FEED THE FUTURE
The U.S. Government's Global Hunger & Food Security Initiative

Food Processing for Improved Diets

USAID
FROM THE AMERICAN PEOPLE

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Acronyms

AINFP	Alliance for Inclusive and Nutritious Food Processing
CE	circular economy
FAO	Food and Agriculture Organization
GFSS	Global Food Security Strategy
LMICs	low- and middle-income countries
LSFF	large-scale food fortification
NCD	non-communicable disease
RFS	Resilience and Food Security
SMEs	small and medium enterprises
USAID	U.S. Agency for International Development
WHO	World Health Organization

Introduction

The goal of this brief is to help the U.S. Agency for International Development (USAID) and its implementing partners design and implement food processing activities for improved diets and nutrition. The sections that follow describe how food processing can improve diets, how it fits within USAID's multi-sectoral food security and nutrition strategies, and what to consider when implementing food processing activities to improve diets and nutrition.

Key Messages

Food processing—

- **is at the center of food supply and demand.** It can improve diets by linking production to consumption within the food system,[1] offering great potential to increase year-round availability and affordability of safe, nutritious foods.
- **can take a variety of forms**; contextual considerations are key to determining suitable foods and best approaches for processing in a given food system.
- when planned and executed properly, **can simultaneously enhance** diets, provide income generation opportunities, and promote resilience.

Background

What is food processing?

Almost all foods consumed are processed in some way. A processed food is "any food other than a raw agricultural commodity, including any raw agricultural commodity that has been subject to washing, cleaning, milling, cutting, chopping, heating, pasteurizing, blanching, cooking, canning, freezing, curing, dehydrating, mixing, packaging, or other procedures that alter the food from its natural state" (Dwyer et al. 2012). Food processing ranges from simple techniques used by individuals to large-scale industry operations that involve cutting-edge science and technology. Food items are classified according to the degree of processing.

The NOVA Food Classification System, for example, includes four primary groups:

1. unprocessed or minimally processed foods
2. processed culinary ingredients[2]
3. processed foods (created by adding salt, sugar, oil, or other to items in group 1 and 2
4. ultra-processed foods (Monteiro 2016).

Ultra-processed foodstuffs are marked by the addition of other ingredients (e.g., preservatives, flavors, nutrients, or other additives or substances, such as salt, sugars, and fats) (Dwyer et al. 2012; Martínez Steele et al. 2016; Monteiro et al. 2019). In countries where Feed the Future supports food processing, as of 2019, activities had focused on minimal processing of fruits and vegetables, grains, dairy, and legumes and processing of culinary ingredients. The most common type of processing in Feed the Future

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1 See the glossary near the end of this document for definitions of these terms: agriculture sector, circular economy, food loss, food system, food waste, lower-middle-income economies, processed food, ultra-processed food.

[2] 2 "Processed culinary ingredients" (2) include oils, butter, lard, sugar and salt. These are substances derived from group 1 foods or else from nature by processes such as pressing, refining, grinding, milling, and drying. They are rarely if ever consumed by themselves. They are used in combination with foods to make palatable, diverse, nourishing and enjoyable meals and dishes such as stews, soups and broths, salads, breads, preserves, drinks, and desserts" (Monteiro et al. 2019).

activities was drying, followed by milling, threshing, cold storage, and shelling (USAID Advancing Nutrition 2019).

Food Processing and Diets

According to the 2021 Food and Agriculture Organization (FAO) report *The State of Food Security and Nutrition in the World*, "the high cost of healthy diets and persistently high levels of poverty and income inequality continue to keep healthy diets out of reach for around 3 billion people in every region of the world." (FAO et al. 2021). In sub-Saharan Africa and Southern Asia, the double burden of malnutrition, the coexistence of undernutrition with overweight/obesity or non-communicable diseases, is highest. These regions host the majority of Feed the Future priority countries, where the initiative aims to improve diets and nutrition through policy and program efforts.

Box 1. Benefits of Food Processing

- Increase in product availability
- Improvement in consumer convenience
- Ability to tailor to specific dietary needs
- Improvement in food safety
- Increase in dietary diversity
- Ability to alter flavor and texture
- Ability to fortify and enrich new products
- Decrease in food cost
- Reduction in food loss and waste

**Adapted from EUIFC 2018: ABC on Food Processing*

These diet and nutrition challenges have spurred global and national responses. Recognizing the need for transformation in agricultural and food systems to sustain and expand gains made in global food security, the U.S. Government updated its Global Food Security Strategy (GFSS) 2022–2026 with elevated emphasis on food systems actions to improve diets. The GFSS puts affordable, healthy diets at the core of improving nutrition (USAID 2021b).[3] The GFSS recognizes that healthy diets are safe, diverse, balanced, based on nutritious foods, and help protect against malnutrition in all its forms. Healthy diets vary depending on an individual's characteristics; geographic, demographic, cultural contexts; food preferences; availability of foods from local, regional, and international sources; and dietary customs.

Rural markets consist primarily of perishable, minimally processed foods, such as animal-sourced foods and fruits and vegetables. These food items are expensive in LMICs, making it difficult for lower-income consumers to diversify away from nutrient-poor staples, such as corn and wheat (Headey and Alderman 2019). However, some evidence shows that low-income consumers are willing to pay a premium for high-quality, safe, nutritious foods and food products when available (Chege et al. 2019). While food processing in LMICs is predominantly done by small and medium enterprises (SMEs), large, industrially sophisticated processors, supermarkets, and fast-food chains have emerged over recent decades (FAO and WHO n.d.).

How Food Processing Influences Diets

The relationship between food processing and diets is complex; expanding the production of processed foods may play a role in both supporting and hindering food systems in delivering safe, nutritious diets. In regions of the world with high burdens of malnutrition—including both overweight/obesity, micronutrient deficiency, and undernutrition—food processing can be leveraged to improve diets and nutrition.

3 The GFSS contributes to United Nations Sustainable Development Goals and the 2030 Agenda, including several UN priorities referenced in the UN Food Systems Summit, the UN Sustainable Development Goals, and the 2030 Agenda for Sustainable Development.

Food processing can support healthy diets in several ways. Most foods require some kind of processing or preparation to make them attractive to consumers, and many food items are not edible without some degree of processing. Certain foods, such as grains, vegetables, meats, and fish, may be unpalatable in their raw state; flours and salts may be fortified with micronutrients; and some foods, such as cassava, are dangerous if eaten without processing (Fellows 2004). Foods that have been processed, for example, to remove harmful bacteria or apply safe packaging, can contribute to year-round availability, accessibility, and safety of diverse foods, in turn reducing the amount of food loss and waste and potentially decreasing carbon emissions (Weaver et al. 2014). Food packaging, including branding and labeling, also plays a role in marketing strategies where packaging may be designed to attract attention or provide information about the contents. Food packaging may increase convenience by making foods more transportable or enabling foods to be sold in a form that reduces preparation or cooking requirements, such as pre-chopped vegetables. In addition, food packaging may create opportunities to encourage healthy food choices by sharing nutritional information; however, packaging may also include misinformation such as unsubstantiated health claims.

Conversely, food processing may be a detriment to healthy diets by producing nutrient-poor foods such as sugar-sweetened beverages, instant noodle meals, and packaged salty snacks. Processing that reduces the nutritional value of food, or adds substantial amounts of additives like sugar, salt, and fat, increases the risk of weight gain, diabetes, high cholesterol, high blood pressure, stroke, heart diseases, cancers, and dental caries (Reardon et al. 2021). Current evidence shows that displacement of minimally processed or freshly prepared foods by ultra-processed products is associated with unhealthy diets, several diet-related non-communicable diseases, and increased mortality (Monteiro et al. 2019; Rico-Campa et al. 2019; Cliffer et al. 2019). Non-communicable diseases, or NCDs, are defined as chronic diseases resulting from genetic, physiological, environmental, or behavioral factors; the main types of NCDs include cardiovascular diseases, cancers, chronic respiratory diseases, and diabetes. Annually, three-quarters of global NCD-related deaths—31.4 million—occur in LMICs, with suboptimal diet as a leading preventable risk factor for mortality and disability-adjusted life years (DALYs) (WHO 2021; Afshin et al. 2019).

Similarly, food processing can impact food safety in both positive and negative ways. The handling of foods under inferior sanitation and hygiene conditions, including during processing, can contribute to foodborne illnesses and increased costs for health systems (Fellows 2004). Improving food processing standards and infrastructure can facilitate good hygiene practices and manage food safety threats (Cliffer et al. 2019). Standardized milk pasteurization is a key example of how processing can improve the safety of perishable foods (Monteiro et al. 2010). At the least developed end of the processing continuum, SMEs are generally ill-equipped to maintain food safety and quality in a sustained manner. Many food producers and handlers have limited knowledge and expertise in applying advanced agricultural practices, food hygiene, and good manufacturing practices[4] (FAO 2019). This results in potentially unhygienic environments, where the risk of contamination and adulteration increases, as many food processing SME units have inadequate facilities and infrastructure and lack the resources (e.g., safe water, electricity, finances) to address these issues (FAO and WHO n.d.).

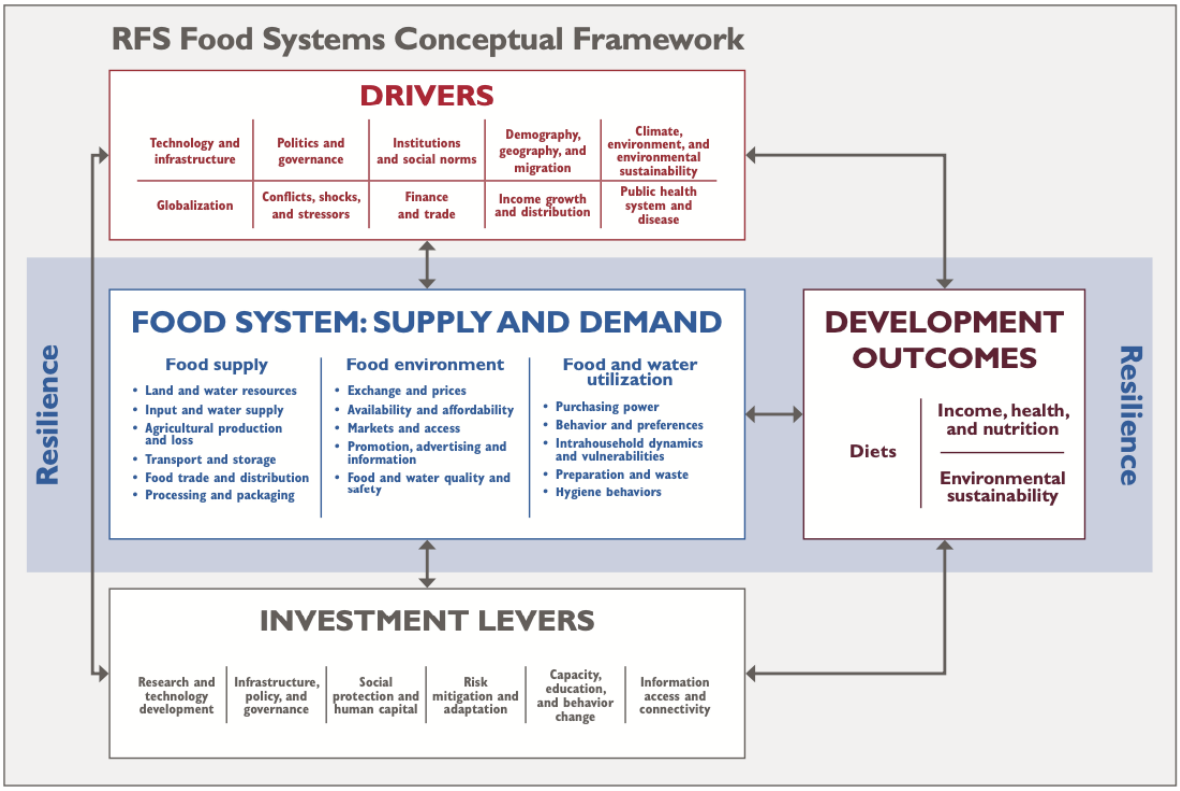
4 The role of good manufacturing practices (GMPs) in food industry success is critical—they help food and beverage companies maintain food safety and quality while increasing their productivity. GMPs describe the methods, equipment, facilities, and controls for producing processed food. As the minimum sanitary and processing requirements for producing safe and wholesome food, they are an important part of regulatory control over the safety of a nation's food supply (www.fda.gov).

Food Processing within U.S. Government Guidance for Food Systems Actions

The GFSS emphasizes a food systems approach for improving global food security, working across its objectives related to agriculture-led growth, improved resilience, and nutrition to support the production, affordability, and marketing of safe, nutritious foods that improve diets. The GFSS highlights food processing at the commercial and household levels as part of its approach because of its potential to increase the supply of safe, nutritious foods year-round (USAID 2021b).

As depicted in USAID's Bureau for Resilience and Food Security (RFS) Food Systems Conceptual Framework (figure 1), food systems comprise complex, interrelated elements that function collectively to produce outcomes, most notably diets (USAID 2021a).[5] To achieve sustainable outcomes across the food system, actions must focus on the system as a whole, including actors, their relationships, and incentives.

Figure 1. USAID Bureau for Resilience and Food Security Food Systems Conceptual Framework



Source: USAID 2021a.

Food processing sits within the center of the RFS Conceptual Framework as an integral component of the food supply. In the framework, food system supply and demand have a bidirectional relationship with other elements of the food system, meaning that within the system, food processing can influence and is influenced by drivers and investment levers. When food processing is developed with consumer

5 https://www.usaid.gov/feed-the-future/documents/rfs-food-systems-conceptual-framework

preferences in mind, and according to hygiene and sanitation standards, it can make nutritious foods more desirable, convenient, and safe. In this way, food processing can improve food systems outcomes, primarily diets.

Food Processing for Improved Diets: USAID Feed the Future Activities

Recognizing the important role food processing can play in delivering safe, nutritious foods, in 2019, USAID asked USAID Advancing Nutrition to help identify opportunities to strengthen USAID food processing programming to better contribute to improving diets. This included conducting a landscape assessment of Feed the Future activities from 2010–2019 to understand how food processing had been included in activities to date (USAID Advancing Nutrition 2019). The assessment found that, overall, food processing activities lacked strategic inclusion of nutrition—of the 63 activities with a food processing component, only 26 explicitly cited nutrition objectives.

What types of food processing activities is USAID supporting?

Of the 63 activities identified, about half focused on improved drying techniques, one-third on milling, one-fifth on threshing, one-fifth on cold storage, and over one-tenth on shelling. These techniques are classified as minimal processing or processing of culinary ingredients according to the NOVA system of classification. About one-third of the 63 projects focused mainly on processing fruits and vegetables, one-quarter cereals (maize, sorghum, millet, wheat), one-fifth dairy (mainly milk), and one-fifth legumes, although a few projects used other food products such as nuts and meats.

How is nutrition incorporated?

The assessment highlighted opportunities for food processing activities to improve diets and nutrition. Key recommendations for USAID and implementing partners included the following:

- Assess diet and nutrient intake and nutrient food gaps in target populations.
- Conduct business/market analysis and assessments of consumer demand for safe, nutritious foods to inform design and implementation.
- Integrate social and behavior change interventions to increase consumer demand for same, nutritious processed foods.
- Scale up support to nutrition-sensitive processing technologies and products.
- Assess stakeholder engagement and strengthen engagement with private and public sector actors.
- Consider gender in design and throughout implementation for improved outcomes and impact on diets.

Similarly to this brief, the assessment stressed the importance of supporting food processors in applying new technologies to improve the efficiency of their production, desirability of their products, and uptake of nutritious processed foods. It also emphasized the need for activities to include stakeholder assessments to identify and engage the right actors throughout their activities—such as women and private and public sector actors—to help activities better reach target groups and achieve desired outcomes.

How Does Food Processing Impact Economic Opportunities and Income?

The Role of Food Processing in Generating Economic Growth, Diverse Job Opportunities, and Income

In addition to influencing diets, food processing affects economic growth, jobs, and income. One way food processing supports economic growth is by bolstering the agriculture sector.[6] Agriculture plays an important role in LMICs, where around 80 percent of the poorest populations live in rural areas and rely on agriculture for their livelihoods (Castañeda et al. 2018). As a result, growth in agriculture can have a disproportionate impact on poverty reduction as compared to other sectors—some evidence has shown it to be more than four times as effective (USAID 2021b). Global increases in demand for processed foods are creating a market for agricultural products and generating a multiplier effect of increasing employment opportunities in agriculture. When demand is complemented by improved infrastructure, such as roads and electricity, businesses, including food processors, can play a role in connecting farmers to markets, which may also improve farmers' access to finance and services (AGRA 2019; IFPRI 2020).

Food processing plays a critical role in creating employment opportunities in the agriculture sector. Off-farm activities at the center of the supply chain, such as wholesale trade, logistics, processing, and retailing, are highly labor-intensive. As a result, these industries account for one-quarter of rural employment in many low-income countries (Thurlow 2020). They can provide as much as double the income of farming jobs and are often higher paying than jobs in other industries (Dolislager et al. 2019). Processing can stimulate opportunities across off-farm activities.

The Benefits of Food Processing for Marginalized Groups

Food processing can provide critical income-generating opportunities in LMICs, particularly for rural poor, women, and youth. Jobs in agriculture and off-farm jobs, such as food processing, are particularly important for women and youth, who represent a large portion of the agriculture sector yet are less likely to own land or have access to finance to compete in other sectors (Townsend et al. 2017). In addition, increased income for women from paid work has the potential to boost their decision-making power. Evidence has shown that women's empowerment, in agriculture and household decision-making, is associated with a positive impact on the dietary status of households (Sraboni et al. 2014; Asian Development Bank 2013). Youth (aged 15–24 years) represent a major potential workforce and are estimated to make up one-third of the population in LMICs (Global Roundtable n.d.). Youth are promoted as potential purveyors of advancements in food systems because they are often more likely than their elders to adopt new technologies and ideas. Therefore, when supported by conducive policy and public investment, youth could be well-positioned to take advantage of opportunities in high-value agriculture and processing, such as starting off-farm businesses, adopting new agriculture technologies, and moving to more urbanized areas for work, all of which could increase and diversify rural incomes (IFPRI 2020).

6 For purposes of this brief, the agricultural sector includes activities such as farming, hunting, forestry, and fishing and excludes activities at the middle of the value chain such as processing, as described in the glossary.

Key Considerations for Food Processing Activities

Role of Governments and Development Partners

While food processors themselves are generally private sector actors, food processing activities must also consider the important role of the public sector. Governments are tasked with setting, testing, and enforcing a policy framework for food safety standards and regulations. Policies and regulations can support food processing activities by investing in the required infrastructure to facilitate transportation, storage, and trade; they can also provide incentives that support private sector investments (e.g., tax breaks, low-interest loans, land tenure, and revenue sharing). Governments also play an important role in supporting small processing units as they provide employment and generate income for their operators while delivering on the basic food needs of an important segment of the population. The challenge for governments in LMICs is to provide inclusive incentives to effectively expand these small and often rurally based businesses to employ improved practices and technologies that support equitable access to safe, nutritious foods for low-income consumers.

Development partners are well placed to facilitate individual and systems-level capacity strengthening of private and public sector entities, including host country government agencies. Technical assistance can be provided for improving safety and quality control systems and applying the standards required for all types of food processing. Development partner support could focus on technologies that improve food quality and safety at the point of processing, as well as technical capacity building programs to improve practices that address potential limitations of national policies and strategies, the various food system components, and the stakeholders involved in these systems. Support to business associations, unions, and commodity-based stakeholder platforms can bring the right actors together to review, advocate for, and develop policies and regulations that provide win-win opportunities for both public and private sector stakeholders. In addition, development partners can provide technical assistance to private and public sector partners to develop effective consumer demand creation strategies, including marketing and promotional campaigns that seek out and stimulate business opportunities for food processing to improve diets while creating long-term business opportunities. Business skill development for new and existing entrepreneurs can help them increase their market reach and can support business plan development for operations expansion, with improved chances for access to finances.

Resilience

Food processing plays a role in food system resilience by establishing production capacities that can withstand the negative effects of systemic shocks and stressors. For example, the COVID-19 pandemic caused major disruptions in both local and global markets, transportation, and labor systems. With the supply of fresh foods interrupted, restaurants and markets closed, workers' movements restricted, and consumer demand in flux, food processors continued to produce shelf-stable foods. However, some caution should be observed. While food processing can support the year-round availability of safe, nutritious foods, not all processed shelf-stable foods are nutritious. To encourage resilience while

Box 2. Large-Scale Food Fortification as Part of a Sustainable, Resilient Food System

LSFF entails improving the nutrient content of a food item during the processing stage by adding essential vitamins and minerals. Processed foods that meet quality and safety standards can be part of a resilient and sustainable food system that continues to supply vitamins and minerals when people are unable to access or afford diverse foods. A major approach to supplying essential nutrients is LSFF of staple foods and condiments. LSFF is an evidence-based and cost-effective system-level intervention that has the potential to improve diets and safely reduce micronutrient inadequacies that often occur seasonally or during crises that result in low food supply and limited access to diverse diets. This solution has a 100-year track record of success.

encouraging healthy diets, food processors should be supported and incentivized to consider their influence on diets and consumer demand.

As described in box 2, large-scale food fortification (LSFF) is a type of food processing that can be part of efforts to address micronutrient deficiencies, thereby improving the quality of diets, nutritional status, and resilience to disease. Commonly consumed food items are ideal candidates for LSFF as they can contribute to improving diets and nutrition without requiring major dietary shifts.

Large-scale or "industrial-scale" food fortification refers to those food processors of sufficient size and operational sophistication to cover their costs of fortification (equipment, fortificant, and operations) within the market price of the fortified foods (typically < 5 percent) without significantly affecting supply.

Legislation in the form of laws, standards, and/or regulations stipulates what foods should be fortified with what micronutrients in what amounts. Currently, more than 140 countries globally have guidance or regulations in place for fortification programs, the majority of which are mandatory. The benefit of mandatory fortification is that, given set standards and regulatory control, food processors can be assured that all competitors must similarly comply and bear the associated costs (e.g., equipment, fortificant, and quality assurance/quality control), which are largely incorporated into the product price and passed on to consumers. National fortification programs, when implemented correctly, have the potential to achieve significant reach and coverage to decrease micronutrient deficiencies among entire populations.

The USAID Large-Scale Food Fortification Results Framework (USAID n.d.) and the USAID *Large-Scale Food Fortification Programming Guide* (USAID 2022) provide important examples of the need for local governments, the private sector, and civil society to streamline their efforts such that each actor plays to their unique strengths and positions in the (local) food environment, allowing for a food system to trigger positive-change nutrition outcomes. As such, food fortification interventions have the potential not only to influence the supply and demand component of food systems, but also to have a positive impact on the drivers and levers, through the (inter)actions and investments made by public, private, and civil society actors.

Box 3. Sustainable Processing and Improved Food Delivery Require Investments in—

- the development of sustainable, efficient, and responsible food packaging, storage, transportation, and delivery systems
- the exploitation of alternative energy sources and biosystem-based production/processing
- building sustainable practices into food preparation and processing
- the creation of flexible, scalable, and appropriate urban food processing, preparation, delivery, and consumption models
- the development of food processes based on preferences, acceptance, and nutritional needs (PAN) principles for consumers

Source: Rr, Augustin, and Tiwari 2020

Long-Term Sustainability

Many argue that we can only meet the nutritional needs of a growing global population by increasing food production, but the natural resources required are finite and under increasing pressure. Thus, the environmental sustainability of any action targeting food supply is important to consider. At the same time, much of the food produced is not distributed equitably across geographic segments of the world's population, leading to food loss and waste among some, and food shortages for others. In many cases, raising agricultural output to meet the growing demand for food has brought with it excessive use of fertilizers, pesticides, and insecticides, which have a direct impact on both the nutritional quality of food and human health (Segneanu et al. 2018). Processing

of food specifically may entail increased use of resources (energy, water, fuel), as well as waste in the form of packaging.

Sustainability in the context of food processing includes more than environmental sustainability; economic and social factors must be considered as well. The private sector plays an important role, and food processors generally operate as private sector actors driven by the market forces that influence their business performance. Food processors may respond to incentives from governments and consumers that encourage processing of nutritious foods in more sustainable, equitable ways. Whether or not product or service delivery is sustainable often depends on how profitable a business is—in the case of processors a sustainable operation might require considerations of production cost fluctuations, access to required inputs, and a consistent demand for the safe, nutritious foods.

Consumers themselves influence the sustainability of a food processing operation. Consumer preferences and behaviors change based on a number of factors, including attitudes towards food sourcing, production and/or processing methods, perceptions of status, promoted diets, and others, which impact their demand for processed products. Food processing activities should consider all sustainability factors to increase demand for food in a manner that ensures equitable access to safe, nutritious foods.

Promoting Sustainability and Inclusivity while Improving Food Systems Outcomes

Technologies, Models, and Investments for Consideration in Food Processing to Improve Diets and Nutrition

Technologies

Investing in technological advancements in food processing can encourage economic efficiencies for private sector actors while also addressing social and environmental sustainability and mitigating negative impacts of external shocks and stresses. A wide range of conventional and emerging food processing technologies exist; however, many small processing units in LMICs lack the economic resources to invest in advanced technologies. Whether considering the use of conventional or advanced processing technologies, the use of energy efficient, environmentally friendly and gender-friendly technologies[7] should be considered a best practice and smart investment for any type of processing. Existing natural elements (such as sun, air/wind, light, water, and earth) combined with potential new resources (such as new raw materials, new processes, and new packaging materials) used in food processing should be considered for improving the sustainability of the food supply. Sustainability, as well as the development of zero discard/loss/waste technologies, needs to be the goal of future food processing models and inventions (Knorr, Augustin, and Tiwari 2020).

Box 4. Upcycling for Improved Nutrition

Upcycling is emerging in the food industry as part of regenerative and circular economy models. Upcycling food means converting items that would ordinarily have been wasted into new products or ingredients.

Foods considered for upcycling tend to be those that are surplus or by-products formed during production of other foods. Some of these food items tend to be destined for the compost pile or used as animal feed. However, many foods can be converted into different end products, such as protein powders, vitamins, jams and jellies, bakery products, and beverages.

Certain economically viable upcycled food products are already on the market—whey protein from cheese production is used in protein powders and health bars, and wheat middlings left over from milling are added to breakfast cereals to bulk up fiber and other nutritional content. In order to develop appropriate guidelines and standards for this food upcycling, it is important to understand the food safety implications that come with it.

Source: FAO 2022

7 Gender-friendly technologies and innovations are those that do not unnecessarily increase the burden on women or men.

Innovative Models and Investments

In the past decade, the circular economy (CE) model has garnered interest for its emphasis on economic, environmental, and social sustainability. The CE model is a model of production and consumption, which suggests strategies for using and reusing existing materials and products for as long as possible (Rajković et al. 2020). Investments in food processing that follow the CE model can support production and processing in recycling and reusing required inputs. A CE model promotes a regenerative approach to food production and processing, not only restoring the diversity of natural resources and the crop production system, but also offering the potential to restore the nutrient density of food from production to consumption (Ellen MacArthur Foundation n.d.; HLPE 2020). A CE model can reduce environmental impact through waste minimization, increased economic benefits, redesigned food products, new choice of materials, reduced price volatility, and increased job growth (Rajković et al. 2020). Food processors are at the center of this model, thereby potentially impacting both production and consumption.

Adoption of climate-smart agri-food practices and technologies by food processors will require a range of financial products and financing options that encourage these practices and technologies. Investments can emphasize development of and investment in innovative financing mechanisms that target improving diets and nutrition outcomes. The Nutritious Foods Financing Facility (N3F) is an example of a mechanism that can increase the available financing solutions for agri-food enterprises that produce or promote nutritious foods—which can strengthen food value chains and increase the supply of safe, nutritious foods (GAIN n.d.).

Do No Harm

Food processing design and implementation can result in unintended negative impacts. For example, increasing availability of highly processed, low-cost, and nutrient-poor food options to all segments of the population could negatively impact diets. Furthermore, increased packaging needs resulting from processing can create greater waste. Improved food processing business models and the application of technological innovations described in this brief should be considered to avoid interventions that potentially deteriorate the natural environment needed for the production of raw materials used in food processing.

Implementers need to consider trade-offs and apply "do no harm" principles to avoid or mitigate potential negative impacts, and investors need to consider proposed processing approaches when investing. These include taking into account the broader context of the planned approaches, analyzing underlying dynamics within socioeconomic groups, and mitigating potential unintended consequences that affect the social, economic, and natural environment.

Case Study: Alliance for Inclusive and Nutritious Food Processing

The Alliance for Inclusive and Nutritious Food Processing (AINFP) is a Feed the Future initiative that provides technical assistance to sub-Saharan African food processors to enhance the nutritional value, safety, and quality of their products. Activities help food processors strengthen linkages with other food system actors to ultimately become a catalyst for improving the availability and accessibility of safe, nutritious foods for low-income consumers.

Food Supply

Processors can influence food systems from the production stage by developing relationships with and investing in the smallholder farms that produce and supply their raw materials. AINFP supports processors with formalizing their relationships with farmers by encouraging them to develop outgrower schemes, or through use of more formal contracts (AINFP 2019). These partnerships often benefit both sides; farmers secure a guaranteed market for their produce, while processors establish a more stable supply of quality raw materials for use in processing nutritious foods. These relationships can also incentivize additional investment in agriculture, including technical capacity strengthening. Through these partnerships, processors source from the same farmers or cooperatives over time and therefore see the benefit in offering technical training to farmers to improve the quality of raw materials.

Processors play a role in ensuring food safety from farm to market, which is particularly important for ensuring that highly perishable nutritious foods such as fruits and vegetables and animal-sourced foods reach consumers without food safety risks. In many lower-income countries, safety standards are often not implemented or enforced. AINFP provides assistance to processors requiring access to financial investment for critical food safety infrastructure, such as clean water, refrigeration, and transportation equipment needed to avoid spoilage and contamination.

Food Environment

Further downstream, food processors play a role in marketing safe, nutritious products to consumers. For example, an AINFP-supported processor in Ethiopia, Zagol Milk, developed the creative idea to sell milk on the street using pushcarts with cooling boxes. The company found it an effective way to maintain low product prices while reaching low-income consumers, who often buy their food from dispersed, smaller vendors.

Food and Water Utilization

Processors also respond to consumers' shifting demands. For example, when the COVID-19 pandemic hit in Kenya, consumers no longer wanted to purchase fresh milk. They preferred to buy shelf-stable milk products to avoid regular visits to the store (Thomas 2020). AINFP worked with food processing businesses to develop long-life milk products, thereby supplying consumers with food products that met their changing food preferences while continuing to provide nutritious food that can be part of a healthy diet.

Additional Resources

USAID. 2021a. *RFS Food Systems Conceptual Framework*. Washington, DC: USAID. https://www.usaid.gov/sites/default/files/documents/RFS-Food-Systems-Conceptual-Framework-Summary-Guidance.pdf.

USAID. 2021b. *U.S. Government Global Food Security Strategy.* Washington, DC: USAID. https://www.usaid.gov/sites/default/files/documents/Global-Food-Security-Strategy-FY22-26_508C.pdf.

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Glossary

The **agriculture sector** consists of activities in agriculture, hunting, forestry, and fishing, in accordance with division 1 (International Standard Industrial Classification [ICIS] 2) or categories A–B (ISIC 3) or category A (ISIC 4) (World Bank 2022). Agricultural activity excludes any subsequent processing of the agricultural products; this is defined as manufacturing (UN 2002). (For the purposes of this brief, we use the definition of the agriculture sector used by the World Bank because it is the source of data for the studies referenced, The World Bank uses the United Nations ICIS of All Economic Activities definition.)

The **circular economy** (CE) can be defined as an industrial system that is renewable or regenerative with intent or design, with the aim of eliminating waste through superior design of materials, products, systems, and business models. It can also be defined as an economic strategy proposing innovative ways for transformation of the currently predominant linear systems and achieving economic sustainability with material savings. In general, circular economy is a term that encompasses all activities that reduce, reuse, and recycle materials in the processes of production, processing, distribution, and consumption (Rajković et al. 2020)

Food loss is the decrease in the quantity or quality of food resulting from decisions and actions by food suppliers in the chain, excluding retailers, food service providers, and consumers (FAO n.d.).

A **food system** is the intact or whole unit made up of interrelated components of people, behaviors, relationships, and material goods that interact in the production, processing, packaging, transporting, trade, marketing, consumption, and use of food, feed, and fiber through aquaculture, farming, wild fisheries, forestry, and pastoralism. The food and agriculture system operates within and is influenced by social, political, economic, and environmental contexts (USAID 2021a).

Food waste refers to the decrease in the quantity or quality of food resulting from decisions and actions by retailers, food service providers, and consumers (FAO n.d.).

Lower-middle-income countries are country economies with a gross national income per capita, calculated using the World Bank Atlas method, of more than $1,046 but less than $4,095 (World Bank 2021).

An **ultra-processed food** consists of "formulations of ingredients, mostly of exclusive industrial use, typically created by a series of industrial techniques and processes (hence 'ultra-processed'). Some common ultra-processed products are carbonated soft drinks; sweet, fatty or salty packaged snacks; candies (confectionery); mass produced packaged breads and buns, cookies (biscuits), pastries, cakes and cake mixes; margarine and other spreads; sweetened breakfast 'cereals' and fruit yogurt and 'energy' drinks; pre-prepared meat, cheese, pasta and pizza dishes; poultry and fish 'nuggets' and 'sticks'; sausages, burgers, hot dogs and other reconstituted meat products; powdered and packaged 'instant' soups, noodles and desserts; baby formula; and many other types of product" (Monteiro et al. 2019).

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