



Investing in rural people

# DEVELOPING NUTRITION-SENSITIVE VALUE CHAINS IN **NIGERIA**

Findings from IFAD research for development







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## Acknowledgements

The findings contained in this report are from the research project “Support of development of nutrition-sensitive value chains in middle-income countries,” undertaken by the International Fund for Agricultural Development (IFAD), in partnership with the CGIAR Research Program on Agriculture for Nutrition and Health and funded by the Government of Germany. Complementary funding was provided by the Government of Canada. The text was authored by Soma Chakrabarti (independent consultant), Isabel de la Peña (IFAD) and James Garrett (Bioversity International) and was based on reports prepared by Food Basket Foundation International (Nigeria) (FBFI) and the Koninklijk Instituut voor de Tropen (Royal Tropical Institute, The Netherlands) (KIT). Support from the Government of Nigeria, the Climate Change Adaptation and Agribusiness Support Programme (CASP) and the IFAD country office in Nigeria (Oussama Ameziane, Ben Odoemena and Patricia Willis-Obong) along with administrative support from Cristina Fumo is gratefully acknowledged.

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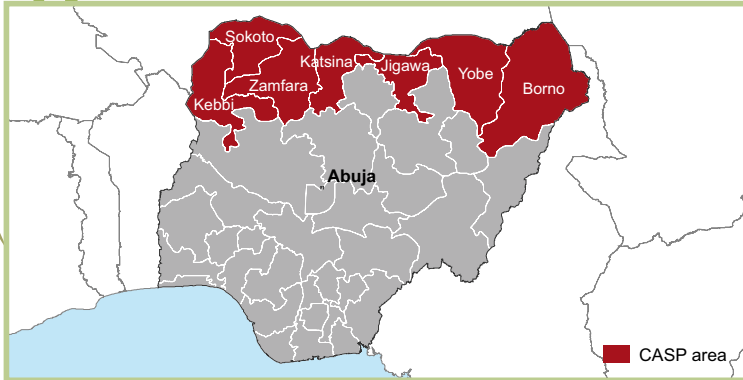
ISBN 978-92-9072-814-6

Printed April 2018

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## Summary



With funding from the German and Canadian governments, IFAD recently carried out a set of studies in Nigeria and Indonesia to determine how to design nutrition-sensitive value chain (NSVC) projects for smallholders. Such projects seek to shape the development of value chains for

nutritious commodities in ways that are likely to address nutrition problems.

In Nigeria, the studies were undertaken in the northern states of Katsina and Sokoto, where the IFAD-funded Climate Change Adaptation and Agribusiness Support Programme (CASP) is being implemented by the Federal Ministry of Agriculture and Rural Development of Nigeria. The studies showed that cowpea, groundnut, soybean, millet and sorghum could contribute to improving nutrition as well as livelihoods for smallholders. The studies revealed that the main nutrition problems for smallholders in the project areas include diets with inadequate energy, micronutrient and protein consumption. Such diets are known to contribute to high levels of wasting and stunting in children and undernutrition in women. Problems associated with generally poor diets are compounded by seasonal fluctuations. Promotion of the production and consumption of the five crops identified above could help improve diets and lay the foundations for a more nutritious local food system that also promotes women's empowerment and resilience in the face of climate change. Importantly, these crops also make business sense for smallholders and value chain development.





## IFAD nutrition and value chain research in Nigeria



A value chain approach is emerging as a useful way to analyse and navigate the complexity of the food system to improve food security and nutrition. Such an approach can help to identify entry points for policy interventions, investment decisions and capacity development. The traditional focus of value chain development is on increasing the economic value of the commodity to the producer (or other value chain actors). Nutrition-sensitive value chains (NSVCs) leverage opportunities to enhance nutrition value as well, increasing supply and demand for safe and diverse food and adding nutrition value, or minimizing nutrition losses, through, for example, promotion of biofortified crops or improved transport and storage. In this way, NSVCs contribute to a household's consumption of a healthy, diverse diet and consequently to the improvement of the nutritional status of all its members.

Guidance on how to design and develop NSVCs is extremely limited, and in 2014 IFAD initiated a project to develop such guidance. IFAD first gathered existing information on challenges and opportunities facing smallholders in developing NSVCs and then outlined a specific approach for design. IFAD then tested that approach by applying it in the field, working alongside projects in Indonesia and Nigeria.

In Nigeria, IFAD works with the Climate Change Adaptation and Agribusiness Support Programme (CASP). The project aims to reduce rural poverty, increase food security, accelerate sustainable economic growth and reduce vulnerability for smallholder farmers. It also has a particular focus on women and young people. CASP operates in several of the northern states of Nigeria (CASP area map). Given considerations of timing, resources and security, however, the NSVC studies were carried out only in Katsina and Sokoto. The conditions found in these states, nevertheless, include the three different agroecological zones (Sahel, Northern Guinea and Sudan) that are present across the project area. The studies therefore reflect the kinds of conditions that are found in the areas where CASP works.

Studies applying and learning from the proposed approach were carried out by Food Basket Foundation International (FBFI) and the Koninklijk Instituut voor de Tropen (KIT).<sup>1</sup> Data showed that project households in Katsina and Sokoto face significant nutritional challenges, including poor-quality diets. The studies suggested that the production and marketing of these commodities (cowpea, groundnut, soybean, millet and sorghum) can make business sense for smallholders and, at the same time, help to improve diets and create a more nutritious local food system. From additional analyses and consultations with key stakeholders, the studies identified a number of interventions that could be incorporated into the project, including those that would increase the supply of and demand for these nutritious foods as well as enhance their basic nutritional value and reduce loss and waste. These investments can make diverse, safe foods from these five crops more available and affordable to the project population while also increasing incomes.

The findings were developed specifically within the CASP project context, but are also of broader potential interest to all actors in agriculture and nutrition, including policymakers, practitioners, producer organizations and development agencies. Given the multidimensional nature of nutrition, these findings are also of interest to actors from other sectors such as health, education, water, environment, infrastructure and community planning, as well as those working for gender equity, women's empowerment and child protection.

<sup>1</sup> The full reports from FBFI and KIT, as well as other materials related to this project, are available at [www.ifad.org](http://www.ifad.org).

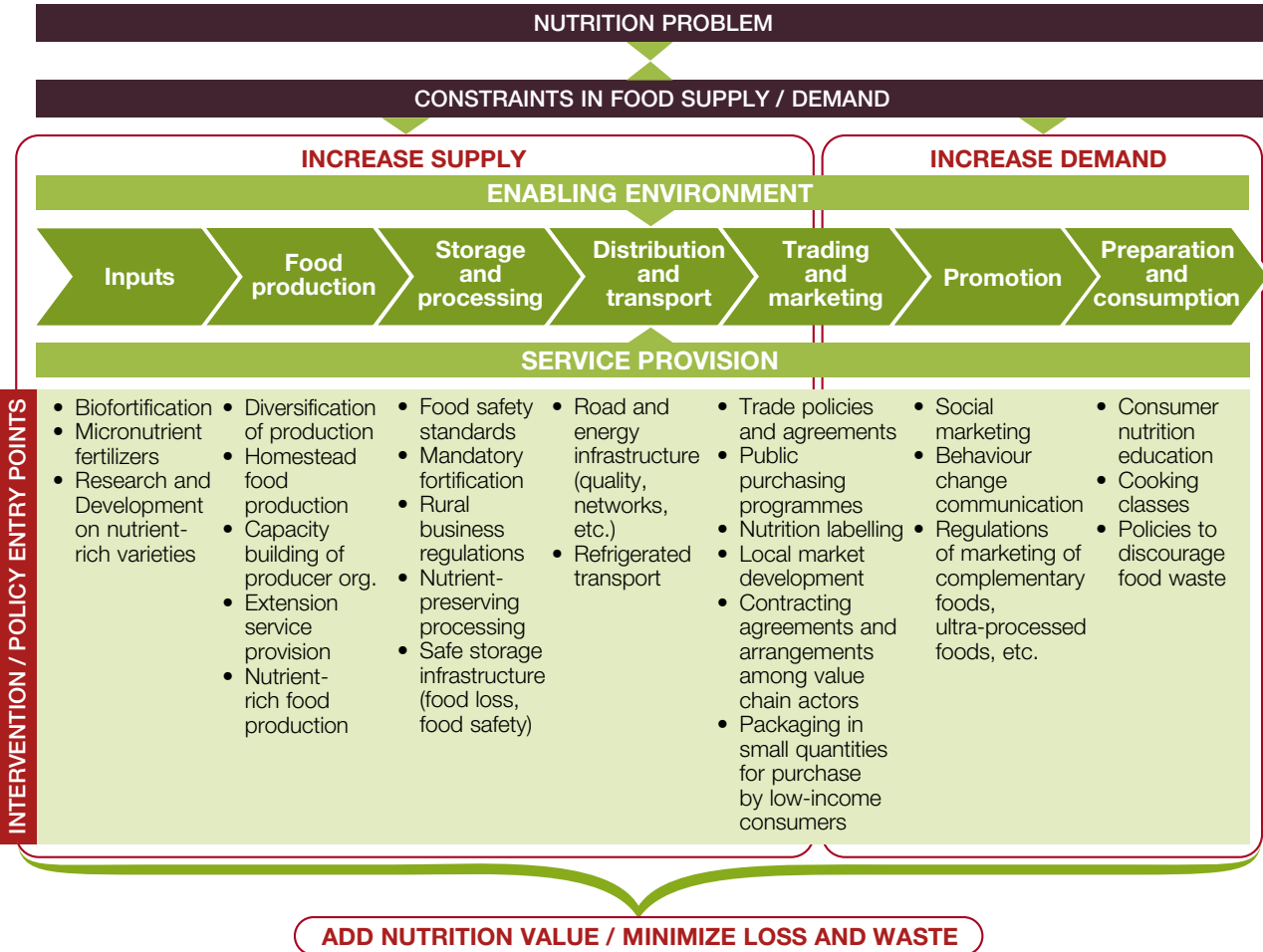


# Making value chains nutrition-sensitive

To address the nutrition and food security challenges of today, there is a need to improve not only how food is produced but also how it is processed, distributed, marketed and delivered to consumers. This series of actions together makes up a value chain. By analysing all stages across a chain for a commodity, projects can address these problems and shape the value chain to respond to identified nutrition challenges, largely through taking actions that will lead to improved dietary quality.

An NSVC approach makes a clear link between nutrition problems in target populations and possible constraints in commodity supply, demand and nutrition value (figure 1).

FIGURE 1: A framework for understanding how to shape nutrition-sensitive value chains



Source: Adapted from De la Peña, I., Garrett, J. & Gelli, A. 2018. *Nutrition-sensitive value chains from a smallholder perspective: a framework for project design*. Rome, IFAD

Specific policies and interventions can enhance supply by increasing the availability and affordability of nutritious foods while also raising the incomes of project beneficiaries. Actions can also promote demand, including that of beneficiary producers, through, for example, nutrition education or behaviour change campaigns. Other interventions can add nutrition value or minimize nutrition losses through, say, the use of biofortified crops or more nutrient-rich varieties, or specific actions that address food loss, waste and safety. Figure 1 provides some illustrative examples of entry points for improving nutrition at different stages of the value chain.

### Impact pathways

Policy and programme interventions have their effect on the nutrition of project beneficiaries, primarily smallholders, through three main pathways: income, the market and consumption out of own production. Developing value chains for particular commodities can raise *incomes* of producers, and even other value chain actors, and so improve diets by allowing households to purchase adequate amounts of more diverse food of higher quality. Project interventions may also catalyse improvements in the food environment. With improved efficiency, for instance, more and more diverse foods may be made available in the *market* at reduced prices. This pathway benefits consumers, including project beneficiaries, who purchase their food. Producer households that produce the nutritious foods for the market may also *consume out of their own production*. Nutrition awareness and knowledge, in general and for the specific commodities, along with women’s empowerment and equity, are needed to ensure that higher incomes or more nutritious foods on the farm or in the market are translated into better diets and, consequently, better nutrition.

### The research project approach

A systematic approach was developed to use the framework in figure 1 to inform project design. The approach has four steps that seek to ensure that the commodities selected and interventions proposed for value chain development will address diet-based nutrition problems. The steps,<sup>2</sup> summarized in figure 2, are:

1. Identify the nutrition problem through a situation analysis (e.g. identify gaps in nutrient intakes related to food consumption patterns)
2. Select commodities that can address the nutrition problem while also making business sense (therefore with good potential for NSVC development).
3. Analyse the value chain of selected commodities with a nutrition lens, identifying constraints and opportunities and assessing potential for investment.
4. Identify intervention options to address these constraints and opportunities.

FIGURE 2: Steps for designing a nutrition-sensitive value chain (NSVC) project



<sup>2</sup> In Nigeria, working with CASP, the first two steps were carried out by FBFI and the last two by KIT.

# Key findings 1: What is the nutrition problem in Katsina and Sokoto?

A review of secondary data and site visits revealed the following picture of food consumption patterns and nutritional deficiencies among people living in project areas in Katsina and Sokoto.

## Nutrition problems

Prevalence of malnutrition, specifically undernutrition, is quite high in the study states. In both states, stunting rates among children under five years of age are around 55 per cent and wasting rates around 10 per cent.<sup>3</sup> In Katsina, around 15 per cent of women are underweight. In Sokoto, this rises to 19 per cent of women. The prevalence of malnutrition also varies by agroecological zone, with a higher prevalence in the Sahel zone and a lower prevalence in the Northern Guinea zone. There are no recent empirical data on micronutrient deficiencies at state level.

## Dietary patterns in Katsina and Sokoto

The causes of malnutrition are multiple, cutting across sectors (food, health and care) and levels (individual, household, community, society). State- and community-level data point to alarming levels of malnutrition and hunger and their determinants.<sup>4</sup> Poverty rates are high: 75 per cent of residents of Katsina are poor, as are 81 per cent in Sokoto. In both states, access to safe drinking water and appropriate sanitation is poor and prevalence of diarrhoea is high. Over 90 per cent of children are without access to a minimum acceptable diet. Women face significant challenges. Seventy-eight per cent of women in Katsina and 89 per cent of women in Sokoto have no education. Gender inequality compounds the problem; the women's literacy rates (15 per cent in Katsina, 10 per cent in Sokoto) are only one third that of men in Katsina and one quarter that of men in Sokoto.

Millet and sorghum, rice and maize are the most consumed foods. These cereals are generally consumed all year round, whereas the consumption of tubers, legumes, nuts, and fruits and vegetables fluctuates greatly depending on the season. Cowpea, groundnut, fruits and vegetables and soybean as well as animal products are available but less consumed by communities than cereals. In general, the consumption of foods rich in vitamin A and in iron is very low. Consumption patterns suggested by secondary data were largely confirmed by primary data collection in study communities.

<sup>3</sup> Stunting, or low height for age, reflects chronic undernutrition. Wasting, or low weight for height, reflects acute undernutrition.

<sup>4</sup> Figures cited are from the Harmonized Nigeria Living Standards Survey (HNLSS) (2009/2010), the National Nutrition and Health Survey (NNHS) (2015), the Nigeria Demographic and Health Survey (NDHS) (2013), the Food Security and Livelihood Assessment in North East Nigeria and the Food Security and Vulnerability Survey in Five North West States of Nigeria (2015).

Generally, households in both states say they have food coverage from their own production for about seven months of the year, although over 95 per cent in both states say they can generally find food in the market. Fourteen per cent of households in Katsina and 16 per cent in Sokoto report being food-insecure (based on a household dietary diversity score of four or less). These problems worsen in the lean season from June to September, when some households are forced to reduce portion sizes and others experience hunger as a result of food shortages. The NSVC study found that women in the study communities consumed, on average, foods from 5 (of 10) food groups, and 71 per cent had at least the minimum acceptable level of dietary diversity (consumption of 5 or more groups), suggesting micronutrient adequacy. This may reflect a close to maximum level, as data were collected at the end of the rainy season, when vegetable production was reported to be high. In this context, target communities are likely to suffer from energy deficiencies on a seasonal basis and more constantly from protein and micronutrient deficiencies.

Tradition and culture are also major determinants of food and nutrient intake. For example, households tend to prepare food with practices such as excessive boiling or drying that may cause nutrient loss, especially for vegetables. Gender roles also influence food consumption patterns. Men generally perform all farming activities and are in charge of market activities, particularly those that take them beyond the community. Even if women own farms, they need to hire men to carry out farming activities. Women are mainly engaged in activities in the home, including food preparation and processing. Women typically sell and buy within the community, usually things they have processed themselves, such as groundnut cake. Men thus tend to consume more animal products than women or children, because these products are often consumed outside the home.

The most significant contribution of NSVCs to improved nutrition, therefore, will be through improving diets by increasing the availability, affordability, acceptability and safety of a range of nutritious foods.



## Key findings 2: Which commodities have most potential to address the nutrition problem while making business sense?

### Nutrition, market and income generation potential: coming up with a shortlist

Based on market observations and community focus group discussions, a total of 45 commodities that were poorly or inadequately consumed in the study communities were initially identified as having potential for NSVC development. A set of criteria, looking at nutrition improvement potential, market potential and income generation potential, were then applied to determine which commodities had the greatest potential to address the nutrition problems, while also making business sense.<sup>5</sup>

1. **Nutrition improvement potential** – if a commodity can respond to the nutrition challenges identified in household diets (hunger and specific nutrient gaps). The selection process specifically looked at the following aspects for each commodity: (i) currently inadequate or only seasonal consumption so there is scope for increasing consumption to address nutrition problems; (ii) familiar to the household (i.e. a significant number of households consume the item, showing high acceptability and potential for wide impact); (iii) rich in nutrients likely to respond to the identified nutrient gaps; and (iv) potential to empower women (i.e. women are involved in production or processing so the commodity has the potential to improve nutritional status through effects on women's use of time or their health, or on gender empowerment more generally). If a commodity scored "high" or "medium" overall against these criteria, it was then further assessed for market and income potential.
2. **Market potential** – if (i) demand for the commodity is high (considering national and international as well as local markets) or there is a reasonable possibility of creating an attractive market for that commodity; (ii) local supply cannot consistently meet demand; and (iii) seasonal price fluctuations are high, again implying supply is not able to meet demand during certain periods.
3. **Income generation potential for smallholders** – if (i) producers can respond to market demand at a profit, taking into consideration costs of production as well as related costs, such as those of processing, storage and transport; (ii) the commodity has a higher market price than other items; and (iii) current producer production patterns and techniques can be optimized. The selection process also considered whether or not there was potential for a substantial number of smallholders to be involved in production of the commodity.

<sup>5</sup> In the study, findings were disaggregated by agroecological zone because food systems vary by zone.



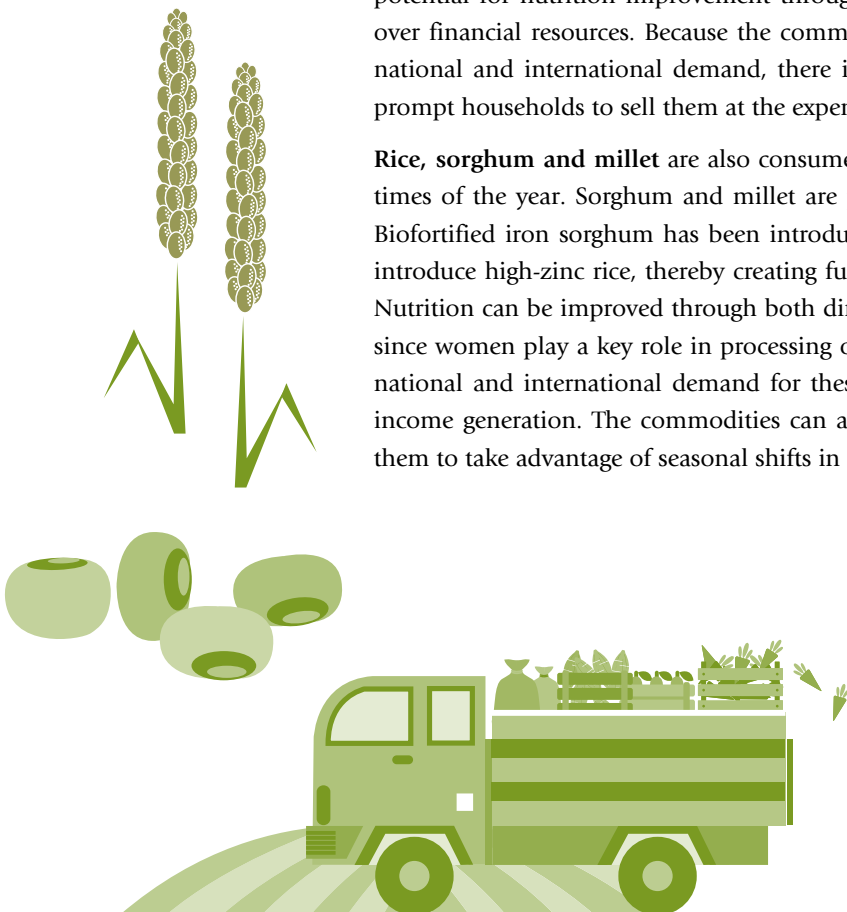
### Commodities with potential across criteria

Legumes, chicken eggs, cow's milk and cheese, and several dark green leafy vegetables were found to have *high* nutrition improvement potential, whereas meats, fruits, cereal grains, sweet potatoes and other vegetables had *medium* nutrition improvement potential. Even when these commodities scored well in terms of the other aspects of the criterion, they scored lower because of the currently limited involvement of women in their production or processing. When it came to market and income potential, there were some surprises. First, although several vegetables and fruits had high nutrition improvement potential, very few of these commodities were found to have a high market demand or were likely to be profitable for farmers. Animal foods likewise did not have high market and income generation potential because of a lack of the infrastructure needed for regular sales and storage; because households generally consider livestock to be assets rather than something commonly sold on the market (typically sold as live animals in distant markets that are not regularly frequented by many households); and because, related to the previous consideration, demand is limited.

In the end, six commodities emerged as having good potential when evaluated against all criteria.

**Cowpea, groundnut and soybean** are able to address key nutrient gaps, but are generally considered cash crops and are currently infrequently consumed by households (either seasonally or in small amounts). They can be stored for a long time and frequently fetch a good income for farmers. Women are heavily involved in processing, so there is also potential for nutrition improvement through women's empowerment and greater control over financial resources. Because the commodities are seen as cash crops with large local, national and international demand, there is, however, a risk that further promotion will prompt households to sell them at the expense of their own consumption.

**Rice, sorghum and millet** are also consumed in inadequate portions, especially at specific times of the year. Sorghum and millet are produced mainly for household consumption. Biofortified iron sorghum has been introduced in the country, and efforts are ongoing to introduce high-zinc rice, thereby creating further opportunities for nutrition improvement. Nutrition can be improved through both direct consumption and women's empowerment, since women play a key role in processing of these commodities. There is significant local, national and international demand for these commodities, so there is solid potential for income generation. The commodities can also be stored fairly easily by farmers, enabling them to take advantage of seasonal shifts in prices.



## Key findings 3: What are the constraints and opportunities for developing the selected value chains from a nutrition perspective?

Value chain analyses were carried out for sorghum and millet (staples), groundnut, cowpea and soybean (legumes). Rice was not selected because the CASP project does not work with this commodity in Katsina and Sokoto. These analyses considered standard value chain issues but also used a nutrition lens to identify points of entry and actions to promote good nutrition at all stages of the value chain. As suggested in figure 1 and presented specifically for the selected commodities in the tables below, such analyses consider constraints and opportunities related to food supply and demand in addition to nutrition value, which encompasses issues of nutrient content, food safety, and food loss and waste.

Increasing the consumption of just one food will generally not make much difference to nutritional status. An underlying consideration in developing nutrition-sensitive value chains, therefore, should be the development of multiple chains that can ultimately lead to a more diverse food system of available and affordable foods that can provide the basis for healthy diets.

Opportunities for CASP and NSVC lie in supporting farmers to increase their production of these commodities so that marketable surplus is available year-round. This implies also improving processing and market linkages, complemented by sensitization to make some foods and food combinations more attractive to the consumer. In this way, the local food system itself is strengthened to provide healthy diets.

Highlights of value chain analyses for the selected commodities are given below. Findings are categorized according to whether they relate to supply or demand. In addition, three main types of constraints and opportunities related to nutrition value were identified:

- “Critical loss points” in the value chain where food losses have the greatest impact on food quantity and quality, caused by, for example, climatic variations as well as handling practices
- “Critical food safety points” where processing, handling of raw materials, storage and preservation methods, packaging and transportation to markets may create food safety hazards (mainly in cowpea and groundnut value chains)
- “Critical nutrition value points” where nutrition value could be enhanced or retained, for example through biofortification.

### Main types of value chains

The research identified three main types of value chains: traditional, semi-commercial and commercial. The first type involves traditional ways of linking smallholders to markets. In traditional (usually short and mostly local) value chains, the commodity moves from the farmer to local processors (mostly home-scale and women) and back to local markets (local vendors, village markets, etc.) that serve rural consumers, primarily small-scale producer households. In semi-commercial value chains, small and medium-sized processors, including women's groups, source their raw material directly from the producers or from local markets. They mostly cater to non-producer consumers, although they may also sell their products on to industrial processors, who are in the third, commercial, value chain. In commercial value chains, producers sell to local aggregators who take the produce to local markets where agents, dealers, middlemen and direct customers come together. From there, the produce goes to other buyers, including to industrial processors or even to those in the semi-commercial chain. Industrial processors either export or sell through retail outlets to serve urban consumers. From a nutrition and local food systems viewpoint, the first two types of value chains appear to have more "direct consumption" potential, as the commodity stays in the area. The larger markets associated with the commercial value chain may hold potential for greater income gains.

### Constraints and opportunities in increasing supply, demand and nutrition value

#### Sorghum value chain analysis summary

##### Supply

- Farmers produce sorghum primarily for home consumption. They are interested in increasing production to have a marketable surplus and generate income.
- Farmers use own saved seed. The shortage of improved varieties also hampers production increases.
- Because of limited problems with pests, no chemicals are used, generating benefits in terms of reduced cost and food safety.
- Sorghum is amenable to different processing technologies that offer different marketing options, such as fermentation, malting, wet and dry milling, boiling, roasting and popping.
- Opportunities exist to introduce time-saving technologies for hulling and milling to save time for women.

##### Demand

- Red and yellow sorghums are used for animal feed and human consumption; households already use sorghum for some traditional items in their daily meals.
- White sorghum can be processed into malt and therefore offers new product options.
- Sorghum is a key crop in the Federal Government's Agricultural Transformation Agenda. There is high local, national and international commercial demand (for example from breweries and large flour processors).
- Increased demand, particularly for yellow sorghum, may have a negative impact on consumption, as producers sell their product for income rather than consume it.
- Because sorghum is gluten-free, opportunities for baking may be limited; but traditional recipes exist and can be promoted and the market potential for gluten-free products can be explored.



### Millet value chain analysis summary

#### Supply

- Traditionally grown by smallholders for food security.
- Farmers use own saved seed, which has low yield and low nutritional value. Production has a limited market. There is a severe shortage of improved varieties.
- Whole-grain milling is preferred in order to retain micronutrient content.

#### Demand

- Millet is important to household consumption and smallholders are reluctant to risk household food security. They sell only after household needs are met. Value chain interventions will thus need to look at increasing production.
- Like sorghum, millet is gluten-free, potentially limiting commercial demand for baking products; but traditional recipes exist and can be promoted and the market potential for gluten-free products can be explored.

### Cowpea value chain analysis summary

#### Supply

- Considered by farmers a valuable cash crop so may be less attractive for increased consumption by farmers themselves.
- Nigeria is a leading producer of cowpea, with most production in northern states, including Katsina.
- Food loss occurs because of pest attacks.
- High levels of pesticide use and unsafe storage practices can create food safety issues.
- A United States Agency for International Development (USAID) upscaling programme is in place for community-based seed production, which can help address seed shortage.
- Better processing may help to make cowpea easier to digest for children, thereby making it more attractive to mothers.

#### Demand

- Households have several traditional recipes that use cowpea, so there is high local demand.
- Traditional cooking methods (soaking and overcooking), however, can lead to nutrient losses.
- Cowpea is often seen as a poor person's food, so sensitization may be needed to generate more demand.
- Households are aware of nutritional properties but feel they cannot afford to consume more. Increasing income is therefore important to increase demand in non-producer households.
- Institutional buyers also exist, but smallholders will need to depend on market intermediaries to access markets beyond the farm gate.
- Preference for varieties differs by agroecological zone, offering opportunities to market different varieties.

### Soybean value chain analysis summary

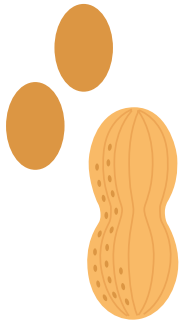
#### Supply

- Like cowpea, soybean is mainly grown as a cash crop, so it may be less attractive for increased consumption by farmers themselves.
- No chemicals are needed for production, so food safety hazards are limited.
- Mixed cropping, for example alternating soya with maize, cowpea or sorghum, allows smallholders both cash and food crop options.

#### Demand

- Soybean is not popular for direct consumption, as it takes longer to cook (and therefore needs more fuel than other foods) and has a strong odour. Nevertheless, soy cheese is eaten as a snack, and soy milk is given to children.
- There is substantial demand from the animal feed and poultry industry, which is not met by domestic production.
- As with cowpea, households are aware that soybean is nutritious but feel they cannot afford to increase consumption.
- Prolonged soaking and cooking reduces nutrient value.





### Groundnut value chain analysis summary

#### Supply

- Households have a preference for local varieties, but these have low yields and are prone to contamination from aflatoxin.
- Improved commercial seed is available, but it is expensive and in short supply. The 'groundnut upscaling programme' financed by USAID has formed seed producer groups and has approval from the National Agricultural Seed Council (NASC) to produce Quality Declared Seed.
- Sun-drying of peanuts, which is common, accelerates rancidity.
- The quality of water used for cleaning or processing can pose hazards to food safety.

#### Demand

- As with other commodities, households appear to be aware of nutritional value but cannot afford to purchase more.
- Producers are unaware of the effects of consuming aflatoxin-contaminated products.
- Groundnut is a popular snack, so greater consumption can be readily promoted.
- Women are knowledgeable about and interested in oil and *kuli* (a traditional food) processing.
- Medium-scale oil processors in Katsina and Kano are willing to buy groundnut directly from farmers.



## Key findings 4: Which interventions support nutrition-sensitive value chains?

The interventions proposed for developing more nutrition-sensitive value chains for these commodities respond to the challenges and opportunities identified in the value chain analysis, within the framework of the CASP project.

The proposed interventions described below are categorized into two types: general interventions that are relevant to several value chains and interventions that are more relevant to specific value chains (see page 20). Some interventions focus on supply while others focus on demand; both are important, since potential innovations in supply need to be backed up by others that affect demand, to ensure there will be a market for more nutritious products. In line with the NSVC framework, interventions to improve nutrition value are found in both supply and demand interventions.



## Potential interventions across value chains

### Supply interventions

- **Support smallholder extension services and complement them by providing development opportunities for agro-dealers.** Smallholders can be trained by qualified and independent agents on the judicious use of fertilizers and chemicals in ways that ensure human and food safety. This would help to overcome the current lack of reliable information on the use of agrochemicals. Smallholder extension should also include training on post-harvest handling, storing, processing and marketing, and on choosing crops for nutritional value and resilience in the face of climate change. Actions could also link to USAID-financed programmes that encourage community-based seed production. Improved extension services are especially critical to encourage smallholders to adopt improved seed varieties, which often need more technical support and inputs. Such services should be sure to reach and empower women.
- **Improve access to capital, especially for women and young people.** For example, community-based microfinance institutions could be supported to reach these important target groups, with an emphasis on institutional strengthening in order to create trust and reduce the risk of defaults or exploitation. Linkages to banks or other financial entities could be facilitated for local small and medium-sized enterprises, such as processors.
- **Link smallholders with commercial processors for mutual benefit.** Interventions can support existing producer groups to help them aggregate produce and bargain with buyers. Contract farming can be promoted through formal agreements that also stipulate standards for quality and delivery. If trusted third parties productively facilitate arrangements between smallholders and other value chain actors, it can ensure that smallholders get a profitable and reliable return on their investment; that they can access financial institutions and credit; and that buyers are confident of receiving a quality product in a timely fashion. Commercial processors can help smallholders procure their preferred varieties of seeds and can provide credit for inputs. Better linkages with local markets should also be promoted in order to ensure that nutritious products are available to local consumers.
- **Increase availability of improved seed.** The NASC could expand its efforts in producing approved Quality Declared Seed through community-based groups of men and women farmers. These could include varieties resistant to pests (for cowpea), aflatoxin (for groundnut) and drought (for sorghum, millet and soybean). Agricultural research could ideally further enhance the nutritional benefits of common varieties. Local varieties should be promoted based on considerations of their nutritional value, yield and resilience, and other considerations of production and marketability.
- **Improve access to appropriate production and processing technologies.** Working with service providers, interventions can target and promote specific technologies that will improve production and processing efficiency. Attention should be paid especially to those technologies that reduce workloads, especially for women. For example, interventions could promote machines for groundnut crushing and oil extraction. This could be done through processor or other enterprise groups, particularly those for women and young people, rather than individuals. With regard to home-based processing, women's enterprise groups could be trained to make business plans. These actions are likely to stimulate demand for raw produce as well as processed products.




- **Reduce food loss and increase safety using improved storage facilities and practices.** Use of inexpensive storage facilities would help small-scale producers and processors store raw produce after harvest until prices rise, which is increasingly important as climate change makes the weather increasingly variable and renders traditional storage methods inadequate. Technologies should also consider how to manage food safety and preserve nutritional value. Free or subsidized distribution of PICS (Purdue Improved Crop Storage) or similar bags can help smallholders to safely store cowpea and avoid the use of dangerous chemicals.
- **Introduce food quality and safety standards for home-based processing and products.** Through extension services or other community groups, women's groups and other local processors can be made aware of hygienic practices for commodity and food preparation and storage in the home. Dialogue between stakeholders at the state and local government area levels should be encouraged to ensure that regulatory mechanisms take informal markets into account (in ways that make sense given food safety challenges and local capacities and needs).

#### **Demand interventions**



- **Develop new products attractive to consumers to enhance demand.** For example, public agencies and private sector companies could work to develop high-quality complementary foods for young children based on locally produced mixes, for example a blended porridge mix. Pounded roasted groundnuts could serve as a natural fortifier for weaning foods. New snack and drink products, which combine legumes and grains, could be developed. Local women's groups could be encouraged to produce easy-to-make products in affordable sizes with enhanced nutritional value and taste.
- **Sensitize smallholders about the nutritional value of local crops and good practices, to promote good nutrition.** The nutritional value of local crops, especially legumes, may be underappreciated. They may not be used or they may be sold as cash crops rather than consumed at home. Raising awareness could increase demand and also improve the nutrition of household members.
- **Carry out behaviour change campaigns.** Building on linkages with state-level nutrition coordination committees, service providers can work to provide women's groups with information on (i) appropriate cooking methods, food combinations and recipes; (ii) good nutrition practices and nutrient requirements of different members of the household, especially infants and young children and adolescents; and (iii) how to maintain dietary diversity throughout the year. Awareness and action can help smallholder families avoid nutrient losses and obtain the maximum nutritional value from their foods through appropriate cooking methods, food combinations and "natural home fortification". For example, cooks can add cowpea and groundnut to local recipes for porridge, breads and sauces. They can shorten soaking times to avoid washing out nutritious vitamins and consider shorter cooking times and use of steaming. For millet and sorghum, whole-grain milling can be promoted to retain micronutrients. Behavioural change campaigns could create awareness about the dangers of consuming unhygienic products, such as those contaminated with aflatoxin. Such campaigns should consider that the dietary needs of household members can vary and that intrahousehold dynamics and gender relations can affect nutrition-related decision-making.

## Potential interventions for specific value chains

### Potential interventions along specific value chains

INTERVENTIONS		
Commodity	Supply	Demand
<p>Cowpea</p> 	<ul style="list-style-type: none"> <li>Explore use of improved high-yield varieties developed for different agroecological zones.</li> </ul> <p>Also nutrition value:</p> <ul style="list-style-type: none"> <li>Sensitize smallholder producers to the dangers of unregulated chemicals when storing cowpea.</li> <li>Promote safe storage practices, such as use of PICS bags and improved hygiene.</li> <li>Promote pest-resistant varieties to reduce loss.</li> <li>Explore use of biofortified varieties as they are developed and released.</li> </ul>	<p>Also nutrition value:</p> <ul style="list-style-type: none"> <li>Marketing campaign to address image of cowpea as poor person's food.</li> <li>Promote cowpea's high protein value, especially when combined with cereals.</li> <li>Promote demand for food combinations with increased nutritional value (for example adding cowpea to <i>fura</i>, a local beverage made out of millet; and other local recipes, including for porridges, breads, cakes and sauces).</li> <li>Promote adequate cooking methods to reduce nutrient losses caused by oversoaking and overcooking.</li> </ul>
<p>Groundnut</p> 	<ul style="list-style-type: none"> <li>Promote drying in the shade for reduction of rancidity and longer shelf life.</li> <li>Promote simple manual tests to check drying in unshelled pods.</li> </ul> <p>Also nutrition value:</p> <ul style="list-style-type: none"> <li>Make sure that groundnuts are dried well and introduce safe storage facilities.</li> <li>Sensitize smallholders about aflatoxin risks, especially smallholders with potential to train others in their villages.</li> <li>In the short term, encourage state Agricultural Development Programmes (ADPs) to build smallholder capacities to reduce aflatoxin incidence in popular varieties such as SAMNUT 24 and 25. In the longer term, introduce aflatoxin-free SAMNUT 26, if commercially viable.</li> <li>Promote the use of clean water for cleaning or processing, for greater food safety.</li> </ul>	<p>Also nutrition value:</p> <ul style="list-style-type: none"> <li>Promote food combinations with increased nutritional value, for example add groundnuts (whole or crushed) to local recipes and complementary foods for porridge, breads, sauces and cakes.</li> <li>Carry out behaviour change campaigns to create awareness and promote action to take advantage of groundnut's high nutritional value while also noting dangers of consuming contaminated groundnut.</li> </ul>
<p>Sorghum</p> 	<ul style="list-style-type: none"> <li>Increase production to meet industrial demand while taking into account how to maintain home consumption (by producers who may divert their own consumption to their market or by other local consumers who may be price-sensitive).</li> <li>Promote labour-saving technologies for hulling and milling to free up women's time and reduce drudgery.</li> <li>Introduce drought-resistant varieties for better yields.</li> </ul> <p>Also nutrition value:</p> <ul style="list-style-type: none"> <li>Explore promotion of biofortified varieties.</li> </ul>	<ul style="list-style-type: none"> <li>Promote new sorghum flour products such as cookies and sorghum bread (<i>roti</i>).</li> <li>Promote easy-to-make recipes to promote sorghum and millet as staples instead of rice and wheat, which can be more expensive.</li> </ul> <p>Also nutrition value:</p> <ul style="list-style-type: none"> <li>Raise awareness that long soaking and overcooking result in loss of nutrients such as iron and zinc.</li> </ul>

## INTERVENTIONS

Commodity	Supply	Demand
<p>Millet</p> 	<ul style="list-style-type: none"> <li>Promote improved millet varieties, with faster maturity, drought resistance, three times higher yields and three times more iron.</li> <li>Promote labour-saving technologies for hulling and milling to free up women's time and reduce drudgery.</li> </ul> <p>Also nutrition value:</p> <ul style="list-style-type: none"> <li>Promote whole-grain milling for better iron and other micronutrient content.</li> <li>Explore use of biofortified varieties as they are developed and released.</li> </ul>	<ul style="list-style-type: none"> <li>Promote easy-to-make recipes to promote sorghum and millet as staples instead of rice and wheat, which can be more expensive.</li> </ul> <p>Also nutrition value:</p> <ul style="list-style-type: none"> <li>Introduce new mixed legume-millet snacks or products that have a high protein content.</li> <li>Raise awareness that long soaking and overcooking result in loss of iron and zinc.</li> </ul>
<p>Soybean</p> 	<ul style="list-style-type: none"> <li>Support efforts to improve production efficiency, reduce costs and increase supply.</li> <li>Explore potential to scale up production of nutrient-rich soy cheese and soy milk.</li> </ul> <p>Also nutrition value:</p> <ul style="list-style-type: none"> <li>Explore processing methods that prevent discoloration, which is associated with nutrient loss.</li> </ul>	<ul style="list-style-type: none"> <li>Tackle resistance to consumption of soybean: increase awareness, attractiveness and demand in coordination with nutrition communications about cooking time and ideas to mask odour.</li> <li>Improve production and promote increased consumption of products that are already known and consumed (such as soy cheese or <i>awara</i>) rather than introducing new products, which have a history of failure.</li> <li>Explore institutional markets such as school-lunch programmes for maize flour enriched with up to 20 per cent soybean flour.</li> </ul> <p>Also nutrition value:</p> <ul style="list-style-type: none"> <li>Promote awareness that oversoaking and overcooking wash out water-soluble vitamins and minerals – although longer soaking times can reduce cooking times and fuel use.</li> </ul>



## Conclusions

The findings here can offer some insights for other actors working to improve nutrition in Nigeria through development of NSVCs. CASP and other national stakeholders are already considering how to take up some of these findings. The experience also generated some general findings about how to carry out efforts to develop NSVCs.

**Employ a holistic NSVC approach.** A holistic approach provides project managers with comprehensive information to maximize a value chain project's contribution to nutrition beyond the nutritional value of the products themselves. For example, the food systems analysis in Nigeria helped to identify underlying gender roles, which also shape the differential access of women and men to different kinds of foods. With this information, managers can pinpoint possible strategies to shape the value chain to address nutrition-relevant gender gaps. The classification of value chain types into traditional, semi-commercial and commercial is another useful typology. In a commercial value chain, for example, the commodity may be more likely to leave the project area when sold. Mitigation measures may be needed to reinforce the own-consumption and income pathways.

**Carry out primary research as needed to fill information gaps.** In contexts such as those of Katsina and Sokoto, where there is little information on food systems and food consumption patterns at the level of the project area, primary data collection is vital to profile the context and understand challenges and opportunities. Primary research also supports analyses and interventions to be more context-specific, which is key for understanding how other cross-cutting issues, such as climate change and gender, can be incorporated. In the CASP context, for example, field observation highlighted the staple-based nature of local diets, which then influenced which crops were most promising for improving diet quality.

**Consider synergies and trade-offs.** The studies highlighted synergies across different dimensions, such as crops or products that can improve nutrition and at the same time be profitable, empower women and withstand climate changes. However, there may also be trade-offs, such as interventions and national policies that make commodities attractive as cash crops but, because of rises in prices or because the product is then exported from the area, have a negative impact on their consumption within the target areas. This kind of trade-off could be addressed through sensitization campaigns that encourage households to spend increased income on healthy foods or other items that improve nutrition. Another trade-off to consider is that greater income as a result of better and safer processing and storage could support the income pathway to improved nutrition, but, if prices increase, could have a negative impact on the affordability of the commodity to non-producing consumers or on companies or organizations, such as women's groups, that use these commodities as inputs into value-added businesses. On the other hand, greater efficiency in processing, transport and storage, with reduced losses, could result in lower prices to the consumer, while at the same time allowing higher prices to the producer, with a win for all.

**Mainstream more than nutrition.** This NSVC approach is useful not only for mainstreaming and improving nutrition, but also for taking climate change, environmental sustainability, gender empowerment and resilience into account. The analysis by agroecological zone, for example, is important to ensure that commodities can grow in prevailing environmental and climate conditions. The integration of gender into the analysis identifies the potential for women's empowerment along the value chain and also highlights where there may be opportunities and risks to the promotion of gender equity. This kind of mainstreaming across issues is important in a world where there is increasing recognition that multisectoral strategies are needed to address interconnected global problems, including climate change, environmental degradation and gender inequality, as well as nutrition.

**Promote processing, storage and food combinations for greater nutrition value.** This research highlights how promoting the consumption of new, more nutritious food combinations of existing commodities and improving processing and storage technologies offer key pathways for improving nutrition value. A number of the interventions identified here benefit women not only as consumers and as caregivers but also as entrepreneurs.

**Identify clear, mutually reinforcing pathways to tackle malnutrition.** Before embarking on any intervention, it is important to be clear about *how* to achieve adequate food intake and dietary diversity, all year round. The impact pathways of improved *income*, increasing *production for own consumption* and increasing the availability of more nutritious foods in the *market* offer three potential pathways, all of which must be combined with sensitization, awareness-raising and consideration of gender. These should, wherever feasible, be mutually reinforcing to promote change. Indeed, given the multisectoral nature of the causes of malnutrition, linkages with other sectors should be promoted to encourage the convergence of these efforts for better diets and better nutrition.

**Reflect on and adjust interventions.** As with all development interventions, an adaptive management approach is desirable, all the more so when working in a relatively new area such as nutrition-sensitive value chains. The multidimensional nature of malnutrition and the possible solutions need to be balanced with the economic returns essential for successful smallholder participation in value chains. Finally, trade-offs and risks across dimensions of income generation, environment, gender and sustainability, and resilience of livelihoods as well as nutrition, need to be taken into account. Research gaps may emerge and require study to ensure that actions are effective and evidence-based.

### **Note**

The findings in this publication are based on technical reports by FBFI and KIT. A working paper that develops the NSVC Framework in more detail, "Nutrition-sensitive value chains from a smallholder perspective: A framework for project design", and a manual, "Nutrition-sensitive value chains: A guide for project design", based on field experiences in Indonesia and Nigeria, are also available. All documents are accessible on the IFAD website, [www.ifad.org](http://www.ifad.org).

It is hoped that this brief on the key findings in Nigeria, together with the manual, will stimulate interest and action on the part of relevant stakeholders in the country and beyond.





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