



Investing in rural people

DEVELOPING NUTRITION-SENSITIVE VALUE CHAINS IN **INDONESIA**

Findings from IFAD research for development

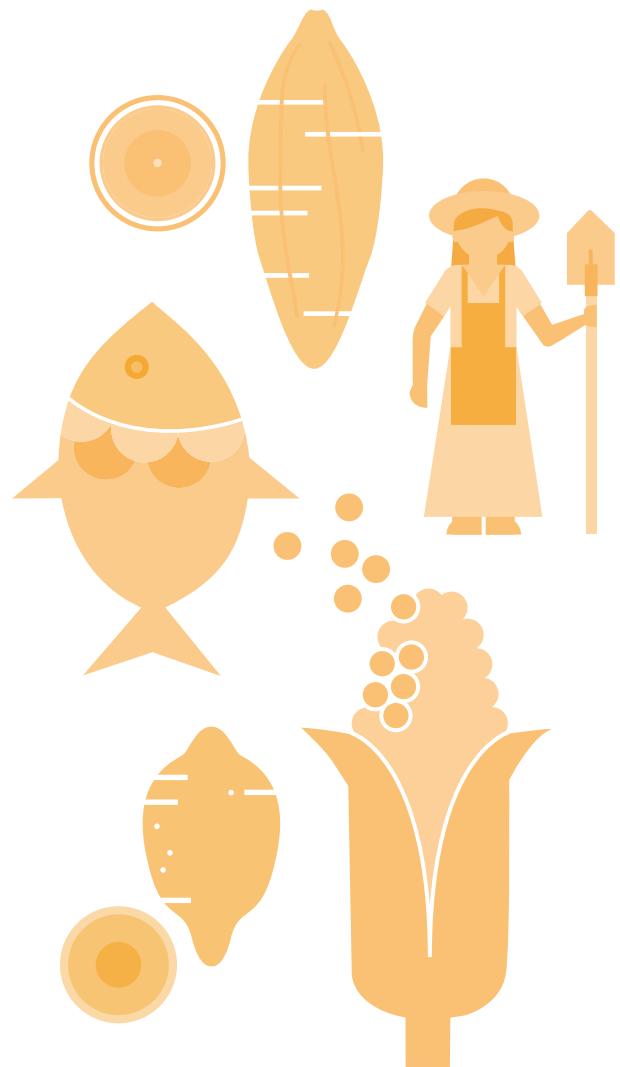




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Summary



In Indonesia's eastern Maluku and North Maluku provinces, malnutrition levels are high. Nutrition challenges include monotonous diets with inadequate levels of energy, micronutrients and protein. Studies commissioned by IFAD suggest that strengthened value chains for foods such as bananas, cassava, maize, spinach,

sweet potatoes and fish could make business sense for smallholders and lay the foundations for a strong local food system that sustainably delivers nutritious foods for healthy diets.

With funding from the German and Canadian governments, IFAD recently carried out a set of studies 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 more likely to address nutrition problems. Investments that increase availability and affordability and promote consumption of nutritious foods, including biofortified or under-consumed varieties; provide extension services as well as nutrition education and behaviour change communications; and improve efficiency of market links and processing could increase incomes of women and men, reduce food losses and increase food safety, while also improving nutritional outcomes, largely through improved diets. Interventions that span multiple value chains can help to diversify and improve the overall quality of the diet.



IFAD nutrition and value chain research in Indonesia



A value chain approach can be a useful way to analyse and navigate the complexity of the food system to improve food security and nutrition outcomes. It can also help to identify entry points for policy interventions, investment decisions and capacity development. The traditional focus of value chain development has been on increasing economic value. Nutrition-sensitive value chains (NSVCs) leverage opportunities to enhance nutrition value as well, by increasing the supply of and demand for safe and diverse food and adding nutrition value, for example through promotion of biofortified crops or minimizing nutrition losses with improved transport and storage.

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

In Indonesia, IFAD worked with the Smallholder Livelihood Development project, or SOLID, in Eastern Indonesia, which is being implemented by the Food Security Agency under the Ministry of Agriculture. The project aims to improve the well-being of people in the target districts of Maluku and North Maluku provinces by increasing incomes and food security.

Studies applying the proposed approach were carried out by SNV Netherlands Development Organisation-Indonesia and the International Center for Tropical Agriculture (CIAT). Data showed that project areas in both Maluku and North Maluku face significant nutritional challenges, including poor quality diets. Project households could reap important nutritional and livelihood benefits from developing value chains in commodities such as bananas, cassava, maize, spinach, sweet potatoes and fish. The studies suggested that production and marketing of these foods can make business sense for smallholders while at the same time helping to improve diets and make the local food system more nutritious. From additional analyses and consultations with key stakeholders, the studies identified interventions that could be incorporated into the design of the projects that were part of the study or future projects. These included interventions aimed at improving the supply and demand for these nutritious foods, as well as enhancing their basic nutrition value and reducing loss and waste. These investments can make diverse, safe foods more available and affordable to the project population, while also increasing incomes.

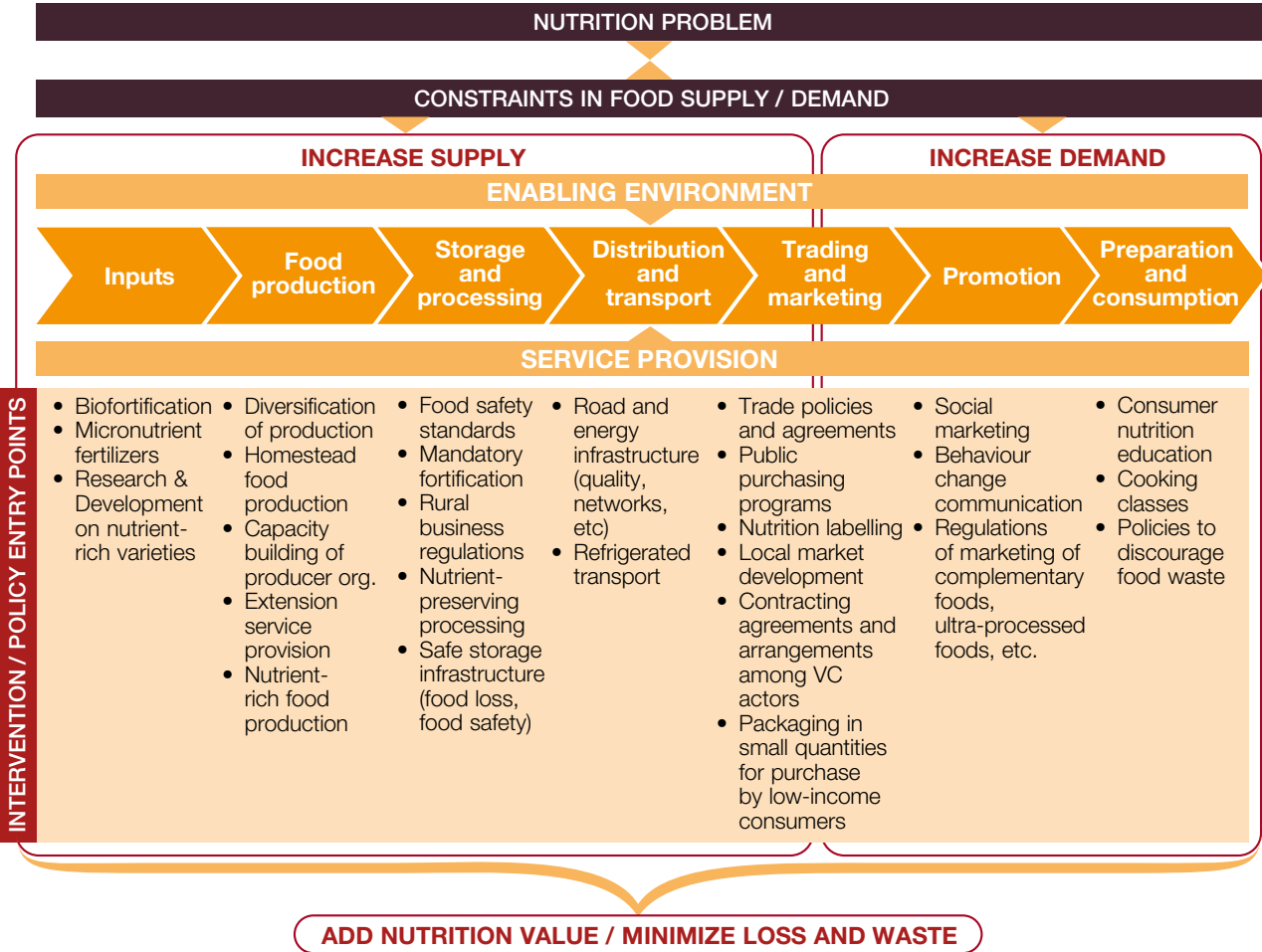
The findings were developed specifically within the SOLID project context, but are also potentially of broader interest to all of those involved in agriculture and nutrition, including policymakers, practitioners, producer organizations and development agencies. Since nutrition is multidimensional, these findings are also of interest to those involved in health, education, environment, infrastructure and community planning, as well as those working for gender equality, women's empowerment and child protection.

Making value chains nutrition-sensitive

To address today's nutrition and food security challenges, there is a need to improve how food is produced, processed, distributed, marketed and delivered to consumers. This series of actions together makes up a value chain. By analysing each of these actions along the value chain for a commodity, project design can address these challenges and shape the value chain to respond better to nutrition problem (largely through improved diets).

Such a nutrition-sensitive value chain (NSVC) approach makes a clear link between nutrition problems in target populations and possible constraints in supply, demand and nutrition value (Figure 1). Specific policies and interventions can enhance supply by increasing the availability and affordability of nutritious foods while also raising incomes of project beneficiaries; promote demand, including that of beneficiaries; and add nutrition value or minimize nutrition losses through, for example, use of biofortified crops or activities to address food loss, waste and safety. Figure 1 provides some illustrative examples.

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



Impact pathways

Policies and interventions have their effect on the nutrition of project beneficiaries (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 the household to purchase food of higher quality and in more appropriate quantities. Project interventions may also catalyse improvements in the food environment. Improved efficiency, for instance, helps to make more, and more diverse, foods available in the *market* at reduced prices. This pathway benefits consumers, including project beneficiaries, who purchase their food. Households that produce the nutritious foods may also consume out of their *own production*. Nutrition awareness and knowledge are also needed to ensure that higher incomes or more nutritious foods on the farm or in the market translate into better diets and, consequently, better nutrition for everyone.

At the same time, projects should work towards empowering women. That is because women are key to the success of all the actions just mentioned to improve nutrition outcomes, as a result of gender roles that are typically associated with care and food provision, including production and marketing, as well as their biological roles as mothers.

The research project approach

A systematic approach was developed to apply this framework 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 also address diet-based nutrition problems. The steps¹ are (Figure 2):

1. Identify the nutrition problem (e.g. gaps in nutrient intakes related to food consumption patterns).
2. Select commodities that can address the nutrition gap 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: Key steps for design of nutrition-sensitive value chain projects



¹ In Indonesia, working with SOLID, the first two steps were carried out by SNV and the second two by CIAT.

Key findings 1: What are the nutrition challenges in Maluku and North Maluku?

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

Nutrition challenges

Malnutrition is a complex condition that can involve multiple, overlapping deficiencies or excess of nutrients. In Maluku and North Maluku rates of child undernutrition are somewhat higher than in Indonesia on average, and rates of overweight in children are lower. While 37 per cent of Indonesian children 0 to 2 years of age are stunted,² rates of stunting in Maluku and North Maluku surpass 40 per cent. Rates in some districts reach 60 per cent. Rates of acute malnutrition³ are 16 per cent in Maluku and 12 per cent in North Maluku, close to the Indonesian average of 12 per cent. Rates of overweight children are lower, at 6 to 7 per cent in these provinces, while the national rate is 12 per cent. With such alarming levels of malnutrition, children in these provinces face long-term limitations to their potential physical and intellectual development.

Women are another particularly vulnerable group. As measured by Body Mass Index (BMI), women in Maluku tend to be less well-nourished than those in North Maluku or Indonesia as a whole. Thirteen per cent are thin (BMI <18.5) in Maluku, whereas 8 per cent are thin in North Maluku and 10 per cent in Indonesia overall. Using mid-upper-arm circumference (MUAC), 34 per cent of pregnant women in Maluku and 25 per cent in North Maluku are at risk of chronic energy malnutrition (MUAC <23.5 cm). This contributes to poorer pregnancy outcomes and, in the longer term, to more undernourished children.

Dietary patterns in Maluku and North Maluku

The causes of malnutrition are multiple, cutting across sectors (food, health, and care) and levels (individual, household, community, society). As noted in the previous section, the most significant contribution of NSVCs will be through improving diets by increasing the availability, affordability, acceptability and safety of nutritious foods. Findings from the studies suggested that, in general, people in the project area, especially young girls and pregnant women, have diets that put them at risk. These diets are characterized by limited energy and protein intake and micronutrient deficiencies. Key food consumption challenges include:

² Stunting, or chronic malnutrition, is measured by low length- or height-per-age.

³ Wasting, or acute malnutrition, is measured by weight-for-height, or -length.

- Energy intake is below the recommended daily allowance (RDA). Adolescent girls consume less than 65 per cent of their RDA. Infants do not receive the complementary foods they need.
- While average daily protein intake generally compares well with the rest of Indonesia, protein appears to come mainly from fish alone, so populations with limited consumption of fish are currently at risk.
- Dietary diversity is limited, even for families living close to markets. Consumption of vegetables and fruit is low. Consequently, micronutrient deficiencies (vitamin C, vitamin A, and calcium, for example) are prevalent.
- Deficiencies caused by not consuming enough micronutrient-rich foods are probably compounded by micronutrient loss during food storage and preparation.
- Hygiene and other factors, such as lack of safe drinking water and high open defecation rates, also contribute to malnutrition.

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

Once the dietary challenges were identified, the next step involved applying a set of filtering criteria to identify and prioritize which commodities could potentially address the nutrition gaps, while also making business sense for a value chain project investment. The first set of criteria assessed the potential for a commodity to address the identified nutrition problems and improve nutrition, basically through improving dietary quality. Two additional sets of criteria looked at the potential market demand for the commodity and for engagement with the value chain in order to raise incomes for the project's smallholders. The analysis also took into account gender, environment and institutional issues relevant for NSVC development.

Nutrition improvement: Coming up with a shortlist

The nutrition improvement criteria were applied to an initial list of 66 commodities, resulting in a shortlist of 15. These criteria looked at the extent to which potential commodities (a) contribute to addressing identified local nutritional deficiencies, including their potential to improve nutrition value through processing; (b) contribute to the dietary diversity of target communities; (c) are available locally; and (d) are familiar, and so more likely to be acceptable, to local communities (thus easing increase in demand, if needed). The initial shortlist included cassava, maize (corn), sea fish, chicken, chicken eggs, spinach, groundnuts, papaya, bananas, mangos, cabbages, tomatoes, carrots and coconuts. Table 1 gives an example of how the criteria were applied to potential commodities.

Additional considerations: Economic, business, gender, environmental and institutional aspects







The economic aspect is an important one for value chain assessment, since any commodity chosen for promotion by the project needs to make business sense to the producer. Foods were assessed according to whether they (a) are locally grown; (b) have potential to increase incomes; (c) can be grown on a greater scale; (d) have the possibility for value addition through processing; (e) can create employment; and (f) are likely to have market demand. The underlying question was not simply whether there was an existing market but rather "what potential is there in the future?" and "how can smallholders participate?"

Women's empowerment is widely acknowledged as a key factor in both increasing agricultural production and in tackling malnutrition. Commodities were therefore also assessed against gender-related criteria, specifically the extent to which women are involved in production, processing and marketing.

Environmental assessments took into account how far local climate and agronomic conditions favour the production of potential commodities, and whether production would impact negatively or positively on the environment.

Finally, institutional assessments evaluated (a) policy support for potential commodities; (b) local norms or taboos regarding selected commodities; (c) quality of transport and accessibility; (d) access to production inputs; and (e) microfinance. Application of the second set of selection criteria and reflection with the implementing partners led to the final selection of commodities for the next step, which was to do a more in-depth value chain analysis to provide further information for project design. On review, sweet potato was added to this second list as well, giving a final list of six commodities. The aim was to refine the list to a manageable number for additional analysis, but also represent a variety of types of crops in terms of food consumption, production and marketing. The six commodities chosen for further analysis were cassava, sweet potato, maize (staples); spinach, bananas (fruit and vegetables); and fish (protein).

TABLE 1: Applying the nutrition improvement criteria: Selected examples

Potential commodity	Energy	Protein	Micronutrients	Contributes to further dietary diversity	Availability	Familiarity	Processing potential
 Fish	Very low	Very high	Vitamins A, B1, B6, B12	No	Very available	Very familiar	Can be processed (e.g., canned, salted)
 Banana	Low	Very low	Vitamins B6, C	No	Very available	Very familiar	Juiced or mashed
 Spinach	No	Very low	Vitamins A, B6, folate, C, iron, calcium	Yes	Familiar	Available	-
 Maize (corn)	Low	Low	Vitamin B3, folate	Yes	Available	Familiar	Can be processed into flour, fortified with vitamins
 Cassava (white)	Medium	Very low	Vitamin C	Yes	Very available	Very familiar	Can be processed and fortified, including through biofortification
 Cassava leaf	Very low	Medium	Vitamins A, B6, C, zinc, calcium	Yes	Very available	Very familiar	

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

Of the six selected commodities, the value chains for cassava, fish, spinach and maize were analysed in Maluku, while those for cassava, fish, sweet potato and bananas were analysed in North Maluku. These analyses considered standard value chain issues but also used a nutrition lens to identify points of entry and actions along all the stages of the value chain that could work to promote good nutrition. As suggested in Figure 1 and summarized specifically for selected commodities in the charts below, such analyses consider constraints and opportunities related to food supply and demand in addition to nutrition value, such as food safety, loss and waste. Many opportunities for SOLID lie in improving services for production as well as in better processing and market linkages.

Increasing the consumption of just one food will not make much difference to nutrition. An underlying consideration of development of nutrition-sensitive value chains, therefore, should be the development of multiple chains that can ultimately lead to a more diverse food system, with beneficial effects for diets.

Key issues: Value chain analyses for selected commodities

Bananas

Supply

Fresh bananas:

- Various banana varieties exist, with varying nutritional values
- While banana offshoots take a year to mature, fruits can then be harvested after only 3-4 months
- Producers use no inputs, do not weed
- Susceptible to undiagnosed diseases
- No extension services for banana production
- Men and women participate in marketing activities

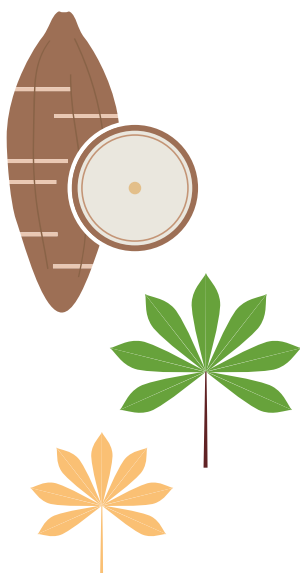
Processed bananas:

- Processing wholly conducted by women, including by women's groups supported by SOLID
- Products include banana chips, banana flour, syrup from banana leaves
- Other inputs are required, e.g. vegetable oil, flour, sugar, kerosene, plastic bags
- Poor packaging leads to loss and contamination
- No formal certification process so producers can only access informal markets
- Women do the marketing of processed bananas, e.g. selling fried bananas as snacks to schoolchildren
- Banana products sold to schools on credit and to traders

Demand

- Some varieties primarily eaten fresh as ripe bananas, others are fried after ripening
- Sweet bananas commonly fed to infants as a complementary food
- During the rainy season, banana production is high, so sales are low as almost every household has bananas; households consume more bananas at this time
- Farmers sell excess production within their villages to other households (mostly processed products, since most households have trees)
- Traders buy bananas from farmers and sell at the market or to other small traders





Cassava

Supply

Fresh roots and leaves:

- Widely cultivated for both consumption and income
- Almost all production is of low-cyanide “sweet” varieties; although some yellow cassava exists, white is more common and used for processing
- No extension services, use of fertilizers or pesticides
- Planting material comes from previous harvests: no cost but poor quality
- Fresh roots are highly perishable so can reach local or district markets only; piecemeal harvesting for on-farm consumption
- Low post-harvest losses, but also low yields and low value compared to transport costs
- Excess production may be sold via traders to district markets; one-off transactions rather than trader relationships
- Leaves are available year-round
- Sold both fresh and cooked in local markets and to neighbours

Processed products:

- Processed products sold in local or district markets
- Small-scale processing for both home consumption and sale
- Mainly manual processing (drudgery for women) for traditional recipes, only of white variety
- Process reduces cyanide content but also nutritional content
- MOCAF: a fermented cassava flour for bakery and other uses (wheat flour substitution): not economically viable and drying is a problem in rainy months

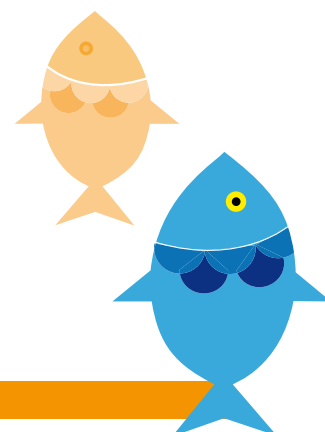
Demand

Fresh roots and leaves:

- On-farm consumption common by all household members but main demand is currently in local markets because of widespread production
- Cassava leaves are the main green vegetable consumed
- Food preparation methods can affect nutrient loss and levels of cyanide content
- Lack of formal studies or analyses of dietary role of cassava leaves

Processed products:

- Processed products consumed widely, e.g. *enbal*, a processed cassava product that is extensively consumed at all meals, often as a biscuit or waffle, and even more by poorer consumers. Other popular snacks and products include *swami* (cassava cake), *pentholan* fish balls (cassava flour and fish) and cassava chips



Fish

Supply

- Various varieties of fresh fish, including tuna; tuna is fished year-round but no cold chain exists
- Catches of anchovies and other fish are apparently declining
- Fishing is the main occupation in many coastal villages – up to 50 per cent of income, mostly from tuna
- Some boats lack motors so must remain in-shore
- Fisherfolk may have limited capacities and lack nets and equipment for some fishing, such as for anchovies
- Federation of fishing groups has links to buyers through company with local presence; purchasers have quality standards; contract fixes prices
- Processed fish also available, including through support by SOLID
- Inland villages access fish via traders but limited supply and higher prices during rainy season

Demand

- Household consumption is mainly of *cakalang* fish, not tuna
- High market demand; in inland communities demand is for fresh *momar*
- Lower consumption of anchovies because of lower availability
- Poor families may eat fish once a day

Maize

Supply

Sweet corn:

- Grown in small plots usually for consumption by the producer household; some sales in local markets
- No fixed planting time and no purchased inputs
- Good germination rates with little crop loss

Hybrid maize:

- Government promotion of hybrid maize production for cash among farmers, supported by input provision and extension services; programme may contribute to less land being dedicated to cultivation of other subsistence crops
- Small-scale processing (drying) for both home consumption and sale; slow drying in rainy season can lead to fungal and aflatoxin contamination

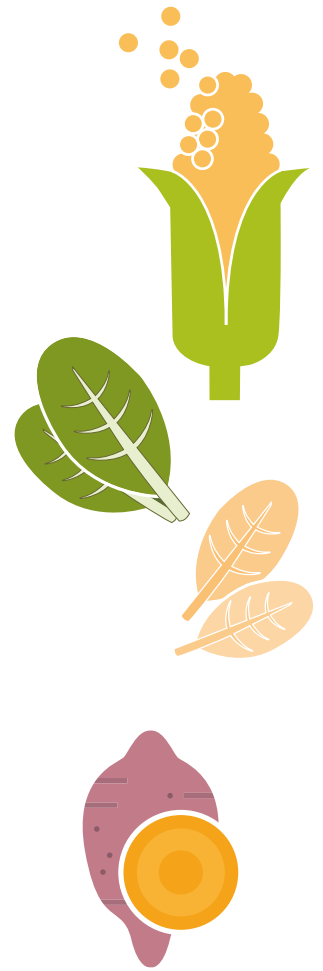
Demand

Sweet corn:

- Sweet corn sold fresh directly after harvest, but in local markets only, limited demand

Hybrid maize:

- Plan is for dried maize to be purchased by BULOG, a government logistics agency, but with no local presence or storage facility as of April 2017
- Very limited local demand, mainly for animal feed



Spinach

Supply

- Minor crop; green and red spinach mainly grown in Maluku
- Produced mainly for local sale; very little for the household's own consumption
- No extension service for spinach production
- Sprayed with pesticides as vulnerable to pests
- Sold immediately after harvesting, due to possibility for spoilage by rain

Demand

- Low demand by consumers, most of whom prefer local vegetables, e.g. cassava leaves
- Not economical to produce fresh spinach for transport

Sweet potato

Supply

- Sweet potato is widely produced, but orange-fleshed variety (OFSP) is not common, despite its higher nutrition value
- Planting material is of poor quality and root infections are common
- No extension service; no fertilizers or pesticides used
- Only family labour used
- Women process and market through on-farm and local village sales and also to traders for marketing to district markets
- On-farm production of fried snacks for local sales

Demand

- Widely consumed; leaves not eaten, despite nutrition value
- No local knowledge of nutrition value of sweet potatoes, or varietal differences
- No knowledge on where to get more improved planting material for various varieties

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 both challenges and opportunities identified in the analysis, within the framework of the SOLID project. The proposals developed as a result of the analysis were shared with a diverse set of stakeholders in two validation workshops.

The interventions proposed are presented in two categories: those for the value chains of specific commodities (summarized in Table 2), and those that cut across different value chains and address specific local nutritional deficiencies. Some interventions focus on supply and others on demand. Interventions that focus on increasing nutrition value can relate to either supply or demand and so are present under both columns.

Potential interventions across value chains

Interventions that span across different commodity value chains are identified below, and whether they relate to supply, demand or nutrition value is denoted by S, D or NV, respectively.

- 1. Carry out farm/village-level demonstrations of production, marketing and consumption of nutritious root crops, namely yellow-fleshed cassava and orange-fleshed sweet potato (S, D, NV)**

These varieties are more nutritious than the varieties currently preferred, therefore both supply and demand need to be addressed. The SOLID project offers specific opportunities for this through a collaboration with a local research institute specialized in roots and tubers, as well as training opportunities such as farmer field schools and farmer field business schools. Improved packaging and processing are also recommended to add value.

- 2. Formulate and carry out trials of complementary food for infants based on a nutritionally balanced combination of locally available foods (S, D, NV)**

The six commodities studied contain the range of nutrients required to produce a balanced complementary food for infants over six months of age. Root crops, bananas and maize can provide carbohydrates, fish supply the protein, and spinach, cassava and sweet potato leaves can offer minerals and vitamins. Potential formulations would be tested for nutritional adequacy and acceptability by infants and mothers. Several formulations may be needed to cover variations in availability of produce by location and season.

This intervention would need technical support from an institution with nutritional expertise, possibly through SOLID. Farmer business schools could be engaged to identify institutional markets such as health centre programmes, as well as direct marketing to local families with infants.

3. Develop and promote nutritional supplementary and snack foods for schoolchildren and young children (S, D, NV)

Similar to the previous suggestions, this intervention focuses on schoolchildren and preschoolers. The intervention could provide nutritious alternatives to the commercially produced and marketed snacks that are currently consumed. Alternative foods would need to be tested for nutritional content and acceptability. The SOLID project offers potential mechanisms, in terms of production and processing, which would involve and empower local women.







4. Undertake nutritional education and behaviour change communication campaigns (D, NV)

Without adequate demand for more nutritious alternatives, changing production has little value. This intervention would focus on building demand for the selected commodities, particularly in communities in SOLID locations. The approach should encompass various dimensions of consumption, such as food preparation methods and recipes to preserve nutritional values and promote food safety (e.g. eliminate cyanogens while minimizing nutrient loss in cassava). Women, especially pregnant women and mothers of infants, would be especially targeted given their roles in household food purchase and preparation. However, men and schoolchildren should also be targeted because they are consumers and can support or undermine efforts to improve nutrition. Nutritional information can also be included in the school curriculum, and activities might be funded through a village fund or take place in partnership with other government or NGO programmes.

5. Develop marketing of a variety of local products between villages (S)

While inland villages lack access to fresh fish, especially in the rainy season, many of the fishing villages lack a regular supply of fresh agricultural produce, particularly more perishable vegetables. Stronger market linkages could be developed between inland and coastal villages to address these gaps and make foods with a diverse but complete set of nutrients available. Potential mechanisms to enhance cross-market linkages include groups such as producer federations already organized by SOLID, which can work to increase market power and marketing capacity and press for improvement of transportation infrastructure.

TABLE 2: Potential interventions for specific value chains

INTERVENTIONS		
Commodity	Supply	Demand
Cassava 	<ul style="list-style-type: none"> Develop seed system to produce and distribute clean, quality planting material of high-yielding varieties with early maturity Pilot production of high-quality cassava flour as a small rural business in remote locations, as a possible product to compete with wheat flour Also nutrition value: <ul style="list-style-type: none"> Introduce/ promote biofortified yellow-fleshed varieties of cassava, which are rich in beta carotene (needed to produce vitamin A) 	<ul style="list-style-type: none"> Promote consumption of high-quality cassava flour in target communities Also nutrition value: <ul style="list-style-type: none"> Promote food preparation methods for cassava leaves that maintain nutritional value while eliminating cyanogens Promote consumption of yellow-fleshed cassava
Sweet potato 	Also nutrition value: <ul style="list-style-type: none"> Introduce/ promote biofortified orange-fleshed varieties, and produce quality planting material, especially of varieties with a short production period 	Also nutrition value: <ul style="list-style-type: none"> Promote awareness of nutrition value of OFSP and sweet potato leaves, and of nutrient-preserving food preparation methods Include value-added processed products, using OFSP where possible
Bananas 	<ul style="list-style-type: none"> Organize marketing at the village and community levels Also nutrition value: <ul style="list-style-type: none"> Improve disease and pest control to reduce loss and waste and increase the quality of fresh produce 	<ul style="list-style-type: none"> Improve processing and marketing of value-added products
Maize 	<ul style="list-style-type: none"> Explore engagement of SOLID with the hybrid dried maize programme, where justified (i.e. if there is clear income potential) Track effects on production by smallholders of other crops 	<ul style="list-style-type: none"> Track impacts on consumption by smallholders of other crops
Spinach 	Also nutrition value: <ul style="list-style-type: none"> Develop planting/harvesting schedules that are adapted to climatic conditions and to variability to reduce loss Improve pesticide management, including promotion of safe, affordable, organic methods Develop processed/dried product options to lengthen shelf life and open up value-added possibilities 	Also nutrition value: <ul style="list-style-type: none"> Promote consumption through recipes, training on health and nutrition benefits, etc.
Fish 	<ul style="list-style-type: none"> Upgrade fishing boats to enable more offshore fishing and so access more and different varieties of sea fish Reduce ocean pollution and maintain ecosystems for sustainable fish catches through use of environmentally friendly fishing methods and equipment Also nutrition value: <ul style="list-style-type: none"> Improve use of by-products and wastes, e.g. to generate fish feed for additional income Develop a cold chain to reduce waste and loss and improve food safety 	<ul style="list-style-type: none"> Further develop processed products that can reach new markets, such as a snack product for neighbourhood/village markets (schools, kiosks, health posts) Also nutrition value: <ul style="list-style-type: none"> Integrate awareness of nutrition value and preparation into village and national nutrition programmes (also for other commodities)

Conclusions

The studies summarized here have provided some insights and recommendations for the government, producers, businesses and other development actors, such as NGOs, about ways to improve nutrition in Indonesia through development of nutrition-sensitive value chains. These include:

Context-specific analysis and interventions matter. The nutrition assessment revealed that there are differences as well as similarities between national and local nutrition gaps. It is thus essential to be aware of local context if nutrition-sensitive value chain projects are to address local nutritional deficiencies and improve local diets. For example, promoting spinach may not be a useful strategy in an area with energy deficiency but good micronutrient consumption. Context and capacities will thus inform the overall analysis and ultimately the recommended interventions. Local context must also be taken into account when considering issues of climate change and gender. As a result, desk research should be complemented by site visits to get a good understanding of local context and so of challenges and opportunities.

Clear, mutually reinforcing pathways and interconnected interventions. Strategies and interventions need to support all stages of a clearly identified impact pathway. Actions should recognize the interconnectedness and interdependence of constraints and opportunities around issues of supply, demand and nutrition value. For example, making the value chain more nutrition-sensitive may be constrained by low nutrition awareness (demand) as well as by limited availability or affordability (supply and nutrition value). In addition, given the multi-sectoral nature of the causes of malnutrition, linkages with other sectors should also be promoted so as to encourage the convergence of these efforts for improved consumption. For example, a nutrition-sensitive value chain intervention could yield better outcomes if supported by other actors' investments in access to clean water and improved sanitation.

An enabling environment and holistic perspective. A systematic perspective that takes into account the dynamics of market systems and food systems as a whole and the role of an enabling environment is also essential. In this case, the proposed interventions were influenced by the profile of available technical and other expertise, as well as of a supportive policy framework. The interventions were also specifically considered within the range of opportunities provided through SOLID, and the specific production and institutional environment in which the producers affiliated with SOLID found themselves. Groups established by SOLID offered a ready organizational entry point and platform for many of the proposed interventions.

A need to reflect and adjust interventions. As with all development interventions, a flexible management approach is desirable – all the more so when working in a relatively innovative area such as nutrition-sensitive value chains. The multifaceted nature of malnutrition and possible nutrition-focused solutions need to be balanced against the economic returns essential for successful smallholder participation in value chain projects.

When trying to develop value chains that are economically viable and environmentally sustainable, while at the same time increasing access, availability and affordability of diverse, safe foods, trade-offs and risks need to be taken into account. Assessing nutritional benefits against environmental damage from current production strategies or against increased women's workloads due to higher production are two examples. Research gaps may emerge from the analyses as well. For example, based upon its work in the field, CIAT identified a need to explore consumer preferences and production strategies for new biofortified varieties of yellow cassava and orange-fleshed sweet potato that would adapt well to climate and soil characteristics in Maluku and North Maluku.

Development of NSVCs has the potential to raise incomes and also improve nutrition of producers and other actors along the value chain, as well as consumers in general. The approach described here is a shift from the traditional value chain approach, which focuses on production and demand alone, to one that starts by understanding the nutrition needs of consumers and relating those to dietary quality and the contributions that can be made by nutritious foods. An inclusive NSVC approach can take into account the needs of poor producers, address issues of environmental sustainability and gender empowerment, as well as unpack the complexity of food systems and identify entry points for action to maximize the contribution of food and agriculture to improved nutrition.

Note

The findings in this publication are based on technical reports by SNV and CIAT. A working paper that develops these concepts in more detail, "Nutrition-sensitive value chains from a smallholder perspective: A framework for project design," and a manual on "How to design nutrition-sensitive value chain projects," based on field experiences in Indonesia and Nigeria, are also available (see www.ifad.org). The manual is also being made available in Bahasa Indonesian.



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