



Improving Nutrition through Agriculture and Food Systems

How does the food system influence nutrition?

Text-only version

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Learning objectives

By the end of this lesson you will be able to:

- describe the linkages between nutrition, agriculture and the broader food system; and
- recognize the relevance of multisectoral approaches for improving nutrition.

Introduction

“ Welcome to this course on **nutrition-sensitive agriculture and food system policies and programmes**. – Jaden, your course guide ”

 *Marta* “As professionals working in food security and agriculture, what can we do to improve nutrition?”

 *Erik* We know that nutrition is a major challenge for individuals and for the social and economic development of our country.

 *Jaden, the course guide* Let’s visit some people in the village nearby to better understand how agriculture and the food system influence nutrition...

A rural scenario

Meet Ismail and Nayece’s family: Ismail is a 35 year old farmer, and his wife is Nayece, 30 years old. They have four children and are agro pastoralists. Over the last several years, the community where they live has suffered recurrent droughts.

What kind of nutrition and health problems do Ismail and Nayece face?

- ✓ Nayece is pregnant. She is underweight and anemic.
- ✓ Their eight month old child is wasted (acutely malnourished).
- ✓ Their four year old daughter is stunted (chronically malnourished).
- ✓ All children suffer from episodic diarrheal events.
- ✓ All family members suffer from multiple micronutrient deficiencies.
- ✓ During the lean season, the nutrition situation of the family gets worse.

How do Ismail and Nayece's family live? What challenges do they face in meeting their nutritional needs?

↳ **Livestock**

We also raise livestock, including goats and a few cows. Many of **our animals died** in the recent drought, which forced us to reduce our consumption of milk and milk products, and lowered our income from livestock sales.

↳ **Granary**

We have a small granary to store our harvest, hence we are obliged to sell the majority of our maize production at harvest time, when prices are lowest. When our stocks are finished, we buy cereals on the market at a high price. Women only grind cereals with traditional stones. **We do not process other foods** because we have no appropriate technologies, nor electricity. Also, sometimes our maize stock gets damaged by rodents, insects or fungus, but we are forced to use it.

↳ **Trader**

I wish more **vendors** would come from the riverine areas where food is grown year round. We could always buy fruits, vegetables and fish, especially during the lean season, and for better prices. The road conditions are so bad and our trucks are not refrigerated. By the time we get to the village, half of the fresh foods we carry - fruits and vegetables and fish - gets lost.

↳ **Kitchen**

Food is scarce, so I reduce portions for my daughter and myself to ensure that my husband and boys get enough food. I also **cut out certain foods like eggs and okra from my diet**, because my stepmother told me they are dangerous during pregnancy and breastfeeding.

When I cook, it is not always easy to keep the food clean. We do not have a water source near the house, soap is not always available or affordable and the animals always roam around the kitchen when I am cooking. I feed my eight month old child with porridge. I would like to mash it with meat or nuts, but they are too expensive. I am not sure **what kind of alternative** cheaper foods I could use.

↳ **Garden**

I used to grow different types of vegetables in my **homestead garden**, but because of low soil fertility, I decided to stop planting tomatoes and cabbage and to only grow leafy greens and okra.

↳ **Crop**

We mostly consume what we produce. I grow maize on our small rainfed plots. Because of the recurrent droughts, **soil fertility and yields have gone down**.

We have seen that Ismail and Nayece face some **challenges related to food production**. How do these challenges impact the nutritional status of different members of their household?

CHALLENGES IN FOOD PRODUCTION → DIETS → NUTRITIONAL PROBLEM

Due to lack of irrigation, drought and low soil fertility...

Maize production has declined	Animals have died due to lack of water and pastures	Some vegetables are no longer grown
▼	▼	▼
Fewer staple foods are available for consumption	Animal-sourced dietary proteins and micronutrients are scarce	A low diversity of foods is available
▼	▼	▼
Inadequate energy intake	Low dietary diversity and insufficient micronutrient intake	Low dietary diversity and insufficient energy and micronutrient intake



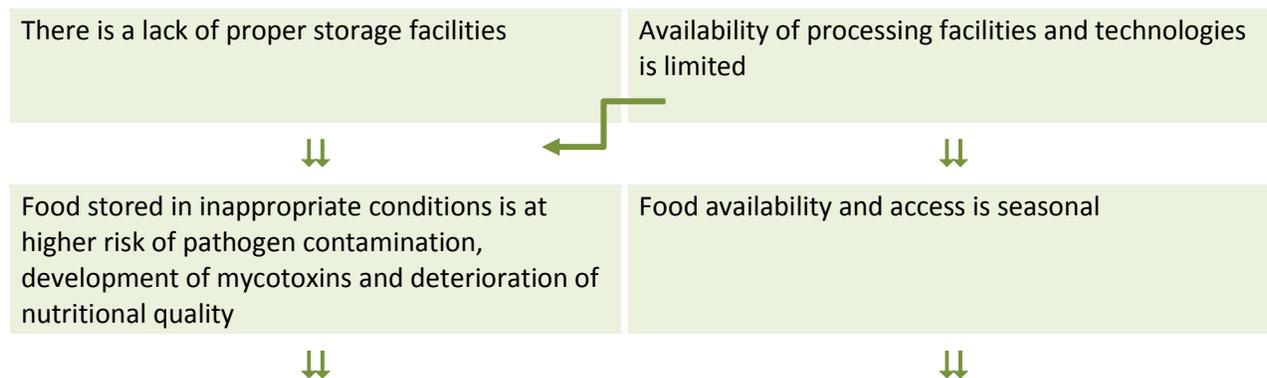
The family suffers from several kinds of malnutrition:

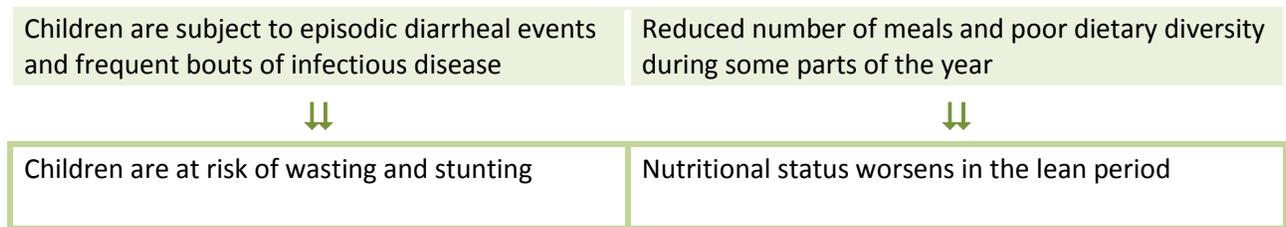
- the youngest child is wasted
- the daughter is stunted
- and all family members suffer from micronutrient deficiencies
- Nayece is underweight and anaemic

As you can see, challenges related to food production have serious impacts on the nutritional status of members of the family.

CHALLENGES IN FOOD STORAGE AND PROCESSING → DIETS AND DISEASE → NUTRITIONAL PROBLEM

Food **storage and processing** also present some challenges that contribute to the poor nutritional status of the family.





Some of the nutritional problems of the family come from inappropriate storage and processing of food. These factors impact on food quality and year-round availability.

CHALLENGES IN FOOD TRADE AND MARKETING → DIETS → NUTRITIONAL PROBLEM- STATE

Food trade and marketing linkages across agroecological¹ zones (with different cropping seasons and products) are weak, creating new challenges for the family.

Road conditions are poor. Trucks are not refrigerated. This results in loss of highly perishable food items such as meat, fish, fruits and vegetables during transportation



There is low trade in and marketing of nutritious and diverse foods across agro ecological zones



During the lean season, availability of diverse and nutritious food is limited on the market, contributing to keeping prices high



Inadequate dietary intake in some periods of the year



Nutritional needs are not evenly met throughout the year

CHALLENGES IN CONSUMER DEMAND → DIETS AND DISEASE → NUTRITIONAL PROBLEM

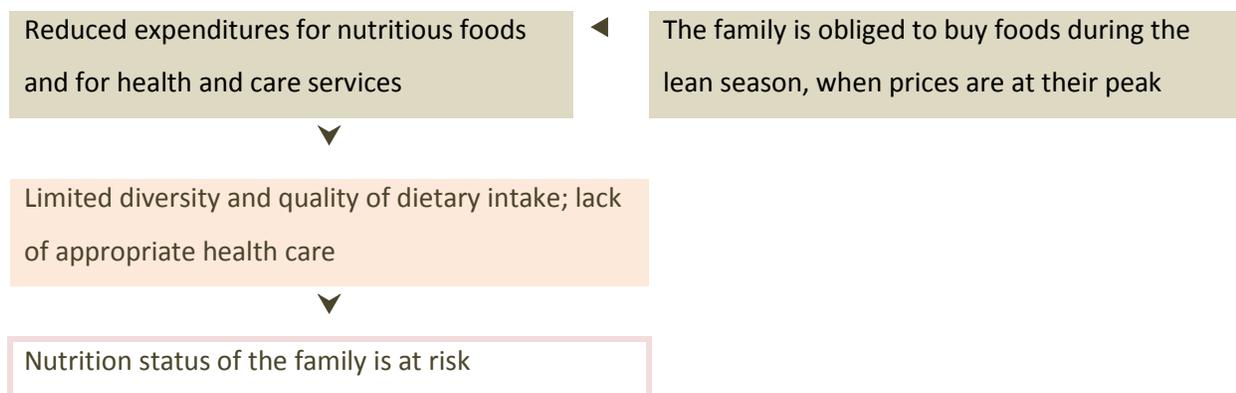
Decrease in income from agriculture and limited purchasing power at certain times of the year have contributed to the nutritional problems of Ismail and Nayece.

Reduced income due to decline in agricultural production and loss of livestock

Most production is sold at harvest time when prices are at their lowest due to lack of storage



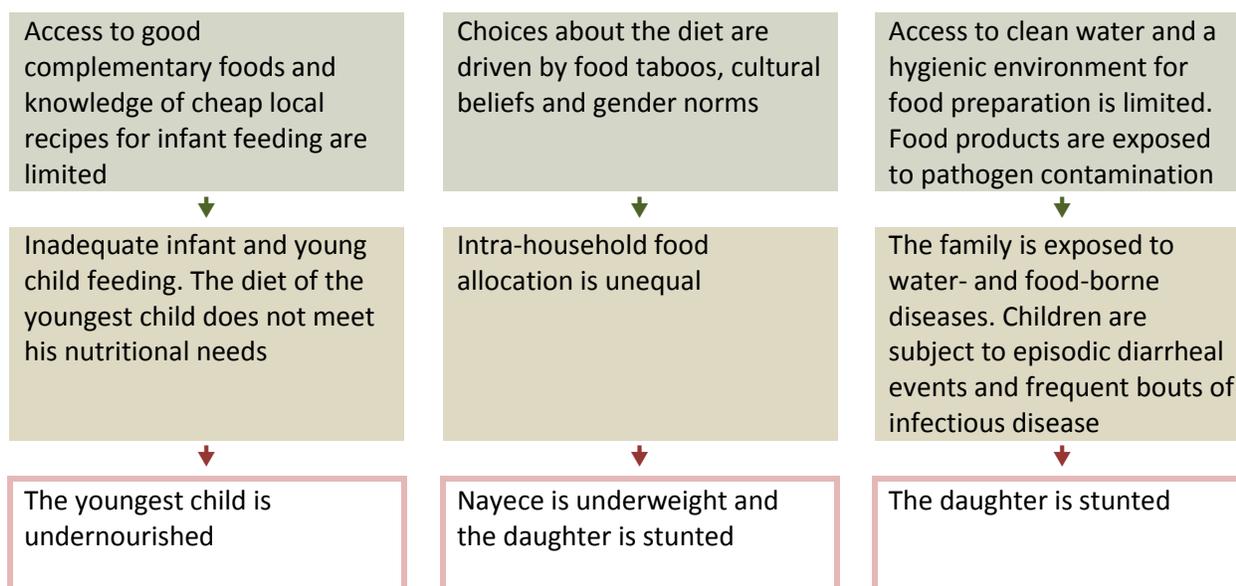
¹ **Agroecological zones** are geographical areas exhibiting similar climatic conditions, landform and soils, and/or land cover, and a specific range of potentials and constraints for land use.



Low income and limited purchasing power, especially during the lean season, reduce access to nutritious food and to health and care services. This further undermines the nutritional status of family members.

CHALLENGES IN FOOD PREPARATION AND PREFERENCES → DIETS AND DISEASE → NUTRITIONAL PROBLEM

Finally, certain **dietary choices** and **the way food is prepared** also have an impact on the family's diet and nutritional status.



People's cultural beliefs and eating habits, knowledge of nutrition and feeding practices are among key factors that determine people's food preferences and diets. The way food is prepared is also a critical element which affects household health and nutrition.

Now it's clear how the nutritional status of Ismail's and Nayece's family is linked to many factors that go beyond food production. The way the food is stored, processed, traded and prepared is fundamental

too and this is in turn linked to the overall context. For example, they select their food according to their cultural habits and beliefs but also according to food prices. This means that, to intervene effectively, we also need to understand the natural, economic and socio-cultural context in which all of this happens. We could summarize this by saying that we need to look at the entire **food system**/

Agriculture and food systems

In fact, **food systems** encompass all the people, institutions and processes by which agricultural products are produced, processed, and brought to consumers (FAO SOFA 2013).



Food systems include both **the activities** (production, storage, processing, trade and marketing, preparation, consumption) and the **context** in which these activities take place. Activities are **driven by the behavior of a set of actors** (farmers, processors, traders, consumers, policy makers and officials in government and non-governmental organizations) which have differential access to power and resources, and respond to opportunities, risks and constraints imposed by the context including the public policy.

 *Jaden, the course guide*

Looking at the food system in its entirety can help us to better understand why people are malnourished and find the best approaches to address the problem.

So, how to work **concretely across the food system to improve nutrition**? One way to look at the food system is to organize it around some main functions. In this course, we are considering four main interlinked functions. Each function includes a subset of activities, actors and related environments, including all supporting infrastructures, institutions, regulations and norms.

Consumer demand, food preparation and preferences

Consumer demand shapes decisions on what foods to produce, process and trade. The main drivers of demand at household level are:

- ➔ Purchasing power determined by level of incomes, prices, productivity, wage rates, taxes and cash transfers and remittances.
- ➔ Preferences linked to food-related knowledge, attitude and practices at individual and societal level.

Individual food consumption is influenced by household food preservation, preparation and cooking practices, and intra-household food distribution.

Social protection schemes including subsidies, school feeding programmes, consumer education can be crucial for supporting consumer demand and consumption.

Food production

Food production encompasses a range of activities - and relevant actors - including rural and urban crop production; livestock rearing at small, medium and large scale; fisheries; and forestry.

Food production also requires managing the underpinning **natural resource base** (land, water, soil, plants seeds, animal breeds etc.) and **supporting infrastructures** (e.g. water supply network).

Beyond making food available, food production is critical for sustaining **rural livelihoods** and shaping - positively or negatively - **food environments**.



Food trade and marketing

Food trade encompasses exchanges at different levels, including domestic (i.e. within and between rural and urban areas), regional and international (i.e. import/export) which serve to bring food to consumers from the locations where it is produced.

Elements of food trade - e.g. quality roads, cold chain during transportation and at the marketplace, imported food regulations, prices and price policies, etc. - thus shape the food supply as well as food prices.

Food marketing refers to all activities,

Food handling, storage and processing

Handling, storage and processing are essential to **preserve food**, help increase **shelf life** and **limit food losses**, which in turn stabilizes food supply and prices throughout the year. Proper food handling, storage and processing also help make food **safe**, **digestible** and **tasty** and broaden the range of food products that can be consumed.

Handling, storage and processing include activities at **household** (e.g. domestic food preservation), **community** (e.g. village granaries; mills) and **commercial** levels (e.g. commercial silos, food industries).

actors and related infrastructures and regulations around the physical sale of food (wholesaling, retailing, catering) and its promotion (labeling, pricing, branding and advertising).

Techniques and level of processing - from minimally processed food (e.g. peeled, frozen and packaged vegetables) to ultra-processed food (e.g. snacks, soft drinks), including fortify foods - impact, either negatively or positively, the nutrient content of food.

Agriculture, the food system and nutrition

Food system functions determine availability, affordability, convenience and desirability of various foods - in other words, the **food environment** - and thus the **behavior of consumers**. Through the food environment, the food system influences consumers' diets and nutritional status.



What is the "food environment"

The **food environment** is one of the emerging concepts associated with food systems and nutrition. It designates the interface between the food system and consumers.

"Food environment" is defined as the **availability, affordability, convenience and desirability of various foods** (Herforth and Ahmed 2015). The food environment is directly affected by the food system, and in turn affects diet quality and nutritional status. In research the concept of food environment has been mainly used in relation to dietary quality issues in high-income countries (i.e. overweight, obesity and Non-Communicable Diseases (NCDs)).

Let's go back to Ismail and Nayece's family. Several factors contribute to their unhealthy diet and related poor nutrition. Their family faces challenges in every function of the food system.

Consumer demand, food preparation and preferences

Food taboos, cultural beliefs and gender norms

Low purchasing power

Use of unsafe water and unhygienic environment in food preparation

Incomplete knowledge on infant feeding practices

Food production

No irrigation schemes, soil infertility and low yields

Loss of livestock

Low on-farm crop diversification

Food trade and marketing

High price of nutritious foods and of appropriate complementary foods

High food losses during transport and low trade in perishable and nutritious foods

Food handling, storage and processing

No processing technologies and electricity

Lack of household granaries

An urban scenario

How would this be different in an **urban context**, where consumers, including the poor, tend to purchase their food rather than produce it?

 *Jaden, the course guide*

Some households in Ismail and Nayece's community have moved to the city and settled in slums. Let's visit them to understand what challenges they face.

Meet Fatuma's family: Fatuma is 30 years old. She migrated with her school-age daughter and young child from the village to the slum area of the capital city. She runs a small roadside business selling snacks, candy and other items.

What nutrition and health problems does Fatuma's family have?

- ✓ Fatuma is overweight.
- ✓ Her daughter is overweight.
- ✓ Her younger son is stunted.
- ✓ Both children suffer from episodic diarrheal events and micronutrient deficiencies.

How does Fatuma get food for her family?

↳ Informal retailer

I buy baby foods from informal retailers at affordable prices. However there is **little information** provided on the package about their content so I am not sure they really meet my child's needs.

↳ Street food

I spend most of the day out of home. I eat ready-to-eat foods bought from street vendors such as deep fried pastries and snacks with sauces. **This food is full of energy, and it's cheap and tasty.**

↳ Fatuma's shop

Without a regular source of income, I find it hard to **plan food purchases** very far in advance. At the end of each day, I use my earnings to buy a small amount of rice to prepare the evening meal.

I heard the government helps poor families with a monthly cash transfer, but we have not been included in the programme.

↳ Supermarket

The local health worker advises me to use fortified flour and oil for my children's health. These foods are only available in big supermarkets **located in upper-class neighbourhoods.**

↳ Garbage

My children sometimes get sick when we eat from foods that I buy in the market. It must be because of the **unclean conditions** in which foods are stored and prepared.

↳ School

At school, my daughter eats a rice or porridge meal. After school, she is often **still hungry** and will peck snacks and candies from my stand. Today, in front of the school, there was a **free distribution of chocolate** bars from my favorite brand. I like them so much!

↳ Home

When I run short on food, I don't ask my neighbours for help because we do not know each other. **Relationships** here in the city are really different from those in the village!

↳ Fruit and vegetables

I cannot afford to buy **fresh foods** everyday. I wish I could grow vegetables at home, but I don't know how.

Several factors contribute to the unhealthy diet and related poor nutrition of Fatuma's family.

Consumer demand, food preparation and preferences

- **Inadequate nutrition knowledge:** Due to lack of knowledge on healthy diets and nutritional requirements, consumer food choices are primarily determined by prices and taste rather than health concerns.
- **Unhealthy meals prepared and served at school:** Inadequate and unbalanced school meals (i.e. in terms of quantity, quality, and diversity) results in unmet nutritional needs in critical periods of life. This increases the risk of child malnutrition while failing to develop life-long healthy eating habits.
- **Low and irregular purchasing power:** Irregular income results in frequent small food purchases at expensive price, and therefore increases the risk of adopting unhealthy diets.
- **Loss of social support networks:** Disruption of traditional social support and solidarity networks results in isolation and loss of informal support mechanisms to cope with food crisis and shocks.
- **No access to social protection schemes:** Access to formal safety nets (e.g. in form of food, vouchers or cash) can help urban poor and food insecure population to secure regular consumption of nutritious foods, plan regular food expenditures, and cope with shocks (e.g. price inflation).

Food production

- **Limited knowledge on urban home gardening:** Agricultural techniques adapted to urban settings enable production of fruits and vegetables for household own consumption, reduce urban consumer's market dependency and improve intake of vitamin- and mineral-rich foods.

Food trade and marketing

- **Scarcity of fortified foods in poor neighborhoods:** Fortified foods could help nutritionally vulnerable consumers to improve their micronutrient intake. However, these food can be scarcely available in market venues where poor people shop. Furthermore there might be limited inspection measures to control for brands which make false claims about fortification.
- **Inadequate labeling of complementary foods for children:** Inadequate legal frameworks for labeling of complementary foods results in unclear information to the consumer and reduced ability to make informed food purchases which respond to infant and young child's specific needs.
- **Irresponsible marketing to children:** Children are often the targets of aggressive and unregulated marketing for unhealthy foods (such as snacks, carbonated drinks, sugar-rich foods,

etc.) from food manufacturers and retailers. This increases the risk of adopting unhealthy diets from an early age.

- ➡ **Lower prices of unbalanced diets versus nutritious ones:** Energy-dense, nutrient-poor foods are often more affordable than fresh and nutritious ones. This encourages people to make inadequate consumption choices and to adopt unhealthy and nutrient-poor diets.

Food handling, storage and processing

- ➡ **Unbalanced formulation of ready-to-eat street foods:** Excessive consumption of unbalanced ready-to-eat street foods (too rich in fats, oils and sugar, and poor in vitamins and minerals) contributes to explain overweight and micronutrient deficiency problems in urban areas.
- ➡ **Unsafe storage and handling of fresh foods:** Fruits, vegetables and livestock products - which are inadequately handled, stored and preserved - are exposed to pathogen contamination. This reduces the nutritional quality of food, beyond exposing consumers to serious health risks.

Rural-Urban linkages

Do you remember what people in both contexts told us about millet? There are some linkages between the two situations...



“Sometimes, I would like to buy millet. It is a local food from our village. But because imported rice is so much more affordable than local millet, I buy rice.”

“We do not buy local millet. We only trade rice and maize from international suppliers.”
“In our village, we stopped growing millet because there is no longer any demand for this cereal. But even selling our maize is difficult because we have to compete with imports.”

If we think about the rural and urban contexts as part of the same system, we see how it would be important for them to be well linked.

Often, locally produced foods of high nutrient value (e.g. local millet) suffer from **low market integration** due to **limited processing, infrastructures and marketing** to move these foods into larger towns and cities. Overall, both producers and consumers are incentivized to simplify their production and consumption toward a few, highly commercialized crops.

When market linkages for locally produced foods of high nutrient value are not developed

Limited market integration for local nutritious foods (limited processing, infrastructures and marketing).



Incentives to shift production from local nutritious foods to basic cereals. Rural producers are incentivised to shift production to more tradable crops even if they must compete for access to urban markets with low cost imports.



As a result, production of local nutritious foods declines. Diets become more monotonous and based on consumption of a few cereals and their processed derivatives (cereal-based snacks). This contributes to nutritional problems such as micronutrient deficiency and overweight.



Scarcity and high relative price of locally produced foods on urban markets. On urban markets, local nutritious food become less available and affordable than commercial crops with low nutrient value.



Dietary change from local nutritious foods to basic cereals. Diets become more monotonous and based on consumption of a few cereals due to low on- and off-farm availability of local nutritious foods. This contributes to nutritional problems such as micronutrient deficiency.



Limited demand for local nutritious foods and increased demand for basic cereals.

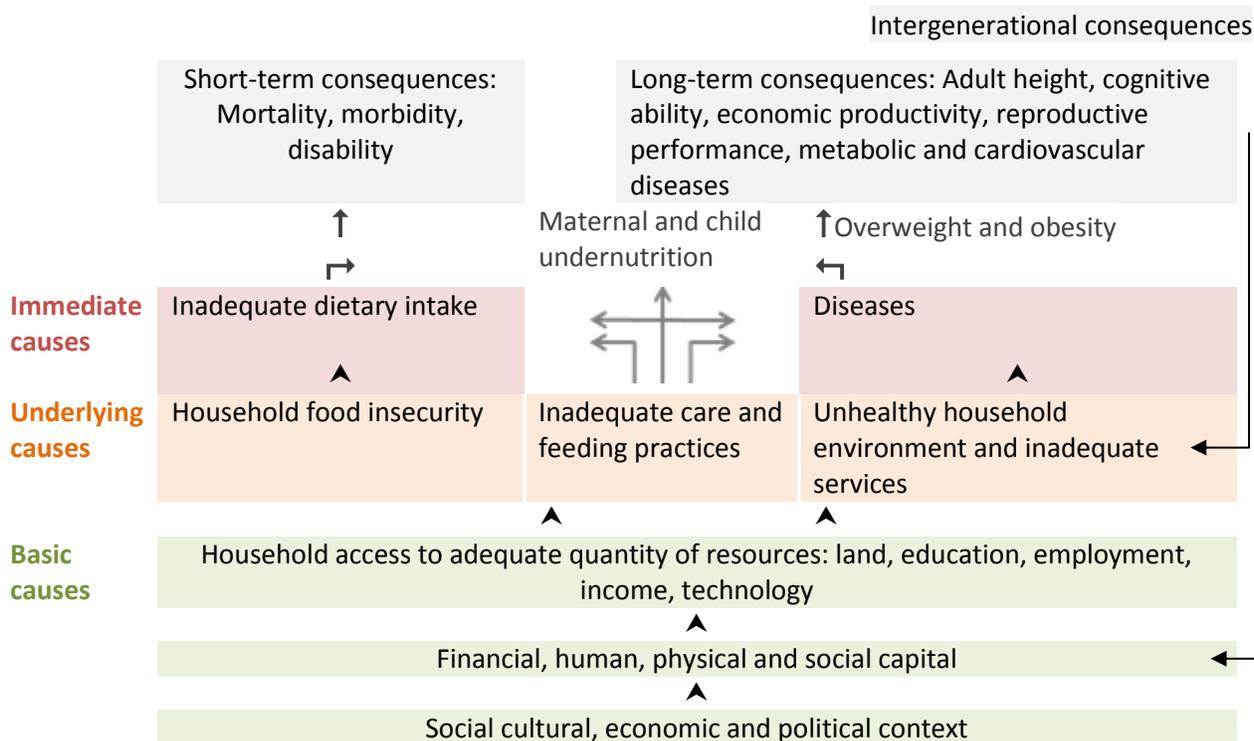
These new dietary habits translate to lower demand for local nutritious foods and higher demand for basic cereals.



...and the cycle repeats itself.

Multisectoral nature of malnutrition

Many factors are there in the food system influence nutrition. These are all nutrition-related issues. Looking at the causes of malnutrition represented here, you can see how the food system can influence immediate, underlying and basic causes of malnutrition.



See the Module “**Nutrition, Food Security and Livelihoods: Basic concepts**” to know more about multidimensional causes of malnutrition.



Conceptual framework for malnutrition

Malnutrition is a **multidimensional** problem. According to the **UNICEF conceptual framework** originally developed for maternal and child undernutrition, three levels of causes need to be considered:

- **immediate** causes which operate at the individual level: inadequate dietary intake and diseases;
- **underlying** causes which operate at the household and community level: household food insecurity, unhealthy environment (namely access to water, sanitation, health services) and inadequate care and feeding practices (including feeding, hygiene, health-seeking

behaviour);

- **basic** causes which relate to the structures, processes and phenomena that operate at the level of the society: they include political, socio-economic and cultural factors, such as governance and institutional capacities, gender relations, social solidarity mechanisms, access to education, presence of infrastructure, trade policies and systems, conflicts, environmental factors such as climate change, and the agro-ecological context in which communities live.

Underlying causes are clearly correlated with child stunting, micronutrient deficiencies and wasting. In the new nutrition landscape, the need to update the framework to include a broader set of underlying drivers for **obesity and NCDs** has become clear. The underlying causes are relevant to obesity and NCDs: food insecurity can also be characterised by difficulty to access diverse foods, including fresh fruits, vegetables and animal source foods, leading to poor diet quality; and all underlying causes are also indirect contributors of obesity and NCDs, since stunted children are more likely to develop these diseases in adulthood. But other factors such as the food environment, **physical activity and lifestyles** need to be considered. To this end, an **adaptation of the framework** has been proposed by the Global Nutrition Report: <http://globalnutritionreport.org/the-report/> (p. 62).

Water, health environment and food safety

In fact, agriculture and food systems can have a direct impact on **health and care**.



*Fatuma
and
Nayece*

“When I cook, it is not always easy to keep the food clean. We do not have a water source near the house, soap is not always available or affordable and the animals always roam around the kitchen when I am cooking.”

“My children sometimes get sick when we eat foods that I buy in the street. It must be because of the unclean hygiene conditions in which foods are stored and prepared.”

“Also, sometimes our maize stock gets damaged by rodents, insects or fungus, but we are forced to use it.”

Importance of ensuring food safety throughout the food system: Food- and water-borne diseases caused by ingestion of contaminated food (e.g. with toxins, pathogens, microbes) or water are key determinant of both growth retardation and health outcomes. Food safety needs to be ensured from

the field to the fork through preventing and controlling hazards in agricultural practices, processing and packaging, marketplaces, household food preparation and consumption. Appropriate food storage and preservation throughout the food system is also key for managing food safety issues, and limiting food losses and food waste.

Care and feeding practice

Likewise, agriculture and food systems can directly affect **care and feeding practices**.

“I buy baby foods from informal retailers at affordable prices. However there is little information provided on the package about their content so I am not sure they really respond to my child needs.”

“Food is scarce, so I reduced portions for my daughter and myself to ensure that the boys get enough food. I also cut red meat, eggs and okra from my diet, because my step-mother told me they are dangerous during pregnancy and breastfeeding.”


Fatuma
and Nayece

“I feed my eight month old child with porridge. I would like to mash it with meat or nuts, but they are too expensive. I am not sure what kind of alternative cheaper foods I could use.”

Gender issues

Most of the challenges we have looked at are closely related to the role of women in food systems and nutrition because Women account for 40% of agriculture labor and play a critical role in other functions such as primary processing and local trade. They are also the main caregivers and the **cornerstone of household nutrition**. Many of nutritional challenges we’ve looked at here are related to gender such as time use, decision-making power, income, inequity. These have direct impacts on caring practices and household nutrition.

Gender-related issues in contributing to child and maternal malnutrition in:

Nayece’s family...

- Excessive workload at harvest time leads to inadequate childcare and risk for poor maternal health and nutrition.
- Limited women’s control over resources and decision-making power does not allow the main caregiver to effectively respond to household nutrition, care and health needs.

- Lack of support for women crops leads to reduced production diversification and increased risk of poor quality of household food intakes.

Fatuma's family...

- Lack of social support for mothers leads to inadequate childcare.
- Unequal access to employment in the formal food sector hampers women's access to a regular income and enhances the risks of poor nutrition and health, and female poverty.

Joining efforts

As we have seen, agriculture and food systems can directly impact the immediate, underlying and some basic determinants of malnutrition. Of course, the food and agriculture sector alone **can't address all causes of malnutrition**. That's why the food and agriculture sector **should work with other sectors** to properly address malnutrition.

Making best use of agriculture to fight malnutrition will require **joining efforts towards a common approach**.

Conclusion

Now you are well equipped to identify the linkages between the food system and nutrition in the context you are working.

In the next lesson "Making agriculture and food system nutrition-sensitive: key principles", we will try to go a step further and answer the following question: *How can we make agriculture and food system policies, investments and programmes work better for nutrition?*

Summary

Agriculture and food systems impact nutrition by influencing the quantity, quality and diversity of food produced, prices and purchasing power of producers, as well as food preferences and consumption choices.

In order to understand how the food system serves nutrition, we need to unpack the linkages between nutrition and the food system. This requires to:

How does the food system influence nutrition?

- look at all the functions of the food system: food production; food processing and storage; food trade and marketing; consumer demand, food preparation and preferences
- consider the food system from the perspective of the consumer's nutritional needs.

Agriculture and food systems also have an impact on **water, health environment** and **caring practices**, which are important drivers of nutrition.

Women play a key role in household care and nutrition. Many nutritional challenges are also linked to gender issues, and we know that agriculture and food systems can significantly impact women's time use, decision-making power, income, inequity.

A nutrition-sensitive approach requires **collaboration across different sectors** in order to address all the determinants of malnutrition in an integrated way.