Chapter 34
Value Chain Focus on Food and Nutrition Security

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Keywords Food value chains · Nutrition · Value chains · Agriculture · Food processing · Private sector

Learning Objectives

- Define the concepts of food value chains.
- Describe the actors in food value chains and the different typologies of food value chains in the developing world.
- Elucidate why food systems and diets have evolved in the context of value chains.
- Analyze how nutrition-focused value chains can address nutrition and improve diets.
- Develop a nutrition-focused food value chain framework.

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Introduction to Value Chains

What Are Value Chains?

The value chain describes the full range of activities that the specific actors involved undertake to bring a product from its design and conception to its end use by the consumer. This includes activities such as design, production, marketing and distribution. The activities that comprise a value chain can be contained within a single actor or divided among different actors. Value chain activities can produce goods or services and can be contained within a single geographical location or spread over wider areas [1].

Value chains have focused mainly on a supply chain in which value is added to the product as it moves through the chain. Most commonly, value chains are thought of as a series of activities and actors along the supply chain, and what and where value is added in the chain for and by these activities and actors. The point of the value chain is to create and build value at every step as a product moves through the chain. Depending on the commodity, there are a series of activities and actors involved with what and where value is added in the chain, for and by these activities and actors.

Michael Porter first described value chains in the 1980s as a way to identify how and where value can be increased in an internal business chain. Porter defines the value chain as made of primary activities and support activities (Fig. 34.1). Primary activities involve inbound logistics (getting the material in for adding value by processing it), operations (which are all the processes within the manufacturing), outbound (which involves distribution to the points of sale), marketing and sales (which sell it, brand it and promote it) and service (which maintains the functionality of the product, post-sales).

The support functions, which feed into all the primary functions, are the infrastructure, human resources, technology and procurement. These support activities, often undervalued, can change the value of products by the quality of those services. Both the primary and support activities allow a "company" or "business" to charge a margin, which partly comes from the value addition of the primary and support functions and partly from the advantage that the company gains due to communication of the value addition to the consumer (through advertisement and branding, trust, etc.).

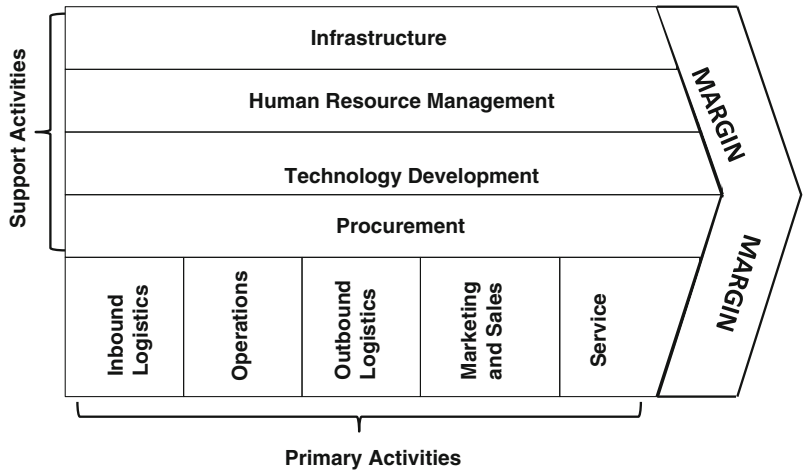

Fig. 34.1 Basic model of Porter's value chain. From Porter and Millar [2]. Reprinted with permission

The major goal is that the margin should be the amount a consumer is willing to pay above the sum of the costs of all the said activities in the value chain [2].

What Are Food Value Chains?

Food value chains (FVC) are the full range of activities that are required to bring a food product from conception, through the different phases of production, to delivery to final consumers and disposal after use [3]. Production is actually growing, raising or making of the product. Processing is refining, altering and potentially creating value of the product. Manufacturing is the process in which the product is produced at a larger scale. FVCs should be distinguished from food supply chains. Food supply chains are a generic term for the sum of the many food production, manufacturing and marketing links from farm to table. Those links include equipment dealers, seed suppliers, food processors, distributors and even government regulators. The term "food value chain" is a permutation of the food supply chain concept in that quality of the end product is prioritized. Therefore, every actor in the chain is invested in making sure the chain produces a valuable food product for the consumer.

What Is Value?

Value chains have always played an important role in the food system, particularly from an economic perspective. Taking a value chain approach necessitates understanding a market system in its totality: the firms that operate within an industry—from input suppliers to end market buyers; the support markets that provide technical, business and financial services to the industry; and the business environment in which the industry operates.

The end markets into which a product or service is sold—whether local, regional or international—provide the opportunities and set the parameters for economic growth. Generally, there are multiple actual and potential end markets, each with different demand characteristics and returns.

The terms "value" and "values" are used in different ways when referring to food value chains:

1. "Value-added" is used to characterize food production and processing that involves the conversion of raw products through processes that give the resulting product an "incremental value" in the market place. An "incremental value" is realized from either higher price or expanded market.
2. "Value-added" is also used to characterize food products that have incremental value in the marketplace by differentiating them from similar products based on food production and processing attributes such as geographical location; environmental stewardship; food safety; or functionality.
3. The words "value" and "values" are also used to characterize the nature of certain business relationships among interacting food business enterprises, rather than any attribute of the product itself.

Food Value Chain Actors and Typologies

Actors Across the Food Value Chain

FVCs involve many actors: farmers, processors, wholesalers, distributors, retailers and consumers (Fig. 34.2). These actors influence the way in which food is produced, processed, distributed,

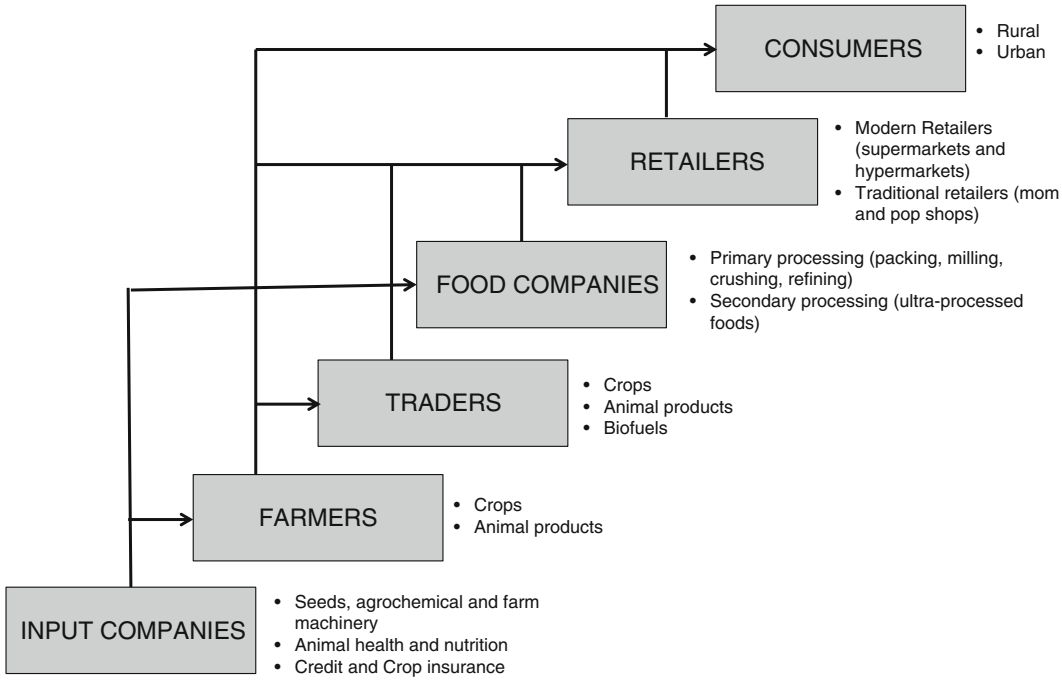

Fig. 34.2 Range of actors in the food value chain. *Source* Adapted from KPMG 2013 [5]

marketed and consumed and whether or not nutritious foods are available, affordable and acceptable. In addition to these actors, policy actors (not depicted in the figure) can also shape FVCs. For example, agriculture policies affect what is grown, raised, processed and sold, which subsequently influences the food environment in which consumers make decisions about what to eat [4]. Thus, the decisions made by one group of actors have implications for the other actors along the value chain. Moreover, these actions need to be responsive to consumer demand and preferences. The FVC is often discussed from the producer's perspective—the *supply* side. Little emphasis is placed on how informed consumers can play a role in influencing the value chains, and how changes in the *demand* for specific foods can influence the processes and outputs of value chains. In order to increase consumption of nutritious foods, both the supply and demand sides of the value chain need to be considered. The private sector—from large multinational companies to small, local agri-business enterprises—is central to linking one end of the chain to the other.

The Role of the Private Sector

In 2011, Porter published an article in the Harvard Business Review entitled "Creating Shared Value: Redefining Capitalism and the Role of the Corporation in Society" [6]. The article posits that companies can create shared value by creating economic value in a way that concomitantly creates value for society by addressing its needs and challenges [6]. Given that the private sector actors are integral to FVCs, there is an opportunity for creating shared value in terms of nutrition.

The role of the private sector in both the primary and secondary activities of the FVC is key. The food and beverage industry spans the entire value chain approach—from food production, to processing, storing to delivering to the consumer. "With rising consumer incomes, urbanization and the

need for preservation and convenience, the food industry will play an expanding role in processing agricultural outputs into food products. The logistics and distribution capabilities of food companies offer an unparalleled worldwide reach into urban and, increasingly, rural markets" [7]. The industry's role is in the driver seat to maximize nutritional outcomes throughout the entire value chain. Supermarkets can improve the food marketing chain as well as distribute the value-added benefits of foods. "Entire food systems are becoming more private, with a far larger role for market forces and a much smaller role of government-owned parastatals and cooperatives" [8].

Types of Food Value Chains

Developing country FVCs have experienced a rapid transformation in recent years. Only a few decades ago, most food was grown for household food consumption among smallholder farmers living in rural areas. Food was also purchased at small, localized markets [9]. That has changed. Now, most food purchased by consumers has travelled longer distances and has touched several different actors across a FVC. This has been influenced by changes in food consumption patterns prompted by rapid urbanization, income growth and expansion of modern retailers, processors and distributors [9]. Furthermore, more and more households are moving out of rural areas into urban centers, where they utilize modern supermarkets and are diversifying their diets, sometimes both positively and negatively. The demand for higher-valued, nutrient-rich products such as meats, dairy, fruits and vegetables is increasing. In addition, the markets for packaged, processed and ready-to-eat foods are expanding, including breakfast cereals, confectionaries, ready-to-eat meals and carbonated soft drinks, among others [3]. Rural populations also depend on FVCs for their food purchases because most of them, including the poor, are net-food buyers and are employed in the food sector [9].

Gomez and Ricketts [9] developed a typology that assigns FVCs that focus on providing nutritious foods to consumers into four broad categories to reflect the aforementioned transformations. The simplified version of the four typologies is shown in Table 34.1 and includes traditional, modern, modern-to-traditional and traditional-to-modern FVCs.

Consumers purchasing food through traditional value chains most often purchase food directly from smallholder farmers and traders in local or regional wet markets or from traditional retailers such as "mom and pop" shops, street vendors or roadside stands [10–12]. Traditional FVCs are mainly informal and are common in small rural markets located relatively close to production regions but may also travel longer distances to reach urban consumers, primarily in lower-income neighborhoods [13]. Traditional markets may help increase access to affordable nutritious foods such as fruits and vegetables, with the potential to lead to improvements in micronutrient intakes, particularly of B vitamins and vitamin C; however, given the lack of post-harvest and distribution infrastructure there may be limited year-round availability of diverse foods that can enhance diet quality [9].

Table 34.1 Typology of food value chains for nutrition

Type	Description
Traditional	Traditional traders buy primarily from smallholder farmers and sell to consumers and traditional retailers in wet (mostly local) markets
Modern	Domestic and multinational food manufacturers procure primarily from commercial farms and sell through modern supermarket outlets
Modern-to-traditional	Domestic and multinational food manufacturers sell through the network of traditional traders and retailers (e.g., mom and pop shops)
Traditional-to-modern	Supermarkets and food manufacturers source food from smallholder farmers and traders

Modern FVCs are largely driven by the expansion of modern retailers in developing countries, primarily in urban areas [9]. They involve both domestic and multinational food manufacturers and wholesalers, in addition to commercial agribusinesses and farms [14, 15]. These value chains are often more streamlined and have greater economies of scale than traditional value chains and are able to offer a year-round, wide assortment of fresh and processed and packaged food products; however, they are unlikely to reach all consumers (i.e., lower-income consumers) [9]. Although the traditional FVCs often still dominate low- and middle-income countries, growth in modern value chains has been high [16]. Modern value chains can impact nutrition outcomes both positively and negatively by providing year-round availability of a wide variety of foods, mainly for high- and middle-income households living in urban areas and by contributing to overnutrition by enhancing the availability of inexpensive, processed and packaged foods that are often high in sugar, salt and unhealthy fat [9].

Modern-to-traditional value chains often involve distribution of primarily processed and packaged foods produced by food manufacturers and sold through traditional retailers [9]. Modern-to-traditional FVCs allow for year-round distribution of processed and packaged foods, targeting lower-income consumers in urban areas as well as remote markets in rural areas [9]. Increasing access to processed and packaged foods through modern-to-traditional FVCs has the potential to decrease undernourishment in rural areas while at the same time potentially increasing overnutrition in urban areas [9]. Nevertheless, these FVCs provide an opportunity for implementing processed and packaged food fortification initiatives targeting micronutrient deficiencies.

Traditional-to-modern FVCs consist of smallholder farmers and traders selling primarily high-value crop and livestock products to supermarkets and food manufacturers [9]. Smallholder farmers and traders' participation in these FVCs may increase incomes leading to reductions in undernutrition particularly through indirect ways such as increased opportunities for off-farm employment in commercial farms and post-harvest businesses [9]. However, smallholders often face difficulties in terms of achieving the product quality and uniformity standards the modern retailers and manufacturers require [17, 18]. The World Food Programme's (WFP) Purchase for Progress (P4P) initiative is trying to address these barriers among smallholders in several countries as part of its procurement of staple crops for food aid. Box 34.1 provides an overview of the P4P initiative.

Box 34.1 An overview of World Food Programme's P4P Initiative

The WFP, the largest humanitarian agency worldwide, is a major staple food buyer. WFP buys these staple foods locally whenever their price, quality and quantity criteria can be met. The P4P initiative aims to increase local procurement and achieve higher development gains with WFP's procurement footprint by buying food in a smallholder-friendly way. Farmers often face challenges gaining access to formal markets, and the P4P tries to address these barriers by focusing on the following three main pillars:

1. Demand: Test innovative ways of buying staple foods and promote marketing opportunities for smallholder farmers
2. Supply: Support farmers to achieve better yields, reduce their post-harvest losses and improve the quality of their crops
3. Learning and Sharing: Gather and share lessons on effective approaches to connect smallholder farmers to markets in a sustainable way.

P4P has been found to lead to positive changes in the lives and livelihoods of participating smallholder farmers by providing them with crucial resources and encouraging them to work together as part of farming organizations.

Global Context of Food Systems and the Evolution of Nutrition

Diet Shifts and Value Chains

There is a rapid transition occurring in dietary and activity patterns globally, paralleled by major demographic and socioeconomic changes. Dietary changes include an increase in the consumption of animal-based products, vegetable oils, sugar, sugar-sweetened beverages (SSB) and ultra-processed, fast and street foods. Much of this shift is due to growing urbanization, increased availability of fast food outlets and marketing and promotion of processed food products [19]. These changes, together with a decrease in activity levels—driven largely by increases in sedentary job opportunities, increased use of motorized transportation and decreased active transportation (i.e., walking and cycling) likely due to insufficient infrastructure (e.g., sidewalks), and lack of leisure time—have resulted in rising levels of obesity in many countries (including low- and middle-income) [20–25].

Low- and middle-income countries are now facing multiple burdens of malnutrition [21, 26]—a high prevalence of undernutrition (and often associated infectious diseases) as well as a considerable rise in overweight and obesity (and the associated non-communicable diseases (NCDs) such as cardiovascular and coronary heart disease, diabetes and various cancers) [21, 23, 27]. While urbanization, sedentary lifestyles and the lack of infrastructure and security of poor neighborhoods and slums contribute to these trends in transitioning economies, rises in overweight and obesity are now found in both urban and rural communities and there are only marginal differences between the ratio of overweight and obesity levels in urban and rural populations [28]. Countries with marked levels of low birth weight and stunting are sensitive to the consequences of changing diets and activity patterns [29]. The trends in obesity are crippling some of the poorest countries, which are still reeling from undernutrition and infectious diseases [28, 30].

Alongside increases in the prevalence of overweight and obesity in low- and middle-income countries, there have also been marked changes to the food supply. Multinational food companies manufacturing ultra-processed foods have begun focusing on low- and middle-income countries as a source of growth as profit gains begin to stagnate in high-income countries [31]. This has led to an increase in the availability, affordability and acceptability of these foods in many countries and has transformed the food environment [31, 32]. Many of these products are targeted to the poor by using smaller package sizes, with a low unit price, and ensuring that the products are available in both traditional and modern retailers.

Changes in the types of food we eat, and shifts in our diet will drive a new “demand” of how food is grown, processed and consumed [19]. While populations are growing, overall wealth among that growing population is also increasing, particularly in places like India, China and Brazil. With this increase in wealth comes an increased demand for higher quality, nutrient-rich products such as meat, dairy products, and oils as well as ultra-processed food consumption. Americans account for just 4.5% of the world’s population, but eat approximately 15% of the meat produced globally [33]. On average, the USA consumes 124 kg meat/capita/year compared to the global average of 38 kg/capita/year [34]. The countries that consume the least amount of meat are in Africa and South Asia, where the highest burden of undernutrition lies, with consumption in some countries as low as 8.5 kg/person/year in Ethiopia and 3 kg/person/year in Bangladesh [35]. While there may be a need to grow more crops in a sustainable way, there is also a need to ensure that food is available and accessible in a more equitable way, that food that is grown, provided and sold is both safe and of better nutritional quality, and consumers demand more nutritious foods [36]. These changes will come with ethical and environmental costs to society in some way.

In middle- and high-income countries, attention and publicity are increasing to promote better quality diets (in terms of nutrition but also sustainability). However, it is clear that the cost of such diets is currently high [19] and even the costs of basic diets in much of the world remains higher than

daily wages [37]. In South Africa, a middle-income country, a nutritious and healthy diet costs 69% more than a typical South African diet [19]. Even in high-income countries, some cannot meet the dietary guidelines, particularly fresh fruit and vegetable recommendations, and energy-dense foods high in fat, sugar and salt are often less expensive and provide more energy per dollar spent than nutrient-rich foods [19, 38].

Changes in value chains and their influence on the obesogenic environment have undoubtedly contributed to these shifts in dietary patterns. In today's environment, energy-dense but otherwise nutrient-poor foods are increasingly accessible and affordable [19]. The obesogenic environment is one of the major explanations for the increasing prevalence in obesity [39]. Disadvantaged, vulnerable and poor families often find themselves in environments that are obesogenic. They have less access to healthy foods, have jobs that don't allow time to prepare and consume healthy meals, and live in environments that do not promote physical activity.

Although value chains are currently geared, in many ways, toward the production of foods that contribute to the obesogenic environment, there is a potential to reorient them to improve the availability, affordability and acceptability of nutritious foods. Although, FVCs for nutrition have most often been thought of in terms of increasing access to micronutrients (e.g., biofortified staple crops), they can also be used to promote (or discourage) consumption of foods within the context of obesity and NCDs and have an important role in addressing the double burden of malnutrition.

Value Chains for Nutrition

Why Food Value Chains Can Contribute to Nutrition

FVC approaches are already used in international development with the objective of enhancing the livelihoods of food producers, but they rarely consider diet quality and nutrition [3]. In low- and middle-income countries, the FVC approach has mainly been thought of through economic, cash crop terms. Yet more can be done within the value chain model, including ensuring that better partnerships with unique sets of players can add value by bringing more nutrition to the value chain. By including nutrition as an outcome of value chains, demand and supply "ends" of the chain can be linked, (with the producer and consumer often being the same person), with a focus on ensuring that the nutritional needs of the population are met.

FVCs touch all four aspects of food and nutrition security: production, access, acceptability and quality of foods. In the recent Lancet series on child and maternal nutrition, value chains were highlighted as a potential way to leverage agriculture to improve nutrition, particularly with regards to traditional value chains for micronutrient-rich foods [40]. Many poor households predominantly consume staple-based diets and lack access to fruits and vegetables, animal-source or wild foods of high nutrient content [3, 41]. In order for the agricultural sector to play a more effective role in terms of improving access, acceptability and quality of diets and more nutrient-rich foods that are lacking in diets of poor households, there needs to be a greater focus on what happens to foods being produced all the way to their consumption [3]. Economic constraints, insufficient supply and demand of affordable nutritious foods, lack of nutrition sensitiveness along the agricultural value chain, and limited appropriate information on nutrition for consumers to change behavior are critical factors that limit poor population's access to nutritious foods. Food and nutrient losses along the value chain, which may be caused by ineffective or inefficient harvesting, storage, processing and handling, are other factors that affect the availability, cost and hence affordability of nutrient-rich foods.

Value for Nutrition

Adopting value chain approaches can be an effective way to identify the causes of inadequate food availability, affordability and acceptability and to implement effective solutions and create long-term, sustainable benefits for nutrition [3]. Perhaps much of this adoption can occur through the agriculture sector. However, it should be noted that commonly, value chain approaches (particularly those approaches rooted in agriculture) focus on the processes and actors involved from the producer's perspective (i.e., the supply side). Very little attention is paid to the role of consumers and how they can influence the value chain through increased demand for nutritious foods. Figure 34.3 depicts some of the ways in which nutrition interventions can leverage agriculture-focused value chain activities to address the double burden of malnutrition at both the market and household level (i.e., consumer).

The ultimate goal of supply-side initiatives is to improve food availability at household level and to increase household income (i.e., food access). However, evidence has shown that improvements in food supply and household income alone are not sufficient to improve nutritional status. Thus, to reflect a nutrition "lens" on the smallholder value chain, the demand side of the equation—the smallholder farmer as consumer of nutritious foods—must also be considered.

The demand side relates to household decisions regarding purchase of food, allocation of resources to different household members and knowledge of safe and nutritious food preparation and child-feeding practices. Demand-side interventions focus on awareness, behavioral change, knowledge transfer and empowerment in order to increase demand for nutritious foods and improve dietary intake. Resources controlled by women, as well as nutrition education, are critical across the entire chain. Because the smallholder value chain focuses on both demand- and supply-side issues, the value chain is articulated not as a linear process but as a circle, which acknowledges that the smallholder farmer is both the target producer and a consumer of the nutritious foods produced. In this context, "value" is defined not only in terms of economic impact (e.g., income earned) but also as a social impact through improved nutritional status and better health.

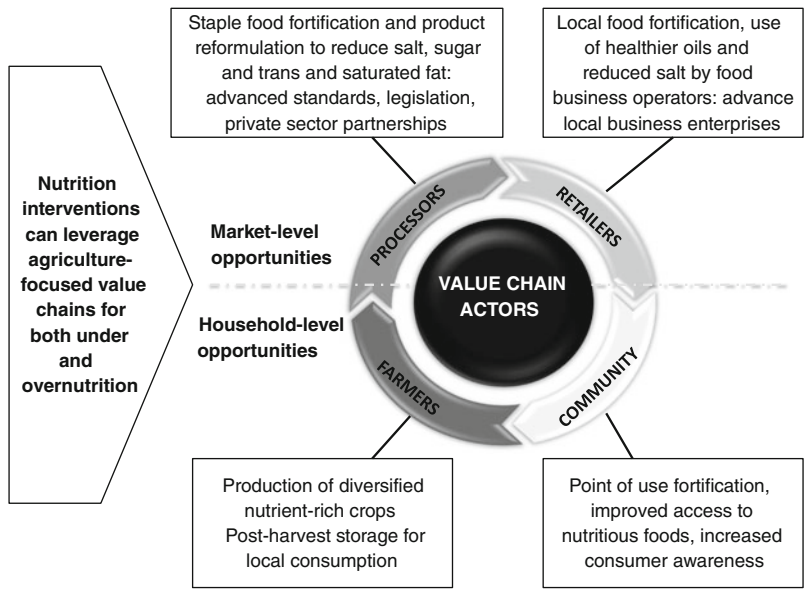

Fig. 34.3 Examples of how nutrition interventions can leverage agriculture-focused value chains. *Source* Adapted from USAID Feed the Future, Rwanda [42]

The links between what is produced on the farm, the consumer who buys that food and the income received by the producer does not stop at production [3]. Food is stored, distributed, processed, retailed, prepared and consumed in a range of ways that affect the access, acceptability and nutritional quality of foods for the consumer. Value chains are thus fundamental to consumption, dietary and nutrition perspectives and not only in terms of the supply of foods. Little emphasis has been given to how consumers can play a role in influencing value chains and how changes in the demand for specific foods can influence the processes and outputs of value chains. Demand for healthier products can be increased when consumers value these higher quality products, which is linked to food preferences. Food preferences are influenced by exposure to eating behaviors of parents, caregivers, peers and role models, to the availability of foods inside and outside the home, to cultural and social norms as well as to new information and marketing [43]. By targeting food preferences through social marketing, modeling of healthy eating behaviors and other mechanisms, demand for more nutritious foods can be increased.

In addition to the role of consumer demand in influencing value chains, there has also been little attention given to how actors, particularly women along the value chain can be better informed on enhancing the nutritional value of local foods. Food and nutrition systems need to be rethought by creating new business paradigms that engage smallholder farmers from a livelihoods perspective but also from a health and nutrition perspective.

Nutrition Value Chain Actors

Figure 34.4 presents the sequence of processes and the main actors involved in a basic value chain with a lens on nutrition, which takes food from the farm to the consumer [44, 45]. It also depicts the two main pathways in which value chains can improve nutrition outcomes: (1) by improving consumption of the nutritious foods produced by smallholders and (2) by generating income which enables consumers to purchase healthier foods. There are various incentives (and disincentives) that can help stimulate activity among value chain actors to produce and consume more nutritious foods, including organizational incentives (e.g., consolidating to increase competitive advantage), financial incentives (e.g., adding value, cutting costs, seeking profit), technological incentives (e.g., technological innovations) and regulatory/policy incentives (e.g., regulations, policies, legal decisions) [44].

Entry and Exit Points

Typically, poor households subsist on monotonous staple-based diets; they lack access to nutritious foods, such as fruits, vegetables, animal-source foods (fish, meat, eggs and dairy products), fortified foods or wild foods of high nutrient content. Lack of diversity in the diet is strongly associated with inadequate intake (and risks of deficiencies) of essential micronutrients [46–48]. The resulting deficiencies have far-reaching health and nutrition consequences, both in the short and the long term.

One of the main uses of value chain analysis is to help identify points in the chain that can be "leveraged for change" [44]. Targeting leverage points can reduce the likelihood that nutrients are lost or exit the value chain as well as enhance the nutritional value of specific nutrient-rich foods. Exiting points, such as food and nutrient losses that occur along the value chain, are caused by ineffective or inefficient harvesting, storage, processing or handling, reducing availability and raising the price of nutrient-rich foods. The poor are at highest risk of exposure to unsafe food, and since malnourished and micronutrient-deficient children are most susceptible to the health risks associated with unsafe

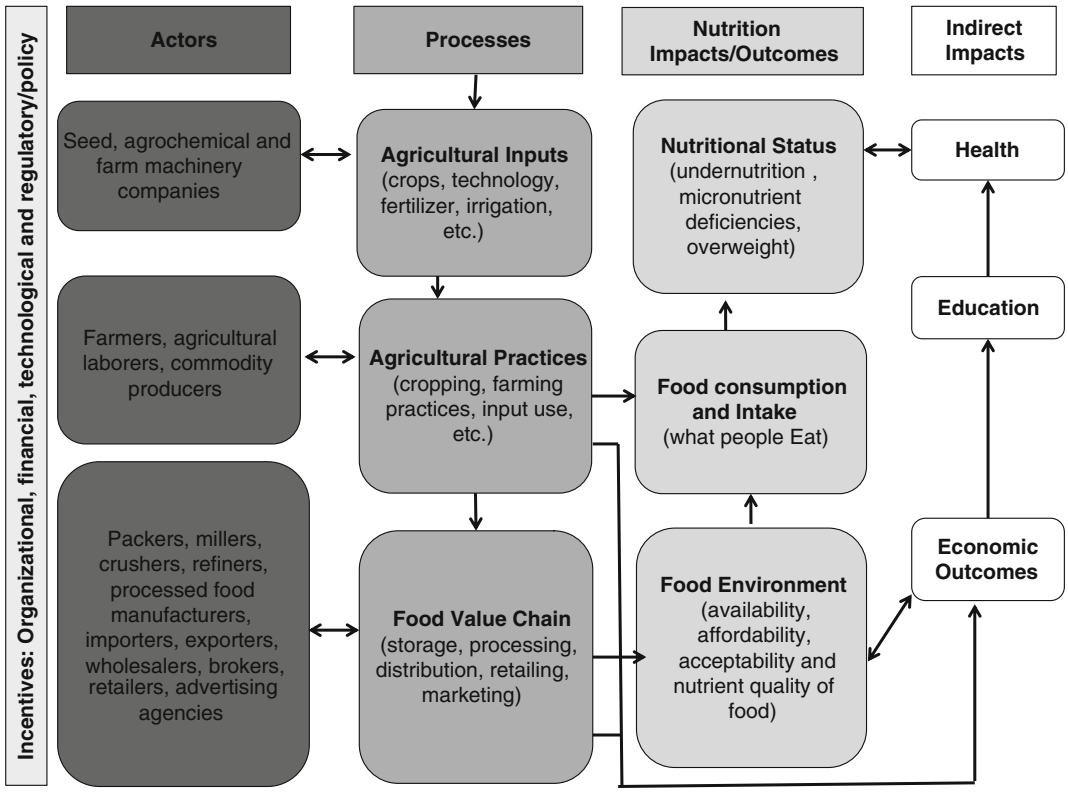

Fig. 34.4 Food value chains for nutrition. *Source* Adapted from Hawkes 2009 [44], Hawkes et al. [45]

food or water, they have the most to gain from improvements in the nutritional value and safety of foods [3].

It is also important to understand potential entry points: to enhance (or prevent losses) in the nutritional value of foods during processing or to fortify (or restore the nutrient content of) foods formulated for special groups (such as complementary foods for young children or nutrient-rich foods for pregnant women or people living with HIV). Entry points to educate and raise awareness among the different actors in the value chain are also important in terms of stimulating demand for the target products. Economic constraints, lack of knowledge and information, and related lack of demand for nutritious foods are critical factors that limit poor populations' access to such foods. Figure 34.5 shows ways in which more nutrition can enter or exit FVCs.

As FVCs have become more popular in terms of improving nutrition in development, tools to help extension workers, non-governmental organizations and researchers to apply value chain analysis in the field have been developed. These tools help guide value chain analysis and identify potential leverage points in the chain. By mapping the FVC, it is possible to identify areas where nutrients are lost or exit the value chain and to identify potential solutions to try to mitigate these loses. IDS and GAIN recently developed a "Nutritious Agriculture by Design" tool[1] that aims to help program planners put a nutrition focus on agricultural programs and the Value Chains Knowledge Clearing House[2] provides tools for farmers, practitioners and researchers to help guide value chain analysis.

[1] http://nutritiousagriculture-tool1.gainhealth.org/.

[2] http://tools4valuechains.org/.

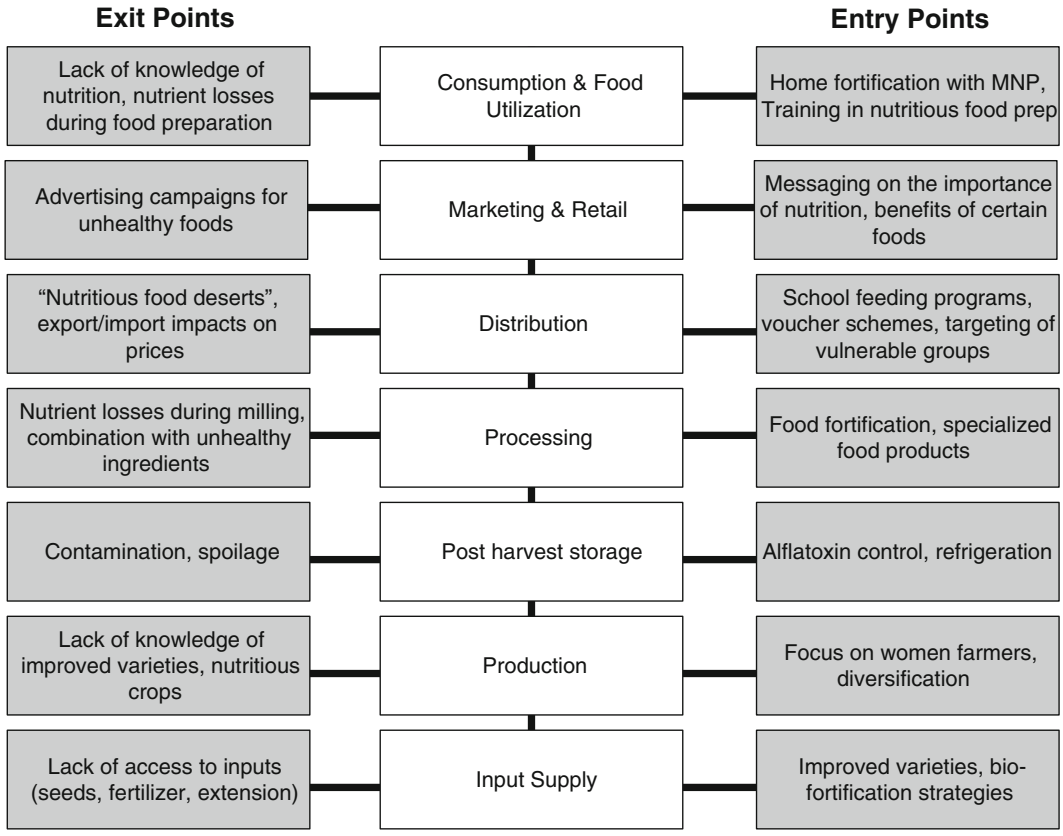

Fig. 34.5 Exit and entry points along the value chain for nutrition

Nutrition-Focused Food Value Chains

Figure 34.6 adapts Porter's value chain to a more nutrition-focused chain. The primary activities encompass the FVC from inputs into agricultural production to food retailing, marketing and labeling. The secondary activities relate to the supportive factors that increase the likelihood of adding nutrition value along the FVC. Throughout the nutrition-focused FVC, there are opportunities for creating shared value in terms of both economic and nutritional goals.

Primary Activities

Inbound Logistics

Inbound logistics encompass inputs into production and agricultural production itself. The actors involved in these processes include seed, irrigation and farming equipment companies as well as plant breeders, farmers and laborers, among others. Adding nutrition value at this stage of the FVC can be achieved by producing nutrient-rich crops and by maximizing yields of those crops. For example, HarvestPlus has developed specific crop and nutrient combinations (e.g., rice biofortified with zinc in Bangladesh and India, maize biofortified with provitamin A in Nigeria and Zambia) to deliver specific

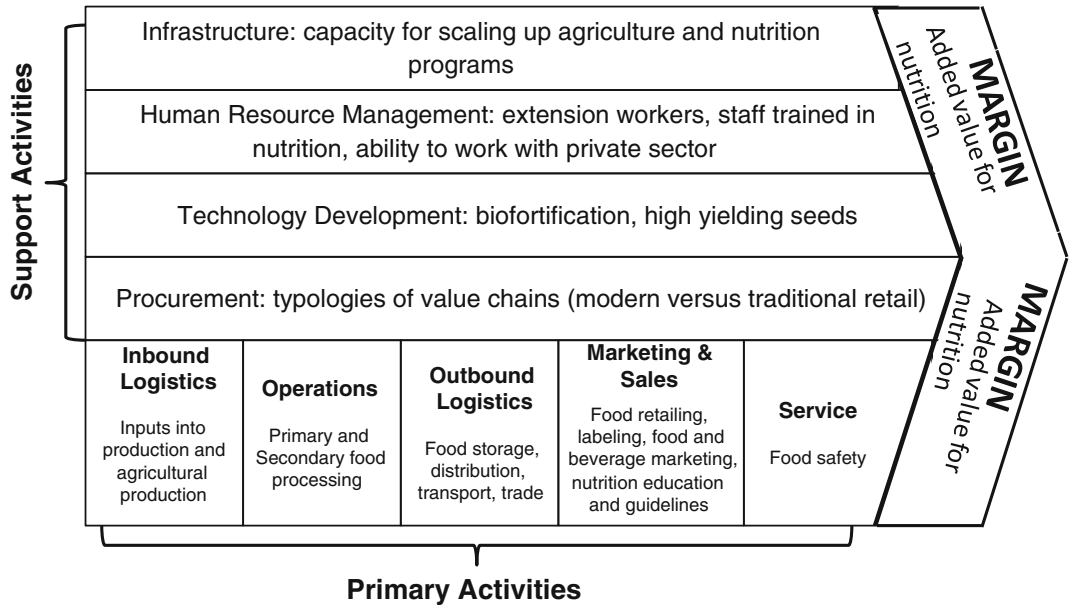

Fig. 34.6 Nutrition-focused food value chain framework. Adapted from Porter and Miller [2]

micronutrients to populations at risk of micronutrient deficiency in Africa and Asia [49]. Golden rice—rice that has been genetically modified to be high in beta-carotene in order to reduce vitamin A deficiency—provides another example of adding value in terms of nutrition before food leaves the farmgate. Importantly, a key factor in increasing the uptake of vitamin A rich orange sweet potato in Uganda and Mozambique was that the crop was high yielding, drought tolerant and virus resistant, and consumers who received education on the nutritional value of the food and were encouraged to try it reported to enjoy the taste of the food, which increased farmers' willingness to produce this nutrient-rich variety [50, 51].

Operations

Operations include both primary and secondary food processing and the actors (mainly the food industry) involved in these processes. Adding nutrition value at this point in the value chain can be achieved both by fortifying processed foods with micronutrients and by ensuring healthier inputs are used in processed foods (e.g., using less salt, limiting trans fat, etc.). The private sector has a key role to play at this point in the FVC.

New partnerships working across the value chain are emerging such as the new partnership between PepsiCo and World Food Programme on the development of locally sourced chickpea-based ready-to-use foods for treating malnutrition in Ethiopia. Danone has partnered with Grameen Bank to develop a social business model that delivers nutrients to those who may be at risk for micronutrient deficiencies in Bangladesh through their dairy production, along with nutrient-rich biscuits and snacks. However, we need more of these types of models, and more partnerships to inject nutrition into the many agri-food value chains across the developing world.

> There is an urgent need for major donors from the private sector, foundations, and the development community to invest in a twenty-first century approach to nutrition science.
>
> —Yach et al. [52].

Outbound Logistics

Outbound logistics include food storage, distribution, transport and trade. Outbound logistics can occur directly after food production (inbound logistics) or after food processing (operations), depending on the product type. Improving nutrition at this stage of the FVC can be achieved by increasing access to nutrient-rich foods. Ensuring proper storage of foods to reduce wastage, distributing food more efficiently and ensuring that there are roads and adequate infrastructure in place to transport food can help increase access to nutritious foods. For example, a dairy farming development assistance project in Zambia—which aimed to reduce household food insecurity among vulnerable groups through increased incomes generated from the sale of milk and other dairy-related products—improved storage and transportation through technologies for milk aggregation and cooling [3, 53]. This led to improved availability of safe, high-quality, cooled milk through milk collection centers and increased farmer profits, diet diversity and food security [3, 53]. In Singapore, the Healthy Hawkers Programme led to an increase in the availability and affordability of healthier oils for use by street vendors after the Health Promotion Board worked with oil manufacturers to produce a blended oil with 25% less saturated fat than the oil typically used (palm oil) by vendors. In order to bring down the cost of the blended oil, the Health Promotion Board worked with manufacturers to share logistic services, including storage and delivery resources, which led to the oil being comparable in price to palm oil [4].

Marketing and Sales

This is a very important step in the FVC to improve acceptability as well as the availability and affordability of nutritious foods. Food retailers play a key role in terms of increasing access to foods that have a higher content of essential nutrients, such as vitamins and minerals, without having a higher energy density compared to similar foods. In urban populations, supermarkets are critically important and are playing a role in coordinating markets and price determination [54]. In rural populations, local markets, smallholder farms and small "mom and pop" shops are important in terms of accessing nutritious foods such as fruits and vegetables and health products.

Food and beverage marketing—both by food industry and governments—can improve consumer acceptability of foods; however, the types of foods "marketed" by these two types of actors are often quite different. Governments and NGOs can influence consumers' perceptions of the nutrition value of foods by implementing regulation, mass media campaigns, adopting nutrition guidelines and nutrition education. For example, when the USA adopted mandatory labeling of trans fat, it raised consumer awareness [55], which then led to an increase in consumer demand for trans fat-free foods [58]. This in turn resulted in the food industry reformulating many of their products [56]. In Mozambique, a HarvestPlus Reaching End Users project increased the production, availability and consumption of orange-fleshed sweet potato among rural households [57]. More than 50% of consumers who purchased sweet potato in 10 markets indicated that they bought it because of its associated nutritional and health benefits, which they had learned about from the educational messages (radio ads, programs, promotion events, market signs and murals) implemented as part of the project [3, 57]. Building demand for nutritious foods is a key component of value chains for nutrition, particularly when their appearance or taste differs from the foods that consumers are accustomed to eating (e.g., golden rice) [58].

Secondary Activities

The secondary activities consist of infrastructure, human resource management, technology development and procurement. In terms of adding nutrition value in the value chain, these activities aim to support the primary activities in the chain and increase the uptake of activities that are likely to improve the availability, affordability and acceptability of nutritious foods. For example, ensuring that there is sufficient infrastructure in place increases the likelihood of being able to successfully scale up nutrition-sensitive agricultural programs and initiatives. For example, the Scaling Up Nutrition (SUN) movement focuses on increasing in-country capacity to implement interventions aimed at improving nutrition outcomes, while the SUN Business Network supports SUN countries to develop plans for collaborating with business on these approaches. As part of the movement, SUN countries mobilize resources to enable prioritization of nutrition interventions. Given that many of the initiatives aimed at creating nutrition value along the FVC involve various sectors and disciplines, ensuring that staff are trained in the importance of nutrition as well as being able to work with the private sector is important. Many of the initiatives involving biofortification are joint ventures among governments, NGOs and the private sector. In addition to improving infrastructure and human resource management, ensuring technology development, and its uptake, by actors in the FVC as well as streamlining the value chain by improving procurement can help increase access to nutritious foods. For example, reducing post-harvest losses is an important point for intervention along value chains, particularly in low- and middle-income countries where a substantial proportion of food is lost before leaving the farm gate [59].

Conclusion

Value chains are not a new concept and many working in agriculture and business have been utilizing not only the concept, but have put value chains into practical use. Yet, very little has been done to ensure nutrition is included and linked into the chain. This is likely a reflection of the cross-disciplinary nature of FVCs. The analysis of FVC requires an understanding of nutrition, agriculture, food technology, economics, marketing, etc. However, the training received by nutritionists in these other areas is often insufficient. Because of this, there are still many unanswered questions that require research, more operational understanding and collaborative investigation. Nevertheless, FVCs for nutrition have a role to play in terms of identifying innovative ways to improve the availability, affordability and acceptability of nutritious foods both in the context of under- and overnutrition, and there is currently a push for conducting FVC analyses in an integrated manner with various stakeholders. This will require buy-in from various actors in the value chain and will need to target both supply and demand-side dynamics. There is likely a role for policy in terms of supporting actions along the FVC that can contribute to healthier consumption patterns; however, there is also a role for the private sector. Applying a business-lens to nutrition may help to identify opportunities for integrating nutrition into FVCs with the goal of increasing the availability, affordability and acceptability of nutritious foods for the population.

Discussion Points

- What are the opportunities and barriers to increase the consumer demand for and consumption of nutrient-rich foods among the poor? Does nutrition knowledge and awareness of consumers play a role in influencing the value chain? Where do they get their information from and what sources/value chain actors do they trust?

- What role does industry play in ensuring access to nutritious foods? What role should commercial farmers/producers/processors/distributors play in value chains that are more nutrition focused? What role do women play as they play dual roles as producers and consumers?
- How can food be enriched, processed, preserved to increase their nutritive potential along the value chain? How can nutrient losses be avoided along the value chain? How expensive are these alterations to foods? Are consumers willing to pay for more nutritious foods?
- How can value chains be better used to produce specialized nutritious foods for children under two, pregnant mothers and special needs populations such as People Living with HIV?
- Where do supermarkets play a role for poor and vulnerable populations?
- How can nutrition be balanced (economies of scale/trade-offs) with economic gains, intensification of agricultural production systems and more complicated value chain systems (i.e., USA)?

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