RAISE-FS experience brief # 05

# Enhancing food systems through home gardens

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*This brief outlines the approach for implementing partners to support farmers in home garden initiatives, aiming to transform Ethiopia's food systems. The guide is based on evidence gathered from validating year-round production and consumption through home gardening practices.*

## 1 Introduction

This document outlines the contribution home gardens can make to food system outcome and serves as a guide for implementing partners (at universities, agricultural research institutes) who will support farmers implementing home garden initiatives following the Resilient Agriculture for Inclusive and Sustainable Ethiopian Food Systems programme (RAISE-FS) approach as well as scaling partners and any other organization aiming to bring about transformation in the Ethiopian food system by developing and implementing a demand- driven and interdisciplinary approach to Research for Food System Transformation and contributing to the Government of Ethiopia's transformational agenda.

RAISE-FS envisions a more resilient, inclusive, and sustainable food systems in Ethiopia, defined as a food system which is more resilient to biophysical and economic shocks, inclusive of women, youth, smallholders, low-income communities, and marginalized groups, and sustainable environmentally, socially, and economically.

RAISE-FS has identified year-round production of home garden vegetables and fruits as one of the important leverage points to promote year-round consumption of nutritious food as a means of alleviating the identified gaps in terms of access and consumption of nutritious food across food-insecure and high-potential food systems of Ethiopia.

### 1.1. Rationale

Home garden activities have been promoted by both development partners as well as the government of Ethiopia for several decades, and the Ministry of Agriculture (MoA) has a target of 40% of rural households actively engaging in home garden activities by 2020. While home gardens can take many forms, this manual mainly considers people growing nutrient-dense foods (vegetables, to a lesser extent fruit) on small plots primarily for home consumption.

## KEY messages

- Home gardens are essential for addressing food insecurity and promoting the consumption of nutrient-dense foods, with a goal for 40% of rural households in Ethiopia to engage in home garden.
- Promoting gender equality and empowering both women and men in home garden initiatives is crucial for maximizing the impact on food security and nutrition.
- Implementing sustainable agricultural practices, including the use of organic fertilizers and efficient water management, is vital for enhancing productivity and ensuring year-round vegetable production.
- Encouraging the cultivation of diverse, micronutrient-rich crops based on community needs and environmental suitability is key to improving dietary diversity and nutrition.
- Providing inclusive training programs that address the diverse needs of community members is essential for effective knowledge transfer and the successful implementation of home garden initiatives.

To support the implementation of this ambition, a large number of guiding manuals have been developed, and tested, specifically for the Ethiopian context, including:

- The Ministry of Agriculture's Horticultural Package (Government of Ethiopia)
- Homestead Gardening for Better Nutrition Training of Extension workers (CDSF project)
- Adaptation of keyhole gardens in Ethiopia: Training manual and operations guide (Team Today and Tomorrow)
- Empowering New Generations to Improve Nutrition and Economic Opportunities: Vegetable and Fruit Production Guide (ENGINE project)

- Guideline for Vegetable and Fruit Home Gardening (CASCAPE/ BENEFIT)
- Manual for Vegetable Home Gardening in Oromia Region Ethiopia (CaNaG project)

Rather than developing a new manual for the use in the RAISE-FS project, this experience brief seeks to bring together the most useful elements of existing manuals and supplement these with additional contents, which address critical issues that have not received adequate attention in other manuals, for example, gender issues.

Because RAISE-FS is primarily a research project, rather than a development project,our aim with this guide is to present a set of established best practices for home garden, which are implemented in conjunction with other initiatives (e.g. training on nutrition based on the Ethiopian Food- Based Dietary Guidelines, social analysis, and action training, support to access agricultural inputs including seeds). This document is intended as a guide to support partners in implementing home garden interventions and to detail how to best document the evidence, as well, in terms of how people perceive both the benefits, as well as the burden, of the home gardens.

### 1.2. Objectives

The objectives of this document are to:

- Provide a set of guiding principles for implementing partners who support home garden activities, including how to document evidence of positive changes and trade-offs.
- Give a “menu of options” for partners to decide what types of home gardens are best suited for their particular agro-ecologies, women empowerment, dietary practices, and identified nutritional gaps.
- Specify what evidence should be collected from the home gardens, to support analysis on effectiveness and documentation of best practices.
- Introduce critical concepts of nutrition, and how home gardens can support households with access to more nutritious diets.

*Figure 1: Home garden demonstration plot at Adet, Amhara region*
*Photo taken by: Andualem Tadesse*

*Figure 2: Home garden demonstration plot at Melkasa, Oromia region*
*Photo taken by: Fitsum Miruts*

# 2. Sustainable home garden approach in RAISE-FS

### 2.1. Conceptual framework for RAISE-FS home gardening approach

Home gardens have been identified as a key leverage point to address the existing gaps derived from the results of baseline and rapid food system appraisals. The outcome pathways around the home garden properly address food system challenges and leverage points, proposed interventions, a list of activities, desired outcomes, trade-offs and risks, and learning questions. A conceptual framework (Fig. 1) has been developed to create a better understanding of how leverage points and activities need to be integrated to meet the home garden as well as food system outcomes. The framework also helps to guide the generation of evidence for efficient and sustainable implementation of home garden innovations for food system transformation towards addressing the family nutrition gaps through integrated actions related to production, nutrition, and gender empowerment outcomes among others. The framework also emphasizes inclusive targeting, production practices, behavioural change communication on nutrition, gender equality and empowerment, and the continuous support required for the successful implementation of home garden interventions.

Based on feedback from stakeholder engagement, the following key learning questionsare generated to guide evidence generation from year-round production and consumption of home gardennutrient-dense fruit and vegetable innovations.

Does the intervention contribute to:

- Year-round production of nutrient-dense fruits and vegetables (NDF&V) at the household?
- Year-round consumption of NDF&V for households?
- Reduce chemical utilization and promote organic production system?
- Reduced labour burden for women and youth?
- Change in decision making patterns at the household level?
- Change power relations in the household?
- Improve knowledge, attitude, and practices of healthy diets in the household?
- Increased income? And  influence over income use by women and youth ?
- Improve access to knowledge, information, and inputs for intervention participants?
- Resilience in relation to short-term food scarcity?

Throughout the process of implementation, the evidence needs to be collected based on the developed harmonized data collection tools to answer these learning questions.

### 2.2. Targeting home gardeners

#### Gender equality & social inclusion considerations

Farmers will have more confidence and be more receptive to innovations if a fellow farmer shows a new practice (Miller and Cox 2006). Therefore, both women and men should lead home garden plots to increase the impact of the diffused agricultural information. For this reason, due consideration should be taken in the selection of home garden hosts.

Inclusive targeting is especially important because male farmers often tend to be overlooked and underrepresented when targeting home garden participants. This is mainly because the home garden is assumed to be women's domain. The selection is often biased towards female-headed households, and people of high socio-economic status.

- Prior to the selection of participants, facilitate community consultations with pertinent stakeholders (community elders, religious leaders, local community-based institutions (such as idir) representatives, development agents , health extension workers, etc.) to ensure representation of individuals from diverse backgrounds, including those from marginalized communities and underrepresented groups.
- When targeting participants, the inclusion of host farmers of different ages, abilities, socioeconomic statuses, educational levels, and incomes should be ensured.
- Consider the five Leaving No One Behind factors (discrimination; place of residence; socio- economic status; governance; and vulnerability to shocks) in selecting participating farmers.
- Aim for a gender-balanced selection to ensure equal opportunities for participation and benefits (ensure 50% of the plots are hosted by male farmers and 50% are hosted by female farmers.)
- Targeting households instead of individuals is important.

#### Bio-physical

- Households owning fewer durable assets (e.g. land, livestock) can be targeted since low wealth status is strongly associated with child undernutrition (Hong et al. 2006; Hong and Mishra 2006).
- The natural suitability of the local environment, such as soil quality, rainfall pattern and climate variability, temperature range, water availability, topography, pest, and disease pressure
- Availability of minimum size of land for practicing home garden and the willingness of households to practice home garden production. The demonstration of year-round production of home garden vegetables was on 10 X 10m land size in most locations whereas 10 X 5m was also practiced in areas with land scarcity.

## Fruit and vegetable selection

Increasing production and consumption of a variety of types and colours of fruits and vegetables are key to providing a full range of vitamins, minerals, and fibres which is necessary for good health. The selections of vegetable varieties need to consider:

- Selection of diversified micronutrient rich fruits and vegetables especially the best plant sources of vitamin and mineral rich dark green vegetables and others such as spinach, kale (*gommen*), Swiss chard, lettuce, Chinese chard or pak choy, amaranthus, okra, green bean, broccoli, and orange, red/yellow colour fruits and vegetables such as papaya, mango, pumpkin, carrots, beetroot, orange sweet potatoes.
- Consider what types of vegetables grow in which seasons and agroecological zones (see Table 1).
- Let participants choose which of these selected vegetables to produce, however, it is important to ensure that the choice should be made considering the inclusion of vegetables from each vegetable group based on the Ethiopian Food- Based Dietary Guidelines, see Figure 3 for example.
- It is essential to take community consultation into account when selecting the types of fruits and vegetables.
- Open pollinated varieties are easily available at affordable prices and produce reasonable yields, hybrid varieties give higher yields under good management but their seeds are expensive. Whenever an open pollinator variety is available, start with these and gradually use hybrid varieties as the gardeners get more experience in producing vegetables.

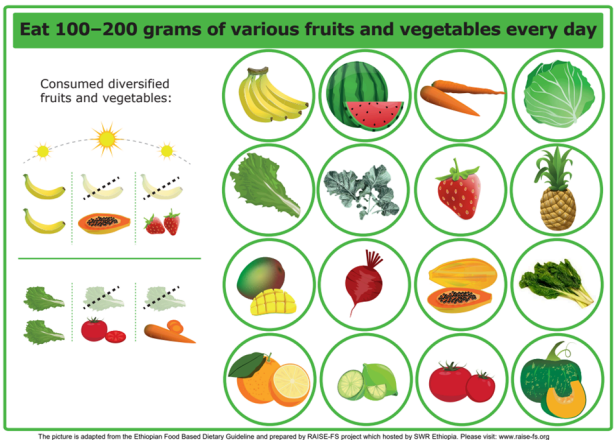


*Figure 3: Fruits and vegetable groups to consume based on the Ethiopian Food- Based Dietary Guidelines*

*Table 1: Vegetable suitability by agro-ecology, altitude, and rainfall (MOA & Global affair (2018).*

| Agro-ecology | Attitude (masl)) | Rain fall (mm) | Vegetables | Legumes |
|---|---|---|---|---|
| Dry Kolla | 500-1500 | < 900 | Cassava, sweet potato | Mung bean & pigeon pea |
| Moist Kolla | 500 – 1500 | 900-1400 | Kale, cucurbits (pumpkin, watermelon, squash), sweet potato, cassava, ladies finger (okra), Eggplant, pepper, tomato, onion | Mung bean, cowpea, pigeon pea, Soybean, haricot bean |
| Dry Weyna Dega | 1500-2300 | <900 | Kale, pumpkin, sweet potato, cassava, carrot, beet root, Swiss chard, lettuce ,eggplant, pepper, tomato, onion | Haricot bean, cowpea, pigeon pea, chick pea, lentil |
| Moist Weyna Dega | 1500-2300 | 900-1400 | Potato, cabbage, carrot lettuce, Swiss chard, kale, pumpkin, shallot & garlic | Snap bean, field pea, pigeon pea, soybean, fava bean |
| Wet Weyna Dega | 1500-2300 | >1400 | Potato, cabbage, carrot, lettuce, Swiss chard, kale, pumpkin, shallot & garlic | Snap bean, field pea, pigeon pea, soybean, fava bean |
| Moist Dega | 2300-3200 | 900-1400 | Potato, cabbage, cauliflower, Swiss chard, lettuce , beet root, carrot, shallot & garlic | Faba bean & field pea |
| Wet Dega | 2300-3200 | >1400 | Potato, cabbage, cauliflower, Swiss chard, leVuce, beet root, carrot, shallot & garlic | Faba bean & field pea |

# 3. Sustainable home garden production

### 3.1. Types of home garden

Choosing a suitable type of home garden that considers agro-ecology, availability of water, land, labour, and inputs for construction is important. The following section describes the potential designs of home gardens in more detail:

#### Raised Bed

Raised beds are elevated planting areas constructed from locally available materials such as wood, bamboo, stones or concrete. These are suitable in areas where the land is plain with adequate drainage and are easy to set up.

A raised bed garden is a versatile and efficient method for cultivating vegetables, offering several advantages in terms of water management, improved soil drainage, better soil aeration, reduced soil compaction, nutrient utilization, and overall plant health. It is the most often used and recommended type of seed bed.

- The elevated nature of the bed offers good drainage and aeration, creating favourable conditions for plant roots. Raised beds have excellent drainage due to theirelevated design. Excess water can easily drain away, preventing waterlogged soil and root damage and mitigating favourable conditions for some pest and disease
- It allows planting directly into the raised bed.
- Transplanting seedlings is also possible.
- Raised beds give the opportunity to leave space between raised beds to create pathways. These pathways make it easier to access plants, reduce soil compaction, and provide a defined space for walking, weed management, watering, and other agronomic operations.
- It is advantageous to fill the raised bed with a customized soil mix. This mix typically includes a combination of topsoil, compost, and other organic matter. The goal is to create a well-draining, fertile, and loose soil structure.

Ridge beds: mainly used for root crops, known for draining excess water out of heavy soils during rainy seasons.

*Figure 4: Raised beds*
*Photo taken by: Andualem Tadesse*

#### Sunken beds

A sunken bed (Figure 5) is a bed dug into the soil creating cooler and wetter condition. This type of bed is preferred to raised bed in hot and dry conditions. Sunken beds are used in areas of prolonged dry conditions as the structure helps to conserve moisture. The structure of sunken beds may offer some protection from strong winds particularly for vegetables vulnerable to wind damage. However, maintenance and keeping the bed uniformly flat could be challenging and could result in uneven distribution of water during rains and watering.

*Figure 5: Sunken beds*

### Traditional in-ground beds

Traditional in-ground beds (Figure 6) are the most common types consisting of planting areas dug directly into the soil. In-ground beds offer ample space for root expansion and natural soil contact, promoting healthy plant growth. This is much cheaper than making beds or sunken structures and provides more space for planting. It is also easy to change into other land use or cultivation of other crops. While these gardens can be surrounded by borders, the soil surface isn't going to be much higher than the rest of the landscape. Because these beds are using the existing soil, there is typically less start-up work. These beds rely on the existing soil, but they should be amended with compost and other types of fertilizers to improve the soil.

*Figure 6: Traditional in-ground beds*

### Keyhole

A keyhole garden (Figure 7) is a sustainable and innovative way to grow food in small spaces and challenging environments. It is a type of raised bed garden that has a circular shape with a keyhole-shaped entrance on one side. The entrance leads to a compost basket in the centre of the garden, where organic waste and greywater can be added to nourish the plants. The garden is designed to be accessible, productive, and water-efficient, especially in dry and arid regions.

Some of the characteristics of a keyhole garden are:

- They are usually about 2 metres wide and 1 metre high, with walls made of stones, bricks, or other locally available materials.
- They are usually constructed with sloping soil surface that drains water from the centre to the edges, where plants with different water needs can be grown.
- They support diverse and intensive (year-round) planting of nutrient-dense vegetables such as leafy greens, herbs, and root vegetables, which can be harvested throughout the year.
- They have a compost basket that acts as a source of nutrients and moisture for the plants, as well as a way to recycle kitchen and garden waste and grey water.
- It has a keyhole-shaped entrance that allows easy access to all parts of the garden without stepping on the soil or bending over too much.

*Figure 7: Keyhole garden*

## 3.2. Seed supply system for home garden production

A productive garden starts with the use of quality seed, and/or, seedlings. Seed quality refers to a combination of seed purity, high germination, vigour, and absence of diseases. A seed supply system for scaling of sustainable home garden production can follow either of the following pathways.

- The first is throughthe establishment of a supply system of quality seed that requires creating access to small seed packs affordable and demanded by households. Private seed companies may not be aware of the business opportunity in seed mini-packets and prefer to sell seed in larger packs to large- and medium-scale farmers.It is very important to devise a mechanism for mitigating adulteration and quality deterioration due to improper long-time handling of seed alongthe value chainparticularly when seed packs are large. On the other hand, demand for mini packets can be low because smallholder farmers might not be aware of the benefits of using quality seed. Stakeholders involved in support of scaling of home garden production should put a coordinated effort to give seed companies a guaranteed demand for mini packets to reduceinitial risk whilepromoting their use. Conversely, seed companies could initiate marketing small packs by piloting mini packets access in targeted areas while promoting awareness about the use of quality and diversified seeds.

- The second is empowering organized groups or private actors in villages to raise seedlings of various vegetables as a business targeting home garden producers as potential buyers of seedlings.
- Seed saving can sometimes be practiced when quality seed cannot be bought or available. While own seed saving can be a solution, it, however, requires specific skills; community-based seed production can be more sustainable.
- For vegetables that are easy to transplant, own seedling rearing can be practiced also by households who prefer to buy seeds. Raising seedlings in the nursery is preferred to direct field planting for vegetables that are easy to transplant.

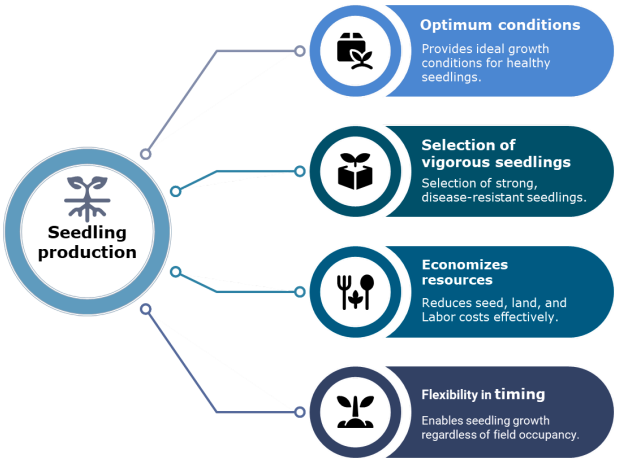


*Figure 8: Advantage of seedling production*

### 3.3. Preparation for home garden practices

Garden location and garden size

Selection of the best location for the household garden should consider easy access to water for year-round production, soil conditions, adequate sunlight and effect of shade, safety, and protection from animals and theft.

The garden can be established on land owned by the household or on communal land allocated by the local authority for such purpose. The site should be:

- Gently sloping surface
- Fertile, light texture and well-drained soil,
- Land not previously planted with the same or related crops to avoid build-up of disease and pests or parasitic weeds

The optimal size of a garden varies from household to household depending on the availability of space, water, and most importantly, labour.

It is better to start small and expand later than to start big and then realize it is too much to handle. The used garden space can be variable, depending on available water.

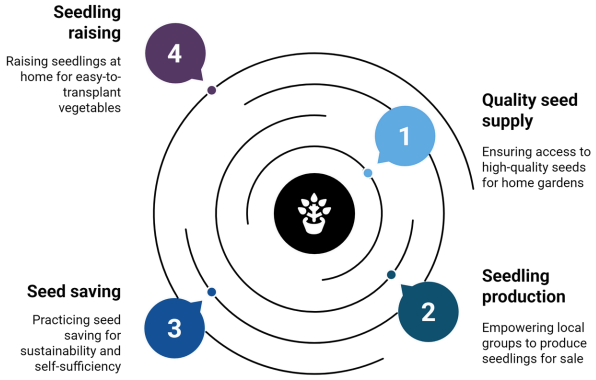


*Figure 9: Seed supply system for home garden production*

Seedling production has a number of advantages including:

- Use of optimum conditions such as fertile soil, optimum humidity, and water, shade against intense sunlight, and protection against insect pests and diseases.
- Possibility to select vigorous seedlings, and economizes seeds, land, and labour.
- Seedlings can be raised (on seedbeds, trays, or any suitable container) even when the field for transplanting is occupied by crop.

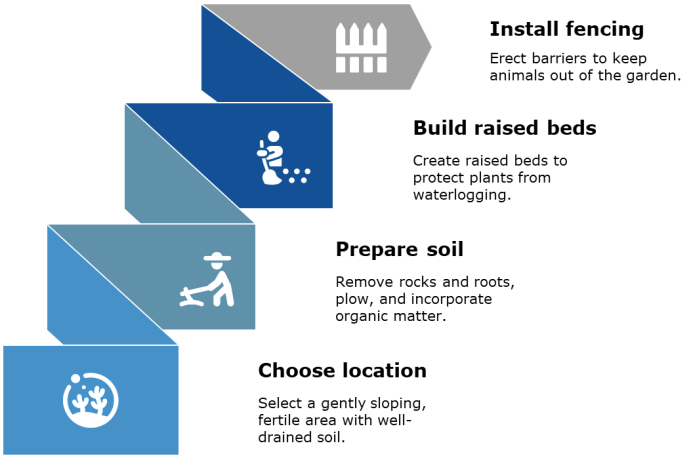


*Figure 10: Preparation for home garden practices*

### Soil and seedbed preparation

- Remove rocks, shrubs, stumps and roots of trees.
- Plow the land at least to 30-40 cm depth at the onset of the dry season (while soil still contains moisture) or after irrigating the field.
- Harrow and expose the weeds to the sun and let them dry.
- Break the clods and prepare the soil into fine.
- Incorporate organic matter in two to four weeks before transplanting or planting.
- The use of raised planting beds is advisable, particularly during the rainy season or in low-lying areas because it protects vegetables from waterlogging, reduces soil compaction, and makes weeding and other crop management practices easier. Mixing compost into these beds when they are first prepared is recommended. In dryland areas, the use of planting pits (also known as zai holes) and grass mulches can improve water use efficiency.

### Fencing

Domestic animals— goats, chickens, and cows— wandering freely can trample plants and quickly destroy a garden. It is critical to establish barriers to keep them out. Fencing can be made from locally available materials.

## 3.4. Good production practices

### Organic fertilizer

Home gardens are usually small in size, about a 10 X 10 metre field. This makes it ideal for the use of organic fertilizer including compost and vermicompost. Encourage hosts to prepare compost and vermicompost for their own home garden consumption. Alternatively, link farmers with other households involved in the production of compost and vermicompost for business. The use of organic fertilizer improves soil health as well as the quality of vegetables.

However, in conditions where organic fertilizers are not available in sufficient amount, the deficit can be complimented from inorganic sources following recommended rate and timing specific to the vegetables grown.

### Thinning, pruning, staking and trellising

Thinning may be needed for all crops, but particularly for those that grow long shoots or vines such as tomatoes, cucurbits, and beans. Staking and trellising enable plants to grow upwards, thereby optimizing garden space, improving yield quality, and making harvesting easier.

- Direct-seeded vegetable crops such as carrots, beetroot, Swiss chard, etc. are often sown densely within the row.
- Sow the seeds thinly to reduce the number of seeds required and reduce the necessity for thinning.
- Thin the seedlings to achieve the recommended spacing within the row that helps to avoid shading among seedlings and to produce vigorous seedlings
- Start thinning two weeks after emergence and continue every week for about three times until the recommended density is attained.
- Transfer the thinned seedlings to a separate seedbed to save the seedlings or transplant them directly to a permanent field.

### Water sources for home garden use

The location and size of the household garden as well as the year-round model of vegetable production are largely determined by access to water particularly during the dry season.

The sources of water to irrigate home gardens differ depending on several factors such as agroecology, topography, geology, climate and so on. The main sources for irrigation water are groundwater from wells, surface water, rainwater harvesting ponds, and rain. The main purpose of accessing water is to produce vegetables in small plots with the aim of improving household's year-round consumption.

*Shallow wells*

Wells are clean source of water not only for vegetable production but also for home consumption. In areas with shallow water table, digging wells at household level is common and within the capacity of most households. This provides year-round supply of clean water that ensures year-round production of vegetables. This is a sustainable source of water once initial investment is made and is less exposed to evaporative losses that could take place from the storage. This may require labour saving and low-cost water lifting mechanisms.

*Surface water*

includes streams, rivers, lakes and ponds which are usually found on communal lands dependent on runoff from adjacent land or from ground water springs. These are dependent on rainfall rates that vary from year to year and from place to place. These sources are not always close to settlements. Therefore, fetching and transporting requires additional time and labour.

*Rainwater harvesting*

Collection, storage and use of rainwater from catchment surfaces such as iron sheets (hard roofs), grass thatched roofs, polythene/tarpaulins, trees, rocks and artificially paved surfaces. Harvested water can be held in a concrete cistern, fiberglass or polyethylene tank, water silo or other holding tank. It is clean except for any debris that gets into the system. The choice of the catchment for water harvesting and the harvesting structures could be household level decision depending on the availability of input materials.

Runoff water harvesting

This is usually a combination of rain water and run-off. Drainage ponds commonly contain silt, fertilizers or other agricultural chemicals washed away from catchment areas and could end up in to ponds. This requires careful management as it could easily contaminate the water. The storage structures could be earth dams or ponds that may demand a lot of labour and money particularly if some kind of roofing is to be constructed to minimize evaporation losses and if impermeable membrane or plastering is implemented to minimize infiltration losses.

## 3.5. Year- round production of vegetables

Sequential sowing and/or transplanting, which can also be referred as successive or staggered planting is an important practice to ensure year-round production, to provideenhanced access to vegetables for year- round consumption. It is a method of sowing and/or transplanting in succession so that plants of different stages are grown at the same time and place. The use of crop calendarincluding the habitof growth as well as theirlength of maturityperiod are helpfulto understand and plan better the best sequencing considering the seasonalas well as the vegetableand fruit characteristics. A crop calendar describes timeline of major horticultural activities from sowingto harvesting throughout the year. For details on individual vegetables, refer MoA horticulture package

Sequential sowing provides the following advantages

- Avails produce for an extended period of time
- Reduces surplus harvests and the need for postharvest storage or sale.
- Encourages more consumption.

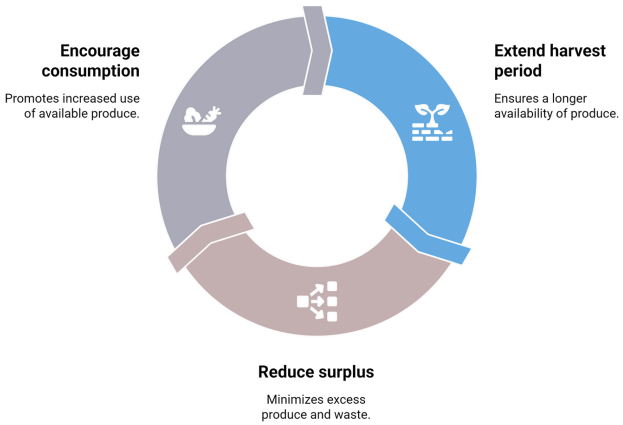


*Figure 11: Benefits of sequential sowing*

### 3.5. Harvesting

Harvesting can be planned based on:

- When best a particular vegetable can be consumed for the best nutritional benefit.
- The active windows of seasons when a particular vegetable stays in the field for continuous harvesting without losing nutritional value.
- The anticipated weather conditions. Sometimes, the weather condition during the window of harvesting may force households to collect faster. In such cases, the use of technologies to improve the shelf life is highly recommended.
- If produce is larger than the consumption of the household within the shelf life of the vegetables, it is also important to look for market alternatives, which can be used for economic empowerment of members of households.

*Figure 12: Home garden demonstration site at Gumer woreda, Centeral Ethiopia*

# 4. Home garden for sustainable and healthy diet

## 4.1. Role of home garden for dietary diversity

Home gardens are a promising approach to enhance household food security and well-being (ore et al., 2025). They improve household access to fruits and vegetables, and contribute to household dietary diversity, by increasing household food availability, households' income, and buffering the household against food shortages.

- The crops selection should consider missing nutrients to households' meals should be considered while designing home gardens to guarantee that they can support households with greater access to nutrient-dense foods.
- Ensure appropriate selection of diversified micronutrient-rich vegetables and fruits in the local context, highest in vitamin A, vitamin C, iron, calcium, folate, and zinc. See table 2 for which crops are the highest in the specific micronutrients.

*Table 2 : Micronutrient content of selected fruits and vegetables per 100g (raw)*

| Crop | Vitamin A (RAE, µg) | Vitamin C (mg) | Iron (mg) | Calcium (mg) | Folate (µg) | Zinc (mg) |
|---|---|---|---|---|---|---|
| **Vegetables:** | | | | | | |
| Amaranth leaves | 153 | 36 | 3.79 | 305 | 52 | 0.66 |
| Carrots | 835 | 6 | 0.30 | 33 | 19 | 0.24 |
| Malabar spinach, green | 249 | 49 | 1.03 | 25 | 71 | 0.38 |
| Malabar spinach, red | 189 | 51 | 1.02 | 27 | 104 | 0.34 |
| Moringa leaves | 146 | 278 | 3.27 | 97 | 295 | 0.85 |
| Okra (ladies' fingers) | 43 | 44 | 1.75 | 49 | 27 | 0.58 |
| Purple eggplant | 1 | 2 | 0.23 | 9 | 22 | 0.16 |
| Red cherry tomatoes | 33 | 40 | 0.69 | 10 | 5 | 0.19 |
| Green beans | 35 | 12 | 1.03 | 37 | 33 | 0.24 |
| Sweet potato leaves | 138 | 25 | 0.51 | 67 | 1 | 0.15 |
| Sweet potato roots | 709 | 2 | 0.61 | 30 | 11 | 0.30 |
| Water spinach (kang kong) | 85 | 9 | 0.88 | 44 | 34 | 0.21 |
| **Fruits:** | | | | | | |
| Guava | 31 | 228 | 0.26 | 18 | 49 | 0.23 |
| Mango | 54 | 36 | 0.16 | 11 | 43 | 0.09 |
| Papaya | 47 | 61 | 0.25 | 20 | 37 | 0.08 |
| Passion fruit | 64 | 30 | 1.60 | 12 | 14 | 0.10 |
| Pineapple | 3 | 48 | 0.29 | 13 | 18 | 0.12 |

*Sources: (WVC, 2016)*

## 4.2. Social behavioral change communication approach (SBCC)

Social and Behaviour Change Communication (SBCC) is a research-driven approach designed to influence and sustain positive behavioural changes across individual, community, and societal levels .Interventions targeting a change in behaviour can significantly enhance the adoption of the Ethiopian food-based dietary guidelines (Hailu et al., 2025). To maximize impact, interventions must be context-specific and grounded in evidence. Selecting and properly applying behaviour change models allows practitioners to identify key behavioural determinants, tailor interventions to local realities, and accurately measure outcomes. Table 3 summarizes four commonly applied behaviour change models within SBCC.

Behaviourial change communication should focus on the provision/creation of support for the specified behaviour and practices to be achieved in addition to developing and transmitting nutrition information. The aim of the SBCC needs to be to increase knowledge, change attitudes, beliefs and practices through the use of different reinforcing methods for healthy diets.

*Table 3: Comparison of commonly used behaviour change models*

| Aspect/ Model | Type of research question | Typically used step of intervention timeline | Commonly used type of study methods | Presentation of results | Limitations | Strengths |
|---|---|---|---|---|---|---|
| Capability, Opportunity, Motivation, Behaviour (COM-B) Model | Identifies key determinants influencing behavior | Analysis during evaluation phase | Interviews and FGDs | Often summary table linking determinants to COM-B components, followed by text and quotes | - Not accounting for the element wanting (removing intention-behaviour gap)Lacks inclusion of contextual factors (Marks, 2020; Whittal et al., 2021) | - Practical use for identifying what needs to change<br>- Facilitates design and analysis of interventions (Michie et al., 2011; Willmott et al., 2021) |
| Behavioural Change Wheel (BCW) | Identifies and links key determinants to specific intervention strategies for behavior change | Follows COM-B analysis | Interviews and FGDs | Builds upon COM-B analysis, table mapping findings to BCW, followed by text and quotes | - Adaptation to specific context is required<br>- Broad scope (Michie et al., 2011) | - Comprehensive framework, incorporating nineteen models<br>- Overcomes individual model limitations (Michie et al., 2011) |
| Socio-Ecological Model (SEM) | Exploring key determinants across multiple levels of influence and effectiveness of multilevel study | Analysis during evaluation phase | Interviews, FGDs, questionnaires | Often text organized by SEM levels, sometimes including tables and quotes | - Limited guidance and theoretical background on dynamic interactions between levels<br>- Operational challenges due to multi-level framework (S. Golden & J. A. Earp, 2012; Schölmerich & Kawachi, 2016; Stokols, 1996) | - Emphasizes importance of social, cultural, and institutional context<br>- Acknowledges complex interplay between individual and environmental factors (Caperon et al., 2022; S. D. Golden & J. A. L. Earp, 2012). |
| Social Cognitive Theory (SCT) | Focusses on social and cognitive factors influencing behavior | Analysis during evaluation phase | Interviews and FGDs | Often text organized by thematic analysis, supported by quotes | - Focus primarily on individual psychological processes, overlooking contextual factors<br>- Not focussed on population-level (Islam et al., 2023) | - Widespread use and acceptance in field since it uses all determinants of health<br>- Adaptable to various contexts (Islam et al., 2023) |

Behavioural change is nutrition-sensitive when:

- Consumers purchase safe and nutritious foods
- Households equitable distribution of safe, nutritious foods, especially women of reproductive age and young children,
- Men and women make joint decisions on nutritious food to grow, buy and sell ,
- Elders challenge social norms that restrict women of reproductive age and young children from eating healthy diet.

There are many SBCC approaches, a useful framework is provided in Table 4.

*Table 4: - SBCC framework for promoting health diet through home garden*

| Problem statement | Target audience | Desired behaviour | Major SBCC topics | SBCC strategies and channel |
|---|---|---|---|---|
| • Limited availability, accessibility and utilization of NDF<br>• Low dietary diversity<br>• Limited consumption of fruit and vegetables<br>• Limited nutrition related knowledge<br>• Food taboos (e.g. fruit consumption for pregnant women) | • Primary target audience (Home gardener and their spouses)<br><br>• Secondary audiences are people who influence the primary target audience (DA, HEW, community and religious leaders) | • Enable home gardeners to produce/purchase and consume fruit and vegetables per day<br>• Encourage consumption of diversified food based on EFBDG key messages<br>• Encourage DA/HEW to provide more support and motivation on consuming fruit and vegetables.<br>• Increase access to healthy diet information<br>• Improve Knowledge attitude and practices of healthy diet and food hygiene<br>• Encouraging positive social norms and community support for healthy eating habits | • Cultivation and consumption of locally available NDF (through Nutrition sensitive agriculture practices)<br>• Healthy food choices and balanced diets (From EFBDG)<br>• Existing misconceptions and social barriers to the consumption of various food (food taboos and food distribution)<br>• Food safety and hygiene (mainly focused on fruit and vegetable) | Interpersonal channel (Between provider and client, teacher and student, parent and child, or among peers)<br>• Individual counselling and household visit<br>• Group education session<br>• Peer-to-peer counselling<br>• Discussion platform and others<br><br>Community mobilization,<br>• Food demonstration<br>• Field Day<br>• Distribute posters, leaflet,<br>• ·Religious and cultural events<br>• Group discussion (community gathering) and others<br><br>Advocacy,<br>• Multi-stakeholder meeting |

### 4.3. Targeted key messages from the Ethiopian FBDG

- In orderto improve dietary diversity and safety through garden, individuals must first be made aware of the issue, its causes and effects, and potential solutions.
- In behavioural change strategy, you should define the messages, messengers, communication channels, and the creative strategythat you will use to promote behaviourchange.
- The SBCC activities should be based on the 'Implementer's Guide for communicating behavioural change around the Ethiopian Food-Based Dietary Guidelines'.( (see https://raise-fs.org/publications/)
- The goal of increasing nutritional knowledge is to improve understanding of the basics of nutrition and the capacity building section will consider major nutrition components (malnutrition and its effect, cause of malnutrition and its effect, and possible agricultural interventions, different types of food groups and its benefit, importance of fruit and vegetable, fruit and vegetable handling and preparation and food taboos).
- It should also consider the existing nutrition related information of each woreda.

Ethiopia has launched a food-based dietary guideline with 11 key messages. The SBCC communication materials were linked to home garden interventions as well as the Ethiopian food-based dietary guideline's key messages (Figure 13).

### 4.4. Year-round fruit and vegetable consumption

- The primary desired behaviour of home garden interventions is to increase year-round accessibility and consumption of fresh and diversified nutrient-dense vegetables, fruits, and roots at the household level.
- If there is surplus production, it is advisable for host farmers to use techniques that increase shelf life so that households can continue consuming for extended period, and consider as an income source and utilize the generated income to diversify their food by purchasing other nutrient-dense foods such as animal source food, legumes and others that are not available in the household. To ensure year round fruit and vegetable consumption appropriate data should be collected and analysed to gained insight in seasonal variation of the consumption

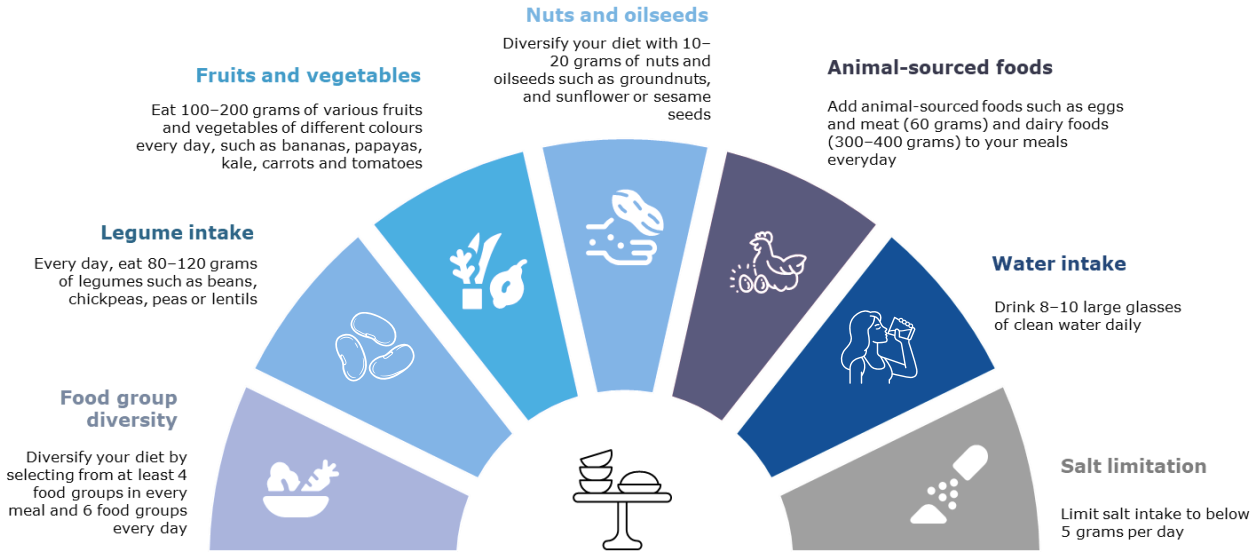


*Figure 13: Target key messages based on Ethiopian Food Based Dietary Guideline*

## 4.5. Fruit & vegetable handling, storage and preparation

- Eating plenty of fruit and vegetables contributes to a healthy diet, but it is difficult to always includethem in meals because they have a very short shelf life. Improving storage options for fruit and vegetables is a simple way to increase access to fresh produce.
- Different fruit and vegetable storage technologies such as pot-in-pot should be promoted to improve farmers' knowledge of fruit and vegetable handling and preservation techniques.
- Proper storage will help to maintain the nutritional content of the crops besides prolonging access to, and consumption of, micronutrient-rich foods.
- The storage area should be kept clean, dry and ventilated when needed, and painted (using whitewash and lime).

For example, the use of pot-in-pot or clay pot coolers (Figure 6) to store fruits and vegetables can reducespoilage and preventpostharvest food losses. These are designed to cool air through the evaporation of water, providing a stable environment to store most fruits & vegetables.

- Wet sand placed between a larger outerpot, dish, or basin, keeps the fruits and vegetables inside the inner chamber cool.
- A jute bag or other absorbent cloth material placed over the opening protects its contents.

If properly maintained, clay pot fridgeor coolers provide many benefits to households, including i) reduced post-harvest losses; ii) increased availability of vegetables; iii) fewer trips to the market to purchase vegetables; iv) saving costs.

*Figure 14: pot in pot technologies*

*For actions:*

*Promote any appropriate preservation/storage technologies such as pot-in-pot and analyse their contribution to year-round access and extend the shelf-life of products.*

## 4.6. Organize food demonstration events

To promote the utilization of fresh fruit and vegetables as well as diversified food preparation the following should be done:

- Conduct participatory diversified food demonstration sessions (Figure 16] )with the collaboration of MoA ,health bureau and extension workers and/or existing NGOs in the woreda for the wider community using home garden and the newly introduced nutrient dense crops as leverage points.
- During cooking demonstrations or recipe preparation, consider referring to the MoA Food Recipe Compendium Manual
- The objective is to enhance the knowledge and practices of the community as such focus on good food preparation techniques and practices for enhanced preservation and utilization of micronutrients.
- The primary target and secondary target audience should be participating in the cooking demonstration sessions.


*Figure 16: Tips for organizing food demonstration session*

## 4.7. Food hygiene and safety practices

Proper hygiene practices are important to prevent disease occurrences and hence ensure good child growth and development.

- The five key WHO recommendations for food hygiene, stay clean, separate raw and cooked foods, cook and reheat food thoroughly, keep food at asafe temperature, and use safe water and raw materials, should be promoted. Messages are to wash hands before eating and handling foods, clean utensils, and use clean water.
- Promote good practices for fruit and vegetable production, handling, and storage to minimize risks of microbial and chemical safety hazards.
- It is important to provide a general overview of appropriate food handling and storage techniques.

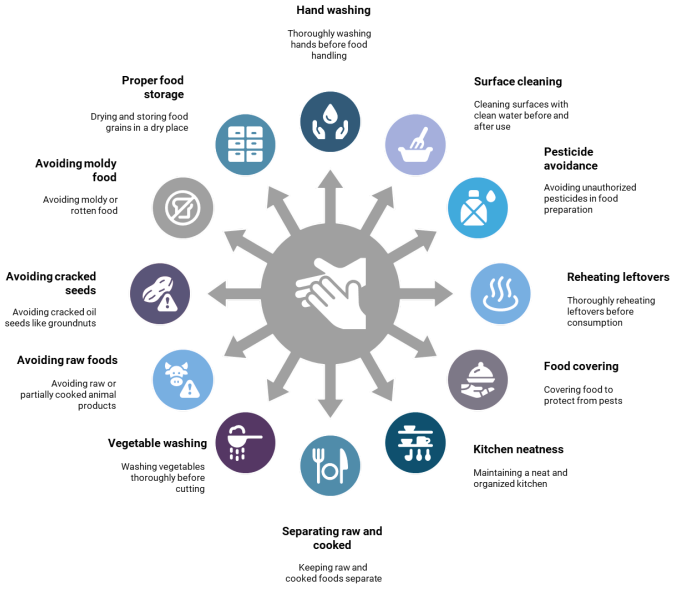


*Figure 17: Good practices to improve food hygiene*

# 5. Gender equality and women empowerment in the context of home gardens

## 5.1. Gender division of roles in home garden production and management practices

- Women ‘s unpaid domestic tasks are continuous, time-intensive, and energy consuming causing time poverty inhibiting women from engaging in other productive roles.
- Homestead vegetables are majorly used for home consumption and are not considered as a cash-oriented job in many rural households. Due to this, home garden production and management activities are assumed to be women’s roles. Studies show that female family members put most of their labour input into home garden activities like land preparation, transplanting, watering, and harvesting, although men help with fertilizer and pesticide application. (Joshi and Kalauni, 2019)
- It is important to assess the division of roles in a household’s home garden production and management practices. Gender analysis tools, such as pile sorting (Figure 18) can be used to assess family members' labour inputs in home garden activities.
- To understand the triple work burden on women, it is important to categorize activities in the household into three
    - Productive roles- include activities related to the production of goods for consumption or trade and income-generating activities (sowing, weeding, harvesting, etc)
    - Reproductive roles –include tasks and activities relating to the creation and sustaining of the family and the household (like cooking and cleaning)
    - Community management role: describes activities usually carried out for the benefit of the community, for example, the provision and maintenance of scarce resources of collective consumption, such as water, health care, and education.

- Women’s unpaid domestic tasks are continuous, time-intensive, and energy consuming causing time poverty inhibiting women from engaging in other productive roles.
- The benefit of pile sorting major activities in the household is to help household members see where the most work burden lies and whether or want to make changes by recognizing, reducing, and redistributing tasks in the household in a fair manner. It requires the participation of all family members to develop a corrective action plan that can assist them to equitably share work burdens. The same template in annex1 can be used for action planning.

*For action*

*Carry out a rapid gender analysis, on the gender division of home gardening tasks, with households in your intervention area.*


*Figure 18: pile sorting*

Reducing workload on women in home garden activities

Women'sinvolvement in home garden is significant, but it often contributes to their already heavy workload, as they balanceproductive, reproductive, and community roles. To alleviate the burden on women while ensuring effective home garden practices, the following strategies should be considered:

**i. Promote labour-saving technologies and practices**

Introduce efficient tools and equipment - provide training on the use of efficient garden tools and equipment that reduce the physical labour required, such as drip irrigation systems.

Encourage the use of mechanized solutions - where feasible, introduce small-scale mechanization for land preparation, irrigation and maintenance tasks, reducing the time and effort required for these activities.

**ii. Foster household collaboration and shared responsibilities**

Encourage shared garden roles - promote gender-inclusive participation in home garden by encouraging men and other family members to take on tasks traditionally assigned to women, such as watering, weeding, and harvesting.

Conduct gender-sensitive training - offer training sessions that involve both men and women, emphasizing the benefits of shared responsibilities in home garden activities and highlighting successful models of collaborative household work.

**iii. Implement flexible and time-saving garden practices**

- Promote time-efficient garden methods: Introduce practices that require less time and space, making it easier for women to manage alongside their other duties.
- Promote time-saving planting and harvesting schedule: Encourage planting schedules that distribute gardening activities more evenly over time (like staggering), preventing peak workloads during planting and harvesting seasons.

**iv. Monitor and evaluate workload distribution**

- Regularly assess workload distribution - regularly assess how garden tasks are distributed within households and make adjustments as needed to ensure an equitable workload balance.
- Adjust training programs based on feedback - continuously refine training and support programs based on feedback from women participants to address emerging challenges and reduce their workload effectively.

## 5.2. Decision-making roles in home gardening

- In rural Ethiopia, men dominate most household decisions, with women only rarely making decisions. Females are often in charge of the household's decisions when the senior male in the household is no longer in the picture.
- Home garden seems to be one of the rare activities where the percentage participating in most or all production decisions is higher for women than for men.
- Decision-making in home garden activities could involve the following elements.
- Who decides on activities regarding home garden production? This involves inputs in production-related decisions like what fruits/vegetables to grow, land preparation, input use, harvesting, and post-harvest decisions, when and who to take to the market, etc.
- Who makes consumption-related decisions?
- Consumption-related decisions include decisions related to households' consumption of home garden produce including whether to keep or sell home garden produce, decisions on who eats what (amount and frequency) in the household, etc.

*For action*

*Carry out rapid analysis, of intrahousehold decision-making patterns in the household and plan, with households in your intervention area*

### Income related decisions in home garden production

Income from home garden can contribute to household livelihoods and financial stability, providing resources for purchasing food, paying for education and healthcare, and investing in agricultural inputs or other productive assets.

- Home gardens are widely promoted as a mechanism to avert poverty and as a source of income for women. In addition to household dietary diversity, homestead vegetable and fruit production can contribute to additional income for a household from surplus sales.
- Studies have shown that home gardens can contribute to over 34% of a household's annual income. (Atiso and Fanajana, 2020)
- Although additional income generation is a positive contribution to the household, it does not necessarily translate into women's economic empowerment unless conscious efforts are made to guide the income use towards such specific outcomes.
- In households where vegetable and fruit production is mainly for commercial production, women's control over the income tends to decline.

Some income related decisions can include the following:

- Home consumption vs sale of home garden products
  - Sales vs income is one of the major income related decisions among home garden producers as home garden innovations primarily target to improve households' dietarydiversity. A balance between selling some surplus produce while reserving the majority for home consumption should be made.
- Market analysis and access
  - What are the main marketing channels available for selling home garden produce (e.g., farmers' markets, roadside stands, local stores, online platforms)?
- Record keeping and financial management:
  - What tools or systems should be used to track expenses, sales, and profits associated with home garden activities?
- How can households assess the profitability and performance of different crops or garden management practices over time?
- Cost management and efficiency
  - How can households minimize input costs such as seeds, fertilizers, pesticides, and water to maximize profitability?
  - What measures can be taken to improve resource efficiency and minimize wastage throughout the production process?

- What measures can be taken to improve resource efficiency and minimize wastage throughout the production process?

- Income diversification and value-added products
  - Are there complementary income-generating activities (e.g., backyard poultry, beekeeping, vermiculture) that can be integrated with home garden to diversify revenue streams?

- Community participation and networking
  - Participating in training programs, workshops, or extension services to enhance agricultural skills, business knowledge, and market linkages.

- Social and family considerations
  - Considering the needs and preferences of family members when making income allocation decisions, including investing in children's education, healthcare, and household improvements. Negotiating intra-household dynamics and decision-making processes to ensure equitable distribution of income and resources among family members.
- Savings and investment planning
  - Setting aside a portion of income for savings, emergency funds, or investment in long-term assets such as land, housing, or education.

Promoting equitable income control in home garden-producing households involves strategies aimed at empowering all household members, particularly women, to have a voice in decision-making processes related to income generation, allocation, and management. Some of these can be providing sensitization training and awareness on gender equality and women's empowerment, and analysing the intra-household income control patterns using gender analysis tools to help communities understand the need for changes in benefits-sharing patterns in the household. It is also important to encourage open communication, dialogue, and participation of all family members in discussions related to home garden and income control. Facilitate family meetings or discussions to ensure that women's voices are heard and respected.

*For action*

*Carry out a rapid assessment of income control patterns in the household and plan, with households in your intervention area*

## Food and nutrition-related decisions

Food and nutrition-related decisions in rural households often play a significant role in determining the health and well-being of family members. In many rural settings, these decisions are influenced by various factors including cultural norms, access to resources, education levels, and gender roles. In many rural areas, there exists a traditional division of labour where men are primarily responsible for agricultural activities and earning income, while women are responsible for household chores, including food preparation. This division can influence who has more control over food-related decisions.

- Intra-household food and nutrition-related decisions in home garden involve choices and actions made within the household regarding the planning, cultivation, management, and utilization of food produced in home gardens.
- Crop selection: rural households must decide which crops to cultivate in their fields or home gardens. This decision affects the availability of nutritious foods for the household. For instance, choosing to grow diverse crops can enhance dietary diversity and nutritional intake(Frison et al., 2011).
- Food purchasing: rural households may need to purchase certain foods that they cannot produce themselves. This decision involves considerations of affordability, accessibility, and nutritional value. (Gillespie et al.,2012)
- Meal planning and preparation: rural households decide what meals to prepare based on factors such as family preferences, cultural practices, and nutritional needs. In relation to cooking skills, there are embedded norms in our communities appropriating cooking for the HH, especially for children to women. Whereas men also need to be involved in cooking and feeding their children
- Coping strategies during food shortages: during periods of food shortages, rural households may implement coping strategies such as reducing portion sizes or relying on alternative food sources (Devereux, 2001).
- Food safety and hygiene: rural households must make decisions to ensure that food is handled, stored, and prepared safely to prevent foodborne illnesses. This may involve practices such as washing hands before eating and cooking, storing food at appropriate temperatures, and avoiding cross-contamination
- Household consumption vs sale: deciding how much of the produced crops (including home garden crops) should be utilized for home consumption and how much of the produce should be taken to market is another important FNS- related decision.
- Intra-household distribution of food- helps to understand how decisions are made in the HH in terms of food distribution, who gets the priority in case of shortage of resources, food taboos influencing the distribution, and the challenges in making decisions in the HH food distribution.

To sum up, advancing gender equality in rural households is critical to enhancing nutrition outcomes, food security, and general well-being. To achieve this, it is necessary to address the underlying structural injustices, empower women, and encourage inclusive decision-making in communities and families. Remedial measures ought to be implemented to confront inequitable roles and unjust decision-making within homes that restrict female family members to decisions solely pertaining to meals. In order to bring about fair sharing of FNS-related decisions in the household, it is crucial to involve male family members in home garden instruction and cooking demonstrations.

*For action*

*Using the annexed template assess major decisions in the household, and who makes them, and plan with households in your intervention area*

*Figure 19: Recipe preparation and demonstration at Wolmera woreda, Oromia Region Photo taken by Yadesa A.*

# 6. Capacity building

Successful implementation of year-round production and consumption of home garden vegetables requires capacity development in relation to good and sustainable production practices, nutrition and food safety behavioural change, empowerment and decision-making of women and youth, evidence documentation, and monitoring among others.

Gender and social inclusion sensitive training takes into account the needs, priorities, and expectations of women and men and other social categories (illiterate, differently abled, old, young, etc.)to ensure everyone benefits evenly from the learning process.

- When designing training materials, develop your content and training structure based on the education level of the different target groups.
- Training venue and time need to take into consideration the needs of different participants (e.g. women, elderly, disabled…)
- Make sure to invite spouses to the training. In the case of female-headed households, invite another family member who is involved in the activity.
- Include basic gender sensitization training contents (decision-making, division of roles, income control, social norms, etc.) along with production and nutrition training in home garden training.
- People learn differently, so it is important to use a mix of approaches (lectures, cases, pictures, demonstrations).
- Encourage participation of all. Directly ask some women (or shy people) to share. Show that you value women's experiences.
- The content of nutrition education training will be based on the prepared SBCC training material.
- To change nutrition-related behaviour, use different approaches such as individual host farmer counselling, group education, drama, household visits, peer-to-peer counselling, organized discussion platforms, or community mobilization, through food demonstrations field days, and group discussion (community gathering).
- Make sure the engagement of all responsible stakeholders during nutrition education and cooking demonstration sessions.
- During community mobilization time, invite nutritionally vulnerable people such as lactating and pregnant women.
- The minimum frequency of message transition or contact with host farmers should be not less than 6 times per year.
- Continuing support and adult learning approach are so important to change consumption behaviours.


*Figure 20: Capacity building approach to promote home garden*

# 7. Evidence collection and documentation

Periodical data collection and evidence generation can improve intervention, identify the key factors, understand producers' and consumers' needs as well as enable the project to make decisions on it.

- The primary objectives of data collection and documentation for home garden intervention is to make the intervention successful, efficient and sustainable based on the identified aspired outcome from food systems perspective as well as create evidence.
- It should appropriately follow and record timely the developed monitoring and evaluation tools such as participant registration, event recording (training, cooking demonstration, and others), field report format, indicator tracking table, quarterly status update, monthly data collection tools, and other related qualitative data tools.
- Pre and post-intervention data should be collected from host farmers based on the developed qualitative data collection tools to assess the contribution of the intervention.
- Monthly quantitative data such as production, consumption, income, decision-making status and others should be collected from the host farmers based on the format (see the Annex) to ensure the desired outcome and answer the learning questions.

*Figure 21: Home garden demonstration at Gumer woreda, Centeral Ethiopia Region*
*Photo taken by Andualem Tadesse*

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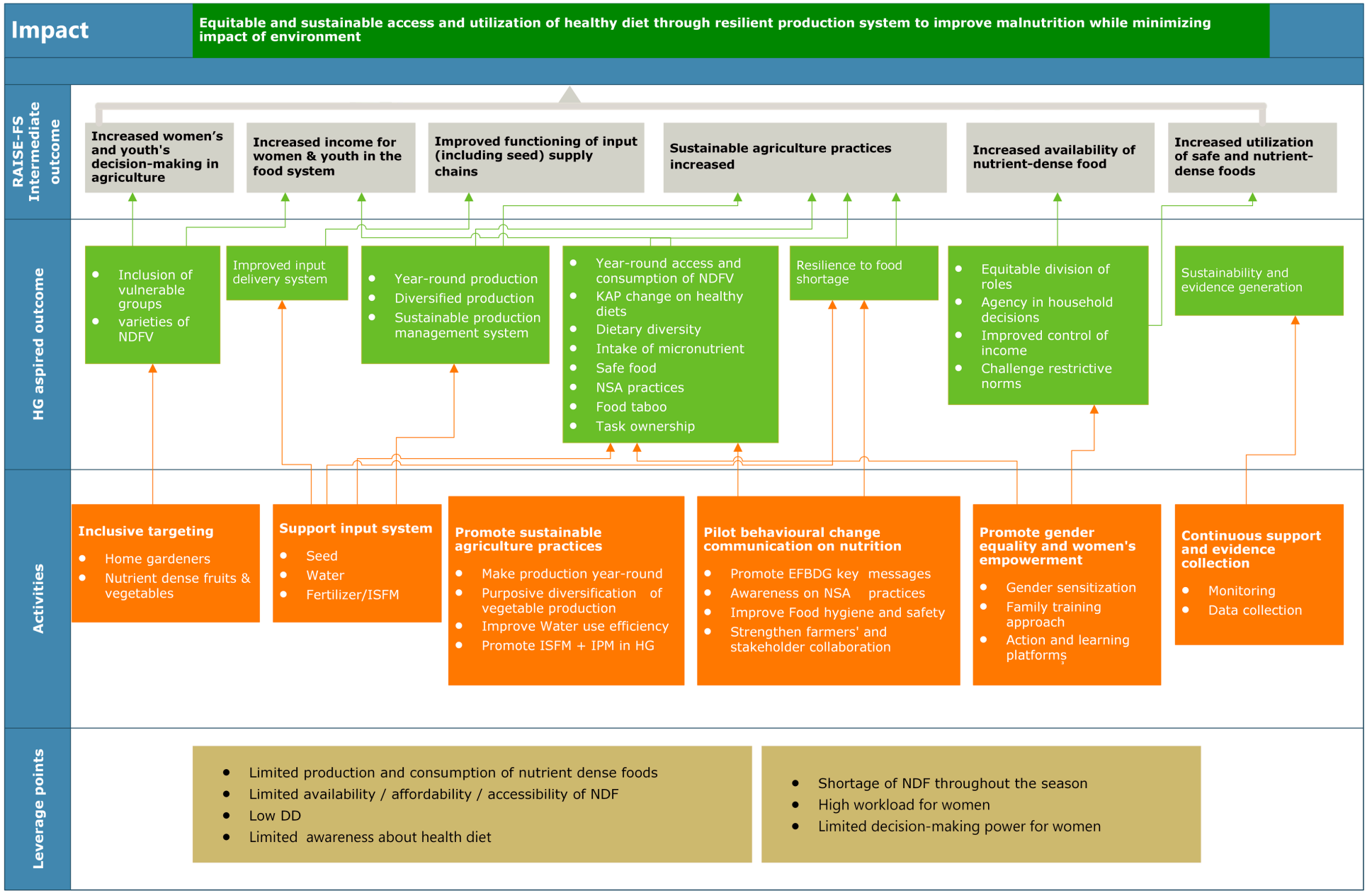
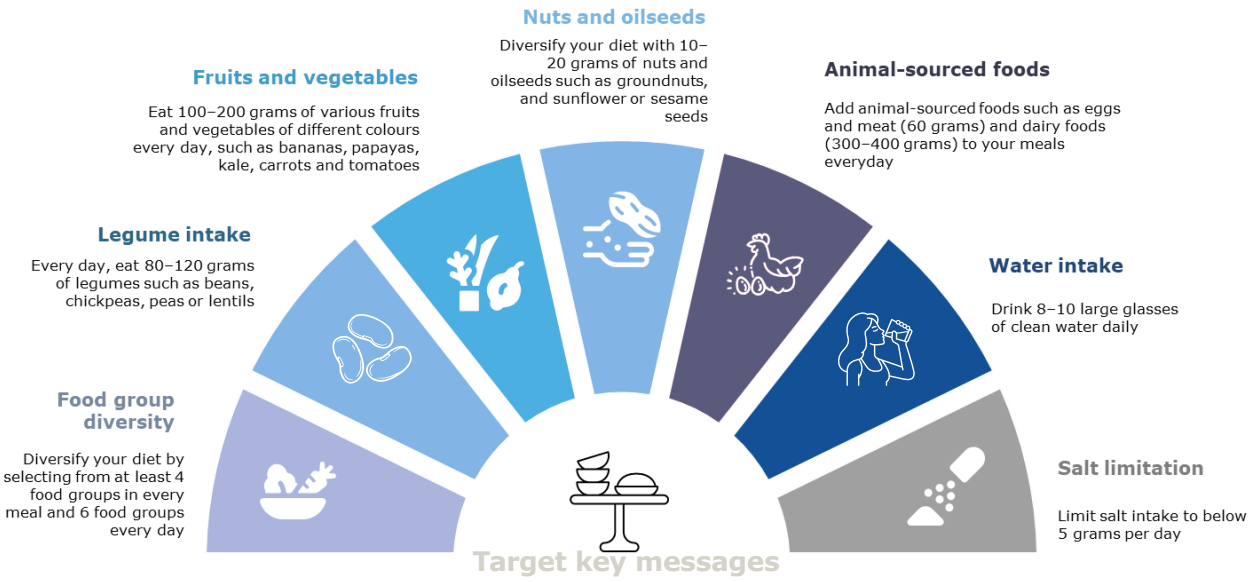
## Annex I: RAISE-FS home garden framework



# Targeted key messages from Ethiopian FBDG

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