the challenges that businesses face in marketing nutrient-dense foods to poor populations, and valuable lessons as to the effectiveness of the strategies that such businesses employ.

Figure 1 Business model requirements for achieving sustained consumption of nutrient-dense foods by poor populations



Source Authors' own, adapted from Henson and Humphrey (2015).

The remainder of the article is structured as follows. First, a conceptual framework is presented that aims to disaggregate the various factors that determine the extent to which businesses can achieve both nutrition impact amongst poor communities and commercial sustainability. The methods of the study are then described. Subsequently, the value chain of GDFL is mapped and analysed using key elements of the conceptual framework. Finally, key insights and conclusions regarding the role of businesses in promoting the increased consumption of nutrient-dense foods by poor populations are presented.

2 Conceptual framework

In considering the role of businesses in enhancing consumption of nutrient-dense foods by poor populations as part of broad-based initiatives directed at reducing micronutrient deficiencies, it is critical to examine both the demand side and supply side of the market. With respect to demand, poor consumers must be able and willing to pay a price that is sufficient to provide a sufficient economic return to businesses. In turn, this requires that consumers recognise the nutritional value of the food in question and weigh this appropriately against other characteristics of the food including taste, quality, brand name, convenience, etc. (Humphrey and Robinson 2015; Koh, Hegde and Karamchandani 2014). On the supply side, the food needs to be produced, processed, and distributed in such a way that it is nutrient-dense and safe at the point of consumption, and also easily available to poor consumers. The costs of achieving this must be kept under

control so as to be able to charge a price that ensures the business is commercially viable in the medium to long term whilst not being prohibitive to the consumer (Henson and Humphrey 2015).

Henson and Humphrey (2015) outline a conceptual framework that delineates these demand- and supply-side requirements for viable business models for nutrient-dense foods directed at poor populations and that bring about sustained consumption of safe nutrient-dense food (Figure 1). On the one hand, businesses must create sufficient value in the eyes of the consumer so as to motivate purchase consumption. Thus, communication efforts must ensure that consumers are aware of the health benefits of consuming more nutrient-dense foods; the positive effect of nutrition education on improved consumption of nutrient-dense foods has been well established (see, for example, Hotz and Gibson 2005; Ickes *et al.* 2017; Smitasiri, Attig and Dhanamitta 1992). Furthermore, businesses must signal in a clear and reliable manner that the foods they are selling have nutritional attributes that are superior to less nutritious alternatives. This can be challenging given that the micronutrient content of food is a credence characteristic and unverifiable even post-consumption (Nwuneli *et al.* 2014). There is a key role of indirect indicators of the nutritional value of the food here including labels, branding, etc. which has been shown to influence consumer choice even in the context of credence attributes (Verbeke 2008). Finally, all of this needs to be achieved in a manner that ensures nutrient-dense foods are affordable, available, and more generally acceptable to poor populations.

On the other hand, businesses must operate in a manner that allows them to capture a sufficient proportion of the value they create for consumers so as to cover their costs and earn a commercial return. Businesses, furthermore, must ensure that there are sufficient incentives for actors along the value chain to undertake the functions necessary for the production and distribution of nutrient-dense foods that are safe, and that are available, affordable, and acceptable to poor populations. The structure and *modus operandi* of the value chain plays a critical role here; for example, in ensuring the accurate and timely transmission of information between actors and in the coordination of their respective functions. Given that markets directed at poor populations are characterised by significant risks, and that there is a continuous need to drive down costs in order to achieve prices that poor populations are able and willing to pay, achieving these conditions can be very challenging for businesses.

Credence is given to this conceptual framework by the findings of the limited existing literature on businesses engaged in markets for nutrient-dense foods directed at poor populations. For example, Kayser, Klarsfeld and Brossard (2014) provide evidence of the ability to market food products with claimed health benefits to poor communities in South Asia and sub-Saharan Africa. However, the viability of such businesses requires innovative ways in which to create value and manage costs in order for poor populations to be able and willing to purchase such products. Furthermore, a wider body of studies examines

the ‘willingness to pay’ of poor populations for nutrient-dense foods; for example, biofortified staples (see, for example, Chowdhury *et al.* 2011; DeGroot, Kimenju and Morawetz 2011; DeSteur *et al.* 2012) that highlight the importance of consumer awareness and appreciation of the nutrition and health benefits such products are claimed to deliver in generating value in the eyes of the buyer.

3 Methods

The study reported here has two primary research questions. First, to explore the challenges faced by GDFL in marketing nutrient-dense foods to poor communities whilst establishing longer-term commercial viability and achieving scale. Second, to provide preliminary evidence of the extent to which GDFL was successful in bringing about improvements in the nutrition of poor populations. To address these research questions, two stages of data collection and analysis were undertaken.

First, preliminary data were collected through a desk review of existing studies of GDFL. Subsequently, in-depth interviews were undertaken with members of the managerial team at GDFL (n=9) and with actors along the GDFL value chain including retailers (n=11), door-to-door sales team (n=3), and producers (n=2). A standard interview schedule was employed for the interviews. The interviews were audio recorded and detailed notes were kept for analysis.

Subsequently, a survey of households in rural communities and children in urban schools in which GDFL marketed its fortified yogurt was undertaken. The survey collected data on awareness, and purchase and consumption behaviour of households and children with respect to the yogurt. Also, data were collected on the nutritional adequacy of the diet of children in these communities and schools, using diet diversity scores (DDS) as a proxy indicator. The aim in so doing was twofold: (1) to explore the ‘willingness to pay’ of poor populations for Shokti+ consumed in these communities and schools; and (2) to determine the characteristics of households and children that did or did not purchase the yogurt, especially with respect to the nutritional adequacy of their diet.

The rural community survey (n=1,000) was undertaken through face-to-face interviews with the individual primarily responsible for food purchases in their household. Households were selected using a multi-level proportional sampling method in three districts surrounding the GDFL factory, namely in Bogra, Sirajganj, and Naogaon. The urban school survey was undertaken in schools that were randomly selected from the 25 districts of Dhaka, Chittagong, and Bogra that had at least a 5 per cent extreme poverty rate. In each of these schools, 20 children between the ages of 8 and 12 were randomly selected for face-to-face interview.

4 GDFL and its value chain

Established in 2006, GDFL is a social enterprise that is a joint venture between Grameen Enterprises of Bangladesh and the French food conglomerate Groupe Danone. The enterprise has two social objectives. First, to bring improved health through better nutrition to the poorest

Table 1 Nutritional composition of Shokti+

Nutritional composition	Per 60g	% RDA
Energy (kcal)	71.6	–
Protein (g)	2.3	–
Lipids (g)	2.5	–
Carbohydrates	10.1	–
... of which sugars	3.8	–
Calcium (mg)	85	18.4
Phosphorous (mg)	67	18.7
Iron (mg)	3.3	30
Zinc (mg)	3.0	30
Iodine (µg)	40	30

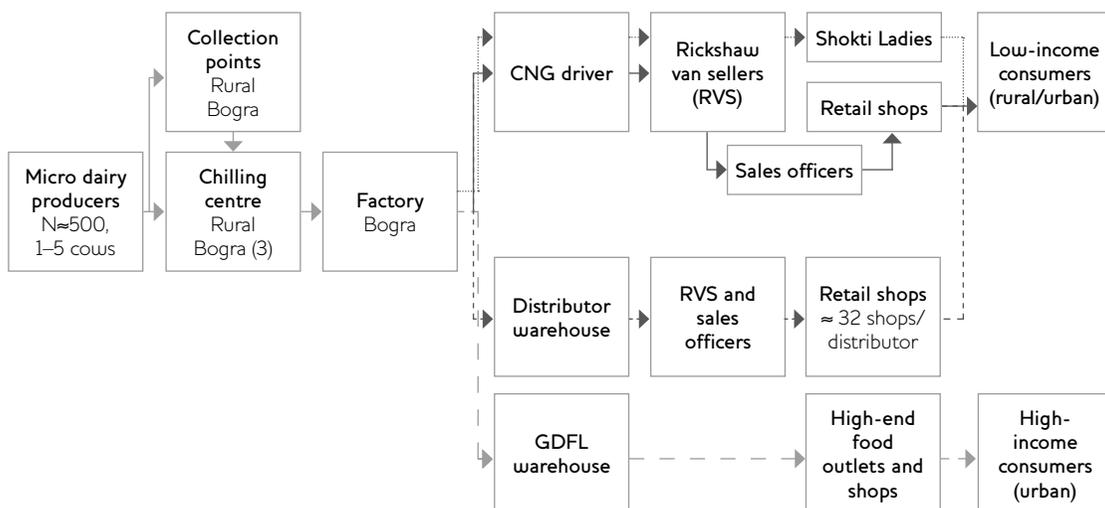
Source Sazawal *et al.* (2013).

children of Bangladesh. Second, to reduce poverty and create employment for local people, particularly through a rural distribution network of women in poor rural communities. Whilst GDFL aims to be financially sustainable, its performance is measured against attainment of these two social objectives. Towards this end, GDFL aims to leverage the resources of Groupe Danone as a global manufacturer and distributor of yogurt, with those of Grameen Enterprises as a major NGO engaged with poor populations in Bangladesh.

As of 2014, GDFL was engaged in the manufacture and distribution of two fortified yogurt products. The flagship product, Shokti+, is a fresh probiotic yogurt that is packaged in 60g plastic pots and sold for 10BDT (US\$0.12). This product requires refrigeration and has a shelf life of 22–25 days. A second product, Shokti Pocket, is ultra-heat-treated yogurt packaged in 40g tubes and sold for 6BDT (US\$0.07). Introduced in February 2014, Shokti Pocket does not require refrigeration and has a shelf life of 90 days. Both products are fortified with 30 per cent of the recommended daily amount (RDA) of the micronutrients zinc, iodine, iron, and vitamin A (Table 1).

GDFL received support from the Global Alliance for Improved Nutrition (GAIN) in establishing the initial formulation of Shokti+. Furthermore, an efficacy study was undertaken (see Sazawal *et al.* 2013) to determine the impact of regular consumption on the nutritional status of children. This study confirmed that consumption of Shokti+ resulted in the improved haemoglobin status of children that were otherwise iron deficient. On the basis of this efficacy study, GDFL recommends that the yogurt is consumed at least three times per week. Furthermore, the enterprise specifically targets children

Figure 2 GDFL value chain



Source Authors' own, based on interviews with GDFL senior management.

aged 3–12 years, in which high levels of deficiency in iron, zinc, and vitamin A are observed in Bangladesh.

The value chain for Shokti+ and Shokti Pocket is pictured in Figure 2. GDFL aims to procure as much of the milk they require as possible from around 500 small-scale producers; many of these producers had existing marketing relations with Grameen Enterprises. While no formal contracts are signed, GDFL guarantees the purchase of 100 per cent of the milk these farmers produce and pays a quality premium on the basis of lactose and fat content. Extension officers employed by GDFL provide dairy production education and training, artificial insemination and cross-breeding services, veterinary and medical services, and access to high-quality grass seed. This arrangement has allowed the enterprise to develop a relationship of trust with its producers; this is critical given the intensity of competition for milk in rural Bangladesh. Given the seasonality of milk production in Bangladesh, there are times when GDFL has to procure milk from the local market.

The producers from which GDFL procures transport fresh milk in metal cans to local collection points or direct to one of three chilling centres that have been established within a 30km radius of the factory. Any milk delivered to a collection point is transported to a chilling centre using a refrigerated truck. GDFL has positioned these collection locations to facilitate ease of delivery and to minimise the time milk remains un-chilled. Producers are paid the market price at the time of delivery. In addition, 1BDT per litre is deposited in a savings account and paid out every three months as a cash incentive for selling to GDFL. After the milk arrives at the factory, batches from each of the chilling centres are tested for pathogens, lactose, and fat content, then chilled to 4 degrees Celsius. The milk is pasteurised before entering yogurt production.

The GDFL processing facility is situated in Bogra, an area with a high unemployment rate and which is close to areas of milk production where Grameen Enterprises already operate. The facility was constructed in 2006, financed through a US\$1 million mutual fund established by Groupe Danone. The initial installed capacity of the factory was 1,600 tonnes per annum, but this was increased to 3,000 tonnes per annum in 2010. As of 2015, the facility was operating at around 60 per cent capacity.

From the factory, there are four distribution channels for Shokti+, three of which also distribute Shokti Pocket. First, distribution through the Shokti Ladies (dotted arrow flows in Figure 2) which play a central role in GDFL's distribution model. The Shokti Ladies are a door-to-door sales force comprising local women, delivering Shokti+ and Shokti Pocket daily to households along a specified distribution route in the rural areas of Bogra, Naogaon, and Sirajganj. Members of the sales force purchase the products using microcredit and sell them at a pre-specified price for a small profit. They are also paid a 'salary' of 0.5BDT per pot sold as a further incentive to maximise sales. Sales of Shokti+ and Shokti Pocket are also made through small retail shops in rural Bogra (continuous arrow flows in Figure 2). The products are delivered by rickshaw van sellers (RVS) who pick them up from delivery drivers who transport the products from the factory. Each RVS partners with sales officers to distribute the products to local retail shops.

Urban distribution of Shokti+ through retail shops in Dhaka, Chittagong and Bogra (dashed arrow flows in Figure 2) commenced in 2009 and extended to Shokti Pocket in 2014. These products are sold to urban distributors, and delivered to retail stores throughout these cities by RVS. GDFL remains involved in Shokti+ and Shokti Pocket to ensure sales are only made to outlets that have refrigeration capabilities, expired product is replaced, and that the products are being sold for the specified price.

GDFL started distributing larger 80g pots of Shokti+ to *high-income markets* in Dhaka and Chittagong (longer dashed arrow flows in Figure 2) to help offset the costs of distribution to low-income markets. The product is transported and stored in GDFL-owned and operated warehouses before being distributed to high-end grocery stores and retail outlets. The product is sold in packaging distinct from that sold in rural and urban low-income markets and at a significant price premium of 30BDT (US\$0.37).

5 Results

5.1 Effectiveness of strategies employed to address the challenges faced by GDFL

Applying the conceptual framework to the value chain for Shokti+ and Shokti Pocket, it was possible to explore the challenges faced by GDFL in establishing and maintaining a viable business model in the context of markets targeted at poor populations. In understanding these challenges, it is important to recognise that GDFL was one of the first businesses to market nutritionally enhanced processed food

targeted at poor communities, both in Bangladesh and internationally. Furthermore, single-serve packaged yogurt designed to be consumed as a snack food had not previously been available in Bangladesh. In launching Shokti+, therefore, GDFL was introducing a truly innovative concept into the marketplace.

A key challenge for GDFL is communicating the nutritional attributes of Shokti+ to consumers who were initially not used to claims being made about the health benefits of the foods they purchased, had little awareness and/or knowledge of nutrition, and are of limited literacy. At the same time, GDFL recognised that marketing costs had to be minimised in order to establish a price that poor consumers were able and willing to pay. A multi-pronged strategy is employed to address these challenges. Most fundamental is the name of the product; the word *shokti* means strength or energy in Bengali, thereby conveying to consumers, including those who are illiterate, the health benefits of the product. For those consumers who are literate, advertising in and around stores lists the nutrients provided. Nutrition education is also integrated into the various distribution channels (see Figure 2). For example, the Shokti Ladies and retail shop owners are educated on the nutritional attributes and health benefits of the yogurt and are charged with communicating these benefits to consumers. GDFL also takes the products to schools and conducts ‘mummy seminars’ as a means of raising awareness amongst students and parents.

The results of the survey in rural communities where Shokti+ is distributed suggest that GDFL has been successful in raising awareness of the nutritional benefits of these products. For example, 98 per cent of respondents who were aware of the Shokti brand, believed that the product was good for their child. Of these respondents, 82 per cent were able to cite correctly at least one potential benefit from consuming Shokti+. Furthermore, the nutritional benefit of Shokti+ is considered the most important attribute, with 56 per cent purchasing it because of its nutritional benefits. There is evidence, however, that not all purchasers of Shokti+ are convinced of the nutritional benefits to their children. For example, of respondents to the rural survey that had stopped consuming Shokti+, 20 per cent cited uncertainty over the nutritional benefits of the product.

To ensure consistent availability of Shokti+ and Shokti Pocket and at the same time limit distribution costs, GDFL has put great emphasis on proximity-based marketing, targeting poor communities that are near to its processing facility in Bogra. At the same time, the use of women within these communities to deliver the product direct to consumers, a so-called ‘last-mile’ distribution strategy, aims to minimise the time and effort required of consumers to access the product on a continuous basis. The fact that the Shokti Ladies are not required to provide any long-term commitment in order to distribute the product, however, means that there is a significant rate of turnover within the salesforce, causing disruption to the availability of the product in some instances.

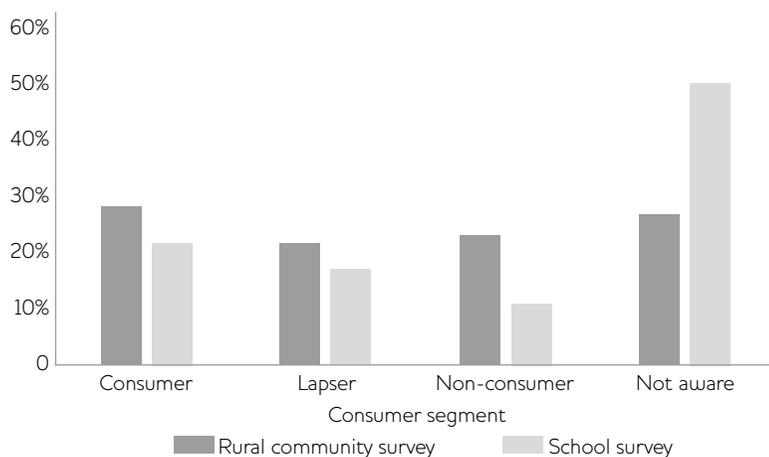
Amongst respondents to the rural survey, 27 per cent indicated that lack of availability of Shokti+ prevented them from consuming the product more frequently. Availability is also an issue with other distribution channels for Shokti+, most notably through schools. Amongst respondents to the survey of students in urban schools where Shokti+ is distributed, 52 per cent cited lack of availability as the primary reason for not consuming the product more frequently.

In order to extend its distribution network in rural areas, and also into urban centres, an increasing proportion of Shokti+ and Shokti Pocket has been sold through independent retail stores. A key challenge here has been the implementation of effective incentive mechanisms that aim to foster repeat purchases by consumers. Examples have included offering stickers with purchases of Shokti+ and reward cards whereby customers receive a stamp for every purchase that can be exchanged for prizes after a specified number of pots have been bought. GDFL has faced difficulty in ensuring that retailers use these incentive schemes appropriately; that is, they are specifically tied to the purchase of Shokti+ or Shokti Pocket rather than being used to reward customers more generally or benefit the retailer personally. Furthermore, there have been quality issues faced where retailers do not store Shokti+ in a refrigerator, either because facilities are not available or because these are used for other products that are perhaps perceived to be of higher commercial value.

The most critical, and also most problematic, issue for GDFL is the pricing of Shokti+ and Shokti Pocket. The pricing of these products must reflect the ability and willingness to pay of poor consumers given the degree to which they value the nutritional and other benefits they deliver. At the same time, the price must be sufficient to cover the costs incurred by GDFL and to provide a sufficient commercial return to the enterprise. Whilst a relatively small proportion of respondents to the survey of rural communities where Shokti+ is distributed indicated that affordability was the main reason they did not purchase (8 per cent), financial constraints were cited by 45 per cent of purchasers when asked why they did not consume Shokti+ more frequently. It is apparent, furthermore, that purchasers are highly sensitive to price changes. Over the period since 2007, the price of Shokti+ has more than doubled due, predominantly, to increase in raw milk prices. GDFL reports that, while they will eventually recover, sales decline significantly when prices increase even by small amounts. A key rationale behind the introduction of Shokti Pocket is to provide a cheaper alternative to Shokti+, facilitated by offering a smaller portion size and the lack of need for chilled distribution.

Whilst GDFL's marketing and distribution strategy appears relatively effective at creating awareness, and facilitating initial purchases of Shokti+, it is less successful at establishing regular purchase patterns. In the survey of rural communities where Shokti+ is distributed, whilst 73 per cent of respondents had ever purchased Shokti+, only 50 per cent had ever purchased the product in the last three months, and 28 per cent were current consumers (Figure 3). In schools where Shokti+ was

Figure 3 Frequency of purchase of Shokti+ by households in rural community and school surveys



Source Authors' own.

distributed, only 50 per cent of respondents had ever purchased the product, whilst almost 22 per cent had purchased in the last week. A further 17 per cent of schoolchildren had purchased Shokti+ in the last month. The need to expand the market for Shokti+ and Shokti Pocket, both through expanding the number of households that purchase these products and by increasing the frequency of purchase by purchasing households, is openly recognised by GDFL. This is seen as critical to the attainment of commercial sustainability of GDFL's business and also for the pursuit of established plans to expand production to new facilities.

Initially, GDFL focused on minimising costs throughout the value chain in order to achieve a price that was sufficiently low to enable poor consumers to be targeted. Over time, however, it became clear that costs could not be reduced to the degree required whilst still maintaining robust incentives throughout the value chain and meeting the broader social objective of GDFL. For example, offering employment and income-earning opportunities for milk producers and the Shokti Ladies is essential to the first social objective of the enterprise.³ An alternative strategy was therefore implemented, whereby the costs of producing and marketing Shokti+ to poor populations were defrayed (or maybe more accurately, cross-subsidised) through sales at higher prices to richer consumers. In 2010, GDFL started to distribute Shokti+ through modern retail stores in Bogra, Dhaka, and Chittagong. Given that these stores target much higher-income consumers, GDFL is able to sell an 80g pot of Shokti+ for 30BDT. Whilst currently only 5 per cent of production is distributed in this way, this has not prevented critics of GDFL from claiming it has compromised on its initial focus on the nutrition of poor communities. There is growing evidence, however, that parallel distribution to high-income markets might actually provide an effective mechanism through which costs can be defrayed sufficiently to contribute to the commercial viability of the business.

5.2 Evidence of nutritional impact

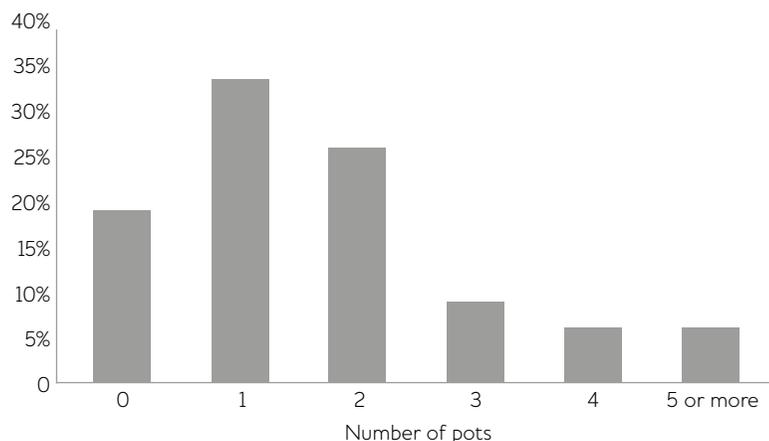
As outlined previously, a primary rationale for the establishment of GDFL was to promote improved nutrition amongst the poor through the distribution of a yogurt that was fortified with key micronutrients. GDFL recognises that the poorest households lack the economic ability to purchase a relatively high-value processed food such as yogurt. However, even households in the second and third income quintiles in the areas surrounding Bogra that are targeted by GDFL exhibit high levels of micronutrient deficiency, and indeed significant prevalence of stunting of pre-school age children (HKI and JPGSPH 2013). Thus, at least in principle, there is scope for Shokti+, which has been shown to be efficacious at enhancing micronutrient status when consumed in sufficient quantities (see Table 1), to have a positive nutritional impact on these target populations.

The results of both the rural community and school surveys suggest that levels of consumption of Shokti+ are generally below the three pots weekly that are recommended by GDFL. For example, in the rural community survey, within households that had purchased Shokti+ in the last week, only 21 per cent of children aged 3–12 years had consumed three or more pots in the last week (Figure 4). Almost 34 per cent of children in these households had consumed only one pot in the last week, whilst 19 per cent had not consumed any Shokti+. Across all households in the rural community survey, only 6 per cent of children had consumed at least three pots of Shokti+ in the previous week.

The targeting of consumers represents a difficult balancing act for GDFL. On the one hand, GDFL must sustain sufficient sales of Shokti+ and Shokti Pocket to sustain operations, achieved by selling to those willing and able to pay for the yogurt products. On the other, the degree to which GDFL has a positive and substantive impact on the nutrition of poor populations is dependent on targeting households in which children are most likely to be deficient in micronutrients. In the rural community and school surveys, diet diversity scores (DDS) are used as a proxy for the nutritional quality of children's food in the households of respondents.⁴ On average, children in households that had purchased Shokti+ in the previous week had a DDS of 5.2. This is greater than the mean DDS (4.0) for households in the Rajshahi division where Bogra is located, according to the Bangladesh Food Security Nutrition Surveillance Project (HKI and JPGSPH 2013). The mean DDS of children in households that had consumed Shokti+ in the last week exceeded that of children in households that had not consumed Shokti+ (ANOVA⁵ 0.0314) and those that had no prior awareness of Shokti+ (ANOVA 0.0208). These results suggest that consumption of Shokti+ tends to be greater in children with a more diverse (and by implication higher nutritional quality) diet.⁶ Whilst these children will undoubtedly benefit nutritionally from the consumption of Shokti+, the households in which they live are not those of most nutritional need.

A particular issue for GDFL is establishing incentive mechanisms through the value chain for those engaged in the sale of Shokti+

Figure 4 Frequency of consumption of Shokti+ by children in households that have purchased in the last week – rural survey



Source Authors' own.

and Shokti Pocket to target poorer households in which children are most likely to benefit nutritionally. The fact that the Shokti Ladies, for example, are paid according to the number of pots of yogurt sold, means that they tend to target existing (and often less poor) consumers for which less time and effort are required to make a sale. This is further evidenced by the average income of households consuming Shokti+. In the rural household survey, the mean weekly income of households that had purchased Shokti+ in the last week (2,807BDT) is significantly higher, for example, than households that are not aware of Shokti+ (1,818BDT; ANOVA <0.0001), and that had not been targeted by the Shokti Ladies.

6 Conclusions and recommendations

The case of GDFL illustrates the very considerable challenges faced in marketing nutrient-dense foods to poor communities. These challenges are symptomatic of the difficulties associated with communicating the benefits of foods that are nutritionally enhanced to consumers in general, creating and capturing value in the context of poor populations, and minimising distribution and marketing costs in low-income food markets. Evidently, GDFL has needed to change and adapt in response to both structural and emergent challenges over time. The importance of being able and willing to adapt is perhaps the biggest lesson to be drawn from the case of GDFL. At the same time, even a business that has been able to draw on the collective experience and resources of Groupe Danone and Grameen Enterprises is yet to secure its long-term sustainability, even after more than ten years of operation.

The particular examples of Shokti+ and Shokti Pocket highlight the very particular problems associated with efforts to market nutritionally enhanced foods that are novel and present very new food purchase and consumption scenarios to poor communities. Arguably, therefore, GDFL presents a more extreme example of the opportunities and challenges

associated with markets for nutrient-dense foods targeted at poor populations. The fact that GDFL has achieved daily sales in excess of 100,000 pots daily suggests that such challenges are not insurmountable. At the same time, questions inevitably remain about the scope for more novel nutritionally enhanced foods such as Shokti+ to have nutritional impacts on poor populations at scale, even in the medium to long term. Evidently, more analysis is needed, including of a broad range of business initiatives and ideally within the context of a consistent conceptual framework (such as that presented previously), so as to provide a more comprehensive picture of which products and through which business models achieve the greatest nutritional impact, and in what contexts.

The case of GDFL provides important lessons for other business-based initiatives aimed at promoting consumption of nutritionally enhanced foods by poor populations. First, the importance of distribution and marketing networks and establishing incentive systems that reward efforts to target poorer households. Second, the role of efforts to segment markets and to establish higher-priced sales to those who are less poor as a means to defray costs along the value chain. Third, the imperative of understanding the nature and importance of the value proposition presented as a nutritionally enhanced food to poor communities, and how this is (or is not) translated into the ability and willingness to pay a price that presents opportunities for businesses to achieve commercial sustainability in the medium term. Of course, the lessons from GDFL may not translate well into businesses of differing size and/or in distinct contexts. Again, this highlights the need for further analysis of business initiatives like that of GDFL.

In terms of nutritional impact, there is little doubt that promoting consumption of Shokti+ and Shokti Pocket brings benefit to the communities where GDFL operates. Shokti+ has been shown to have a substantive impact on the nutritional status of children when consumed in adequate amounts. Furthermore, the DDS of children in the rural community and school surveys indicate that there remains considerable scope for improvement in the nutritional quality of the diets they consume. At the same time, however, it is evident that GDFL does not (and indeed does not strive to) reach children in the poorest households and those that are likely to benefit most nutritionally from consumption of Shokti+ or Shokti Pocket. There is arguably a more general lesson from this finding. It is likely that business initiatives will struggle to reach those that are poorest, and it is for such households that public initiatives or public-private partnerships are most critical. Contrastingly private initiatives, including social enterprises such as GDFL, are more likely to play a role in improving nutrition in households that are less poor and that already have some discretion over their food purchases. However, this does not necessarily mean the potential for nutritional impact is diminished since even in these households the prevalence of micronutrient deficiency remains high, particularly in countries such as Bangladesh.

Notes

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- 1 Spencer Henson is Professor in the Department of Food, Agricultural and Resource Economics and Director of International Development Studies at the University of Guelph, Canada. He is also a Professorial Fellow at IDS. Jessica Agnew is a PhD student at Virginia Polytechnic and State University, USA.
 - 2 See for example: KeBal (Indonesia), Pushtikona (Bangladesh), Protein Kissee-La (Côte d'Ivoire), Nutriset (Niger), Britannia (India), Lisabi Mills (Nigeria), Dala Foods (Nigeria), Econocom Foods (15 African countries), Nutri'Zaza (Madagascar), Soy Sauce Fortification (China), Faire Tache D'Huile (Western Africa).
 - 3 Indeed, there may be a degree of incompatibility between the social objectives of GDFL. On the one hand, making efforts to enhance the income of small-scale dairy producers and women in local rural communities; on the other, targeting poor consumers who exhibit the greatest prevalence of micronutrient deficiencies.
 - 4 Respondents were asked to report the consumption of specified food groups by each of their children in the previous 24-hour period. A nine-point score was then constructed for the child in each household following the procedure laid out in the Bangladesh Food Security Nutrition Surveillance Project (HKI and JPGSPH 2013).
 - 5 ANOVA = analysis of variance.
 - 6 An alternative interpretation is that consumption of Shokti+ increases the diversity of the diet of children that are consumers. However, more in-depth analysis indicates that the vast majority of these children consumed some milk, such that the introduction of Shokti+ did not increase the value of their DDS.

References

- Bailey, R.L.; West, K.P. and Black, R.E. (2015) 'The Epidemiology of Global Micronutrient Deficiencies', *Annals of Nutrition & Metabolism* 66 (Supplement 2): 22–33
- Black, R.A. *et al.* (2013) 'Maternal and Child Undernutrition and Overweight in Low-Income and Middle-Income Countries', *The Lancet* 382: 427–51
- Chowdhury, S.; Meenakshi, J.V.; Tomlins, K.I. and Owori, C. (2011) 'Are Consumers in Developing Countries Willing to Pay More for Micronutrient-Dense Biofortified Foods? Evidence from a Field Experiment in Uganda', *American Journal of Agricultural Economics* 93.1: 83–97
- DeGroot, H.; Kimenju, S. and Morawetz, U. (2011) 'Estimating Consumer Willingness to Pay for Food Quality with Experimental Auctions: The Case of Yellow versus Fortified Maize Meal in Kenya', *Agricultural Economics* 42: 1–16

- DeSteur, H.; Gellynck, X.; Feng, S.; Rutasaert, P. and Verbeke, W. (2012) 'Determinants of Willingness-to-Pay for GM Rice with Health Benefits in a High Risk Region: Evidence from Experimental Auctions for Folate Biofortified Rice in China', *Food Quality and Preference* 25.2: 87–94
- FAO (2013) *The State of Food and Agriculture*, Rome: Food and Agriculture Organization of the United Nations
- Gibson, R.S. (2011) 'Strategies for Preventing Multi-Micronutrient Deficiencies: A Review of Experiences with Food-Based Approaches in Developing Countries', in B. Thompson and L. Amoroso (eds), *Combating Micronutrient Deficiencies: Food Based Approaches*, Rome: Food and Agriculture Organization of the United Nations (FAO)
- Gillespie, S.; Haddad, L.; Mannar, V.; Menon, P.; Nisbett, N. and Maternal and Child Nutrition Study Group (2013) 'The Politics of Reducing Malnutrition: Building Commitment and Accelerating Progress', *The Lancet* 382: 552–69
- Henson, S. and Humphrey, J. (2015) *Assessing the Effectiveness of Agri-Food Value Chain Interventions Aimed at Enhancing Consumption of Nutritious Food by the Poor*, LANSA Working Paper 4, Brighton: Leveraging Agriculture for Nutrition in South Asia (LANSA)
- HKI and JPGSPH (2013) *State of Food Security and Nutrition in Bangladesh*, Dhaka: Helen Keller International and James P. Grant School of Public Health
- Hotz, C. and Gibson, R.S. (2005) 'Participatory Nutrition Education and Adoption of New Feeding Practices are Associated with Improved Adequacy of Complementary Diets among Rural Malawian Children: A Pilot Study', *European Journal of Clinical Nutrition* 59.2: 226–37, doi:10.1038/sj.ejcn.1602063 (accessed 1 November 2017)
- Humphrey, J. and Robinson, E. (2015) 'Markets for Nutrition: What Role for Business?', *IDS Bulletin* 46.3: 59–69
- Ickes, S.B.; Heymsfield, G.; Wright, T.W. and Baguma, C. (2017) 'Maternal Participation in a Nutrition Education Program in Uganda is Associated with Improved Infant and Young Child Feeding Practices and Feeding Knowledge: A Post-Program Comparison Study', *BMC Nutrition* 3: 32–42
- Kayser, O.L.; Klarsfeld, L. and Brossard, S. (2014) *Marketing Nutrition for the Base of the Pyramid*, Paris: Hystra
- Koh, H.; Hegde, N. and Karamchandani, A. (2014) *Beyond the Pioneer: Getting Inclusive Industries to Scale*, Mumbai: Monitor Inclusive Markets
- Nwuneli, N.; Robinson, E.; Humphrey, J. and Henson, S. (2014) *The Role of Businesses in Providing Nutrient-Rich Foods for the Poor: Two Case Studies in Nigeria*, IDS Evidence Report 64, Brighton: IDS
- Sazawal, S. et al. (2013) 'Impact of Micronutrient Fortification of Yoghurt on Micronutrient Status Markers and Growth – A Randomized Double Blind Controlled Trial among School Children in Bangladesh', *BMC Public Health* 13: 514
- Smitasiri, S.; Attig, G.A. and Dhanamitta, S. (1992) 'Participatory Action for Nutrition Education: Social Marketing Vitamin A-Rich Foods in Thailand', *Ecology of Food and Nutrition* 28.3: 199–210, doi:10.1080/03670244.1992.9991271 (accessed 1 November 2017)

- Verbeke, W. (2008) 'Impact of Communication on Consumers' Food Choices', *Proceedings of the Nutrition Society* 67: 281–88
- von Grebmer, K. *et al.* (2014) *2014 Global Hunger Index: The Challenge of Hidden Hunger*, Washington DC: International Food Policy Research Institute (IFPRI)

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Going Against the Grain of Optimism: Flour Fortification in Pakistan

Natasha Ansari, Rashid Mehmood and Haris Gazdar

Abstract Food fortification is a popular strategy for addressing ‘hidden hunger’, and staple foods are seen as promising, if unproven, vehicles for the delivery of essential micronutrients to poor people in developing countries. This article examines wheat flour fortification with iron in Pakistan as a case of technocratic optimism in the face of institutional constraints. An evaluative framework based on the analysis of entire value chains can provide a reality check on technocratic optimism. We find that poor people based their preferences for different types of flour on price as well as perceptions of nutritional value. Many of these flour types are not covered by fortification programmes. Fortification interventions, meanwhile, have attempted to leverage public–private partnerships in a segment of the wheat flour value chain which is beset with regulatory weakness. This article illustrates why technical interventions should support rather than ignore a broader agenda of reforms in food policy.

Keywords: wheat, wheat flour, grain, fortification, value chains, Pakistan, agriculture, nutrition, food systems, INGOs.

1 Introduction

Pakistan has high rates of stunting and wasting among children, and high rates of iron deficiency among adult women and children alike. Cereals contribute around half the energy intake in Pakistan and wheat dominates all other cereals (Gazdar and Mysorewala 2016). The standard meal includes flat wheat flour bread or *roti* – cooked either on a hot plate as *chapati* (flat bread) or baked in a clay oven as *naan* (leavened bread traditionally cooked in a clay oven) – as its main starchy component. Wheat flour has, therefore, been seen as a promising vehicle for addressing anaemia through iron fortification (Gaffey *et al.* 2014). The high prevalence of wheat flour consumption, which makes wheat a favourable vehicle for fortification is, in fact, a sign of undernourishment – wheat flour is the cheapest source of energy. Even so, around two-fifths of the country’s population consume less than 2,100 kilocalories per day (Balagamwala and Gazdar 2013).

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Hunger directly affects around one third of households. A nationally representative survey found that one tenth of households had experienced severe hunger while another 20 per cent had experienced moderate hunger (Government of Pakistan 2011).

The appeal of wheat flour fortification, evidence notwithstanding, is clear from the number of attempts at establishing fortification programmes (Zuberi, Mehmood and Gazdar 2016). There have been at least seven wheat flour fortification interventions in Pakistan – two national and five regional – since 2005. Independent evaluations are not publicly available for any of these. The largest programme was the National Wheat Flour Fortification Programme (NWFFP) led by the Global Alliance for Improved Nutrition (GAIN) with technical support from Nutrition International (NI, formerly Micronutrient Initiative). NI has been involved in one way or another in all interventions since then (MI 2015). The United Nations World Food Programme (WFP) is another key participant. At the time when fieldwork for this case study was carried out, the only operational project was a WFP and NI project in the Azad Jammu and Kashmir (AJK) region. NI is also a technical partner in the consortium, implementing an ambitious new national fortification programme supported by UK Aid (DFID 2016b).

All of the interventions follow a similar model. They work with licensed private sector flour mills to create capacity for fortification, provide the pre-mix, conduct social marketing campaigns to increase awareness about the benefits of consuming fortified flour, and lobby for the mandatory fortification of flour and for the setting up of systems of quality assurance. These are, in fact, common elements in food fortification programmes across developing countries. This article proposes to study wheat flour fortification programmes as a case study of technocratic optimism in the face of stubborn institutional constraints. We believe that the case study bears relevance for countries where comparable models of intervention have been championed or implemented, and for a broader agenda of pro-nutrition food policy reform.

Section 2 sets our framing of the case study and its methodology. Wheat flour value chains are described in Section 3, where we also anticipate issues for the design of wheat flour fortification interventions. Section 4 reports our observations from the fortification project in AJK. Case study findings are discussed in Section 5, and Section 6 concludes the article and draws out broader lessons for nutrition interventions.

2 Framing and methodology

2.1 Technocratic optimism

'Technocratic optimism' – or the belief that there are viable technological solutions to structural problems – has been identified as a powerful driver of champions of technology-based interventions (May *et al.* 2003).¹ An insightful study of the process of introducing a new technology into health systems speaks of 'ideation' as a level in the discourse where 'general notions about the definition and production of

both a new technology and reliable knowledge about it are formed and circulated' (May *et al.* 2003: 701). The processes and actions analysed by May *et al.* (2003) in the context of health systems could easily apply to the role of champions such as the American Medical Association in the 1920s and 1930s (Bishai and Nalubola 2002), or *The Lancet* 2013 Nutrition Series (e.g. Bhutta *et al.* 2013) in the current discourse on food fortification. Positive but inconclusive evidence on the reduction in anaemia through food fortification (e.g. Gera, Sachdev and Boy 2012; Das *et al.* 2013) has been deemed 'reliable knowledge' on which to base strong advocacy for an intervention for which there is no specific evidence, viz. wheat flour fortification in countries such as Pakistan.²

Moreover, as public–private partnership models have progressively replaced government or donor-administered programmes in developing countries (Danton-Hill 1998; Yach *et al.* 2010), food fortification champions such as GAIN have constructed persuasive narratives that link technocratic optimism with corporate power. The linear output-oriented approach of these narratives predisposes them towards ignoring broader issues and causes of hunger and malnutrition (Kaan and Liese 2010). A fortification programme, after all, is more complex and involves coordinated actions by a range of players, than a tightly administered trial.³

2.2 Value chains perspective

The resistance to evidence of particular models of wheat flour fortification interventions in Pakistan and elsewhere suggests a need for broader evaluative frameworks that can make explicit some of the structural, institutional, and behavioural constraints which technocratic optimism overlooks. Although it emerged initially as a tool for business strategy, the value chains perspective gained wider applicability for an understanding of how private business might contribute to public policy goals such as nutrition.⁴ A value chain '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' (Hawkes and Ruel 2011: 3).

Maestre, Poole and Henson (2017) developed a simple framework to aid the design and assessment of sustainable public–private interventions for improving the nutrition of vulnerable populations through the consumption of nutrient-dense food useful for correcting biases such as technocratic optimism. Based on an extensive review of existing literature on agri-food value chains, their framework proposes a checklist of requirements which must be met with respect to producer incentives, consumer behaviour, and coordination, for the success of an intervention:

- On the consumer side, the intervention must factor in awareness about the nutritional value of the food, and needs to ensure that the food is available, acceptable in terms of tastes and cultural norms, and affordable, for the target population.

- For the intervention to be successful, the private sector must respond to incentives and be able to capture value along the value chain, and public policy must play an effective role with respect to coordination and regulation.

This system-wide view of an intervention is particularly useful for bringing perspectives from agriculture and food policy to bear on nutrition interventions which tend to be driven by health programming. We, therefore, use the Maestre *et al.* (2017) framework to map elements of the wheat flour value chain in Pakistan – including producer incentives, consumer behaviour, and regulatory governance – to place the generic model of the wheat flour fortification intervention in its broader institutional context. We probe whether and to what extent this intervention fulfils the requirements set out in Maestre *et al.* (2017), technocratic expectations notwithstanding.

2.3 Methodology

We draw on three sources to trace the wheat flour value chain in Pakistan: existing studies and reviews of the wheat sector and fortification projects; a representative sample survey of consumers in (wheat-growing) rural areas of Sindh Province; and qualitative fieldwork including interviews with stakeholders with interests along the value chain including policymakers, project implementers, farmers, millers, wholesalers, retailers, and consumers.⁵ Community-level qualitative research was carried out to understand consumer behaviour and preferences, and producer incentives. We conducted in-depth household interviews to probe factors behind consumer (and producer) choices with respect to the acquisition, storage, and use of wheat and wheat flour.

Three types of sites were purposively selected. First, we visited rural communities in a wheat-growing region of Sindh Province to understand both the producer end of the value chain as well as consumption patterns in a setting where locally produced wheat was in abundant supply. Second, low- to middle-income localities in the metropolis of Karachi were selected to gain insights into consumer behaviour in a market-dominated setting. Third, we wanted to observe a wheat flour fortification project at work. The only opportunity at the time of the fieldwork was in the region of AJK which had an ongoing fortification programme. We had aimed to interview informants in rural as well as urban areas in that region but were unable to visit rural sites due to security considerations. The main respondents in these communities were women and men in households with young children who were interviewed about any interaction they had with the wheat value chain – as producers and consumers. Although all our survey sites were relatively low-income communities, we took care to ensure that our respondents included the more marginalised individuals and households as well as the somewhat better-off ones.

3 Wheat flour value chains

3.1 Grain to flour

Pakistan grows around 23 million tonnes of wheat annually and domestic output is sufficient, in most years, to satisfy consumer demand (Pakistan, Ministry of National Food Security and Research 2014–15). Wheat is grown across the country, particularly in the irrigated plains of Punjab and Sindh which account for around nine-tenths of the total harvest (*ibid.*). The government occupies a strategic position in a sector otherwise dominated by the private sector. At harvest time, its procurement agencies – notably provincial food departments – purchase around a quarter of the crop at an officially designated support price. Government stock is subsequently sold to private mills at subsidised prices. The government’s involvement in the wheat economy is seen as the main plank of the country’s food security policy, which revolves around ensuring domestic stocks of wheat and preventing shortages and price spirals in urban markets (Gazdar 2015).

There is no precise data about other uses of the crop, but it is estimated that private traders and mills directly buy between 15 and 19 per cent of the harvest. Farmers are, therefore, thought to retain over 60 per cent of the harvest in the first instance. Only around half that amount is kept for self-consumption or seed. The rest is either used as in-kind payments (including to harvest labourers), or sold to private sector buyers.⁶

3.1.1 Alternative value chains: *chakkis* and mills

There are two alternate value chains for producing wheat flour: small-scale, traditional, community-level *chakkis* and large-scale flour mills spread across the country. Virtually all the grain which does not enter the market, such as that which is retained for self-consumption by farmers or is earned by labourers as in-kind payment, goes through a local *chakki*. For grain that customers bring for grinding, the *chakki* charges a small fee. The *chakki* system is the predominant value chain in wheat-growing rural areas of Punjab and Sindh, by which grain is crushed into wholewheat flour.⁷ *Chakkis* are not limited to rural areas; they are common in cities too. *Chakkis* also buy grain from the market, which is particularly the case in urban areas where customers do not, typically, have their own grain stores.

The second method is processing through large-scale flour mills spread across the country. These mills acquire grain from two sources. Licensed mills are supplied grain from government stocks at subsidised prices, and they are also free to buy grain from the open market. Nearly all of the grain procured by the government eventually ends up being processed in a licensed flour mill. Mills produce a range of varieties of flour from ‘regular’ to ‘fine’ qualities.

The relationship between government agencies (primarily the provincial food department) and privately owned licensed flour mills currently revolves around three parameters. One, mills are assigned quotas according to their processing capacities and their supply of government-procured grain is determined by this quota. Two, a mill

is obliged to produce a requisite quantity of regular flour against the supply of grain. Three, the ex-mill price of regular flour, whether it is made from government-supplied grain or grain acquired from the market, is agreed between the government and the mills association.⁸ This price is set by taking into account processing costs and other margins which are negotiated between the millers and the government. Industry sources claim that while all *atta* (flour) is subject to the food department's price regulation, 'fine' qualities with low bran content (or *maida*) are not. The average price of the all-purpose *maida* flour in 2016 was anywhere between 7 and 47 per cent higher than the price of regular flour in the same market. This price differential suggests that there might be incentives for the mills to divert some of their allocation of subsidised grain towards *maida* production.

3.2 Wheat economy of households

3.2.1 Wheat-growing rural region

Our sample survey of households in rural Sindh provided insights into consumption patterns in wheat-producing areas. Of the 939 households that reported using wheat flour *roti* as their main staple food, around two thirds had some grain from the harvest – either from their crop, or as in-kind payment for work done. But only 18 per cent had sufficient grain to last them the whole year. Others either bought grain to take to *chakkis* or bought flour. Nearly three-fifths of the wheat-consuming households in our sample (59 per cent) worried about not having enough food to eat. A third of the households reported that adults had gone to bed hungry at least once in the previous month, and in 19.3 per cent of the households even children had slept hungry in the last month.

During in-depth interviews in the wheat-growing region, the issue of quality came up in most conversations about different sources of flour. The experience of Raheela, whose family does not own land but receives grain for wages, was fairly typical:

We get compensated with wheat grain for our labour. We use one maund [a unit of weight, equal to about 40kg] every five or six days – we have a big family. When there is no work, we end up buying sarkari [government] flour from the local shop. The shop doesn't keep chakki flour. We prefer chakki flour – we don't like the consistency of milled flour. It feels like chewing gum and is sometimes white and at other times black, and causes stomach aches. (Raheela, age 27, Naushero Feroze District)⁹

Although mills can produce *atta* using either government or privately acquired grain, most respondents mill flour with the government system. Besides perceptions about quality in terms of freshness and adulteration, consumers in the wheat-growing area also expressed their preference for freshly ground *chakki* flour, referring to its nutritional value:

There is 'strength' in the real [pure] grain, not in the factory-milled flour which is mixed with other stuff. We prefer getting and storing grain to flour, because we get it crushed as needed. We like fresh flour. Grain has its own vitamins, but loose flour is adulterated. (Hamid, age 40, Naushero Feroze District)

3.2.2 Urban areas

We were surprised to find a strong preference for *chakki* flour in both of the Karachi fieldwork sites. In Azam Basti, along with factory-milled flour, a local *chakki* was also a main source of flour – and unlike communities in the wheat-growing areas, *chakki* flour was available all year round.

My husband brings 5kg of wheat which lasts a week. We make chapati. The shop is close by. Chakki flour is fresh and healthier. Flour from the mills is often stale. (Saima, age 36, Azam Basti, Karachi)

Bhittaiabad, by contrast, has stronger rural linkages, as many of its residents are recent rural–urban migrants. Residents brought grain from their villages to the city and used a local *chakki* much in the same way as their rural counterparts – that is, to grind their own grain.

We buy wheat from our village in Sindh and bring it over by bus. My husband or some other family member who visits the village brings it with them. We bring 40–60kg, and grind 25kg at a time. This lasts us a month. We don't have our own land but our village has a lot of wheat so my husband buys it at harvest time. The flour made from this wheat tastes good, and its roti has a nice colour. We don't buy milled flour. Our own wheat is better. (Huma, age 25, Bhittaiabad, Karachi)

Like their rural counterparts, many in Bhittaiabad are unable to stock up enough grain to last them the whole year. They need to rely on alternatives. Some opt for milled flour because it is cheaper than that from the *chakki*. Interviews with other informants in Karachi, including shopkeepers, confirm the availability of various types of flour – *chakki* as well as different grades of milled flour.

In the city of Muzaffarabad in AJK, we did not come across *chakkis* or *chakki* flour. This region does not have very much wheat cultivation and relies on milled flour. It is also a region where a wheat flour fortification initiative is currently active, with the claim that local mills (nearly all of which depend on government-supplied grain) are part of the programme. While most households we interviewed bought industrially milled flour, none were aware of the availability or benefits of fortified flour. 'Fine' flour (*maida*) is popular here and we were told that regular coarse flour, known in this area as 'red flour', is considered to be an inferior product and is consumed mostly by urban poor people and rural households. Some of the reasons for the unpopularity of mill *atta* here are similar to those in the wheat-growing region. It is suspected that red flour is made from poor quality grain and contains adulterants and impurities.

3.3 Issues highlighted for wheat flour fortification interventions

Past, current, and planned fortification interventions in Pakistan share one essential feature: they work with the industrial mill segment of the wheat flour value chain. This is in line with the view of influential international organisations that regard industrially milled flour as 'fortifiable' (WHO *et al.* 2009).¹⁰ These organisations recommend fortification as a viable strategy in countries where a large proportion of

the flour that is consumed is milled industrially. Moreover, fortification interventions in Pakistan seek to leverage existing public–private partnership between government (mostly provincial food departments) and licensed mills which are members of the Pakistan Flour Mills Association (PFMA). Our review of the wheat flour value chain reveals a number of institutional issues that are pertinent to the viability and success of wheat flour fortification interventions.

3.3.1 Data gaps

First, there are significant gaps in the data on key aspects of the wheat economy. While the PFMA website (PFMA 2016) reports a total of 915 mills across the country, other sources give divergent numbers.¹¹ The mills association publishes data on the aggregate milling capacity of its members, but no data are available on their utilisation of grain or their output of *atta* or *maida*. Gaffey *et al.* (2014) assert that around half of all households acquire their flour from the mills without citing a source. A key informant from an international non-governmental organisation (INGO) involved in a fortification programme was of the view that mills account for around 60 per cent of all flour consumed in the country. Other sources speculate that mills cater to the consumption needs of around 40 per cent of the population (Prikhodko and Zrilyi 2013). There is no precise data on the number of *chakkis* either – estimates range from 6,000 (a key informant from an INGO), 7,925 (a representative of the PFMA, Awan 2015) to 30,000 (Gaffey *et al.* 2014).

3.3.2 Consumer constraints and choices

Second, factors which determine the availability and consumption of fortifiable flour in preference to its alternatives vary across income groups and regions. For many of the poorest, the most salient nutritional issue is the acquisition of sufficient amounts of flour or bread to stave off hunger. But even families, such as that of Raheela mentioned previously, who opt for the cheapest alternative available, have a clear preference for particular types of flour. Rural consumers in wheat-growing areas, as well as urban migrants from those areas, prefer freshly ground *chakki* flour for its texture, taste, and the perception of 'goodness'. In non-wheat-growing areas and urban centres that have historically relied on milled flour (made from government issued wheat), coarse flour is considered to be an inferior product and the more expensive 'fine' flour (*maida*) is associated with upward mobility.

There is a seasonal element in the availability of different types of flour in the various regions. Wheat is harvested from March to May, and consumers in the wheat-growing regions maintain post-harvest stocks which last them several months. From around January onwards, most rural households rely on the market for their flour – either on local *chakkis* which have their own grain stores or on mill flour. The formal value chain around the larger flour mills also operates seasonally. While government procurement operations take place at harvest time, supplies from this stock begin only from around September and carry on until the next harvest. The availability of different grades of mill flour also varies seasonally and by region.

3.3.3 Prices and efficiency

Third, the wheat procurement and supply system has given rise to several types of inefficiencies. The government ends up with a virtual monopoly in the stock of wheat grain in most wheat-deficit areas. According to a Food and Agriculture Organization of the United Nations (FAO) study (Prikhodko and Zrilyi 2013), there is little incentive for the private sector to invest in storage capacity if the government is expected to subsidise the cost of holding stocks. Licensed private sector mills are then allocated quotas of subsidised grain from government stocks. The quotas are determined by mill size and this accounts for overinvestment in or over-reporting of milling capacity (Dorosh and Salam 2008). Prikhodko and Zrilyi (2013) estimate that the issue price of wheat to flour mills includes a subsidy element of around 15 per cent. The retail price of *chakki* flour, however, is only around 10 per cent higher than mill *atta*, and it remains competitive despite the industrial scale and public subsidy enjoyed by the modern value chain.

3.3.4 Regulatory weaknesses

The observations above point to regulatory weaknesses in the wheat economy, particularly in the relationship between government and mills. The absence of precise data on key aspects of the value chain underlines the lack of transparency in the utilisation of the public subsidy. Negative consumer perceptions about mill *atta* point to inadequate incentives and sanctions to ensure quality. The system has introduced costly distortions, and is unable to pass on the benefit of subsidies and industrial scale to consumers. Wheat fortification interventions seek to leverage existing public-private partnerships in a segment of the wheat flour value chain which is beset with regulatory lapses.

4 Fortification programmes

4.1 Fieldwork findings in Azad Jammu and Kashmir

There are 11 licensed flour mills in AJK, and apart from two mills in Mirpur which have special permission to buy some grain privately from Punjab Province, all of them rely exclusively on government-supplied grain. The mills are NI partners and, as such, have agreed to produce only fortified flour.¹² Fortified flour is available with retailers who act as licensed dealers. Other shops do not stock it. Most of the stores we visited, however, stocked flour from mills located in Punjab or elsewhere. We found only one licensed depot across Muzaffarabad and did not find fortified flour in any other retail outlet. Some shops stocked a local brand which had the tagline ‘full of nutrition’ on the packaging, but there was no specific mention of fortification on the bag.¹³ According to millers and wholesalers, rural poor people end up buying the fortified flour not because they know it is fortified but because they are constrained to buying the cheaper ‘red’ flour which happens to be fortified.¹⁴

At the one licensed depot that we found, the shopkeeper said he had little incentive to sell or keep fortified flour as it had a very small margin for him. He said that a 40kg bag of flour – whether it was fortified or not – sold for 1,500 rupees. He bought fortified flour for 1,486 rupees,

but could get non-fortified flour (from Punjab mills) for 1,360 rupees. Consumers, including those living close to the licensed depot were unaware of any fortification initiative.

It might be argued that constraints to the successful implementation of the NI project in AJK were partly related to the nature of the region itself. While the high level of reliance of AJK mills on government-supplied wheat from outside the region made AJK a good candidate for fortification, the fact that flour could be brought in easily from other non-fortification regions, also made the uptake of fortified flour more challenging. We believe, however, that our analysis of the wheat flour value chain as well as findings from AJK do have lessons for future interventions.

4.2 Current fortification plans

A new national-level plan for wheat flour fortification was initiated in 2016 with a grant from UK Aid. This project is to be implemented by a consortium of organisations (including NI) in partnership with provincial and federal governments. The wheat flour fortification element of this project is similar in some ways to past initiatives. The project aims to work with licensed flour mills and the PFMA to provide feeders, pre-mix, and training for flour fortification. The main lesson from past projects which is reflected in the initial thinking about programme design is the need for prior attention to mandatory fortification in the provinces, and the setting up of quality checking and enforcement mechanisms on the ground.¹⁵

5 Discussion

Technocratic optimism around the reduction in anaemia through wheat flour fortification is based on a number of assumptions about consumer behaviour, producer incentives, and regulatory action that appear to be unrealistic. There are questions about whether or to what extent the simple checklist of pro-nutrition value chains actions and processes identified by Maestre *et al.* (2017) are met by the generic design of flour fortification programmes that has shown resilience in Pakistan.

The availability of fortified flour to the target population is not simply an unresolved issue with respect to the relative size of the *chakki* value chain which is not subject to any of the fortification programmes. There are seasonal variations in the operation of industrial mills as well across different parts of the country. Existing evidence on the acceptability of fortified flour (e.g. Mahmood, Zeb and Khan 2007), is based on the blind testing of specially prepared batches of flour which are identical except for the addition of fortificants. A more realistic comparison will include the range of products of different qualities that are actually available to consumers across seasons and locations. The impact of wheat flour fortification on outcomes such as anaemia has been difficult enough to establish empirically under conditions where there is high and consistent exposure to fortified flour (Hurrell *et al.* 2010). It is likely to be considerably harder to show in a population where a large segment does not consistently consume fortified flour.

There are critical issues with respect to producer incentives and regulation. The AJK fieldwork reiterated regulatory weakness in the government–mills relationship as, perhaps, a basic institutional constraint which has ramifications not only for the quantity and outreach of fortifiable flour, but also on consumer perceptions about its quality. Mandatory fortification backed up by effective quality checking has been proposed as a solution to such problems (Gaffey *et al.* 2014). It is questionable, however, whether a technical response is sufficient to turn things around in an entire segment of the industry that has evolved around the capture, not of entrepreneurial rent (as envisaged in the value chains perspective), but of public subsidy.

6 Conclusion

Wheat is perhaps the most important food crop in the country, and being the main source of energy for large segments of the population, it occupies a central place in food security and nutrition policies. The government has a strategic position in the wheat flour value chain, even though private sector stakeholders are responsible for virtually all of the wheat grown and processed in the country. The persistence of felt as well as hidden hunger suggests that the existing system has failed to ensure food security for the population, even if it does prevent shortages and price spirals in urban markets. The system has, however, spawned inefficiencies, regulatory failures, and rent capture. Nutrition interventions such as wheat flour fortification need to be part of a broader reform agenda that has food security as its central objective.

Given the depth of the nutrition deficit in Pakistan, the delivery of essential nutrients through the fortification of a widely consumed staple food will remain an attractive proposition. The scientific and technical aspects of intervention design need to be seen alongside a range of factors which shape consumer behaviour and producer incentives. Fortification interventions that are not attentive to institutional constraints that perpetuate inefficiencies along the value chain are not likely to deliver on their potential. Will engagement with these arrangements lead to an unwitting endorsement of regulatory weakness and rent-seeking opportunity, or can it be used as a lever for much needed reform?

Wheat flour fortification and other food fortification initiatives across the globe are sustained, in part, by technocratic optimism which need to be corrected using other evaluative frameworks such as those offered by the value chains perspective. The possibility of the involvement of the business sector through public–private partnerships tends to magnify this optimism by holding out the prospect of commercial viability and long-term sustainability. The core narrative is appealing, indeed, as it combines the apparent certainty of science with the logic of the market. This case study of wheat flour fortification interventions in Pakistan is a cautionary tale that highlights some costs of ignoring process for output. It calls for taking a step back and asking whether existing public–private partnerships in the sector where the intervention is sought are ready for institutional reform.

Notes

- 1 Technocratic optimism has been shown to affect expert opinion and decision-making in a number of spheres (e.g. Clark, Robert and Hampton 2016), and is thought to be stronger among specialised experts in a given field compared with individuals with broader areas of expertise (Tichy 2004).
- 2 In fact, as Bishai and Nalubola (2002) show, following the success of salt iodisation in eliminating goitre in the US Midwest in the 1920s, the championing of other forms of food fortification (notably that of wheat flour and bread with iron) was based on technocratic optimism rather than specific evidence of impact.
- 3 Evidence of positive impact of flour fortification programmes is, understandably, even more ambivalent than that based on trials (Hurrell *et al.* 2010; Pachón *et al.* 2015).
- 4 A brief account of how the value chains perspective evolved with respect to nutrition is offered in the accompanying case study on the dairy sector in Pakistan in this issue (see Ansari *et al.*, this *IDS Bulletin*).
- 5 The Women's Work and Nutrition survey undertaken for LANSAs in collaboration with the Collective for Social Science Research and the Leverhulme Center for Integrative Research on Agriculture and included modules related to the consumption end of wheat flour.
- 6 These aggregate harvest shares are based on Dorosh and Salam (2008), who in turn, base their estimates on a survey of farmers in Punjab and Sindh in the late 1990s.
- 7 Key informant interview, sector expert, Islamabad. Bran content of flour produced by *chakkis* cannot be extracted.
- 8 While the ex-mill price is regulated by the provincial food department, wholesale and retail price regulation comes within the domain of other market regulation authorities in most areas.
- 9 The community-level fieldwork interviews cited in this article took place 13–30 May 2016.
- 10 Designating industrially milled flour as 'fortifiable' is to do with the available fortification technologies rather than the milling process itself.
- 11 Gaffey *et al.* (2014) record 1,200 mills, and the logframe of DFID's (UK Department for International Development, also UK Aid) food fortification project in Pakistan (DFID 2016a) notes a total of 1,202 licensed mills. A 2015 presentation by an expert associated with the PFMA claims that there were 1,575 mills registered with the association (Awan 2015).
- 12 According to the programme director, the choice of AJK for the MI fortification project was partly motivated by the fact that the region has a high proportion of fortifiable wheat, and that there is greater government control over the supply of grain (Naqash 2015).
- 13 It was surprising, given the claim that all local mills relied exclusively on government-supplied grain, that this AJK mill produced flour other than the regular fortified variety.
- 14 In the rural localities close to Muzaffarabad that we visited, retailers did not report stocking fortified 'red' flour. We were unable to visit more remote rural areas due to security-related travel restrictions.

15 Gaffey *et al.* (2014) draw this lesson from the unpublished evaluation of an earlier national wheat flour fortification project.

References

- Awan, M.T.S. (2015) *Wheat Flour Fortification Status in Pakistan and Entrepreneurial Approaches*, www.slideshare.net/tariqsarwqarawan/wheat-flour-fortification-status-in-pakistan-and-entrepreneurial-approaches (accessed 10 March 2017)
- Balagamwala, M. and Gazdar, H. (2013) 'Agriculture and Nutrition in Pakistan: Pathways and Disconnects', *IDS Bulletin* 44.3: 66–74, <http://bulletin.ids.ac.uk/idsbo/article/view/236> (accessed 13 October 2017)
- Bhutta, Z.A. *et al.* (2013) 'Evidence-Based Interventions for Improvement of Maternal and Child Nutrition: What Can Be Done and at What Cost?', *The Lancet* 382.9890: 452–57, [http://dx.doi.org/10.1016/S0140-6736\(13\)60996-4](http://dx.doi.org/10.1016/S0140-6736(13)60996-4) (accessed 7 November 2017)
- Bishai, D. and Nalubola, R. (2002) 'The History of Food Fortification in the United States: Its Relevance for Current Fortification Efforts in Developing Countries', *Economic Development and Cultural Change* 51.1: 37–53
- Clark, B.B.; Robert, C. and Hampton, S.A. (2016) 'The Technology Effect: How Perceptions of Technology Drive Excessive Optimism', *Journal of Business and Psychology* 31.1: 87–102, <https://doi.org/10.1007/s10869-015-9399-4> (accessed 7 November 2017)
- Danton-Hill, I. (1998) 'Overview: Rationale and Elements of a Successful Food-Fortification Programme', *Food and Nutrition Bulletin* 19.2: 92–100
- Das, J.K.; Salam, R.A.; Kumar, R. and Bhutta, Z.A. (2013) 'Micronutrient Fortification of Food and its Impact on Woman and Child Health: A Systematic Review', *Systematic Reviews* 2: 67, doi:10.1186/2046-4053-2-67 (accessed 7 November 2017)
- DFID (2016a) *Logical Framework – 204023*, Supporting Nutrition in Pakistan (SNIP), <https://devtracker.dfid.gov.uk/projects/GB-1-204023/documents> (accessed 7 March 2017)
- DFID (2016b) *Terms of Reference for the Food Fortification Component of the Supporting Nutrition in Pakistan Programme*, Supporting Nutrition in Pakistan (SNIP), www.contractsfinder.service.gov.uk/Notice/b9978272-c841-40ec-8b52-4bb953d2fbc0 (accessed 7 March 2017)
- Dorosh, P. and Salam, A. (2008) 'Wheat Markets and Price Stabilisation in Pakistan: An Analysis of Policy Options', *The Pakistan Development Review* 47.1: 16
- Gaffey, M. *et al.* (2014) *Pakistan Food Fortification Scoping Study*, Research Report, Seattle WA: PATH
- Gazdar, H. (2015) 'Food Prices and the Politics of Hunger: Beneath Market and State', *IDS Bulletin* 46.6: 68–75, <http://bulletin.ids.ac.uk/idsbo/article/view/51> (accessed 13 October 2017)
- Gazdar, H. and Mysorewala, A. (2016) *Large Surveys and Small Voices: Meanings of Hunger in Pakistan*, Joint Agency Research Report, Brighton: IDS and Oxfam International

- Gera, T.; Sachdev, H.S. and Boy, E. (2012) 'Effect of Iron-Fortified Foods on Hematologic and Biological Outcomes: Systematic Review of Randomized Controlled Trials', *American Journal of Clinical Nutrition* 96.2: 309–24, doi:10.3945/ajcn.111.031500 (accessed 7 November 2017)
- Government of Pakistan (2011) *National Nutrition Survey 2011*, conducted by Agha Khan University, Agha Khan: UNICEF
- Hawkes, C. and Ruel, M.T. (2011) *Value Chains for Nutrition*, paper 4 prepared for the IFPRI 2020 International Conference 'Leveraging Agriculture for Improving Nutrition and Health', New Delhi, India, 10–12 February
- Hurrell, R. *et al.* (2010) 'Revised Recommendations for Iron Fortification of Wheat Flour and an Evaluation of the Expected Impact of Current National Wheat Flour Fortification Programs', *Food and Nutrition Bulletin* 31.1 (supplement)
- Kaan, C. and Liese, A. (2010) 'Public Private Partnerships in Global Food Governance: Business Engagement and Legitimacy in the Global Fight Against Hunger and Malnutrition', *Agriculture and Human Values* 28.3: 385–99
- Maestre, M.; Poole, N. and Henson, S. (2017) 'Assessing Food Value Chain Pathways, Linkages and Impacts for Better Nutrition of Vulnerable Groups', *Food Policy* 68: 31–39
- Mahmood, F.; Zeb, A. and Khan, N. (2007) 'Comparative Acceptability Studies on Roller-Milled Wheat Flour Fortified with Three Different Iron Fortificants in Pakistan', poster presented at Micronutrient Forum: Consequences and Control of Micronutrient Deficiencies, Istanbul, Turkey, 16–18 April
- May, C.; Mort, M.; Williams, T.; Mair, F. and Gask, L. (2003) 'Health Technology Assessment in its Local Contexts: Studies of Telehealthcare', *Social Science & Medicine* 57.4, doi:10.1016/S0277-9536(02)00419-7 (accessed 7 November 2017)
- MI (2015) 'MI Experience in Pakistan', internal Micronutrient Initiative document
- Naqash, T. (2015) 'Wheat Flour Fortification Project Launched in AJK', *DAWN*, 9 June, www.dawn.com/news/1187086 (accessed 13 October 2017)
- Pachón, H.; Spohrer, R.; Mei, Z. and Serdula, M.K. (2015) 'Evidence of the Effectiveness of Flour Fortification Programs on Iron Status and Anemia: A Systematic Review', *Nutrition Reviews* 73.11: 780–95, <https://doi.org/10.1093/nutrit/nuv037> (accessed 7 November 2017)
- Pakistan, Ministry of National Food Security and Research (2014–15) *Agricultural Statistics of Pakistan*, Ministry of National Food Security and Research, www.mnfsr.gov.pk/ (accessed 3 March 2017)
- PFMA (Pakistan Flour Mills Association) (2016) www.thepfma.com/ (accessed 13 February 2017)
- Prikhodko, D. and Zrilyi, O. (2013) *Review of the Wheat Sector and Grain Storage Issues*, FAO Investment Centre, World Bank Cooperative Programme, Rome: Food and Agriculture Organization of the United Nations (FAO)

- Tichy, G. (2004) 'The Over-Optimism Among Experts in Assessment and Foresight', *Technological Forecasting and Social Change* 71.4: 341–63, <https://doi.org/10.1016/j.techfore.2004.01.003> (accessed 7 November 2017)
- WHO, FAO, UNICEF, GAIN, MI and FFI (2009) *Recommendations on Wheat and Maize Flour Fortification*, Geneva: World Health Organization (WHO)
- Yach, D.; Feldman, Z.A.; Bradley, D.G. and Khan, M. (2010) 'Can the Food Industry Help Tackle the Growing Global Burden of Undernutrition?', *American Journal of Public Health* 100.6: 974–80, doi:10.2105/AJPH.2009.174359 (accessed 7 November 2017)
- Zuberi, S.; Mehmood, R. and Gazdar, H. (2016) *Review of Agri-Food Value Chain Interventions Aimed at Enhancing Consumption of Nutritious Food by the Poor: Pakistan*, LANSA Working Paper 7, Brighton: Leveraging Agriculture for Nutrition in South Asia (LANSA)

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Food Distribution Value Chains under the Integrated Child Development Services*

Bhavani RV and Rohit Parasar

Abstract Globally, social provisioning of food is recognised as an important means to reduce the prevalence of malnutrition. Government food distribution programmes have potential for impact at scale in this context. This article examines the food distribution value chain of the Supplementary Nutrition Programme (SNP) under the Integrated Child Development Services (ICDS) scheme of the Government of India, targeted at pregnant and lactating women and children below six years of age. Following the conceptual framework outlined in Maestre, Poole, and Henson (2017), the article examines two different models in operation under the SNP value chain in two states of India: Telangana, where a state enterprise is engaged in the manufacture of fortified premix for distribution, and Tamil Nadu, which follows a public-private partnership (PPP) model. The article highlights the challenges and opportunities associated with the two models and attempts to provide insights for designing better delivery under public food distribution value chains.

Keywords: value chain, nutrition, social protection, food distribution, state enterprise, PPP, ICDS, Supplementary Nutrition Programme.

1 Introduction

Globally, one finds that public expenditure in agriculture and the role of the government is central to food safety nets (del Ninno and Mills 2015; FAO 2015a). There exist different examples of social protection programmes to promote food and nutrition security, such as school nutrition programmes, cash-for-work programmes, and nutrition-sensitive behaviour change programmes (FAO 2015b). Public distribution of food through social protection measures is an important source of nutritious food for poor people in some developing countries. Furthermore, if these food distribution programmes are targeted to key groups, such as women and children, they have the potential for impact on nutritional outcomes (GloPan 2014).

Food distribution programmes can be seen as a potential post-farmgate agri-food value chain pathway through which poor and vulnerable

target groups can gain access to nutritious food and thereby improved dietary diversity (Maestre, Poole and Henson 2017). A number of studies over the last decade have examined the scope and effectiveness of agri-food value chains for nutrition (Allen and de Brauw 2017; Henson, Humphrey and McClafferty 2013; Gelli *et al.* 2015; Hoddinott, Gillespie and Yosef 2015; Hawkes and Ruel 2011). However, researchers agree that focus on consumers has been largely missing in value chain development (Gelli *et al.* 2015). Henson and Humphrey (2015) and Maestre *et al.* (2017) bring in this focus, by linking the agri-food value chains with the households that consume the food, using a post-farmgate or markets perspective.

Following the framework outlined in Maestre *et al.* (2017), this article examines the food distribution value chain of the Supplementary Nutrition Programme (SNP) under the Integrated Child Development Services (ICDS) scheme in India and the mode of its operation in two states of the country. The state-led SNP value chain operates at scale and has scope for public-private partnerships (PPPs) and community engagement. The aim of this article is to review the operation of the value chain of the SNP in producing and distributing nutrient-rich products to undernourished populations and understanding the policy options to make them more effective.

We review two models, the state enterprise model in Telangana and the PPP model in Tamil Nadu (TN). Section 2 discusses the methodology, followed by a description of how the SNP functions and the value chain in operation in each state; the similar and different characteristics of each approach are discussed in Section 3; the concluding section summarises the findings, focusing on insights for designing better delivery under public food distribution value chains.

2 Methodology

The methodology followed for the study comprised: (1) a desk review of literature on food distribution programmes, documents (reports, government circulars) on the ICDS scheme, secondary data on coverage under the scheme in the two states; and (2) primary data collection via key informant interviews with (i) government officials, and (ii) manufacturers of fortified food given as take home rations (THRs); and interviews with a sample of actors at the lower end of the value chain such as *anganwadi*¹ workers (AWW) at the ICDS/*anganwadi* centres (AWCs) and consumers.

First, the desk review was undertaken to collect relevant information from secondary sources, including published reports and government websites. Following this, officials at the director and deputy-director level coordinating the programme in each state were contacted for a clear understanding of the value chain. With their permission, a qualitative assessment of the value chain under SNP was undertaken through interviews with the different actors, by visiting a few ICDS centres and the manufacturing units. At the AWCs, the objective was to get broad

feedback on the programme delivery from the officials and consumers, and no sampling method was adopted to choose the centres. A checklist of questions was used to guide the qualitative interviews.

We met with concerned officials in the Department of Women Development and Child Welfare in Hyderabad, Telangana; visited and interacted with the functionaries and women beneficiaries at three rural/suburban AWCs; and visited and had discussions with officials at Telangana Foods (TF), the public-sector manufacturer of the weaning food. In TN, we met with officials in the Department of Social Welfare and Nutritious Meal Programme in Chennai and visited: (i) eight AWCs, two each in urban, rural, suburban, and tribal areas; (ii) two women cooperative societies manufacturing weaning food; and (iii) the manufacturing unit of the private sector company manufacturing the blend for weaning food.

The information collected was analysed using the framework discussed in Maestre *et al.* (2017) on how the value chain addresses: (i) the three desired outcomes, viz. food safety, food being nutrient-dense at point of consumption, and food being consumed in adequate amounts on a sustained basis; and (ii) the consumer- and supplier-side requirements for the desired impact on nutrition outcomes.

3 The SNP under the ICDS scheme

The ICDS scheme is a mandated national social protection measure launched by the Government of India in 1975. Targeted at women and children, it aims to provide essential services to ensure the health and nutrition outcomes of children 0–6 years of age, adolescent girls, pregnant women, and lactating mothers (GoI 2011). The programme operates through AWCs at the village level in rural areas and at the municipality level in urban areas, with prescribed norms of population per centre. The SNP is part of the ICDS scheme, and is an agri-food distribution value chain initiative to improve the nutrition status of these vulnerable groups. As of September 2016, there were 1.35 million AWCs in the country, catering to an average of 75 beneficiaries per centre under the SNP (GoI 2017a).

The AWW and the helper/cook are the key personnel responsible for all the activities at each ICDS centre. The AWW, generally a woman with education up to at least secondary school level, is responsible for managing the AWC and delivering all the services that are to be provided under the scheme, including the feeding and monthly growth monitoring of children (see Parasar and Bhavani RV (forthcoming, 2018) for details on the structure and operation of the programme).

The Ministry of Women and Child Development, Government of India (GoI) is the nodal ministry for the ICDS scheme implemented by all the states of the country.² Variations exist in the name of the nodal department across states; the programme is headed in each state by an official at director level belonging to the Indian Administrative Service

with a team under him/her spread across the districts. Each state has freedom within the mandated framework to make extra budgetary allocation and decide how to produce and distribute the food under the SNP.

3.1 Production models under the SNP in Telangana and Tamil Nadu

As mentioned, the two states under study in this article are Telangana and TN. Telangana is a young state formed in mid-2014 following bifurcation of the state of Andhra Pradesh (AP). There were 35,700 AWCs under 149 ICDS projects as of September 2017 reaching out to 2.8 million beneficiaries.³ TN has been a forerunner in social protection schemes, having been the first state in the country to pilot school meal programmes. There were 54,439 ICDS centres or AWCs under 434 projects in the state reaching out to 3.5 million beneficiaries as of October 2016.⁴

The food production and distribution strategies under the SNP in each state are discussed first in this section before examining the value chain.

3.1.1 Target consumers and food provided under the SNP

A. Women

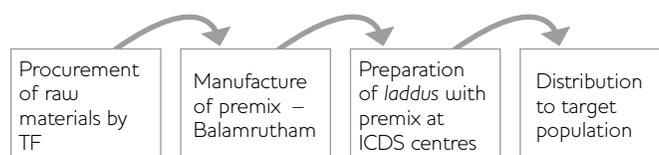
In Telangana, pregnant women and lactating mothers of infants (0–6 months) are entitled to a full meal at the centre under the Arogyalakshmi programme.⁵ The SNP meal comprises rice, pulses and vegetables, and covers 40–45 per cent of the daily calorie requirement for pregnant and lactating women. Freshly cooked food is served every day at lunchtime according to a weekly predefined menu. Spot feeding ensures that the food is consumed by the target population. Milk, a naturally nutrient-dense food often not affordable to poor households, is also provided under the programme.

In TN,⁶ pregnant women are given a fortified premix made of wheat, millet, pulses with *jaggery* (cane sugar) added for taste in prescribed ratios in the form of THR, as a supplementary food. The premix is given to the women on a fixed day every week. Previously, women had to consume the premix at the AWC itself to ensure consumption by the intended person. However, many women were unable to visit the centre every day due to potential loss of wages, and thus the process was changed. The prescribed amount to be consumed by women in the antenatal and postnatal stages is 160g of premix/day, which provides 616kcal of energy and 15.6g of protein.

B. Children

The SNP targets reduction of undernutrition in children below six years of age through provision of therapeutic food and freshly cooked meals.

In Telangana, 'Balamrutham',⁷ a therapeutic food made from roasted wheat, chickpea, skimmed milk powder, sugar and oil, and fortified with eight micronutrients, is given to mothers as THR to feed children aged below three years; the recommended daily intake of 100g (0.22lb) of Balamrutham ensures 50 per cent of the recommended dietary intake (RDI) required by children of this age. In addition, 16 eggs a month

Figure 1 Supply chain of premix under SNP in Telangana

Source Authors' own, based on qualitative assessment.¹²

are given as THRs. Children aged between three and six years come to the AWC and are fed the same meal that is given to women under the Arogyalakshmi programme. They are also fed a ready-to-eat extruded snack⁸ manufactured by TF with wheat and maize flour, chickpea, and fortified with micronutrients.

In TN, children (6–36 months) are given 130g/day of the same fortified premix that is provided to women, accounting for 500kcal of energy and 12.67g of protein. Children aged between one and two years also get a boiled egg every Wednesday. Children aged between two and three years are entitled to a boiled egg three times a week and a full meal at the centre; however, given their very young age, not many have meals at the AWC. Children aged between three and six years are provided with hot cooked meals and the menu is a variety of rice and pulses/boiled egg.⁹ Salt fortified with iron and iodine is used.

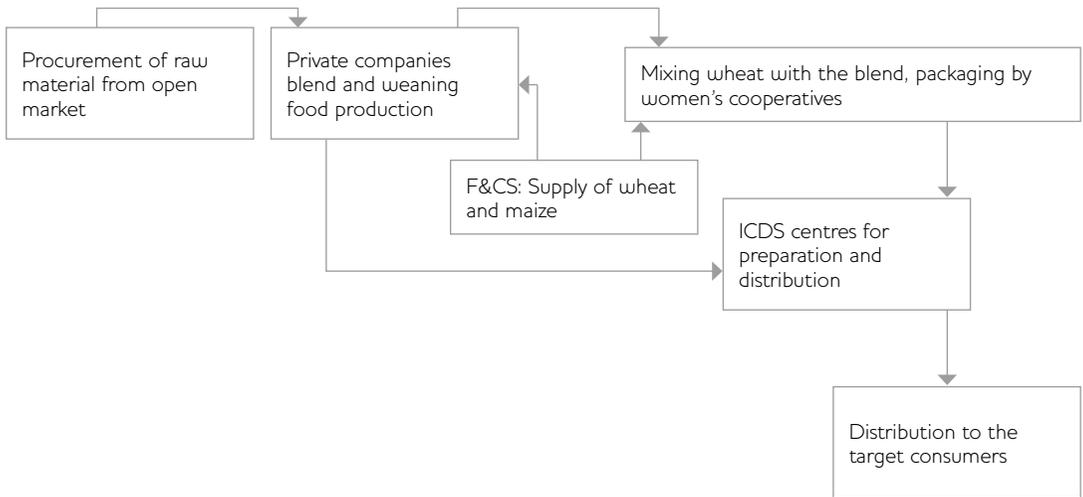
In both states, children classified as 'severely malnourished' during monthly growth monitoring are provided extra nutrition until their status improves.

3.2 The SNP value chain

The cereals and pulses required for cooking at the AWCs are procured centrally from the Food & Civil Supplies (F&CS) department of the government. The AWW is responsible for the purchase of condiments, spices, and vegetables. The vegetables are usually purchased from the local market and the quantity of vegetables varies according to the market price, in order to manage within the available budget. Children are encouraged to bring vegetables from their homes to encourage community contribution and engagement. However, this practice is not very popular, as explained in Section 4.

The value chain for the manufacture of fortified premix is, as expected, more elaborate. In Telangana, the state owns Telangana Foods (TF), an ISO-certified state government enterprise that manufactures Balamrutham and other extruded snacks for SNP. The company, originally AP Foods, was established by the government of undivided Andhra Pradesh (AP) in 1974 with support from the central government, UNICEF, and the international humanitarian agency CARE, specifically for producing and supplying nutritious foods to malnourished schoolgoing and pre-school children, pregnant women, and lactating mothers. It is governed by the Essential Services Maintenance Act.¹⁰

Figure 2 Supply chain of premix under SNP in Tamil Nadu



Source Authors' own, based on qualitative assessment.

Following the bifurcation of AP in 2014, the company located in Hyderabad in Telangana was renamed Telangana Foods (TF).

Figure 1 outlines the value chain for the preparation of premix by TF. Wheat is procured from the Food Corporation of India.¹¹ The sourcing of other food materials is through a process of competitive bidding for suppliers under a tender call by TF.

The packaging of the product is aligned with the guidelines of the Indian Institute of Packaging; the institute suggests the parameters for labelling, packaging material, and other biological and chemical parameters. An official informed the authors that the company sells all disposable and scrap material every year, the proceeds of which – amounting to approximately ₹1 million in some years – are added to the company's corpus fund, which is used for capital investments.

In Telangana, the public enterprise model ensures some of the essential requirements for adequate nutritional intake, including of micronutrients and high energy food by children, with due attention to quality and food safety aspects. The model is cost-effective as pricing is done in consultation with the government departments and is as per the allocation available under the relevant programme. The company had embarked on capacity expansion with support from the Global Alliance for Improved Nutrition (GAIN) prior to state bifurcation; it is, however, currently catering only to Telangana state instead of the whole of AP¹³ and therefore has underutilised capacity.

TN follows two different PPP models for production of the premix: (i) tripartite partnership with state-promoted cooperatives of women from low-income households and a private sector manufacturer; and

Table 1 Cost and nutrient norms of the SNP under the ICDS scheme

Target group	Cost norms (per beneficiary/day) INR	Cost norms (per beneficiary/day) £	Calories (kcal)	Protein (grams)
(i) Children (6–72 months)	6.00	0.07	500	12–15
(ii) Severely underweight children (6–72 months)	9.00	0.11	800	20–25
(iii) Pregnant and lactating women	7.00	0.08	600	18–20

Note 1 gram: 0.002 pounds; INR/£: 0.01135.

Source Government of India, Ministry of Women and Child Development.¹⁷

(ii) partnership only with a private sector manufacturer. In the first model, the private enterprise manufactures a premix blend with chickpea, malted finger millet, *jaggery*, and the micronutrient fortificant. The women's cooperatives are responsible for sourcing, roasting and milling wheat into flour, mixing it with the blend in the prescribed ratio, and packing and supplying it to the AWCs. In the second model, the entire process from production to delivery is handled by the private company. Twenty-five women cooperatives engage in the manufacture and supply of weaning food to AWCs across 25 districts and cater to about 75 per cent of the premix requirement. On average, a cooperative member earns around INR17,000 (£193) a month from this activity.

Figure 2 gives a diagrammatic representation of the value chain under the two models.

The blend manufacturers are contracted by the government through a competitive bidding process; currently, there are two private sector players: Rasi Nutri Foods (RNF)¹⁴ and Christy Friedgram Industry (CFI).¹⁵ RNF manufactures and directly supplies the premix to centres in ten districts; CFI directly supplies premix in four districts and the blend to the 25 women cooperatives for the manufacture of the premix.

4 Comparing the two SNP models: Telangana and Tamil Nadu

The SNP under the ICDS scheme reaffirms the states' commitment to improving the nutritional status of children and their mothers. There is scope for active engagement of private business and civil society for effective delivery under these initiatives; this section throws some light on this by comparing the models in Telangana and TN.

4.1 Analysis of expenditure on SNP

The costs of the programme as per the national norm are shared equally by the centre and states; extra allocations, if any, are to be met from the budgets of respective states. Both TN and Telangana states are currently spending more under the SNP than the budget allocation norms set by the Government of India, summarised in Table 1.¹⁶

The cost, for instance, of the hot meal under the Arogyalakshmi programme in Telangana at INR21 (£0.24)/woman/day is three times

Table 2 An estimate of cost to exchequer for providing hot cooked meals to women under the ICDS scheme

State	No. of women	Cost per day per head (INR)	Estimated total annual expenditure (million INR)	GSDP current prices 2015–16 (million INR)	Percentage of GSDP
Telangana	531,310	21 (₹0.24)	3,458.8 (₹40)	5,831,172.5 (₹66,170)	0.059
Tamil Nadu	649,249	21 (₹0.24)	4,226.6 (₹48)	12,126,679.9 (₹137,610)	0.035

Note Exchange rate as of 26 September 2017: INR/₹: 0.01135).

Sources No. of women covered by the SNP under the ICDS scheme: <http://wdcw.tg.nic.in/index.html#>; http://icds.tn.nic.in/all_categories.html;

Reported per head/day cost: http://wdcw.tg.nic.in/Arogya_Lakshmi.html;

Nominal GSDP: NITI Aayog State Statistics: <http://niti.gov.in/state-statistics>.

the national norm of INR7 (£0.08)/day for pregnant and lactating women, i.e. Telangana state spends INR17.5 (£0.22) per woman instead of its prescribed share of INR3.5 (£0.03). The cost per head of a hot meal and snack for children aged between three and six years at INR7.26 (£0.08)/day is also higher than the norm of INR6 (£0.07)/day.

In TN, where the women are given premix instead of a hot cooked meal, the cost per head at INR10.22 (£0.12)/day is higher than the norm, and the state spends an additional INR6.72 (£0.08)/woman/day. The cost per head for children aged 6–36 months is also higher at INR8.3 (£0.09)/day.

Going a little further, the cost of providing hot cooked meals under the Arogyalakshmi programme in Telangana for 310 days in a year was examined. Calculating on the basis of coverage and the given per head cost, it is seen that the total expenditure even without considering central contribution amounts to only 0.06 per cent of the gross state domestic product (GSDP) of the state (see Table 2). Although a hot cooked meal is not provided to pregnant women in TN, the estimated cost, if provided, was worked out using the same per head cost as in Telangana, to further examine this aspect. Taking the number of women reported to be covered under the scheme in TN, the cost worked out to a little under 0.04 per cent of the state's GSDP.

This cost is only that of providing the hot cooked meal to pregnant and lactating women, and not the premix. The analysis reveals that it will account for only a small share of government expenditure if any other state in India were to consider providing a hot cooked meal towards targeted nutrition for pregnant and lactating women from poor households.

It was further examined whether the additional amount spent has any association with the prevalence of undernutrition in children, using state-level data for nutrition outcome indicators. The analysis showed a significant negative association of per capita expenditure on the SNP with a prevalence of undernutrition, i.e. higher state spending on the SNP is associated with a lesser proportion of child undernutrition

Table 3 Child nutrition and health indicators: Telangana, Tamil Nadu, and all India

	Stunting (%)	IMR (per 1,000)	U5MR (per 1,000)
Telangana	28.1	28	32
Tamil Nadu	27.1	21	27
India	38.4	41	50

Note IMR: infant mortality rate; U5MR: under-5 mortality rate.

Source Gol 2017b.

(Parasar and Bhavani RV forthcoming, 2018). Both Telangana and TN are also found to have better child mortality and nutrition rates compared to the national average (see Table 3).

The literature suggests that early childhood development initiatives directed towards the poorest children can have significant returns on investment for economic growth in the long term (Lake 2011; UNICEF 2012). The SNP focuses on improving nutritional intake by providing both 'spot feeding' at the ICDS centres through hot cooked meals and THRs in the form of fortified premix to provide supplementary nutrition to the targeted households. Studies show less prevalence of undernutrition in children in areas with significant coverage of ICDS centres and among children registered with the centres versus others (Kapil and Pradhan 1999; Saxena and Srivastava 2009).

4.2 Assessment of the value chain

Following the three requirements for desired impact, viz. food must be 'safe to eat', 'nutrient-dense at the point of consumption', and 'consumed in adequate amounts on a sustained basis' (Maestre *et al.* 2017), the hot cooked meal programme that targets children >3 years in both states and also women in Telangana, addresses the issues of both ensuring consumption and fulfilment of the three desired outcomes. It is an important and non-substitutable part of the programme; the menus take into account different food groups and the prescribed serving for different age groups address the issues of being nutritious and adequate. The AWW and cook are trained to keep the centres clean, and to cook and serve in a hygienic environment. In the case of THRs, however, it is difficult to ensure sufficient consumption, although targeted consumers are oriented on the quantity to be consumed and the importance of consuming it.

On further examining the five consumer requirements of *signalling*, *availability*, *affordability*, *awareness*, and *acceptability* discussed in Maestre *et al.* (2017), one finds that the first three requirements do not strictly apply here: as this is a state-mandated food distribution programme, the prescribed menu addresses nutritional requirements and is made available to those who are registered with and come to the centres; food is available throughout the year at the centres as a buffer stock of food grains and other necessary logistic support are well managed

by the relevant government department. Price fluctuations, however, have implications for the availability of vegetables which have to be procured from the market. Encouraging households to donate vegetables to the centres is not popular: 'People ask why we should donate when government is providing allocation for buying vegetables' (response of AWW in Vasanapatti, Thinnanur Panchayat, TN).¹⁸

The target consumers are oriented and made aware on the importance of consuming nutritious food, addressing the requirement of *awareness*. In both states, consumers were aware about the importance of hot cooked meals and fortified food provided at the centres. Consumers perceived the food to be nutritious as it is distributed by the government to address undernutrition, pointing to its credibility:

I like the taste. Even if I dislike it, I would consume it... it is good for my health. (Response of a woman in her eighth month of pregnancy, AWC in Taramani, Chennai, when asked about the taste of the premix¹⁹)

Yes. Tastes good, Healthy... It is good for both the mother [pregnant woman] and her child [foetus]. There is some weight gain... As she is not having food properly, we feel this [THR] will help her. (Response of above respondent's mother, AWC, Taramani, Chennai²⁰)

Labelling the produce with nutritional information reinforces the credibility of the fortified premix. In TN, the bulk packets supplied to the AWCs have the necessary labelling, but the premix is distributed in loose packets to the target population. This can undermine the assurance of food safety and needs attention.

The last requirement, '*acceptability*', is important for ensuring consumption and was found to have influenced the food served. For instance, in Telangana, officials mentioned that people did not like the ready-to-cook food served earlier because its palatability was reduced once the food became cold. Pregnant women and lactating mothers at the three centres visited were appreciative of the hot meals they were getting now at the centres. The AWWs we spoke to also felt that the women appreciated the Arogyalakshmi programme and came to the centre for the meal. However, it is not possible to make a generalised statement about their regularity, based on this limited assessment. In TN, the practice of consuming the premix at the centre was changed to THRs as some working women were not able to come daily to the centre; hence the model was changed to be *acceptable* for the women, as mentioned in Section 3.1.

Maestre *et al.* (2017) also outline five supply-side requirements, to ensure that the value chain is stable and reliable, viz. 'capturing value', 'distribution of incentives along the value chain', 'coordination and governance', 'managing costs, risk and uncertainty', and 'appropriate institutional environment'.

It is difficult to assess the element of *'capturing value'* under a state-mandated programme; it would require an assessment of the cost versus impact; however, we may assume that the private players in TN are capturing some of the value as they remain suppliers of the state. Within the PPP, the *'distribution of incentives'* and *'coordination and governance'* aspects are addressed, as observed in the case of both the women cooperatives and private player in TN; this is not, however, relevant in the case of the state enterprise model in Telangana. The staple cereals provided under the SNP are procured and supplied by the government, thereby ensuring *'management of costs, risk and uncertainty'* for this part of the agri-food value chain. But in the case of vegetables that have to be procured from the market, the serving amount and/or quality is likely to vary with volatility in prices, in order to manage within the cost allocated; this will affect the consumer requirement of *availability* of nutrient-dense food. Vegetable markets in India are not always efficient (Gandhi and Namboodiri 2002), so sourcing vegetables from these markets with a fixed budget allocation can be a challenge. Linking local vegetable growers with the AWCs could be a possible approach to address both the supplier and consumer requirements in this case. Examples in this line are women's groups growing and supplying vegetables for the school nutrition programme in Bangladesh (Islam and Ul-Kabir forthcoming, 2018) and procurement directly from family farmers under Brazil's Food Acquisition Programme (PAA) for distribution to vulnerable groups covered by social assistance, cited in Hawkes and Ruel (2011).

In the case of the manufacture of premix, bringing in a private partner in TN helped with better *management of costs, risk, and uncertainty* by the women's cooperatives. The private company is better equipped to source raw materials that have to be procured from the market, and would ideally have built in the costs for this when applying for the bid.

The state-led programme also determines the *'institutional environment'* of operation for businesses that engage with it under the PPP framework. The private business partners in TN come through a process of competitive bidding and operate on a commercial basis; their operations are not restricted to catering only to the SNP. Such engagement under state-led food distribution programmes can be an effective way of involving business in reaching nutrient-rich foods to poor and vulnerable populations. Robinson and Humphrey (2014) make a similar observation based on their study in Nigeria. Including women cooperatives in the value chain is part of the state's approach to nurture such initiatives. In Telangana, the situation of underutilised capacity calls for state action to ensure operation of the state enterprise at full capacity.

Gender is a key focus in the SNP value chain with women in a vulnerable phase of their lifecycle being a core target group, not only providing food, but also nutrition awareness for future generations; the value chain also provides employment opportunities to women as AWWs and helpers. Further, in TN, the women's cooperative in the value chain enables women from economically deprived households to gain an assured income.

5 Conclusion

Studies have shown that developing countries have low dietary quality with dominance of starch and carbohydrate in diets (Ruel 2003). This makes the SNP an important vehicle for increasing the consumption of balanced and micronutrient-fortified foods by women and children in poor households at crucial phases in their lifecycle, viz. pregnancy, lactation, and infancy.

As a targeted value chain backed by the state, the programme has the potential to generate impacts on nutritional outcomes at scale. Both Telangana and TN states are spending over and above the central government allocation under the programme, highlighting their commitment to addressing the problem of undernutrition among vulnerable sections of the population. The scope for PPPs and role for private business engagement in improving nutrition outcomes are innovative dimensions. The two models of the state enterprise-linked food distribution value chain in Telangana and public-private-cooperative sector partnership in the value chain in TN for the manufacture of fortified premix suggest innovative pathways for consideration (see Box 1). Each has lessons to offer for other states in India to emulate and adopt for delivery under the nationally mandated food distribution programme.

As stated previously, TF has enhanced but underutilised capacity, posing a question of cost to the exchequer. Given that the company is a state enterprise that was established with the support of the central government, ideally measures should be taken for the company to cater to the requirements of more states and ensure full capacity utilisation. TN has enhanced its production capabilities with innovations in the value chain. The private sector players, besides partnering in the SNP supply chain, also operate in commercial markets and are free to diversify their production base. The large-scale production of food blend ensures value creation for the private players, despite uncertainty due to price fluctuations in its components. Assurance of demand for the blend and premix ensures that both the private sector player and the cooperative avoid the risk of overproduction/excess supply.

A company set up exclusively to cater to the requirements of government food distribution programmes is a unique model that reinforces the state's capacity and willingness to promote and sustain the value chain targeting women and children from economically poor households. However, there is the danger of inefficiency if the production capacity is not fully utilised as is currently the case. This is less likely to happen under a PPP model, where operational viability would be a key concern for private players to sustain operations.

It may be said that the programme in operation in both Telangana and TN is equipped to deliver the three outcomes for food value chain pathways to improve nutrition listed in Maestre *et al.* (2017), viz.: (i) sustained and safe, (ii) nutrient-dense, and (iii) adequate food, to

women and children from poor households. There is, however, potential for further improvement. The issue of safety regarding the premix at the point of consumption is dealt with well until it reaches the target consumer. In TN, however, the women are not provided premix in sealed packets, and hygiene and food safety could be an issue though the existing infrastructure was found to be well maintained. The adequacy of consumption of THRs is also uncertain, when unobserved.

Box 1 Value chains for nutritious premix under the SNP in Telangana and Tamil Nadu

Some salient aspects and differences

Reach: Telangana Foods (TF) is a centralised production system with distribution through the ICDS scheme. The women's cooperatives are spread across the state in TN and production of premix is decentralised.

Risk for public investment: Manufacturing of fortified premix at scale requires large production capacity and investment. TF is catering only to Telangana after the state's bifurcation from erstwhile AP and operating below full capacity, raising questions on the viability of the enterprise. Public investments face such risks in an uncertain policy environment.

The state's level of economic development: A state with lower economic prosperity or with high policy uncertainty may find it difficult to attract private investment for a public food distribution initiative. The number of private players is also likely to be limited in less developed economies, leading to a call for a stronger state role. The state-owned enterprise fulfils an important role in developing the necessary production capacity.

Cooperative and social welfare: Besides being a player in the food distribution chain, the women's cooperative in TN also supports the economic development of cooperative members, who come from socioeconomically deprived backgrounds; women members interviewed expressed satisfaction with their work and earnings. The state initiative to include the women's cooperatives in the value chain brings in a larger social welfare perspective.

The importance of innovation and a mixed value chain: TN initially had only the women's cooperatives and no private players. The limited economies of scale of each cooperative made operation difficult and their earnings remained low. The inclusion of private business has made the value chain more efficient and also enabled women's cooperatives to gain increased earnings.

Source Authors' own assessment.

This article examined the value chain model under the SNP in operation in two states. Other models are also found to be in operation. For instance, non-governmental organisations (NGOs) are a part of the value chain in the state of Delhi; self-help groups (SHGs) are involved in Odisha state. The participation of the private sector can be in different forms (companies, farmers' groups, cooperatives). States may choose between different models based on their capabilities, willingness, and local milieu. The two different models examined in this study can help in identifying opportunities and bottlenecks, and with the design of a better production and delivery system for other states in India, as well as offering insights for other countries in the region.

From the perspective of the conceptual framework against which we have examined the two value chains, one finds that all the consumer choice requirements and also producer requirements are not strictly applicable in the case of a targeted food distribution programme such as the SNP. The issues of capturing value and incentives also do not apply to a state-led programme. Incentives come to play only where there is a PPP model. Although there is danger of inefficiency in cost management in state-funded food distribution programmes, there is also scope for innovation and larger welfare benefits as seen in the engagement of women's cooperatives in TN. The SNP under the ICDS scheme is unique in using a life cycle approach to reach some of the most vulnerable population groups, viz. children, pregnant, and lactating women. Such public food distribution value chains are important in the context of developing economies with large undernourished populations. An alternative framework that addresses the requirements of these value chains will be useful. Clear objectives and alignment of actors' motives with them, the level of trade-off between efficiency and social welfare in the organisation of the production system, and sustained funding are some of the supply-side requirements; from the consumer perspective, in the absence of signalling, a mechanism for grievance redressal will help promote better delivery. Proper monitoring processes and evaluation are other requirements.

Notes

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1 *Anganwadi* literally means courtyard shelter. The *Anganwadi* centres operate under the Integrated Child Development Services (ICDS) scheme as pre-school, nutrition and immunisation centres for children under six years old; they also provide pregnant women with supplementary nutrition.

2 <http://icds-wcd.nic.in/icds/>.

- 3 <http://wcdw.tg.nic.in/> and <http://nhts.telangana.gov.in/#/categoryreport>.
- 4 <http://icds.tn.nic.in/files/awcs.pdf> and http://icds.tn.nic.in/all_categories.html.
- 5 *Arogya* means healthy; Lakshmi is the goddess of fortune and prosperity and is a term used to refer to women; http://wcdw.tg.nic.in/Arogya_Lakshmi.html.
- 6 http://icds.tn.nic.in/weaning_food.html.
- 7 <http://wcdw.tg.nic.in/Balamrutham.html>.
- 8 The snack is manufactured using extrusion technology: https://en.wikipedia.org/wiki/Food_extrusion and <http://apfoods.ap.nic.in/html/snackfood.htm>.
- 9 http://icds.tn.nic.in/noon_meal.html.
- 10 'The Act provides for maintenance of certain essential services for normal life of the community': www.doccentre.net/docsweb/LABOURLAWS/bare-acts/essential_service_Act.htm.
- 11 Set up under a national Act, the Food Corporation of India procures and distributes food grains under national programmes: <http://fci.gov.in/aboutUs.php?view=268>.
- 12 *Laddu* is a ball-shaped sweetmeat. The premix is made into *laddus* at the ICDS centres and distributed.
- 13 www.thehindu.com/news/national/telangana/%E2%80%98Balamrutam%E2%80%99-programme-caught-in-bifurcation-tangle/article14004406.ece.
- 14 www.rasifoods.com/index.html.
- 15 www.christyfoods.in/.
- 16 The Government of India has recently revised the cost norms for the SNP, as reported in the press in September 2017. Details of implementation are not yet available; www.business-standard.com/article/pti-stories/cost-norms-revised-for-nutrition-provided-at-anganwadi-centres-117092000930_1.html.
- 17 <http://icds-wcd.nic.in/icds/icdsimg/snrules2017.pdf>.
- 18 Interview, January 2016.
- 19 Interview, January 2016.
- 20 Interview, January 2016.

References

- Allen, S. and de Brauw, A. (2017) 'Nutrition Sensitive Value Chains: Theory, Progress, and Open Questions', *Global Food Security* (advance online publication), <http://dx.doi.org/10.1016/j.gfs.2017.07.002> (accessed 24 October 2017)
- del Ninno, C. and Mills, B. (2015) *Safety Nets in Africa: Effective Mechanisms to Reach the Poor and Most Vulnerable*, Washington DC: World Bank
- FAO (2015a) *The State of Food and Agriculture – Social Protection and Agriculture: Breaking the Cycle of Rural Poverty*, Rome: Food and Agriculture Organization of the United Nations
- FAO (2015b) *Nutrition and Social Protection: The Many Dimensions of Nutrition*, Rome: Food and Agriculture Organization of the United Nations

- Gandhi, V.P. and Namboodiri, N.V. (2002) *Fruit and Vegetable Marketing and its Efficiency in India: A Study in Wholesale Markets in Ahmedabad Area*, IIMA Working Paper, Ahmedabad: Indian Institute of Management
- Gelli, A. et al. (2015) *Value Chains and Nutrition: A Framework to Support the Identification, Design, and Evaluation of Interventions*, IFPRI Discussion Paper 01413, Washington DC: International Food Policy Research Institute
- GloPan (2014) *How Can Agriculture and Food System Policies Improve Nutrition?* Technical Brief, London: Global Panel on Agriculture and Food Systems for Nutrition
- GoI (2017a) *Annual Report 2016–17*, New Delhi: Ministry of Women and Child Development, Government of India, www.wcd.nic.in/sites/default/files/FINAL%20WCD_AR_English%202016-17.pdf (accessed 24 October 2017)
- GoI (2017b) *National Family Health Survey–4 (2015–16): India Fact Sheet*, New Delhi: Ministry of Health and Family Welfare, Government of India
- GoI (2011) *Evaluation Study on Integrated Child Development Schemes (ICDS) Volume I*, PEO Report 218, New Delhi: Programme Evaluation Organisation, Planning Commission, Government of India
- Hawkes, C. and Ruel, M.T. (2011) 'Value Chains for Nutrition', 2020 Conference Paper 4 in *Leveraging Agriculture for Improving Nutrition and Health*, New Delhi: International Food Policy Research Institute
- Henson, S. and Humphrey, J. (2015) *Review of Agri-Food Value Chain Interventions: Assessing the Effectiveness of Agri-Food Value Chain Interventions Aimed at Enhancing Consumption of Nutritious Food by the Poor: Conceptual Framework*, LANSa Working Paper 4, Brighton: Leveraging Agriculture for Nutrition in South Asia (LANSa)
- Henson, S.; Humphrey, J. and McClafferty, B. (2013) *Nutritious Agriculture by Design: A Tool for Program Planning*, GAIN-IDS Discussion Paper, Geneva: Global Alliance for Improved Nutrition, www.ids.ac.uk/files/dmfile/GAIN-IDSDiscussionPaper.pdf (accessed September 2017)
- Hoddinott, J.; Gillespie, S. and Yosef, S. (2015) *Public–Private Partnerships and the Reduction of Undernutrition in Developing Countries*, IFPRI Discussion Paper 01487, Washington DC: International Food Policy Research Institute
- Islam, S. and Ul-Kabir, A. (forthcoming, 2018) 'School Nutrition Programme in Bangladesh', LANSa Working Paper, Brighton: Leveraging Agriculture for Nutrition in South Asia (LANSa)
- Kapil, U. and Pradhan, R. (1999) 'Integrated Child Development Services Scheme (ICDS) and its Impact on Nutritional Status of Children in India and Recent Initiatives', *Indian Journal of Public Health* 43.1: 21–5
- Lake, A. (2011) 'Early Childhood Development – Global Action is Overdue', *The Lancet* 378.9799: 1277–78
- Maestre, M.; Poole, N. and Henson, S. (2017) 'Assessing Food Value Chain Pathways, Linkages and Impacts for Better Nutrition of Vulnerable Groups', *Food Policy* 68: 31–39

- Parasar, R. and Bhavani, R.V. (forthcoming, 2018) 'Supplementary Nutrition Programme under ICDS: Case study of Telangana and Tamil Nadu', LANSAs Working Paper, Brighton: Leveraging Agriculture for Nutrition in South Asia (LANSAs)
- Robinson, E. and Humphrey, J. (2014) 'Non-Profit Food Distribution: Working with Businesses to Reduce Undernutrition in Nigeria', *IDS Policy Briefing* 50, Brighton: IDS
- Ruel, M.T. (2003) *Is Dietary Diversity an Indicator of Food Security or Dietary Quality? A Review of Measurement Issues and Research Needs*, FCND Discussion Paper 140, Washington DC: International Food Policy Research Institute
- Saxena, N.C. and Srivastava, N. (2009) 'ICDS in India: Policy, Design and Delivery Issues', *IDS Bulletin* 40.4: 45–52, <http://bulletin.ids.ac.uk/idsbo/article/view/644> (accessed 24 October 2017)
- UNICEF (2012) *A Brief Review of the Social and Economic Returns to Investing in Children*, New York: Policy Advisory Unit, Division of Policy and Strategy, United Nations Children's Fund

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‘Milk for Milk, Water for Water’: Analysing Pakistan’s Dairy Innovation*

Natasha Ansari, Rashid Mehmood and Haris Gazdar

Abstract Interventions in agri-food value chains are thought to potentially make important contributions towards enhancing agriculture’s role in nutrition. Some frameworks have begun to identify sets of requirements for pro-nutrition value chains. Pakistan’s dairy sector has been the focus of a business-driven innovation which introduced ultra-high temperature (UHT)-treated milk in aseptic packaging. This was expected to relieve existing constraints in production and distribution, raise incomes for producers, and increase the supply of an affordable nutrient-dense food to consumers. While this innovation appeared to fulfil most requirements of a pro-nutrition value chain, it ultimately failed to act as a bridge between farmers and consumers. Instead, it led to the introduction of non-dairy products and imported raw materials. This case study shows that while existing frameworks take a relatively static view of whether an innovation prospectively fulfils certain requirements, businesses can quickly alter entire value chains in response to market conditions.

Keywords: value chains, dairy, Pakistan, agriculture, nutrition, markets, agribusiness, food systems, private sector, milk.

1 Introduction

This article presents the case study of a promising agri-food value chain innovation in a largely agricultural country with a high burden of undernutrition. The dairy sector in Pakistan attracted private business-driven innovations from the 1980s onwards, and particularly since the mid-2000s. We construct a case study of the sector using the emerging conceptual literature on agri-food value chains for nutrition. The case study has two main objectives. First, it aims to draw lessons on the potential for business-driven agri-food value chains interventions to improve nutrition in Pakistan and elsewhere. Second, it offers an opportunity for understanding the limitations of existing conceptual frameworks in prospectively identifying conditions and requirements for pro-nutrition value chains interventions.

1.1 Evolution of the value chains perspective

The value chains perspective began to be recognised in the 1980s as an internal business development tool that firms were using to strategically position themselves, under conditions of rapid technological and organisational change (Porter 1985). Companies became interested in identifying and advancing those elements of their business processes which would offer the greatest opportunities for value creation and appropriation. This perspective gained popularity in development studies in the 1990s through an influential paper by Kaplinsky (2000) who, in this strategic pursuit of entrepreneurial rent, identified a key characteristic of the emerging globalised economy.¹ What businesses were doing in developed countries had implications for developing countries as value chain management linked faraway producers and consumers through a series of closely coordinated inter-firm and intra-firm transactions. The prescriptive element in these earlier studies was limited to directing industrial policy towards those sectors and activities in developing countries which could be expected to accrue value. But policy interest was to extend further:

Value chains approaches to development have been adopted by several developing agencies to encourage greater participation by poor people in modern value chains, including food value chains. These include agricultural value chain development projects, which tend to focus on some forms of 'upgrading' as a means of increasing returns to farmers (that is, changing their products, improving their processes, increasing the volume produced, changing their functions, or improving their coordination to capture more value) (Hawkes and Ruel 2011: 74).

The value chains concept had made a long journey from being named as an element of business strategy to an avenue of development investment for market-driven poverty reduction. Having come this far, could value chains interventions be used for addressing nutrition, particularly undernutrition (Hawkes and Ruel 2011)? A number of possible answers were forthcoming. Maestre, Poole and Henson (2017) reviewed these and summarised the requirements for pro-nutrition value chains interventions. On the consumer side, the product in question needed to be nutritious and safe, there needed to be clear signalling of its nutritional value, and the intervention simultaneously needed to ensure that the product was available, affordable and acceptable to the poor. On the production, distribution and supply side it was important to know if, or to what extent, agents' incentives were aligned and if they were able to capture the value of their activity.

Pakistan's dairy sector offers a case of an innovation which appeared, prospectively, to fulfil most, if not all, of the requirements of pro-nutrition value chains outlined by Maestre *et al.* (2017) with respect to consumer choice as well as producer incentives. The introduction of modern milk-processing using ultra-high temperature (UHT)-treated technology was anticipated in various sector reviews to be a promising

route to overcoming bottlenecks in the expansion of production, supply and consumption of a popular and nutrient-dense food item (Anjum *et al.* 1989; Burki, Khan and Bari 2004; Fakhar and Walker 2006; Staal, Pratt and Jabbar 2008; Zia, Mahmood and Ali 2011; Younas 2013; Burki and Khan 2016). We propose to examine the value chain innovation by placing it in the context of the broader post-farmgate system for the supply and distribution of milk, including existing (traditional) value chains which predated the innovation, which the innovation sought to replace. This comparative lens is a key element of our methodology for assessing the success or otherwise of the innovation.

1.2 Methods

This case study brings together evidence from a range of sources – secondary literature and data, key informant interviews, and qualitative research in relatively low-income communities – to examine whether or to what extent the value chain innovation in Pakistan’s dairy sector lived up its promise. Key informant interviews were conducted with representatives of private businesses operating in the modern segment of the dairy value chain, farmers, milk traders and transporters, industry experts, and retailers of dairy products.² A rural region which was known (from industry sources and secondary material) as an area where a dairy company had established its milk procurement system was purposively selected to observe the modern value chain at the supply end. Further, household and key informant interviews were carried out by two of the authors in selected low-income urban and rural communities to understand consumer behaviour with respect to milk.^{3,4}

1.3 Outline of the article

Section 2 provides a historical account of the introduction of the value chain innovation in Pakistan, in the context of sector reviews and analyses. Section 3 describes the operation of traditional and modern value chains for milk and in the dairy sector. A qualitative assessment of the business-driven modern value chain innovation is given in Section 4. The innovation consists of numerous actions along the value chain by multiple actors over time, and our assessment does not attempt to evaluate the impact of any of these; rather, the focus is on patterns and trends in the modern value chain and its comparison with the traditional value chain that it sought to replace. Conclusions in Section 5 draw lessons for the dairy sector in Pakistan, on the potential of business-driven innovations for nutrition improvement more generally, and on the strengths and limitations of emerging conceptual frameworks for assessing the nutritional impact of value chains interventions.

2 Dairy value chain innovation in Pakistan

Milk and other dairy products constitute an important part of the diet of adults and children alike in Pakistan, and livestock rearing is the largest source of value added within the agricultural sector. However, a series of sector analyses characterised the dairy situation in Pakistan as that of low productivity and high potential (Anjum *et al.* 1989; Burki *et al.* 2004; Fakhar and Walker 2006; Staal *et al.* 2008; Zia *et al.* 2011;

Younas 2013; Burki and Khan 2016). Small herds of low-yielding breeds, wide fluctuations in output due to the seasonal variation in availability of green fodder, and high levels of spoilage because of the absence of effective cold chains⁵ were identified as the supply-side issues limiting growth. Weak regulatory enforcement meant that the milk that reached consumers was vulnerable to adulteration and poor hygiene.⁶

The introduction of a modern value chain for processed milk was seen as a significant innovation which could raise farmer incomes and improve the safety and availability of a widely consumed nutrient-dense food.⁷ A positive narrative was constructed around the developmental, income-generating, poverty-alleviating, and empowering roles of this innovation.⁸ The innovation, which was spearheaded by Packages Ltd – the Pakistan-based partner of the transnational packaging company Tetra Pak – was taken up by a number of other private businesses.⁹

The core element of the innovation was the sourcing of fresh milk from local suppliers, its treatment and processing, and the aseptic packaging of UHT milk for distribution and sale. Two brands (Milkpak and Haleeb) were introduced in the early 1980s – the former being a joint venture led by Tetra Pak's local partner, Packages Ltd.¹⁰ UHT milk was promoted as a safe and nutritious alternative to the unprocessed raw milk that was widely available and consumed in rural and urban areas alike. The market attracted new entrants, and by the late 2000s several brands of UHT milk became available – nearly all of them using Tetra Pak packaging. Most of the other entrants were local firms, such as Engro Foods (with the UHT milk brand Olpers), looking for a share in what promised to be an expanding market. It has been argued that a 2007 livestock sector policy – spurred on, in part, by the optimism surrounding the modern dairy value chain – was an important turning point (Burki and Khan 2016).¹¹

At around the same time, a number of supportive interventions were made at the supply end of the value chain.¹² The main stated aim of these interventions was to increase farmer incomes by addressing some of the weak links on the supply side of the dairy value chain. These interventions provided infrastructure and organisational inputs at the community level to connect farmers with the modern value chain. They installed cold chain facilities, trained and hired local staff, and offered veterinary services and trainings to farmers. The private sector played an important part in all of these projects. The Dairy Hub project, for example, was led by Tetra Pak Pakistan to help a number of milk-processing companies – all customers of Tetra Pak's packaging – to set up or improve their milk sourcing systems. For at least the Haleeb Value Chain Project and Women Empowerment Through Livestock Development, private businesses received funding from development agencies. We were unable to find independent evaluations of these interventions.

The modern value chain innovation in Pakistan's dairy sector was premised on realising the untapped potential of this sector by providing

a critical missing link between producers and consumers. Consumers would be offered a safe and hygienic, naturally nutrient-dense food in the place of unprocessed fresh milk, which was thought to be susceptible to spoilage and adulteration. This new product, namely UHT milk (in aseptic packages supplied by Tetra Pak), was highly portable and had a long shelf life. It was expected that, because of efficiency gains, UHT milk would eventually become cheaper than unprocessed milk due to economies of scale and would capture market share (Burki *et al.* 2004). Thus, an affordable, acceptable, nutritious food was to be made widely available to consumers in greater quantities. At the same time, the interventions at the supply end implied that all actors along the value chain would benefit and be able to capture some part of the value thus created. Most importantly, the fact that the innovation was driven by private business meant that producer incentives were well aligned for profitability and sustainability.

3 Traditional and modern value chains

Descriptions of the dairy sector in Pakistan have identified distinctive value chains – such as those rooted in rural or peri-urban areas and the one serving the metropolis of Karachi (Anjum *et al.* 1989; Burki *et al.* 2004). The traditional–modern dichotomy which ‘recognizes the existence of a modern sector (e.g. large commercial farms, agribusinesses, multinational food manufacturers, and modern supermarkets), a traditional sector (e.g. smallholder farmers and traders, wet markets, and “mom and pop” stores) and the interaction between modern and traditional actors’ (Gómez and Ricketts 2013: 139) is one way of framing the change envisaged through the introduction of the UHT innovation. The modern value chain led by agribusinesses was expected to take market share from the more traditional value chains dominated by smallholders and wet markets.

Though traditional value chains with small-scale operators have the advantage of supplying nutritious food at low prices, they are constrained by seasonal and other sources of variability in supply. A modern value chain is thought to potentially help overcome some of these constraints and ensure greater availability, particularly if it targets the ‘bottom of the pyramid’¹³ through traditional channels of marketing and distribution.¹⁴ Our review of the UHT innovation is prefaced, therefore, by a description of other existing value chains in Pakistan from the point of view of context and comparison: what was the UHT innovation planning to displace or replace, and how did it actually perform in comparison with existing value chains?

3.1 Traditional rural value chain

Historically, keeping livestock for milk has been a mainstay of rural society in Pakistan. For example, in the Women’s Work and Nutrition Survey of 1,000 households in rural Sindh (Mazhar, Balagamwala and Gazdar 2017), nearly all households reported consuming milk, but under two-fifths reported buying it. The rest relied entirely on their own cattle, or on free or reciprocal exchange with neighbours. Livestock is

usually the most valuable asset owned by the rural poor, many of whom do not own agricultural land. Women and children are responsible for grazing, collecting fodder, and cleaning the animals, which are generally kept within the homestead; and livestock work is seen as an extension of household chores rather than an economic activity (Balagamwala, Gazdar and Mallah 2015; Mazhar *et al.* 2017).

There were various customs around the disposal of milk (*ibid.*). Traditionally, many rural communities did not market milk. When a buffalo or cow is in season it is milked twice a day – once in the morning and then again in the evening. Morning milk was usually consumed by family members or churned into butter which was purified to prolong its shelf life. Any surplus from the evening milking would be shared with neighbours free of cost. It might be argued that these customs and the notion of 'surplus' milk are connected with the absence of storage and transportation facilities. Although rural livestock holders do sell milk, in our fieldwork villages we found that some free or reciprocal circulation of milk and buttermilk from the evening milking is still practised.

Rural and peri-urban areas supply most of the milk that is marketed in Pakistan. The main actors are the small-scale producers who hold anywhere from one to five animals. They supply fresh, unprocessed milk to a middleman (known in many areas as a *doodhi*), who in turn delivers it to retailers or directly to consumers. The *doodhi* has arguably played an important role in the commodification of milk. Their ability to deliver and supply highly perishable, fresh milk over long distances quickly and safely, converted milk into a tradable good. There is also a growing rural market for milk, particularly in the form of roadside tea cabins and restaurants, and these, too, rely on the *doodhi*.

Sector reviews cited above have identified a number of constraints in traditional rural value chains. It is thought that the absence of an established cold chain leads to a high rate of spoilage – estimated to be up to a fifth of the produce.¹⁵ There is also seasonal fluctuation in the availability of milk – herds produce around twice as much milk in the winter 'flush' season than in the lean months of the summer (Anjum *et al.* 1989).¹⁶ The availability of free or cheap green fodder in the winter months is attributed to seasonal variation. It is widely reported, but with little more than anecdotal evidence, that *doodhi*-supplied milk is adulterated with contaminated water as well as other unsafe additives. Adulteration is seen as being linked to the risk of spoilage and seasonal variations. It is suspected that *doodhis* use ice (made from unsafe water) to chill the milk in the summer, and then use various chemical agents to make the milk appear thick and creamy.

3.2 Modern value chain

According to industry informants, the main sources of milk for all milk-processing companies are the village milk collection centres (VMCCs) spread across rural areas of the two high-productivity agricultural provinces – Punjab and Sindh. The location and number

of VMCCs have tended to shift over time, and there have been cases where a company has abandoned operations in a region and handed over its collection infrastructure to another firm. One dairy company, which reportedly has an approximate 50 per cent share of the UHT milk market, claims to operate over 1,600 such collection centres, each with a milk storage and processing capacity of up to 500 litres.¹⁷

Companies base their decision to site a VMCC after surveying a village for its capacity to produce surplus milk.¹⁸ Once a VMCC starts functioning it enrolls local vendors and maintains a relationship with them. Typically, a VMCC can have between 50 and 80 active milk vendors on its register and pays them on a weekly basis. In our qualitative fieldwork, we found that the VMCC had difficulty maintaining a regular group of suppliers due to competition from the *doodhis* who offered higher prices for the produce. Companies claimed that their preferred suppliers are direct vendors, which provide around 2–4 litres daily. They also use local agents who collect milk from several farmers in their localities and who bring 30–40 litres a day. Finally, there are contractors and *doodhis* who can manage 100–200 litres daily. Some companies said that they rely exclusively on direct vendors, while others accept the use of intermediaries, particularly during the summer months when the supply of fresh milk is constrained. Rather than displacing *doodhis*, in many instances the VMCCs end up relying on them.

3.3 Beyond milk and dairy

From around 2007¹⁹ onwards, UHT milk manufacturers began to introduce new, mostly non-dairy, products which have little or no nutritional value. The so-called ‘tea creamers’ are vegetable fat-based liquids that are designed to taste and look like milk when added to tea. These were joined by ‘dairy liquids’ in 2011, which have some added milk fat but cannot be marketed as milk or as a substitute for milk.²⁰ Tea creamers now account for 55 per cent of the sales volume of UHT milk manufacturers while dairy liquids make up another 7 per cent (Burki and Khan 2016; interviews with industry key informants²¹). These products, particularly tea creamers are the main sources of growth in the industry. They, like UHT milk, use aseptic packaging supplied by Tetra Pak, and are marketed along similar supply chains to those utilised for UHT milk. The liquid tea creamers innovation is viewed as a breakthrough in the industry, and was framed as an achievement by industry key informants in our interviews with them, even though the powdered variant has been in the market for a longer time. The companies have successfully created a product that has overcome cost constraints²² associated with the UHT chain (Andrew 2012), and which simultaneously has the attributes of traditional fresh milk – such as richness of colour in tea-making, and sweetness. Some of these attributes are associated by consumers with good nutrition as they evoke the high fat and nutrient content of buffalo milk. Our industry key informants indicated they were aware of instances where the product was being utilised for drinking by children in low-income households, even though it is categorically harmful for children under five years of

age to consume it. It might be argued that the rapid growth in the sales of creamers is premised on subtly prodding consumers into believing they are using a nutritionally sound product.²³

3.4 Distribution and retail of UHT products

UHT products are sold in all kinds of retail outlets, unlike fresh unprocessed milk which is sold either directly to consumers or through specialised dairy shops. But also, unlike fresh milk, UHT products are marketed intensively. Interviews with industry informants revealed that the companies have made concerted attempts at understanding consumer behaviour. They classified milk consumption not only by region and socioeconomic status of households, but also according to the use of milk. Insights such as the differential demand within the household for milk as a drink (mostly for children) and for 'tea-creaming' formed the basis of strategies which aim to address various market segments. UHT milk, which the companies like to call 'premium UHT' is mainly targeted at higher-income groups in urban areas. It is difficult to find these products on the shelves of retailers in low-income urban localities or in rural communities.²⁴ According to industry sources, tea creamers have been developed specifically to compete with unprocessed milk, which is significantly cheaper than UHT products, and are priced accordingly.

4 Assessment of the value chain innovation

For the business-driven value chain innovation to have lived up to its promise of acting as a bridge between producers and consumers, and for it to have had a positive impact on nutrition, a number of trends and patterns should have become apparent. Numerous frameworks and *ex ante* sector reviews (such as those cited in Sections 1 and 2) had helped to create a positive narrative around this innovation as a panacea to the problems of low productivity, seasonal fluctuations, and the supposedly poor quality of existing supply. According to the reviews, the modern value chain should have made a significant dent in the market shares of supposedly inefficient traditional value chains, both at the supply and consumer ends (Burki *et al.* 2004). The price of UHT milk should have decreased over time and become available and affordable to low-income consumers (*ibid.*). Consumers should have become willing to pay a premium for quality (and nutrition) over available alternatives. With these changes in place, we should then have been able to observe some of the bottlenecks and constraints associated with the traditional value chains – such as high rates of spoilage, seasonal fluctuations, and low yields – being addressed (Anjum *et al.* 1989; Burki *et al.* 2004; Fakhar and Walker 2006; Zia *et al.* 2011; Younas 2013).

Data on the total volume of milk that goes through the modern value chain, and changes within that over time, are patchy and based mostly on figures provided by the industry. Burki *et al.* (2004) reported that, in 2003, UHT milk accounted for around 1 per cent of the total volume of milk produced in the country. With the rapid expansion of the sector in the mid-2000s and the establishment of dairy hubs across the

country, Burki and Khan (2016) cited industry sources as claiming that 1.8 billion litres out of an annual output of around 40 billion litres of milk – or 4.5 per cent – were processed by the dairy companies, out of which 1.18 billion litres (under 3 per cent) were used specifically for UHT products.^{25,26} Younas (2013) cited Afzal (2006), who reported that 4–5 per cent of the milk produced in the country was being processed by dairy companies, with around half of that in the form of boxed UHT milk. The rest of the milk channelled through the modern value chain was converted into other dairy products. We were told by our industry key informants that the market share of UHT products had risen to around 10 per cent but that over half of the volume was accounted for by non-dairy milk replacements such as tea creamers.²⁷

There were indications that milk procurement through VMCCs had initially risen and then regressed. In a panel survey of dairy farmers, Burki and Khan (2016) found that the selling of milk to companies had declined since 2010. Our qualitative research in a VMCC community in rural Sindh revealed a reason for this: the dairy company paid far less to the farmers than the local *doodhi*, and the VMCC was active only in the winter flush season. The *ex ante* narrative of the modern value chain innovation expected seasonal fluctuations to even out as increased demand from UHT companies would have created incentives for farmers to use green fodder the year round. Instead, the companies themselves end up leveraging seasonal differences in the availability of raw milk (Hasan 2017). In fact, sector reviews failed to account for structural factors behind the continued subsistence characteristics of the dairy economy. Seasonality in milk output is not necessarily an investment bottleneck. It is driven in large measure by the reliance on farming by-products which, in turn, is made possible by the existence of unpaid family labour of women and children. The scale of this subsistence-like activity can be gauged from the fact that while livestock accounts for over half of value added in agriculture, fodder cultivation takes up only around a tenth of the gross cropped area (MNFSR 2016).

There are concerns, moreover, that dairy companies started relying on imports of dried milk in order to produce pasteurised milk. The volume and value of milk product imports witnessed a fivefold increase between 2007 and 2015 – the period when a number of new UHT milk and non-dairy milk replacement products came on the scene.²⁸ These trends are clearly in the opposite trajectory of the expected benefits to local milk output of the value chain innovation.

Despite the lower price paid to farmers compared to the *doodhi*, the retail price of UHT milk (or the so-called ‘premium product’) is higher than that of fresh unprocessed milk in most cities. In Karachi, at the time of our survey, fresh milk sold for PKR85 per litre compared with PKR110 per litre being charged for UHT milk. The gap was wider still in smaller towns and rural areas where UHT milk was not stocked by retailers due to its high price.

With the marketing insight that over two thirds of milk consumption in the country is for preparing tea, companies came up with a product which is creamy, a little sweet, and gives a rich colour to the tea when cooked. Our qualitative fieldwork findings about consumer preferences suggest that companies have been successful in deciphering some of the factors associated with the popularity of buffalo milk in Pakistan. In our interviews with consumers in rural and urban sites alike, we were told that buffalo milk is considered to be a nutrient-dense product and its sweet taste and creamy consistency is read as a signal of its goodness. Dairy companies have been able to reproduce that signal without the original ingredients at a low price.

Some three decades down the line, hopes and expectations vested in the growth of modern value chains in the dairy sector in Pakistan appear to have been largely unmet. It was thought that processed milk would revolutionise demand as well as supply by expanding the market for a safer product than unpasteurised fresh milk, which had a notorious reputation for adulteration and dilution. Our case study of the modern value chain in the dairy sector – the supply side, as well as its consumer end – has shown that the main dairy product (packed UHT milk) struggles to compete with its traditional alternative.²⁹

Where the modern value chain has innovated and competed profitably with unpasteurised fresh milk in terms of price and consumer preferences, it has engineered a product that is less nutritious and uses less raw milk than the products that already existed. Creamers and the so-called 'dairy liquids' are mostly non-dairy products of little nutritional value, and with weak or non-existent linkages with local agriculture. Modern value chain dairy companies have done what they are good at doing – understanding the market and responding to it.

Our case study of Pakistan's dairy sector suggests that a simplistic traditional–modern dichotomy in value chains for nutrition is not only erroneous, but it is also misleading. While frameworks such as Gómez and Ricketts (2013) offer a more nuanced understanding of the relationship between the supposedly traditional and modern sectors, ground realities are more complex. The resilience of the *traditional* value chain in Pakistan is, in part, due to an optimal use of available resources, and the higher costs in the *modern* value chain may be due to the uncompetitive pricing of the packaging. The 'upgrading' of value chains (Hawkes and Ruel 2011), which is usually taken to entail the introduction of modern segments, needs a more rigorous comparison with existing value chains than has been the case in Pakistan.

Evaluative frameworks such as that of Maestre *et al.* (2017) can play an important role in guiding policymakers in this regard. By focusing on specific requirements with respect to consumption and production conditions, such frameworks can obviate the need for a prior classification of value chains. Our case study has revealed that while the dairy value chain innovation in Pakistan met, *ex ante*, the

requirements posited by Maestre *et al.* (2017) (see Section 1.1), it failed to live up to its promise. Instead of developing the local dairy sector, increasing the availability of milk and increasing farmer incomes, this innovation led to the marketing of mostly non-dairy products made with imported raw materials. Marketing-driven food companies moved quickly from the dairy value chain to non-dairy products in response to their analysis of where they could capture value. While the checklist of requirements offered by Maestre *et al.* (2017) is very useful in evaluating the nutrition impact of a value chain intervention at a given moment in time, it would be more useful to policymakers if it could also anticipate dynamic changes in value chains, given producer incentives and consumer behaviour.

5 Conclusions

What can we learn from the failure of what appeared to be a promising pro-nutrition business-led value chain innovation in Pakistan's dairy sector? A cynical view might be that the positive narrative around the UHT innovation was promoted, at least in part, by corporate interests that benefited from the expansion of their markets, regardless of any benefits in terms of addressing constraints and bottlenecks in existing value chains. While this view cannot be discounted altogether, there are still lessons to be drawn for the sector or for wider debates on business-driven nutrition improvement, and for the emerging analytical frameworks. After all, the question of how agriculture can play a more positive role for nutrition improvement is still with us, and livestock is the largest sub-sector within Pakistan's agriculture. Moreover, a traditional–modern dichotomy is widely used in the analysis of food value chains, often with the presumption of a productivity advantage of modern innovations.

A key lesson for Pakistan's dairy sector from this case study is that the identification of technical constraints to productivity improvement and market expansion needs to happen alongside institutional analysis. Sector reviews, embedded in a dichotomous traditional–modern framework, focused on supply chains as the locus for strategic intervention without recognising the effectiveness of the *doodhi*-managed traditional supply chain in delivering a perishable product at low cost. While these analyses understood capacity issues in smallholder production, they were not attentive to the actual organisation of the livestock economy at the household level which relies on unpaid work by women and children, particularly in the collection and processing of fodder from local farm by-products. Despite increasing commodification, the livestock sector retains important elements of a subsistence household economy, such as the concept of surplus milk.

There is merit in recovering some of the insights from earlier literature on the value chains perspective which focused not so much on prescriptions about value chains interventions, but on the policy implications of companies applying value chains analysis in their business strategies. Companies focused squarely on actions that offered

them the greatest opportunities for capturing value, and changed strategies in response to these opportunities. Rather than being wedded to particular value chains, they created new ones which offered them higher returns. The packaging company leveraged its near-monopoly status as the supplier of aseptic packaging to create new markets for its product. Milk-processing companies saw marketing as their niche and designed products and marketing campaigns to compete with the otherwise more-efficient traditional value chain. A value chain innovation that appeared, prospectively, to be pro-nutrition along with being pro-poor, was abandoned over time as businesses rapidly adapted to new marketing insights and homed in on a value chain devoid of the nutrition focus, but which has proved to be more robust in terms of overcoming business costs and constraints. Emerging conceptual frameworks such as those which identify necessary conditions for pro-nutrition value chains (e.g. Maestre *et al.* 2017) need to be extended to pay greater attention to the inherent dynamism of the private sector in creating a new value chain just as an existing one has been analysed.

Notes

- * 'Milk for Milk, Water for Water' is a traditional saying in Pakistan and India to denote when each party is given its due share, or is getting to the true picture.
- 1 By then the business studies literature was already referring to the value chains concept as belonging to 'that old industrial model' (Normann and Ramírez 1993: 65).
- 2 Thirty key informant interviews were conducted between 30 September 2015 and 8 January 2016. These included several representatives from two local, private, large-scale dairy businesses.
- 3 The Naushehro Feroze District of Sindh has a high concentration of village milk collection centres (VMCCs) belonging to one of the leading UHT milk manufacturers. The district also had villages which did not have a VMCC. We also carried out fieldwork in the urban centres of Karachi and Muzaffarabad. We carried out five in-depth interviews at each of the sites. All in-depth interviews were carried out with mothers who had children aged between 6 and 24 months. This selected criterion was driven by our primary focus on understanding infant and young child feeding or complementary feeding of children in that age category. Focus group discussions were also conducted with separate groups of married women and men in each fieldwork site. We also conducted key informant interviews with local retailers.
- 4 According to project material that we saw when visiting the VMCC, a donor-supported intervention had been implemented in this community.
- 5 'Formal processors use a cold chain for bulking and transporting milk. Farm cooling tanks (FCTs), owned and operated by processors, are set up in villages. Milk from the FCTs is transported in refrigerated tanks to regional collection facilities for onward transfer to centralized processing units' (Zia *et al.* 2011: 19).

- 6 Similar issues have been identified in dairy sector reviews in other countries – see, for example, Millogo *et al.* (2008) for Burkina Faso and Omore *et al.* (2004) for Kenya, Ghana, and Bangladesh.
- 7 The term ‘modern’ is used here in contrast with ‘traditional’ food value chains which source fresh produce locally and supply it through wet markets at relatively low price (Gómez and Ricketts 2013). Wet markets can include large or small markets which sell fresh produce.
- 8 Evocative phrases such as ‘rivers of milk’ conveyed the optimism associated with this approach (Fakhar and Walker 2006). Such slogans were widely used by the Pakistan Dairy Development Company which was set up as an autonomous entity with a grant from the government’s Small and Medium Enterprises Development Authority (SMEDA) (Mumtaz *et al.* 2011).
- 9 Packages Ltd was a joint venture of a Pakistani industrial group led by the entrepreneur Syed Babar Ali and Tetra Pak of Sweden.
- 10 Milkpak was launched in 1981 as a brand of Milkpak Ltd in which Packages Ltd was a major stakeholder. In 1982, Tetra Pak Pakistan was formed as a local subsidiary of the transnational Tetra Pak, and Packages Ltd was a key shareholder of this company. In 1988, the transnational company Nestlé acquired stakes in Milkpak, and then took over the company and the brand in 1992.
- 11 In 2009, Tetra Laval of Switzerland acquired Packages Ltd’s shares in Tetra Pak Pakistan, thus creating some nominal distance between Tetra Pak and the Milkpak brand. This move also, arguably, facilitated the entry of rival brands in the UHT market. The connection between Tetra Pak and Nestlé Pakistan remained strong through Packages Ltd. The latter retained its stakes in Nestlé Pakistan, and also dominated the market in the raw material used for Tetra Pak packaging.
- 12 There have been seven value chains interventions in the dairy sector in the last decade. Four of these (Modern Farm and Farm Cooling Tanks Programme 2006; the Dairy Hub project 2007; Haleeb Value Chain Project 2008; and Women Empowerment Through Livestock Development, or the WELD project, 2011) were directly related to the UHT milk industry. See Zuberi, Mehmood and Gazdar (2016) for a detailed review of these interventions.
- 13 ‘Bottom of the pyramid’ refers to a marketing term that identifies the poor as a potential market for commercial interests. Markets at the bottom of the economic pyramid ‘are fundamentally new sources of growth [for multinationals]. And because these markets are in the earliest stages of economic development, growth can be extremely rapid’ (Prahalad and Hammond 2002: 51).
- 14 Gómez and Ricketts (2013) classify the latter – i.e. modern sourcing and flexible marketing through existing markets and retailers – as a modern–traditional value chain which is regarded as a promising path to nutrition improvement.
- 15 It is difficult to find direct evidence of spoilage. Sector reviews base their estimates of the rate of spoilage on differences in aggregated national data on milk output and consumption reported officially.

- 16 The existence of seasonal variation is widely accepted and cited anecdotally. The basis for the claim that milk output varies by a factor of 100 per cent between seasons is based on a rare study of seasonality carried out in a 1980s study of herds in one region of the country (Anjum *et al.* 1989).
- 17 If all of these VMCCs operated to full capacity (two collections a day) throughout the year, they would dispatch 584 million litres of milk to processing plants annually, compared with Pakistan's estimated total milk output of 40 billion litres.
- 18 The modern value chain thus operates within a traditional context in which only surplus milk is brought to the market.
- 19 Engro's flagship tea creamer, Tarang, entered the market in 2007.
- 20 Engro was found to be in violation of the Competition Act 2010 (Pervaiz and Quddus 2016) and fined by the Competition Commission of Pakistan for marketing and misrepresenting their dairy drink, Omung, as an alternative and substitute for loose milk (Cornall 2017). Loose milk is fresh, unprocessed, unpasteurised milk supplied by the traditional value chains.
- 21 Conducted 30 September 2015–8 January 2016.
- 22 Vegetable fat costs PKR130 per kg, whereas the milk fat it replaces costs PKR250 per kg, according to Andrew (2012).
- 23 Some non-dairy products have names such as 'Nature', which evoke a natural produce. While industry key informants are careful to state that their marketing does not advertise these products as milk, they admit that most consumers are illiterate and unable to read the fine print on the packaging. Recently the Food Authority in the Punjab province of Pakistan issued requirements for companies to indicate that this product is not milk on 15 per cent of the packaging (DAWN 2017). At a meeting convened by a parliamentary committee on this matter, companies went on the record to state that such information on packaging would adversely affect their sales (Junaidi 2017).
- 24 Authors' fieldwork.
- 25 Burki and Khan assume total processed output to include 'UHT milk, milk powder, chilled and flavored milk' (2016: 61).
- 26 Our own back-of-the-envelope calculations based on the processing capacity of VMCCs suggest a far smaller ratio.
- 27 Industry informants speak of market share – that is, UHT milk as a proportion of all milk sales. They do not include milk that is self-consumed by farming households, which accounts for around half of all produce (Burki and Khan 2016).
- 28 Although UHT companies claim that they source their milk locally, in a debate on rising imports of dried milk products the federal commerce minister revealed that these were being used by the dairy industry to make pasteurised milk (Senate Secretariat 2016).
- 29 There have been similar experiences in other countries – see, for example, Leksmono *et al.* (2006) and Karanja (2003) on Kenya.

References

- Afzal, M. (2006) *Dairy Sector – Pakistan*, Islamabad, Pakistan: Livestock and Dairy Development Board
- Andrew, M. (2012) ‘Milk in the Time of Opportunity’, *Aurora*, September–October
- Anjum, M.S.; Lodhi, K.; Raza, A.A.; Walters, F. and Krause, S. (1989) *Pakistan’s Dairy Industry: Issues and Policy Alternatives*, Special Report Series 14, Islamabad: Directorate of Agricultural Policy and Chemonics International Consulting Division
- Balagamwala, M.; Gazdar, H. and Mallah, H.B. (2015) *Women’s Agricultural Work and Nutrition in Pakistan: Findings from Qualitative Research*, LANSA Working Paper 2, Brighton: Leveraging Agriculture for Nutrition in South Asia (LANSA)
- Burki, A.A. and Khan, M.A. (2016) *Pakistan’s Dairy Sector: Lessons from the Past to Build a Resilient Dairy Industry*, Lahore, Pakistan: Lahore University of Management Sciences
- Burki, A.A.; Khan, M.A. and Bari, F. (2004) ‘The State of Pakistan’s Dairy Sector: An Assessment’, *Pakistan Development Review* 43.2: 149–74
- Cornall, J. (2017) ‘IFC Helping FrieslandCampina with \$145m Package for Engro Purchase’, *Dairy Reporter*, 6 February, www.dairyreporter.com/Article/2017/02/06/IFC-helping-FrieslandCampina-with-145m-package-for-Engro-purchase (accessed 25 October 2017)
- DAWN (2017) ‘Final Warning: Manufacturers Told to Specify Tea Whitener is not Milk’, *DAWN*, 27 March, www.dawn.com/news/print/1323043 (accessed 25 October 2017)
- Fakhar, H. and Walker, G. (2006) *The White Revolution ‘Dhoodh Darya’: White Paper on Pakistan’s Dairy Sector*, Lahore, Pakistan: Pakistan Dairy Development Company
- Gómez, M.I. and Ricketts, K.D. (2013) ‘Food Value Chain Transformations in Developing Countries: Selected Hypotheses on Nutritional Implications’, *Food Policy* 42: 139–50, <https://doi.org/10.1016/j.foodpol.2013.06.010> (accessed 25 October 2017)
- Hasan, M. (2017) ‘Nestlé Pakistan MD Discusses Challenges in Dairy Sector’, *The News International*, 20 January, www.thenews.com.pk/print/180359-Nestl%C3%A9-Pakistan-MD-discusses-challenges-in-dairy-sector (accessed 25 October 2017)
- Hawkes, C. and Ruel, M.T. (2011) ‘Value Chains for Nutrition’, Paper 4 prepared for the IFPRI 2010 International Conference ‘Leveraging Agriculture for Improving Nutrition and Health’, New Delhi, India, 10–12 February
- Junaidi, I. (2017) ‘Senate Body Wants Tea Whitener Suppliers’ Interests Protected’, *DAWN*, 17 October
- Kaplinsky, R. (2000) ‘Globalisation and Unequalisation: What Can Be Learned from Value Chain Analysis?’ *Journal of Development Studies* 37.2: 117–46, <http://dx.doi.org/10.1080/713600071> (accessed 25 October 2017)
- Karanja, A.M. (2003) *The Dairy Industry in Kenya: The Post-Liberalization Agenda*, Working Paper 1, Nairobi: Tegemeo Institute of Agricultural Policy and Development, Egerton University

- Leksmono, C.; Young, J.; Hooton, N.; Muriuki, H. and Romney, D. (2006) *Informal Traders Lock Horns with the Formal Milk Industry: The Role of Research in Pro-Poor Dairy Policy Shift in Kenya*, Working Paper 266, London: Overseas Development Institute and International Livestock Research Institute
- Maestre, M.; Poole, N. and Henson, S. (2017) 'Assessing Food Value Chain Pathways, Linkages and Impacts for Better Nutrition of Vulnerable Groups', *Food Policy* 68: 31–39
- Mazhar, S.; Balagamwala, M. and Gazdar, H. (2017) 'The Hidden Economic Backbone – Women in Agriculture', paper presented at the LUMS International Conference on Gender, Work and Society, Lahore, Pakistan, 22–23 April
- Millogo, V.; Ouédraogo, G.A.; Agenäs, S. and Svennersten-Sjaunja, K. (2008) 'Survey on Dairy Cattle Milk Production and Milk Quality Problems in Peri-Urban Areas in Burkina Faso', *African Journal of Agricultural Research* 3.3: 215–24
- MNFSR (2016) *Agricultural Statistics of Pakistan 2014–15*, Ministry of National Food Security & Research, Government of Pakistan, www.mnfsr.gov.pk/pubDetails.aspx (accessed 3 March 2017)
- Mumtaz, M.K.; Hemani, M.A.; Hameed, N. and Gulzar, S. (2011) *Dairy Hub: A Community Dairy Development Programme*, Working Paper F-37012-PAK-1, London: International Growth Centre (IGC)
- Normann, R. and Ramírez, R. (1993) 'From Value Chain to Value Constellation: Designing Interactive Strategy', *Harvard Business Review* 71.4: 65–77
- Omoro, A. et al. (2004) *Employment Generation through Small-Scale Dairy Marketing and Processing: Experiences from Kenya, Bangladesh and Ghana*, Rome: Food and Agriculture Organization of the United Nations (FAO)
- Pervaiz, M. and Quddus, M. (2016) *Enquiry Report: In the Matter of Alleged Deceptive Marketing Practices by Dairy Companies* (translation), Competition Commission of Pakistan
- Porter, M.E. (1985) *Competitive Advantage*, New York NY: Free Press
- Prahalad, C.K. and Hammond, A. (2002) 'Serving the World's Poor, Profitably', *Harvard Business Review*, September, <http://web.mit.edu/mit-africa/Archive/7269399.pdf> (accessed 12 December 2017)
- Senate Secretariat (2016) *Questions for Oral Answers and their Replies*, 253rd Session, PCPPI—2375(16)Senate—28-09-2016—275
- Staal, S.J.; Pratt, A.N. and Jabbar, M. (2008) *Dairy Development for the Resource Poor. Part 3: Pakistan and India Dairy Development Case Studies*, PPLPI Working Paper 44-3, Pro-Poor Livestock Policy Initiative, Rome: Food and Agriculture Organization of the United Nations (FAO)
- Younas, M. (2013) *The Dairy Value Chain: A Promoter of Development and Employment in Pakistan*, ICDD Working Paper 9, Kassel, Germany: International Center for Development and Decent Work
- Zia, U.; Mahmood, T. and Ali, M.R. (2011) *Dairy Development in Pakistan*, Rome: Food and Agriculture Organization of the United Nations (FAO)
- Zuberi, S.; Mehmood, R. and Gazdar, H. (2016) *Review of Agri-Food Value Chain Interventions Aimed at Enhancing Consumption of Nutritious Food by the Poor: Pakistan*, LANS Working Paper 7, Brighton: Leveraging Agriculture for Nutrition in South Asia (LANS)

Building Dairy Value Chains in Badakhshan, Afghanistan*

Nigel Poole¹

Abstract Considerable recent research has tried to link agricultural production and the distribution of nutrient-rich foods to consumption, and hence improved health, of nutritionally vulnerable population groups. However, we are still unsure how agri-food value chains can assure positive linkages between agriculture and nutrition. Badakhshan is a remote region of Afghanistan, where high rates of malnutrition prevail among vulnerable population groups. The research reported here is a value chain analysis of a dairy project in Badakhshan that was designed to enhance women's economic development through investments in production, processing, and marketing, but also had considerable potential for nutritional impact. Using primary data from surveys of project participants and non-participants, focus groups, and key informants, I conclude that building effective value chains can leverage dairy production for better human nutrition, but projects need contextualisation, and further research and value chain development are needed to maximise the potential.

Keywords: Afghanistan; dairy sector; value chain development; public-NGO partnership; Afghanaid; nutrition security; vulnerable groups; women's empowerment.

1 Introduction: malnutrition and livestock interventions

Food security is often understood as freedom from hunger, or 'zero hunger' – which, put simply, can be addressed by a diet with adequate amounts of macronutrients, energy and protein. More precisely, the Committee on World Food Security refers to 'access to sufficient, safe and nutritious food', and emphasises that the 'nutritional dimension is integral to the concept of food security' (2009: 1). Likewise, the Sustainable Development Goal 2 (SDG2) 'Zero hunger' is broad, aiming to 'End hunger, achieve food security and improved nutrition and promote sustainable agriculture' (United Nations 2017: 1). However, it is useful to reserve the term 'nutrition insecurity' for deficiencies of micronutrients – vitamins and minerals – which are principal causes of stunting of children, insufficient growth, and reproductive performance of adolescents, in particular girls, and of pregnant and lactating women, and which are one cause of the increasing global levels of non-communicable diseases.

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Nutrition insecurity can be addressed, *inter alia*, by a range of policy actions and interventions that deliver micronutrient-rich foods to nutritionally vulnerable population groups. Increasing dietary diversity, meaning the consumption of a wider range of foods which include micronutrients, is one significant approach to enhance nutrition security. These foods include fruits, vegetables, and nuts, and a wide range of animal source foods. Access to micronutrient-rich foods can be achieved through a variety of pathways such as crop and livestock production and consumption, improved incomes enabling purchases of nutrient-rich foods from markets, social and supplementary feeding programmes, and local and massive nutrient supplementation programmes.

The last few years have witnessed a surge of interest in understanding agriculture–nutrition linkages, and shaping agriculture and food sector initiatives to improve nutrition security (Dangour *et al.* 2012). Summing up the view of a High Level Panel of Experts, the Food and Agriculture Organization of the United Nations (FAO) reports that ‘the sustainable development of agriculture, including livestock, is essential for poverty reduction and the achievement of food security and nutrition’ (Committee on World Food Security 2016).

However, with reference to the commonly accepted ‘pillars’ of food security (Committee on World Food Security 2009), ‘availability’ of nutrient-rich foods does not automatically ensure ‘access’, ‘affordability’, and ‘stability’ of supply and consumption by vulnerable population groups. Agricultural produce of higher nutritional quality may be sold and substituted in the diet by poorer foodstuffs bought with cash. Increased incomes may also be diverted towards non-food consumption. Thus, there is no assurance that nutritious home produce will be consumed by vulnerable women and children, or in sufficient quantities to effect improvements in nutrition and health (Maestre, Poole and Henson 2017). In such circumstances, access to, and forms of engagement with, food markets become important. Research increasingly points beyond agricultural production to the role of markets as a source of nutritious foodstuffs, even among rural peoples (Sibhatu, Krishna and Qaim 2015; Flores-Martínez *et al.* 2016; Sibhatu and Qaim 2017).

1.1 Dairy value chains and nutrition in Afghanistan

This article is about agri-food value chain development, and assesses the extent to which the dairy sector can contribute to improvements in nutrition security. The focus is on Badakhshan, a north-eastern mountainous province of Afghanistan (Figure 1). It captures three important themes embedded in the UK Aid-funded research consortium programme Leveraging Agriculture for Nutrition in South Asia (LANSA): fragility, gender, and innovation. The region is characterised by fragility in terms of climatic extremes and natural resources constraints and in terms of the ongoing conflict which affects much of the country. In this traditional social environment, women have a significant role in agriculture and dairy in particular, but gender equality and women’s empowerment are major issues (Boros and McLeod 2015;

Figure 1 Badakhshan, Afghanistan

Source Author's own.

Ministry of Agriculture, Irrigation and Livestock 2015a, 2015b). Developing new ways of dairy value chain organisation are inherent in the initiative (Glover 2017; Gupte 2017).

After this introduction, the article proceeds in three main sections. Section 2 explains the Afghan context regarding nutrition and the prevailing mode of implementation of public policies, which, because of the limited capacity of the state, is through national and international non-governmental organisations. Section 3 introduces the women's economic empowerment (WEE) project implemented in Badakhshan by the UK non-governmental organisation (NGO) Afghanaid and explores the findings of a review specifically of the dairy sector interventions. Section 4 is the major part of the analysis, which considers the development of the dairy value chains in relation to the LANSa value chain framework (Maestre *et al.* 2017). It explains the methods, maps the value chains, presents the findings, provides an assessment of the development of the dairy sector in Badakhshan, and comments on the limitations of the analysis and needs for further research. Finally, the conclusions in Section 5 suggest ways ahead to maximise the pro-nutrition impact of dairy value chain development.

2 The Afghan context

LANSa has been working in South Asia since 2012. In Afghanistan, one of the four target countries, undernutrition is evidenced by high rates of stunting, wasting, micronutrient deficiencies, and anaemia. The national rate of stunting was recorded in the latest National Nutrition Survey 2013 as 40.1 per cent. Nevertheless, in some of the 34 provinces, rates still exceed 70 per cent, and even within provinces, there is considerable variation in health indicators between districts. The survey investigated a

number of micronutrient deficiencies and found that anaemia (Hb levels <11.99gm/dl) affected 40.4 per cent of women of reproductive age (15–49 years), with 24.0 per cent suffering iron deficiency and 13.8 per cent suffering iron-deficiency anaemia. Anaemia among children 0–59 months of age remains persistently high at 44.9 per cent, with 26.1 per cent suffering from iron deficiency and 13.7 per cent suffering from iron-deficiency anaemia (UNICEF 2014). Badakhshan, a remote and mountainous north-eastern province subject to climatic extremes and natural disasters, is one of the provinces most affected.

In reality, Afghan food and nutritional security policies are heavy on therapeutic interventions, behavioural change, and market supports (Poole, Echavez and Rowland 2016). Ten years ago, Johnecheck and Holland (2007) envisaged a multisectoral approach to improving malnutrition in Afghanistan, while various other research outcomes have identified gaps between the agricultural and nutrition sectors, and highlighted the significance of food-based approaches to improving nutrition (Levitt, Pelletier and Pell 2009a; Levitt *et al.* 2009b; Levitt *et al.* 2010; Levitt *et al.* 2011). Nevertheless, current policies do not emphasise the role of agriculture and food-based strategies for improving nutrition.

2.1 Modes of intervention

As with many areas of public services in Afghanistan, project interventions are undertaken through partnerships between the public sector and implementing organisations which are often NGOs such as Afghanaid. This public–NGO (PUNGO) modality redresses the limited capacities of the public sector in terms of human and financial resources and access to remote communities (Newbrander *et al.* 2014; Varkey *et al.* 2015). For a resource-poor and conflict-ridden country, the PUNGO partnership approach is a workable solution and is no less sustainable than other forms of governance: Afghanaid has been supporting development since 1983. In the livestock sector, the 25-year plus history of the Dutch Committee for Afghanistan (DCA) in Afghanistan is also illustrative of such long-term commitment (Schreuder 2015).

Recent work undertaken by Afghanaid is one example of interventions designed to enhance the role of women in economic development – but not specifically nutrition. Women's economic empowerment in Afghanistan is necessary but probably under-recorded. Maybe only 20 per cent of adult women are engaged in the formal economy, but women's contribution to certain sectors such as horticulture and livestock husbandry is significant. The dairy production sector is one in which female participation is high, with a range of potential benefits for women in terms of income, employment, and empowerment. For rural households, dairy has potential to increase the nutritional status of vulnerable groups: children, adolescent girls, and women. In Afghanistan, dairy consumption is constrained by lack of product volume, inefficient value addition by processing, weak marketing, and limited distribution. Seasonality also is a major constraint to domestic supply, which is supplemented by imports from neighbouring countries (Boros and McLeod 2015; Safi 2016).

3 Women's economic empowerment in Badakhshan

Integrated dairy schemes in Kabul, Balkh, Kunduz, and Herat have been supported by the FAO since 2005 with financial support from the national government, bilateral donors (German and Italian governments) and the UN International Fund for Agricultural Development (IFAD). A recent study of the initiatives focused on four of the five existing schemes, located in Kabul, Balkh, Kunduz, and Herat, the other project being a newer initiative in Jalalabad. The state of the dairy sector in Afghanistan has been summarised by Boros and McLeod:

The dairy sector is at an early stage of development. Most producers are small farmers scattered across villages with some larger ones concentrated in peri-urban markets. Imports from the Islamic Republic of Iran (especially in the western part of the country) and Pakistan account for a large part of the supply of dairy products and seem set to increase rapidly. Milk is imported mainly in the form of milk powder and the rest as ultra-high temperature (UHT) products. UHT products are more widely sold than fresh milk as they have a long shelf-life and are less dependent on refrigeration. They are twice as expensive as those produced locally with fresh milk from farms (2015: 6).

The first stage of a Women's Economic Empowerment (WEE1) project financed by DFID was implemented by Afghanaid between 2013 and 2016 (Afghanaid 2016). The WEE1 project in Badakhshan Province is one example of a number of value chain interventions implemented within Afghanistan. The aim was to enhance women's inclusion, incomes, and employment by delivering technical training in rural production, provision of physical inputs, training in entrepreneurship and leadership skills, establishing community-based organisations (CBOs), and building product processing capacity and marketing networks. The dairy sector was one of those specifically targeted by the value chain development interventions. Nevertheless, WEE1 was not designed specifically to address nutritional deficiencies. The goal of WEE2 funded by the UK Foreign and Commonwealth Office through the British Embassy in Kabul was to strengthen the sustainability of the women-led CBOs in target areas of Badakhshan, consolidate their income gains, and deepen women's economic and social empowerment.

3.1 The dairy sector contribution

The second stage began with a baseline study of rural households in June 2016. This had three aims: to evaluate gender equality and status issues affecting women's participation in income generation and decision-making; to assess women's participation in community leadership and governance; and specifically, to investigate the dairy production sector and food consumption.

A total of 562 women were interviewed. Fifty-one per cent of them (287) had been directly involved in the implementation of the WEE1 project and 49 per cent (275) were randomly selected control group

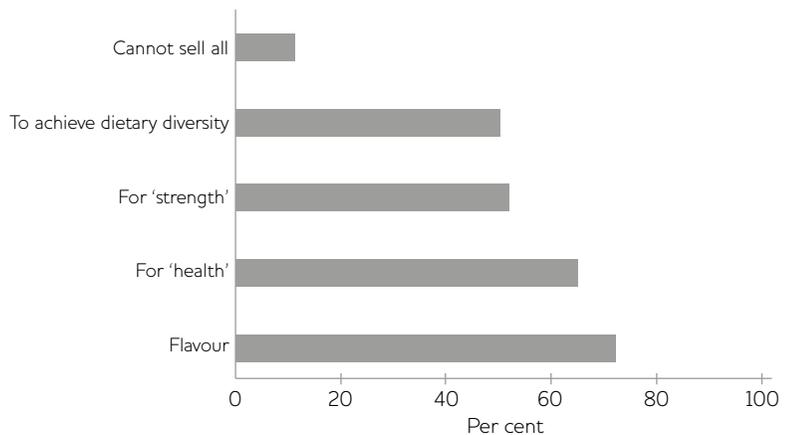
Table 1 Sources of dairy products consumed within households

		WEE participants %	Non-WEE participants %	Total %
Own production	Milk	70.4	56.4	63.5
	Milk products	57.1	41.1	49.3
Purchase	Milk	16.7	24.0	20.3
	Milk products	12.9	13.5	13.2
Exchange with relative/ neighbour	Milk	16.0	16.4	16.2
	Milk products	6.3	7.6	6.9
Gifts from relative/ neighbour	Milk	11.5	10.9	11.2
	Milk products	10.1	2.9	6.6

Source Afghanaid (2016).

members without any previous involvement. Baseline findings showed that the income of female-headed households was significantly lower than that of male-headed households, and that in half of households, income-generating activities were shared between men and women. Women's economic activities were related to home garden vegetable and fruit production, and poultry and dairy production, mostly for household consumption. About 10 per cent of women were not engaged in income-generating activities. Income generation was found to contribute to women's self-esteem. Respondents who engaged in commercial activities tended to sell to neighbours and to local markets rather than more distant district and provincial markets, and on an individual rather than collective basis.

The findings on dairy showed that household diets were dominated by bread, rice, oil, tea, and leafy vegetables, but consumption of dairy products was the next most important food category. Dairy products were sourced either from own production or purchased, and were consumed by more than 96 per cent of respondents' households. For those who had been involved in the WEE1 project, dairy constituted the principal source of income for 34.6 per cent of households, compared to 18 per cent for households that did not participate in the project. The frequency of dairy consumption for most households was daily (87 per cent), while 8 per cent consumed dairy a few times a week, and just over 1 per cent said that they never consumed dairy products. For the whole sample, among children, 78 per cent of daughters and 80 per cent of sons consumed dairy products, and female household members consumed (53 per cent) more than men (47 per cent). In cases where milk was not distributed equally, preference was given to children. WEE participants were significantly more likely to consume dairy products than the control group who had not participated in previous empowerment activities, as is evident in Table 1.

Figure 2 Reasons for dairy product consumption

Source Author's own, redrawn from Afghanaid (2016).

The study showed that women in the household were the members most likely to be responsible for milk production, and even more so among project participants than non-participants. Fewer than 10 per cent of adult men were responsible for dairying. Either as the wife of the head of householder/livestock owner, or as the person responsible for caring and milking the livestock, they also exercised decision-making responsibility for the distribution of milk within the household. Women were also the major beneficiaries of income from sales of dairy products. Income was spent mostly on daily household expenses (95 per cent of the whole sample), followed by school expenses (57 per cent) and health care (32 per cent).

Not surprisingly, a marked seasonality of production was recorded, with milk supply and income from dairy products peaking in the spring and summer months. Milk volumes were small, on average about three litres in the summer, with a maximum of 16 litres registered within the project participant group. In the winter months, the small supply of milk was mainly consumed rather than sold. Respondents' reasons for consuming dairy products were a mix of reasons including some awareness of the nutritional value (Figure 2).

In summary, dairy production was shown to be an important enterprise which can be boosted by interventions such as the WEE project. Dairy products make an important dietary and economic contribution to households, and to children in particular. Dairy production and consumption is a defining characteristic of women's role and empowerment. However, more remains to be discovered about the potential for dairy to contribute to household wellbeing and nutrition on a larger scale, viz.:

- Dietary contribution: the volumes of milk collected and consumed were small, and it is not clear what effective contribution the

consumption of dairy products actually makes to diets, which is a function of quantities as well as frequencies.

- **Product development:** observational data and reports from key informants indicated that household milk supplies were considered as a single product: milk from cows, sheep, and goats was not separated, but mixed. Little is known of the type of dairy products; processing and storage activities; and patterns of commercialisation of such products as cheeses and yogurts derived from milk. Thus, there was a need for a more detailed value chain study to explore the potential for greater value addition through product preservation, differentiation and branding, product quality control and marketing, and chain governance.
- **Spatial issues in the dairy sector:** the milk markets into which the dairy women are linked are mainly local. More remains to be understood about consumption of dairy products in rural areas by households that are not directly engaged in dairy production. Moreover, there are as yet no data on dairy product consumption in urban areas.
- **Seasonality:** finally, production is highly seasonal, but it is not known precisely how seasonality affects variability in consumption and prices, nor how seasonality of local production interrelates with milk imported from outside the region, and the potential for processing milk to exploit the season of low production and availability.

4 WEE dairy value chain analysis

The rest of this article concerns a dairy value chain analysis undertaken from July 2016–March 2017 as part of WEE2 following the interventions to strengthen women's economic participation through empowerment of women-led CBOs for production and savings, targeting more than 8,000 members. The project worked in eight districts of Badakhshan, establishing and training 88 women's dairy production groups, 16 milk collection centres (MCCs) and eight dairy processing centres (DPCs), aiming to attract 200–500 litres per day, depending on the season, to each centre for processing into other dairy products and for commercial distribution. WEE project participants received training on a range of technical topics including feed preparation. During 2015, Afghanistan equipped 16 MCCs with essential milk handling and bulking equipment and materials. Milk processing equipment and materials were provided to each DPC for milk chilling, pasteurisation, processing of derived products, hygiene, and quality control. Para-veterinarians who had been trained by DCA in each of the targeted districts provided guidance on livestock management, health and epidemiology, and vaccination services. Many WEE participants acknowledged the benefits from upgraded knowledge and skills through giving positive responses to several technical and non-technical questions about livestock keeping such as hygiene, diseases, and vaccination.

The value chain analysis was conducted by an independent analyst to assess the impact of the WEE intervention and the constraints to boosting the dairy sector (Safi 2016), specifically to:

- a Identify the main players and linkages in the dairy value chain;
- b Evaluate the competitive advantages/disadvantages of the value chain players (market access, technology/product development, management/organisation, input supply/raw materials);
- c Assess the sector institutional environment (finance, policy, operating environment/infrastructure, trade regime);
- d Identify the main opportunities for value addition for women-led CBOs; and
- e Identify the main constraints faced by the value chain members.

4.1 Analytical framework

4.1.1 Availability of nutrient-rich foods

This article focuses on how value chain investment enhanced the ‘availability’ pillar of food security (Committee on World Food Security 2009). Further work is being undertaken to assess the dairy consumption characteristics within the wider population to examine the extent to which interventions improve the ‘affordability, utilisation and stability’ pillars in relation to seasonal extremes affecting the dairy sector in Badakhshan.

The concepts proposed by Maestre *et al.* (2017) are used here to frame the results of the value chain study. The study provided evidence concerning the second pathway by which value chain interventions can impact human nutrition, viz. by increasing the production and distribution of dairy products. Afghanistan has agricultural development strategies to boost the livestock sector. However, as noted, agri-business policies have not historically been formulated to address nutrition objectives, and LANSAs envisages realignment of multisectoral objectives to reduce the high rate of malnutrition.

From a public perspective, milk and derived products are naturally nutritious foods that can do much to enrich a micronutrient-deficient diet. From a private perspective, the attractiveness of the sector for the individual firm in the value chain post-farmgate depends on three elements:

- In the first place, there is the nature of sector competition and each firm’s own business strategy in creating and sustaining performance, both economic and, to the extent to which consumer demand exists, in relation to social parameters such as employment creation and inclusion of women, and environmental management.
- Secondly, the industry attractiveness is also shaped by supporting and regulatory functions which facilitate business development, such as financial services, the provision of infrastructure and energy, business regulation and, in the case of dairy (and other foodstuffs), a quality framework for ensuring product safety.

- Thirdly, from a public nutrition perspective, an efficient system of product distribution is critical to ensuring the availability of products to nutritionally vulnerable consumers.

Within this institutional environment, Maestre *et al.* (2017) frame these business concerns under four requirements for there to be 'availability' of naturally nutritious foods to vulnerable consumers:

- a the extent to which a value chain enables firms to add value;
- b an equitable sharing of incentives throughout the chain;
- c the efficient governance of inter-firm relations; and
- d the management of costs and risks.

4.2 Methods

4.2.1 Secondary data

Several socioeconomic and feasibility studies conducted by Afghanaid in Badakhshan were an important source of secondary data. Other documents were published reports of donor-funded development projects that were previously implemented or currently being implemented in Badakhshan Province; for instance, by FAO, the German organisation for international development, GIZ, and the Aga Khan Foundation. This dairy value chain assessment report relies largely on primary data from field research.

4.2.2 Primary data

Primary data collection was conducted among chain actors from input suppliers to retailers, through focus group discussions and interviews with representatives of CBOs, MCCs, and DPCs, and with key stakeholders of the dairy sector in Badakhshan Province. The latter included local representatives of the Department of Agriculture, Irrigation and Livestock (DAIL), the Department of Women's Affairs (DoWA), representatives of the provincial governor, and NGOs working in the dairy sector.

A questionnaire was designed for milk producers concentrating on aspects of milk production, supply to the market, required inputs, and challenges. Implementation targeted about 40 producers sampled from members of WEE groups and non-WEE dairy producers from eight districts of Badakhshan (Argo, Baharak, Darayem, Faizabad, Jurm, Kishem, Shuhada, and Yaftal). In total, 139 respondents were interviewed including producers, respondents from MCCs, DPCs, transporters, retailers, and other stakeholders (Table 2). A key issue was the comparison between dairy producers who benefited directly from the WEE intervention, and the non-WEE producers.

A focus group discussion was held in each district including representatives of CBOs, MCCs, and DPCs. Questions focused on factors assuring sustainability of existing dairy groups. Participants of the focus group discussion were key players, active beneficiaries, and

Table 2 Sample framework

Respondents/region	Argo	Baharak	Darayem	Faizabad	Jurm	Kishem	Shuhada	Yaftal	Total
Input suppliers	1	1		1	1	1			5
WEE dairy producers	3	3	3	3	3	3	3	3	24
Non-WEE dairy producers	2	2	2	2	2	2	2	2	16
Retailers	2	2	2	2	2	2	2	2	16
Representatives of MCCs (FGD)	2	2	2	2	2	2	2	2	16
Representatives of DPCs (FGD)	2	2	2	2	2	2	2	2	16
Representatives of MCCs (IND)	2	2	2	2	2	2	2	2	16
Representatives of DPCs (IND)	2	2	2	2	2	2	2	2	16
DAIL		1		1		1			3
DoWA		1		1		1			3
Governor's office		1		1		1			3
GIZ official				1					1
Afghanaid provincial programme manager				1					1
Afghanaid – WEE coordinators				2					2
Afghanistan Chamber of Commerce and industry official				1					1
Total									139

Note FGD = focus group discussion; IND = individual interview.

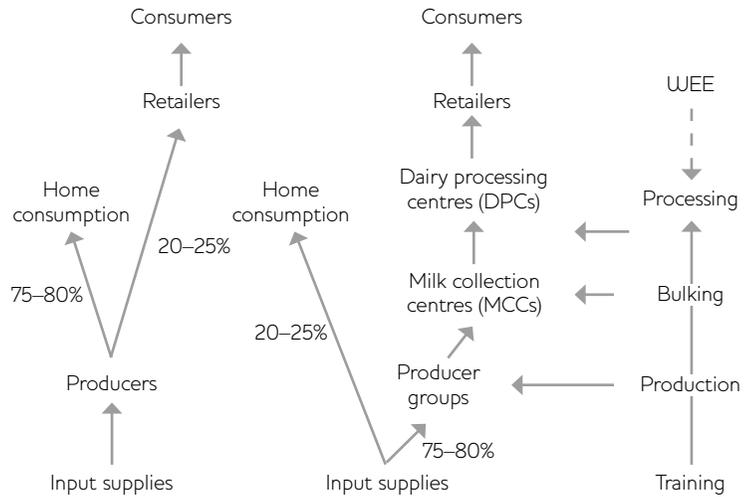
Source Adapted from Safi (2016).

experienced dairy sector experts; therefore, it was essential to collect their ideas in the initial stage of the assessment.

4.3 Findings: the dairy value chains

The formal structure of the dairy system is simple. Service providers in the form of feed and animal health inputs, transport, and hygiene controls support the chain from input supply to end consumer. The system comprises two chains, each consisting of the following main actors: input suppliers, producer groups, MCCs, DPCs, retailers, and consumers. The principal differences between the two chains shown in Figure 3 are the simpler structure of the chain and the small volumes estimated to flow to commercial outlets from non-WEE producers (20–25 per cent), compared to the WEE producers' chain (75–80 per cent).

Figure 3 The dairy value chains: non-WEE producers and WEE producers



Source Adapted from Safi (2016).

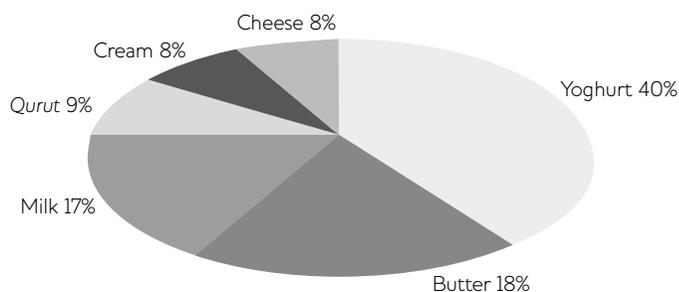
Value addition includes all necessary processes of milk conversion to other dairy products by boiling/pasteurisation, cooling, packaging, and ultimately producing and supplying various dairy products to the market. National data for demand for various dairy products is shown in Figure 4.

4.3.1 Production and productivity constraints

The common type of cow is the *watani* or *kunari* cow, estimated to produce up to three litres of milk per day during a lactation period of ten months, giving about 850 litres per lactation period. Mostly, households keep one or two cows. Because cows also suckle calves, only 20 per cent of respondents were occasionally supplying two or more litres of milk either to retail shops or MCCs. While the total milk production of WEE producers was considerably lower than the total capacity of the MCCs, the total production of each district was estimated to be several times higher than the total capacity of the MCCs in each district. The traditional spring calving period coincides with the better availability of fresh fodder, and more milk can be collected than the local plants can manage. In winter, there is a shortage of milk, as many cows are dry and feed is scarce.

The initial stages of production and processing are performed by the women, up to the engagement in markets. Livestock keeping is a significant activity for women producers because keeping livestock helps to eliminate fuel and fertiliser costs by producing dung. It also helps reduce family food expenditure by producing fresh milk and other dairy products, and is an important source of income.

Besides extreme seasonality of production, limitation in supplies was attributed to the traditional nature of Afghan markets and society, and the constraints that this imposes on women's engagement in economic activities. While dairy is a 'women's' enterprise, their participation in

Figure 4 The national market for dairy products

Source Adapted from Boros and McLeod (2015).

sales and exchange of dairy products for other goods was restricted to within local communities.

4.3.2 Milk collection centres

There was evidence that women tended to deliver milk to small local retail outlets and make local sales. However, transportation is a major challenge due to the bad road connectivity, insecurity, and long distances, physical conditions which exacerbate the customary social restrictions affecting women. Poor logistics also compound the short product shelf life.

Two MCCs were established in each targeted district and were equipped for milk collection. Each functioning centre was managed by three to four women. However, only eight of the 16 MCCs were activated: two in each of the four districts of Baharak, Jurm, Shuhada, and Yaftal. Other districts – Faizabad, Darayem, Argo, and Kishem – were yet to re-activate and operationalise the MCCs and DPCs.

The total milk production of WEE producers was considerably lower than the total capacity of the MCCs. Most households in the rural region kept cows and thus the local demand for milk and yogurt from retail shops or neighbours was limited. Supplies reached a peak in spring and summer, and it was outside these seasons when processing capacity was least utilised. Besides production and productivity-enhancing activities, value chain development opportunities at the MCC level included human capacity building among producers to take advantage of efficiencies of scale and provision for better horizontal and vertical coordination to exploit the capacity of the new formal sector.

There was potential to expand sourcing by women's associations through establishing links between non-WEE producers and the MCCs to satisfy the DPCs' processing capacity, and to meet the urban demand for milk and yogurt in the targeted markets of Faizabad, Baharak, and Kishem.

4.3.3 Dairy processing centres

Each district had its own DPC equipped to handle a capacity of 1,000 litres/day. Each centre was operated by four to five women who provided technical managerial services. These centres were equipped

to process raw milk into several types of local dairy products such as yogurt, cheese, *qurut*, cream, and butter. *Qurut*, a processed yogurt curd, is often dried and is valuable because of its long shelf life.

As noted, seasonality of milk production affects supply to DPCs and hence the potential mix of products. Every DPC was equipped with transport facilities to collect milk from producers and MCCs at district level. The processed products were delivered in bulk loads of 300–350kg from DPCs to the market, and transport costs and ease depended on the quality of roads. Major markets were Faizabad, Baharak, and Kishem, three districts with significant urban populations where multiple retailers purchased and sold different types of packaged and non-packaged products in competition with national and imported products. It was evident that more sophisticated product development and marketing initiatives at DPC level would be required to capture market share.

As noted, sales and delivery to MCCs and to DPCs were a male responsibility, and men were thus responsible for vertical coordination between the stages. Non-WEE producers were a potential source of supplies for MCCs and DPCs to address capacity issues. Inconsistency due to the seasonality of production was a feature of milk supplies to the local market and to urban markets, and needs to be better understood in terms of prices and demand, in order to evaluate the nutritional impact of fluctuating supplies as well as the efficiency implications for processing. Stakeholders and beneficiaries believed that milk collection could reach the maximum of 8,000 litres per day in the eight districts if middlemen in each district were encouraged or employed to regularly visit women producers (WEE groups and non-WEE producers), organise them, and collect milk from every group every morning and evening.

Respondents commented that lack of electricity, input supplies, and advanced technologies were major factors at macro and micro level that require governmental support.

4.3.4 Consumption

There were three customer segments identified in Faizabad market. The first was customers who were price-sensitive: about half of the customers, as expected, pointed to the high prices as one of the important factors in consumption decisions. Others were quality-sensitive, who wanted only high-quality dairy products, and showed little price sensitivity. A third segment was of potentially loyal customers of local production, but who were currently purchasing imported products due to lack of awareness and local availability.

The retailer survey found no wholesaler in Faizabad as well as in targeted districts willing to purchase high volumes of dairy products. Sales were largely through small retail shopkeepers and roadside vendors who purchased small quantities of fresh milk and yogurt from local producers and processors. Other dairy products were imported Iranian

products such as cheese, butter, cream, and *qurut* that were supplied from Kunduz to Badakhshan. On a daily basis, retailers sold about 30–35kg of yogurt and milk, 0.5kg of butter, followed by cream and *qurut*. During interviews, retailers in the Faizabad provincial market expressed interest in visiting DPCs, negotiating prices and contracts for specific quantities of dairy products. It was evident that weak processing and commercial activities of domestic enterprises facilitated access by neighbouring countries to the market, allegedly supplying low-quality products.

4.4 Assessment

The FAO study cited earlier makes clear that the dairy sector is at an early stage of development, but also that there is potential to increase both domestic supply and demand (Boros and McLeod 2015). The potential impact on women's empowerment is evident, particularly because dairying is one of the few commercial activities that is viable in remote regions of the country.

The marked seasonality to production and supply to markets has been noted, and also that yogurt is important as a major component of sales, followed by butter, raw milk, and a series of other derived products: cheeses, *qurut*, and cream. The constraints to realising the potential to address some of the national nutritional insufficiencies can be interpreted using the data from the value chain analysis and the framework proposed by Maestre *et al.* (2017).

The production and distribution of nutrient-rich foods such as dairy products is one pathway by which agricultural value chains can impact consumer target groups such as children, adolescent girls, and women – the LANSAs target group. With reference to the concepts proposed by Maestre *et al.* (2017) and highlighted in Section 4.1, the results suggest the following:

- 1 Sector attractiveness: it is evident that the WEE intervention offered a business opportunity, the attractiveness of which is the foundational element for value chain development. Investment in human and physical assets through improving inputs, training, and creation of MCCs and DPCs enabled WEE participants (compared to non-WEE participants) to deliver much increased volumes of milk to MCCs, and onwards DPCs, boosting the supply to market of milk and dairy products in the pilot districts of Badakhshan.

Women's inclusion in the dairy chain was primarily at the production stage, except for employment opportunities in the MCCs and DPCs and in some districts such as Yaftal, where some women sold their products in the market. The more market-related functions were a male responsibility, consistent with the prevailing sociocultural norms.

The attractiveness of the sector is not yet fully demonstrated. Potential for development remained. Constraints to development existed due to the lack of horizontal coordination for bulking milk supplies at the level of production, and the lack of vertical

coordination to DPCs and onwards to consumer markets. To exploit the processing capacity of the infrastructure and market opportunities, more traders or middlemen were needed. The need for further investment in organisational capacity building was also identified. All these factors condition the extent to which the dairy value chains can have a positive impact on nutrition.

- 2 Supporting and regulatory functions: investment in transport and communications infrastructure is a huge challenge in remote regions such as Badakhshan: poor roads, uncertain electricity, and limited knowledge and communications systems increase processing, transport, and information costs. Quality management and hygiene control were found to be compromised and poor packaging was a major gap.

Similarly, competition with imported products from neighbouring countries that are backed by more sophisticated export marketing strategies needs to be addressed. Further development of products is needed in response to demand for appropriately packaged and efficiently distributed goods at prices that are attractive to consumers. Addressing these weaknesses will be a significant business challenge.

- 3 Distribution to nutritionally vulnerable consumers remains another challenge. Delivery of quantities to meet the demand in existing markets will require a major upscaling of milk production and dairy processing capacity, including new product development. This must be accompanied by an increase in sophistication in vertical coordination through the value chain up to the retail level. The propensity of WEE producers to commercialise suggests that supply will be forthcoming. However, sales of milk by poor families might compromise their own diets and nutritional needs.

Regarding the four requirements to encourage individual dairy chain participants to engage in collective enterprises:

- a The fundamental potential to add value from dairy production through processing and marketing to consumption is not in question. Processing capacity could be increased as per market demand, subject to existing producers' commitment to expand milk supply, attracting new suppliers and finance to make the necessary investments. Much more needs to be learnt about the characteristics of demand for different products in order to formulate appropriate marketing strategies, viz. price, product type, packaging and presentation, and distribution systems – particularly how best to address the requirements of nutritionally vulnerable consumers. Uptake of dairy products through schools, clinics, and other public institutions is one market access route that could be explored.
- b To build a successful value chain, it is necessary to ensure an equitable sharing of incentives throughout the chain and this would require innovation in both economic and social organisation: more

- labour input would be required of the dairy producers in order to scale up production, which would likely create tensions and trade-offs with women's other activities and responsibilities. The extra investment by women would have to be rewarded by financial returns commensurate with the production effort invested. An increasing acceptance of women's employment creation would shape an industry environment beyond the farmgate, and boost women's participation in the economy and women's role in providing for their households in nutritional and economic terms. These changes would affect household economics and decisions in challenging ways.
- c The requirement for efficient governance of inter-firm relations has not yet been addressed: further investment is needed in human and organisational capacity building in order to build enterprise scale throughout the chain to achieve efficient businesses and meet nutritional objectives for consumers. Traditional gender roles may constrain cooperation at different levels of the chains, and vertical coordination of the different stages, and even opportunities for training in both basic education and entrepreneurship.
 - d The management of costs and risks requires further careful examination. Public utilities are weak in Badakhshan and require significant investment in energy and communications; information and transport infrastructure are unreliable; and the region is subject to climatic extremes and natural disasters, such as earthquakes, floods, and landslides. Such significant risks, and those market and other risks inherent to dairy business activities are likely to be unequally shared among value chain participants, but can be identified and managed through training and capacity building, and creation and sharing of market information. Above all, a basic public good, which is the security situation, is affected by the encroaching insurgency by non-state armed groups and is currently beyond the capacity of the national government alone to ameliorate.

4.5 Limitations and further research

Any research in Afghanistan is limited by the restrictions on empirical data collection imposed by the current situation of insecurity. This leaves an ongoing research agenda. One area for further analysis beyond what has been achieved in the current assessment is to develop the rudimentary cost-benefit analysis undertaken by Safi (2016), not reported here, with accurate and quantitative data representative of all districts on prices, costs, margins, and profitability of the different value chain functions. This is necessary for an assessment of the sharing of incentives among the range of actors throughout the chain, and therefore the attractiveness of the sector for private enterprise.

Secondly, enhancing the nutritional impact of dairy value chain development requires matching food availability and access to consumer demand by poor and nutritionally vulnerable population groups for dairy products, within a better understanding of diets in Badakhshan

overall. A particular focus is the impacts of production seasonality on dietary sufficiency and hence nutritional security (Zanello, Shankar and Poole 2017). LANSAs work with Afghanaid has already begun in Badakhshan to address this second consumption dimension.

Finally, it is essential to understand the pre-existing social environment: '... systems of social bonds and trans-border ethnic, familial and/or political connections [which] are based on trust and are deeply engrained in livelihoods; they are, in practice, the primary systems that regulate and govern rural markets' (Minoia, Mumtaz and Pain 2014: 1). They have been described in terms of 'agri-mafia' (Poole *et al.* 2016), characterised by strong social structures and specific patterns of behaviour, caste, ethnicity, and age, requiring carefully designed interventions specific to particular locations (Mallett and Pain 2017).

5 Conclusions

There are ways ahead for building the dairy chains. The comparison of WEE participants with non-participants shows that dairy interventions to add value through improving production, milk collection, processing, and distribution are effective. However, the WEE interventions are a 'work in progress' that is likely to require ongoing support. Limited resources restrict Afghanaid from directly covering additional districts of Badakhshan, whereas further support is needed to improve milk collection, transport facilities, and distribution by linking traders with the MCCs and DPCs. While the principal opportunity to expand is to attract supplies from producers who have not yet participated in the dairy development programme, the principal challenge is to build efficient structures and stimulate effective strategies for effective value chain coordination. Quality control also requires further investment, and another potential opportunity is to develop local product branding. The LANSAs framework (Maestre *et al.* 2017) is an important reminder that business attractiveness is a condition for independent private firms to develop.

Project sustainability is a challenge in Afghanistan more than in many other countries, and value chain development can take many years (Donovan and Poole 2013; Poole and Donovan 2014). Given the ongoing weaknesses of the state, the public sector-NGO (PUNGO) modality of intervention to build local enterprise, and profitable and efficient value chains currently is the only effective approach to overcome the limiting constraints. Among key informants, the director of the provincial DoWA commented that the WEE programme should be expanded to other districts of Badakhshan Province. Respondents from DAIL and DoWA indicated during interviews that they would support financing initiatives from several sources such as credit by public and private banks. DAIL would support market extension initiatives, to provide technical support and training, and also would seek further support from national and international donors and funding organisations. DoWA could support strengthening women's empowerment and organisation building (Safi 2016).

Given time, the dairy value chain model could also be adopted by the private sector in cooperation with regional stakeholders and the public sector, not only in Badakhshan but in other provinces such as Bamyan, and other regions and countries characterised by similar nutritional vulnerabilities and underdeveloped production and market opportunities. The opportunities for dairy to contribute to nutritional security are more or less global. However, Badakhshan is an unusual region: contextualisation which recognises diversity and locality rather than a blueprint approach is essential. Value chain interventions promoted by public sector policymakers and implemented by NGO practitioners, with the intention of stimulating better nutrition through long-term private sector development, should build on local knowledge and specificities, with the onus of responsibility for planning and implementation on the local structures rather than central decision-making (Poole 2017).

Notes

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- 1 The author wishes to acknowledge the encouragement of Afghanaid to analyse the dairy value chain, and for permission to use data collected to evaluate the work in Badakhshan on women's economic empowerment; thanks also to Afghanaid staff for critical comments and to enumerators, interviewees, and respondents who contributed to the fieldwork.

References

- Afghanaid (2016) *Baseline Survey Report: Women's Economic Empowerment II*, Kabul, Afghanistan: Afghanaid
- Boros, R. and McLeod, A. (2015) *Empowering Women in Afghanistan – Reducing Gender Gaps through Integrated Dairy Schemes*, Rome: Food and Agriculture Organization of the United Nations (FAO)
- Committee on World Food Security (2016) *Making a Difference in Food Security and Nutrition*, Rome: Food and Agriculture Organization of the United Nations (FAO)
- Committee on World Food Security (2009) *Reform of the Committee on World Food Security: Final Version*, Rome: Food and Agriculture Organization of the United Nations (FAO)
- Dangour, A.D. *et al.* (2012) 'Linking Agriculture and Health in Low- and Middle-Income Countries: An Interdisciplinary Research Agenda', *Proceedings of the Nutrition Society* 71.2: 222–28
- Donovan, J. and Poole, N.D. (2013) 'Asset Building in Response to Value Chain Development: Lessons from Taro Producers in Nicaragua', *International Journal of Agricultural Sustainability* 11.1: 23–37
- Flores-Martínez, A.; Zanello, G.; Shankar, B. and Poole, N. (2016) 'Reducing Anemia Prevalence in Afghanistan: Socioeconomic Correlates and the Particular Role of Agricultural Assets', *PLoS ONE* 11.6: e0156878

- Glover, D. (2017) *Connecting Agriculture to Better Nutrition in South Asia: Innovation as a Process of Socio-Technical Change*, LANSAs Working Paper 16, Brighton: Leveraging Agriculture for Nutrition in South Asia (LANSAs)
- Gupte, J. (2017) *Leveraging Agriculture for Nutrition in Fragile Contexts*, LANSAs Working Paper 19, Brighton: Leveraging Agriculture for Nutrition in South Asia (LANSAs)
- Johnecheck, W.A. and Holland, D.E. (2007) 'Nutritional Status in Postconflict Afghanistan: Evidence from the National Surveillance System Pilot and National Risk and Vulnerability Assessment', *Food & Nutrition Bulletin* 28.1: 3–17
- Levitt, E.J.; Pelletier, D.L. and Pell, A.N. (2009a) 'Revisiting the UNICEF Malnutrition Framework to Foster Agriculture and Health Sector Collaboration to Reduce Malnutrition: A Comparison of Stakeholder Priorities for Action in Afghanistan', *Food Policy* 34.2: 156–65
- Levitt, E.J.; Kostermans, K.; Laviolette, L. and Mbuya, N. (2010) *Malnutrition in Afghanistan: Scale, Scope, Causes, and Potential Response*, Washington DC: World Bank
- Levitt, E.J.; Pelletier, D.L.; Dufour, C. and Pell, A.N. (2011) 'Harmonizing Agriculture and Health Sector Actions to Improve Household Nutrition: Policy Experiences from Afghanistan (2002–2007)', *Food Security* 3.3: 363–81
- Levitt, E.J.; Stoltzfus, R.J.; Pelletier, D.L. and Pell, A.N. (2009b) 'A Community Food System Analysis as Formative Research for a Comprehensive Anemia Control Program in Northern Afghanistan', *Food Security* 1.2: 177–95
- Maestre, M.; Poole, N. and Henson, S. (2017) 'Assessing Food Value Chain Pathways, Linkages and Impacts for Better Nutrition of Vulnerable Groups', *Food Policy* 68: 31–39
- Mallett, R. and Pain, A. (2017) *Markets, Conflict and Recovery: Findings from the Secure Livelihoods Research Consortium*, London: Secure Livelihoods Research Consortium
- Ministry of Agriculture, Irrigation and Livestock (2015a) *Food Security and Nutrition (FSN) Strategy 2015–2019*, Kabul, Afghanistan: Ministry of Agriculture, Irrigation and Livestock
- Ministry of Agriculture, Irrigation and Livestock (2015b) *National Strategy on Women in Agriculture*, Kabul, Afghanistan: Ministry of Agriculture, Irrigation and Livestock
- Minoia, G.; Mumtaz, W. and Pain, A. (2014) *The Social Life of the Onion: The Informal Regulation of the Onion Market in Nangarhar, Afghanistan*, Working Paper 26, Kabul, Afghanistan: Afghanistan Research and Evaluation Unit (AREU)
- Newbrander, W.; Ickx, P.; Feroz, F. and Stanekzai, H. (2014) 'Afghanistan's Basic Package of Health Services: Its Development and Effects on Rebuilding the Health System', *Global Public Health* 9.suppl 1: S6–S28
- Poole, N. (2017) *Smallholder Agriculture and Market Participation*, Rugby UK and Rome: Practical Action and Food and Agriculture Organization of the United Nations (FAO)

- Poole, N. and Donovan, J. (2014) 'Building Cooperative Capacity: The Speciality Coffee Sector in Nicaragua', *Journal of Agribusiness in Developing and Emerging Economies* 4.2: 133–56
- Poole, N.; Echavez, C. and Rowland, D. (2016) *Stakeholder Perceptions of Agriculture and Nutrition Policies and Practice: Evidence from Afghanistan*, LANSA Working Paper 9, Chennai, India: Leveraging Agriculture for Nutrition in South Asia (LANSA), MS Swaminathan Research Foundation
- Safi, Z. (2016) *Dairy Value Chain Assessment in Eight Districts of Badakhshan, Kabul, Afghanistan*: Afghanaid
- Schreuder, B. (2015) *Afghanistan, A 25-Years' Struggle for a Better Life for its People and Livestock. The Story of DCA, a Small NGO with a Large and Lasting Veterinary Programme*, Lelystad, The Netherlands: DCA-VET
- Sibhatu, K.T. and Qaim, M. (2017) 'Rural Food Security, Subsistence Agriculture, and Seasonality', *PLoS ONE* 12.10: e0186406
- Sibhatu, K.T.; Krishna, V.V. and Qaim, M. (2015) 'Production Diversity and Dietary Diversity in Smallholder Farm Households', *Proceedings of the National Academy of Sciences* 112.34: 10657–62
- UNICEF (2014) *National Nutrition Survey: Afghanistan (2013)*, Kabul, Afghanistan: United Nations Children's Fund
- United Nations (2017) *The Sustainable Development Goals Report 2017*, New York NY: United Nations
- Varkey, S.; Higgins-Steele, A.; Mashal, T.; Hamid, B.A. and Bhutta, Z.A. (2015) 'Afghanistan in Transition: Call for Investment in Nutrition', *The Lancet Global Health* 3.1: e13–e14
- Zanello, G.; Shankar, B. and Poole, N. (2017) 'Buy or Make? Agricultural Production Diversity, Markets, and Dietary Diversity in a Seasonal Context', unpublished LANSA Working Paper, Chennai, India: Leveraging Agriculture for Nutrition in South Asia (LANSA)

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A Study on Milk Value Chains for Poor People in Bangladesh

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Abstract Child and maternal undernutrition is still prevalent in Bangladesh and poor dietary diversity is one of the major causes. While milk can contribute to nutritional requirements, currently availability in Bangladesh is 126ml/person/day, whereas recommended consumption is 250ml/person/day. This case study was conducted to identify existing milk value chains and the milk consumption behaviour of poor people. Priority was given to women and children as they are the most vulnerable in both rural and urban areas. It was observed that both formal and informal value chains coexist where milk collectors and chilling centres have a lead role. At the household level, milk purchase decisions are usually taken by men in rural areas, whereas in urban areas women take part equally in the process. Government and private sector initiatives can play a role in increasing milk production and consumption through greater investment. Behavioural change communication is also vital to build awareness of milk consumption.

Keywords: dairy value chain, nutrition, milk consumption, milk preference, women and children, milk price.

1 Introduction

1.1 Nutrition insecurity

According to the latest *State of Food Security and Nutrition* report, the number of chronically undernourished people in the world is estimated to have increased from 777 million in 2015 to 815 million in 2016 (FAO *et al.* 2017). Estimates are that 155 million children worldwide still suffer from stunting, and climate-related shocks are contributing to increasing food and nutrition insecurity. It is evident that there is uncertain progress towards meeting the Sustainable Development Goals, specifically SDG 2, to 'End hunger, achieve food security and improved nutrition, and promote sustainable agriculture'.¹

The links between agriculture and better nutrition of vulnerable groups have been the focus of considerable recent research, and there has been a surge of interest in understanding agriculture–nutrition linkages to achieve nutrition outcomes globally (Dangour *et al.* 2012). Reviews by Berti, Krusevec and Fitzgerald (2004), Leroy and Frongillo (2007),

Girard *et al.* (2012) and Masset *et al.* (2012) show limited but growing evidence for a positive relationship between agricultural strategies, and nutrition and health. Regarding the potential for livestock interventions, recent reviews have improved the evidence base (Rawlins *et al.* 2014; Hoddinott, Heady and Dereje 2015).

The UK Aid-funded research consortium programme Leveraging Agriculture for Nutrition in South Asia (LANSA) has addressed the question: why do high levels of undernutrition persist in South Asian countries with predominantly agrarian economies? It has sought to understand the policy and stakeholder environment, the nature and impact of agricultural and other interventions, and the functions of agri-food value chains, in order to improve the efficacy of agriculture–nutrition linkages and raise the health status of nutritionally vulnerable groups, specifically children, adolescent girls, and women. A growing body of evidence can be understood in terms of the four food security ‘pillars’ (FAO 2009). Overall, the literature shows that the *availability* of nutrient-rich foods does not automatically provide *access*, *affordability*, and *stability* of consumption by vulnerable population groups: there is no assurance that nutritious home produce will be consumed by vulnerable women and children, in sufficient quantities and over time, to affect permanent improvements in population nutrition and health. More studies point beyond agricultural production to the role of markets as a source of safe and nutritious foodstuffs (Sibhatu, Krishna and Qaim 2015; Flores-Martinez *et al.* 2016; Zanello, Shankar and Poole 2017). This suggests potential for value chain analysis to evaluate and improve food system health, safety, and efficiency even among rural peoples (Maestre, Poole and Henson 2017). This article reports on work in Bangladesh that explores the role of markets and value chain development for nutrient-rich foods – specifically dairy produce – in contributing to improved diets, nutrition, and health in Bangladesh.

1.2 Agriculture, dairy, and nutrition in Bangladesh

Despite nationwide improvements in nutritional status, undernutrition in Bangladesh persists, especially in the form of childhood undernutrition, maternal undernutrition, and different forms of micronutrient deficiencies. The reduction in stunting among under-five children nationally has remained relatively stagnant, declining from 43 per cent in 2007 to 41 per cent in 2011. Wasting rates have seen a similar lack of movement, declining by only 1 per cent between 2007 and 2011. Micronutrient deficiencies are similarly widespread. Bangladesh’s 2013 national micronutrient survey reported that the prevalence of anaemia in pre-school-aged children was 33 per cent, with much higher rates in rural areas (37 per cent). Night blindness has sharply reduced due to the large-scale implementation of a vitamin A supplementation programme, but pregnant women still have inadequate vitamin A intakes. The national prevalence of zinc deficiency is approximately 45 per cent among pre-school-aged children. Twenty-four per cent of married women nationwide are undernourished [body mass index (BMI) < 18.5], while 17 per cent of this same cohort are overweight or obese

(BMI > 25.0). Despite the progress that still remains to be realised in improving many nutrition outcomes, the country has seen a reduction in the prevalence of chronic energy deficiency among women from 52 per cent in 1997 to 25 per cent in 2012 (Yosef *et al.* 2015).

To address the persistence of undernutrition in Bangladesh, multiple evidence-based, nutrition-specific interventions have been in place for a couple of decades. Cereals, largely rice, are the main food in Bangladesh with nearly two-thirds of the daily diet consisting of rice, some vegetables, a small amount of pulses and minimal quantities of protein. Animal-sourced foods such as meat, milk, eggs, and cheese still make up a relatively small proportion of an average Bangladeshi family diet, compared with grains and cereals. Milk, milk products, and meat are consumed only occasionally and in very small amounts. As a result, traditional eating habits often do not translate into a balanced nutritious diet (Copenhagen Consensus Center 2016). Nevertheless, milk production in Bangladesh is increasing. During 2006–07, the production was 2.28 million tonnes, and during 2011–12 it rose to 3.46 million tonnes and in 2015–16 to 7.27 million tonnes (DLS 2016).

The livestock sector currently accounts for about 3 per cent of gross domestic product (GDP) and 15 per cent of employment. During 1996–2006, livestock output grew at the rate of 4.1 per cent compared to 3.4 per cent for crop and horticulture, and 4.6 per cent for fisheries. The share of milk in the total value of livestock sector output increased from 26 per cent in 1990–91 to 29 per cent in 1995–96. The share was 30 per cent in 2000–01 then decreased to 24 per cent in 2005–06 – primarily because the share of meat, especially poultry meat and eggs, increased. These changes have been prompted by a rapid growth in demand for livestock products due to income and population growth, and urbanisation. The income elasticity of demand for milk was estimated to be 1.62 compared to 1.19 for meat and eggs in 1995–96, and these were projected to be 0.65 and 0.63 respectively in 2020. Expenditure elasticity of demand for milk and meat only in the urban areas in 2007 was estimated at 0.95 and 1.36 respectively. National statistics on production and consumption of milk in the country is poor and inconsistent, so the growth rates shown above should be interpreted with caution (Jabbar 2010).

The dairy sector offers a major opportunity to improve nutrition: milk and dairy products are concentrated dietary sources of macro and micronutrients and milk is particularly important for children (Grillenberger *et al.* 2003; Lien do *et al.* 2009; Neumann, Harris and Rogers 2002). In particular, milk can make a significant contribution to meeting the body's needs for calcium, magnesium, vitamin B12, and energy (Muehlhoff, Bennett and McMahon 2013). Pre-school children, and pregnant and lactating women are at highest risk for malnutrition and have highest potential benefit from dairy consumption, due to the nutrition in the milk as well as the potential for income production (CARE 2016). For example, a smallholder dairy initiative by Grameen Bank between

2000 and 2006 improved the nutritional status of 6,000 households. Beneficiaries consumed 0.2–1.0 litre of milk daily. Community-based pro-poor dairy initiatives provided an effective entry point for improving family household nutrition. Dairy industry development aimed at smallholders enhances broader development opportunities for women and young rural people. Empowerment of women has a significant effect on household nutrition outcomes, particularly children's health, wellbeing, and development (Muehlhoff *et al.* 2013).

A number of milk supply chains, mostly around the processing companies, are currently operating in the country. Major milk supply chains are related to Bangladesh Milk Producers' Cooperative Union Ltd. (Milk Vita), BRAC Dairy and Food Project (Aarong), Pran Dairy Ltd, Akij Dairy, Rangpur Dairy, etc. Milk Vita has the largest market share followed by Aarong and Pran (Mandate, Mandal and Rahman 2009).

In Milk Vita cooperatives there are around 65,000 smallholder dairy farmers from 925 villages in 15 areas of Tangail, Manikganj, Tekerhat, Baghabarighat, Sree Nagar, and Rangpur, supplying over 538,000 litres of milk per day. Historically, Shahjadpur and Pabna are the highest milk-producing areas. More than 100 BRAC chilling centres are in the Shahjadpur, Pabna, and Manikganj districts (Halder and Barua 2003).

Moreover, dairy production in Bangladesh offers good employment opportunities for both farm and non-farm rural and urban families. Development of the dairy sector positively impacts the life of poor people through stabilisation and generation of income, employment opportunities, nutrition, providing draft animals and manure for agricultural productivity, intra-household allocation of resources, and division of labour. It has been found that, in terms of employment, most workers are employed in small-scale milk production, with a declining number of workers employed by the larger-scale milk producers. The potential for the dairy sector to contribute not just to better nutrition but to poverty reduction, enterprise, and economic development objectives seems clear.

1.3 Dairy demand

Milk demand, measured by per capita consumption, is increasing by 4 per cent per year, which is higher than the growth in milk production (3.6 per cent). This has led to a continuous widening of the gap between milk supply and demand (Uddin *et al.* 2011).

In Bangladesh, the daily recommended requirement for milk is 250ml/person/day but the availability is very low, at 126ml/person/day. Total annual demand for milk is 16.49 million tonnes, whereas the production, as noted above, is 7.27 million tonnes (DLS 2016).

Milk consumption behaviour by the poor is very important while studying the dairy value chain. Consumption behaviour of dairy consumers depends upon income, price, and availability of milk and dairy products. A large number of factors directly affect the consumption

expenditure such as income, prices of individual commodities, size and composition of household, etc. (Roy *et al.* 2002).

There is hardly any evidence that the recent increase in production has increased milk consumption by the poor, particularly by women and children. And, as noted, the increase is relatively small in relation to potential demand. The study reported on in this article is an exploration of the characteristics of dairy demand in terms of availability, access, and affordability by nutritionally vulnerable population groups in Bangladesh. The study adopts the agri-food value chain approach of Maestre *et al.* (2017) as a conceptual framework. The study will be helpful for identifying policies to be effective in promoting milk products as nutrient-rich foods to take into account not only how dairy products are produced, but also how they are processed, distributed, and marketed along the value chain.

Maestre *et al.* (2017) identified different potential pathways where post-farmgate value chain interventions can contribute to enhanced nutrition among poor people. Direct interventions such as investment in physical and institutional infrastructure can improve food chain performance; foods with increased nutritional value can be developed and distributed; and finally, by enhancing access to, and consumption of, foods that are naturally rich in micronutrients, overall dietary diversity will increase (*ibid.*: 34). From those pathways the study followed the last one; that is, by enhancing access to, and consumption of, foods that are naturally rich in micronutrients. The framework implies three outcomes to bring about improvements in the micronutrient intake of vulnerable populations. The study acknowledges that a particular nutrient-rich food ‘must be safe to eat’; it must be ‘nutrient-dense at the point of consumption’; and finally, ‘Food must be consumed in adequate amounts on a sustained basis to bring about the desired nutritional outcomes (*ibid.*: 34–35). Having recognised the limitations in effective demand for dairy produce, and hypothesising that consumption by vulnerable groups is limited, this study focused on the final expected outcome by measuring the consumption of dairy products by poor people. The study also tried to test some of the requirements shown in the conceptual framework. Concentration was on nutritional awareness, availability, acceptability, and value chain coordination with governance. It was not possible to address all the requirements through a single study with a short time frame. While working with the milk value chain, these five requirements were found to be essential.

Food safety is also an important characteristic: it is well documented that milk and milk products provide a wealth of nutritional benefits, but that raw milk can harbour dangerous microorganisms that can pose serious health risks. According to an analysis by the Centers for Disease Control and Prevention (CDC) between 1993 and 2006, unpasteurised milk is 150 times more likely to cause food-borne illness and results in 13 times more hospitalisations than illnesses involving pasteurised dairy products. Raw unpasteurised milk can carry dangerous bacteria

that causes numerous food-borne illnesses (US Food and Drug Administration 2012). In the pasteurisation process, milk is heated to 72–75 degrees Celsius for 15–20 seconds. With appropriate cooling and chilled distribution, it has a shelf life of 5–15 days. Pasteurised milk in Bangladesh is marketed as 'Pasteurised full-cream liquid milk' and the companies provide a seven-day expiry date on this product. On the other hand, ultra-high temperature (UHT) milk lasts up to six months without refrigeration and preservatives. UHT milk is rapidly gaining popularity among urban consumers in Bangladesh due to its longer shelf life (BIDA 2016).

The objectives of this current study were to:

- Map the existing dairy value chain in urban and rural areas;
- Identify the quality and quantity of milk that households consume, particularly by women and children, and determine if there are differences between milk-producing and non-milk-producing households;
- Identify the engagement of women in decision-making for milk consumption and in the different steps of the dairy value chain; and
- Identify the household preference for milk consumption.

2 Methodology

2.1 Study sites

Survey data were collected through questionnaires using both quantitative and qualitative methods. Data collection was conducted in three different types of areas within the research framework of the BRAC-led Agriculture and Food Security Programme (AFSP).² The AFSP involves both international donors and local organisations, working in 52 *upazilas*³ of 18 districts in Bangladesh through agricultural research, development, and extension activities. In every *upazila*, ten blocks are selected, and the programme works with around 1,000 farmers of each *upazila* with the aim of changing their livelihood through dissemination of climate-smart agricultural technologies. The LANSAs activities focusing on agriculture and human nutrition is one component of the programme.

A classification of rural people by land size was considered here using the Household Income and Expenditure Survey 2010 (BBS 2011). In this study, we used the presence and approach of the AFSP to select the rural *upazilas*. According to ownership of land, poor people are considered to be those that are landless through to people who have up to 1.5 acres of land.

The first of the three types of area was a milk-producing rural area where households rear one or two cows. The Sonatala *upazila* of Bogra District is such an area and was selected purposively as it has good infrastructure facilities (including a chilling centre) for dairy industry development.

Figure 1 Survey areas, Bangladesh



Source Authors' own, adapted from BRAC communications.

There are many areas of the country where people are not engaged in the dairy business. The second area was a non-milk-producing rural area where people do not rear cows and are not commonly engaged in milk production. The Pirgachha *upazila* of Rangpur District is such an area and was purposively selected as a non-milk-producing area using the AFSP survey framework. Household selection criteria for this area were: (a) households are not engaged in milk production, and (b) landholdings of rural households are less than 1.5 acres.

The third area selected was an urban slum. Generally, it was assumed that the most poor and vulnerable people in the city live in slum areas. There are a number of slums in Dhaka, and Korail area in Gulshan 1, where a large number of poor people live, was selected.

2.2 Sample size

One hundred households from every site were selected randomly as being representative of the area. Household-level data were collected and the special target groups were women and children. Five collectors were involved in data collection. Training was conducted for the data collectors before the survey. They first collected data from the milk-

Table 1 Involvement of men and women in decision-making of milk purchasing

Groups	Women	Men	Both	Total
	%			
Rural non-producer	26	55	20	100
Urban slum	39	40	21	100

Source Survey conducted by the Agriculture and Food Security Programme of BRAC during 2016.

producing area. Samples from rural areas were selected from a previous survey of the AFSP. Sampled households from urban slums were selected randomly. Data analysis was limited to simple descriptive statistics.

3 Results and discussion

3.1 Sample characteristics

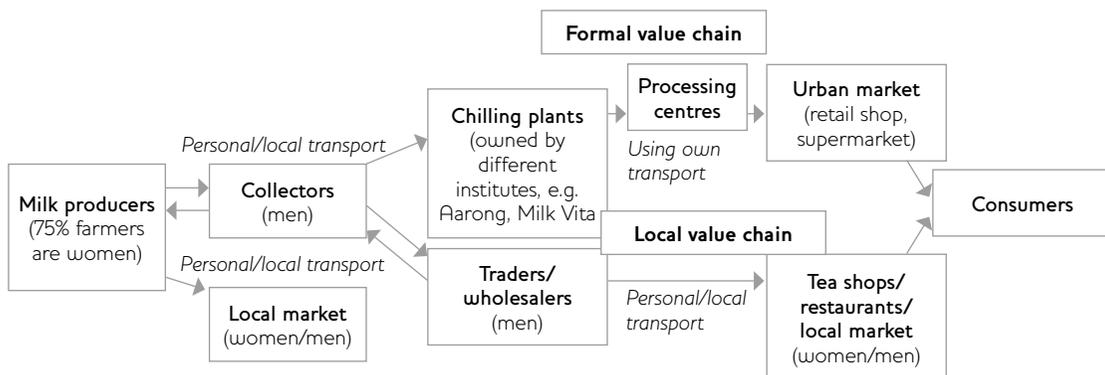
It was observed that the average number of household members was between four and five. Ninety-four per cent of household heads were male and their ages ranged between 40 and 47 years. In the dairy-producing area, it was observed that 45 per cent of the rural milk-producer household heads were primarily engaged in agriculture. Only 15 per cent of them undertook milk production as their main profession. They also engaged in day labour (15 per cent) and business (13 per cent). In non-milk-producing areas, the largest proportion of household heads (38 per cent) were engaged in day labour. They were also engaged in agriculture (25 per cent) and small businesses (16 per cent). In the urban slum, most of the household heads were engaged in small contractual services (32 per cent); they were also engaged in small businesses (17 per cent) and day labour (27 per cent). The average per head monthly income of milk-producing, non-producing, and urban slum households was US\$30, US\$48 and US\$37 respectively.

In the milk-producing area, households produced milk for eight months of the year. Every household produced on average eight litres of milk per day. They sold seven litres and the remaining one litre they kept for their own consumption. Ninety-eight per cent of the households sold milk direct to traders and only 2 per cent sold milk to their neighbours.

3.2 Value chains

Smallholder dairy producers are the starting point of the value chain. They are the person or household, often landless or without assets, involved in milk production for economic return on surplus milk, and usually owning up to two cows. Family labour is the only source of labour for this group. In most cases, women are responsible for cleaning the cowshed, feeding, and milking. Women are more involved in income-generating activities. Thus, their contribution is at the production level, and they also make a significant contribution in sales and distribution, and decision-making in the dairy value chain.

Figure 2 Dairy value chain of milk-producing area at Sonatala upazila, Bogra District



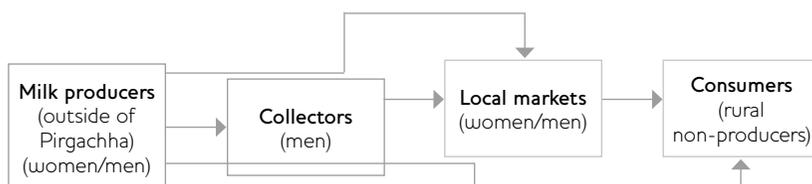
Source Survey conducted by the Agriculture and Food Security Programme of BRAC during 2016.

Regarding decision-making, in the rural milk-producing areas both male and female household members agree to keep some milk for daily consumption and together decide to sell the bulk of the milk in the market for cash.

But the scenario is different in other areas. In non-milk-producing areas, decision-making about purchasing milk is different: 55 per cent of males and only 26 per cent of female members of the household take decisions to purchase milk (Table 1). In the urban slum, 40 per cent of males and 39 per cent of females take this decision. Therefore, women are contributing more in decision-making about purchasing milk in the urban slum than in rural non-milk-producing areas.

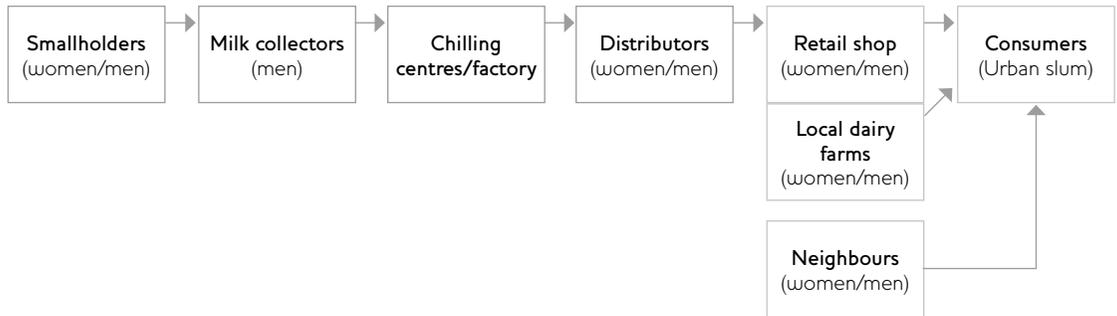
Both informal and formal dairy value chains coexist in rural milk-producing areas (Figure 2). It was observed that rural producers did not buy any milk from the market: rather, they regularly consumed their own cow’s milk. Smallholder milk producers in rural areas sell their milk in two ways, i.e. to the milk businessman (collector) or directly to the rural market. Most of the producers (75 per cent) are women. In formal value chains in rural areas, milk collectors sell to the nearest chilling plants and then the milk goes to the urban market after processing. In informal (local) value chains, the collectors sell milk to the local trader or wholesaler. The traders then sell the milk to the local tea shops, restaurants, and in local markets.

Figure 3 Dairy value chain of non-milk-producing area at Pirgachha upazila, Rangpur District



Source Survey conducted by the Agriculture and Food Security Programme of BRAC during 2016.

Figure 4 Dairy value chain of urban slum area at Karail slum, Dhaka



Source Survey conducted by the Agriculture and Food Security Programme of BRAC during 2016.

Figure 3 illustrates the value chain in rural non-milk-producing areas. In rural non-milk-producing areas, it is important to mention that a significant proportion of people (80 per cent) in households do not consume milk. Those that do, buy raw milk from the market irregularly; they are not in the habit of purchasing pasteurised milk. Ninety-nine per cent of them buy milk from the local market. Milk collectors collect milk from milk producers in neighbouring areas and bring it to the local markets of the study areas. Milk producers are not from Pirogachha, but are from neighbouring milk-producing areas. In some cases, milk producers directly sell their milk to the local markets. Only 1 per cent of consumers directly purchase from the milk producers of neighbouring areas.

Figure 4 depicts the urban milk value chain. The urban study area was a slum where relatively poor people of the city live. The study does not represent the scenario of the whole city. Here also, significant numbers (77 per cent) of households are not consuming milk regularly. They cannot recall the last date that they consumed milk in their households. There are some non-institutional dairy farms in Dhaka city. People living next to these farms collect fresh milk from these dairies, but in most cases people buy milk from retail shops. What they buy is pasteurised full-cream liquid milk. These products should be refrigerated below 4 degrees Celsius and can be kept for up to seven days. There is also UHT-processed milk available in the city, and respondents indicated that pasteurised milk is always available in the retail shops nearby. Of the people who buy milk in the slum, 83 per cent of them purchase milk (pasteurised) from small urban retail shops. Sixteen per cent of them purchased raw cow's milk from local dairy farms, and only one per cent purchased raw cow's milk from neighbours. People very rarely consume powdered milk in the urban slum area – even for their children, they use raw cow's milk or pasteurised milk.

3.3 Product quality

In analysing the dairy value chain process, it was not possible to test the quality of milk in order to ensure that it was 'safe for the consumer at the point of purchase and at consumption' within the household. Nevertheless, it is important to know the kinds (e.g. raw, boiled,

Table 2 Type of milk consumption by different groups (household level)

Groups	Boiled	Pasteurised/UHT
	%	
Rural producer (RP)	100	0
Rural non-producer (RNP)	100	0
Urban slum (Urb)	76	24

Note Ninety-six per cent of RP, 20 per cent of RNP, 23 per cent of Urb consume milk. Source Survey conducted by the Agriculture and Food Security Programme of BRAC during 2016.

pasteurised, etc.) of milk that different distributors carry from one step to another, and also to know the forms of consumption. In the study, both rural producers and non-producers were found to be consuming milk in boiled form (Table 2). These households do not buy pasteurised or UHT milk from the market. Seventy-six per cent of urban slum households consume milk in boiled form and the rest of the households have it in pasteurised form. So, whether raw in boiled form, pasteurised or UHT, the quality of the consumed milk is being ensured in every location.

It is similarly important to know how the milk is being stored at different stages. In earlier tests, milk from the organised dairy farm kept well in aluminium containers for up to ten hours, but milk from villages deteriorated after six hours. The keeping qualities of milk were poorer in other containers, and worst in earthen containers (Rahman *et al.* 2012). In the study, we observed that rural producers do not store their milk for long. They consume milk regularly after collection from their own cow. Only 5 per cent of households in the other two areas stored milk before consumption, and they stored it for three hours. Among this 5 per cent, 33 per cent of rural non-producers store milk in clay pots and 67 per cent store it in steel pots, whereas 60 per cent of people in urban slums store milk in clay pots and the rest store it in steel pots.

3.4 Price

It was a major concern before the study that the price may be a key reason for low milk consumption: it was assumed that poor people may not purchase milk if the price becomes higher compared to other food items. The price of milk varies in different locations. In rural milk-producing areas, the producers sold milk at 32BDT⁴ per litre but the consumer buys the same milk for 40–44BDT per litre. People in urban slums were paying 65BDT per litre for pasteurised milk and 70–80BDT per litre for fresh milk. Regarding willingness to pay, the people who did not consume milk regularly said that, even if their income were to increase or the price of milk to reduce, they would not start consuming milk. Discussions revealed that they are aware of the nutritional importance of milk, but they habitually prioritise other nutrient-rich foods such as rice, fish, vegetables, and meat over milk. This is a partial explanation as to why low milk consumption is quite

Table 3 Milk consumption in households by area

	Rural producer	Rural non-producer	Urban slum
	%		
Do not consume	4	80	77
51–250ml	5	14	16
251–500ml	28	5	3
501–1,000ml	57	1	4
1,001–1,500ml	5	0	0
More than 1,500ml	1	0	0
Total	100	100	100

Source Survey conducted by the Agriculture and Food Security Programme of BRAC during 2016.

pronounced in Bangladesh overall. Considering consumption at daily and weekly intervals together, nearly half of Dhaka city households are not consuming milk (PPRC 2016).

3.5 A comparison of milk consumption behaviour

Table 3 summarises the marked differences in milk consumption behaviour between the three areas. In rural milk-producer households, 96 per cent of the households were consuming milk, whereas only 20 per cent of rural non-producers and 23 per cent of urban slum households were consuming milk regularly. On average, rural producers were consuming 668ml of milk per household, whereas rural non-producers and urban slum households were consuming 41–59ml respectively. It was observed that 57 per cent of rural producer households were consuming 501–1,000ml of milk regularly. In the rural non-producer group, 80 per cent were not consuming milk at all and only 14 per cent were consuming between 51–250ml of milk. In the urban slum, 77 per cent of households were not consuming milk, and 16 per cent of them were consuming only 51–250ml. Therefore, a significant finding of the study was that most of the rural milk producers are producing milk through their own cows and consuming milk regularly. On the other hand, a very small proportion of rural non-producers and poor people in the urban slums were consuming milk regularly.

It was observed that in rural producer groups, 13 per cent of women and 15 per cent of children do not consume milk (Table 4). The main reason identified through the survey was said to be that they do not like the taste of liquid milk. The rest of this group are consuming milk in different amounts. Forty-five per cent of the women and 49 per cent of children are consuming 126–200ml of milk regularly. Thirty-five per cent of women and 24 per cent of children are consuming 101–125ml of milk. It seems that women and children are consuming milk in a lower amount than the recommended 250ml/person/day.

Table 4 Household-level milk consumption (% of members)

	Women			Male			Child		
	Rural producer	Rural non-producer	Urban slum	Rural producer	Rural non-producer	Urban slum	Rural producer	Rural non-producer	Urban slum
Do not consume	13	89	88	11	84	88	15	96	92
51–100ml	1	7	4	2	13	5	2	0	2
101–125ml	35	2	5	27	2	5	24	0	2
126–200ml	45	1	2	54	1	2	49	4	4
201–250ml	5	0	0	3	0	0	2	0	0
More than 250ml	2	0	0	4	0	1	7	0	0

Source Survey conducted by the Agriculture and Food Security Programme of BRAC during 2016.

4 Conclusions and recommendations

The dairy industry has great potential in developing the economy of a country like Bangladesh. It is necessary to make liquid milk available in the market for many reasons. Firstly, it is evident that women's participation in the dairy sector is important, from production – care of cows and milking practices – to sales of milk, which generally were a subject of joint household decision-making and of economic benefit to the household. Even landless households could engage in dairy production, and own-consumption benefited even poor rural producing households. It plays an important role in enhancing nutritional status across all age groups, and has a significant role in child feeding, and through sales, for the household economy.

However, the principal finding from this study is that a large proportion of people in non-milk-producing areas and in urban slum areas are not consuming milk. Lack of consumer acceptance is a significant reason for low levels of consumption, and this low willingness to consume was conflated with low willingness to pay in rural non-producing areas in particular. Urban slum consumers were paying prices with a significant margin compared to rural and producer prices. No significant issues concerning the health and safety of milk were noted: household-level processing was common where milk was not treated industrially, and milk was not stored for long in unhygienic conditions.

In every area, the women and children were consuming less milk than the national recommendation. For improving diets, it is necessary to increase awareness and convey information about the importance of milk consumption, but at the same time, national production needs to be increased. Information dissemination and behavioural change communication may be the way to change the food habits of people.

In terms of Maestre *et al.* (2017), milk appears to be a safe food and a handle up to consumption in hygienic value chains. However, milk is not readily available, nor necessarily affordable, nor indeed is it acceptable,

as a significant source of micronutrient nutrition to all sections of the Bangladesh population, to the extent that it can be consumed by vulnerable groups in adequate quantities. It was observed that women engage more in milk production and decision-making. Market prices vary from the policy recommendations. These recommendations should also include emphasis on encouraging more women to engage in the dairy sector; stabilising market prices, ensuring proper marketing systems and information dissemination, proper processing, and appropriate packaging;

National initiatives could play a part in boosting the dairy sector and milk consumption. To meet the current market demand, the government has initiated various measures such as training at grass-roots level and low-interest loans for cow rearing (*The Daily Star* 2016). However, adequate consideration is required in other related problem areas such as the development of proper value chains, pricing mechanisms that help to sustain farmers' incomes, and awareness campaigns on food hygiene and consumption behaviours. Systematic and wide-ranging analysis is required to formulate effective longer-term policies. Milk is available in all the studied areas, but there is a lack of acceptability observed in both rural and urban environments. While increasing dairy consumption is a valid nutritional objective, public health authorities need to give attention to the consumption of other animal source foods for vulnerable groups who choose not to consume milk.

This exploratory study relied on limited sampling and only descriptive statistics have been reported. Having identified the principal value chains in the Bangladesh dairy sector, a more detailed quantitative study is needed to follow up the prices and margins from production to consumption. The study addresses most of the requirements outlined in Maestre *et al.* (2017). However, a new quantitative analysis is necessary to address the levels and flows of costs and returns, which have to be sufficiently attractive in the context of the business requirements and associated risks and uncertainties, to assess the returns to commercial stakeholders, and to ensure that the value chain benefits are distributed equitably among participants – notably female entrepreneurs. An equitable process capturing the value of costs, risks, and contractual incentives for quality is an important requirement, particularly the interrelationships at the intersection of informal and formal, or industrialised chains. Finally, as Maestre *et al.* note, the responsibilities for commercial nutrition-sensitive value chains are shared by other stakeholders:

The public sector state shapes market competition and provision of finance for agribusiness investment, provision of information and marketing, food standards and regulation, management of business risks and insurance. Both under- and over-regulation can increase transaction costs and risk to the extent that all value is eroded, and business fails. Civil society can play a major role in awareness raising and advocacy that influences both business and policy-makers (2017: 37).

Notes

- 1 <https://sustainabledevelopment.un.org/?page=view&nr=164&type=230>.
- 2 <http://baenbd.net/overview-of-bracs-agriculture-programme/>.
- 3 An *upazila* is a geographical region in Bangladesh used for administrative or other purposes. *Upazilas* function as sub-units of districts and are the country's second lowest tier of regional administration.
- 4 £1 sterling = Bangladeshi Taka 110 (26 September 2017).

References

- BBS (Bangladesh Bureau of Statistics) (2011) *Household Income and Expenditure Survey 2010*, Dhaka: Ministry of Planning, Government of the People's Republic of Bangladesh
- Berti, P.R.; Krasevec, J. and FitzGerald, S. (2004) 'A Review of the Effectiveness of Agriculture Interventions in Improving Nutrition Outcomes', *Public Health Nutrition* 7.5: 599–609
- BIDA (Bangladesh Investment Development Authority) (2016) *Dairy in Bangladesh*, http://bida.portal.gov.bd/sites/default/files/files/bida.portal.gov.bd/page/f40752f4_ccac_45d4_9bc4_3367eb475e8a/1.%20VP%20-%20Dairy.pdf (accessed 30 October 2017)
- CARE (2016) *Strengthening the Dairy Value Chain Project: Stories of Impact*, CARE Bangladesh, www.carebangladesh.org/publication/Publication_610192.pdf (accessed 8 November 2017)
- Copenhagen Consensus Center (2016) *Dietary Diversification in Bangladesh*, Bangladesh Nutrition Priorities, Factsheet, www.copenhagenconsensus.com/sites/default/files/brief_dietary_diversification_ccc.pdf (accessed 30 October 2017)
- Dangour, A.D.; Green, R.; Häslar, B.; Rushton, J.; Shankar, B. and Waage, J. (2012) 'Linking Agriculture and Health in Low- and Middle-Income Countries: An Interdisciplinary Research Agenda', *Proceedings of the Nutrition Society* 71.2: 222–28
- DLS (Department of Livestock Services) (2016) *Livestock Economy at a Glance 2015–16*, http://dls.portal.gov.bd/sites/default/files/files/dls.portal.gov.bd/page/5f7daa39_d71f_4546_aeaf_55b72ee868f2/Updated%20Livestock%20Economy%20%282015-2016%29.pdf (accessed 30 October 2017)
- FAO (2009) *Declaration of the World Summit on Food Security*, Rome: Food and Agriculture Organization of the United Nations
- FAO, IFAD, UNICEF, WFP and WHO (2017) *The State of Food Security and Nutrition in the World 2017: Building Resilience for Peace and Food Security*, Rome: Food and Agriculture Organization of the United Nations (FAO)
- Flores-Martinez, A.; Zanello, G.; Shankar, B. and Poole, N. (2016) 'Reducing Anemia Prevalence in Afghanistan: Socioeconomic Correlates and the Particular Role of Agricultural Assets', *PLoS ONE* 11.6: e0156878
- Girard, A.W.; Self, J.L.; McAuliffe, C. and Olude, O. (2012) 'The Effects of Household Food Production Strategies on the Health and

- Nutrition Outcomes of Women and Young Children: A Systematic Review', *Paediatric and Perinatal Epidemiology* 26.s1: 205–22
- Grillenberger, M. *et al.* (2003) 'Food Supplements Have a Positive Impact on Weight Gain and the Addition of Animal Source Foods Increases Lean Body Mass of Kenyan Schoolchildren', *Journal of Nutrition* 133.11: 3957S–3964S
- Halder, S.R. and Barua, P. (2003) *Dairy Production, Consumption and Marketing in Bangladesh*, Research and Evaluation Division, Dhaka: BRAC
- Hoddinott, J.; Heady, D. and Dereje, M. (2015) 'Cows, Missing Milk Markets, and Nutrition in Rural Ethiopia', *Journal of Development Studies* 51.8: 958–75
- Jabbar, M.A. (2010) *Policy Barriers for Dairy Value Chain Development in Bangladesh with a Focus on the North West Region*, Dhaka: CARE Bangladesh
- Leroy, J.L. and Frongillo, E.A. (2007) 'Can Interventions to Promote Animal Production Ameliorate Undernutrition?', *Journal of Nutrition* 137: 2311–16
- Lien do, T.K. *et al.* (2009) 'Impact of Milk Consumption on Performance and Health of Primary School Children in Rural Vietnam', *Asia Pacific Journal of Clinical Nutrition* 18.3: 326–34
- Maestre, M.; Poole, N. and Henson, S. (2017) 'Assessing Food Value Chain Pathways, Linkages and Impacts for Better Nutrition of Vulnerable Groups', *Food Policy* 68: 31–39
- Mandate, G.K.; Mandal, M.A.S. and Rahman, M.S. (2009) 'Production and Marketing of Milk in Some Selected Areas of Serajgonj District', *Bangladesh Journal of Agricultural Economics* XXXII 1&2: 105–15
- Masset, E.; Haddad, L.; Cornelius, A. and Isaza-Castro, J. (2012) 'Effectiveness of Agricultural Interventions that Aim to Improve Nutritional Status of Children: Systematic Review', *British Medical Journal* 344: d8222
- Muehlhoff, E.; Bennett, A. and McMahon, D. (2013) *Milk and Dairy Products in Human Nutrition*, Rome: Food and Agriculture Organization of the United Nations (FAO)
- Neumann, C.; Harris, D.M. and Rogers, L.M. (2002) 'Contribution of Animal Source Foods in Improving Diet Quality and Function in Children in the Developing World', *Nutrition Research* 22.1–2: 193–220
- PPRC (Power and Participation Research Centre) (2016) *Politics, Governance and Middle Income Aspirations: Realities and Challenges. An Empirical Study*, Dhaka: PPRC
- Rahman, M.M.; Islam, M.N.; Siddiquee, N.U. and Habib, M.A. (2012) 'Keeping Quality of Cow Milk in Different Containers with or without Sodium Bicarbonate', *Bangladesh Veterinarian* 29.2: 90–95
- Rawlins, R.; Pimkina, S.; Barrett, C.B.; Pedersen, S. and Wydick, B. (2014) 'Got Milk? The Impact of Heifer International's Livestock Donation Programs in Rwanda on Nutritional Outcomes', *Food Policy* 44: 202–13
- Roy, B.K.; Huque, K.S.; Islam, M.R.; Hasanuzzaman, M. and Rahman, M.M. (2002) 'Consumption Pattern of Milk and Milk

- Products among Different Income Levels in Some Selected Areas of Bangladesh', *Pakistan Journal of Nutrition* 1.6: 282–87
- Sibhatu, K.T.; Krishna, V.V. and Qaim, M. (2015) 'Production Diversity and Dietary Diversity in Smallholder Farm Households', *Proceedings of the National Academy of Sciences* 112.34: 10657–662
- The Daily Star* (2016) 'Bangladesh Dairy: Challenges and Opportunities', 29 December, www.thedailystar.net/round-tables/bangladesh-dairy-challenges-and-opportunities-1337251 (accessed 12 October 2017)
- Uddin, M.M. *et al.* (2011) 'Milk Production Trends and Dairy Development in Bangladesh', *Outlook on AGRICULTURE* 40.3: 263–71
- US Food and Drug Administration (2012) *The Dangers of Raw Milk: Unpasteurized Milk Can Pose a Serious Health Risk*, Food Facts, August, www.fda.gov/downloads/Food/FoodborneIllnessContaminants/UCM239493.pdf (accessed 8 January 2016)
- Yosef, S.; Jones, A.D.; Chakraborty, B. and Gillespie, S. (2015) 'Agriculture and Nutrition in Bangladesh: Mapping Evidence to Pathways', *Food and Nutrition Bulletin* 36.4: 387–404
- Zanello, G.; Shankar, B. and Poole, N. (2017) 'Buy or Make? Agricultural Production Diversity, Markets, and Dietary Diversity in a Seasonal Context', unpublished LANSAs Working Paper, Chennai: Leveraging Agriculture for Nutrition in South Asia (LANSAs)

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Focus on Gender, Context, and Evidence: CARE's Lessons Learned

Emily Janoch, Elly Kaganzi and Thomas Schaezel

Abstract This article explores the most effective ways to influence nutrition through value chains, based on CARE's long history in food and nutrition security. With implementation experience in 90 countries and evidence from 11 existing projects, the article argues that the best ways to impact nutrition through value chains and market systems are to focus on gender equality and pay attention to market systems contexts. Furthermore, experience in emergencies programming has different lessons and important caveats to strengthen markets rather than default to subsidised distribution systems.

Keywords: nutrition, gender equality, value chains, pro-poor, emergencies, market systems.

1 Introduction

CARE is an international non-governmental organisation (NGO) that has been focusing on improving food and nutrition security (FNS) since it sent its first CARE Package in 1945. In the intervening 72 years, CARE has expanded to reach 80 million people in more than 90 countries in the world in 2016. This depth and breadth of experience provides a rich set of evidence and lessons for how to use market systems to improve nutrition. Reducing stunting for children under five is one of CARE's top-level impact goals in the *CARE 2020 Program Strategy* (CARE 2017d). To achieve this goal, CARE uses both nutrition-specific and nutrition-sensitive interventions as part of its global theory of change, which rests on four technical pillars: smallholder agriculture, sustainable economies, nutrition, and humanitarian action (CARE 2015). CARE especially focuses on women and girls, who face even more hurdles than the average person living in poverty.

Within this context, market systems and value chains are a critical tool in the set of options that can help improve nutrition impacts around the world. However, this is only possible when market-based programming meets specific criteria that support nutritional impacts. When it comes to nutrition-sensitive programming, CARE aims to incorporate 12 key nutrition recommendations into all of its FNS

programming (CARE 2016b). These include a focus on the first 1,000 days, an emphasis on gender equality, community-centred approaches that emphasise sustainability and resilience, and a focus on the groups most at risk.

Value chain development is an approach that CARE has used in its programming in order to enhance the incomes of rural households and the most vulnerable, particularly women. Its focus is on productivity and profitability, and ensuring empowerment and participation. CARE's programming focuses on addressing the empowerment of marginalised women. Through value chain programming, CARE ensures that the most marginalised have access and capacity to engage equitably in agricultural value chains. This can also have a positive impact on nutrition as empowerment, equity, and increased incomes can lead to further spending on nutritious foods for families.

This article draws on CARE's experience in FNS to demonstrate key evidence of how to use increased intake, product demand environments, agri-food firm environments, food (and cash/voucher) distribution, and public policy to increase the nutritional impacts of market system interventions. It also highlights the importance of gender equality as a key lever for creating nutritional impacts in the context of market-based programming. Finally, it underlines the need to consider emergencies contexts and the data on rapidly changing market situations as a way to examine which pathways will best impact nutritional outcomes.

2 Objectives, methodology, and limitations

2.1 Objectives

This article aims to explore the most effective ways to influence nutrition through value chains, based on CARE's long history in FNS. It examines how work that supports market access and agri-food value chain development can support not only benefits for the poorest families, but also ensure impacts in nutrition – not just in income or agricultural production. The article builds on the Maestre (Maestre, Poole and Henson 2017) framework from *Food Policy*. It provides contributions to the framework through the lens of on-the-ground programming that works through value chains to improve nutrition for the poorest people. It draws from a portfolio of CARE's 619 FNS projects, which includes work in 62 countries, and reaches 28.6 million people directly – 17.8 million of them in Bangladesh, India, and Pakistan (CARE 2017c). Typically, these programmes focus on poor and extremely poor populations, those who live on less than US\$1.25 a day, and who have little access to markets, education, or decision-making.

2.2 Methodology

In order to critically examine the Maestre framework, the authors started by conducting a meta-review of all projects in the FNS portfolio to select those that met the following criteria:

- 1 A focus on achieving nutrition outcomes through work with value chains;

- 2 Use of methods and approaches that are relevant to the framework; and
- 3 Enough evaluation or project-reporting evidence to be able to draw conclusions (this depends on the timing of the project cycle and the focus of evaluations).

A review of CARE's project portfolio using these criteria revealed 11 projects operating in 14 countries with relevant contributions to the question of how best to impact nutrition through value chains. The authors then conducted a thorough review of project documentation, including project proposals, annual reporting documents, theories of change, evaluations, and action research for those 11 projects (Weatherhead *et al.* 2016) to pull out common threads and recommendations based on evidence and experiences from projects on the ground. This article then examines the Maestre framework, drawing on project evidence for each of the six pathways proposed to determine their relevance, important notes about context, and adding any components that the current framework overlooks.

2.3 Limitations

Evidence of reduced stunting or micronutrient deficiency – the gold standard for proving nutrition impacts – takes time to generate and requires extensive measurement that we do not always have resources for in a project. Additionally, the evidence we have is that of correlation, not causation. We can say that we often see that value chain approaches often show changes in income, women's empowerment, and dietary habits. We cannot prove that those are causal relationships or that they necessarily resulted in improved diets for infants and young children under two years old, or in improved nutritional status.

The projects highlighted in this article have generated evidence that combines information on increased income or production with information about changes in dietary practice. This allows us to make a plausible case that there have been improvements in intake of nutritious foods. Some projects have also generated evidence about changes on the agri-business side that improves the supply of nutritious food available in the market. Additionally, evidence on women's empowerment outcomes gives us strong indications that there are also likely to be changes in nutritional status.

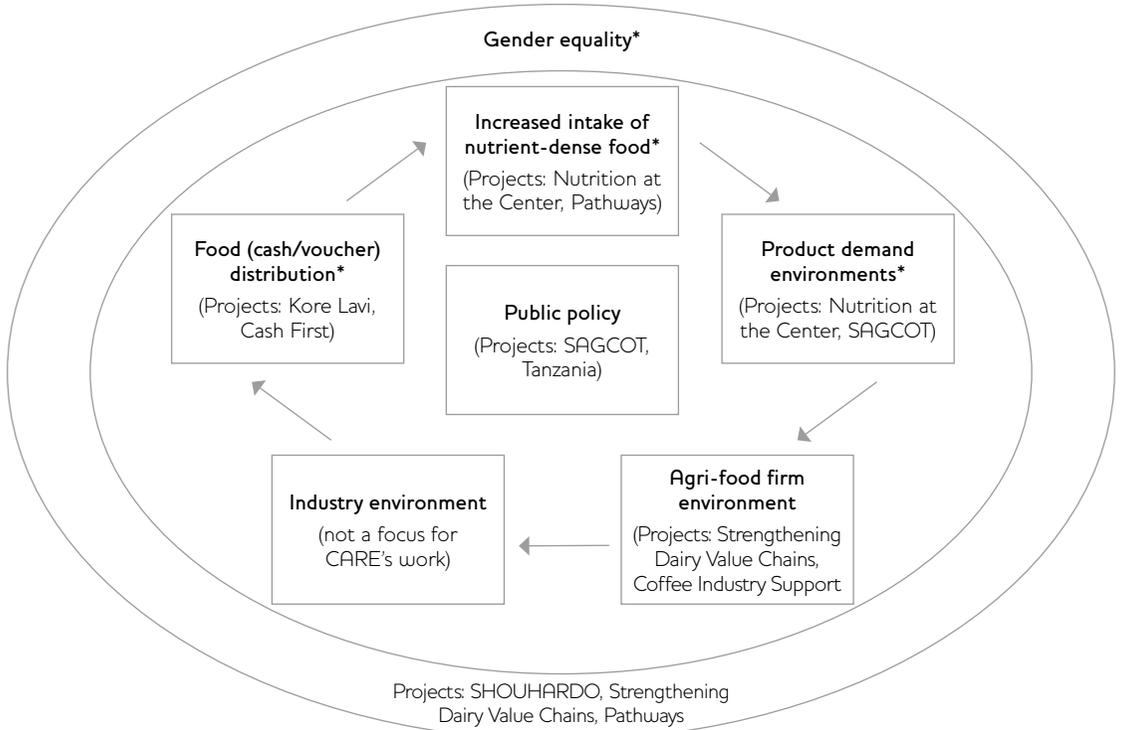
3 Findings on the framework

3.1 Relevant pathways

Maestre *et al.* (2017) propose a framework for agri-food linkages to nutrition, which includes six pathways for improved nutrition. The review of project documentation finds that these six pathways are all relevant to achieving nutrition outcomes through value chain work. While some of them are not prevalent in CARE's work – given the focus on action for the poorest and most vulnerable people – all six pathways point to relevant considerations for improving nutrition outcomes.

CARE's document review finds that if the ultimate goal is to improve nutrition for the poorest people, the most relevant pathways for

Figure 1 Revised framework based on CARE's programme experiences



* Changes in emergency context relative to development spaces.
Source Authors' own/CARE.

immediate action are: (1) increased intakes of nutrient-dense foods by vulnerable groups, (2) the product demand environment, (3) the agri-food firm environment, (4) the food (and cash/voucher) distribution environment (Maestre *et al.* 2017), and (6) public policy.

3.2 Linkages between pathways

It is also especially important to focus on the linkages between the different pathways. Focusing on only one pathway will miss important opportunities to have impacts on nutrition. A key focus for CARE's interventions is targeting the poorest and most vulnerable populations, using pro-poor value chain approaches to increase income, promote gender equality, and engage communities in market systems. The push-pull approach that CARE first piloted in Ethiopia (Garloch 2015) uses a combination of push factors – those that help producers change their own capacities and behaviours to increase production – and pull factors – which focus on changes to the market and enabling environment, making it more accessible and profitable for poor smallholder producers. The push-pull factors focus on strengthening the links between different pathways in the framework. These connections between pathways (for example, between product demand and agri-food firms) can maximise impact and strengthen feedback loops within the market system – eventually creating a more sustainable and resilient approach.

Figure 1 shows CARE's proposed revisions to the Maestre *et al.* (2017) pathways, and highlights project examples that this article uses as evidence to support each of the pathways in this revised framework.

3.3 Additions to the framework

3.3.1 Gender

To the existing framework, CARE adds the cross-cutting theme of gender equality and women's empowerment as a critical pathway, without which it would be impossible to have sustainable impacts on nutrition. Access to markets through deliberate focus on value chains with nutritional value is also seen as a critical pathway to achieving this. Through a selection process that not only looks at the nutritional value of selected value chains, but value addition that incorporates nutrition, one can have impact on nutrition (Gelli *et al.* 2015).

3.3.2 Emergencies

CARE's programming shows that emergency contexts change the framework and the relative importance of each pathway. For example, the food distribution environment and its impact on markets becomes especially critical in emergency contexts, when distribution is much more likely to become the default response to crisis. CARE works in places that are characterised by emergencies and disasters, some of which are related to conflict and some to natural disasters. Even in the most disaster- and conflict-affected areas, markets can play a critical role in improving nutrition. CARE strives to make market systems more resilient to crisis. CARE's programming in emergencies looks at both emergency market assessments as well as pre-crisis market mapping to look at opportunities to support vulnerable populations to recover and be more resilient.

4 Programme evidence supporting the pathways to improve nutrition

4.1 Gender empowerment and women's equality

Evidence shows that gender norms play a critical determining factor in household nutrition. In most societies, women are considered to be the primary caregivers, and are responsible for all food preparation and the feeding of young children. Research in 2003 in 39 countries identified that women's social status is a key determinant of children's nutritional status, and estimates that equalising men's and women's status in South Asia alone could reduce the number of malnourished children in the world by 13.4 million (Smith *et al.* 2003).

The pathways for this change are multifaceted. One example is the barriers women face regarding decision-making with household income. While women are often charged with buying and preparing food for the household, they rarely make decisions about how much money to spend on food, and often do not set the menu. It is estimated that increasing a woman's income by US\$10 will have the same health and nutritional impact in the household as increasing a man's income by US\$110 (Haddad, Hoddinott and Alderman 1997). Another example is in women's time use. According to the Food and Agricultural Organization of the United Nations, women in rural areas often work

a 16-hour day (FAO 2016), and they have insufficient time to prepare nutritious complementary foods for young children, or to feed or breastfeed adequately. For example, a study of women's time by CARE and Cornell found that although women reported spending the second largest proportion of their time on childcare, on average they reported 75 per cent of this childcare was 'secondary' to another concurrently performed activity (Cornell 2016).

Focusing on strategies that empower women can change this. Many projects have borne out the evidence that focusing on women's empowerment can have significant changes, not only on women's empowerment, but also on the pathways that improve nutrition. A 2011 review of CARE's SHOUHARDO programme in Bangladesh demonstrated that women's empowerment interventions were the single biggest contribution to a reduction in stunting of 6.5 percentage points a year (Smith *et al.* 2011). The combination of maternal and child health nutrition (MCHN) and empowerment interventions together was stronger – an 8.4 percentage point reduction in stunting, while MCHN interventions alone were less than half as powerful as empowerment interventions on their own. CARE focuses on women's empowerment as a cross-cutting pathway – similar to public policy – that must permeate all activities in the value chain and with private sector partners in order to take effect. It is important to note that women's empowerment does not mean working only with women. Men's engagement, particularly as it relates to helping with household chores and giving women the time and mobility to access markets, health care, and educational opportunities, is a critical component to success (Barker, Ricardo and Nascimento 2007).

Funded by the Bill and Melinda Gates Foundation, the Strengthening Dairy Value Chains (SDVC) project operated in Bangladesh from 2007 to 2016, and focused on helping rural women dairy producers improve their production and income using a value chain approach. Working with BRAC Dairy – which had expressed a commitment to social good and supporting the livelihoods of rural women producers – the project opened up new economic opportunities for women (McKague and Siddiquee 2014). Over the life of the project, women's access to and control over inputs increased significantly, and women began to play a much bigger role in the supply chain (Quisumbing *et al.* 2013).

CARE's Pathways to Empowerment programme operates in Bangladesh, Ethiopia, India, Ghana, Mali, Malawi, and Tanzania with the generous support of the Bill and Melinda Gates Foundation starting in 2012 (CARE 2017c). It focuses on getting women farmers access to the inputs, information, and support they need to become more productive farmers and change their families' livelihoods. The impacts have been remarkable. For every US\$1 invested in the programme, communities have seen an average of US\$31 in benefits, spread across food security, women's empowerment, and income increases (Weatherhead *et al.* 2016).

With funding from USAID's Feed the Future and implemented with the Dhaka Asiana Mission, the Agriculture Extension Support Activity (AESAs) in Bangladesh is focusing on building farmers' access to extension, credit, and inputs in order to increase production, especially in jute, livestock, potato, vegetable, and dairy value chains. There is also a strong focus on transforming gender norms and empowering women. While the project is not collecting data on nutrition outcomes, a promising sign is that the gender dialogues are taking effect. Seventy-six per cent of women in the project have more leisure time than the control group – on average 1–2 hours more per day (Chakraborty 2017). Largely, this is a result of men being more involved in household chores, such as cooking, shopping, and taking care of the children. This is not definitive proof that nutrition will improve, but does address some of the key factors inhibiting good nutrition for families and especially children.

4.2 Emergency response and the food/cash/voucher distribution environment

Undertaking market analysis as part of preparedness has a larger potential than simply providing a benchmark on the functionality of several critical market systems from 'reference' to 'post-shock' times. By understanding the capacity and constraints of critical market systems, the pre-crisis market mapping and analysis can not only improve preparedness and feed into contingency planning, but can also help design responses that could mitigate the effects of a crisis, through protecting and/or strengthening certain parts of a market system.

To maximise CARE's impact and reduce the harm it does to communities and markets, much of its emergency work takes the form of food vouchers or cash transfers rather than direct food distribution. This allows communities to buy the food they need directly from the local markets, and offers a more diverse blend of foods than would be available purely through the distribution of staple commodities. Any food distribution work rests on careful market analysis to ensure that there are no other options that would serve to strengthen markets and long-term resilience.

Programming in Haiti and Zimbabwe shows that it is possible to combine food subsidies for poor families in the form of a social safety net with strengthening local markets, both in long-term development contexts and in emergencies. The voucher systems also allow for rapid scaling of food interventions in periods of crisis. For example, during Hurricane Matthew in Haiti, the Kore Lavi project was rapidly able to scale up to reach more than one million additional people between October and December 2016 (WFP 2017). The overall response of working through the local markets increased the availability of nutritious foods in the local markets. Ninety-two per cent of vendors have increased the quantity of the stock they keep, and 76 per cent purchase food more often from local and regional markets. Forty-four per cent of vendors are stocking more diverse commodities than before (Calixte 2016).

In Zimbabwe's UK Department for International Development (DFID)-funded Cash First programme, families that received vouchers instead of direct food distribution reported getting more and better food as the primary impact. About 88 per cent of the cash transfers went into purchasing food. There was a 69 per cent drop in the number of families that had to reduce food intake, and an 84 per cent drop in households suffering from food insecurity (Bailey *et al.* 2017). The project put a specific focus on routinely mapping market information to be prepared to shift project responses in order to deal with market fluctuations that happen quickly in emergency situations, such as the cash crisis in late 2016 (Aggiss 2017).

4.3 Increased intakes of nutrient-dense foods

In order to increase intakes of nutrient-dense foods, CARE focuses on: (1) the capacity of families to use new production and nutrition information to improve their livelihoods; (2) access to nutritious foods through markets and production, as well as access to high-quality nutrition, agricultural, and market information; and (3) increased production and/or income. These are generally combined approaches that use community platforms such as care groups, savings associations, or production groups to bring together the multiple components that make up nutrition behaviours and status.

A 2016 review of the SDVC project's nutritional impact showed that SDVC producers consume nearly four times more milk than the national average (CARE 2017a). Fifty-six per cent of SDVC households have access to adequately diverse foods, according to the Household Dietary Diversity Scale, which includes a fourfold increase in the amount of fish consumed during a month. Women are also more likely to consume milk than previously, as now they are seen to be key players in milk production, who have earned the right to consume a share of the milk. Finally, families said that the income from dairy production, and the steady daily production from their cows, allowed them to have more food and consume milk and vegetables even during the lean season.

Income increases can also influence intake of nutrient-dense foods. The Social and Economic Transformation of the Ultra-Poor (SETU) project was funded by DFID from 2009 to 2015, and focused on helping ultra-poor populations in rural Bangladesh increase their livelihood options and diversify their incomes (Eusuf 2015). The project focused on a diverse variety of value chains, including food crops, cash crops, and consumer goods such as rugs and mats. In addition to seeing an eightfold increase in income over the life of the project, and a 95 per cent graduation rate out of poverty, participants increased their spending on animal-source foods (especially fish, meat, and eggs) on 49 occasions. This means that they went from eating an animal-source food once or twice in a week to at least nine times in a week. Consumption of animal-source foods has been associated with prevention of stunting as well as improvement of dietary quality, micronutrient status, growth and cognitive function among children (Neumann *et al.* 2003; Iannotti *et al.* 2017).

The Pathways programme has shown significant improvements in this pathway. In India alone, farm income has gone up by 54 per cent. Not only has average income gone up, but people earning income from agriculture has nearly tripled – going up to 82 per cent. Rice production has gone up 27 per cent, and there is higher production of many kinds of vegetables. Sixty-one per cent of women have seen their crop yields go up since joining Pathways, despite climate shocks. The number of families that consume a minimum dietary diversity has gone up 32 per cent. Thirty-three per cent more families are able to eat vegetables regularly, and four times more families have access to fish or other animal-source protein (Gamer 2016).

4.4 Agri-food firm environment

CARE often works with the private sector to change their behaviours towards rural poor populations. This primarily takes three forms: (1) increasing purchases from poor smallholder farmers; (2) making inputs and services more available to rural poor communities; and (3) improving their gender equality behaviours to make products, markets, and information more accessible to women. The Strengthening Dairy Value Chains project worked with BRAC Dairy to accomplish all three of these ends. CARE and BRAC worked together to correct market failures and increase transparency with dairy producers using digital fat testers so that producers had an incentive to produce higher-quality, more nutrient-dense milk for sale. As a result, average monthly income from milk sales more than doubled, from US\$9 to US\$20, and production increased by 12 per cent. Women producers went from being 2 per cent of BRAC's supply chain to 55 per cent between 2011 and 2016 (CARE 2017b).

In contrast, the Coffee Industry Support project in Papua New Guinea focuses primarily on gender equality and changing the way coffee-buying companies conduct activities so that they include more women. This project has shown that it is possible to get agri-food firms to focus more on gender, despite their initial reluctance. The mid-term evaluation showed that women's participation in coffee-related extension services has risen from less than 5 per cent to 33–55 per cent. One of CARE's partners has started rearranging their extension sessions – both the setup and the timing – to make sure that women can participate. Extension agents are now focusing on working with men and women together. Many of the partners are also getting CARE's help to conduct gender audits and are adopting better human resources (HR) policies to get women involved (Huxtable and Nardi 2015).

4.5 Public policy

A key pathway in CARE's work in value chains and nutrition is to influence public policy in order to promote more effective inclusion of the poor in decision-making, as well as to create policies and government programmes that will more effectively and sustainably improve nutrition. In the Nutrition at the Center programme, connecting women's solidarity groups to local governments resulted

in a commitment from mayors' offices to allocate nearly US\$2,500 to nutritional needs at the community level (CARE 2016a).

An example of this is the work in the Southern Agricultural Growth Corridor of Tanzania (SAGCOT) in collaboration with the World Wildlife Fund (WWF). In the SAGCOT area, the government has prioritised support to value chains that have both nutritional and multipurpose economic value. Through supporting a number of initiatives working on livestock and livestock feed, production of nutrient-rich food such as soy beans that can also be used for animal feed and oil processing, there is increased focus on nutrition.

5 Recommendations

This survey of project evidence suggests several recommendations to strengthen value chain programming in order to have impacts on nutrition.

5.1 Focus on gender equality

When coupled with strong *women's empowerment*, value chain approaches can lead to changes in *income and household production* of nutritious foods that gets used at least in part to improve dietary practices – all ways to improve the intake of nutritious foods and likely improve nutrition status. Our project evidence especially shows that having diverse sources of income improves dietary diversity and the ability to maintain a nutritious diet even in the face of shocks.

5.2 Engage men in women's empowerment and gender equality programming

Many projects take a gender empowerment approach to mean targeting women for activities, and nothing else. In the context of value chains, this often means that a project selects a 'women's crop' for the value chain and implements everything else as business as usual. This will impair the ability to have impacts at all, especially on nutrition. The Windows of Opportunity project showed that interventions that focused exclusively on women were limited in their impacts (CARE 2013). As the AESA project shows, engaging men can free up women's time, change power dynamics around who gets to make decisions on food and nutrition, and get men more actively involved in nutrition and childcare. A 2016 review of CARE's work involving collectives in value chains showed that the most successful groups were those that included both men and women, and included women in leadership rather than as just token participants (Krause 2016). This was especially true for issues around women's time use, household income, and household decision-making.

5.3 Work with the private sector

The private sector can also be a strong force for women's empowerment, as is the case with BRAC Dairy in Bangladesh, or the coffee industry in Papua New Guinea. BRAC plans to roll out the process it uses with SDVC producers to its entire national network – creating a scale that is not possible with an NGO project alone. As the

Kore Lavi project shows, supporting private sector markets can have benefits for the wider community beyond direct project participants.

5.4 Select appropriate value chains

CARE's agricultural and market systems programming takes a market systems approach that involves the identification and selection of the most viable value chains to promote and support. In all considerations CARE considers value chains that not only increase the earning potential of beneficiaries but the ability for these value chains to contribute to the nutrition status of beneficiaries. Nutrition is a critical criterion in selecting value chains in order to have an impact on nutrition.

5.5 Consider how value chain activities affect women's time use

Introducing new value chains – whether or not they are targeted explicitly at women – can often add hours to women's list of daily chores. Few projects account for women's time and labour as part of the value calculation on income or profit results, and this can obscure a large risk to nutrition. Especially for breastfeeding mothers or women having to cook complementary foods for small children in addition to large family meals, additional burdens reduce the time they have to ensure that their children get the nutrition they need. Households participating in the SDVC project noted that in times of high workload (for example, the height of the agricultural season), family dietary diversity and meal frequency went down because there was not enough time to prepare meals during the day. Producers also noted that household milk consumption dropped when market prices were especially high because families wished to maximise their profits. When market prices dipped, families chose to consume a greater share of their production.

There is much more research to do on questions of women's time use generally, and specifically on how it relates to nutrition. Participants in CARE projects consistently rate the time-use exercises in the gender dialogues as some of the most useful and influential tools available to them in changing their own thinking about gender roles, but these are rarely collected at a project, value chain, or national level. Because value chain activities can pose a risk to nutrition by taking away women's time to care for their family – especially if men do not step in to take on care work – this is an area that needs further investigation to ensure that value chain programmes are not harming nutrition.

5.6 Include water, sanitation, and hygiene (WASH) considerations

This is at least as important as consumption in long-term healthy nutrition. While it is neither possible nor appropriate for value chain approaches to cover all aspects of nutrition, WASH is an overlooked component that value chains should address, at the very least from a do-no-harm perspective. Value chains involving fertiliser or livestock can be actively harmful to nutrition, as they can increase the risk of diarrhoea which can rapidly damage nutrition, especially for small children. Particularly interventions that place animal faeces near the home increase the risk of environmental enteric disorder (Keusch *et al.* 2013) – a chronic condition that reduces the ability

to absorb nutrients after repeated childhood exposure to faecal pathogens. There is little evidence on the links between WASH and value chains, but the causal pathways are clear, and the issue merits further investigation.

5.7 Generate evidence on nutrition

Value chain programmes rarely collect nutrition evidence consistently, and often use income or production as an assumed proxy. It is necessary to widen the scope of value chain programming and private sector partners to include nutrition in the goals, and monitoring and evaluation systems before programmes will start collecting consistent data on how their activities influence nutrition. CARE's programming provides abundant evidence on the link between value chains, income, and assets. If the programme is done well, we generally see increases in income, assets, and savings. However, we have little evidence of whether assets or savings play into improved nutrition. We also do not know whether the question of who controls the assets in the family (husband, wife, or jointly) impacts nutritional status. This is an area for further exploration.

5.8 Collect market data more frequently

The state of the market at any given moment is critical to understanding how market-based and value chains programming will impact nutrition. Undertaking market analysis as part of preparedness has a larger potential than simply providing a benchmark on the functionality of several critical market systems from 'reference' to 'post-shock' times. By understanding the capacity and constraints of critical market systems, the pre-crisis market mapping and analysis can not only improve preparedness and feed into contingency planning, but can also help design responses that could mitigate the effects of a crisis, through protecting and/or strengthening certain parts of a market system. From the moment that the initial market analysis is done, response options can be designed and implemented, so that certain parts of the market are strengthened, helping to support both access to basic needs and livelihoods so that they could, potentially, better withstand shocks. This can begin to address the long-term or 'chronic' nature of vulnerability and poverty in some areas.

References

- Aggiss, R. (2017) *Managing Cash-Based Programmes in a Volatile Markets Context*, Research Report, London: CARE, https://insights.careinternational.org.uk/media/k2/attachments/CARE_Managing-cash-programmes-guidance-note_July-2017.pdf (accessed 6 December 2017)
- Bailey, S.; Kardan, A.; Morris, H.; Scott, M. and Harvey, P. (2017) *Zimbabwe 'Cash First' Humanitarian Response 2015–2017: Evaluation Report*, Oxford: Oxford Policy Management, www.opml.co.uk/sites/default/files/Zimbabwe-Cash-First-Humanitarian-Response-2015%E2%80%932017.pdf (accessed 24 October 2017)
- Barker, G.; Ricardo, C. and Nascimento, M. (2007) *Engaging Men and Boys in Changing Gender-Based Inequity in Health: Evidence from Programme*

- Interventions*, Research Report, Geneva: World Health Organization, www.who.int/gender/documents/Engaging_men_boys.pdf (accessed 24 October 2017)
- Calixte, E. (2016) *Food Voucher-Based Social Safety Net*, Kore Lavi and USAID, www.careevaluations.org/Evaluations/Kore%20Lavi%20Market%20Study%20Branded%20Report%20-%2020-02-17x.pdf (accessed 24 October 2017)
- CARE (2017a) 'SDVC II Social Impact Studies: Food Nutrition, Milk Consumption and Overall Dietary Diversity of SDVC Family', Draft report, August 2017
- CARE (2017b) *Sustainable Dairy Value Chains*, CARE, www.care.org/work/world-hunger/sustainable-dairy-value-chains (accessed 6 December 2017)
- CARE (2017c) *Impact Map*, CARE, <https://impact.care-international.org/reach/countries> (accessed 29 September 2017)
- CARE (2017d) *CARE 2020 Program Strategy: Indicators for Measuring Change*, CARE, <http://careglobalmel.care2share.wikispaces.net/file/view/2017%20July%206%20Global%20and%20Supplementary%20Indicators%20for%20measuring%20change.pdf/615413283/2017%20July%206%20Global%20and%20Supplementary%20Indicators%20for%20measuring%20change.pdf> (accessed 24 October 2017)
- CARE (2016a) *Nutrition at the Center*, CARE, www.care.org/work/world-hunger/featured-food-and-nutrition-security-projects/nutrition-center (accessed 24 October 2017)
- CARE (2016b) *12 Recommendations for Increasing Impacts on Maternal and Child Nutrition*, Geneva: CARE, www.care.org/sites/default/files/documents/visual_nutrition_recommendations.pdf (accessed 24 October 2017)
- CARE (2015) *A Vision for Just and Sustainable Food Systems: The CARE 2020 Food and Nutrition Security Strategy*, Geneva: CARE International Secretariat, www.care.org/sites/default/files/documents/cares_vision_for_just_and_sustainable_food_systems.pdf (accessed 6 December 2017)
- CARE (2013) *Design, Implementation and Impact of the WINDOW OF OPPORTUNITY Program in Nicaragua, Peru, Indonesia, Sierra Leone and Bangladesh*, www.careevaluations.org/Evaluations/Windows%20of%20Opportunity%20Final%20Evaluation.pdf (accessed 24 October 2017)
- Chakraborty, B. (2017) *USAID Agricultural Extension Support Activity: Study on Gender Impact*, EDGE Consulting, www.careevaluations.org/Evaluations/Gender%20Impact%20Study%20Agriculture%20Extension%20Support%20Activity.pdf (accessed 24 October 2017)
- Cornell (2016) *Empowering Women by Reducing their Time Burdens*, www.care-cornell.com/uploads/9/3/9/5/93950490/zambia_womens_time_use_brief_v2.pdf (accessed 24 October 2017)
- Eusuf, M.A. (2015) *End of Project Review Report of 'Social and Economic Transformation of the Ultra-Poor (SETU)'*, www.careevaluations.org/Evaluations/Social%20and%20Economic%20Transformation%20of%20the%20%20Ultra-Poor.pdf (accessed 24 October 2017)

- FAO (2016) *Addressing Women's Work Burden: Key Issues, Promising Solutions and Way Forward*, Rome: Food and Agricultural Organization of the United Nations, www.fao.org/3/a-i5586e.pdf (accessed 24 October 2017)
- Gamer, G.N. (2016) *CARE India Pathways Endline Evaluation*, TANGO International, www.careevaluations.org/Evaluations/Pathways%20India%20Endline%20Report.pdf (accessed 24 October 2017)
- Garloch, A. (2015) *A Framework for a Push/Pull Approach to Inclusive Market Systems Development*, Leveraging Economic Opportunities (LEO), www.microlinks.org/sites/default/files/resource/files/LEO_Framework_for_a_Push_Pull_Approach_to_Inclusive_Market_Systems_Devel....pdf (accessed 24 October 2017)
- Gelli, A. *et al.* (2015) *Value Chains and Nutrition: A Framework to Support the Identification, Design, and Evaluation of Interventions*, IFPRI Discussion Paper 01413, Washington DC: International Food Policy Research Institute
- Haddad, L.; Hoddinott, J. and Alderman, H. (eds) (1997) *Intrahousehold Resource Allocation in Developing Countries: Models, Methods, and Policy*, Baltimore MA: Johns Hopkins University Press
- Huxtable, J. and Nardi, G. (2015) *Seed to Cup: Empowering Women Coffee Farmers. Papua New Guinea Coffee Industry Support Project Mid-Term Review*, www.careevaluations.org/Evaluations/Coffee%20Industry%20Support%20Prgram%20Mid-Term%20Review.PDF (accessed 24 October 2017)
- Iannotti, L.L. *et al.* (2017) 'Eggs in Early Complementary Feeding and Child Growth: A Randomized Controlled Trial', *Pediatrics* 140.1, doi:10.1542/peds.2016-3459 (accessed 4 December 2017)
- Keusch, G.T. *et al.* (2013) 'Implications of Acquired Environmental Enteric Dysfunction for Growth and Stunting in Infants and Children Living in Low- and Middle-Income Countries', *Food and Nutrition Bulletin* 34.3: 357–64
- Krause, H. (2016) *The Role of Collectives in Achieving Women's Economic Empowerment: A Cross-Project Analysis*, CARE, www.care.org/sites/default/files/documents/care_crossproject_wee_revisedformat_june_2016.pdf (accessed 24 October 2017)
- Maestre, M.; Poole, N. and Henson, S. (2017) 'Assessing Food Value Chain Pathways, Linkages and Impacts for Better Nutrition of Vulnerable Groups', *Food Policy* 68: 31–39
- McKague, K. and Siddiquee, M. (2014) *Making Markets More Inclusive: Lessons from CARE and the Future of Sustainability in Agricultural Value Chain Development*, New York: Palgrave Macmillan
- Neumann, C. *et al.* (2003) 'Animal Source Foods Improve Dietary Quality, Micronutrient Status, Growth and Cognitive Function in Kenyan School Children: Background, Study Design and Baseline Findings', *Journal of Nutrition* 133.11 (Suppl 2): S3941–S3949
- Quisumbing, A.; Roy, S.; Njuki, J.; Tanvin, K. and Waithanji, E. (2013) *Can Dairy Value Chain Projects Change Gender Norms in Rural Bangladesh? Impacts on Assets, Gender Norms, and Time Use*, Gender, Agriculture, & Assets Project (GAAP) Note, Washington DC: International Food

- Policy Research Institute, <http://cdm15738.contentdm.oclc.org/utills/getfile/collection/p15738coll2/id/127912/filename/128123.pdf> (accessed 24 October 2017)
- Smith, L.C.; Kahn, F.; Frankenberger, T.R. and Wadud, A. (2011) *Admissible Evidence in the Court of Development Evaluation? The Impact of CARE's SHOUHARDO Project on Child Stunting in Bangladesh*, IDS Working Paper 376, Brighton: IDS, www.ids.ac.uk/files/dmfile/Wp376.pdf (accessed 24 October 2017)
- Smith, L.C.; Ramakrishnan, U.; Ndiaye, A.; Haddad, L. and Martorell, R. (2003) *The Importance of Women's Status for Child Nutrition in Developing Countries*, Research Report 131, Washington DC: International Food Policy Research Institute
- Weatherhead, M.; Mariam, S.; Arnold, S. and Freeman, A. (2016) *Social Cost Benefit Analysis of CARE International's Pathways Program*, CARE, www.care.org/sites/default/files/documents/nef_social_cost_benefit_analysis_of_pathways.pdf (accessed 24 October 2017)
- WFP (2017) *Post-'Matthew' Emergency Food Security Assessment (EFSA) – Phase 1*, World Food Programme, http://documents.wfp.org/stellent/groups/public/documents/ena/wfp290561.pdf?_ga=2.60330349.11790901.1506963917-1740000592.1506963917 (accessed 24 October 2017)

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Glossary

AESA	Agriculture Extension Support Activity [Bangladesh]
AFSP	Agriculture and Food Security Programme
AJK	Azad Jammu and Kashmir [Pakistan]
AP	Andhra Pradesh [India]
AREU	Afghanistan Research and Evaluation Unit
ATNI	Access to Nutrition Index [The Netherlands]
AWC	Anganwadi Centre [India]
AWW	<i>anganwadi</i> workers [India]
BASICS	Basic Support for Institutionalizing Child Survival
BBS	Bangladesh Bureau of Statistics
BIDA	Bangladesh Investment Development Authority
BIL	Britannia Industries Ltd [India]
BMI	body mass index
BoP	bottom of the pyramid
CATIE	Centro Agronómico Tropical de Investigación y Enseñanza [Tropical Agricultural Research and Higher Education Centre, Costa Rica]
CBO	community-based organisation
CDC	Centers for Disease Control and Prevention [USA]
CFI	Christy Friedgram Industry [India]
CFS	Committee on World Food Security [Italy]
CSR	corporate social responsibility
DAIL	Department of Agriculture, Irrigation and Livestock [Afghanistan]
DCA	Dutch Committee for Afghanistan
DDS	diet diversity score
DFID	Department for International Development [UK]
DLS	Department of Livestock Services [Bangladesh]
<i>doodhi</i>	A milk collector and distributor in Pakistan
DoWA	Department of Women's Affairs [Afghanistan]
DPC	dairy processing centre
F&CS	Food & Civil Supplies
FAO	Food and Agriculture Organization of the United Nations [Italy]
FCND	Food Consumption and Nutrition Division, International Food Policy Research Institute [USA]
FGD	focus group discussion
FNS	food and nutrition security
FSSAI	Food Safety and Standards Authority of India
GAAP	Gender, Agriculture, & Assets Project [USA]
GAIN	Global Alliance for Improved Nutrition [Switzerland]
GCMMF	Gujarat Cooperative Milk Marketing Federation Ltd
GDFL	Grameen Danone Foods Ltd [Bangladesh]

GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH [German Federal Enterprise for International Cooperation]
GoI	Government of India
GSDP	Gross State Domestic Product
HKI	Helen Keller International [USA]
ICDS	Integrated Child Development Services [India]
ICMBMS	International Code of Marketing of Breast-Milk Substitutes
IFAD	International Fund for Agricultural Development [Italy]
IFPRI	International Food Policy Research Institute [USA]
IIMA	Indian Institute of Management
IMR	infant mortality rate
IMS	infant milk substitute
INGO	international non-governmental organisation
INR	Indian rupee
IRRI	International Rice Research Institute [Philippines]
JPGSPH	James P. Grant School of Public Health [Bangladesh]
LANSA	Leveraging Agriculture for Nutrition in South Asia
LEO	Leveraging Economic Opportunities [USA]
MCC	milk collection centre
MCHN	maternal and child health nutrition
MDM	midday meal
MI	Micronutrient Initiative [Canada]
MNC	multinational corporation
MPCE	monthly per capita consumer expenditure
MSEs	micro and small enterprises
MSSRF	MS Swaminathan Research Foundation [India]
NGO	non-governmental organisation
NI	Nutrition International [Canada]
NSSO	National Sample Survey Organisation
NWFFP	National Wheat Flour Fortification Programme [Pakistan]
PAA	Programa de Aquisição de Alimentos [Food Acquisition Programme, Brazil]
PDS	Public Distribution System
PEO	Programme Evaluation Organisation [India]
PFMA	Pakistan Flour Mills Association
PKR	Pakistani rupee
PPP	public–private partnership
PPRC	Power and Participation Research Centre [Bangladesh]
PUNGO	public–NGO
RDA	recommended daily amount
RDI	recommended dietary intake
RED	Research and Evaluation Division
RNF	Rasi Nutri Food [India]

RUTF	ready-to-use therapeutic food
RVS	rickshaw van seller
SAGCOT	Southern Agricultural Growth Corridor of Tanzania
SDG	Sustainable Development Goal
SDVC	Strengthening Dairy Value Chains [Bangladesh]
SETU	Social and Economic Transformation of the Ultra-Poor
SHG	self-help group
SME	small- and medium-sized enterprise
SNIP	Supporting Nutrition in Pakistan
SNP	Supplementary Nutrition Programme [India]
SPRING	Strengthening Partnerships, Results, and Innovations in Nutrition Globally
SUN	Scaling Up Nutrition
TANGO	Technical Assistance to NGOs [USA]
TF	Telangana Foods [India]
THR	take home ration
TN	Tamil Nadu [India]
U5MR	under-5 mortality rate
UHT	ultra-high temperature
UNICEF	United Nations Children's Fund [USA]
USAID	United States Agency for International Development
VMCC	village milk collection centre
WASH	water, sanitation, and hygiene
WBI	World Bank Institute [USA]
WEE	women's economic empowerment
WFP	World Food Programme [Italy]
WHO	World Health Organization [Switzerland]

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