Federal Democratic Republic of Ethiopia

Ministry of Agriculture

National Nutrition Sensitive Agriculture Training Manual for Agricultural Development Agents

November, 2018

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Acronym

AGP	Agriculture Growth Program
AMIYCN	Adolescent, Maternal, Infant and Young Child Nutrition
BMI	Body Mass Index
EDHS	Ethiopian Demographic Survey
FAO	Agriculture Growth Program
DA	Development Agents
FTC	Farmer Training Center
GDP	Gross Domestic product
GTP	Growth and Transformation Plan
HEW	Health Extension Worker
HH	House Hold
IPC	Inter-Personal Communication
IYCF	Infant and Young Child Feeding Practices
KAP	Knowledge, attitude and practice
MDG	Millennium Development Goal
MoA	Ministry of Agriculture
NNP	National Nutrition Program
NNSAS	National Nutrition Sensitive Agriculture Strategy
PSNP	Productive safety net program
SBCC	Social behavior change communication
SHN	School health and nutrition
ATVET	Agriculture Technical Vocational Education and Training
UNICEF	United Nations Children's Fund
VIP	Ventilated Improved Pit
WASH	Water, Sanitation and Hygiene

Preface

Agriculture is the major source of food, employment and income for most Ethiopians. Families living in rural areas derive means of their daily lives from direct involvement in agricultural activities. Understanding this, the government of Federal Democratic Republic of Ethiopia has developed a comprehensive Rural Development Policy and Strategy and implemented it through successive development plans for the past 15 years. Food and nutrition security have always been a challenge and are among the development targets of the five-year Second Growth and Transformation Plan, GTP-II. Hence, agricultural development does not only focus on increasing production but also creating access and means of improving food and nutrition security. The food that we eat needs to be in adequate quantities, safe and nutritionally diverse. In addition, there is also the apparent need to improve access to clean and safe water and health services together with women empowerment interventions.

Agriculture and nutrition are highly interrelated. Agricultural production provides the means to get food and the essential nutrients that people need. While on the other hand, as agriculture is highly labor intensive, agriculture requires well-nourished, healthy, and physically fit people. To improve nutritional outcomes, the agricultural strategy in Ethiopia takes on a nutrition-sensitive approach. The strategy guides planning and implementation of crop and livestock production, processing, marketing and consumption in order to address the prevailing malnutrition problem of the country.

Development agents (DAs) are at the fore front in implementing agricultural programs and supporting farmers to improve agricultural production and livelihood. Over the past five years, more than eight nutrition related DA training manuals have been prepared by various projects and development partners. None of these manuals have been endorsed and are used across the sector other than project areas due to lack of proper engagement of the MoA. This training reference manual is developed by MoA in collaboration with development partners. This manual will be used to train development agents to enable them implement nutrition sensitive agriculture to contribute for the reduction of under-nutrition in the country by promoting and assisting production and consumption of diversified foods in rural Ethiopia.

Definition of key terminologies

- **Home garden**: Home garden can be described as a mixed cropping system that encompasses vegetables, fruits, plantation crops, spices, herbs, ornamental and medicinal plants as well as livestock that can serve as a supplementary source of food and income

- **Nutrition Sensitive Agriculture (NSA):** is an approach that seeks to ensure the production of a variety of nutritious, affordable, culturally appropriate and safe foods in adequate quantity and quality to meet the dietary requirements of populations in a sustainable manner.

- **Food Safety**: Assurance that food will not cause harm to the consumer when it is prepared and/or eaten according to its intended use.

- **GAP (Good Agricultural Practices):** A collection of principles to apply for on-farm production and post-production processes, resulting in safe and healthy food and non-food agricultural products, while considering economic, social and environmental sustainability.

- **Food security** is ensured when all people, at all times, have physical and economic access to safe, sufficient and nutritious food to meet their dietary needs and food preferences for an active and healthy life.

- **Nutrition security** is when all people at all times consume food of sufficient quantity and quality in terms of variety, diversity, nutrient content and safety to meet their dietary needs and food preferences for an active and healthy life, coupled with a sanitary environment, adequate health and care.

Chapter 1: Basics of Human Nutrition

Introduction

Human nutrition describes the processes of obtaining and use of necessary nutrients from foods to maintain structural and functional integrity of our body. The state of under-nourishment results in micronutrient and macronutrient deficiencies which affect the health, agricultural productivity, educational performance and socio-economic development of a country.

Undernutrition is high in Ethiopia and has been affecting the socio-economic development of the country. The government of Ethiopia identified undernutrition to be among the important action areas for national development and Ministry of Agriculture has been engaged in implementing nutrition sensitive interventions to contribute for improving nutrition of the population of the country.

Understanding the basic concepts of nutrition is important to integrate nutrition into agricultural programs. Agriculture has huge potential to impact on nutrition and has been the focus of the government and development partners working in the area. DAs are the frontline actors of the agriculture sector and this section is designed to give them scientific background on the basic concepts on nutrition.

Main Objective

At the end of this session, the trainee will be able to apply basic concepts of human nutrition in achieving nutrition and food security to tackle the problem of malnutrition.

Learning objectives

- Describe basic concepts of human nutrition, food security and nutrition security
- Describe dietary diversity
- Discuss malnutrition and its different forms
- Identify causes of malnutrition
- Discuss the effects and impacts of malnutrition on the community
- Describe the current level of malnutrition nationally

1.1 Basic Concepts of Nutrition, Food and Nutrition Security

Food is any substance plant or animal based which is consumed to provide nutritional support to our body. It is usually of plant or animal origin. Meal is a food served and eaten at a time. Nutrition is the intake of food in relation to the body's dietary need. Nutrients are components in foods that an organism uses to survive and grow. There are two types of nutrients: Macronutrients and micronutrients.

- **Macronutrients** provide the bulk energy an organism's metabolic system needs to function. It includes carbohydrates, proteins and fats.
- **Micronutrients** are vitamins and minerals found in foods which are required by our body in small amounts but are vital to development, disease prevention, and wellbeing.

Nutritional requirements refer to the different nutrients required by the body for energy, growth and repair, as well as protection from disease. Nutritional requirements differ according to age, gender, physical activity, height, weight, and health status of the individual.

1.2 Food Groups

1.2.1 The six food groups for children

Foods are combinations of nutrients, and naturally contain a lot of one nutrient and less of other. Foods are hence grouped according to the nutrient they contain in abundance. After six months of exclusive breastfeeding, the intake of food from different group including animal-source food for children is of special importance.

In Ethiopia, it is recommended that children should consume at least 4 of the six food groups every day. All the six food groups are important and should be eaten to complement each other in increasing dietary intake and utilization of various nutrients by the body.

Seasonal variation dictates various types of foods to be available at a certain time of the year in various agro-ecologies. Knowing this helps individual households plan ahead on how to diversify

their meal, depending on the availability of various food groups in different seasons. Therefore, DAs are advised to prepare crop calendar for each area and help households plan what crops to grow and livestock to raise or locally purchase in the different months of the year.

Table 1: The six food groups for Children

Food Groups		Examples
1	Staples	
2	Pulses and nuts	
3	Vegetables	
4	Fruits	
5	Animal source Foods	
6	Oils and Fats	

1.2.2 The Ten food groups for women

Women need to eat at least five of the ten food groups listed below to have adequate micronutrient intakes.

Table 2. The ten food groups for women

Food groups			
1	Grains, white roots tubers, and plantains	6	Eggs
2	Pulses (beans, peas and lentils)	7	Dark green leafy vegetables
3	Nuts and seeds	8	Other vitamin A-rich fruits and vegetables
4	Dairy	9	Other vegetables
5	Meat, poultry and fish	10	Other fruits

Source: Food and Nutrition Technical Assistance III Project (FANTA). 2015. Measuring the Quality of Women's Diets: Consensus on a Global Indicator for Women's Dietary Diversity. Washington, DC: FHI 360/FANTA

1.3 The six different types of nutrients:

1. **Carbohydrates** – are the main source of energy for our body. Cereal, grains, roots and tubers are the main source of carbohydrates.
2. **Proteins** - are the building blocks of the body tissue and can also serve as a energy source. Meat, egg, poultry, milk, fish and legumes are main source of protein.
3. **Fats** - give the body energy and help the body absorb vitamins. Fats have twice as many calories as proteins or carbohydrates. Butter, fats, oils, fruits such as avocado, nuts and soybeans are good source of fat.
4. **Vitamins** – are essential for normal growth and health. they are required in small quantities every day. Most vegetables and fruits are good source of vitamins.
5. **Minerals** – are nutrients such as iron, calcium, iodine, zinc and magnesium that are important for normal body growth and health. Animal (milk, meat, fish etc) and plant food sources (vegetables, fruits whole grains etc) provide the important minerals.
6. **Water** - is needed for our body functions, including to maintain the health and integrity of every cell in the body.

1.4 Dietary diversity

Dietary diversity is a measure of the number of individual foods or food groups consumed a day. Dietary diversification is a common food-based approach used to enhance nutrient intakes of vulnerable population groups and the total population.

Dietary diversity is considered low when the number of food groups consumed is below four food groups for children and five food groups for women a day based on their respective reference values. Adolescents and adult population groups need to make their food intake as diverse as possible to meet their body food and nutrient demand for an active and healthy life.

Figure 1.1: Diversified diet

Low dietary diversity is a problem in Ethiopia where diets are frequently based on starchy staples e.g. teff, maize, sorghum, inset, and wheat. The diet often lacks animal-source foods, fruits and vegetables which are rich in micronutrients.

While staple foods and fats are important sources of energy in the diet, many of the important vitamins and minerals essential for a healthy diet are found in large quantities in animal source foods, fruits and vegetables, and legumes. Micronutrient deficiencies are particularly common among low-income rural households, and areas where diets are predominantly based on staples diets.

Figure 1.2: Examples of nutrient dense foods

1.5 Malnutrition and Its Different Forms

Malnutrition includes over-nutrition and under-nutrition.

Under-nutrition is the result of insufficient quantity and quality of food and frequent episodes of infectious diseases. Under-nutrition is reflected as being underweight, being short, being thin or overall poor nutritional status. A child is defined as undernourished if it is very thin or much shorter than the average for their age and sex (see Figure 1.3 and 1.4).

Figure: 1.3: Undernourished baby

Over-nutrition results from excess nutrient in-take relative to the requirements based on age, gender, physical activity, height, weight, and health status of the individual. In Ethiopia over-nutrition is still low, but on the rise in urban populations with increased exposure to energy-dense foods. Effects of over nutrition include increased lifetime risk of chronic diseases, including hypertension, diabetes, cardiovascular disease, obesity and various forms of cancer.

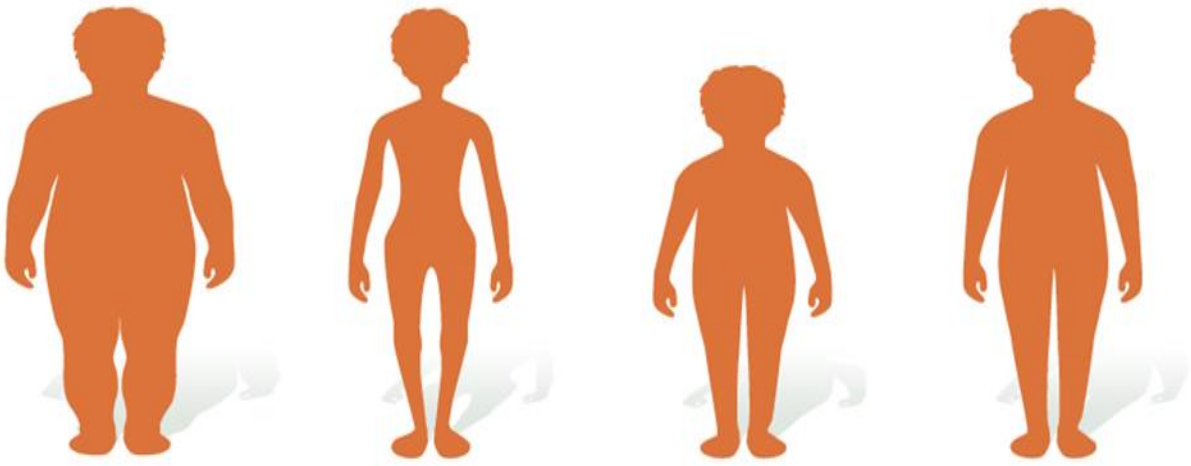
The following are the different forms of undernutrition in children

I. **Wasting** is the result of acute or short-term insufficient food intake often combined with frequent illness. It results in a child who is very thin (very low weight for its height and sex).

II. **Stunting is** an indicative of long-term insufficient energy and micronutrient intake due to poor diets and non-nutritional causes such as chronic infections. The condition results in a child who is very short (very short height for its age and sex).

III. **Underweight** is an indicator assessing adequacy of weight-for-age which could be wasted or stunted child or both. It refers to a body weight which is low to be healthy. The causes of which can be both short-term and or long-term.

IV. **Poor micronutrient status** is when there is a deficiency in vitamins and minerals because of food which is poor in micronutrients content. Micronutrient deficiencies can also result from frequent illness (diarrhea, warm infestation etc.)



Over nutrition: excess body weight for height and age

Wasting: too thin for height

Stunting: too short for age

Good nutrition status, or may suffer **micronutrient deficiencies**

Figure 1.4: Types of malnutrition

1.6 Causes of Malnutrition

Malnutrition is caused by economic poverty, low dietary diversity, culture, eating habits and the likes. Poor access to water, sanitation and hygiene practices are also important factor for the development of malnutrition.

The conceptual framework developed by UNICEF provides a clear framework of the various factors associated with under-nutrition and it depicts the distinct levels at which these factors act (Figure 1.2). The causes of under-nutrition are divided into three levels: immediate, underlying and basic and are explained as follows.

- **Immediate causes (individual level)**: Inadequate food intake and disease are immediate causes of under-nutrition. These are at the individual level.
- **Underlying causes (household and community level)**: Household food security, social care for mothers and children, access to WASH & healthy environment and access to health services are the underlying causes that contribute to under-nutrition.
- **Basic causes (sub-national, national and international level)**: Political, cultural, financial and environmental factors also contribute to under-nutrition at the basic level.

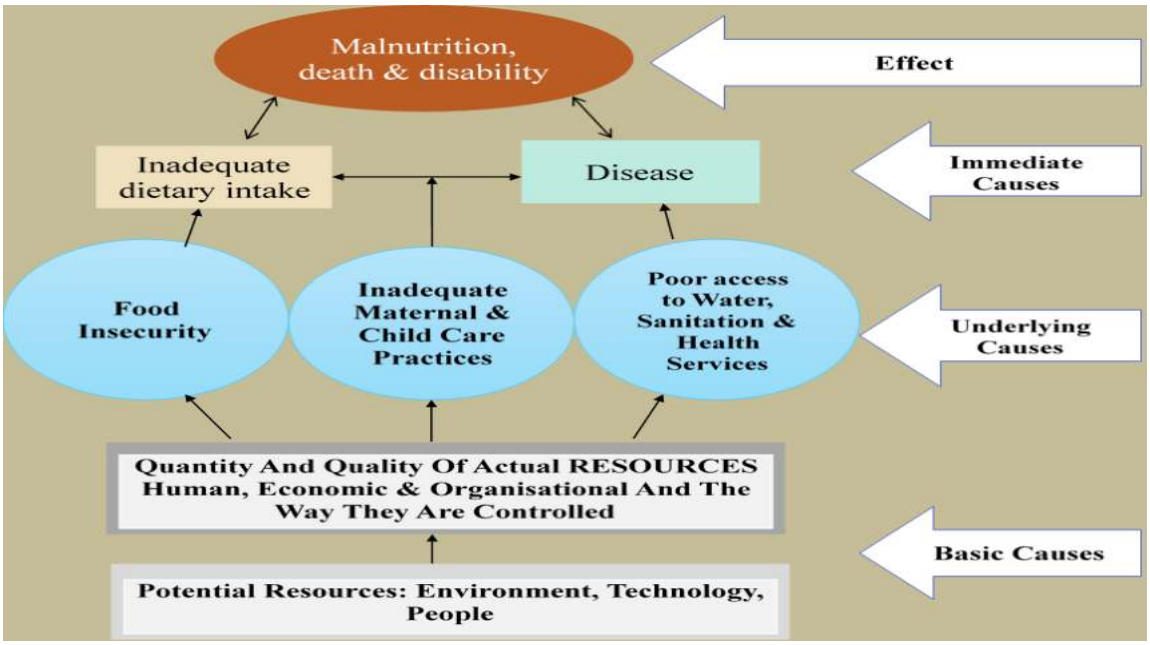


Figure 1.2: Conceptual framework for under-nutrition – UNICEF 2013.

1.7 Effects and Impact of under-nutrition

Malnutrition has a multifaceted effect in the society and affects wellbeing and effectiveness of an individual from childhood to adult both in the short- as well as long-term.

Figure 1.5: Goiter

The right nutrition during the 1,000-days (270 days of pregnancy, 180 days of exclusive breast feeding and 550 days) windows has a profound impact on a child's ability to grow, learn and thrive and a lasting effect on a country's health and prosperity.

Optimum nutrition during this period provides the essential building blocks for brain development, healthy growth and a strong immune system.

Figure 1.6: Baby with blind eye due to Vit. A deficiency

Short-term effect of undernutrition

- Malnutrition significantly increases the risk of mortality in children while under-nutrition increases the susceptibility to and severity of infections in childhood.

Long-term effect of undernutrition

- Malnutrition lead to impaired mental development, ability to learn in childhood and work productively in adulthood.
- Low birth weight may increase the risk of chronic diseases such as diabetes and cardiovascular diseases during adult hood.
- Stunted children have higher risk of becoming shorter adults while a woman's being stunted increases risk of having a low birth weight baby.
- Stunted children perform less at school and have lower income in adulthood.
- Under-nutrition during pregnancy can have a devastating impact on the healthy growth and development of a child.
- Under-nourished babies in the womb have a higher risk of dying and are more likely to face lifelong cognitive and physical deficits and chronic health problems during their adulthood.

Therefore, pregnant and lactating women and children under the age of 2 years are the priority groups for nutrition interventions. Women should be well nourished before, during and after pregnancy. Pregnant women need one extra meal per day to maintain themselves and the infant in the womb. Similarly, lactating women need two extra meals per day for their own body recovery, for adequate breast milk production and proper growth and development of their child as a result.

1.8 Status of Under-nutrition in Ethiopia

Under-nutrition is among the major socio-economic development problems in Ethiopia.

- Only 7% of children aged 6-23 months meet the minimum acceptable diet.
- 38% of children under the age of 5 years are stunted (short for their age);
- 10% are wasted (thin for their height);
- 24% are underweight (thin for their age), and 1% are overweight (heavy for their height).
- 22% of women aged 15-49 are thin (with BMI less than 18.5), and 8% are overweight or obese.

Summary

- Ethiopia is a country where malnutrition is widespread and affecting the health and development of a nation.
- Providing balanced nutrition during the first 1000 days of a child from conception till the age of two years old is key to ensure optimal health and life of an individual.
- Malnutrition has short and long-term impacts and needs to be addressed with a sense of urgency.
- Infants, pregnant and lactating women are the most vulnerable group to malnutrition and priority needs to be given to them.
- Dietary diversification contributes to improve nutritional status of households.
- Healthy diet can be achieved by consuming food from at least four food groups for children.
- A family should plan what to grow and to buy through the different seasons of the year based on agro-ecological suitability and conditions allow.

Self-Assessment Questions

Q1. What is the difference between food security and nutrition security?

Q2. Explain how agriculture provides a diverse food for consumption.

Q3. Explain the different forms of malnutrition.

Q4. Discuss the causes of malnutrition.

Q5. Describe the short and long-term effects of malnutrition.

Chapter 2: Agriculture and Nutrition Linkage

Introduction

Agriculture is the major source of food and income in Ethiopia. Access to and availability of food contributes for improved household food security. When agriculture is integrated with appropriate nutrition interventions approaches, it increased access to adequate, safe and diversified foods and improves nutrition through consumption of diversified diets.

Agriculture plays the key role for nutrition through different impact pathways. Agriculture and food security programs should incorporate appropriate nutrition objectives, indicators and interventions for improved nutritional outcomes. This chapter addresses how agriculture and impacts on nutrition.

Main Objective

At the end of this chapter, trainees will be able to discuss the linkage between agriculture and nutrition

Learning objectives

2.1. Discuss the inter-relationship between agriculture and nutrition

2.2 Explain the agriculture-nutrition impact pathways

2.3 Discuss the guiding principles of nutrition sensitive agriculture programing

2.1 Inter-relationship between Agriculture and Nutrition

Agriculture is the main source of food and income in Ethiopia. Smallholder farms are responsible for about 90 % of the food production in the country. The main role of agriculture in improvement of nutrition is through improving access to adequate, safe and nutritious foods.

Poor agricultural production can lead to poor harvest and food insecurity. Food insecurity leads to under-nutrition which negatively affects agricultural productivity, socio-economic development, educational performance, and community health. Poor nutritional status among farmers can lead to reduced agricultural productivity, a decline in household income and food insecurity.

Improved nutritional status is an input for increased agricultural productivity. Good nutritional status is necessary for productive and healthy community.

Table 2.1. Description of the relationship between agriculture and nutrition.

No	Agricultural Interventions	Explanation linkages
1	Adequate and appropriate agricultural technologies and inputs (crops, animal, fertilizer, etc…)	Adequate and appropriate agricultural technologies and inputs improve access to nutrient dense nutritious crops and animal source foods which can improve nutritional status of HH.
2	Improved nutrition sensitive agricultural practices (cropping, animal rearing practices, technology, etc…)	Cropping and farming systems that produce variety of nutritious foods helps to improve the availability and consumption of diversified foods at the household level.
3	Nutrition sensitive food value chain (storage, processing, distribution, marketing, etc…)	Good agricultural practices result in better production, but only with improved harvesting, storage, transportation and proper marketing. Proper processing and storage is necessary to maintain the nutrient content of the food. The better the food value chain the better the availability and quality of food.
4	Increased household food security and income	Increased production and yield improves household consumption and income through selling marketable products that helps to purchase additional nutritious food.
5	Better household income improves lives, invests in health care and education	When households have better income, they have the capacity to improve their lives, invest in health care and education for their children and other family members.
6	Good access to food (availability, nutrient quality and affordability)	For consumption of adequate and diversified foods, there should be good access to food (both amount and quality). Better access is determined by good value chain practices.
7	Improved food consumption and caring and feeding practice (diversity, HH food expenditure, good feeding practices, etc.)	When households have good access to adequate and diversified foods, the consumption of such foods will likely be improved. Good agricultural practices that yield good production are also important for improved consumption.
8	Improved nutritional status (of farmers, women, children, etc.)	Better consumption and feeding practices will result in improved nutritional status. The investment in health care and education will also contribute to improved nutritional status.
9	Productive and healthy farmers, women and children	The outcome of improved nutritional status is productive and healthy farmers. This is an important input for establishing improved agricultural practices.
10	**Nutrition education**	Good agricultural practices alone may not result in improved consumption and feeding practices. HH should also have access to nutrition information that supports positive behavior change.

Source: NNP II, Ethiopia

In Ethiopia, level of productivity and household food security varies significantly due to diverse agro-ecology, soil fertility and land holding size differences among farmers. Furthermore, due to natural and manmade causes, the traditional modes of subsistent production are no longer a guarantee to ensure food and nutrition security. Rural households in some parts of the country are under permanent state of food insecurity, suffering from hunger and under-nutrition.

In Ethiopia, there is no difference in prevalence of undernutrition between food secure and insecure woredas. This clearly proves that increased agricultural production and food security is not by itself a guarantee for nutrition security. To ensure the contribution of increased production and food security for nutrition security, agricultural activities should incorporate appropriate nutrition-sensitive interventions (*Refer chapter 4*).

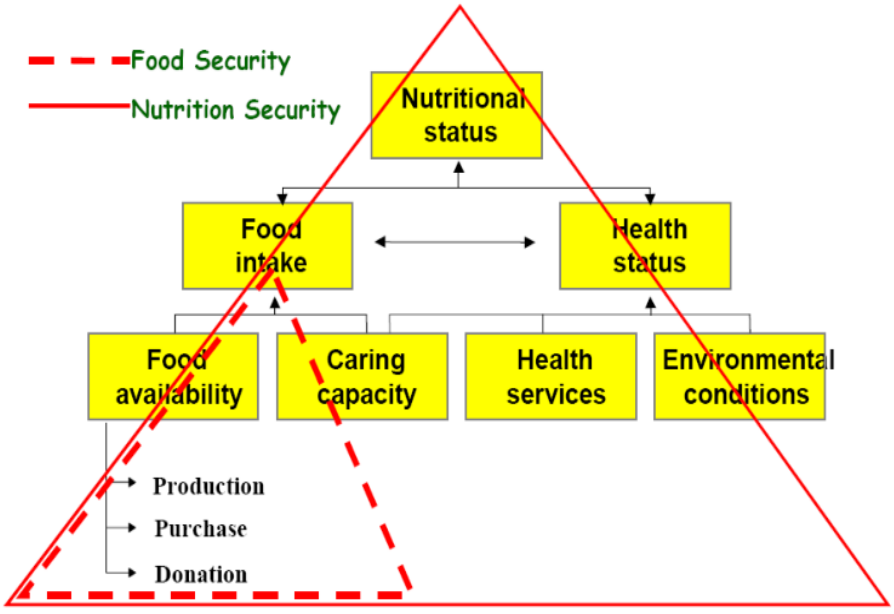


Figure 2.1 Conceptual framework of food security and nutritional status at household level

2.2. Agriculture to Nutrition Impact Pathways

Agricultural development through increased access to diversified foods is one of the main contributing factors for nutrition security. Three main pathways are identified through which agricultural interventions impact nutritional outcomes and described as follows.

2.2.1 Agricultural Production for Own Consumption Pathway

This pathway refers to subsistence -oriented food production for the household's own consumption. Plant and animal source foods produced at small scale levels increases access to household foods better than commercial farms which in most of the times sales the products for local and international markets.

Therefore, development agents should promote, design and implement interventions that increase food production for own consumptions. Home gardens, poultry production for egg and meat, and rearing of small ruminants are good examples of these kind of interventions at household levels.

2.2.2 Agricultural Production for Increased Household Income

It refers to agricultural production oriented for sale of products in markets mainly to earn income for the household including purchase of nutritious food. Development agents should identify the food items (food groups) that are not produced by households in the community and promote the purchase of these foods in the markets from the incomes obtained from sale of the agricultural products. Therefore, agriculture experts and development agents should maximize the effectiveness of this pathway through nutrition social and behavioral change (SBC) interventions and strengthening market linkages.

2.2.3 Agriculture Program that Promote Empowerment of Women.

Agriculture interventions that ensure empowerment of women as agents instrumental to improvement of household food security and nutritional outcomes. Women tend to invest in their children's nutrition, health and well-being. The income and resources that women control yield disproportionately strong effects on health and nutrition outcomes generally.

Women who are reached by agricultural and nutrition programs appear to be effective at delivering improved nutrition outcomes. These characteristic makes women natural priorities for agricultural programs that aim at improving nutrition. However, these programs must take in to consideration the women's time and resource constraints. Development agents should take caution to avoid programs that can harm women time and resources, and the nutrition of themselves and of their children.

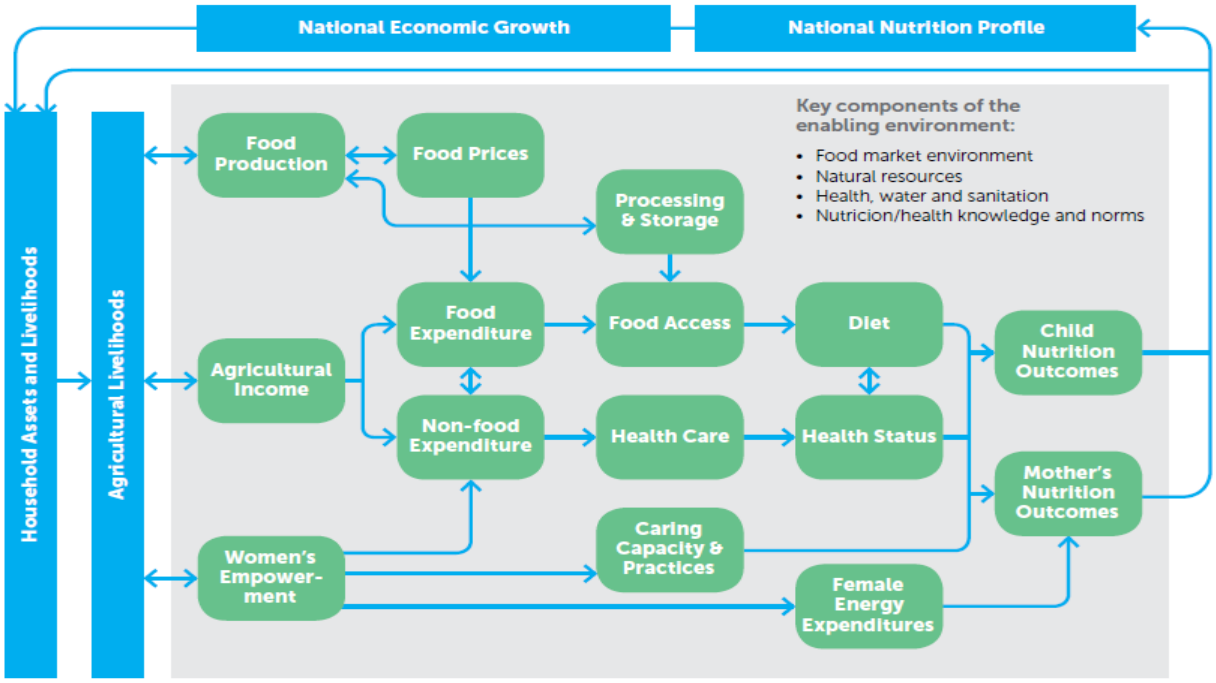


Figure 2.2: Agriculture to nutrition impact pathways framework, Feed the Future: Linkage agriculture and nutrition by Herforth and Harris (2014)

2.3 Guiding principles to Nutrition-Sensitive Agriculture (Adapted from FAO)

To ensure the positive impact on nutrition, agriculture and food security strategies and programs should incorporate clear nutrition objectives, indicators, and targets. The development agents should apply the below ten main guiding principles that should be considered during design and implementation of agriculture programs.

2.3.1 Incorporate explicit nutrition objectives and indicators

Agriculture experts and development agents should be keen enough to incorporate appropriate nutrition objective and indicators during the planning and implementation NSA activities.

2.3.2 **Assess the context at the local level**

The local context needs to be assessed to identify potential food resources, type of agro-ecology, seasonality of production and income, access to productive resources (land, market opportunities and infrastructure, gender dynamics and roles, opportunities for collaboration with other sectors and local priorities) for improved nutrition and socio-economic development.

2.3.3 Target the vulnerable and improve equity

The proposed agriculture and food security program should target the most vulnerable segment of the community, and strive to improve equity through participation, access to resources, and decent employment. Vulnerable groups may include smallholders, women, youth, elders, the landless, etc.

2.3.4 Collaborate and coordinate with other sectors

During the design and implementation of the agricultural programs, the agriculture sector should collaborate with sectors such as health, environment, social protection, labour, water and sanitation, education, energy, through joint strategies with common goals. This helps the agriculture sectors and others to address concurrently the multiple underlying causes of malnutrition.

2.3.5 Maintain or improve the natural resource base

Maintaining the resources bases such as water, soil, climate, biodiversity is critical to the livelihoods and resilience for sustainable food and nutrition security for all.

2.3.6 Empower women

Empower women working in the agriculture sectors by ensuring access to productive resources, income opportunities, extension services and information, credit, labor and time-saving technologies (including energy and water services) and supporting their voice in household and farming decisions. Equitable opportunities to earn and learn should be compatible with safe pregnancy and young child feeding.

2.3.7 Facilitate production and consumption of diversified nutrient-dense foods

Agricultural experts should identify and promote production diversification and consumption of nutrient dense crops and animal source foods. This may include promotion and support of production of horticultural products, legumes, livestock and fish, underutilized nutrient dense crops, and bio-fortified crops.

2.3.8 Improve post-harvest handing and food preservation

Post-harvest handling helps to retain nutritional value, shelf life, and food safety, to reduce seasonality of food insecurity and post-harvest losses.

2.3.9 Expand markets and market access

This guiding principle refers to expanding markets and ensuring market access for vulnerable groups, particularly for marketing nutritious foods or products vulnerable groups have a comparative advantage in producing. This can include innovative promotion (such as marketing based on nutrient content), value addition, access to price information, and farmer associations.

2.3.10 Incorporate nutrition promotion and education

Agriculture programs should incorporate nutrition promotion and education around nutrient dense food and sustainable food systems that builds on existing local knowledge, attitudes and practices. Nutrition knowledge can enhance the nutritional impact of food production and income in rural households, which is especially important for women and young children, and can increase demand for nutritious foods among the community members.

Summary

Agriculture that focuses only on increasing production and productivity cannot effectively contribute for nutrition. It plays a key role in achieving nutrition security. Increased agricultural production and food security are fundamental components of nutrition security but are not by themselves guarantee for nutrition security in the community.

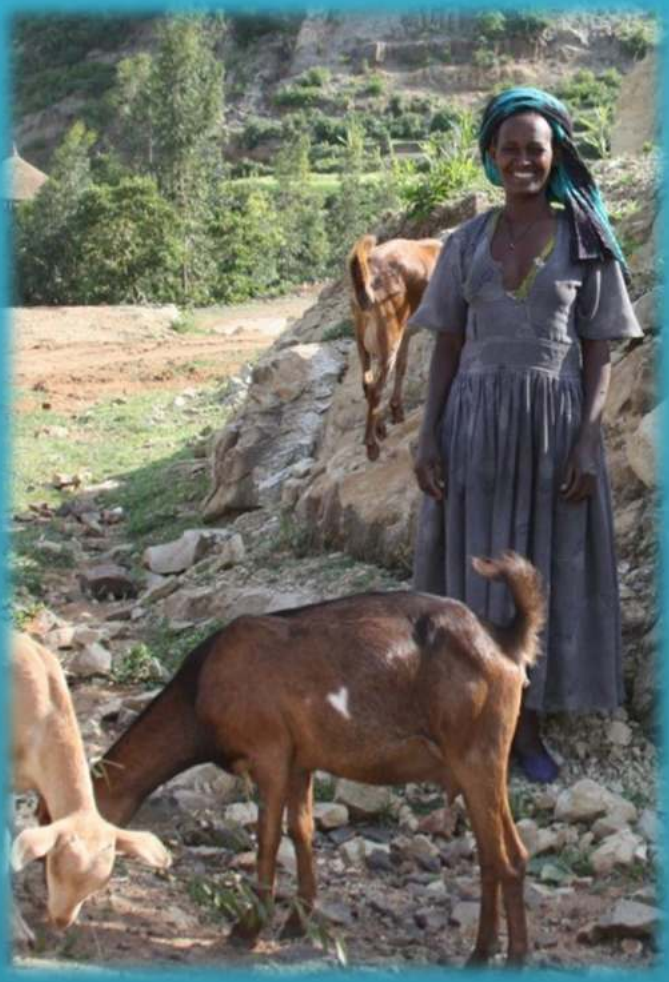
The relationship of food and nutrition security and the agriculture-nutrition impact pathways helps to design and implement effective agriculture interventions that contribute for good nutrition in the community.

Agriculture program is nutrition sensitive when its programs considered the ten guiding principles to maximizes the nutritional impact of agriculture to support household access to adequate and diverse food by targeting nutritionally vulnerable segments of the community.

Self-Assessment Questions

1. How would you explain the linkage between agriculture and nutrition?
2. What role does agriculture plays for food and nutrition security?
3. What are the pathways through which agriculture affects nutrition outcomes?

Chapter 3: Crops and Animal Source Foods and Nutrition



Introduction

Crops are the major staple foods and daily energy sources for majority of Ethiopians. Good mix of plant-based foods prepared from fruits, vegetables, pulses, cereals, roots, nuts and oil seeds are important to improve nutrition.

Animals and Animal products make important contribution to human nutrition. Animal source foods are high in nutritional value. Consumption of animal products thus improves the diets of families and is effective in addressing under-nutrition.

The Main Objective

At the end of this chapter the trainees will be able to explain nutritional values of different plant and animal source foods.

Learning objectives

At the end of the chapter the trainees will be able to

- Describe the nutritional value of plant-based foods
- Describe the nutritional value of animal source foods

3.1 Nutritional value of plant-based foods

Plant based foods constitute more than 80 percent of the daily food consumption in Ethiopia. They are important sources of many nutrients for humans. They contain carbohydrates, proteins, fats, vitamins, and minerals. For healthy and productive life farmers need to produce different agricultural products and consume diversified food. The five plant-based food groups are presented as follows:

I. Staples

In Ethiopia, the most important crop-based foods are cereals including teff, wheat, maize sorghum, barley and millet. In some parts of Ethiopia root crops like potato, enset, taro, cassava, sweet potato, and yam are the main root crops consumed as staples primarily. Staple foods are majorly carbohydrate based and are important source for energy. It usually accounts for the major portion of daily meal.

II. Legumes and Nuts

Legumes include faba bean, common beans, field pea, chickpea, lentil, grass pea, ground nuts and the likes. Legumes are important protein sources and they also provide energy.

III. Vegetables

Vegetables are low calorie, nutrient dense crops in nature and provide micronutrients (vitamins and minerals) and dietary fiber. They include green leaf and yellow vegetables such as kale, spinach, celery, cucumber, peppers, broccoli, carrots, cauliflower, pumpkin, onion, tomatoes, mushroom and others.

IV. Fruits

Fruits are good sources of vitamins, minerals dietary fibers and provide energy. People who eat fruit generally have a reduced risk of chronic diseases. They include bananas, oranges, lemons, pineapple, papaya, avocado, peach, guava, watermelon, and many others. Fruits can be obtained from wild source as well.

V. Oils seeds

Oil seeds includes sesame, sunflower, safflower, Niger seed, linseed and others. They are important source of energy and important fats for health.

3.2 Factors affecting bioavailability of nutrients from plant-based foods

A. Antinutritional Factors

Anti-nutritional factors are compounds found in food which reduce the absorption and utilization of nutrients from plants-based foods and some are toxic to our body. The common anti nutritional factors, their source and method of treatment to reduce or deactivate their effect is indicated below.

Anti-nutritional factors	Common food sources	Health effect	Treatment to reduce or remove the antinutrient factors
Goitrogens	Cabbage, kale, sweet potato, spinach, bamboo shoots etc.	Causes goiter by limiting iodine absorption	Cooking t
Cyanides	Cassava	Toxic for the body	Soak in water for 30minutes before cooking
Protease and amylase inhibitors	Legumes, egg whites, potatoes, cereals	Slows starch digestion	Cooking
Saponins	Soybeans, peas, beans, potato yam, oats, etc.	Toxic to body	Soaking prior to cooking
Phytates and Tannins	whole grains, cereals, soy, nuts and legumes	Reduces minerals absorption from consumed foods	Germination, dehulling, fermentation

B. Food Processing and Preparation Methods: Heat treatment, germination and malting of cereal and pulse-based foods improve the nutrient bioavailability of iron and vitamin A from foods consumed. For instance, nutrients from staple foods become more digestible and bioavailable when the food is cooked well and consumed while hot. Cooking vegetables for extended time destroys the vitamin C content of food consumed.

C. Dietary consumption pattern: If antinutrient containing beverages are taken along with the regular meal, the nutrients in the consumed food may not be available for absorption. For instance, taking coffee along with breakfast, lunch or dinner meal may hinder absorption of minerals like

iron and zinc from the food consumed. In the contrary preparation and consumption of a meal from different food groups improves nutrient bioavailability. For instance, consuming cereals and pulse-based foods with vitamin C rich foods improve the bioavailability of iron in plant-based foods.

3.3 Nutritional value of animal source foods

Animal source foods (ASF) provide micronutrients that are difficult to obtain in adequate quantities from plant source foods alone. Animal source foods are rich sources of nutrients, and relatively small amounts of these foods added to a plant-based food, can substantially increase nutrient adequacy. Inclusion of ASF in diets is an important food-based approach for improving nutritional status of community.

Figure 3.1: Rearing small livestock

Animal source foods are rich in protein, energy and excellent source of selected micronutrients (easily absorbable iron, zinc, calcium, vitamin A, vitamin B12, various essential amino-acids, omega-3 fatty acid and iodine). Consumption of at least one type of animal source food once a day helps our body to get essential nutrients. Avoidance of consumption of these food groups specially in country like Ethiopia increases risk of deficiency in essential proteins, iron zinc, vitamin A, and the likes.

3.4 The major type of animal source foods and their nutritional values:

I. Poultry products

Poultry products contributes to improved human nutrition and food security. It is source of high-quality protein in the form of eggs and meat. Eggs also contain vitamins A, D, E, K and the B-complex.

Figure 3.2: Poultry product

II. Dairy products

Dairy products are the most nutritious foods. However, the national milk production and the overall milk consumption in Ethiopia are very low. Per capita consumption of milk in the Ethiopia is as low as 17 kg per head while the average figure for Africa is 26 kg per head.

Milk contains biologically active compounds, which have physiological and biochemical functions important for human nutrition and health. It contains calcium, magnesium, selenium, riboflavin, vitamin B12 and pantothenic acid (vitamin B5). Milk consumption is important for growth and bone strength.

Figure 3.3: Dairy products

III. Meat from livestock

Meat products are good source of protein, iron, zinc, vitamin A and Vitamin B complex. The inclusion of animal source foods makes it easier to ensure a good diversified diet for children and household members. Meat is important source of quality protein, vitamins and minerals. From vitamins, meat is rich in B-vitamins including thiamin, riboflavin, niacin, biotin, vitamins B6 and B12, pantothenic acid and folacin. Livers is good source of folic acid and Vitamin A. Meat is also important source of iron copper, zinc and manganese.

Figure3.4: Meat

IV. Fishery

Fishery plays an important role in nutrition security and food security. Fish is good source of proteins, healthy fats, omega-3 fatty acids, iodine, vitamin D, and calcium. Fatty fishes are rich in omega 3 fatty acid and small fishes can be eaten contributing for good nutrition. Consumption of fish is important to prevent iodine deficiency and occurrence of goitre.

Figure 3.5 : Fish

Summary

- Staples, vegetable, fruits, Legumes and nuts and oil seeds are the major crop-based food source.
- Fruits and vegetables are highly nutritious, and their consumption needs to be increased.
- Animal source food are highly bioavailable and contribute for better nutrition.
- Small amounts of ASF added to plant-based foods substantially increase nutrient density.

Assessment questions:

1. What is the basic difference between animal and plant source protein?
2. Mention at least three crops used for protein source?

Chapter 4: Nutrition Sensitive Intervention Approaches for Improved Nutrition

Introduction

Nutrition sensitive agriculture in the food systems requires action to address input quality, production, productivity, post-harvest handling, processing, marketing and consumption to deliver safe and nutritious foods all year round. This contributes to improved nutrition outcomes through diversified, safe and nutrient-rich food production and income generation. It also improves access to health service, maternal and child care, education, sanitation, labor-saving technologies and women empowerment activities. This chapter addresses the major nutrition sensitive agriculture interventions which improve nutritional status of the community.

The Main Objective:

At the end of this chapter the trainees will be able to apply nutrition sensitive intervention modalities for improved food and nutrition security.

Learning objectives

At the end of the chapter the trainees will be able to

- Identify the diversified food production system and consumption to improve nutritional status of the community
- Describe the importance of biodiversity for nutrition
- Describe the importance of bio-fortification on the role of improving nutrition
- Describe the importance of food handling, storage and processing to improve nutrition
- Describe the effect of good agricultural practice and food safety for nutrition
- Describe the importance of value chain for nutrition
- Discuss Women's empowerment and gender equality for nutrition
- Discus how improved agricultural income improves nutrition
- Describe the role of market linkages for improved dietary diversification
- Describe the role of Nutrition education and behavior change communication to improve nutrition

4.1 Diversified food production and consumption to improve nutrition

Diversification of food production improves the availability, affordability, stability and to consumption of diverse foods and to promote healthy, nutritional and sustainable diets for all. In areas where commercialization or specialization is recommended, farmers should be advised to diversify their production system through:

I. **Integrated farming systems**: is the practice of producing multiple agricultural products from different farm enterprises that share available resources. The system integrates different crop production, crop and animal production like agro-silvipastoral systems, legume-based cropping systems including crop rotation and intercropping. These systems improve food security, dietary diversity and nutritional security.

Figure 4.1: Integrated farming

II. **Home gardening** with emphasis on nutrient-dense varieties of livestock, vegetables and fruit trees and small-scale integrated farming systems (e.g. mixed crop-livestock aquaculture systems) to improve diet quality and raise levels of nutrition for producing households.

Figure 4.2: Homestead gardenining

III. **Livestock ownership** (e.g. cattle, chicken and other poultry, small ruminants such as goats and sheep) can contribute to dietary diversity and nutritional outcomes through home consumption and income generation, especially if accompanied with nutrition education aimed at promoting consumption of ASFs including for complementary feeding.

Figure 4.3: Rearing Small livestock

IV. **Complementary activities** such as beekeeping, mushroom and high-value crop farming, milk production, and maintaining fish ponds may also be included in these strategies to enhance income and livelihoods.

Figure 4.4: Complementary activities for improved household income

4.2 Biodiversity for food and nutrition

Biodiversity plays key role in ensuring dietary diversity and assuring nutrient adequacy. Globally, there is a huge loss of biodiversity due to environmental degradation, industrialization and urbanization. Protecting biodiversity and prioritizing genetic resources to develop new nutrient-dense, pest-resistant, climate-smart varieties is key to combat malnutrition. Agriculture development programs need to consider biodiversity protection and utilization for improved food and nutrition security.

4.3 Bio-fortification for improved nutrition

Bio-fortification consists in developing new varieties of staple crops with the explicit intent of enhancing levels of micronutrients. Bio-fortification is most commonly accomplished using conventional plant breeding and agronomic bio-fortification (i.e. application of micronutrient-rich fertilizers via soil or leaves). Various animal source foods such as meat, milk and eggs have been fortified through fortification of animal feeds.

Fig: Bio fortified Crops

Figure 4.5: Quality protein maize and Orange fleshed sweet potato

Types of nutrients	Examples of crops fortified with different nutrients
Vitamin A	Cassava, maize, orange-fleshed sweet potatoes, golden rice
Zinc	Rice, wheat, beans, sweet potatoes, maize
Iron	Beans, pearl millet, rice, sweet potatoes, cassava, legumes
Protein	Maize, sorghum, Cassava

4.4 Good Agricultural practice (GAP) and food safety for nutrition

Good Agricultural Practices (GAP) are practices that address environmental, economic and social sustainability for on-farm processes and result in safe and quality food and non-food agricultural

products. Food safety refers to the assurance that food will not cause harm to the consumer when it is prepared and/or eaten according to its intended use.

Food safety is defined as a suitable product which when consumed orally either by a human or an animal does not cause health risk to consumer. There are three potential sources of health risks caused by food:

I. Chemicals – Improperly stored, handled, or used chemicals can be a source of contamination. Examples of chemicals used in food production include: fertilizers, sanitizers, synthetic and non-synthetic pesticides/herbicides/fungicides, equipment lubricants, cleaning agents, etc.

   Exposure to higher levels of aflatoxin which is produced by aspergillus fungus increases risk for cancer and neural tube defects in children. Aflatoxin can be produced both in preharvest and post-harvest time. Corn, nuts such as peanuts, oil seeds such as cottonseed, as well as copra, the dried meat of coconut, are some of the commodities with greater risk of aflatoxin contamination. Pulses and sorghum have lower risk. Animal feeds, such as hay and straw, might be contaminated during pre-harvest or drying stages resulting in aflatoxin contaminated animal products.

II. Physical – Examples include screws, glass, hair, staples, wood, jewelry, insects, etc.

III. Microbial (biological) –Thousands of microbes (organisms too small to see with the naked eye, e.g., bacteria, viruses, parasite) are naturally present in our everyday environment. They can be found all around us in the soil, the air, on our skin, in our water, etc. Microbes that cause illnesses are known as pathogens. Illnesses can range from mild cases of diarrhea/vomiting to life-threatening cases involving hospitalization and in some cases death. Examples include viruses, bacteria, parasites, and fungi. Fresh animal-source food, vegetables and fruits are at highly exposed to food safety hazard. Produce that is not cooked (raw) is therefore considered to have higher risk for pathogens than those fruits and vegetables that are cooked. Children, and pregnant are at greater risk to be affected by this problem

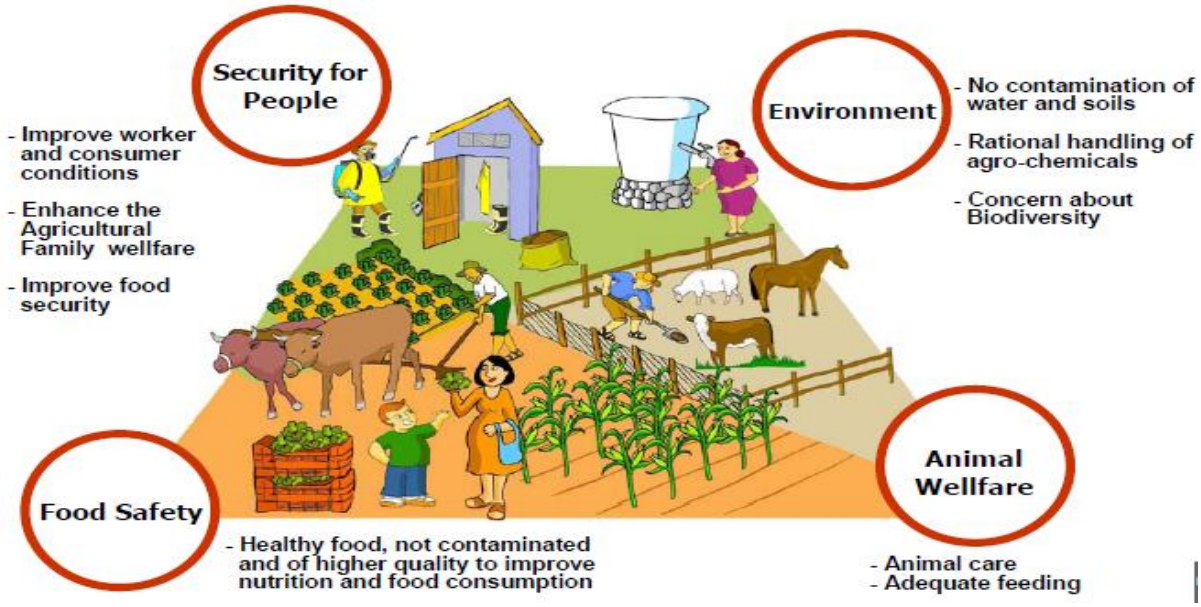


Figure 4.6: Four Pillars of good agricultural practices (GAP)

GAP focuses on the best practices to be used for producing agricultural products to ensure the quality and safety of the final product.

Food quality and safety standards are systematic preventive approaches to food safety that aim to protect public health and improve accessibility of nutritious and safe foods. Risks related to food safety and hygiene can be controlled at various points of the supply chain through:

- ✓ Promote proper application, frequency and amount of agricultural inputs
- ✓ Promote integrated pest management;

4.5 Food handling practice for improved nutrition

Food handling includes all the steps from farm to plate that harvested plant and animal produces passes through the supply chain. Food loss can include loss in nutritional value, economic value and/or food safety. Food loss can take place at primary production level and at post-harvest (handling and storage), processing, distribution and consumption stages in the agricultural, livestock, fisheries or forestry food supply chains.

Causes of food loss and waste are context-specific and may relate to gaps in capacity of the food supply chain actors, inadequate storage facilities and food packaging, lack of access to markets and consumer behavior.

The following handling practices improve nutritional contribution of different food products:

- ✓ Crops must be harvested at an appropriate stage of maturity
- ✓ Good post-harvest handling, supported by appropriate transport and logistical operations, including efficient, is critical to maintaining the quality of food as it moves from the producer to the fresh produce market
- ✓ Promote on techniques to optimize the shelf-life and nutritional quality of foods processing techniques like soaking, malting, sprouting, and fermentation of grains and pulses can enhance their vitamin, mineral and protein content and bioavailability
- ✓ Promote appropriate cooking techniques (avoid overcooking, over drying, and prolonged sun exposure to retain nutrient content of the produce)

4.6 Women empowerment for nutrition

Women empowerment are at the nexus of the agriculture, nutrition and health sectors. Research shows that resources and income that women control have positive impacts on nutrition because they are more likely to be directed towards food, education, health and care.

Women empowerment for nutrition can be addressed through:

- Ensuring access to productive resources (land, agricultural inputs, extension services for female headed, trainings…)
- Introduction of time and labor-saving farming technologies
- Male involvement in household care practice
- Women involvement in the house hold budgeting and income

Refer *Chapter 6* for detailed information on gender and nutrition.

4.7 Income generation for improved nutrition

Regular and decent incomes for consumers is essential to achieve good nutrition. It allows purchase of healthy foods, access to health care and education services. Increase in household income does not necessarily relate to improved nutrition. Factors such as information on nutrition, intra-household income distribution, joint house hold decision making on income, household food preferences and other determinants affect the contribution of income on nutrition. With increasing specialization of agriculture and food systems, income becomes more important for diversifying household diet.

Income generating opportunities:

- Value addition practice (fruits, vegetables, roots, etc. processing)
- Caged poultry production
- Seed and seedling multiplication
- Off farm activities (wage labor, pottery, petty trade…)
- Fattening and dairy farming practice
- Horticulture and spices
- Bee keeping
- Fishery/aquaculture

Figure 4.7: Vegetables production for income

4.8 Agricultural market linkages for improved nutrition

Marketing helps to balance food deficits and surpluses across countries, facilitating the availability of food and contributing to price stability. In the context of urbanization and increased market reliance, looking at trade through a nutrition lens is becoming important to maximize nutritional benefits.

Therefore, to promote and sustainably increase availability, and affordability of diversified nutritious foods for household consumption to improve nutrition, it is important that DAs:

- Facilitate farmers' access to market information.
- Create market linkages for agricultural products
- Enhance the purchasing power of low-income groups through income generation
- Facilitate access to fresh foods for consumers, safe packaging and transportation of perishable food items

- Promoting the nutrient dense food in local market

4.9 Nutrition-sensitive social protection

Safety nets and social protection schemes can play an important role in improving nutrition and addressing the social and economic determinants of malnutrition. The acute and long-term negative effects of shocks can be reduced if social protection systems already in place can be expanded and adapted in a timely manner. Every social protection program provide specific entry points for increasing their impact on nutritional outcomes.

Social protection helps families to access nutritious food, while helping to develop their productive asset base which is critical for sustaining good nutrition in the long term and facilitating access to health care and services through:

- Social assistance schemes designed to support the nutrition of vulnerable groups. Food transfers in kind can be maximized by adding nutrition education component, and by ensuring high nutritional quality of food baskets. This can include provision of nutrient-rich foods (e.g. animal-source foods, fruits and vegetables), fortified flours and bio-fortified staples.
- Social assistance schemes designed to support transfers of productive assets, which can integrate provision of "nutritionally interesting" assets such as dairy cows, small ruminants, poultry, fish or nutrient-rich seeds (i.e. fruits and vegetables).
- Promoting local procurement for social assistance programs, such as for school meals or food distribution, can improve nutrition for both consumers and poor producers.
- Social insurance schemes, including health insurance, targeted weather-based insurance for crops and livestock, maternity protection and employment insurance also contribute to protecting basic pro-nutrition assets against shocks and crises.
- Promoting Self-help saving groups

4.10 Nutrition education and behavior change communication

Nutrition education and behavior change communication to community can be delivered using multiple SBC approaches is more effective than just using one. The more frequently and consistently individuals practice the desired behaviors, the higher the outcome of behavior change. Therefore, the more frequently the DAs contact and visit farmers and their families, the more likely

they will find instances of behavior change in their locality. To realize the SBC, the following points should be addressed:

- Conduct appropriate knowledge, attitude and practice gap assessment.
- Conduct selection of relevant target groups, determinants and activities
- Promoting of appropriate SBC interventions to overcome barriers of behavioral change
- Implement relevant and appropriate behavioral change principles and approaches.

Detail information on Nutrition education and behavior change communication is presented on chapter 7.

Summary

- Nutrition sensitive agriculture intervention approaches need to be implemented synergistically for improved nutrition outcome and
- Making agriculture and food systems nutrition-sensitive necessitates action to address input quality, production, post-harvest handling, processing, retailing and consumption, to deliver safe and nutritious foods all year round to the consumer
- Nutrition-sensitive agriculture and food systems contribute to reduce malnutrition through production of diverse, safe and nutrient-rich food, application of labor-saving technologies and income generation.
- Effective market linkage plays important role in sustainably providing nutrient-rich food to the consumers
- Use of effective preservation, processing and storage techniques contribute to ensure for improved nutrition.
-

Assessment Questions

1. How does diversified crop production contribute to improved nutrition of the farming community?
2. What are the possible intervention approaches to diversify crop production?
3. What are the possible consequences of crop specialization on nutrition given the current

cluster-based approach of the agriculture sector?

   a. What are the positive consequences?
   b. What are the negative consequences?
   c. What are the mechanisms to mitigate to the negative consequences of crop specialization?

4. Discus the effect of pre-post-harvest management techniques on nutrient content of a food/crop
5. How does management of natural resource contribute for dietary diversification and improvement of household nutrition?
6. How does market affect dietary diversification and nutrition?

Chapter 5: Water, Sanitation and Hygiene (WASH) and Nutrition

Introduction

Water, Sanitation, and Hygiene (WASH) refers to water, sanitation, and hygiene facilities and services. Improved sanitation facilities are those that ensure hygienic separation of human feces from human contact. This includes Pit (VIP) latrine, flush/pour flush connected to sewer system, or septic tanks; Ventilated Improved; pit latrine with slab; and composting toilet. The water component of WASH refers to household access to safe, pure, and adequate amount of water for drinking, sanitation, hygiene and small-scale irrigation purposes. The sanitation component refers to access to facilities and services to keep living environmental clean and safe for optimal health and nutrition outcome. The hygiene component refers to personal hygienic practice mainly proper hand washing.

Figure 5.1: Potable water

Rural communities in Ethiopia have poor access to WASH facilities and services. They have also limited knowledge about personal hygiene and environmental sanitation. Access to safe water, good sanitary condition, and hygienic practices are essential for safe preparation, handling, and storage of food, which is important to reduce the risk of food contamination, spoilage, and resulting in food borne illnesses. This section explains the basic WASH practices important for improved nutrition.

Main Objective

At the end of this chapter, trainees will be able to discuss WASH practices to improve nutrition at individual and household level.

Learning objectives

- Explain the effect of WASH on Nutrition
- Discuss WASH practices that help to improve nutrition
- Explain the importance and effect of small irrigation practices on nutrition

5.1 The Effect of WASH on Nutrition

Water, Sanitation, and hygiene (WASH) and nutrition are closely related. Good WASH practices contribute for good nutrition by reducing contamination and disease burdens at individual, household, and community level. Lack of access to WASH facilities and services can affect nutritional status, particularly child nutrition, in many ways. WASH affects nutrition through three direct pathways. These three pathways are described below.

I. **Through Diarrheal Disease**: Poor access to WASH facilities and practices leads to increased onset of diarrhea. Access to improved WASH facilities and services could prevent 58% of the total deaths due to diarrhea in children under five years of age. Washing hand with soap alone can reduce the risk of diarrhea by up to 40 %.

Figure 5.2: Dearrehoe, open defication

II. **Through Intestinal Parasitic Infections**: Soil-transmitted helminths infections are directly caused by poor hygiene and environmental sanitary condition. Soil-transmitted helminths infections can affect nutritional status by causing loss of appetite, mal-absorption of nutrients, and increased loss of blood.

Figure 5.3: Hook worms

Figure 5.4(Below): Children eating on the floor where animals roam

III. **Environmental Enteropathy**: Refers to the condition when an unhygienic environment affects the normal function of the gut (food digestion and absorption). Pathogens that enter gastro-intestinal tracts can impair nutritional status even in the absence of symptoms such as diarrhea. Children living in poor sanitary conditions are exposed to a high load of pathogens, especially between six months and two years of age, when they start crawling on the floor and putting objects into their mouths. Continuous infection with these pathogens causes recurring inflammation and damage to the gut, leading mal-absorption of nutrients from gut.

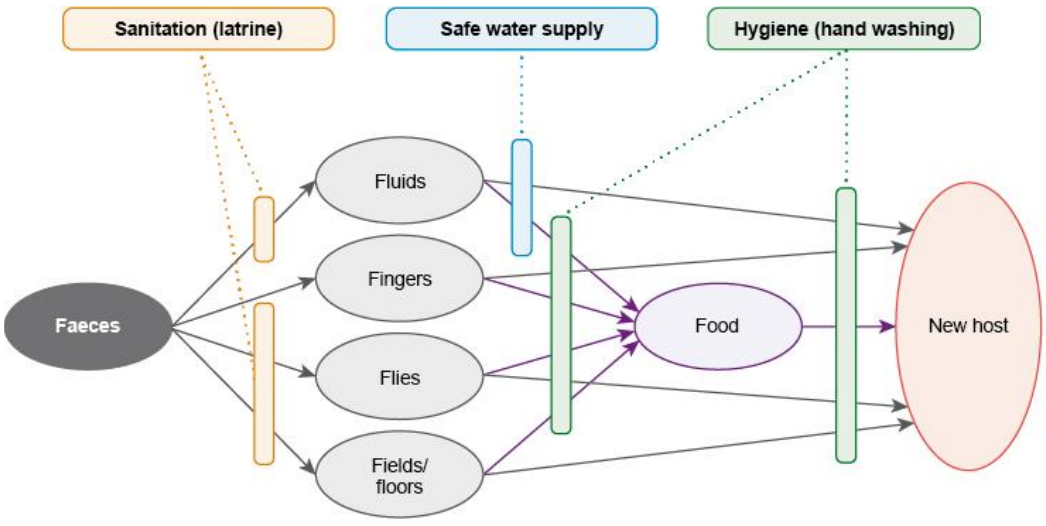


Figure 5.3: WASH-Nutrition linkage

5.2 Basic WASH Practices that Improve Nutrition

WASH and Nutrition are closely related, mainly through disease transmission pathways. To improve the nutritional status of the rural community, development agents should promote the key basic WASH activities listed below, in close collaboration with Health Extension Agents and other kebele level development workers.

- Promote access to safe water source (piped, treated, controlled spring/wells,) in the premises of the household
- Promote access to, and use *Improved* or *Shared* sanitation facilities.
- Mobilize the community to create an open defecation free village.

Figure 5.4: Washing hand after using Toilet.

- Promote proper hand washing (washing with soap or ash) at all times: before preparing food, eating or feeding a child, washing babies; milking a cow; and after toilet, cleaning a child's waste, adding fertilizers/compost, herbicides, pesticides, farming and spraying equipment.
- Promote Safe food handling practices for a safer food
  - Keep a clean environment for handling food (including hand washing, cleaning food contact surfaces and utensils, protecting food preparation areas from insects, pests and other animals)
  - Keep separately the raw and cooked foods
  - Cook food properly (do not over/under cook food to maintain nutrients and to keep its safety)
  - Reheat sufficiently before eating food which was already cooked to kill microbes

Figure 5.5: Hand Washing

- Store food at safe temperature – place unconsumed cooked food in cold place
- Use safe water and raw material for food preparation
- Milk, fruits and vegetables need to be kept away from direct sunlight

- Promote and support key WASH activities related to agricultural production
  - Water resources need to be kept away free from direct animal contacts.
  - Avoid rainwater runoff from getting directly to water reservoirs or construct settling pond to filter off contaminating dirt.
  - Keep livestock away from the active recharge area for well water that will be used for household and irrigation.
  - Keep pesticides and chemicals away during storage, preparation, use or disposal from the active recharge area for well water and drainage area that will be used for household or irrigation.
  - Use filter when possible or settling ponds to improve water quality.
  - Use potable or filtered water for making up chemical pest management sprays.
  - Wash harvest and storage equipment with clean water and dry before use
  - Keep containers off the ground before, during and after harvesting
  - Remove visible dirt and debris from fruits and vegetables in the field
  - Limit access of animals, children and other non-workers to the harvest and storage areas
  - Protect irrigation ponds. To reduce the risk of microbial contamination of irrigation ponds do not allow livestock access.
  - Keep harvesting equipment which comes in contact with fruit, clean and in good condition.
  - Protect light bulbs and glass on harvesting equipment to avoid contamination of fruit or fields in case of breakage.

5.3 Effect of Small Irrigation Practices on Household Nutrition

Access to water is one of the key constraints of diversified foods production in Ethiopia. Homestead farm production is limited mainly due to lack of access to water in rural communities to practice homestead gardening. Development agents should identify means, promote and support access to water for year-round homestead production.

Figure 5.6: Small scale irrigation

Some of the mean to increase access to water for homestead foods production are described below.

I. **Small Scale Irrigation**: Water from rivers can be diverted and accessed to households in both individual and communal water use modalities.

II. **Community Ponds:** Community pond structures can be constructed to harvest water during the rainy season and increase access of water in the dry season.

III. **Rain water harvest**: Rainwater harvested during the rainy season to cultivate fruits and vegetables in the non-rainy season.

IV. **Practicing Re-Use of Waste Water**: Water used in the household for different purposes can be stored, treated and re-used for different purposes such as for home grading.

Summary

Good WASH practices are essential to prevent food borne diseases and improve nutrition. Use of improved latrines to avoid open defecation prevents human waste from running off from fields and contaminating water sources. Proper hand washing prevents contamination of foods. Good sanitation reduces diarrhea and some intestinal parasites/worms that have severe impacts on the nutritional status and growth of children.

Agriculture is a major user of water and can damage the quality and availability of water when not properly managed. Keeping water sources clean and safe from practices that have negative impact need to be known and avoided. On the other hand, proper use of water resources needs to be designed both for human as well as agricultural purpose. Development agents should clearly understand and promote the basic WASH practices among the farmer households to improve the health, nutrition, and wellbeing of the communities.

Self-Assessment Questions

1. What are the pathways that WASH practices will affect nutrition?
2. What are the key WASH practices that help to improve nutrition?

Chapter 6: Gender and nutrition

Introduction

Gender refers the relationship between women and men. It has been described in the NNP that gender inequality is the cause and consequence of hunger and malnutrition. Gender inequality is associated with higher levels of acute and chronic under-nutrition. The nutritional benefits of increased incomes are determined by who controls the income and how it is distributed within households. Women typically spend a higher proportion of their income on food and health care for children than men.

Accordingly, World Bank identified (World Bank 2013) empowerment of women to be among the best approach to affect nutrition through agriculture. So, women must be at the center of nutrition related interventions both in the rural and urban settings.

Main objectives

At the end of the section trainees will be able to understand the concept of gender and the role of women in the family, society and their impact on nutrition outcomes.

Learning objectives

- Describe basic concept of gender
- Explain the importance of women's empowerment to improve household nutrition.
- Explain the roles of women and men in nutrition sensitive agriculture.

6.1 Basic concept of gender

Gender and sex are not the same. Sex refers to the biological attributes of men and women; these attributes are universal and cannot be changed. Gender refers to social, behavioral and culturally specific characteristics defining the behavior of women and men, boys and girls, and the relationship between them.

Gender roles, status and relations vary from place to place (countries, regions, and villages), groups (class, ethnicity, religion, etc…), generations and stages of the life cycle of individuals. Gender is, thus, not about woman or man but about the relationship between them.

Gender equality means when women and men enjoy equal rights, opportunities and entitlements in civil and political life. It means that women and men, girls and boys benefit equal opportunities,

resources, rights and access to goods and services. It also means equal responsibilities in sharing workloads and energy expended in caring for families and communities. **Figure 6.1:** Income generating activities(seedling production).

Promoting gender equality in economic activities and resource allocation has significant impact on the implementation of nutrition programs considering the social, economic and biological differences between men and women and addressing barriers to improved nutrition. Gender roles are the roles both women and men are expected to fulfill in a society as defined by the virtue of being female or male. Men and women get information about their role and division of labor from family, schools, media and society at large.

Gender mainstreaming is an approach for achieving gender equality involving and ensuring that gender perspectives and gender equality are central to policy development, research, advocacy, dialogue, legislation, resource allocation, planning, implementation and monitoring of programs and projects.

6.2 Importance of women's empowerment to improve family nutrition

Women's access to productive assets such as land, formal credit, capital, inputs and extension services is constrained. Their decision-making power on incomes and household expenditures are limited. They still contribute significantly to produce the subsistence mixed agriculture along with their male counterparts and play a greater role in the management of the household.

Figure 6.2: Model farmer

There are key issues regarding gender that need to be considered in agriculture and nutrition and these are

- ✓ equal access to land and other resources such as credit and other support services,
- ✓ the disparity of gender differences in roles be well addressed,
- ✓ gender and agriculture extension services to be equally provided to both women and men and
- ✓ women's empowerment and equal access to household decision making and ensuring intra household food distribution

6.3 The role of women and men in nutrition sensitive agriculture

Improving women's access to agriculture or livelihoods inputs and services has the potential to reduce under-nutrition in children. One reason is that money controlled by women is more likely to be spent on household including nutrition and health care for the children and the family.

The time spent on agricultural activities during the different agricultural seasons, may have variable effects on maternal nutrition status and on the child nutrition. Efforts to boost agricultural productivity must, therefore, consider the impacts of time use and physical demands–especially of female's time spent on agricultural activities. Therefore, it is important that women have access to infrastructure, time and labor-saving technologies to decrease their workload. Men need to support women to generate additional income to spend on nutrition or health care, and to help with childcare practices. Pregnant or lactating women need enough time and physical rest. Women may be over burdened with triple roles and the probability that they face time-related constraints in providing adequate care for the children and betterment of the household. Therefore, fathers need to engage in household activities normally handled by mothers so that mothers have enough time to take good care of their children and themselves.

Figure 6.3: Mother caring her child on the field

DAs are advised to closely work with HEW on maternal and child feeding and caring practices in the farming community. DAs and HEW need to understand the role of women and men in the society and help build an understanding to have a positive impact on the welfare of women themselves, small children, family and the community at large. This entails a well-coordinated and continuous engagement with the community, elders and religious leaders through sensitization and realization of the impacts and benefits of balanced gender role.

Summary of the chapter

- ✓ Gender is the relationship between men and women and the role they play in a society.
- ✓ Balanced role in economic, agriculture and labor of both men and women play a positive impact in the wellness of a family.
- ✓ Nutritional condition of a family can be improved through balancing responsibility and giving ample time and support to women to take care of themselves and young children
- ✓ Both DAs and HEW need to identify, plan, implement and monitor interventions in relation to gender and nutrition in their respective Kebeles

Self-assessment questions

1. Why do you think we need to address gender inequality issues to achieve positive nutrition?
2. What are the roles and responsibilities of DAs to promote gender equality within the context of nutrition sensitive agriculture?
3. Why are women affected more by nutritional deficiencies in the current context?
4. What needs to be done to address the nutritional challenges of communities in general and that of women in particular?

Chapter 7: Agriculture-Nutrition Social Behavior Change

Introduction

Social Behaviour Change Communication (SBCC) has been accepted as a major component of public health and agriculture programs. It plays a critical role in addressing nutrition-specific and nutrition-sensitive interventions. SBCC interventions related to agriculture and nutrition aims to reach families and communities engaged in agriculture activities to improve nutrition practices at the community and household level.

Main Objective

At the end of this session trainees will be able to apply behavior change approaches and skills on implementation of nutrition-sensitive agriculture in the community.

Learning objectives

- Explain social and behavior change communication.
- Identify target groups, determinants and activities for SBC
- Explain common barriers of NSA for behavior change
- Explain techniques of adult learning principles

7.1 Social and Behavior Change

Social and Behavior Change (SBC) is the systematic application of interactive, theory based and research driven communication. The SBC process uses strategies to address change at the individual, community and the large societal level. In the past, it was believed that providing pertinent information about agriculture issue to a farmer was considered adequate. For example, telling a farmer “use beans with high iron and zinc content” may inform the farmer, but it is difficult to determine whether the farmer acted on the information or not. Although giving information is still significant, it doesn’t bring about behaviour change. In current days with the advancement of behavioural sciences, the following points have become clear about behaviour change. The following sections define behaviour and indicate components related to social and behaviour change

Behaviour: refers to actions or response of an individual or group to the environment, the actions of another person, or other stimuli. The behaviour should be very specific, measurable and observable.

Example of behaviour change observed in households:

Before	**Expected Change:**
1. Growing one kind of crops 2. Chickens were not control in cages 3. Backyard gardening was not dedicated for children food diversity 4. Bio-fortified crops were not well practiced	1. Farmers growing cereal grains intercrop with legumes. 2. Women who own chickens keep them enclosed in cages always. 3. Parents (mothers and fathers) with children under five-year olds plant home vegetable gardens. 4. Farmers adapted bio-fortified crops (Orange Flash Sweet Potato, Quality Protein Maize, Iron Rich Beans, etc.)

Note: A behaviour is often referred to as a **"Practice**" and when behaviours or practices are done often they become a **habit**. Thus, deep-rooted habits whether in agricultural production, or food consumption determines how crops are produced, harvested, stored, prepared and used for household consumption.

7.2 Stages of Behavior Change

Behavior change takes place involving series of steps and requires strategic communication to help people to change or maintain desired behaviors. The BCC process includes identifying, understanding, and segmenting audiences and providing them with relevant information. The following pictorial slide highlights the five stages of behavior change.

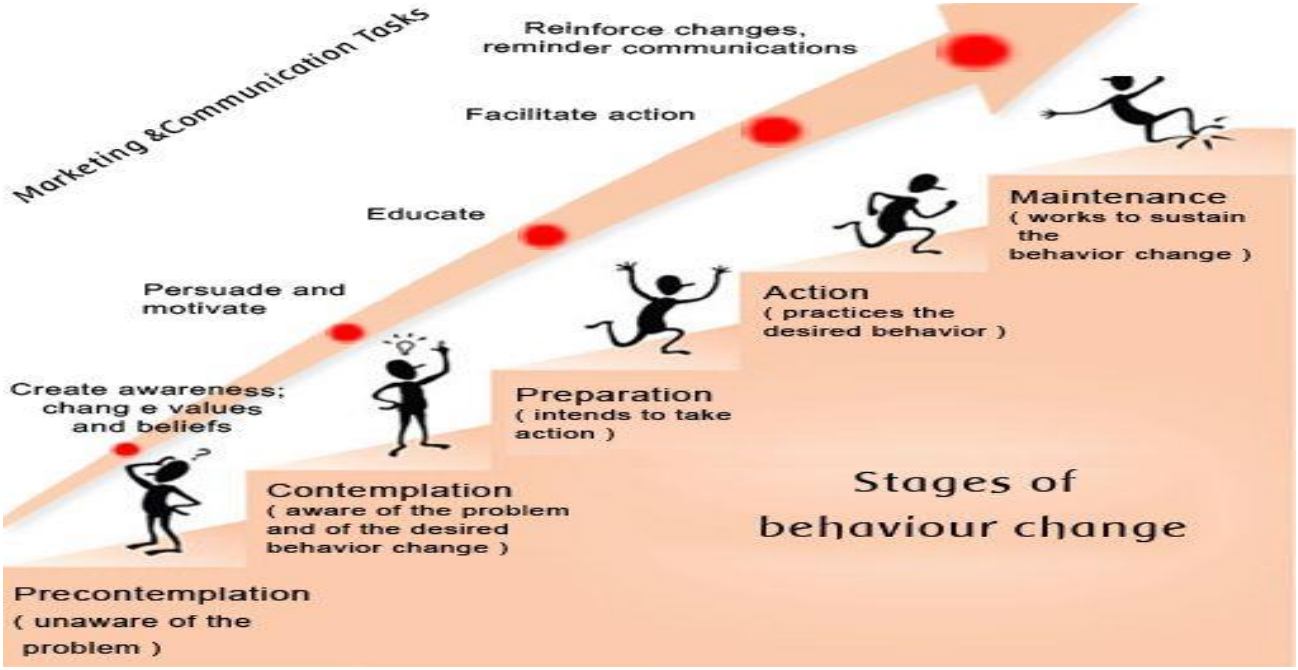


Figure7.1: Stages of behavioral change

7.3 Barriers to behavior change

Barriers for behavior change refer to obstacles that people face that prevents them from practicing a desired behavior. These barriers can be a feeling of personal risk in trying a behavior (i.e fear of caged poultry farming, fear of bio-fortified crops production), or lack of financial resources to accomplish an action. These affect the willingness of people to change their behavior. The following are nutrition sensitive agriculture barriers related for behavior change.

- Lack of clear and consistent information about how to diversify agricultural products for household consumption.
- Perception gap (preparing a variety of foods daily is expensive and time-consuming)
- Lack of time and labor-saving technologies for the women to care and cook nutritious foods for children
- Market access to diversified foods (distance and transportation)
- Lack of women decision-making power to influence household nutritious food consumption (produce, buy etc).
- Poor access to WASH
- Lack of farming activities that provide all nutrient-dense foods for the family year-round

- Cultural barriers such as fasting, food taboos, and low priority to children and women family food share.

7.4 Knowledge, Attitude and Practice Gap in behavioral change

The missing link or the disconnect between what people know, believe and think and what they practice is widely known as the Knowledge, Attitude and Practice **(**KAP) gap. The terminologies below need to be considered in working with individuals or groups through SBC approaches.

- **Knowledge:** is a familiarity, awareness, or understanding of someone or something, such as facts, information, descriptions, or skills, which is acquired through experience or education by perceiving, discovering, or learning.
- **Attitude:** An attitude can be as a positive or negative evaluation of people, objects, events, activities, and ideas.
- **Practice:** a method of learning by doing and repetition to achieve skill

7.5 Target Groups, Determinants and Activities

Development work aimed at improving the lives of people through improved agriculture, nutrition or other area involves several aspects. The food and nutrition security situations as well as the needs of people vary influenced by several factors (consummation pattern, socio economic factors, existing experience, etc.). It is important to know who we are targeting for behaviour change and why. The following components are to select target groups, determinants and activities are:

- **Targets Groups**: are groups that refer to the groups of people that we are encouraging to adopt the behaviour. Priority target groups are found within our target communities (i.e. lactating and pregnant women and children under 5 years).

- **Influencing Groups**: is the group that the priority group identifies as having the most influence regarding the priority group's adoption of the behaviour. Usually there are one or two influencing groups. To know who our influencing group are we must conduct quick assessment on our priority groups such, with religious leaders related to faith based fasting, or other community leaders.
- **Determinants**: Determinants represent a person's livelihood, feelings, beliefs or other elements with his or her environment that can support him or her from doing behaviour.

(e.g. of determinates: lack of access to nutrient dense inputs, lack of materials to build fence for poultry, lack of eggs to feed children daily). It is important to learn which of these determinants are the most influential by intervening members of the priority groups.

- **Bridges to Activities:** are more specific descriptions of what one should do to address the issue identified by research on determinants. It usually begins with a directional verb (e.g. Increase access to nutrient dense inputs, decrease post-harvest loss, improve egg feeding to the children daily) and often proposes to change the perception of the priority group. Note this is not expressed in percentages.
- **Activities:** Activities are tasks that program implementers plan, organize or conduct usually with the priority groups or influencing groups in order to address the bridge to activities. Activities start with an action verb (e.g: offer a loan to farmer to produce quality and affordable chicken feed, etc.,)

Source: Adapted from Food Security and Nutrition Network Social and Behavior Change Task Force 2013. Designating for Behavior Change for Agriculture, Natural Resource Management, Health and Nutrition. Washington DC: Technical and Operational Performance Support (TOPS) Program.

<table>
<tr><th colspan="5">Example showing link between behavior, target groups, determinants and activities: Poultry Management</th></tr>
<tr><th>Behavior</th><th>Priority Group or Influencing Groups</th><th>Determinants</th><th>Bridges to Activities</th><th>Activities</th></tr>
<tr>
<td>Targeted adult men and women who raise chickens keep them enclosed (penned up) at all times.
  </td>
<td>Demo: Adult men and women from families who raise chickens. all have children Under 2 yr. or a pregnant or lactating woman at program start-up.
They live in rural villages, Men and women are somewhat literate;
Common Desires: They all want food security, well-being and education for their children.
Current Practices: Chickens wander freely and sleep in trees. They think chickens will not have enough to eat if they are penned up; they do not know affordable ways to make chicken coops.
Stage of Change: awareness stage.</td>
<td>Negative Consequences:
• chickens will stop laying
• it will be more effort and more expensive to give chickens food and water
Positive Consequences:
• They will not lose chickens to wild animals
• Less loss due to illness
• Chickens will not damage crops and gardens
• It is easy to vaccinate them
• can use manure for fertilizer
Access:
• Lack of materials to build a fence or cage
• Cost of chicken feed</td>
<td>1. Reduce the perception that chickens will stop laying eggs if they are penned up.
2. Reduce the perception that it takes more effort/expense to care for penned up chickens.
3. Increase the perception that it will be economically beneficial to keep chickens penned up.
4. Increase access to low-cost fencing materials and skills for adapting local materials.</td>
<td>1. Create demonstration site at FTCs
2. Communities observe the survival of penned chickens
3. Provide improved feed, clean water and vaccine.
4. Train agriculture volunteer /youth and women groups to promote in poultry care (feed, water, vaccine) and construction of pens and cages using locally available materials. Monitor and reinforce their ability to transmit skills to others.
5. Provide technical assistance to women/youth group to produce and sell quality, affordable chicken feed, and water and feed containers made of local or recycled materials.</td>
</tr>
<tr>
<td colspan="2">Indicator:
Percentage of households that raise chickens and keep them enclosed at all times</td>
<td colspan="3">Indicators:
• Number of successful demonstration sites implemented
• Number of families adopting one or more improved poultry care practices
• Number of women/youth group selling chicken feed</td>
</tr>
</table>

7.6. Behavior Change principles and approaches

Behavior change requires approaches that influence individuals or communities to behave in ways that will make them productive, safer and healthier. It includes activities that aim to help people practice behaviors that will positively impact their livelihoods towards economic wellbeing.

DAs are expected to bring the families /communities to adopt a given practices that can link nutrition to agriculture. DAs need to build certain skills aimed at bringing behavior change. This section summarizes SBC principles, approaches, materials and learners' characteristics to be considered for effective utilization of SBC principles.

7.6.1 SBC Principles: Social and Behavior Change uses a variety of communication approaches, including interpersonal communication, community mobilization, mass media and advocacy. To be effective in bringing behavioral change, the social behavioral change the following principles need to be considered.

- **Client-centered**: responsive to the challenges farmers/mothers face and what motivates them
- **Data-driven**: for decisions about priority behaviors and their determinants, audiences, channels, and placement
- **Prioritized and sharply focused:** on the behaviors with greatest impact on NSA.
- **Emotionally appealing** to get noticed and motivate change, showing the behaviors as beneficial, convenient, feasible, and as the "new norms"
- **Frequently monitored** to prompt adjustments

Source: Adapted from the Alive & Thrive

7.6.2 SBC Approaches

This section the different approaches mostly used on Social and Behavior Change. Different SBC programs and materials can be developed to support the integration of nutrition into agriculture. The following four SBC program components and which have good results when used together are presented below.

Interpersonal communication (IPC): is a face to face discussion for example extension worker with a farmer aimed at deriving behavior change. The process for

developing IPC strategies should be interactive with due consideration of local situations.

Community mobilization: Community mobilization engages local leaders in supporting the new agricultural/nutrition practices and the frontline workers' activities. Community mobilization can help create new social norms and bring about lasting behavior change.

Mass media: Mass media for behavior change involves strategic uses of a country's available communication channels such as audio or video spots, recorded dramas, music videos, print advertisements, text messages, and other materials and delivered through broadcast, out of-home, and digital channels. Mass media is among the important means to bring about change in social norms.

Advocacy: is the process of influencing higher officials to bring desired change. The aim is to improve an enabling environment through creating a positive policy and regularly environment.

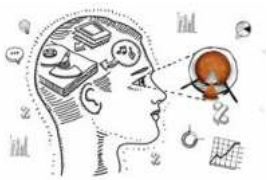
Note: Using multiple SBC approaches is more effective than just using one. The more frequently and consistently individuals practice the desired behaviors, the higher the outcome of behavior change. Therefore, the more frequently the DAs contact and visit farmers and their families, the more likely they will find instances of behavior change in their locality.

7.7 Social Behavioral Change communication

Most people are resistant to change and tend to maintain habits formed since childhood. Simply providing information is ineffective in influencing behaviors. It is important to support DAs who contact communities for bringing gradual and sustainable change over time. Knowing your farmer is important when using SBCC tools to change behavior. Identifying what behavior to change, what kind of actions you want farmers to engage in, the benefits of the proposed behaviors and which factors influence their behaviors.

7.7.1 The three learning styles

The following three learning styles help the facilitators for his proper approach and communication with target groups. Many studies show that the standard leading styles are;



1. **Visuals**: learning by looking the visuals: visuals have a power hock to our emotions and easily been remembered and is recommended for low literate communities.

2. **Auditory**: learning by hearing: since our attention span vary depending on the capacity of the person, learning through hearing is not that much recommended. It is vividly advised to support with other styles.

3. **Kinesthetic**: learning by doing: this is the most preferable way of learning especially for adults. Since adults have their own experiences, they like to expand their exposure and want to test/challenge how new things/knowledge are practical.

Literatures reveal that in average we retain

- 20% what we have heard (Auditory)
- 40% what we have seen and heard
- More than 80% what we have heard, seen and did (learning by doing)

7.7.2 Suggested Techniques for Participatory Adult Learning

There are different techniques for participatory learning. Selected techniques that are applicable for promoting NSA through SBC approaches are presented below.

Approach	Description and benefit
1. Group discussion 	This is a good method that can be used to address several issues at one time by assigning a different topic to each group on specific issues. DAs can use the FTC or other facilities to transfer agricultural skills to ensure farmers produce and consume nutrient-dense vegetables, fruits and animal source foods. These food production trainings can include demonstrations and hands-on skills on how to raise livestock and poultry, homestead gardening, and fishing, where appropriate. *During group discussion* ✓ Plan on how to use this methodology based on the based-on leanings from earlier sessions. ✓ Develop clear and focused discussion questions from each group ✓ Let each group clearly understand its assignment ✓ Encourage and motive participants to stay focused ✓ Let representative present and facilitator summarizes.

Example: Group Discussion Questions

Group 1: Discus on Why is mixing diverse crops (intercropping) or use of animal source foods important for nutrition?

Group 2: Identify possible reasons why farmers do not produce diverse crops /livestock's and suggest 4recommendations to be considered from Regional to kebele level.

Group 3: What is the education situation of young girls and boys in communities, do girls continue their schools like boys, if not identify the reasons and possible recommendations to promote girl's education in their communities.

Group 4: Identify practical activities DAs and HEWs can do jointly to transfer NSA skills to ensure farmers produce and consume nutrient-dense crops and animal source foods.

2. Role plays 	Role plays are essential to simulate a farming community that participants might face in their work and to practice how they should handle those situations. It can be used to develop skills and give feedback on improvement of their skills. During role plays: ✓ Local scenarios could be used in role plays so that the participants could act according to the given farming community scenarios. ✓ Provide information on how the farmers are to proceed and what is expected from each participating farmer during the role play. ✓ The other participants and the facilitator should observe and give constructive feedback. ✓ Prepare some key points to be discussed after the role play to facilitate constructive feedback.
3. Inter-Personal Communication (IPC) 	IPC is a technique which is conducted face to face with one person for example with a farmer, mother during home/farm level /FTC visits. When conducting home visits, DAs should give priority and focus on families with young and small children and women to ensure that parents are feeding their children with nutrient-dense foods. This will ensure that women have access to the family income to enable them to purchase additional nutrient-rich foods that the family may not grow or raise. Balancing gender roles is also important so that both men and women are responsible for food and nutrition security. When you use IPC: ✓ Greet, ask, listen agriculture/nutrition related situation of the family/balancing gender roles, etc ✓ Identify: difficulties identified, priorities determined; ✓ Discuss, recommend, agree on workable actions, ✓ Make appointment stressing suggested options/proposals to farmer/mother/alternatives. **Note:** all counseling materials need to be audience tested and focused on behavior change

- **Use Negotiation: -** is a process during which the person promoting the desired behavior and the community member discuss the nutrition related issue; and the community member agrees to try one or more specific behaviors, during an agreed time frame.

Successful persuasion/negotiation is an important tool in behavior change communication. DAs can use negotiation to convince farmers and their families to adopt nutrition sensitive agriculture practices.

- When using negotiation with farmers, DAs must use credible and evidence-based nutrition sensitive agricultural tools. The negotiation requires careful attention and should focus on the communities' needs and demands, and should address the different barriers, so they can change their attitudes and practice positive behaviors.
- When negotiating individuals, DAs need to encourage farmers and their families to participate and practice nutrition sensitive agriculture activities, until they feel they have acquired the desired skills to adopt the behavior.

Summary

SBC is important to ensure that people adopt a desired behavior on NSA practices.

For effective SBCC and smooth leaning environment, it is advised to consider the following common adult learning principles:

- **Respect:** facilitator actions show respect for the experience and knowledge adult bring and observed and felt by the learners.
- **Immediacy:** how soon can the learners use the event in their own setting?
- **Relevance:** Learners will learn faster and more permanently that is significant to them and to their present lives.
- **Safety:** People need feel safe and challenged in smooth way, hold/balance the opposites.
- **Engagement:** people learn more when they are actively involved; doing what they are learning.
- **Inclusion:** With inclusion, a learner is moved to openly collaborate to learning. Without inclusion, a learning group is fragmented.

Self-Assessment Questions

1. What are the stages of behavioral change?
2. What are the principles of SBC approaches?
3. Discus the social behavioral learning styles
4. What are the common behavioral change barriers?

Chapter 8. Multi-Sectoral Coordination for Nutrition

Introduction

Coordination is one strategic objective focusing on multi-sectoral coordination and linkages for nutrition. The purpose is to enhance the nutritional impact at a grass root level by concerted action of various sectors. Evidence indicates that the factors that hinder progress in improving nutrition are multi-faceted and multi-sectoral. Therefore, these need to be counteracted by equally powerful, multi-sectoral, multi-stakeholder forces that combine nutrition-specific, nutrition-sensitive and environment enabling actions at all levels across sectors in a coordinated manner.

Objective

The main objective of this chapter is to train DAs on multi-sectoral coordination and enable them to play roles in coordinating implementation of the NSA strategy at

Learning objectives

1. Explain the multi-sectoral nature of nutrition
2. Describe the importance of coordination at various administrative levels in the implementation of the National Nutrition Program (NNP)
3. Mention the roles and responsibilities of various sectors for nutrition in NNP-II
4. Identify the roles and responsibilities of agriculture and livestock sectors in implementation of NSA
5. Describe the role of DAs in planning, implementing and evaluating the NSA interventions in collaboration with HEW and other stakeholders at kebele level

8.1. Multi-sectoral Nature of Nutrition

Nutrition has a multi-dimension and multi-sectoral nature in terms of both effect and outcome. The multi-sectoral nature of nutrition requires individual, institutional and system-level capacities to operationalize effective interventions through collaborative engagement across

sectors and stakeholders. Furthermore, effective implementation requires coherence both vertically (within sectors and stakeholder institutions) and horizontally (across sectors and stakeholders).

The multi-sectoral signatory actors integrate into the food system for sustainable development It is important to understand the nutrition sensitive value chain that addresses the conventional value chain in a nutrition lens from the "demand and supply" sides (nutrient content and increasing demand for nutrient dense produce) in addition to the "value addition" component (decrease loss/waste of nutrients and foods) in nutrition-sensitive food system.

Agriculture is nutrition-sensitive when it tackles issues at the root of malnutrition than just food production (Figure **8.2)**. Indeed, well-coordinated intra- and inter-sectoral link of NSA enhances its contribution to improving nutritional status of population. In a nutshell, feed the soil, and take care of environment to feed plants and animals/people.

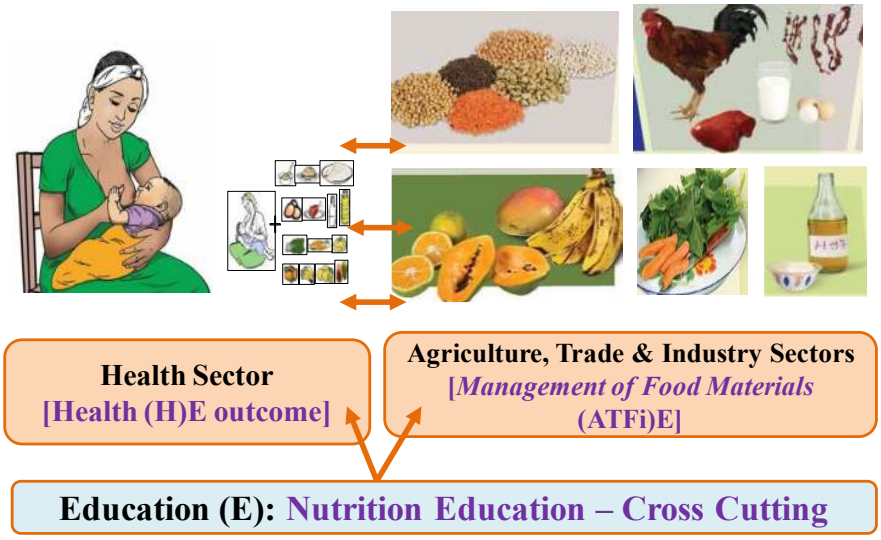


Figure 8.1 Roles of agriculture, health, industry and education sectors for diversified food consumption

8.2. Roles and responsibilities of various sectors in NNP-II

The agriculture sector serves as co-chair of the NNP II and primarily takes the lead in the provision of food for the household and community. The Kebele nutrition technical committee with technical support of DAs and HEWs plan and execute NSA intervention through mobilizing the development army. Each of the 12-signatory sector has a role to play in NNP II and its implementation according to their mandates to ensure good nutrition for the communities (**Table 8.1**).

Table 8.1 The major roles and responsibilities of nutrition signatory sectors

Sectors	Major Roles and Responsibilities
Health	• Strengthen the community level linkage and capacity of women-based structures & associations at all levels to promote optimal adolescent, maternal, infant and young child nutrition (AMIYCN) and caring practices
Agriculture	• Increase year-round availability, and access to and consumption of animals source foods, fruits, vegetables, nutrient-dense cereals and pulses. • Promote technologies for post-harvest food processing, handling, preservation and preparation to help ensure that food is both nutritious and diverse. • Improve nutrition-sensitive agriculture (NSA) knowledge and practice among farmers. • Promote production and consumption of bio-fortified crops. • Promote technologies for post-harvest food processing, handling, preservation and preparation to help ensure that food is both nutritious and diverse • Improve nutrition-sensitive livestock and fishery development knowledge and practice among farmers through behavior change communication.
Industry	• Conduct awareness creation events for the private sector on nutrition related requirements and standards for local manufactured food items.
Trade	• Ensure the quality and safety of imported food items as per the national standard. • Conduct awareness creation events for the public/consumers on the benefits of fortified food.
Water, Irrigation & Energy	• Increase access to safe and clean water. • Increase access to small- and large-scale irrigation schemes. • Increase access to and availability of renewable energy
Youth & Sport	• Promote the provision of credits, grants, microfinance services and other income generating initiatives to support increased access to nutritious foods among vulnerable groups
Disaster risk management	• Strengthen and scale up early warning systems for food and nutrition information from the community level up to the national level. • Improve knowledge and practice of nutrition- sensitive disaster risk management among farmers, using behavior change communication.
Labor & social affairs	• Promote the implementation of gender- sensitive social safety net program and other social protection instrument in urban settings to protect vulnerable groups from food insecurity and under nutrition.
Women & Children	• Incorporate a gender analysis as part of the regular nutrition situation analysis, analyzing the needs, priorities and roles of men and women. • Mainstream gender equality within all nutrition training programs. • Engage and mobilize women's groups in nutrition advocacy and skills transfer. • Promote meaningful male involvement in nutrition interventions.
Education	• Promote and scale up school feeding programs. • Promote school health and nutrition (SHN) interventions through collaboration with other sectors.
Finance & economy	• Mobilize resources for nutrition and making sure public resources allocated for nutrition are properly utilized.

8.3. Role of DAs in implementing Multi-Sectoral NSA interventions

The DAs of different disciples jointly have the responsibility to lead the whole agriculture development activities at kebele level, where they can make a difference in implementation of the NSA. Based on local potential resources, the DAs plan, implement, monitor and evaluate the NSA activities in collaboration with farmers, kebele authorities and woreda offices in a coordinated multi-sectoral manner. This encompasses the need to sensitize farmers and then mobilize resources based on the nature of development intervention. Some of the nutrition sensitive agriculture roles and responsibilities of DAs are highlighted below.

1. Nutrition Sensitive interventions

- ✓ Train and assist adoption of farmers on improved agricultural technologies (crop, livestock and fishery).
- ✓ Introducing and demonstrating new technologies for the specific area, including new/nutrient dense foods for household consumption and market.
- ✓ Include the NSA in the FTC and on-farm demonstrations of best practices and proven technologies to farmers.
- ✓ Facilitate and technically support input supply, production and consumption of nutrient dense agricultural products at household and community levels.
- ✓ Support farmers to practice GAP in the use of chemicals, fertilizer, food handling and the likes to make food produced safe and sustainable.

2. Facilitate the agricultural economic activities

- ✓ Assess development potentials, diagnose production challenges and plan interventions in a participatory manner.
- ✓ Train on expanding the use of homestead garden and small animal rearing to help diversify household production, consumption and to generate income, with a focus on women engagement.
- ✓ Expanding existing infrastructure and helping farmers develop new small-scale irrigation facilities and effective use of water resource for NSA implementation.
- ✓ Setting the nutrition demonstrations corners at the FTC where production trials and nutritious food preparation are carried out.
- ✓ Create market linkage for nutritious crops and animal source foods to improve access nutritious foods and also create means of income for producers.

3. Creating awareness and social mobilization of farmers

- ✓ Convey nutrition sensitive messages to the farming community using various extension methods
- ✓ Creating and further expanding the role of women in use of improved agricultural technology through focused and demand driven gap filling training.
- ✓ Train male farmers on gender equality and importance of addressing women's empowerment for improved household nutrition.
- ✓ Conduct food demonstrations and public awareness on diet diversity using various extension methods.
- ✓ Conduct development group dialogue on selected nutrition and gender sensitive agenda that empower women and tackle under-nutrition using the NSA.
- ✓ Prioritize vulnerable households and women at reproductive age to PSNP, on/off-farm productive activities.

4. Areas of multisectoral collaboration

- ✓ Collaborate with stakeholders at kebele level in identifying nutrition problems, opportunities and share information among the members of kebele nutrition technical committee.
- ✓ Addressing NNP and NNSA nutrition priorities by collaborating different nutrition-sensitive and specific sector.
- ✓ Monitor the progress on the multisectoral interventions during different seasons of the year.
- ✓ Report NSA related practices to respective government structure

Summary

- ✓ There is a need of addressing the multi-sectoral NNP agenda that requires highly integrated and inter-sectoral interventions through the established coordination platform, which goes from federal to kebele levels.
- ✓ The agriculture sector has the prime responsibility of providing diverse and nutritious food for the family and market.
- ✓ DAs have the major role of creating awareness, social mobilization, providing Nutrition Sensitive Training Packages, Facilitate Agricultural economic activities and collaborating with different sectors to improve production and productivity of nutritious foods for household consumption.
- ✓ DAs and other development sectors jointly identifying nutrition problems, opportunities, planning, execute interventions and share information among the members of nutrition technical committee at the kebele.

Self-Assessment Questions

1. Discuss the multi-sector nature of nutrition and roles of sector signatories?
2. List out the five strategic objectives of the NNP II?
4. Discuss at least five roles and responsibilities of DAs in implementation of the NSA at kebele level?
5. Identify the locally specific potentials for implementation of NSA in collaboration with the HEWs at kebele level?