

Ceres2030 Deep Dives into  
the Nexus of Food Systems,  
Climate Change, and Diets

# Country Diagnostic Report:

ETHIOPIA





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### **Country Diagnostic Report: Ethiopia Ceres2030 Deep Dives into the Nexus of Food Systems, Climate Change, and Diets**

May 2022

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## Abstract

The purpose of this report is to provide an overview of findings from the first round of activities for the four components of the project, namely the nutrition profile (Task 1), the data assessment (Task 2), relevant parts of the literature review (Task 3), and the findings of the first consultations (Task 4). Our research is based on diverse sources of information, including the relevant outcomes of the Ceres2030 project, public policy documents, and international databases. Using these sources of information, this report provides an overview of the current economic, social, and climate (mitigation and adaptation) trends in Ethiopia, as well as projections based on the Ceres2030 project model. We also include a brief review of relevant policy documents addressing undernourishment and agricultural development, along with an overview of the approach and early findings from country consultations. The report concludes with a brief summary of relevant national trends and planned next steps in the country-level research and analyses.



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# 1.0 Introduction

This report provides an overview of the findings from the first round of activities for the four components of the project, namely the nutrition profile (Task 1), the data assessment (Task 2), relevant parts of the literature review (Task 3), and the findings of the first consultations (Task 4). The findings reported here address research questions 1 and 3:

1. What are the expected trends in terms of diets for the three countries? and
3. What is the definition of a healthy diet for a country, considering cultural and economic specificities and the nutritional value of different food items?

This report also contributes to addressing research question 4:

4. What are the policy instruments and the food system<sup>1</sup> innovations required to achieve healthier diets?

This report is based on diverse sources of information, including the relevant outcomes of the Ceres2030 project, government policy documents, peer-reviewed literature, and international databases, such as those on official development assistance (ODA). When working with these sources, we outline relevant trends and key aspects of planned economic modelling without providing detailed background explanations or definitions, as we assume an informed audience.

This report provides an overview of current trends in undernourishment and basic economic indicators in Ethiopia, summarizing projections for these indicators using the Ceres2030 model. We also outline current trends in nutrition profiles and challenges by population groups, from related data sources and data processing efforts. The report also describes trends in greenhouse gas (GHG) emissions, climate change impacts, especially on agriculture and nutrition, as well as adaptation measures proposed in key policy documents. We include a brief review of relevant policy documents addressing undernourishment, resilience building, and agricultural development, along with an overview of the approach and early findings from country consultations. The report concludes with a brief summary of relevant national trends and planned next steps in the country-level research and analyses.

The key messages are as follows:

- **Poverty and hunger today.** In Ethiopia, the prevalence of extreme poverty is significantly lower than the average for Africa, South of the Sahara (30.8% versus 42% in 2015) (World Bank, Development Research Group, 2021), while the prevalence of undernourishment remains near the average for the region (17% versus 18%) (Food and Agriculture Organization of the United Nations [FAO], 2021). In the past decade, undernourishment has fallen significantly within the country. In the next decade,

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<sup>1</sup> A food system gathers “all the elements (environment, people, inputs, processes, infrastructures, institutions, etc.) and activities that relate to the production, processing, distribution, preparation and consumption of food, and the output of these activities, including socio-economic and environmental outcomes” (High Level Panel of Experts on Food Security and Nutrition, 2014, p. 2).



the projected economic growth and the expansion of agricultural production will contribute to an accelerated trend in the reduction of undernourishment and extreme poverty. According to our projections, by 2030 the prevalence of extreme poverty will be 18%, and the prevalence of undernourishment at 8.5%.

- **GHG emissions from increasing animal production till 2030.** Livestock production already contributes significantly to GHG emissions and the potential GHG emissions from the sector are projected to increase by 5.8% per year, compared to the 0.2% on average for the world, and 1.2% for the rest of Africa, South of the Sahara, according to our Ceres2030 projections. Therefore, promoting sustainable intensification in the livestock sector is critical to reducing the environmental impacts of the expected growth in the sector (see Table 1).
- **Climate change impacts on agriculture.** Ethiopia is vulnerable to drought, which is the most significant climate-related hazard. This is mostly because of the importance of agricultural productivity and thus the potential for worsening existing social and economic problems in the country. Ethiopia's agriculture is heavily dependent on rainfall, which implies that temperature and changes in precipitation impact crop yields and, in turn, food insecurity, malnutrition, and food shortages.
- **Efforts to address climate change and links to dietary diversity and improved nutrition.** Ethiopia has developed strategies to address climate change with a focus on both adaptation and mitigation. Most of these strategies focus on efforts to enhance the adoption of climate-smart agriculture (CSA) in agricultural production. Importantly, the adoption of CSA and associated technologies has been shown to increase dietary diversity and improve the quality of the food consumed through increased calorie and protein availability, leading to improved nutritional outcomes (Stifel & Minten, 2017; Teklewold et al., 2019). Ethiopia is also one of the few countries that has developed a National Adaptation Plan (NAP).
- **National dietary guidelines in development.** Ethiopia has begun a process to develop food-based dietary guidelines, led by the Ethiopian Public Health Institute (Bekele et al., 2020). The process of development occurs in multiple steps, bringing together diverse agencies as well as national and local stakeholders. While Ethiopia currently lacks food-based dietary guidelines, it does have several policies that relate to nutrition and, as such, are leading, at least indirectly, toward healthier diets.
- **Richer households have higher dietary diversity with more meat consumption.** The major food categories—cereals, pulses and nuts, vegetables, and meat/fish—are reported by almost all households. For households in the lowest quintile of the income distribution, food expenditures are dominated by cereals, with 43.8% of households' estimated expenditure going to this category. The next largest share is spent on vegetables, followed by meat and fish (including dairy products), which account for 18.6% and 12.9% of total estimated food expenditures respectively. For households in the highest quintile of the income distribution, cereals offer a lower but still substantial share of expenditures (27.1%). Vegetables take up a slightly larger share (22.6%), while meat and fish (including dairy products) take up almost double the budget share relative to poor households (21.5%) (see Figure 5).



- **Role of ODA in the food system.** In total, USD 1.4 billion of ODA was disbursed annually to projects directly affecting the food system in Ethiopia (average, 2014–2018). This accounts for 50% of ODA grants and philanthropic donations. The United States accounted for 36% of this disbursement, making it the top donor to projects in the food system (see Table 4).



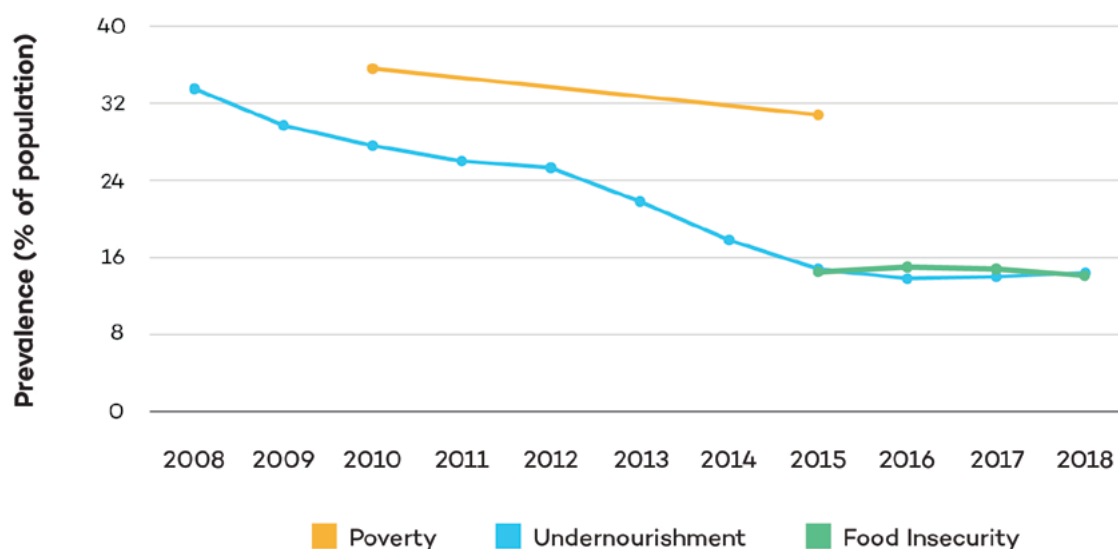


## 2.0 Assessing Domestic Progress Toward Healthy and Sustainable Food Systems

### 2.1 Recent Evolution of Relevant Indicators, Including but not Limited to Sustainable Development Goal 2 Targets

Ethiopia is located in Eastern Africa. It is a landlocked country with 112 million people (data for 2019 in World Bank, 2021). The country has a tropical climate with high variation based on topography. Agriculture accounts for the majority of employment in the Ethiopian economy, employing over 67% of the labour force and representing over 34% of GDP (World Bank International Bank for Reconstruction and Development, & International Development Association, 2021). Agriculture remains highly inefficient in generating income: the value added per worker in agriculture is about 25% of what prevails in the rest of the Ethiopian economy (calculations based on World Bank, 2021).

**Figure 1.** Prevalence of extreme poverty and hunger in Ethiopia



Sources: Author's diagram, based on the following data sources: extreme poverty is a poverty headcount ratio at USD 1.90 per day (2011 PPP) (% of population), from PovcalNet via World Bank Open Data (World Bank, Development Research Group, 2021). Undernourishment is the PoU (%) from FAO, 2021.

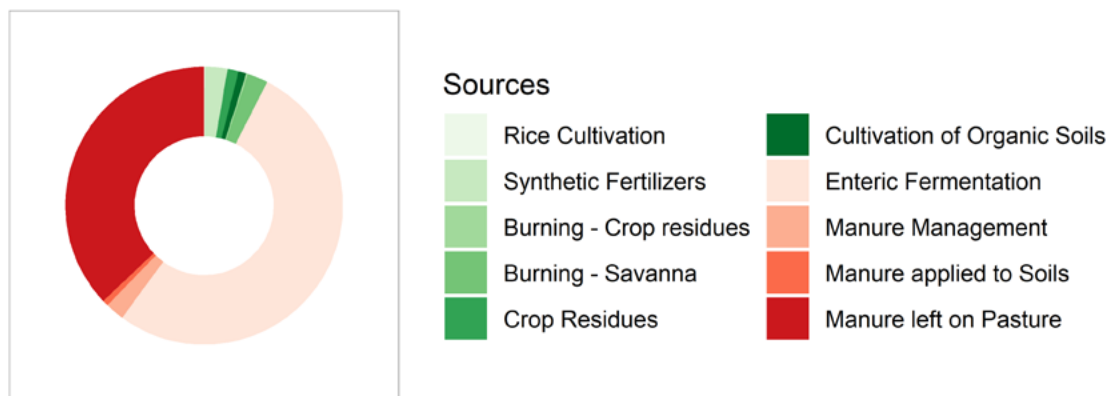
Extreme poverty (at the USD 1.90 per day international poverty line) is lower in Ethiopia than in Africa, South of the Sahara on average (31% versus 42% in 2015) (World Bank, Development Research Group, 2021). The prevalence of undernourishment (PoU) is similar to the average in the region. In 2018, the PoU was 20% in Ethiopia versus an average of 18% in Africa, South of the Sahara (FAO, 2021). The experience of severe food insecurity is slightly lower than average for the region. In 2018, 14% of the Ethiopian population experienced severe food insecurity versus 21% in Africa, South of the Sahara (FAO, 2021). A comparison



of the prevalence of extreme poverty, PoU, and experience of severe food security for Ethiopia is shown in Figure 1.

In terms of specific population groups, 7% of children under five are affected by wasting and 37% are affected by stunting. While wasting rates have remained variable over the last decade, the rate of stunting has decreased on average, from 44% in 2011 to 37% in 2019. However, it is important to note that the prevalence of malnutrition is not uniformly distributed across the regions of Ethiopia, and statistics relating to national prevalence can mask variations in the subnational prevalence and distribution. For example, the national prevalence of stunting masks the variation from 14% in Addis Ababa to 49% in the Tigray region (Amaha, 2020). Similarly, while the prevalence of obesity is very low in the country (3% in 2008 versus 5% in 2016) (FAO, 2021), this masks significant gender differences. Ethiopia parallels the gender trends visible in Nigeria and Malawi, with 28% and 7% overweight and obesity amongst women, respectively, compared to 13% and 2% for men, respectively (Global Nutrition Report, 2020). The prevalence of both overweight and obesity has been increasing steadily since 2000 (Global Nutrition Report, 2020), and therefore represents an issue of growing concern, especially considering the gender dimension. Anemia affects one in four women of reproductive age, slightly lower than the average for Africa, South of the Sahara. Although the prevalence of anemia decreased considerably from 2000 to 2010, there has been a plateau in progress, with numbers even slightly increasing in recent years (Global Nutrition Report, 2020).

**Figure 2.** Agricultural emissions by source



Source: Author diagram, based on data from FAO, 2021.

Ethiopia devotes over 20% of all arable land to teff production.<sup>2</sup> The five main crops (teff, maize, sorghum, wheat, and barley) represent 64% of harvested land, and cereals make up almost half of the Ethiopian diet. Ethiopia is highly vulnerable to the impacts of climate change, particularly in the agriculture and water sector. With approximately 98% of all

<sup>2</sup> Teff is a small grain, approximately the size of a poppy seed, originating in Ethiopia and Eritrea. Teff seeds are ground and used to make the traditional bread, injera: a flat, pancake-like, fermented bread.



cultivated land in the country under rain-fed agricultural production, the agricultural sector is very sensitive to climate change and weather variability. Droughts and inappropriate land management practices also result in increasing desertification (Federal Democratic Republic of Ethiopia [FDRE], 2019) (see Section 3).

GHG emissions from agriculture, which are emissions from yearly production activities, are predominantly from livestock production. During the period from 2008 to 2018, GHG emissions from agriculture production increased by 30%, driven in large part by increasing livestock production (see Figure 2) (FAO, 2021).

Agriculture-related land-use emissions, which are generally emissions from converting natural land to agricultural land, are only about one third the magnitude of agriculture emissions and are relatively stable (agriculture-related land-use emissions averaged 33 megatonnes of carbon dioxide equivalent [CO<sub>2</sub>eq] per year from 2008 to 2018, versus 103 megatonnes for agricultural emissions in 2018) (FAO, 2021).

## 2.2 Baseline Results Regarding a Business-as-Usual Situation Based on Modelling Results

Existing projections, based on the Ceres2030 model and without considering additional investments, are summarized in Table 1. The table shows that Ethiopia remains one of the countries with the strongest demographic pressure in the world, with an annual population growth rate of about 2.3% in the next decade, and a low GDP per capita in the country. It will remain among the low-income countries of the world despite strong economic growth projected at 7.2% per year.

The agricultural sector will continue to develop as the demand for food increases, particularly for animal products. This will lead to a very strong increase in the production of GHG emissions, by 5.8% per year, or 76% in 10 years. Land-use change from forestry to agriculture will reach a plateau, with expected limited deforestation, leading to a reduction in forested area by only 1% in the next 10 years. Sustainable intensification of the livestock sector, in particular, is required to allow the country to achieve its economic and environmental objectives. Finally, the economic growth and the expansion of agricultural production will contribute to an accelerated trend in the reduction of chronic hunger and extreme poverty. The PoU will remain at 8.5% by 2030, and the prevalence of extreme poverty will fall to 17.5%, according to our projections.

**Table 1.** Summary results regarding existing model projections for Ethiopia

Indicator	2020	2030	Average annual growth rate
Population, million	114.96	144.94	2.3%
Real GDP, 2017 USD, billion	127.27	256.07	7.2%
Real GDP per capita (USD)	1,107.05	1,766.67	4.8%



Indicator	2020	2030	Average annual growth rate
Agricultural production, volume, constant USD 2017	34.71	60.47	5.7%
Agricultural land, million ha	36.49	37.92	0.4%
Forest, million ha	17.21	16.98	-0.1%
Agricultural production emissions, megatons CO <sub>2</sub> eq	129.87	229.18	5.8%
Prevalence of extreme poverty USD 1.90	30.02	17.98	-5.0%
Prevalence of extreme poverty USD 1.90 among farmers	33.36	19.77	-5.1%
PoU	16.88	8.45	-6.7%

Source: MIRAGRODEP Simulations, Ceres2030 baseline.

In Appendix C, Figure C1, we present the existing Ceres2030 projections in terms of food consumption for Ethiopia.

## 2.3 Climate Change and Weather Variability Exposure and Adaptations

Ethiopia's climate is highly variable, and this trend will continue. The country's average annual temperatures vary from 10°C in the highlands to about 35°C in the lowlands. Observed climate trends in Ethiopia over a 50-year period reveal that temperatures have increased at an average rate of 0.25°C per decade since 1960 and varied between 0.1 and 0.4°C for 10 years, cumulatively amounting to an increase of 1.3°C from 1960 to 2006 (FDRE, 2019). A significant decline in precipitation was also observed in the Belg (the short rainy season in March–April in parts of south-central and eastern Ethiopia) (FDRE, 2015). Mean total annual rainfall decreased between the years 1951 and 2010 (FDRE, 2015). Finally, Ethiopia is highly vulnerable to drought, with significant impacts on agricultural productivity and related impacts on incomes, food security, and nutrition.

Ethiopia's agricultural activities, particularly crop cultivation, pastoralism, and agro-pastoralism, are heavily dependent on rainfall, which implies that temperature and rainfall significantly affect crop production, food security, and food shortages. Furthermore, the agriculture sector is mostly rain fed, and roughly 85% of the population's livelihoods depend on it (FDRE, 2016; 2019). Finally, most plots are smaller than 0.5 hectares, and farmers do not have capacity to invest in efforts to increase climate resilience.

Ethiopia has demonstrated a strong political will to address climate change and its impacts through adaptation and mitigation measures. In 2007, the country developed its National Action Plan for Adaptation (NAPA) covering 11 priority projects to respond to climate change



impacts and build resilience. The 2010 Ethiopian Programme of Adaptation to Climate Change developed the priority areas listed in the NAPA further. The Climate Resilient Green Economy strategy, developed in 2011, focused on integrating climate change into the national development strategy and building a climate-resilient future, for example, by promoting CSA (FDRE, 2011). In 2019, Ethiopia became one of the few countries that has developed a NAP. Its NAP identified 18 adaptation options for implementation at all levels and across all sectors, recognizing the diversity in context and vulnerability across Ethiopia's geographical regions and social groups.

### **Box 1. Summary of historical and projected climate change impacts in Ethiopia**

#### **Historical Weather and Climate**

- Between 1960 and 2016, the temperature increased by 1.3°C (FDRE, 2019).
- Between 1960 and 2003 the average number of hot days increased by 20%, and the average number of cold days decreased except for the period between December and February. The frequency of cold nights decreased in all seasons (McSweeney et al., 2010).
- The trend in rainfall between 1960 and 2006 does not show a consistent pattern: rainfall trends have been also highly diverse for the regions of the country (McSweeney et al., 2010).

#### **Projected Weather and Climate (FDRE, 2019).**

- The temperature is projected to increase from -0.5°C to 6°C by 2100 compared to the baseline covering the period between 1975 and 2005.
- Models also project an increase in annual precipitation by at least 4% to up to 12% by 2100 compared to the baseline of 1975–2005.

Ethiopia has identified the private sector as an important player in climate adaptation especially in the agricultural and energy sectors to support the country's development. In adaptation, the private sector is seen as important, particularly as it relates to agriculture. The role of the private sector, as identified in the policy documents, includes providing access to financing and technical assistance, as well as supporting the building of the skills needed to adapt and mitigate climate change.

Climate change and climate variability impact food security in various ways. This includes influencing agricultural production, in terms of the quantity, quality, and availability of certain foods. The relationships between diet diversification and climate variables in Ethiopia show a correlation between rainfall and dietary diversity. Further, it has been shown in the literature that in places with high rainfall variability, households experience low dietary diversity (Hirvonen et al., 2016; Teklewold et al., 2019).

The adoption of CSA and associated technologies has been shown to increase dietary diversity and improve the quality of the food consumed through higher calorie and protein availability,



leading to improved nutritional outcomes (Stifel & Minten, 2017; Teklewold et al., 2019). Interestingly, higher nutritional outcomes and dietary diversity were found with increased use of a combination of technologies related to CSA, as opposed to a single CSA technology (Herforth & Ahmed, 2015; Teklewold et al., 2019).

## 2.4 Understanding the Dynamics of the Local Food System

### 2.4.1 Data Sources

The principal source of primary data used in the estimation is the most recent round of household survey data from the World Bank's Living Standard Measurement Survey (LSMS) data set for Ethiopia. Table 2 presents a summary of the key features of the data set.

**Table 2.** Summary of LSMS data for Ethiopia

Country	Ethiopia
Years covered	2018–2019 (Wave 4)
Coverage	Nationally representative; Regionally representative
Regions	11
Number of enumeration areas	535
Number of households interviewed	6,770
Key modules of interest	Food consumption (7-day recall), Household roster; Non-food expenditures; Agricultural production

Source: Authors' summary.

A key feature of the LSMS data set for the purposes of demand system information is that it provides high-quality and nationally representative data on household food consumption decisions reported directly by respondents. A designated respondent is asked to recall their household's consumption of a uniform list of food items, adapted to be contextually appropriate to their region in Ethiopia, and to report how much the household consumed, the source of the food item (whether it was purchased, produced by the household, or obtained from other sources, such as gifts or non-monetary transfers), and how much was spent to acquire the item if it was purchased. This information allows us to estimate the value of all food items consumed by each household in the sample, which in turn forms the basis of the estimation of the demand system.

### 2.4.2 Stages of Data Processing

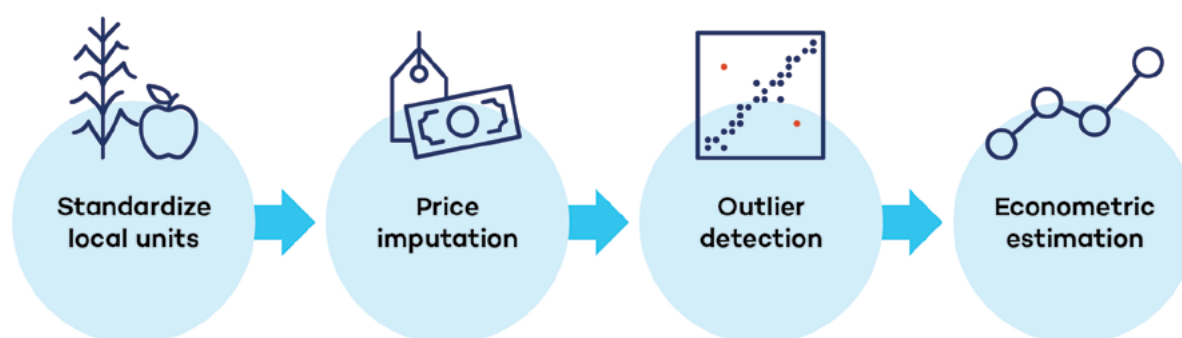
In order to use the information from the primary data in the LSMS data set as an input into the modelling exercise, we use the following processing steps: conversion of quantities from local into metric units; imputation of prices and estimation of value of food items produced



or otherwise not commercially acquired by households; outlier detection; and econometric estimation of the demand system. Figure 3 summarizes these steps.

A key challenge in estimating the quantities of food items consumed by individuals is that people typically do not think about the foods they consume in terms of standard scientific units; for example, it is natural to report having a bowl of cereal for breakfast, rather than an amount in grams. Rather than asking respondents to provide conversions, which is likely to be challenging, particularly for individuals who have had limited access to formal education, they instead report in familiar units, which are often locally specific. The first stage of data processing is therefore to convert these quantities from non-standard units into metric units, using auxiliary data on conversion factors collected as part of the LSMS data collection process.

**Figure 3.** Data processing flow diagram



Source: Authors' summary.

After converting the quantities reported in the consumption module to metric units, we next estimate prices for those units. To do so, we first calculate the implied price reported by each individual for purchased items (which is simply dividing the total expenditure on a given item by the reported quantity purchased). For households who report purchasing an item, we can use this price to estimate the value of the amount of that item, on a per unit basis, that the household produced itself or it obtained from other sources. This procedure implicitly assumes that the per unit value of a food item that the household produced or obtained from other sources is equal to the value of the same quantity of that item purchased on the market; e.g., that there are no quality differences. By making this assumption, the overall value of the total amount of the item consumed by the households can be calculated. For households that consumed an item but did not purchase it, we calculate the median price of that item reported by other households within the same geographic area (at various administrative levels) and use this to impute the value of that item which the household produced or obtained from other sources.

The last stage of processing to prepare the data for use in the econometric model is outlier detection. This is an important consideration when using primary data since a reporting error by a small number of individual respondents (or indeed even one respondent) could bias our estimate of the quantity and/or value of a given food item for the whole sample. To



deal with the issue of outlier values, we adopt a simple procedure to identify observations taking on values to the extreme left- or right-hand side of both the quantity and price distributions of a given food item. We calculate the mean and standard deviation of the quantity of each food item and identify any respondents' answers for which the reported (or imputed) value is greater than the mean plus or minus three times the standard deviation. Under a normal distribution, we should on average observe 99.7% of observations within this range. Truncating the distribution in this manner thus entails a very small loss in terms of information if all values are accurate representations of actual consumption. This data-driven approach allows us to straightforwardly exclude erroneous extreme values without ourselves having to define numeric values for an appropriate range for food items.

### 2.4.3 Summary Statistics

To reflect the quality issues relating to these data processing steps, Table 3 summarizes the share of quantities we are able to convert into metric units, along with the rate of outlier detection for reported quantities and prices for all food items. It disaggregates these shares by food category.

**Table 3.** Overview of consumption data processing issues

Food category	Conversion available	Quantity outliers	Price outliers
All	90.6%	0.8%	0.8%
Cereals	92.6%	1.2%	0.9%
Pulses & nuts	94.5%	1.4%	0.8%
Oil seeds (unprocessed)	98.5%	0.8%	2.0%
Vegetables	97.7%	0.3%	0.9%
Fruits	96.4%	0.7%	0.5%
Tubers and stems	97.0%	1.1%	1.5%
Meat/fish (incl. dairy, condiments)	97.0%	0.7%	0.5%
Beverages & stimulants	78.3%	1.0%	0.5%
Other prepared food	40.8%	0.5%	1.1%

Source: Authors' calculation using LSMS Ethiopia, Wave 4.

For 90.6% of reported consumption items, we are able to convert the respondent's information to a metric quantity, though there is some variation in response shares. The overall availability of non-standard unit conversions is good, covering over 90% of the available reports. The share is much higher for most food categories but low for beverages & stimulants (78.3%) and especially for food prepared outside the home, for which we are only able to convert 40.8% of observations into metric units. In terms of outliers, the overall rate

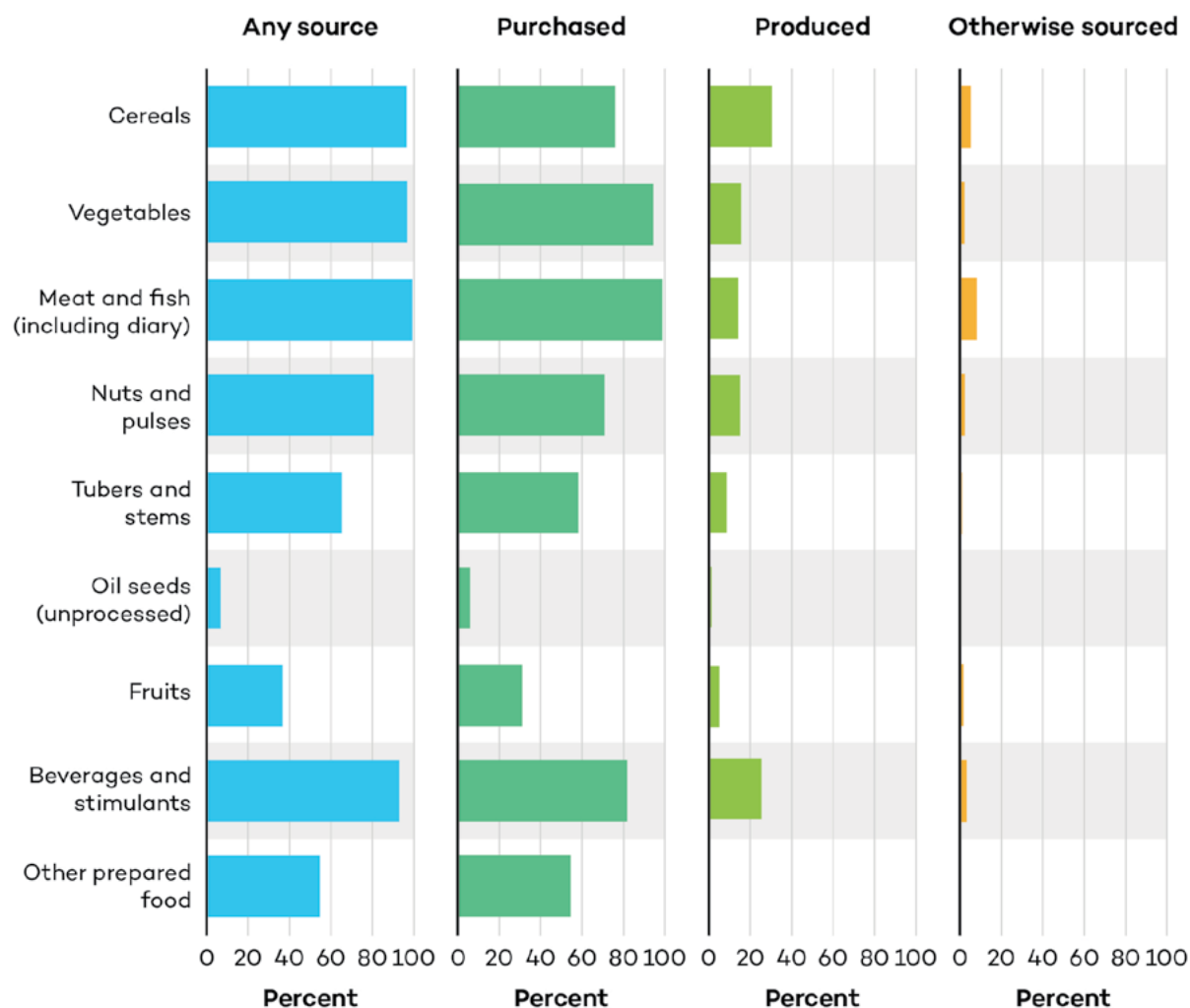




is low—less than 1% for both quantity and price measures overall (recall that under a normal distribution the expected rate is approximately 0.3%). While there is some heterogeneity by category, the outlier share is less than or equal to 2% for all food groups. Figure 4 presents household reporting of each consumption category, disaggregated by the source of the item.

Among these food categories, cereals, vegetables, and meat and fish (including dairy products) are reported by almost all households. More than 25% of households report producing cereals. Notably, a majority of surveyed households do not report having consumed any fruit (35.7% report having consumed one or more in the preceding 7 days). The most commonly reported fruits are bananas (25.4% of households), followed by mango (13.7%) and avocado (8.9%). Figure 5 presents an overview of the share of the total estimated value of each food group, for the fraction of the sample with lowest and highest income (proxied by household expenditures on non-food items).

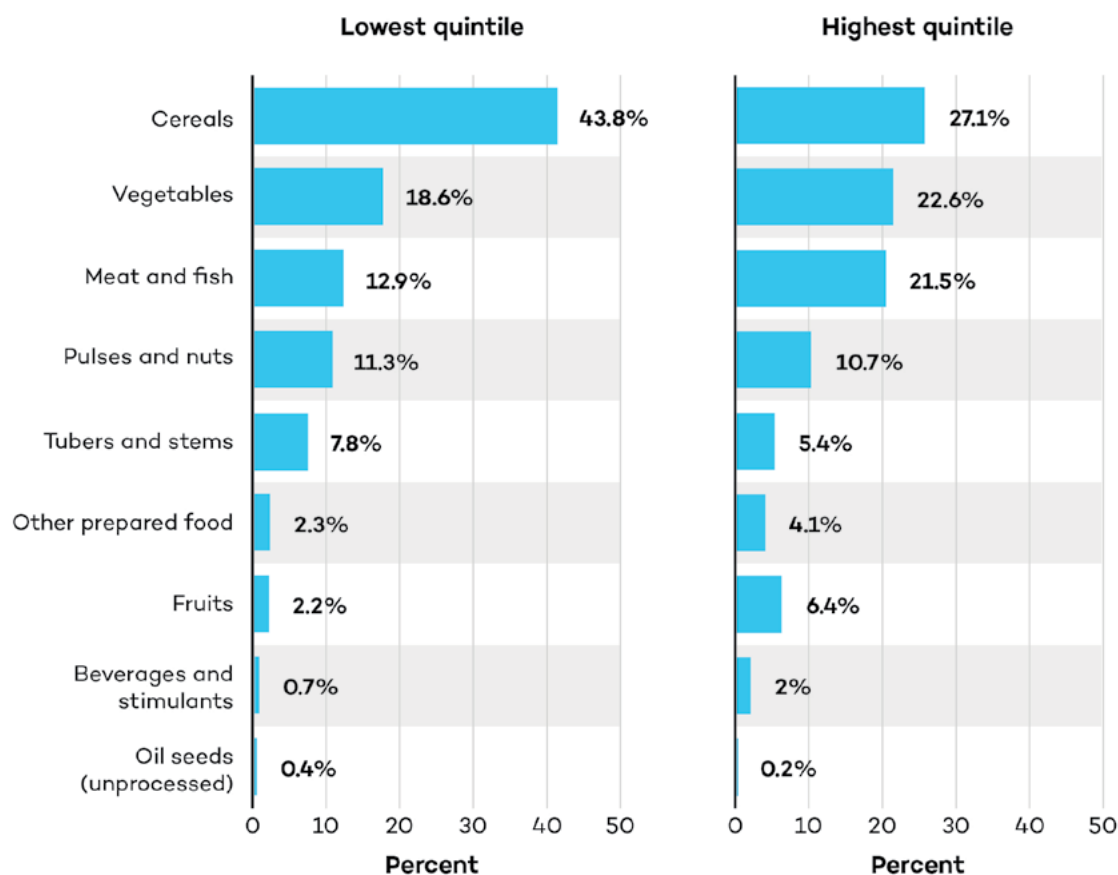
**Figure 4.** Share of households reporting food category, by source (Ethiopia)



Source: Authors' own using data from LSMS Ethiopia, Wave 4.



**Figure 5.** Share of value by food category, by non-food expenditure level (Ethiopia)



Source: Authors' own using data from LSMS Ethiopia, Wave 4.

As Figure 5 shows, for households in the lowest quintile of the income distribution, food expenditures are dominated by cereals, with 43.8% of households' estimated expenditures going to this category.<sup>3</sup> The next largest shares of spending are on vegetables, and on meat and fish (including dairy products), which account for 18.6% and 12.9% of total estimated food expenditures, respectively. For richer households in the highest quintile of the income distribution, cereals offer a lower but still substantial share of expenditures (27.1%). Vegetables take up a slightly larger share (22.6%), while meat and associated products take up almost double the budget share relative to poor households, at 21.5%.

<sup>3</sup> Note that these totals are aggregated intertemporally across the year of reporting. Seasonal production and availability, as well as cultural practices (such as fasting) create important within-year variations in dietary consumption. This is an important consideration for the design of dietary interventions, which we will address in our discussion of policy recommendations.



## 3.0 Existing Nutrition Guidelines for Healthier Diets

Ethiopia has begun a process to develop food-based dietary guidelines, led by the Ethiopian Public Health Institute (Bekele et al., 2020). The development of food-based dietary guidelines is occurring as follows. First, nationally representative surveys on consumption and micronutrient intakes are being processed to understand nutrient intakes and identify dietary gaps relative to recommended levels. Second, linear programming is being used to identify the lowest-cost ways of filling those gaps, using prices prevailing in the surveys, given initial availability and consumption of such foods. Third, the findings are being reviewed by local experts, with some iteration between steps two and three, as there are several things that could have changed since the surveys were collected, including increased consumption of specific foods and/or nutrients, prevailing prices, or migration between areas with different average consumption bundles. Once complete, the food-based dietary guidelines will be used to construct an Ethiopia-specific healthy eating index, which can then be used to compare anyone's consumption against the reference diet.

While Ethiopia currently lacks food-based dietary guidelines, it does have several policies that relate to nutrition and thus are leading, at least indirectly, toward healthier diets. In 2015, the Second National Nutritional Programme was instituted, designed to consolidate policy around improving maternal and child nutrition, and to make progress on stunting and underweight among those under 5 years old. Ethiopia also has a national salt iodization mandate. Its policy is no longer only focused on undernutrition or micronutrient deficiency. According to the WHO Global Health Observatory, Ethiopia now also has a multisectoral noncommunicable disease policy to try to reduce the increase of disease associated with overweight and obesity. In fact, to combat overweight and obesity, Ethiopia has a 40% ad valorem tax on sugary beverages.

### 3.1 Ongoing Policies and Investments Toward Healthier and Sustainable Food Systems

Several key government strategies emphasize the need to improve the sustainability of the food system in Ethiopia, including the National Nutrition Program (FDRE, 2013), the second Agricultural Growth Program (Ministry of Agriculture, 2016), the Growth and Transformation Plan (FDRE, 2016), the Seqota Declaration (Government of Ethiopia, 2018), and the Nutrition Sensitive Agriculture Strategic Plan (Ministry of Agriculture and Natural Resource and Ministry of Livestock and Fisheries, 2016). These strategies stress the important contribution of agriculture to improving nutrition status in the country as well as improving aspects of agricultural production, such as productivity and value chains, increasing household income, and encouraging the uptake of risk management and adaptive strategies to promote resilience. The strategies also emphasize that environmental impacts need to be considered when encouraging agricultural investments, and that priority should be given to environmentally friendly agricultural investments. The strategies also acknowledge the role of donor support in promoting sustainability and the need to better target donor support.



In terms of ODA, in total, USD 1.4 billion was disbursed to projects directly affecting the food system in Ethiopia on average annually from 2014 to 2018, accounting for 50% of ODA grants and philanthropic donations (OECD, 2021).<sup>4</sup> The United States accounted for 36% of this disbursement, making it the top donor to projects in the food system, followed by the United Kingdom and European Union (EU) institutions. The top 10 donors account for USD 1.2 billion (see Table 4).

**Table 4.** Top 10 donors by average annual disbursement, 2014–2018

<b>Donor</b>	<b>USD million (constant 2018 USD)</b>
United States	492
United Kingdom	222
EU Institutions	159
Canada	81
Germany	72
Netherlands	50
Bill & Melinda Gates Foundation	40
Sweden	36
Norway	36
Japan	28

Source: Authors' analysis of OECD's Creditor Reporting System (CRS), OECD, 2021.

Finally, an extensive list of programs and initiatives funded or implemented by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), the European Union, and USAID that are relevant to the nexus of climate change, food security, and nutrition is presented in Appendix B. This list demonstrates that there are projects that link agriculture and food systems with climate change resilience and adaptation, as well as projects that link agriculture and food systems to nutrition diversification, but very few that link all three components of the nexus in one project. Additional projects were identified during the ongoing consultations with key stakeholders in the country.

<sup>4</sup> Figures in this paragraph and Table 4 are preliminary estimates, to be refined as the project progresses.



## 4.0 Next Steps

### 4.1 Summary of Key Messages

This report provides an overview of recent data on undernourishment, current and projected economic development, climate change, and ODA in Ethiopia. It also includes current strategies and policies addressing climate change, agriculture, and undernourishment. The report provides a summary of efforts by the team to include nutrition in the economic modelling developed in the Ceres2030 project. These indicators and policy documents reveal specific findings relevant for the next steps of this project, as follows:

- **Poverty and hunger today.** In Ethiopia, the prevalence of extreme poverty is significantly lower than the average for Africa, South of the Sahara (30.8% versus 42% in 2015) (World Bank, Development Research Group, 2021), while the PoU remains near the average for the region (17% versus 18%) (FAO, 2021). In the past decade, undernourishment has fallen significantly within the country (see Figure 1).
- **Poverty and hunger by 2030.** In the next decade, the projected economic growth and the expansion of agricultural production will contribute to an accelerated trend in the reduction of undernourishment and extreme poverty. According to our projections, by 2030 the prevalence of extreme poverty will be 18% and the PoU 8.5% (see Table 1).
- **GHG emissions from increasing animal production till 2030.** Livestock production already contributes significantly to GHG emissions, and the potential GHG emissions from the sector are projected to increase by 5.8% per year, compared to the 0.2% on average for the world and 1.2% for the rest of Africa, South of the Sahara, according to our Ceres2030 projections. Therefore, promoting sustainable intensification in the livestock sector is critical to reducing the environmental impacts of the expected growth in the sector (See Table 1).
- **Climate change impacts on agriculture.** Ethiopia is vulnerable to drought, which is the most significant climate-related hazard. This is mostly because of its impacts on agricultural productivity and the resulting worsening social and economic problems in the country. Ethiopia's agriculture is heavily dependent on rainfall, which implies that changes in temperature and precipitation impact crop yields and, in turn, food insecurity, malnutrition, and food shortages.
- **Efforts to address climate change and links to dietary diversity and improved nutrition.** Ethiopia has developed strategies to address climate change by focusing on both adaptation and mitigation. Most of these strategies focus on efforts to enhance the adoption of CSA in agricultural production. Importantly, the adoption of CSA and associated technologies has been shown to increase dietary diversity and improve the quality of the food consumed through higher calorie and protein availability, leading to improved nutritional outcomes (Stifel & Minten, 2017; Teklewold et al., 2019). Ethiopia is also one of the few countries that has developed a NAP.



- **National dietary guidelines in development.** Ethiopia has begun a process to develop food-based dietary guidelines, led by the Ethiopian Public Health Institute (Bekele et al., 2020). The process of development is occurring in multiple steps, bringing together diverse agencies as well as national and local stakeholders. While Ethiopia currently lacks food-based dietary guidelines, it does have several policies that relate to nutrition and as such are leading, at least indirectly, toward healthier diets.
- **Richer households have higher dietary diversity with more meat consumption.** The major food categories—cereals, pulses and nuts, vegetables, and meat/fish—are reported by almost all households. For households in the lowest quintile of the income distribution, food expenditures are dominated by cereals, with 43.8% of households' estimated expenditure going to this category. The next largest share is on vegetables, followed by meat and fish (including dairy products), which account for 18.6% and 12.9% of total estimated food expenditures, respectively. For households in the highest quintile of the income distribution, cereals offer a lower but still substantial share of expenditures (27.1%). Vegetables take up a slightly larger share (22.6%) while meat and fish (including dairy products) take up almost double the budget share relative to poor households (21.5%) (see Figure 5).
- **Role of ODA in the food system.** In total, USD 1.4 billion of ODA was disbursed to projects directly affecting the food system in Ethiopia (average, 2014–2018). This accounts for 50% of ODA grants and philanthropic donations (OECD, 2021). The United States accounted for 36% of this disbursement, making it the top donor to projects in the food system (see Table 4).

## 4.2 Implications for Next Steps and Potential Revision of the Proposed Methodologies

### Setting Up and Conducting Country Consultations

We have established connections with International Food Policy Research Institute colleagues in the Ethiopia office in Addis Ababa and with Akademiya2063, with whom we will be partnering to organize and host consultations rounds 2 and 3.

While Ethiopia is about to nominate its convenor for the UN Food Systems Summit, we have approached African Union Development Agency–New Partnership for Africa's Development, which is collaborating with the Food Systems Summit Secretariat to support African Union member states in organizing their national dialogues leading up to the UN Food Systems Summit. We are exploring routes for collaboration with them to ensure that our consultations are integrated into the UN Food Systems Summit process in Ethiopia.

One of the key challenges we anticipate is the organization of consultation round 3 in Ethiopia. Specifically, the general elections are scheduled to be held in June, and therefore it will be impossible to organize consultation with any government officials in the two months prior to and following this election. We propose that consultation round 3 in Ethiopia be delayed until November. Although this will not allow us to validate the final results of the study and check their social acceptance prior to the UN Food Systems Summit, this delay will ultimately



maximize stakeholder validation and endorsement of the project's findings. Importantly, the project's findings may be enhanced by engaging the newly elected representatives.

## Estimating the Characteristics of Healthy Diets

Since food-based dietary guidelines are still in development in Ethiopia, we plan to instead examine how locally available foods can be combined to constitute a diet that meets micronutrient needs. For example, as Ethiopia's diet is largely staple based, with staples depending upon the region, we would look at how other foods can fit into a largely staple-based diet rather than considering complete substitutions for various staple foods, which have at least slightly different micronutrient profiles. In other words, we expect that staple (wheat, maize, teff) consumption would decrease to fit in more nutrient-rich foods. The diets we will develop will account for elasticities as estimated to modify current consumption patterns closer toward adequate key nutrient levels for most people. In this way, we will be looking for people to consume healthier diets, rather than a completely healthy diet, which is controversial to define in any case.

## Adapting the Economic Modelling

Currently, the baseline assumptions on economic growth are very optimistic, leading to major improvements in poverty and undernourishment. However, ongoing political instability may compromise the projected strong growth path, and thus the potential improvements in poverty and undernourishment may not be realized. We may revise growth assumptions based on ongoing investigation. Finally, the taxation of sugary beverages is not included in the baseline policies; this new policy framework will be included in the business-as-usual policy.



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# Appendix A. Country-Level Consultations

## Approach and Method

To help determine to what extent the three dimensions of climate, nutrition, and agriculture are integrated into ongoing projects in Ethiopia, we undertook a consultation and a desk review. The latter helped gather information on appropriate projects from donors' websites. This round of the consultations had two components: the first was an online survey focused on gathering from specific donors the profile of their projects, trying to get specifications on their objectives and targeted groups (see below for the survey questionnaire). For the second component, the team planned to conduct a series of semi-structured interviews with the same objectives plus covered a direct validation of the methodology, as we intended to confirm respondents to participate in rounds 2 and 3 of the project. We did not receive any responses from Ethiopian stakeholders in this round of consultations.

## The Survey Questionnaire

### Ceres2030 Deep Dives Into the Nexus of Food Systems, Climate Change and Diets

#### Country-Level Consultations, Round 1

##### Introduction

“How can we influence consumption patterns through policy interventions that will lead to better environmental and nutritional outcomes?” This is the central question that Ceres2030 is exploring through a study on the nexus of climate change, food systems, and nutrition. The project will identify food system transition pathways, and their associated cost, on how to improve nutrition outcomes through healthy diets using a more climate-resilient production system with fewer greenhouse gas emissions in three countries: Ethiopia, Nigeria, and Malawi.

We would like to invite your participation in a first round of consultations aimed at establishing an accurate inventory of ongoing projects and policies in these three countries. The consultation aims to assess how the nexus between food security, environmental sustainability, and healthy diets is conceived and integrated into the national strategy and donor agencies' strategies and programs.

Your response will provide key elements to the research teams on how to connect the research conducted in the two other components, that is, the large-scale modelling exercise based on the Ceres2030 framework and the research into food demand behaviour at the household level, with respective countries' policies and institutional environments.



## Online Survey

### Section 1—Profile

1. Contact

Name  
Role  
Department  
Email address

2. Are you a

Government official (Go to 2B and 3B)  
Donor Agency (Go to 2A and 3A)

### Section 2A—Project and Policies Profiles (Donors)

3. Does your department have a project/program/strategy linking food systems, food security, climate change, and nutrition?

Yes  
No

4. If you answered yes above, please provide information here to relevant material related to your projects and their status.

Name of the project/strategy/program  
Links if available:  
Any other information or comments

5. If you answered no, could you please provide a little more information on your current or future plans?

6. Does your project/program/strategy use a definition of “healthy diet”?

Yes  
No  
Please specify and briefly explain.

7. Does your project/program/strategy have a clear set of objectives related to supporting the nexus between food systems, food security, climate change, and nutrition?

Yes  
No  
Please specify and briefly explain.

8. Who are the target recipients of your project/program/strategy?

Children below three years of age  
School-aged children  
Pregnant and lactating women  
Women  
Small-scale producers  
Others (please specify)



### Section 2B—Project and Policies Profiles (Government Officials)

9. Does your country have a strategy/policy/program linking food systems, food security, climate change, and nutrition?

Yes

No

10. If you answered yes above, please provide information here to relevant material related to strategy, policy, or program and their status.

Name of the strategy, policy or program

Links if available:

Any other information or comments

11. If you answered no, could you please provide a little more information on your current or future plans?

12. Does your strategy, policy or program use a definition of “healthy diets”?

Yes

No

Please specify and briefly explain.

### Section 3—Objectives of Your Programs/ Projects? (Donor)

13. What are the objectives of your project/program/strategy?

	<b>Very important</b>	<b>Important</b>	<b>Less important</b>	<b>Not important</b>
Enhance understanding and awareness of healthy diets				
Promote the production of food with high nutritional values, aligned with national dietary or nutrition guidelines				
Improve access to fresh and nutrient-dense foods for consumers				
Support the development of technological innovations that increase productivity and nutritional content [of crops and food products]				
Promote environmentally sustainable agriculture				



	Very important	Important	Less important	Not important
Increase household production and consumption of micronutrient-rich foods				
Improve nutrition through behaviour change				
Invest in the implementation of good practices and technologies for resilience to climate variability and change				
Other objectives (please specify)	Yes		No	

14. What is the share of your project/program/strategy that contains quantifiable objectives?
- > 75%
  - 75%–50%
  - 50%–25%
  - < 25%
  - Not sure
  - Not applicable
15. Please provide one or two examples of how these objectives are quantified.
16. Has the demand for aid from your partner countries changed to reflect a systems approach to food security, climate change, and healthy diets?
- Yes
  - No
  - Not sure
17. If the demand increased, how is this reflected in the specific local projects and activities for which aid requests are made?
18. Are you harmonizing your strategy with other donors?
- Always/usually
  - Sometimes
  - Rarely/never
  - Not sure
  - Not applicable



19. If you are harmonizing, how often do you use the following approaches?

	<b>Always</b>	<b>Sometimes</b>	<b>Rarely/never</b>	<b>Not sure</b>
Joint needs assessment				
Co-financing				
Sector-wide approaches				
Joint implementation				
Joint evaluation				
Other (please specify)				

20. Please rate the importance of the following challenges in evaluating your programs and projects:

	<b>Very important</b>	<b>Important</b>	<b>Less important</b>	<b>Not important</b>
Difficulty in identifying quantifiable objectives				
Absence of suitable indicators				
Budgetary constraints				
Ability of in-country staff to collect and report data				
Ability of project partners to collect and report data				
Difficulty of assigning changes to the program				
Other (please specify)				

### Section 3B—Objectives of Your Policies? (Government Officials)

21. What are the objectives of your policies?

	<b>Most important</b>	<b>Important</b>	<b>Less important</b>	<b>Not important</b>
Improved nutrition and healthier diets				
Increasing production and consumption of nutritious foods				





	Most important	Important	Less important	Not important
Promoting changes in behaviour toward healthier diets through education, communication strategies, and school programs related to nutrition.				
Increasing capacity to measure and monitor weather or climate risk exposure to food systems				
Taking action to address weather or climate risk exposure to the food system				
Other (please specify)				

22. Which funding and financing sources do you primarily use?

- Public
- Donor Aid
- PPP arrangements
- Other (please specify)

23. Has your country benefited from donor-funded projects related to food systems, food security, climate change, and nutrition?

- No
- If yes, please specify.

#### Section 4—Further comments or suggestions

Please feel free to share with us any additional information that might be of interest for our project.



## Appendix B. Overview of Projects by International Agencies

This table is the result of the consultations and desk review. It offers a non-exhaustive overview of the projects funded or implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), the EU, and United States Agency for International Development (USAID) in Ethiopia.

**Table B1.** Projects by international agencies

Agency	GIZ
<b>Project Title</b>	Global programme Food and Nutrition Security, Enhanced Resilience
<b>Objective</b>	Enhancing food and nutrition security and resilience for people, especially women of child-bearing age, pregnant or nursing women, and small children (GIZ, n.d.-b).
<b>Strategy</b>	Provides education on nutrition, the importance of dietary diversity, and how to grow, store, and prepare nutritious foods. The program also provides information about hygienic practices within the household (GIZ, n.d.-b).

Agency	GIZ
<b>Project Title</b>	Ethiopia Wild Coffee – Supply Chain Project
<b>Objective</b>	By supporting the development of a premium brand and coffee supply chain for wild coffee, long-term incentives are created for forest and biodiversity conservation (GIZ, n.d.-i).
<b>Strategy</b>	Supports farmers' cooperatives in their adoption of improved harvest and post-harvest production techniques to improve the quality of their coffee. Also, supports the integration and development of new and existing markets. This increases the income of small farmers while creating opportunities and incentives for forest conservation (GIZ, n.d.-i).



<b>Agency</b>	<b>GIZ</b>
<b>Project Title</b>	Promotion of sustainable forest products from biosphere reserves in Ethiopia
<b>Objective</b>	Supports improved production and processing techniques of local forest products, such as honey and wild coffee, to increase the income of smallholder farmers while preserving the montane rainforests and reducing biodiversity loss (GIZ, n.d.-k).
<b>Strategy</b>	Facilitates product certification processes and the development of relationships between Ethiopian farmers and private companies, enabling integration into international export markets. Consequently, farmers can achieve higher prices and diversify their incomes. It also provides training to local smallholder organizations so that they can independently manage the export process (GIZ, n.d.-k).

<b>Agency</b>	<b>GIZ</b>
<b>Project Title</b>	Strengthening Drought Resilience in Pastoral and Agro-Pastoral Communities of Afar and Somali Regional States, Ethiopia
<b>Objective</b>	In order to strengthen the resilience of communities affected by drought, this project assures access to natural resources, such as water and land, that can be used for agricultural purposes. Capacity development is also provided to institutional actors on management, cooperation, and networking techniques (GIZ, n.d.-n).
<b>Strategy</b>	<p>Improve the capacities of the institutions at all levels dealing with pastoral and agro-pastoral issues.</p> <p>Testing and introduction of new measures and technologies that improve land use, secure soil and water for livestock feed and food production, and are suited to the pastoral and the ecological context. Additionally, this project supports the introduction of methods (such as water-spreading weirs and lowland dry-stone measures) that contribute to drought resilience by mitigating against the effects of flash floods (GIZ, n.d.-n).</p>



<b>Agency</b>	<b>GIZ</b>
<b>Project Title</b>	Capacity Development to Strengthening Drought Resilience in the Ethiopian Lowlands, Somali Region
<b>Objective</b>	Supporting the implementation and scaling up of measures to increase drought resilience from national to community levels in the Somali lowlands (GIZ, n.d.-a).
<b>Strategy</b>	Supports the testing and evaluation of technical, economic, and organizational elements of the models to rehabilitate and improve the productive use of degraded dry valleys (as well as new innovative technologies for rehabilitation). These concepts can then be implemented by third parties, allowing for their regional and national dissemination and institutionalization. The project also supports the capacity development of partner organizations to further the implementation of these models (GIZ, n.d.-a).

<b>Agency</b>	<b>GIZ</b>
<b>Project Title</b>	Participatory forest management (PFM)
<b>Objective</b>	As part of the national Sustainable Land Management Program, this project supports the practice of participatory forest management in selected areas in and near watersheds. This intends to increase the resilience of smallholder farmers, especially in the context of a changing climate (GIZ, n.d.-h).
<b>Strategy</b>	<p>Project includes the following steps:</p> <ol style="list-style-type: none"> <li>1. Suitable forest areas are identified and an inventory of socioeconomic and forest data is gathered.</li> <li>2. Experts provide advice based on the knowledge and skills of the village community and local forest owners.</li> <li>3. Training and advice are provided to increase the villagers' skills for sustainable forest management. Employees of government institutions also receive training in PFM.</li> <li>4. Village communities share their experiences, and organizational structures for PFM are created, where practical advice can be given as well as enabling the development of sustainable management strategies that account for forest types and status (GIZ, n.d.-h).</li> </ol>



<b>Agency</b>	<b>GIZ</b>
<b>Project Title</b>	Building an Avocado and Sesame Value Chain in Ethiopia (develoPPP.de)
<b>Objective</b>	The goal is to build and increase a sustainable supply chain of organic sesame and avocado oil, in order to increase the local value addition of the sectors (GIZ, n.d.-g).
<b>Strategy</b>	<ul style="list-style-type: none"> <li>• Develop a local infrastructure for the production of avocado and sesame oil.</li> <li>• Train local people in the skills required across the whole value chain.</li> <li>• Provide training and practical help to small-scale farmers from cooperatives on sustainable production methods.</li> <li>• Evaluate waste streams as a potential extra income source.</li> <li>• Provide farmers with assistance in securing organic and social certification and fair purchase agreements (GIZ, n.d.-g).</li> </ul>

<b>Agency</b>	<b>GIZ</b>
<b>Project Title</b>	Innovations for Sustainable Agricultural Supply Chains in Ethiopia (ISASE)
<b>Objective</b>	The objective is to enable producers to achieve a higher product quality, increasing their income and encouraging the use of natural resources in a sustainable way, and reducing pressure on existing forest areas (GIZ, n.d.-j).
<b>Strategy</b>	<p>Promotes various new approaches along the value chain of different products:</p> <ul style="list-style-type: none"> <li>• Supports private enterprise and the development of trade links with international coffee and beeswax companies to increase producers' income.</li> <li>• Provides training to smallholders and cooperatives in farming and post-harvest practices to improve product quality.</li> <li>• Promotes new production and manufacturing approaches across the coffee supply chain, for example, new drying technology that speeds the process and runs solely on agricultural waste products.</li> <li>• Supports the Global Coffee Platform in bringing together stakeholders and establishing a national coffee platform that advocates for workers' living conditions and natural resource conservation (GIZ, n.d.-j).</li> </ul>



<b>Agency</b>	<b>GIZ commissioned by EU</b>
<b>Project Title</b>	EU Support to the Sustainable Land Management Programme
<b>Objective</b>	The project supports the rehabilitation of landscapes in Ethiopia by increasing the efficiency and sustainability of agriculture cultivation techniques. This results in improved livelihoods and food security for farmers, as well as reducing pressures on natural resources and land (GIZ, n.d.-l).
<b>Strategy</b>	<ul style="list-style-type: none"> <li>• Investments to increase the adoption and use of sustainable land and water-management technologies in selected areas.</li> <li>• Capacity development of key stakeholders in sustainable land management.</li> <li>• Support to establish effective program management at all levels, from district to federal programs (GIZ, n.d.-l).</li> </ul>

<b>Agency</b>	<b>GIZ</b>
<b>Project Title</b>	Transitional aid measure: Improving food security and disaster risk management to enhance resilience in Afar, Ethiopia
<b>Objective</b>	<p>Increasing the institutional capacity and population's ability to secure stable incomes in order to increase long-term food security, and resilience to climate change and variability.</p> <p>Forms part of the Strengthening Drought Resilience in Arid and Semi-Arid Lowlands of Ethiopia program (GIZ, n.d.-e).</p>
<b>Strategy</b>	<ul style="list-style-type: none"> <li>• Improve access to and quality of available water through collective filter systems. Awareness campaigns on the importance of clean water and hygiene practices.</li> <li>• Increase access to food and fodder, and promote the sale of locally produced items (e.g., tree fruit). Nutrition education to enhance food utilization.</li> <li>• Radio-based and other warning systems that provide recommendations for action in the face of drought, flood, or other potential risks (GIZ, n.d.-e).</li> </ul>



Agency	GIZ
<b>Project Title</b>	Trilateral Resilience Enhancement in the Ethiopian Lowlands as part of the Strengthening Drought Resilience in Arid and Semi-Arid Lowlands Programme
<b>Objective</b>	“Agro-pastoral communities are able to plant and care for multi-purpose and fruit trees through improved management knowledge and the use of adapted seedlings material” (GIZ, n.d.-d).
<b>Strategy</b>	There are three project components: <ul style="list-style-type: none"> <li>• “Production of multi-purpose and fruit trees in three nurseries,</li> <li>• Improvement of agro-pastoralists’ knowledge and understanding of planting multi-purpose and fruit trees,</li> <li>• Training for operators and employees of the nurseries and agricultural extension services in planting multi-purpose and fruit trees” (GIZ, n.d.-d).</li> </ul>

Agency	GIZ
<b>Project Title</b>	Supporting Sustainable Agricultural Productivity in Ethiopia
<b>Objective</b>	Increasing the conditions for agricultural productivity (GIZ, n.d.-f).
<b>Strategy</b>	<p>Locally adapted seeds: Assists in breeding locally adapted seeds, developing regulations/strategies for the seed sector, and promoting the application of global standards relating to seeds, such as quality control and variety release.</p> <p>Agricultural mechanization: Provides training and field demonstrations in agricultural machinery, mechanization techniques and cultivation practices that maintain soil fertility and enhance long-term productivity.</p> <p>Improves training capacities for farming cooperatives: Enhancing capacity development and developing a permanent range of training courses (GIZ, n.d.-f).</p>



<b>Agency</b>	<b>GIZ</b>
<b>Project Title</b>	Agricultural Mechanisation and Technology for Smallholder Productivity
<b>Objective</b>	Increasing the adoption of high-quality mechanization services and technologies by smallholders that improves their productivity and income (GIZ, n.d.-o).
<b>Strategy</b>	<ul style="list-style-type: none"> <li>• Development of strategies to promote mechanization by the agricultural authorities.</li> <li>• Promotion of dialogue between stakeholders to enhance the exchange of experience and promote understanding of different perspectives and challenges.</li> <li>• Capacity development of mechanization service providers.</li> <li>• Development of a buyers' guide for important technologies to assist with investment decisions.</li> <li>• Delivery of practical demonstrations of modern mechanization technologies to encourage adoption (GIZ, n.d.-o).</li> </ul>

<b>Agency</b>	<b>GIZ</b>
<b>Project Title</b>	Soil protection and rehabilitation for food security
<b>Objective</b>	In selected partner countries, approaches to promoting long-term soil conservation and restoration are implemented and shared (GIZ, n.d.-m).
<b>Strategy</b>	Smallholders receive guidance on agroecological practices that enhance the soil's fertility and water absorption capacity, thereby increasing yields. This contributes to climate change adaptation and mitigation by preserving the soil (GIZ, n.d.-m).

<b>Agency</b>	<b>GIZ</b>
<b>Project Title</b>	Country package Ethiopia Forests4Future
<b>Objective</b>	Restoration of Ethiopian forests and productive forest landscapes (GIZ, n.d.-c).
<b>Strategy</b>	A results-based incentives system offers beneficiaries a payment following successful planting, covering the gap until farmers can earn income from the sale of timber. This encourages participation in forest development. The project is also developing the capacity of actors' working in forest restoration (GIZ, n.d.-c).





<b>Agency</b>	<b>EU – through the Global Climate Change Alliance Partnered with GIZ</b>
<b>Project Title</b>	Building the national capacity and knowledge on climate change resilient actions in Ethiopia
<b>Objective</b>	Offers capacity building and sustainable land management to support the achievement of Ethiopia's Climate Resilient Green Economy (The Global Climate Change Alliance Plus Initiative, 2018a).
<b>Strategy</b>	Increase the understanding and capacity of the rural population and selected federal and regional government institutions, to address climate change. (The Global Climate Change Alliance Plus Initiative, 2018a).

<b>Agency</b>	<b>EU – through the Global Climate Change Alliance Partnered with GIZ</b>
<b>Project Title</b>	The Global Climate Change Alliance Plus Initiative Plus in Ethiopia: Mainstreaming of Climate Smart Planning and Implementation approaches into the Productive Safety Net Programme IV (PSNP IV)
<b>Objective</b>	Enhance the adoption and implementation of climate-smart planning and improve climate change resilience among specific PSNP recipients (The Global Climate Change Alliance Plus Initiative, 2018b).
<b>Strategy</b>	<ol style="list-style-type: none"> <li>1. Incorporate climate-smart approaches into PSNP design and implementation processes.</li> <li>2. Improve the institutional and technical capacity for implementation and monitoring of climate change risks and opportunities.</li> <li>3. Improved recording and distribution of the evidence gathered as a result of the project in order to promote sector engagement and climate finance</li> </ol> <p>(The Global Climate Change Alliance Plus Initiative, 2018b).</p>



<b>Agency</b>	<b>EU</b>
<b>Project Title</b>	Quality Diets for Better Health
<b>Objective</b>	<p>“The QDBH [Quality Diets for Better Health] project aims at improving the nutrition situation of pregnant and lactating women and young children through dietary education and the incorporation of bio-fortified orange-fleshed sweet potato (OFSP) varieties in the local farming system and diets” (Delegation of the European Union to Ethiopia, 2019).</p> <p>Also known as Sustained Diet Quality Improvement by Fortification with Climate-smart, Nutrition-Smart OFSP in Southern Nations, Nationalities and Peoples’ Region, Ethiopia</p>
<b>Strategy</b>	<ol style="list-style-type: none"> <li>1. Provision to households of OFSP varieties and the appropriate technologies for repeated production and processing.</li> <li>2. Provide nutrition training and education to rural households with young children using a curriculum and tools adapted to the local context and requirements.</li> <li>3. Support the commercialization and processing of OFSP.</li> <li>4. Document and disseminate evidence of the effectiveness of the approach to encourage further adoption</li> </ol> <p>(Delegation of the European Union to Ethiopia, 2019).</p>

<b>Agency</b>	<b>EU</b>
<b>Project Title</b>	Multi Donor Trust Fund for Ethiopia – PSNP
<b>Objective</b>	Aims at improving food and nutrition security, and resilience to shocks by providing economic opportunities. PSNP’s fourth phase, which began in 2015, adds improving environmental management to the existing objectives (Delegation of the European Union to Ethiopia, 2018b).
<b>Strategy</b>	<ul style="list-style-type: none"> <li>• Increase resilience through “sustainable natural resources management, public works, cash transfers, and nutritional feeding”</li> <li>• Cash and food transfers are provided in return for manual labour on public work projects for integrated watershed development</li> <li>• Contributes to land restoration and efforts to counteract deforestation (Delegation of the European Union to Ethiopia, 2018b)</li> </ul>



<b>Agency</b>	<b>EU</b>
<b>Project Title</b>	Supporting Horn of Africa Resilience initiative
<b>Objective</b>	“Provides additional support to the most affected regions of the Horn of Africa, improves disaster preparedness and helps to better link humanitarian aid and development cooperation” (European Commission, 2013).
<b>Strategy</b>	Multi-faceted assistance, including: <ul style="list-style-type: none"> <li>• Supports mechanisms that provide the vulnerable with cash and food in crises.</li> <li>• Encourages dietary diversification and local vegetables, milk, and forage production.</li> <li>• Supports animal health services (including vaccination) and natural resource management (European Commission, 2013)</li> </ul>

<b>Agency</b>	<b>EU</b>
<b>Project Title</b>	Beekeepers Economic Empowerment Through Long-Term Investments in Entrepreneurship and Value Chain in Ethiopia (BEE-LIEVE)
<b>Objective</b>	The overall objective is to contribute to poverty reduction by developing a sustainable and inclusive honey value chain. Specifically, the objectives are strengthening the productive capacity of small-scale honey producers, improving market access, improving the value chains, and enhancing management knowledge (European Commission, 2019).
<b>Strategy</b>	The project improves the access of smallholder beekeepers, especially young people and women, to inputs, finance and markets, in order to expand the market base and increase honey production and productivity. The focus is on technical and business skills and establishing public-private partnerships to improve the governance of the value chain. The additional benefit is that beekeeping is well-suited to rugged terrain compared to crop production that can exacerbate environmental degradation (European Commission, 2019).



<b>Agency</b>	<b>EU</b>
<b>Project Title</b>	Share Resilience Building and Creation of Economic Opportunities in Ethiopia (RESET II)
<b>Objective</b>	The program's overall goal is to strengthen the resilience of vulnerable communities, especially to natural disasters, by creating economic opportunities and increasing livelihoods and access to basic services. In so doing, the programme hopes to address the fundamental causes of irregular migration and displacement (Delegation of the European Union to Ethiopia, 2018c).
<b>Strategy</b>	Introduction of quinoa to Ethiopia to address malnutrition and drought, as quinoa contains all the essential food groups required for growth and only needs a small amount of rain to grow (Delegation of the European Union to Ethiopia, 2018c).

<b>Agency</b>	<b>EU</b>
<b>Project Title</b>	INFORMED programme
<b>Objective</b>	Supports national and regional institutions to monitor and share evidence-based information and analysis regarding food security, nutrition, and resilience in crisis-prone countries. (Delegation of the European Union to Ethiopia, 2018a).
<b>Strategy</b>	<ul style="list-style-type: none"> <li>• Gather, analyze, and disseminate data on a variety of food security and nutrition factors</li> <li>• Support the integration of food security, nutrition, and resilience into policy frameworks and programs</li> <li>• Develop early-warning mechanisms related to food and nutrition security crises</li> </ul> (Delegation of the European Union to Ethiopia, 2018a).



<b>Agency</b>	<b>USAID</b>
<b>Project Title</b>	Feed the Future
<b>Objective</b>	Connect marginalized and vulnerable people to economic opportunities, enable them to access financial services, and improve food and nutrition security and resilience. The overall goal is to promote agriculture-led economic growth to reduce the challenges posed by chronic poverty and food insecurity (Feed the Future, n.d.).
<b>Strategy</b>	<ul style="list-style-type: none"> <li>• “Increase crop and livestock productivity and diversity</li> <li>• Improve the business enabling environment</li> <li>• Increase employment and entrepreneurship opportunities, especially for youth and women</li> <li>• Expand access to markets with more urban opportunities</li> <li>• Improve natural resource management</li> <li>• Strengthen resilience to shocks and stresses</li> <li>• Promote social cohesion in resilience activities, including access to disputed regional resources</li> <li>• Boost nutrition, particularly among women and children” (Feed the future, n.d.).</li> </ul>

<b>Agency</b>	<b>USAID</b>
<b>Project Title</b>	Feed the Future Growth through Nutrition
<b>Objective</b>	Improve the nutritional status of women, children and adolescents, with a particular focus on improving nutrition in the first 1,000 days of a child’s life (USAID, 2018).
<b>Strategy</b>	Multi-sector approach (including agriculture, health, education, Water, Sanitation and Hygiene [WASH]) to target the causes of malnutrition. The project works closely with Ethiopia’s PSNP (USAID, 2018).

<b>Agency</b>	<b>USAID</b>
<b>Project Title</b>	Feed the Future Ethiopia Value Chain Activity
<b>Objective</b>	Supports the Government of Ethiopia in their goal of increasing the agricultural output and commercialization of smallholders. The initiative emphasizes nutrition-sensitive productivity in specific value chains, with a particular emphasis on the involvement of women and young people (USAID, 2021).
<b>Strategy</b>	Supports the increased production and commercialization of typical foods produced by smallholders. This enables smallholders to consume more of the nutritious foods they produce while also earning higher profits (USAID, 2018).



<b>Agency</b>	<b>USAID</b>
<b>Project Title</b>	Feed the Future Ethiopia Livelihoods for Resilience project
<b>Objective</b>	Increases land-use productivity and the resilience of communities to recurring droughts (USAID, 2020).
<b>Strategy</b>	Supports the rehabilitation and management of watersheds and other resources to improve year-round irrigation and water access (USAID, 2020).

<b>Agency</b>	<b>USAID</b>
<b>Project Title</b>	Feed the Future Ethiopia Resilience in Pastoral Areas project
<b>Objective</b>	Supports climate-resilient growth in the Ethiopian lowlands (USAID, 2020).
<b>Strategy</b>	“Promotes livelihood diversification, enhances local use of national meteorological information, and pilots weather-based livestock insurance products” (USAID, 2020).

<b>Agency</b>	<b>USAID</b>
<b>Project Title</b>	Feed the Future Smallholder Horticulture Project
<b>Objective</b>	Support the economic growth of smallholder horticulturalists (USAID, 2018).
<b>Strategy</b>	“Strengthening the commercial viability of fruit and vegetable production” (USAID, 2018).

<b>Agency</b>	<b>USAID</b>
<b>Project Title</b>	Development Food Security Assistance Program (DFSA)
<b>Objective</b>	Improves the nutritional status of specific communities, including pregnant or lactating women (USAID, 2021).
<b>Strategy</b>	Offers support to nutrition-related activities carried out by Ethiopia’s PSNP. Provides nutritious food to women and children, raising awareness of important WASH practices, improving health services, and providing capacity development to extension services, and supporting the development of community-based management (USAID, 2021).



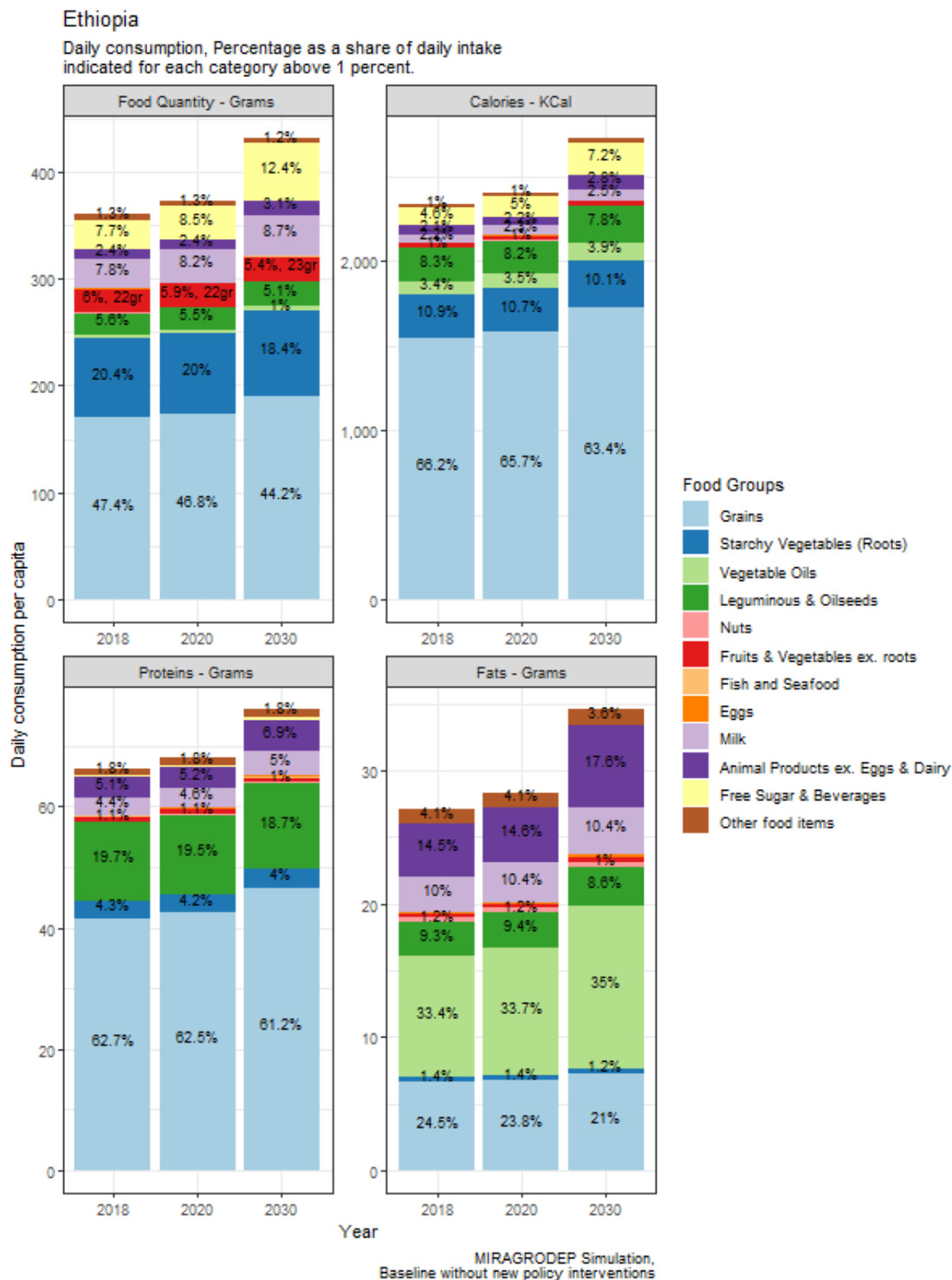
<b>Agency</b>	<b>USAID</b>
<b>Project Title</b>	Food For Peace
<b>Objective</b>	Food for Peace targets rural households susceptible to food insecurity. It aims to enhance their livelihoods and resilience to shocks in order to reduce chronic food and nutrition insecurity (USAID, 2018).
<b>Strategy</b>	Partners with Catholic Relief Services, Food for the Hungry, Relief Society of Tigray, World Vision, and the USAID Office of Food for Peace to implement long-term development interventions through Ethiopia's PSNP. Approach includes: food and cash transfers, support for the creation of assets to benefit the wider community, providing relief and food assistance to those suffering from shocks, providing specialized nutrition commodities, and providing resources to assist in local agricultural production (USAID, 2018).

<b>Agency</b>	<b>USAID</b>
<b>Project Title</b>	Famine Early Warning Systems Network
<b>Objective</b>	Supports the Famine Early Warning Systems Network by helping in the prediction and mitigation of natural resource use during economic and food crises (USAID, 2020).
<b>Strategy</b>	



# Appendix C. Additional Figures

**Figure C1.** Composition of the diet in Ethiopia for 2018, 2020, and projection for 2030

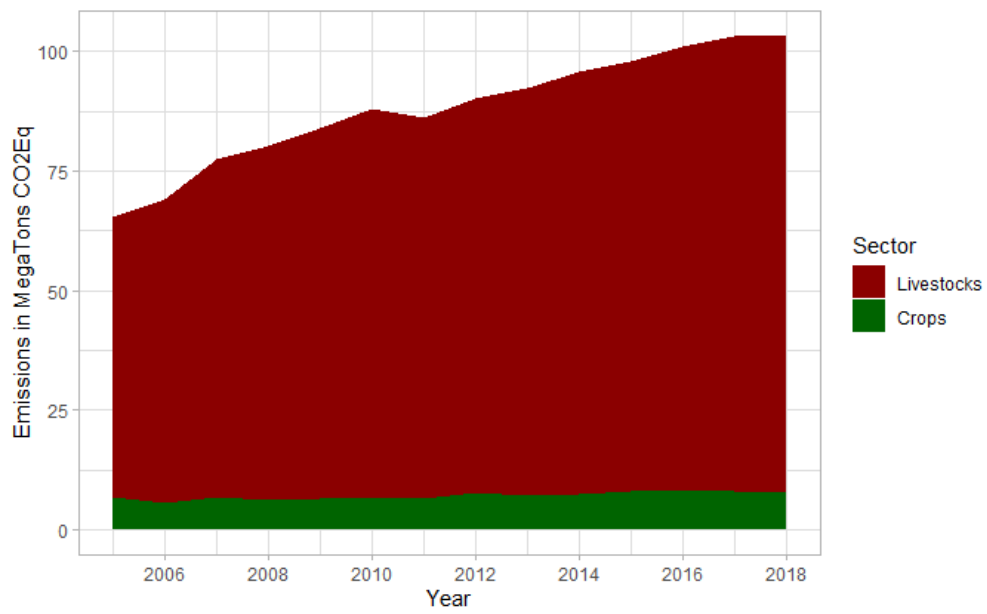


Source: Author's own





**Figure C2.** Evolution of agricultural emissions



Source: Author's diagram based on data from FAO, 2021.



## Appendix D. List of Research Questions

The project will answer seven research questions by applying them to the three countries, Ethiopia, Malawi, and Nigeria, and is aimed at studying the food system transitions and supporting decisions to trigger transformative changes:

1. What are the expected trends in terms of diets for the three countries?
2. What is the definition of a healthy diet for a country, when considering cultural and economic specificities and the nutritional value of different food items?
3. Based on micro-econometric evidence, how well do we understand consumer decisions regarding food, in particular in transitioning food systems (for example, with rising income, urbanization, food processing, and food consumed away from home)?
4. What are the policy instruments and the food system innovations required to achieve healthier diets?
5. What are the costs and benefits, both in economic and environmental terms (GHG focus), of these diets, and what is their mitigation value?
6. Considering the answers from questions 2–4, what is the most efficient set of actions to achieve this transformation? (Criteria to assess efficiency include these factors: feasibility, potential costs/benefits, gender-transformative or -sensitive aspects, if applicable).
7. How do the different sets of actions in question 6 translate in terms of weather or climate risk exposure to the future food systems?

The project is funded by the German Federal Ministry for Economic Cooperation and Development (BMZ) and the European Commission, through the GIZ-implemented projects Knowledge for Nutrition (K4N) and Agricultural Policy and Food and Nutrition Security as a contribution to the 2021 UN Food Systems Summit. The results will contribute to the Summit's goal of providing healthy diets for all, in a sustainable way, and will be published to coincide with the dates of the Summit

Ceres2030 is a partnership between academia, civil society, and economists, led by three institutions—Cornell University, the International Food Policy Research Institute, and the International Institute for Sustainable Development—who share a common vision: a world without hunger, where small-scale producers enjoy greater agricultural incomes and productivity, in a way that supports sustainable food systems.



Implemented by

