

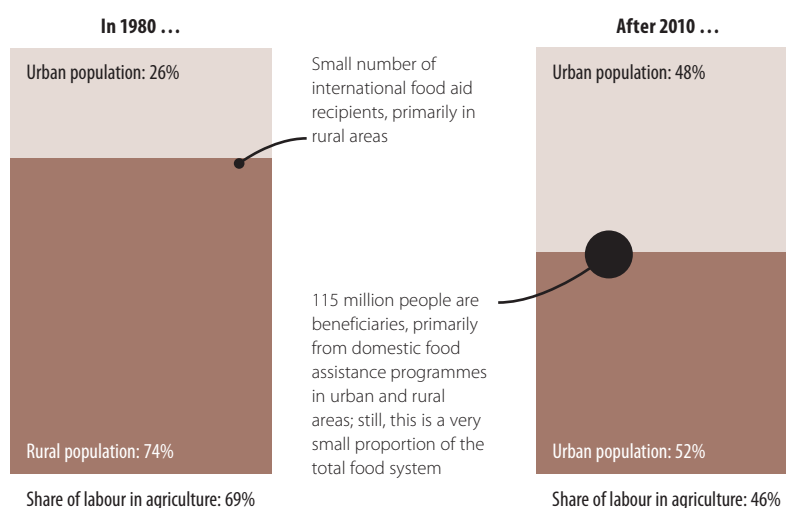
## Innovations in Food Distribution: Food Value Chain Transformations in Developing Countries and their Implications for Nutrition

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Millions of individuals are affected by malnutrition globally. Malnutrition in developing countries is characterized as a triple burden,<sup>1</sup> which includes undernourishment (insufficient calorie and protein intake), micronutrient malnutrition (hidden hunger), and over-nutrition (excess calories leading to overweight and obesity). In 2010, undernourishment and micronutrient malnutrition affected about 900 million and 2 billion people, respectively, in developing countries.<sup>2</sup> Meanwhile, over-nutrition—reflected in escalating overweight and obesity rates along with higher incidence of chronic diseases such as diabetes—continues to expand in developing countries.<sup>3</sup> The causes of this triple burden are multiple, but the availability, variety, and composition of foods that make up peoples' diets play a major role.

This chapter explains how food value chain (FVC) innovations in recent years are influencing the triple burden of malnutrition in developing countries. These chains are changing fast as a result of population and income growth; technological progress in food production and distributions; urbanization; and the expansion of modern food retailing, distribution, and wholesaling firms.<sup>4</sup> As a result, today's developing-country FVCs exhibit great diversity, because modern food sector firms either establish their own food chains or

**Figure 1: Developing-country food systems: Key differences between 1980 and 2010**



Source: Based on Gómez et al., 2013.

Note: The trend of people moving to urban areas and working in less physically demanding jobs continues in 2017. Updated data would show an even higher percentage of urban dwellers and beneficiaries of food assistance programmes.

interact with traditional FVC actors, such as smallholder farmers and traders, wet markets (which sell fresh meat and produce), corner stores, and street vendors. A deeper understanding of the drivers of emerging FVC arrangements, the interactions of businesses that participate in them, the products offered, and the markets targeted can provide valuable insights into strategies to curb malnutrition.

### Food system transformation

Figure 1 highlights key differences between a representative food system in 1980 and 2010.<sup>5</sup> In 1980,

about 74% of people in low- and middle-income countries resided in rural areas. The share of food sold in local rural wet markets and grown for household consumption was relatively high, while the share sold in supermarkets out of total food consumed was very small.<sup>6</sup> In the same year, the share of low- and middle-income countries' total labour force in agriculture was approximately 69%;<sup>7</sup> these workers expended considerable energy in manual labour. In addition, domestic public food-based safety nets to provide food assistance to those missed by the commercial sector were practically non-existent

**Table 1: Food value chain typologies and their influence on nutrition**

Type	Participants	Implications for food access	Nutritional impacts
<b>Traditional</b>	Traditional traders buy primarily from smallholder farmers and sell to consumers and traders in wet, mostly local, markets.	<ul style="list-style-type: none"> <li>• <b>Affordability:</b> A local clearing-house for products, with flexible prices, product volumes, and quality standards.</li> <li>• <b>Availability:</b> Food hub for consumers and local 'mom and pop' stores to access directly from traders and smallholder farmers; market offerings are highly dependent on production seasonality.</li> </ul>	<ul style="list-style-type: none"> <li>• Traditional FVCs help reduce micronutrient deficiencies and undernourishment by offering low-priced fruits, vegetables, livestock products, and staples, particularly in rural areas and in poor neighbourhoods of urban areas.</li> <li>• Production seasonality, combined with lack of post-harvest and distribution infrastructure, increase FVC intermediation costs and limit the ability of traditional FVCs to reduce micronutrient deficiencies and undernourishment.</li> </ul>
<b>Modern</b>	Domestic and multinational food manufacturers procure primarily from commercial farms and sell through modern supermarket outlets.	<ul style="list-style-type: none"> <li>• <b>Affordability:</b> Economies of scale enable the production, marketing, and distribution of packaged/processed foods at low per-unit prices.</li> <li>• <b>Availability:</b> Modern supermarkets provide year round, wide product assortment, primarily in urban areas; supermarkets are successfully expanding the market for processed and packaged foods.</li> </ul>	<ul style="list-style-type: none"> <li>• Modern FVCs may contribute to alleviate micronutrient deficiencies by offering a wide assortment of products year round, but supermarkets' physical locations and quality standards may imply higher retail prices, missing the poor.</li> <li>• Modern FVCs may contribute to obesity/overweight malnutrition by expanding the reach of inexpensive, calorie-dense processed/packaged foods, primarily in urban areas.</li> </ul>
<b>Modern-to-traditional</b>	Domestic and multinational food manufacturers sell through the network of traditional traders and retailers (e.g., mom and pop stores).	<ul style="list-style-type: none"> <li>• <b>Affordability:</b> Food manufacturers benefit from economies of scale to connect with traditional distributors and retailers, offering low-priced processed foods to reach low-income consumers.</li> <li>• <b>Availability:</b> By linking with traditional retailers, food manufacturers develop intense distribution strategies in urban areas and in rural, isolated markets.</li> </ul>	<ul style="list-style-type: none"> <li>• Expansion of processed/packaged foods into isolated, rural regions may alleviate undernourishment, but it can result in over-nutrition among urban consumers.</li> <li>• Food fortification initiatives focusing on modern-to-traditional FVCs may help reduce micronutrient malnutrition.</li> </ul>
<b>Traditional-to-modern</b>	Supermarkets and food manufacturers source food from smallholder farmers and traders.	<ul style="list-style-type: none"> <li>• <b>Affordability:</b> Increased income opportunities in high-value crop and livestock production for smallholder farmers and traders can expand food budgets because most are net food buyers.</li> <li>• <b>Availability:</b> Increased production and crop diversification may increase food available for local consumption.</li> </ul>	<ul style="list-style-type: none"> <li>• Traditional-to-modern FVCs may reduce micronutrient deficiencies and undernourishment of smallholder farmers and traders through higher incomes leading to diet diversification.</li> <li>• Opportunities for smallholder farmers and traders to benefit directly from participation appear limited and may miss asset-poor farmers; substantial benefits are generated through off-farm employment opportunities.</li> </ul>

Source: Gómez and Ricketts, 2013.

in developing countries, other than those programmes supported by foreign food aid shipments from high-income countries.<sup>8</sup>

Developing-country food systems became dramatically different by 2010. A larger portion of people in developing countries lived in urban areas by then and depended on commercial FVCs to deliver their food, while they typically worked in less physically demanding jobs than agriculture, expending far fewer calories in daily labour. In 2011, only about 52% of low- and middle-income country people resided in rural areas and

the share of agricultural labour had fallen to about 46%.<sup>9</sup> Thus the share of food sold in local rural markets and grown for household consumption after 2010 was significantly smaller than it was in 1980. The percentage of people residing in rural areas and the share of agriculture in total labour continue falling today. Meanwhile, modern food retail and wholesale and the foreign direct investment of global food manufacturers have expanded rapidly.<sup>10</sup> Another key feature of today's food systems is that many developing countries are establishing food-based safety

nets—'food assistance programmes' (FAPs)—for those individuals who are at risk of experiencing macronutrient and micronutrient deficiencies. The World Bank (2013) estimates that, on average, nearly 115 million people benefited annually from safety nets in developing countries during 2011–14.

#### Emerging food value chain typologies: Implications for nutrition

Table 1 offers a typology that assigns FVCs into four broad categories to reflect ongoing FVC transformations

in developing countries. For each FVC category, the table describes its primary characteristics and participants, explains the essential mechanisms affecting food access (availability and affordability), and describes its impact on elements of the triple malnutrition burden. The typology 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 at different FVC stages. A discussion of the implications of each FVC type on nutrition follows.

#### **Traditional food value chains**

Consumers in traditional FVCs follow long-established patterns and most often purchase food directly from smallholder farmers and traders in regional/local wet markets, or from a network of traditional retailers that includes independently owned mom and pop corner stores, street vendors, or roadside stands.<sup>11</sup> Wet markets, in turn, can include large, regional markets that function like distribution hubs, or smaller, local, weekly markets with more limited product assortment. Product availability in these FVCs tends to be seasonal. Traditional FVCs are common in small rural markets located relatively close to production regions. Products delivered by traditional FVCs travel longer distances to reach urban consumers, primarily in lower-income neighbourhoods.<sup>12</sup>

Despite the expansion of modern supermarkets and food manufacturers, evidence suggests that food categories that are important sources of micronutrients continue to be accessed primarily through traditional FVCs in developing countries.<sup>13</sup> For example,

over 90% of all fruits and vegetables are purchased in traditional FVC retail outlets in Kenya, Nicaragua, and Zambia,<sup>14</sup> and 90% of households in Ethiopia buy their beef through a local butcher in wet markets.<sup>15</sup> These large market shares are mainly the result of three advantages accruing to traditional FVCs, particularly with respect to perishable products: (1) their ability to offer products at low prices, (2) their considerable flexibility in product quality standards, and (3) their convenience for consumers as a result of their flexible retail market locations.<sup>16</sup>

Food products rich in micronutrients (e.g., fruits and vegetables) and staple foods rich in calories (e.g., pulses, grains) tend to be more affordable in traditional FVCs than in modern supermarkets. These marketing channels often deliver nutritional benefits to rural residents who are largely missed by modern FVCs. Additionally, important nutritional benefits accrue to low-income people in urban areas, where traditional FVC retailers enjoy cost and location advantages. Moreover, traditional FVCs offer relatively more flexibility to target consumers who are willing to settle for lower food standards. This is reflected in significant retail price differences between modern and traditional FVCs.

Nevertheless, the post-harvest and distribution infrastructure requirements of perishable foods are more expensive and more technologically advanced than they are for other food types. Traditional FVC infrastructure is typically lacking in developing countries and may imply higher price variability and limited year-round availability in traditional FVCs, imposing higher distribution costs and high post-harvest losses, as well as less quantity and lower quality.<sup>17</sup> Lack of access to adequate post-harvest processing and distribution

infrastructure may limit the ability of traditional FVCs to contribute to year-round availability of micronutrient-rich foods, resulting in high intermediation costs that may offset, to some extent, the cost advantages in retailing.

#### **Modern food value chains**

These FVCs are largely driven by the expansion of modern retail enterprises in developing countries, primarily in urban areas with a large consumer base. They generally involve domestic and multinational food manufacturers and wholesalers, as well as commercial agribusinesses and farms.<sup>18</sup> In general, modern FVC participants coordinate the supply chain through formal, well-documented contractual arrangements that feature predetermined product standards, volume requirements, and purchase prices.<sup>19</sup> Such tight coordination, together with access to a network of global and domestic suppliers, allows modern FVCs to offer a wide year-round assortment of fresh and processed/packaged food products. These chains also generally benefit from economies of size in the production, marketing, and distribution of shelf-stable packaged/processed foods.

Modern FVCs are changing the dietary landscape in the developing world. Overall, research suggests that modern FVCs help alleviate micronutrient deficiencies by offering a wide assortment of products year round for a diverse diet, but often only for urban households with relatively high incomes.<sup>20</sup> Higher retail prices of foods rich in micronutrients (produce, dairy products, meats) resulting from stricter product standards may limit the ability of lower-income consumers to afford a diet with an adequate micronutrient intake.<sup>21</sup>

A number of studies suggest that the expansion of modern FVCs is

associated with an increased market for processed/packaged foods, with at least two implications for nutrition.<sup>22</sup> First, modern FVCs may be contributing to obesity/overweight malnutrition by expanding the reach of inexpensive, calorie-dense processed/packaged foods, primarily in urban areas. There is evidence that dietary changes in developing countries, along with other factors (e.g., change in lifestyles, reduced manual labour), are associated with the emergent global epidemic of obesity, particularly among younger people.<sup>23</sup> Although there are no studies showing causality between the expansion of processed/packaged food categories and obesity, it is plausible that this is a primary contributing factor driving the increase in the number of overweight and obese people in developing countries. Second, there may be demand substitution effects, such that low-priced packaged/processed foods substitute for fresh produce and livestock products, further worsening nutritional outcomes.

#### Modern-to-traditional food value chains

These FVCs consist of food manufacturers utilizing traditional wholesale and retail networks to market primarily processed/packaged foods. Two key characteristics of these FVCs are that food manufacturers often benefit from economies of scale in production and distribution, and from an increased ability to coordinate the downstream supply chain (as opposed to having to negotiate with large, powerful supermarkets). These two characteristics allow modern-to-traditional FVCs to implement intensive, year-round distribution strategies for processed/packaged foods, targeting lower-income consumers in urban areas as well as consumers who get their food from smaller, remote markets in rural areas.

The market for processed/packaged foods has been growing substantially more quickly in developing countries than in their developed counterparts.<sup>24</sup> Much of this growth is being fuelled by food manufacturers selling products through traditional FVC retailers in urban and rural areas. For example, in India, small independent grocers (*'kirana'* stores) are ubiquitous in urban and rural areas and represented over 53% of processed/packaged food retail sales in that country in 2010.<sup>25</sup> Similarly in Brazil, small corner stores (called *'mercadinhos'*) represented over 21% of processed/packaged food retailing in 2010.<sup>26</sup>

Moreover, processed/packaged foods sold through modern-to-traditional FVCs may help alleviate (and prevent) undernourishment in remote rural areas. These products can be made available to consumers year round at stable prices in remote rural areas, which often experience high food price variability as a result of production seasonality and production risk (e.g., adverse weather during the cropping cycle). The influence of modern-to-traditional FVCs on the nutrition of urban consumers with relatively low incomes appears to be negative because, similar to the case of modern FVCs, the ongoing market expansion of processed/packaged foods through modern-to-traditional FVCs may be associated with excess weight and obesity, mirroring long-established over-nutrition trends in developed countries.<sup>27</sup>

Although expanded sales of processed/packaged foods may be associated with over-nutrition in urban areas, fortification of these foods may provide an avenue for alleviating micronutrient deficiencies with modern-to-traditional FVCs. The World Economic Forum (2009) suggests that innovative public-private partnerships can create incentives to

develop business models targeting micronutrient concerns among the poor. These partnerships are being established at three distinct levels:

1. *Investing in new product development of fortified foods*—for example, nutritious yogurt fortified with essential micronutrients is distributed by Grameen-Ladies at affordable prices to address vitamin A deficiency in Bangladesh and elsewhere in South Asia, where over 8 million children are affected.<sup>28</sup>
2. *Expanding distribution networks for existing fortified foods*—for example, in Mozambique, the National Committee for Food Fortification is a government-food industry partnership aiming at expanding distribution of fortified products such as vegetable oil with vitamin A, and wheat flour with zinc, iron, B-complex vitamins, and folic acid.<sup>20</sup>
3. *Strengthening consumer demand for micronutrient-rich processed/packaged foods*—examples of public-private collaborations expanding education and distribution of fortified foods include a partnership between GAIN and nutrition/supplement companies such as Herbalife.<sup>30</sup>

These private-public partnerships necessarily include the network of traditional FVC retailers and traders because these entities offer the primary point of sales employed by the poor to access food.

Increasing business partnerships between large food manufacturers and traditional retailers is (and will continue) expanding the affordability and availability of processed/packaged foods in developing countries. These products are often rich in calories but poor in important micronutrients.

Modern-to-traditional FVCs may have a mixed influence on nutrition, depending on the population segment targeted. For example, they can assist in efforts to prevent or at least reduce undernourishment in some rural, remote areas, but they can also create problems associated with over-nutrition in urban areas for patrons of traditional FVC retail outlets. There is substantial enthusiasm for public-private partnerships that link food manufacturers to the network of traditional retailers to alleviate micronutrient deficiencies through fortification.

#### Traditional-to-modern food value chains

These chains are characterized by smallholder farmers and traders selling primarily high-value crop and livestock products (e.g., meats, dairy products, fruits, and vegetables) to modern supermarkets and food manufacturers. These FVCs are interesting primarily for their impacts on the nutrition of smallholder farmers and traders, not of end consumers. The impacts come from higher-income opportunities, which may involve selling products to supermarket supply chains directly; or indirectly, through off-farm employment in food production and post-harvest activities. Here we focus on participation in domestic markets because developing-country FVCs are primarily domestically oriented,<sup>31</sup> and also focus on nutritional implications for smallholder farmers and traders in rural areas because most of them are net food buyers.<sup>32</sup>

Farmers who participate in supermarket supply chains enjoy higher income opportunities,<sup>33</sup> even when facing strict product safety and product standards established by supermarkets.<sup>34</sup> Nevertheless, these benefits may reach only farmers with advantageous endowments and education.<sup>35</sup> Furthermore, recent studies

suggest that the poorest farmers and traders may benefit indirectly by linking with modern FVCs through the labour market markets—for example, off-farm employment in commercial agriculture and post-harvest processing.<sup>36</sup> There is evidence of a positive correlation between smallholder farmer and trader participation in traditional-to-modern FVCs and reduction in undernourishment.<sup>37</sup> Most of these benefits appear to occur indirectly, particularly for the poorest farmers, in the form of off-farm employment opportunities in commercial farms and post-harvest businesses.

#### Conclusions

FVCs in developing countries have changed dramatically in recent years, driven primarily by the expansion of modern food manufacturers, wholesalers, and retailers, which coexist and interact with traditional FVC actors. These FVCs are changing in ways that have no precedent in developed countries, where the transition occurred gradually, over a longer period of time. The FVC typology discussed here sheds light on how the relationships among participating business, the types of products offered, and the needs of the consumer targeted are all affecting the triple malnutrition burden (undernourishment, micronutrient deficiencies, and over-nutrition) in the developing world.

Drawing general conclusions about the impact of emerging value chains on nutrition is far from simple. Traditional FVCs, for example, tend to facilitate access to micronutrient-rich foods (e.g., fruits and vegetables) for urban low-income people and most rural residents. Nevertheless, lack of post-harvest and distribution infrastructure may limit the ability of traditional FVCs to assist in

micronutrient deficiency reduction year round, and may result in higher intermediation costs affecting the food prices and demand for low-income consumers. Given that micronutrient deficiencies affect more people today, interventions to boost the efficiency of traditional FVCs can be effective in improving access to micronutrients, particularly among urban and rural poor people. Modern FVCs, for their part, may simultaneously promote over-nutrition and reduce micronutrient deficiencies among urban emerging middle- and high-income individuals. Nevertheless, these effects may be nonexistent for the urban poor and rural residents because these markets are missed by the modern supermarket.

The interactions between traditional and modern FVC participants in developing countries are extremely important, highlighting the need for a more nuanced view of the links between nutrition and food value chains. In particular, intensive processed/packaged food distribution strategies promoted by modern food manufacturers linking to traditional retailers may contribute to over-nutrition in urban areas, but may prevent or reduce undernourishment in remote rural areas. In addition, the distribution networks established in these chains may offer opportunities to form partnerships between governments and private businesses to use food fortification to reduce micronutrient deficiencies targeting specific regions where this malnutrition problem is prevalent. Regarding efforts to link smallholder farmers and traders to the modern sector, the evidence suggests that important nutritional benefits may occur through elevated incomes, and primarily generated by off-farm employment in farm and post-harvest activities—as opposed to direct selling.

Developing-country FVCs will continue evolving with the expansion of the modern sector and the adoption of innovative food distribution and retailing technologies. This ongoing transformation will play a key role in global initiatives to alleviate the triple burden of malnutrition. Future research should shed light on how these FVC transformations can be leveraged by private firms and governments to reduce micronutrient deficiencies, alleviate undernourishment, and control the so-called over-nutrition epidemic. In addition, very little is known about demand substitution effects among process/packaged foods, staples, fruits and vegetables, and livestock products and how consumers respond to changes in the relative prices of these product categories. This should be a priority for future research. Finally, future work examining individual- or household-level consumption patterns over time can illuminate ways that changes in product assortments offered to end consumers affect malnutrition.

## Notes

- 1 Pinstrup-Andersen and Watson, 2011.
- 2 FAO, 2013; Gómez et al., 2013.
- 3 Popkin, 1998, 1999.
- 4 Reardon and Timmer, 2007.
- 5 Gómez et al., 2013.
- 6 Reardon and Timmer, 2007.
- 7 FAO, 2013.
- 8 Barrett and Maxwell, 2005; IEG, 2011.
- 9 FAO, 2013.
- 10 Reardon et al., 2003, 2007, 2009; Regmi and Gehlhar, 2005.
- 11 Gorton, 2011; Reardon et al., 2010; Reddy et al., 2010; Ruben et al., 2007.
- 12 Ruben et al., 2007.
- 13 FAO, 2005; Guarín 2013.
- 14 Gorton, 2011; Reardon et al., 2010; Tschirley et al., 2009.
- 15 Jabbar et al., 2010.

- 16 Guarín, 2013; Jabbar and Admassu, 2010; Minten, 2008; Schipmann and Qaim, 2010; Wanyoike et al., 2010.
  - 17 Gómez et al., 2011.
  - 18 Reardon and Gulati, 2008; Reardon and Timmer, 2007.
  - 19 Reardon and Barrett, 2000.
  - 20 Humphrey, 2005; Reardon et al., 2003; Reardon and Gulati, 2008.
  - 21 Gómez and Ricketts, 2013.
  - 22 Burch and Lawrence, 2007; Hawkes, 2008; Reardon et al., 2012.
  - 23 Caballero, 2007; Garde, 2008; Harris and Graff, 2012.
  - 24 Hawkes et al., 2010.
  - 25 Euromonitor, 2011.
  - 26 Euromonitor, 2011.
  - 27 Mendez et al., 2005; Wang et al., 2002.
  - 28 Singh and West, 2004.
  - 29 CONFAM, 2012.
  - 30 Information about the Global Alliance for Improved Nutrition (GAIN) can be found at [www.gainhealth.org](http://www.gainhealth.org).
  - 31 Gómez et al., 2011.
  - 32 Barrett, 2008.
  - 33 Bellemare, 2012; Miyata et al., 2009.
  - 34 Berdegue et al., 2005; Minten et al., 2008.
  - 35 Michelson 2013; Neven and Reardon, 2009.
  - 37 Gómez et al., 2011; Maertens and Swinnen, 2009.
  - 37 Ndhleve et al., 2012; Smith et al., 2005.
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