

The Food and Nutrition Policy Environment and Drivers of Changes in Key Food System Outcomes in Ethiopia

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Abstract

Background: There seems to be huge gap in our understanding of the changes over time in food system outcomes and their drivers in Ethiopia. The main aim of this study is to examine the food and nutrition programs and policies and their corresponding key food system outcomes in Ethiopia.

Methods: The bulk of the information was generated using scooping review of relevant articles and policy documents. About 67 full text records were used for the review. In addition, data were collected using Key Informant Interview (KIIs) purposefully selected from sectoral offices from two major cities (Hawassa and Dire Dawa), of two regions. The analytical framework used in this paper was adopted from previous studies on related subjects and addressed three key components of food system: review of food and nutrition policy environment, key food system outcomes and key drivers.

Results: Despite improvement in some food system outcomes (such as child nutrition and survival), food security crises in Ethiopia are still becoming more frequent and more acute, affecting the poor disproportionately. Most food and nutrition policies are constrained by lack of implementation capacities. Indicating the presence of various barriers (socioeconomic, demographic, and environmental). Poor human capital (such as knowledge and attitude), food taboos and tradition, cultural practices such as gender-based norms, poor education, poor delivery/supply chain, demographic pressure and other environmental drivers play critical role in food and nutrition security of most vulnerable population groups in Ethiopia.

Conclusion and implications: Given the challenges confronting Ethiopia today, it is imperative to assume that meeting Sustainable Development Goal (SDG) 2 (*i.e.*, attaining zero hunger by 2030) becomes challenging. This calls for continuous capacity building to help implement, learn, and adapt a systems approach; and access to education and skill training on food production and consumption and narrowing down the gender differential in food access and consumption.

Keywords: Ethiopia, food systems, dietary diversity, nutrition outcomes, policy environment

I. Introduction

Worldwide, one in three people suffer from some sort of malnutrition, making it the most prevalent public health issue (Dukhi, 2020). The double burden of malnutrition characterized by the coexistence of both undernutrition and overweight/obesity among women and children continues to be a major public health problem worldwide resulting in three million women deaths annually (Kosaka & Umezaki, 2017). Malnutrition and poor access to food are known to have intergenerational effects, and increases the risk of poor pregnancy outcomes such as premature or low-birthweight (LBW) babies, obstructed labor, and postpartum hemorrhage (Girma & Timotiows, 2002; Khan et al., 2017).

In 2020, more than 45 million children suffered from acute malnutrition, a condition that puts them at risk of dying, experiencing developmental delays, and contracting disease (WHO, 2023). Nearly three-quarters of these children live in lower-middle-income countries (UNICEF, WHO, & World Bank Group, 2021). Incredibly, 149 million children were stunted in 2020 (UNICEF, 2022). Africa is the only region where the number of children affected by stunting increased over the past 20 years, from 54.4 million in 2000 to 61.4 million in 2020 (UNICEF,

2022) which causes them to have an immediate and long-term impact on a child's health and is directly linked to both mothers' and babies' survival (Kedir et al., 2016).

Food security is a prominent concern in Ethiopia. Despite improvements in several health and development indicators in recent years, Ethiopia remained one of the countries with the highest prevalence of maternal and child undernutrition (Negussie & Nigatu, 2023). Moreover, Ethiopia is one of the top ten food insecure countries in the world. Concurrently, eradicating all forms of malnutrition is an integral component of the global agenda for Sustainable Development Goals 2 (SDG-2) through agricultural transformation. Transforming Agriculture will support the transformation of the food systems so that a healthy diet is increasingly easy to access (Ruben et al., 2021). It supports the food and agriculture systems to become more sustainable, resilient, and responsive, increasing its long-term capacity to adapt to demographic trends, socio-cultural patterns and preferences, and shocks and stresses (Calicioglu et al., 2019).

In view of curbing the ever-increasing food and nutrition challenges, Ethiopia has made attempts to implement a food governance system and policy aimed at ensuring food security and promoting agricultural development. The Agricultural Development Led Industrialization (ADLI) strategy, the Productive Safety Net Program (PSNP), the Sustainable Land Management Program (SLMP), child survival policy, National Nutrition Program (NNP), etc., are all commitments on the part of the national government to reduce food and nutrition insecurity among vulnerable populations in the country. Ethiopia has also prioritized climate change adaptation and resilience-building in its food governance system (Ayele et al., 2020). This includes efforts to promote climate-smart agriculture, increase the use of renewable energy in the agriculture sector, and strengthen early warning systems for weather-related risks (Deressa & Hassan, 2019; Terefe & Belay, 2019).

The food system governance and policy environment in Ethiopia has been a subject of study and analysis in the literature. However, most scholars have focused on agricultural policies versus food system and its governance structures, with little or no emphasis on key outcomes of the food system (nutrition security) (Tadesse, 2019; Abate & Shimeles, 2019). Given food systems determine food and nutrition security outcomes in a complex and dynamic manner, there seems to be a huge gap in our understanding of the drivers of changes in food system outcomes in Ethiopia, including the policy context and other sociodemographic drivers. The main aim of this study is to review the food and nutrition programs and policies and their corresponding key food system outcomes in Ethiopia. Thus, the study presupposes the need for analyzing the policy and strategic responses to food and security over the last two decades and the food system outcomes registered.

2. Methods

Data sources: The study employed both primary and secondary sources of information. The bulk of the information was generated using a review of food policy documents and Key Informant Interviews with experts from sectoral offices in two major cities, (Hawassa and Dire Dawa), representing two regions. Twenty-one regional council and sector office representatives participated as Key Informants.

Comprehensive search: A comprehensive scoping review was made to generate evidence on the subject. A scoping review is a form of knowledge synthesis that addresses an exploratory research question by systematically and comprehensively searching, selecting, and synthesizing existing knowledge related to a defined area with the aim of informing practice, programs and policy and providing direction to future research priorities. The review began by identifying relevant sources of information by searching the major scientific databases and grey literature. The search used the following keywords: food systems, food security, food governance, food environment, food policy, and food security strategies in the Ethiopian context. The search was made in January 2024. The following inclusion criteria were used: Martials focusing on Ethiopia; and published since the year 2000 (for policy document). For the most part, we included a study only if it was produced after 2010, was written in English, and was conducted in Ethiopia.

Data collection and extraction: The data collection activities were conducted using the Joanna Briggs Institute (JBI) data extraction from observational studies. For each included article, the first author's last name, year of publication, the setting where the study was conducted, study design, and the key findings were assessed before actual review. Some materials were excluded because they did not match the current study objectives.

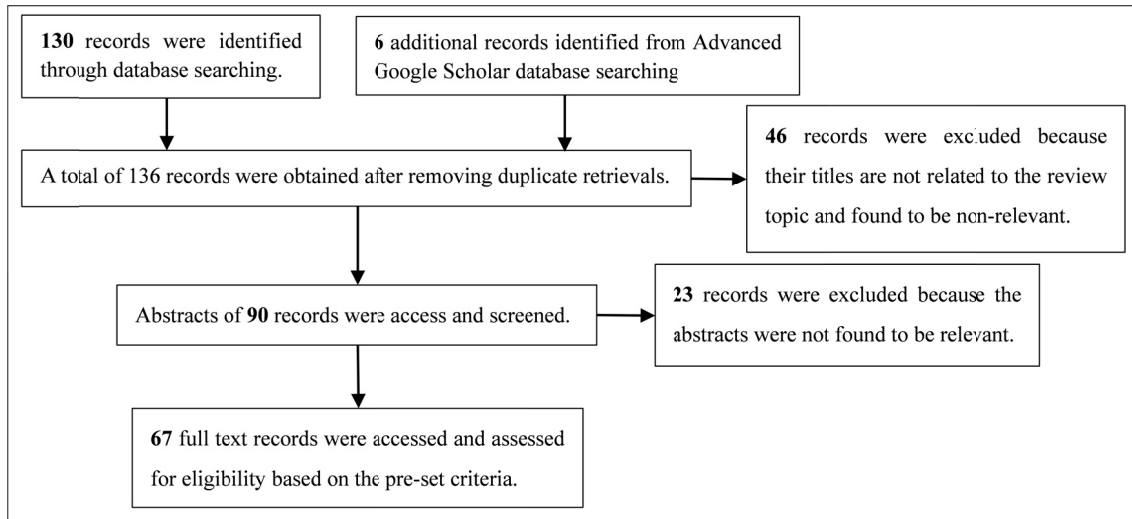


Figure 1. Flow chart showing the procedure of selecting studies for the scoping review

Analysis and synthesis framework: Once the information was extracted from the selected materials, synthesis was made based on key thematic areas which cover the policy environment, the key food system outcomes, and drivers of change. Though the concept of food system is relatively new, various food system frameworks are introduced to date. The analytical framework used in this paper was adopted from previous studies on related subjects (Fatime, 2021; HLPE, 2017). The framework distinguishes between three elements in food systems, namely food supply chains, food environments and consumer behavior (HLPE, 2017). These three elements can be regarded as both the entry points for nutrition interventions and exit points for nutrition and may determine an individual’s diet (Fatime, 2021). The framework shows five drivers that can affect value chains, the food environment and consumer behavior, but the three elements can also affect the drivers (Fatime, 2021; HLPE, 2017).

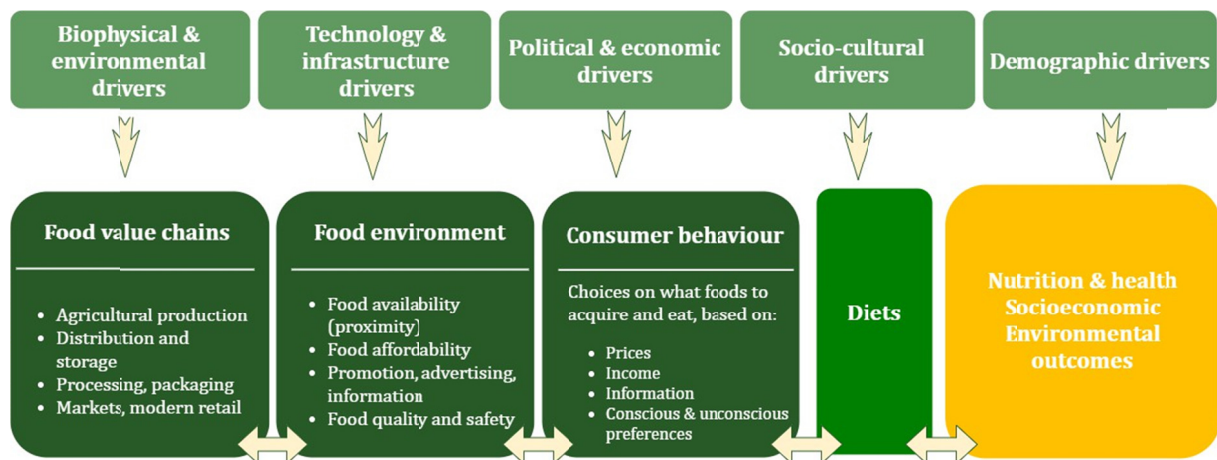


Figure 2. Conceptual framework of food systems

Source: Based on Fatime (2021), de Brauw et al. (2019), and HLPE (2020) framework.

3. Results and Discussion

Ethiopia’s food system may encompass a range of issues including consumer behavior, food environment, value chains, and food system outcomes. The discussion below focuses only on two key dimensions: review of the food and nutrition programs and policies in Ethiopia, and the key food system outcomes and drivers.

Food security is a multi-dimensional concept, comprising access to food, food availability, utilization, and stability. The government of Ethiopia made significant changes to its existing food security program, scaling up

its level of intervention towards food security problems. Several interventions have been initiated to address the underlying and immediate causes, and thereby curb the adverse effect of malnutrition in the country.

3.1 The Food and Nutrition Programs and Policy Environment

In several key government strategies, the Ethiopian government has expressed a commitment to transform food systems to combat malnutrition (Gebru et al., 2018). While some of these policies were outdated and are less useful for the present discussion, it is important to note that the recent ones were built on the former.

Ethiopia's key national food-security scheme is the Productive Safety Net Programme (PSNP). The program was initially funded by a consortium led by the World Bank following the drought of 2002/2003. The program has primarily aimed at breaking the cycle of Ethiopia's historically high household food insecurity by providing food and/or cash transfers (15 kg of cereals and 4 kg of pulses or their cash equivalent) to poor households in chronically food-insecure woredas (districts), in return for participation in public works (Abduselam, 2017). The PSNP was complemented by the Other Food Security Programme (OFSP), which provided productive asset packages to households and invested in socio-economic infrastructure. It currently covers seven regions, benefiting up to 10 million rural and one million urban Ethiopians. There are a range of controversies surrounding the safety net program as to whether the program ensures longerterm growth and development (Headey et al., 2017). Some scholars are of the opinion that cash transfers, compared to direct food supply, allow individuals to maximize their utility (Lhachimi & Seuring, 2019, 2002). Some evidence generated from sub-Saharan Africa asserts that unconditional cash transfers are effective at increasing households' consumption of food, livestock holdings, and purchases of durables; and are effective responses to short term food crises (Ralston, 2017). However, the effectiveness of the cash transfer is conditional on the type of governance system in place.

It was two years after the issuance of the PSNP that the Ethiopian Government embarked on implementing the National Strategy for Infant and Young Child Feeding (IYCF) in 2004 (FMOH, 2004). The main objective of the strategy was to improve the IYCF behavior in the country by standardizing the practices and outline the technical directive for interventions (FMOH, 2004). The first 12 months of child's life was emphasized in the policy document. This is the period when growth faltering takes hold due to sub-optimal infant feeding practices (FMOH, 2004). The document outlines seven key messages to be delivered by Health Extension Workers (HEWs) : promoting optimal feeding, promoting complementary feeding at 6 months; controlling vitamin A deficiency, nutritional care of the sick child during and after illness; improve women's nutrition; reduction of anemia; and controlling iodine deficiency (FMOH,2004). Regions are making some efforts in implementing the PSNP, but are constrained by a range of problems including technical and financial limitations. The key informant from Dire Dawa noted that "*the Productive Safety Net Program (PSNP) devotes 3% of its capital budget to nutrition intervention*".

The National Nutrition Program (NNP) was implemented in two phases for 10 years; each phase lasted five years. The NNP was supported by nine national ministries, mobilizes multiple sectors and stakeholders to improve nutritional status (Gebru et al., 2018). The NNP I targeted the most vulnerable (such as those under 2 years as well as pregnant and lactating women) (FMOH, 2008). There were additional strategies added in the NNP that were not included in the National Strategy for IYCF. The launching of NNP I since 2008 (FMOH, 2008) was an important commitment to improve the widespread malnutrition in Ethiopia (UNICEF-Ethiopia, 2008).

Once the implementation of NNP I (2008-2013) was completed, the government launched another round of NNP for 2016-2020 (NNP II). The revised NNP gives priority to young children under the age of two, pregnant and lactating women, adolescents, infants and young children (FDRE-Ethiopia n.d.). The NNP II has primarily focused on reducing the prevalence of three crucial indicators for children under five: stunting from 40 percent to 26 per cent; underweight from 25 percent to 13 percent and wasting from 9% to 4.9% (FMOH, 2016). The main strategic objective of NNP II is integrating nutrition-sensitive and nutrition-specific programs and enhanced inter-sectoral coordination. In addition, NNP II emphasizes the scale-up of best practices of processing of agricultural products at the household level. NNP II was also aligned to Sustainable Development Goal and the international Seqota Declaration to end child malnutrition by 2030. Building on the work of the National Nutrition Program II (NNP II), the Seqota Declaration initiative sets out to embrace a food systems approach as it aims to leverage a variety of existing policies, strategies and programs and promote multi-sectoral multi-stakeholder cooperation to tackle the root causes of child undernutrition.

The National Child Survival Strategy (2005-2015) and its subsequent second cycle (2015-2020) were instrumental in guiding the design and implementation of high impact newborn and child health interventions in

the country (FMOH, 2004). The National Newborn and Child Survival Strategy (2015/16-2019/20) primarily targeted reducing infant and neonatal mortalities to 29 per 1000 children, 20 per 1000 live births and 11 per 1,000 live births, respectively (FMOH, 2004; HNN, 2015). For this reason, the strategy document identified and prioritized 39 high impact and cost effective newborn and child survival interventions (FMOH, 2004; HNN, 2015). Like other related health policies and strategies, this one also capitalized on the importance of childcare practices such as nutrition, improving accessibility to health services and promoting good hygiene and sanitation at all levels. The Ministry of Health believes that the strategy was instrumental in achieving the Millennium Development (MDG) Goal 4 by reducing infant and child mortality three years ahead of 2015 by two-thirds from its 1990 level (HNN, 2015). A related strategy was the National School Health and Nutrition Strategy, which was issued in 2012, mainly aimed at improving access and educational achievement of school children through health and nutrition interventions. It implemented multisectoral approaches to improve school health and nutrition, education, health, and agriculture.

The year 2018 was marked by the introduction of the Food and Nutrition Policy of Ethiopia, mainly aimed at attaining optimal nutritional status at all stages of life at all levels. The policy uses a range of approaches including life-cycle approach, food as a human right, food-based approach, multisectoral approach, nutrition-specific and nutrition-sensitive approaches, and value chain approach. Food and Nutrition Strategy was introduced in 2021 with the main goal of attaining optimal nutritional status at all stage of life span and conditions to lives that is consistent with quality of life, productivity, and longevity.

The Ministry of Agriculture and Natural Resources (MOANR) introduced the nutrition-sensitive agriculture strategy in 2016 which builds on the second Agricultural Growth Program (AGP-II). It emphasizes the opportunities for improving nutrition through several pathways—via improved production, value chains, and marketing of nutritious foods; increased household income; and women’s empowerment (The FDRE MOANR, 2016). Information on the implementation of this policy at regional and grassroot level is not available. However, based on the information collected from key informants, there are some efforts done to promote nutrition sensitive agriculture in some regions. For instance, a key informant from Dire Dawa asserted that *“farmers are provided with free input supply such as seedlings, motor pump, chicken and goat distributed to encourage their engagement on the production of these vegetable and fruits. Farmers were provided 40 motor pumps last year, 6000 laying chicken and goat were given to pregnant and lactating women for free; shot fattening (sheep, goat and camel) were provided for selected households; farmers who practiced bee farming in traditional way have been provided with 60 beehives”*.

These days, schools are also becoming important agent of nutrition sensitive agriculture. The school feeding program makes use of school garden to grow vegetables and fruits to feed children, A key informant from Dire Dawa reported that *“Fourteen million birr was allocated for 14 schools for school feeding program, purchasing seeds for growing vegetables in the school compound, and providing nutrition related training for teachers, and school heads. National cement has allocated 17million birr for vulnerable students feeding program in 8 schools this year; a private company/individual covered breakfast for 750 chronic vulnerable students in 15 schools for the last three years in Dire Dawa city. The school feeding program contributed to reduction in dropout, reduced student late comer to school, and student class attentiveness improved”*.

The promotion of the nutrition sensitive agriculture has brought about significant changes in production of selected crops. Based on the key informants’ report, in rural areas of Dire Dawa administration, the production of vegetables and fruits has increased from around 1000 ha to 6194 ha of land in 2024. Currently, out of 38 rural villages of DDA, 24 villages have access to irrigation. From this, it is expected that apart from marketing, consumption of vegetables and fruits would significantly increase in rural households if concerned stakeholders make proper awareness raising and related nutritional intervention activities.

The multi-sectoral cooperation is a building block of all the food and nutrition programs and policies in Ethiopia. In all the key informant interview held with the relevant sector offices, the importance of this strategy was emphasized by the respondents. For example, a key informant from Dire Dawa reported that *“the health bureau is the coordinator of all the nutritional activities undertaken by the sectoral offices. The office support nutritional facilities (such as vitamin-A distribution for less than 5 years old children, intestinal nematodes treatment) for health post and health centers; nutritional need assessment for less than 5 years old children; monthly monitoring of infant growth from birth up to 2 years; provide iron folic supplementation to pregnant and lactating women; nutritional need assessment for pregnant and lactating women; provide awareness raising training such as on acute malnutrition, and overall nutritional issues. In collaboration with the agricultural office, the health bureau works on bringing social and behavioral change in balanced diet to farmers especially for women and children*

and malnutrition screening. Health extension workers contribute to teaching women about water sanitation and hygiene in health post and health centers”.

Similarly, in the Sidama region, there is a multi-sectoral council led by the Regional office of the President; There is a steering committee; there is food and nutrition technical committee led by a section at Regional BoH (Women, Children, Nutrition Directorate). According to the KII, there is a clear plan. However, institutional arrangements at zonal and woreda levels are relatively weak. Each sectoral office has its own role. For example, the role of Bureau of Agriculture (BoA) is promoting and supporting the production of nutrition sensitive agricultural products. Similarly, Bureau of Health (BoH) works on awareness creation of issues related to nutrition; Bureau of Trade (BoT) works on enduring the marketing of healthy food items; Bureau of women (BoW) works on the economic empowerment of women; Bureau of Education (BoE) works on adolescent nutrition, and establishment and strengthening of student clubs that works on nutrition awareness. It is promoting school gardening; Inclusion of agriculture in the school curricula is another intervention related to food; Pushing schools to plant edible trees (up to 40 percent) in school gardens replacing non-edible ones; introducing the cultivation/planting of vegetables at school garden to let the students take the experience to their families farm; closing schools during the time of harvest especially when there is rain to let students take part in the collection/harvesting of crop. It was further mentioned that schools also work on nutrition intervention initiatives including the implementation of “Sekota Declaration” to address the nutrition security gaps of the community. Some of these includes strengthening school nutrition club to create nutrition awareness and education, practicing plantation/farming of vegetables at school gardens, food cooking demonstration to promote the practice of using nutritious food among the school community.

Despite efforts to implement the various policies and programs, access to adequate and acceptable food is still a far-reaching goal. Key informants from the two regions mentioned a long list of challenges affecting food access in their specific region. Absence of separate institutional structure for nutrition, which entails that the sectoral focal persons of nutrition have not been exclusively assigned to run nutrition activities. Instead, they have other main duties in their respective office and thus do not give proper attention for nutrition works. For example, focal person of nutrition from health bureau is responsible to follow up and monitor child under 5 years old and Expanded Program on Immunization (EPI-vaccine) in addition to nutrition activities. They recommend that considering the workload, the nutrition expert should be free from other responsibilities. Rural communities lack awareness on healthy food and nutrition despite their production of different cereals, vegetables and fruits. In this respect, an interviewee noted that around twenty years back there were “*nuro bezede/home economics*” expert in rural area that teaches about overall house management, child (especially less than 5 years old) care and nutrition, production of vegetables around home ... etc. This position is replaced by health extension workers who focused on women pregnancy and childcare. The development of dependency syndrome (on safety net) on the communities is another challenge reported. Higher officials are preoccupied with political activities and do not give proper attention to nutrition works monitoring. In the school feeding program, the food cookers lack sufficient training on food preparation especially in the rural schools. Other challenges include shortage of crop varieties and seed, the current inflation problem, the limited financial/budget allocation, poor monitoring of progresses, lack of skills to produce nutritious food, ineffective logistic supply, inflation, and absence of NGOs support on nutrition.

3.2 The Food System Outcomes in Ethiopia

Acceptable diet is one of the key outcomes of a food system. In Ethiopia, while diet play significant role in determining nutritional status of children, substantial proportion of women and children in the country practice poor and monotonous diet. This varies across regions and socioeconomic groups. There are two peculiar characteristics of Ethiopian diet. First, there is high dependence on starchy staples across the country, and the consumption of fruits, vegetables and quality protein remains limited (Gebru et al., 2018). In fact, the diet differs significantly between different population groups based on income (high vs low income), residence (urban vs rural), etc. (Minten et al., 2018). Second, there has been very little progresses made in the proportion of the population having acceptable diet. For instance, only less than 10% households had acceptable diet during the two consecutive Ethiopian Demographic and Health Surveys of 2011 and 2016 (CSA & ICF, 2011, 2016).

Studies on maternal and child diet diversity conducted in different part of Ethiopia reached at nearly similar conclusion. A study conducted in Aksum, Tigray region of Ethiopia, showed that Diet Diversity (DD) of lactating mothers were unacceptably low. Assessments made on the nutritional status of women further shows that, about one fifth of them lack nutritious food in their daily meal (Bekele, 2020). A study conducted in Borena zone of Ethiopia based on 545 lactating women reported that prevalence of undernutrition among them was 17.7% (Bekele et al., 2020). The same study reported that dietary diversity, place of delivery, extra meal taking, monthly income household food insecurity were statistically significant determinants of undernutrition among lactating

women (Bekele et al., 2020). Another study on 416 lactating women from Amhara region (Fentahun & Alemu, 2020) confirmed that 65.7% had inadequate dietary diversity, and the key determinants reported were home gardening practices, practice of income generating activity, meal frequency, pulses production, delivery at health center, food insecurity, and mobile phone usage. Based on two season data collected from Southern Ethiopia, Tafesse et al. (2019) reported over 94% of the 578 mothers did not fulfill the minimum diet diversity score. In a study of 332 pregnant women in antenatal care (ANC) follow-up at selected health facilities in Mekelle city, Tigray, Ethiopia, approximately 79% of respondents had pregnancy diets that were insufficiently diverse (Tela et al., 2020).

In Ethiopia, although the proportion of stunted children declined from 52% in 2000 to 37% in 2019 (Figure 3), there were substantial regional variations in undernutrition indicators. Underweight was highest (36%) in the Afar region, while being stunted (47%) and wasted (23%) were highest in the Amhara and Somali regions of Ethiopia, respectively (CSA & ICF, 2016). The levels of malnutrition are even worse among lactating mothers, which puts the country among those experiencing the highest proportion of malnourished lactating mothers in Sub-Saharan Africa (2015). The 2020 Humanitarian Development Plan indicated that about 8 million Ethiopians require food assistance (WFP, 2020). About 27% of Ethiopian reproductive age women had body mass index (BMI) < 18.5. Undernutrition poses a substantial social and economic costs. For example, maternal and child undernutrition is an underlying cause of 28% of all child deaths and loss of estimated 16.5% of gross domestic product (GDP) (EHNRI (Ethiopian Public Health Institute), 2023).

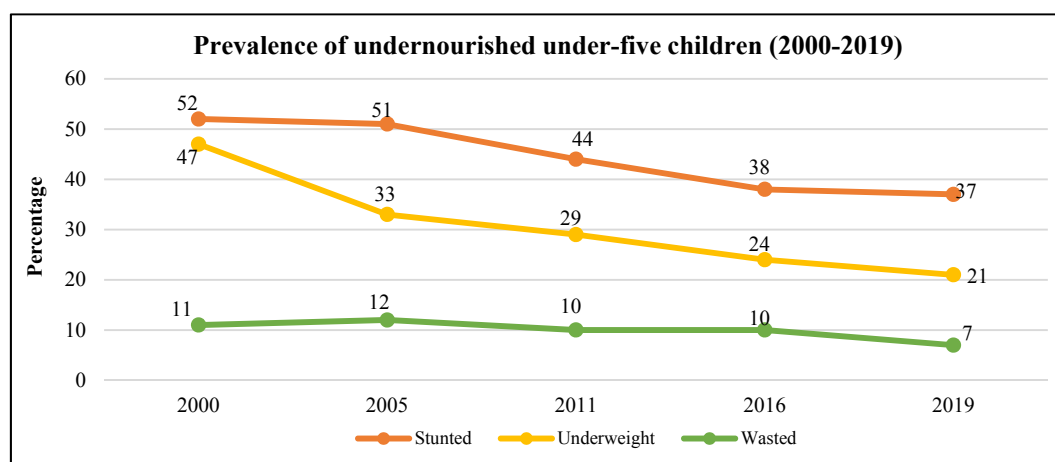


Figure 3. Prevalence of childhood undernutrition from 2000 to 2019, Ethiopia

Despite sufficient dietary iron intake (mainly in the form of iron-rich staples such as teff, barley, and maize), anemia levels are high, at 56% in children and 24% among adult women (CSA & ICF, 2016). This could potentially be explained by high levels of infections and diseases, combined with vitamin A and zinc deficiencies, and relatively low bioavailability of iron in grains (Gebru et al., 2018). Despite improvements in several health and development indicators in recent years (CSA & ICF, 2011), Ethiopia remained as one of the countries with the highest prevalence of maternal undernutrition. The rate of undernutrition declined from 30.5% in 2000 to 22% in 2016 (CSA & ICF, 2016). While several factors affect the level of maternal nutritional status, most studies documented high leverage of women's education. Earlier comparable studies conducted in Ethiopia reported an inverse relationship between women's education level and level of undernourished women (Girma & Timotiows, 2002). Women's education enhances their income generation ability their autonomy and help them develop greater confidence and capability to make decisions about their own and children's health (Kalkidan & Tefera, 2017).

Child survival is another important indicator of nutrition outcomes. In Ethiopia, although under-five mortality declined in the past two decades, evidence shows that the rate is still high (Figure 4). Substantial regional variation was also observed with the lowest Under Five Mortality Rate (U5MR) (39 deaths per 1000 children) in Addis Ababa and the highest U5MR (125/1000) in the Afar region in 2016 (CSA & ICF, 2016). Given that all countries have committed to reducing under-five mortality to 25 or less and newborn mortality to 12 or less per 1000 live births by 2030, Ethiopia is expected to strive more. It should be noted that more than half (55%) of the global under-five deaths occurred in the Sub-Saharan Africa (SSA) region, and 49% of all under-five deaths are also concentrated in five countries, including Ethiopia (Sharrow et al., 2022).

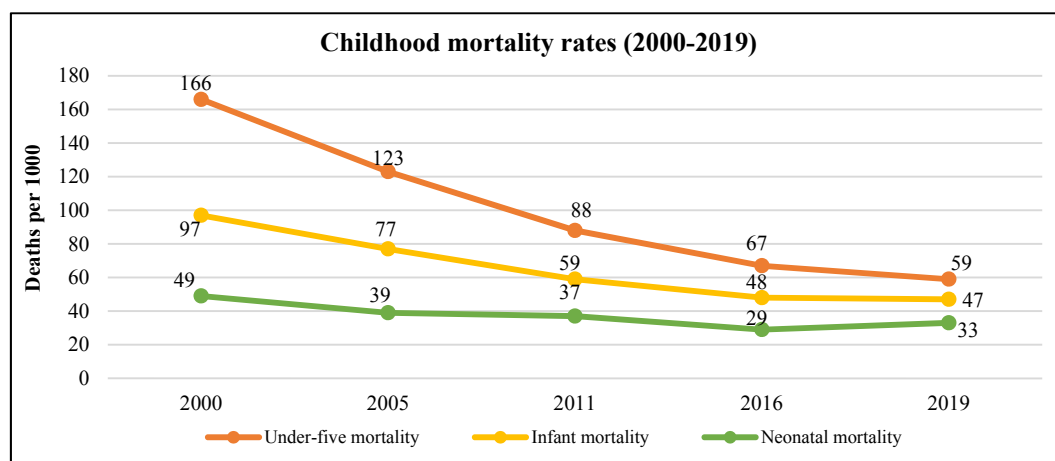


Figure 4. Trends of childhood mortality rates from 2000 to 2019, Ethiopia

3.3 Major Drivers and Challenges

Food security crises in Ethiopia becoming more frequent and more acute, affecting the poor disproportionately, and raising social tensions. In 2021, the number of people in Ethiopia suffering from severe food insecurity amounted to 20 million. The situation is even catastrophic in some regions of the country where we see unprecedented large-scale crisis of hunger, displacement, water scarcity, and insecurity. This entails the need to bridge the various barriers (socioeconomic, demographic, and environmental drivers) adversely impacting the full implementation of the programs and policies. The following few paragraphs present a summary of the key drivers/barriers identified by studies conducted in Ethiopia.

Poor capacity in program/policy implementation: Most food and nutrition policies are constrained by lack of implementation capacities. For example, the Ethiopia's National Nutrition Policy (NNP) failed to mainstream nutrition into their sectoral strategic plan mainly due to inadequate capacity in the form of training/knowledge, financial constraints, and human resources (Government of Ethiopia, 2016). The food and nutrition programs and policies implemented by government and nongovernmental organizations are fragmented and lack coordination among different actors (Olivier et al., 2011). In support of this argument, a recent study on 30 countries' policy documents (Ethiopia included) evidenced highlighted insufficient attention to nutrition and the production of micronutrient-rich foods, lack of strategies to increase farmer market access, and weak multi-sectoral collaboration and capacity building (Asirvatham et al., 2022). According to the World Bank report and a systematic review of several agricultural intervention studies, it was indicated that improvements in agricultural productivity did not necessarily translate to improvement in nutritional status (Masset et al., 2012).

In support of the above argument, responses of a key informant from Dire Dawa indicates that “*National Food and Nutrition Strategy (NFNS) has been operational in Dire Dawa administration (DDA) since 2021. Besides, there are also programs such as Food System Resilience (FSR), and Sekota Declaration which are designed to improve the status of vulnerable household nutrition. But the implementation of NFNS is not effective due to absence of standalone institutional arrangement, its own tagged budget, and nutrition works are undertaken as an additional responsibility*”. It was further mentioned that “*there is a multi-sectoral technical group organized from all sectoral offices each having a focal person. But not well functional except meeting for evaluation of reports quarterly and occasional field visit to nutrition intervention areas*”. On the contrary, key informants from Sidama region (Hawassa city administration) reported that the monitoring and evaluation practices of the implementation of nutrition programs by lower and regional level leadership/management on regular basis (3 times per week) is one of the best practices.

Knowledge and attitude: Despite the obvious direct relationship between food production and consumption, the connection between the two entities [*i.e.*, increased production leading to improved availability, access and improved dietary intake] is much more complex in practice. This is partly due to the awareness, attitude and practices of people that determine eating habits, and, ultimately their nutritional health (McNulty, 2013). The same author also asserts that since attitude and practices can be influenced by education, appropriate nutrition education that focuses on eating the right food, and not just more or less food, would contribute towards improving nutritional health (McNulty, 2013). Promotion and intervention efforts have witnessed that knowledge and practices on consumption can easily be changed through nutrition education and other behavioral change

models (Getenesh et al., 2014; Demmelash et al., 2016). Lack of knowledge among mothers, family members and health workers about appropriate foods for young children is one of the major problems for addressing poor diet and malnutrition (Bhutta et al., 2013).

Food taboos and tradition: Food taboos play a significant role in the diet and health of children and mothers in most African communities. Three baseline studies conducted in Southern Ethiopia (Hawassa University & University of Saskatchewan, 2017) reported that the knowledge, attitudes, and especially practices of mothers towards selected food (such as pulse use) for their families, particularly use in complementary feeding (CF), was significantly associated with the diet diversity score (DDS). Poor practice (< .5 out of 5) has DDS < 3 while better practice (> 3.5 out of 5) shows DDS > 3. In a study of 332 pregnant women in antenatal care (ANC) follow-up at selected health facilities in Mekelle city (Tigray, Ethiopia), around 12% of the pregnant women avoided at least one type of food (legumes included) during their current pregnancy mainly due to food taboos. The most common reasons given for the avoidances were that the foods were believed to cause abortion; abdominal cramps in the mother and newborn; prolonged labor; or coating of the fetus's body (Tela et al., 2020). The same study reported that maternal education (diploma and above) made statistically significant positive effects on reducing food taboos (Tela et al., 2020).

Cultural practice and gender-based norms: Women and girls are expected to consume less or lower quality food than men, contributing to malnutrition and poor health outcomes (FAO, 2020). This kind of food distribution, which follows traditional gender roles and relations rather than physiological needs, would have a subtle impact on the nutrition of women and young children. Women in Ethiopia often have multiple responsibilities, including caring for their families and managing their households. Women are not only the major sources of labor in the production sector, they are also responsible for numerous reproductive and community activities even though such loads are undervalued by society (Bekele et al., 2020).

Access and control: Studies in Ethiopia indicated that female-headed households have lesser access to agricultural packages ($p = 0.019$) as 31.6% of male-headed households are full package users compared to only 11.7 % of female-headed households. The issue of access to agricultural inputs and technologies is mainly related to the issue of whether or not women are perceived as farmers despite of their limited access to land and oxen (Tsegaye et al., 2015). From a nutritional health perspective, the degree of women's access to and control over important household resources may determine how well they nourish themselves, their children, and the family as a whole since they are the ones mostly responsible for preparing meals for the family (Mucha, 2012; Ersino et al., 2016). This kind of food distribution, which follows the traditional gender roles and relations rather than physiological needs, would have a subtle impact on the nutrition of women and young children. Ironically, women who usually get poor nourishment in the family, do most of the work in the homestead (reproductive role), engage in productive activities (including working on farm and engaging in petty trading to earn income) and also have various social responsibilities in their communities; such multiple roles women have to carry out may predispose them to increased activity (work burden). In places where women experience some level of empowerment (be it in terms of resource acquisition, control over important asset or being able to make important decisions), a positive impact has been shown on the nutrition of children.

A recent study in Ethiopia found that maternal empowerment and autonomy made significant contributions to child health and nutritional status (Abate & Belachew, 2017). Another study conducted in Northern Ethiopia reported that lactating mothers who had a practice of income generating activity were 4.45 times more likely to diversify their diet compared to those who did not practice IGA (Fentahun & Alemu, 2020). For example, the results of multi variable linear regression analyses conducted based on 749 farming households living in three coffee producing sub-districts of Jimma zone, Ethiopia, showed that weight for Height (WHZ) scores of children of mothers who had autonomy of conducting big purchases were higher by 0.42 compared to children's whose mothers had not (Abate & Belachew, 2017).

Education: Level of education determines a range of production and consumption patterns (CSA & ICF, 2019). The main challenge in this endeavor is that close to 70% of Ethiopian women are non-educated, most of whom are living in poorer and poorest households, and nearly 85% are living in rural areas with little access to basic services. This has resulted in huge inequalities in selected nutritional outcomes. Thus, the situation necessitates evidence-based findings about the growing socioeconomic disparities to support the ongoing efforts and intervention programs. Nutrition education should be designed to help mothers to use locally available foods for the preparation of complementary foods (Meron et al., 2017). A study done in 'Taba kebele', Southern Ethiopia, on 160 (80 control and 80 intervention) mother-child pairs, provided nutrition education for mothers on complementary foods for 6 months improved mothers KAP (Demmelash et al., 2016). Another study done in Sidama region (Ethiopia) on 197 mother-child pair was also provided a nutrition education on complementary

food and found improvement on maternal KAP (Negash et al., 2014). A 6-month nutrition education intervention on 153 mother-child pair (80 intervention group and 73 control group) on complementary feeding practices in Southern Ethiopia, found an increase of protein and iron intake of young children (6-23 month) in the intervention group (Negash et al., 2014). In this study the nutrition education intervention included recipe demonstration and tasting the porridge made from maize, barley and broad bean (70% cereal and 30% broad bean). At the beginning of the study the knowledge, attitude and practice of mother in using pulse incorporated complementary food was low. However, at the end of the intervention mothers KAP was significantly improved in the intervention group that contributed to increased protein and iron intake among young children (Negash et al., 2014). Another study conducted in Hallaba region, southern Ethiopia, confirmed that with pulse-based nutrition education among adolescents, knowledge, attitude and practice scores improved ($p < 0.001$) in the intervention group while control scores remained low and unchanged. Prevalence of underweight, measured as Body Mass Index (BMI) for age, decreased with the education intervention, from 13.6% to 3% ($p = 0.004$), while there was no significant change seen in control girls (Dansa et al., 2019).

There are also evidences documenting the positive impacts of nutrition education in improving anthropometric measures among children. For example, a study conducted by Demelash and Colleagues (2015) in Southern Ethiopia indicated that all mean measures and indices for intervention and control children were similar at baseline. However, after the 6 months of nutrition education, intervention children significantly gained in absolute weight while control children did not (Demmelash et al., 2016). In general, all available evidence and efforts to link agriculture production and nutrition do in SSA acknowledged that increasing productivity in its own does not necessarily translate to improved nutrition of the most vulnerable groups unless accompanied by nutrition programs such as education and child feeding programs, which have been shown to be highly effective in developing countries (Dansa et al., 2019; Olivier et al., 2011; Teshome et al., 2020).

Dietary transition from traditional foods to processed food: Over the past few decades, there have been profound changes in the types of staple food products consumed in SSA in general and in Ethiopia in particular. Consumption of refined wheat breads is increasing rapidly and displacing traditional meals based on local crops. This dietary transition from traditional foods to wheat-based bread products is attributed to a significant change in consumer attitudes which results from changing lifestyles, demographics, urbanization, increased product availability, accessibility and technological changes (Noort et al., 2022). Given huge urbanization, there could be significant changes in urban dietary preferences and food systems in Ethiopia (Minten et al., 2018).

Poor delivery/supply chain: In many places, new cultivars and agronomic packages lack viable pathways to farmers' fields given fragmented seed multiplication and distribution systems and rural advisory services (IFPRI, 2016). A crop value chain analysis conducted in Ethiopia strengthened the point that despite the country's potential and efforts made to get the pulse sub-sector moving forward, actors in the value chain of pulse crops sub-sector have numerous challenges in production, aggregation, trading, and export (Tadesse, 2019). More importantly, there seems to be poor market linkage for the supply of nutritious food. A key informant from Dire Dawa strengthened this position by stating that "*the challenges we are facing today are absence of cooperatives in Dire Dawa city which distributes industry processed products to rural areas, absence of processing industry, strong bonds of merchants and brokers pervading small holder farmers benefit from its agricultural outputs, absence of infrastructure (road, telephone network- especially in Jeldesa cluster) and low credit service to farmers are pressing issues*".

Price volatility: In Ethiopia, price escalation on food items is unacceptably high either due to the sky rocketing inflation or other man-made factors. In both cases, consumers are finding it hard to purchase quality food products. Key informants indicated that "*the major obstacle for price volatility in Dire Dawa administration is merchants. They collect agricultural products on the farm at a lower price because of weak producer cooperatives. Although weak, eight sheds are ready for farmers to sell their agricultural outputs. Saturday and Sunday market has been operating for farmers to directly bring their agricultural products and sell to the consumers without the involvement of brokers. This can be taken as a best practice to be scaled up. However, the strong merchant network pushes out farmers cooperatives from the system as merchants purchase agricultural products from other areas and selling it at a lower price. Currently, as a solution, the 38 farmer cooperatives have been dissolved and reorganized to 4 farmers' cooperative and is improving their internal structures with the support of cooperative experts of Dire Dire cooperative management directorate*".

Demographic pressure: Ethiopia is the second most populated country in Africa (next to Nigeria) with a population of about 120 million, and is the 12th most populous country in the world (UN, 2017). Ethiopia's population is estimated to reach 140 million by 2030 and 190 million by 2050 (UN, 2017). The Ethiopian population is characterized by a young age structure with a median age of not more than 18 years—a feature of

rapidly growing population (CSA & ICF, 2019). This results in over 70% of the population under 30 years old, while nearly one half of the population is under 15. During the last two decades, The Ethiopian Total Fertility Rate (TFR), which is used to approximate an average family size, dropped from about 7 children per woman in 1990 to 4.2 children per woman in 2019 (CSA & ICF, 2019). Household size in rural Ethiopia averages > 6 members, 26% of households are female-headed; a little more than half of women have no formal education (CSA & ICF, 2019). The country heavily relies on an agrarian economy. Ethiopian agricultural sector employs nearly 85% of its population (World Bank, 2018). No doubt that all these factors adversely affect the possibility of attaining food security and zero hunger.

In Sidama region, key informants reported huge youth rural-urban migration is significantly increasing from time to time leaving the rural farm land/agriculture for old age people; poor work culture is widely common now; farmers are not effectively practicing farming; they are spending much of their time in urban centers doing nothing, but non-productive tasks such as having coffee with friends; population size is significantly increasing from time to time putting pressure on the food supply. This is further aggravated by youths' lack of interest towards agriculture and poor working culture.

Other drivers: There are also other macro level factors contributing to food insecurity in East African countries including poor infrastructure, frequent conflict, floods, capital that are critical for crop production and income growth. Food security is estimated to decline by 5-20 percent on average with each major episode of flooding or drought (EU, 2022).

4. Conclusion and Implications

The discussion presented above summarily indicates that given the challenges confronting the study regions, it is imperative to assume that meeting Sustainable Development Goal (SDG) 2 (attaining zero hunger by 2030) becomes challenging. One possible explanation is that the various policies and programs are not fully and properly implemented at all levels. This calls for a system thinking which entails proper interactions between different parts of a system for visible changes in food and nutrition security. To do this, there should be continuous capacity building and research to help implement, learn, and adapt a systems approach to the local contexts. Policy and regulatory support can help to promote sustainable food systems, including the production and consumption of acceptable diets. This can include support for small-scale farmers and other actors along the food supply chain, as well as policies that promote value-added crop production, and more targeted policies and interventions that support smallholder farmers in adapting to climate change and building resilience.

Given that significant proportion of the study population has poor education, it is important to promote access to education and skill training on food production and consumption. This includes nutrition education programs in schools, community awareness campaigns, media campaigns, and collaborations with healthcare providers. Narrowing down the huge gap in control over resources (land, information, technologies and income from sale of produce) narrowing down the gender differential in food consumption by reducing the cultural norms and taboos will make a big difference in changing the food system outcomes.

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Abbreviations and Acronyms

CSA: Central Statistical Agency

DDS: Diet Diversity Score

DHS: Demographic and Health Survey

EDHS: Ethiopia Demographic and Health Survey

FDRE: Federal Democratic Republic of Ethiopia

FMOH: Federal Ministry of Health

NNP: National Nutrition Program

SDG: Sustainable Development Goal

SSA: Sub-Saharan Africa

TFR: Total Fertility Rate

U5M: Under-five Mortality

U5MR: Under-five Mortality Rate

UN: United Nations

WB: World Bank

WHO: World Health Organization

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Authors Contributions

Prof. Nigatu Regassa Geda was responsible for study design and drafting the first version. Dr. Aklilu Amsalu and Dr. Yeshitila Wondimeneh participated in organizing the data, writing the final version and reviewing. All authors read and approved the final manuscript.

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No additional data are available.

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