Fill the Nutrient Gap Ethiopia

Summary

የጤና ሚኒስቴር፣ ኢትዮጵያ
MINISTRY OF HEALTH, ETHIOPIA

Ethiopian Public Health Institute

WFP
World Food Programme

July 2021

This summary and further information can be found electronically at: wfp.org/fillthenutrientgap

Suggested citation:

Ethiopian Public Health Institute and World Food Programme (2021). Fill the Nutrient Gap, Ethiopia.
Addis Ababa: Ethiopia.

For more information please contact:

Ethiopian Public Health Institute (EPHI), Ministry of Health
Focal point: Andinet Abera
Email: andinet_abera@yahoo.com
Gulelle Arbegnoch Street
Gulele Sub City; 5654/1242
Addis Ababa, Ethiopia

The United Nations World Food Programme Ethiopia
Kirkos Sub City, Kebele 17/18,
River Side Hotel PLC
Addis Ababa, Ethiopia

Nutrition Division (NUT) World Food Programme
Systems Analysis for Nutrition
nutrition@wfp.org
Via C.G. Viola, 68/70, 00148, Rome, Italy

Foreword

Dr Getachew Tolera (M.D, MPH)
Deputy Director-General
Ethiopian Public Health Institute (EPHI)

Nutrition is a crucial pillar in the development of a healthy and productive nation. Good nutrition enhances physical and cognitive development, prevents disease, and increases the potential of the workforce and the society. Fill the Nutrient Gap (FNG) initiative was brought to Ethiopia by UN World Food Programme (WFP). FNG is an analytical process comprised of a secondary literature review in combination with Cost of the Diet linear optimization to understand local drivers that affect the availability, cost and affordability of a nutritious diet. So far FNG analysis was completed in 32 countries and on-going in 12 countries.

According to the Global Nutrition Report, one in every nine people is hungry or undernourished worldwide. The trend shows that the progress is very slow to meet the global targets by 2025. The progress observed in many of the developing countries including Ethiopia is not acceptable. Though, Ethiopia has witnessed encouraging progress in reducing malnutrition over the past decades, the levels of malnutrition remain so high that the country must continue to make significant investments in nutrition. To tackle this problem a lot of tasks, commitment and evidence based information are needed for further action.

The findings of FNG study in Ethiopia are very timely and useful. The results and the recommendations brought forward will help decision makers in planning nutrition interventions aimed at reducing malnutrition and ensuring food security in Ethiopia. Studies of such kind can enable us to make informed decision and provide evidence to support and scale up our existing interventions.

I would like to thank the WFP for the technical leadership and financial support to perform Fill the Nutrient Gap study. I would also like to thank the FNG team at the WFP Ethiopia country office, regional bureau in Nairobi and headquarters in Rome for providing training and continuous support and mentoring the team at EPHI.

I would like to congratulate the EPHI research team for accomplishing this task. Further, I wish to extend my thanks to the multi-sectoral participants who have actively participated and provided inputs during the inception meeting in 2019, the consultation meeting at different occasions and during the validation workshop; and contributed to the success of this project.

Dr Getachew Tolera (M.D, MPH)
July 2021

Executive Summary

Over recent decades, Ethiopia has made considerable progress in reducing the prevalence of stunting, yet, 37 percent of children under five years of age remain affected. Stunting generates an economic loss of ETB 55.5 billion (USD 1.8 billion) every year, equivalent to approximately 16 percent of Ethiopia's Gross Domestic Product (GDP) (1). Persistent rates of child wasting, widespread micronutrient deficiencies and poor quality of diets for both children and adults are among some of the nutrition related challenges faced by Ethiopians. In an effort to understand and address factors determining access to nutritious diets in Ethiopia, and building on the findings of the Cost of Hunger Study of 2013 and the Zero Hunger Strategic Review of 2019, the Ethiopian Public Health Institute (EPHI) of the Ministry of Health, with technical assistance from the World Food Programme (WFP), conducted a Fill the Nutrient Gap analysis (FNG) in 2020. The analytical process sought to understand local drivers that affect the availability, cost and affordability of a nutritious diet.

Process

The FNG process began at the end of 2019, through a multi-stakeholder inception meeting and was followed by a technical training of EPHI and partners. Identification of data, analysis and modelling was conducted from January to October 2020, with technical discussions and validation of results with stakeholders conducted between October and December 2020.

Methodology

The two-pronged FNG approach consists of a review of existing secondary literature and a Cost of the Diet analysis (which uses linear programming for lowest cost diet optimization). Consumer Price Index food prices (November 2018 - October 2019) were used to estimate the minimum cost of energy sufficient and nutritious diets at zonal and regional level. Expenditure data from the Ethiopian Socioeconomic Survey (ESS) of 2015-2016 was used to assess the extent to which Ethiopian households are able to access these diets.

Main findings

1. Almost all households in Ethiopia would be able to afford to meet their energy needs (93%). However, only one out of four households (26%) would potentially have access to a nutritious diet. Based on the results of the Cost of the Diet analysis, diets meeting the needs of multiple nutrients would cost between three to five times the cost of energy sufficient diets. A nutritious diet was estimated to cost at least five times more than what a household in the lowest expenditure decile spent on food.
2. Current diets in Ethiopia are poor and non-diverse, with little inclusion of animal-source foods, vegetables and fruit. Nutritious, diverse and nutrient-rich diets are a prerequisite for preventing malnutrition. In Ethiopia consumption is largely based on staple grains and oil.
3. Adolescent girls and pregnant and lactating women are most at risk of having inadequate diets, as the cost of meeting nutrient requirements are highest for these groups. Diet costs are predominantly driven by requirements for micronutrients such as vitamin B12, iron and calcium, for which animal-source foods are key sources, although expensive. Providing a daily or weekly MMT or IFA doses to pregnant and lactating women or adolescent girls, respectively, could drastically reduce the cost of meeting nutrient requirements.
4. Diets of breastfed and non-breastfed children are suboptimal. Encouraging age-appropriate breastfeeding and providing access to diverse and nutritious complementary foods could reduce the cost of meeting nutrient requirements.
5. The availability and intake of non-nutritious, processed foods is increasing, especially for children and adolescents in urban areas. The real cost of nutritious diets would be higher when energy-dense and micronutrient-poor snack foods are frequently consumed.
6. Households mostly depend on markets for access to fresh, nutritious foods, such as vegetables, fruits, and meat, whilst grains are sourced from own production. Rural households mostly rely on homestead production for eggs and dairy products, although consumption is limited. Prices of these nutritious foods have increased in recent years, whilst grain, sugar and oil prices have decreased; meaning access to nutritious diets could be more difficult.
7. Improving access to nutritious diets and associated changes to consumption patterns can have implications for climate outcomes as well as nutrition. Enabling and promoting nutritious, sustainable, diets should be a priority.
8. Agricultural production is largely focused on staples, whilst the supply and availability of fresh, nutritious foods, such as fruit and vegetables, is insufficient. Current levels of domestic production are not able to adequately meet the nutrient requirements of a growing population.

9. Agricultural production is largely small-scale and subsistence-based, with limited opportunity for growth and development. Innovating agricultural practices, diversifying production and adopting high quality seeds and biofortified and fortified commodities could improve access to nutritious diets.

10. Infrastructure and access to markets for sale and purchase also determine household ability to access nutritious, diverse diets. Investment in road networks, transport and market functionality could positively impact nutrition outcomes.

11. Post-harvest, large-scale fortification could improve access to key nutrients that are low in national food supply or unaffordable for most households. Biofortification through improved seeds and soil fertilizers could improve nutrient intake.

12. Poverty is a basic cause of malnutrition and limits households' access to nutritious diets. Shocks can significantly hamper progress towards poverty reduction and further limit nutritious diet access. If nutrition sensitive, safety nets could increase resilience and access to nutritious diets.

13. School meals have the potential to improve nutritious diet access for children and adolescents. However, greater inclusion of micronutrient-dense foods is needed to meaningfully contribute to children's nutrient needs.

Stakeholder identified priorities by sector

During a series of virtual thematic workshops held in December 2020 and attended by the wider group of stakeholders involved in the FNG process, the main findings of the FNG analysis were shared and discussed with participants to identify priority areas for action. Based on the sector recommendations, the study team summarized the following prioritized interventions and activities by sector.

Health and nutrition

- Prioritize advocacy and education to change the focus from diets that are just focused on meeting energy needs to diets that are rich in multiple (micro)nutrients. Stimulate the demand for nutritious foods (e.g. fruit and vegetables).
- Address increasing consumption of, and access to, ultra-processed and unhealthy snack foods.
- Promote behaviors and actions that contribute to good nutrition (e.g. SBC and focus on vulnerable groups).

Social protection

- Further action is needed to make the Productive Safety Net Programme (PSNP) more nutrition sensitive.
  - Target PSNP households with SBC.
  - Consider cost and affordability of nutritious diets when selecting transfer values and content.
  - Take actions to diversify diets of beneficiary households, such as introducing conditions that promote nutrition (e.g. fresh food vouchers). Prioritize complementary interventions for households that have children under 2 years/ individuals within the first 1000 days to address stunting.

Education

- Improve the nutrient content of school meals.
  - Estimate the cost of interventions for improving school meals to ensure that they are more nutrient-rich.
  - Include multiple micronutrient powders in school meals for vulnerable children.
  - Diversify school meals through school garden initiatives and increased procurement of nutritious foods through home grown school feeding programmes.
- Improve nutrition knowledge through school curriculum and in collaboration with religious leaders.

Agriculture

- Prioritize production of and access to nutritious foods.
  - Revise horticulture products prioritized under government extension services.
  - Encourage crop diversification through extension services for mid and small-scale producers, including home and school-level gardens.
  - Support the establishment or scale-up of poultry production or horticulture within the proximity of schools to ensure supply of nutritious foods for school meals.
  - Ensure short dairy value chains and best practices around production of milk for school consumption.
  - Improve and increase agricultural extension services, including quality of training and number of trained staff.
  - Monitor effective implementation of the National Nutrition Sensitive Agriculture (NNSA) Strategy.

- Address issues of poor productivity in the agricultural sector, especially regarding nutritious food (improved seeds, fertilizer, technology, mechanization, post-harvest technology, food safety regulations etc.).
- Promote climate smart agriculture (incorporate feasible technologies and knowledge sharing into extension services).
- Encourage increased participation in and inclusion of women in agricultural production (e.g. through scale-up of extension services).

Infrastructure

- Improve infrastructure related to access to and provision of power and water, including solar, to facilitate production, processing and transport of nutritious foods.
- Improve infrastructure associated with markets and access to markets (transport, roads, cold chain, storage and facilities) in order to improve access to nutritious foods and encourage/increase demand for production of these foods.

Private sector (public sector engages, enables and regulates)

- Improve the micronutrient content of staple foods and pulses.
  - Share evidence to promote efficacy of fortification and biofortification from global and national experience.
  - Consider the feasibility and benefits of introducing mandatory fortification of cereals and other staple foods to improve micronutrient content.
  - Introduce legislation to support the adoption of biofortified varieties of grains, pulses, and other foods to increase micronutrient content.
  - Support local supply of seeds and inputs for production of biofortified foods.
- Encourage the local production of nutrient supplements (iron and folic acid and multiple micronutrient supplements) and fortified special foods.
- Encourage or support activities that would increase the availability of nutritious convenience or healthy snack foods.

Fill The Nutrient Gap **Ethiopia** | SUMMARY

Introduction to Fill the Nutrient Gap (FNG) Ethiopia

The Government of Ethiopia is highly committed to tackling the issue of malnutrition and has developed several multisectoral policies and initiatives to end all forms of malnutrition by 2030. These include the Seqota Declaration, the National Nutrition Programme (NNPI and NNP II), the Nutrition Sensitive Agriculture policy, and the recently adopted National Nutrition Policy and Strategy. These policies recognize that malnutrition is a multifaceted, complex challenge that requires coordination and commitment across sectors.

Over recent decades, Ethiopia has made considerable progress in reducing the prevalence of stunting yet 37 percent of children under five years of age remain affected. Stunting generates an economic loss of 55.5 billion Ethiopian Birr (ETB) every year (USD 1.8 billion), equivalent to approximately 16 percent of Ethiopia's Gross Domestic Product (GDP)(1). Persistent rates of child wasting, widespread micronutrient deficiencies, and poor quality of diets for children and adults are among some of the nutrition challenges faced by many Ethiopians.

Building consensus for improved nutrition

Nutrition is a crucial pillar in the development of a healthy, productive nation. Good nutrition enhances physical and cognitive development, prevents disease, and increases the potential of the workforce and society. Improving diets, especially of children and women, brings immediate and long-term health, education and economic benefits. The two Lancet series (2013 and 2021) on maternal and child undernutrition identified a variety of nutrition interventions that have proven effective. Improving the nutrition situation in a country requires coordinated actions across the food, social protection, health and education systems, that are grounded in a good understanding of the local context, its opportunities and bottlenecks, and a synthesis of global and local evidence.

Fill the Nutrient Gap (FNG) is an analytical process comprised of a secondary literature review in combination with Cost of the Diet (CotD) linear optimization to understand local drivers that affect the availability, cost and affordability of a nutritious diet. Solutions of interest for improving availability of nutritious foods, lowering their cost and/or increasing income are then assessed for their potential to improve affordability, using the CotD software. In this way, the context-specific potential for impact of proven interventions can be quantified.

This summary report presents findings from the analysis and a discussion of its process, methodology and limitations. It highlights recommendations and priorities identified by stakeholders. By identifying and contextualizing new findings, the FNG analysis contributes towards building consensus around a vision and a path forward for improved nutrition in Ethiopia in a sustainable way that is integrated across the country's food systems.

FILL THE NUTRIENT GAP: SITUATION ASSESSMENT FOR MULTI-SECTORAL DECISION-MAKING ON THE PREVENTION OF MALNUTRITION

Malnutrition has two direct causes: inadequate dietary intake and disease. The FNG assessment focuses on gaps in dietary intake to inform national policies and actions that can be taken across food, social protection, and health systems to improve nutrition, with a focus on the most vulnerable populations. The FNG considers whether nutritious foods are available, accessible, and affordable in a specific context, and identifies the barriers that lead to gaps in nutrient intake. The analysis focuses on the extent to which vulnerable people have choices in the foods they consume and how those choices are made. The FNG process identifies and models the impacts of context-appropriate interventions to improve diets and nutrient intake across food, health, education, and social protection systems. The results are used to identify entry points across systems, to refine programmes, and to make recommendations to policymakers.

The assessment comprises two components:

1. A country-specific review of secondary data and information on factors that reflect or affect dietary intake. This includes malnutrition trends over time, characteristics of the food system and food environment, and population behaviour related to food and feeding.
2. An assessment of the extent to which economic barriers prevent adequate nutrient intake. This uses the Cost of the Diet (CotD) linear programming software developed by Save the Children (UK), and includes modelling of the economic impact of possible interventions to increase nutrient intake and fill nutrient gaps.

Preventing malnutrition, including through improved access to nutritious foods, cannot be achieved by one sector alone. FNG is designed to inform multisectoral decision making and therefore engages stakeholders from all sectors including food, health, agriculture, education, and social protection.

It is the stakeholders who define the scope and focus of the assessment. They contribute data and sources of information for identification of context-specific barriers and entry points and together with the analytical team develop a shared understanding of the issues and possible solutions. They then identify appropriate nutrition-specific and nutrition-sensitive interventions that can be implemented by different sectors using their existing delivery platforms. These could be social safety nets, food processing and markets, antenatal care, school feeding programmes, etc.

The FNG methodology has been developed by WFP with technical support from partners including the University of California Davis, the International Food Policy Research Institute (IFPRI, Washington DC), Epicentre (Paris), Harvard University (Boston), Mahidol University (Bangkok), Save the Children (UK), and UNICEF.

Between 2016 and early 2021, FNG analyses were completed in 32 countries and, at the time of writing in March 2021, were ongoing in 12 countries with more in the pipeline.

For more information on the concept and the method of the analysis, see Bose I, Baldi G, Kiess L, de Pee S, The 'Fill the Nutrient Gap' Analysis: An approach to strengthen nutrition situation analysis and decision-making toward multisectoral policies and systems change. Matern Child Nutr 2019: DOI: 10.1111/mcn.12793

Process and Scope of the Analysis

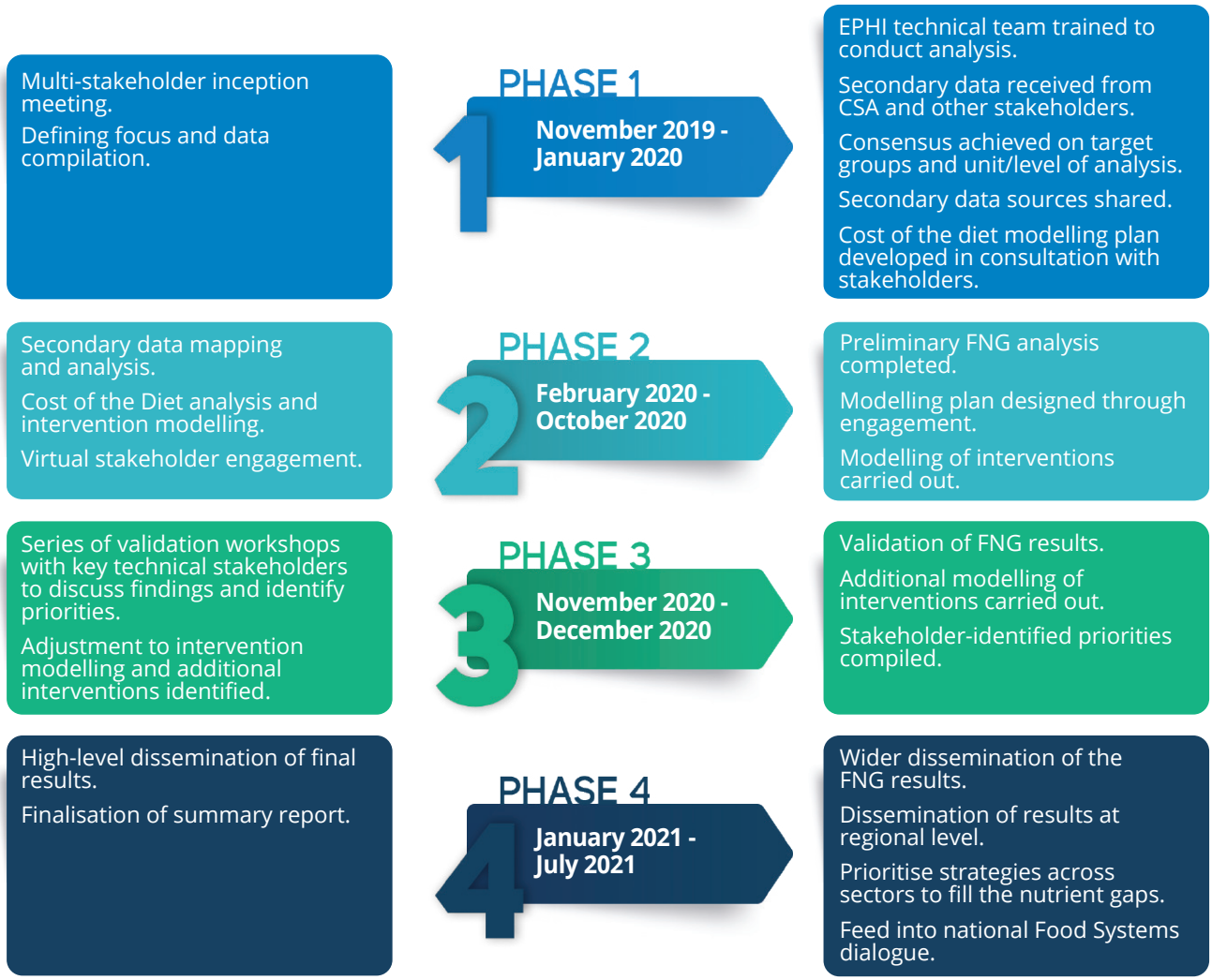
Process of the FNG Analysis in Ethiopia

The FNG process began at the end of 2019 when the Ethiopian Public Health Institute (EPHI) of the Ministry of Health and the FNG team presented it to government, non-government, academic and donor stakeholders in Addis Ababa. Technical training in CotD analysis, facilitated by the WFP-Headquarters Systems Analysis for Nutrition team, was held at EPHI in Addis Ababa. Following inception and training, the team undertook the analysis from January to October 2020, including ad-hoc requests for inputs to programming in response to specific needs that arose through 2020.

The FNG assessment was led by the EPHI with technical support from the FNG team consisting of the World Food Programme (WFP) Ethiopia country office, regional bureau in Nairobi and headquarters in Rome.

At the start of the process EPHI and the FNG team met with government, non-government, United Nations (UN), and other development partners to introduce the FNG's analytical approach, collate secondary data sources and identify interventions and entry points for CotD analysis and modelling. Stakeholders identified the target groups as pregnant and breastfeeding women, children under two (together covering the first 1,000 days from conception to the second birthday), preschool and school-age children, and adolescent girls. To validate the results, preliminary findings were presented to partners and stakeholders through a virtual workshop in November 2020. Three thematic workshops were held in December 2020 to develop sector specific priorities.

Figure 1: The Fill the Nutrient Gap (FNG) process followed in Ethiopia



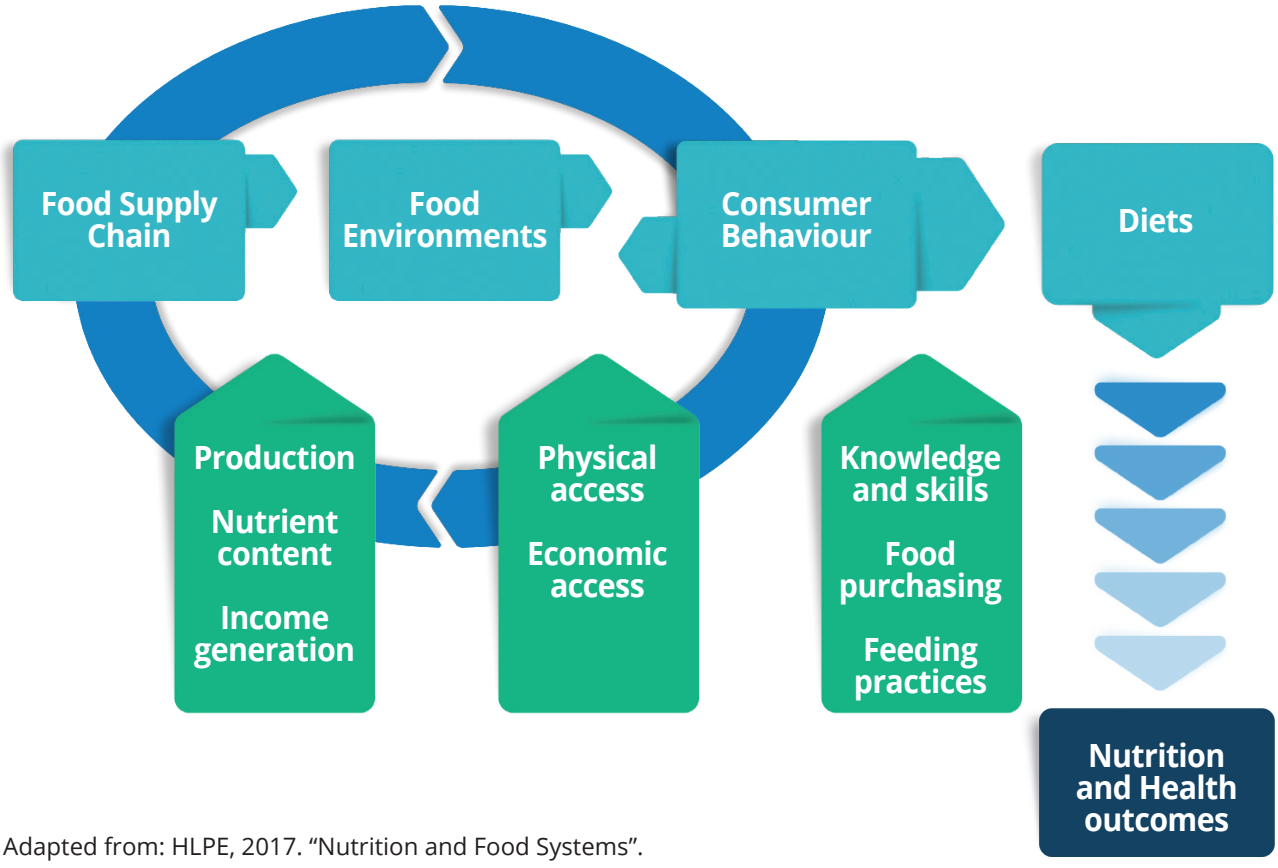
Scope and Focus of the FNG Analysis

Long-term solutions to malnutrition require transformation of the food system along food supply chains, food environments and consumer behaviour patterns (Figure 2). In an effort to understand and address factors determining access to nutritious diets in Ethiopia and build on the findings of the Cost of Hunger Study of 2013 (1) and the Zero Hunger Strategic Review of 2019, EPHI, with technical assistance from WFP, conducted the FNG analysis in 2020.

The analysis aimed to assess issues around availability, access, affordability and intake of nutritious foods. It also sought to provide further evidence of the possible effectiveness of already prioritized multisectoral nutrition actions identified by stakeholders, in order to inform prioritization of activities and identify potential areas for strengthening. In collaboration with the Johns Hopkins Centre for a Liveable Future (CLF), an analysis of the environmental footprint of different diets and diet scenarios was conducted to generate evidence of potential trade-offs in the promotion of country specific dietary shifts to mitigate climate and water crises while meeting nutrition needs.

The analysis and its stakeholder engagement process, which brought together a variety of sectors including health, agriculture, social development and education, has so far facilitated a greater understanding of food systems and nutrition contexts across Ethiopia. The results from the FNG are already being used to support WFP's country operations and future programmes by targeting nutritionally vulnerable groups, informing the fresh food voucher programme and helping to define nutrition sensitive cash transfers and complementary interventions.

Figure 2: Food systems for diets and nutrition and health outcomes framework



Adapted from: HLPE, 2017. "Nutrition and Food Systems".

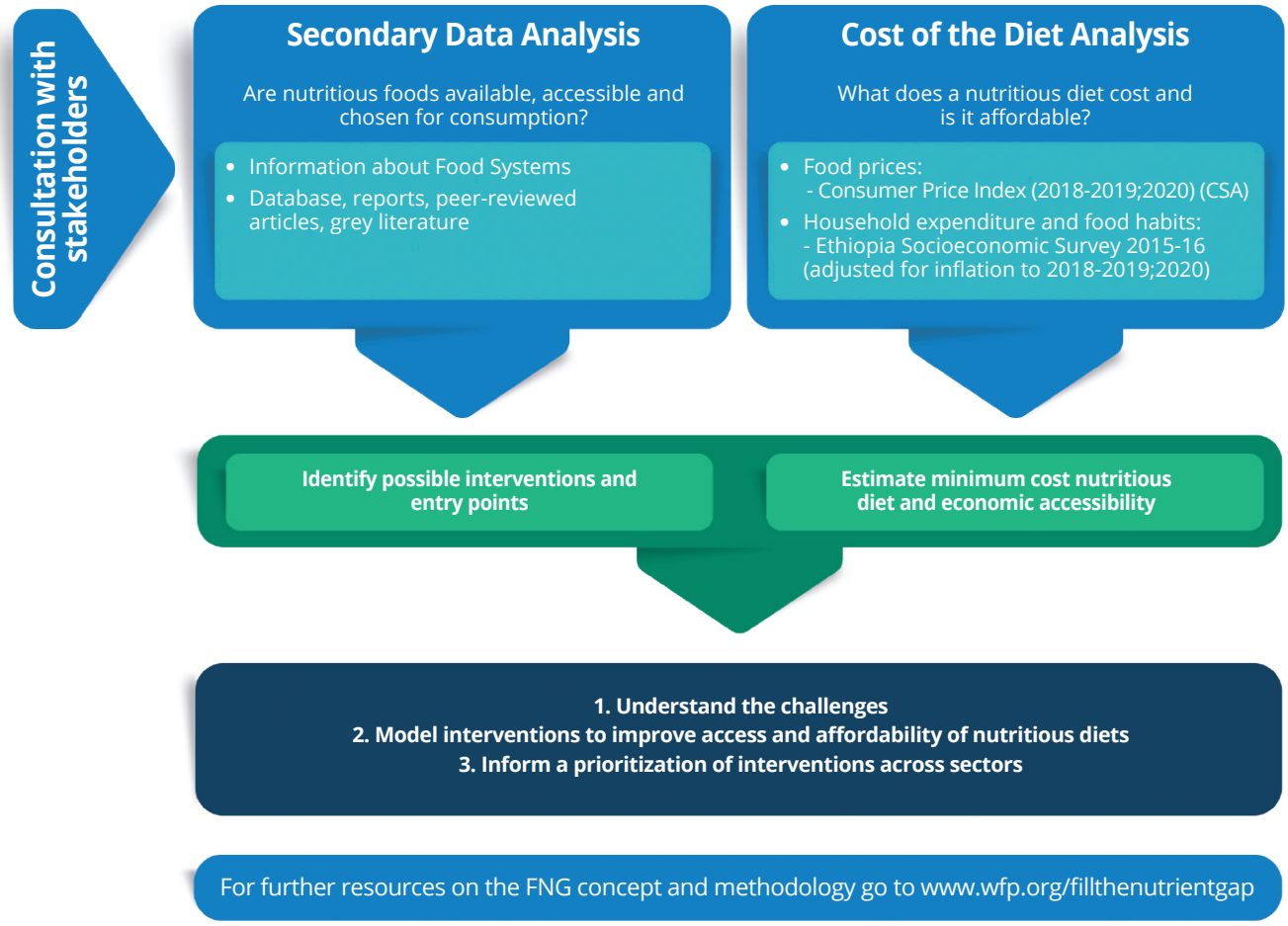
Methodology

The FNG analysis is composed of a secondary literature review of the food system and the social protection and health sectors, focusing on entry points for current and potential nutrition interventions, and a Cost of the Diet (CotD) analysis. CotD analysis uses linear optimization to provide a detailed look at availability, cost and affordability of nutritious diets (Figure 3).

Secondary Data Analysis

FNG secondary data analysis identifies barriers to accessing healthy diets, platforms for reaching nutritionally vulnerable groups in the population and opportunities for policy and programme interventions to improve access to nutritious foods through multiple sectors, including agriculture, health, social protection and education.

Figure 3: FNG analytical framework



Cost of the Diet (CotD)

COST OF THE DIET (CotD) ANALYSIS

CotD software uses linear programming to understand the extent to which poverty, food availability and food prices may affect the ability of people to meet their nutrient needs. Using price data collected from markets or from secondary sources, the software calculates the amount, combination, and lowest possible cost of local foods that are required to provide individuals or households with their average needs for energy, and their recommended intake of protein, fat and micronutrients[1]. These diets are calculated within defined constraints to prevent the inclusion of unrealistic types or amounts of food and the provision of excessive amounts of nutrients.

The FNG approach defines the 'Staple Adjusted Nutritious Diet' as the lowest cost nutritious diet that includes a typical staple food and excludes foods that are prohibited[2]. This diet is referred to as the 'nutritious diet' throughout this summary. It meets requirements for nutrients, including protein, nine vitamins and four minerals, and does not exceed energy and fat requirements. The nutritious diet is conceptually similar to the 'nutrient-adequate' diet estimated as the second level of diet quality in the 2020 State of Food Insecurity (SOFI) report[3].

Population expenditure data is compared to the cost of the nutritious diet and is used to estimate the proportion of the population that would not be able to afford it. This non-affordability can be estimated and compared across different regions, seasons or countries. The estimate of non-affordability is a conservative estimate of the share of households unable to afford the lowest cost nutritious diet, assuming optimized selection of nutritious foods. The real cost and non-affordability of a nutritious diet is likely to be higher, as reflected by a healthy diet, which includes foods from several food groups and has greater diversity within food groups.

[1] As defined by the Food and Agricultural Organization (FAO) and the World Health Organization (WHO).
[2] This diet is not intended to reflect what individuals or households are currently eating nor should it be used to develop food-based recommendations or dietary guidelines. Foods that are prohibited could be for customary or public health reasons, e.g., raw meat during pregnancy in some parts of the world.
[3] FAO, IFAD, UNICEF, WFP, WHO. The State of Food Security and Nutrition in the World 2020 [Internet]. 2020. Available from: http://www.fao.org/3/ca9692en/online/ca9692en.html

Data sources for CotD analysis

Food price data collected monthly by the Central Statistical Agency (CSA) of Ethiopia to construct the Consumer Price Index (CPI) were used as a basis for calculating the cost of the diet (2). The CotD analysis was conducted for 65 zones of Ethiopia. The monthly price data used covered the twelve months between November 2018 and October 2019 and included 102–139 food commodities. The main periods of price change were identified for each zone and the average price for each commodity was calculated to reflect the seasonal average guided by seasonal calendar information available on the Famine Early Warning Systems Network (FEWS NET) (3). Because of the COVID-19 pandemic, CPI food price data for the period between January and May 2020 were also used to update the cost of the diet estimates for Addis Ababa.

Non-affordability was estimated using weighted percentiles of total monthly food expenditure extracted at the regional level[1] from the Ethiopian Socioeconomic Survey (ESS) of 2015–2016[2], and measured at zonal and regional levels against the costs of two diets: the energy-only diet and the nutritious diet. To compare food expenditure to cost of a nutritious diet in 2018-19, the 2015-16 expenditure data was adjusted for inflation using the Food CPI. No adjustments were made to the 2018-19 price data or the cost of the diet estimates reported in this summary. The ESS of 2015–2016 was also used to determine the regional staple preferences, selecting the top two or three most consumed items (4).

Modelled household & main target groups for the analysis

Diet costs were estimated for a household of five members, selected to represent average household size as well as nutritionally vulnerable target groups in the population. As per the 2016 Demographic Health Survey, the average household size was 4.6 nationally (4). The household composition used for the analysis reflects different stages of life and nutrition needs and has been found to provide a good per capita average for the population as a whole. The household includes:

- breastfed child 6 - 24 months
- school-going child
- adolescent girl
- breastfeeding adult woman
- adult man.

[1] The regions for which the sample size was not statistically representative were grouped into the western region, composed of Gambella and Benishangul-Gumuz, and the eastern region, composed of the Afar, Harar, Dire Dawa and Somali regions.
[2] HCES 2015-2016 statistically representative for the regions of Amhara, Addis Ababa, Oromia, Tigray and Southern Nations, Nationalities and People's region (SNNP).

Intervention modelling

Based on discussions with stakeholders all interventions modelled in the FNG analysis were defined and approved by stakeholders. To identify concrete recommendations based on analyses, the FNG process concentrated on modelling the interventions outlined in Figure 4.

The focus of the modelling was initially defined at the inception of the FNG, based on sectoral priorities and further defined during the analytical process. Interventions were based on priorities defined by EPHI, WFP country office, and in engagements with NGOs, civil society, line ministries, and UN partners.

Modelling of interventions was carried out based on available data. The impact of interventions was modelled on specific zones or regions or across all regions, depending on the intervention and its scope.

Figure 4: Entry points and interventions modelled to estimate reduction in cost of a nutritious diet

Considerations for interpretation and data gaps

The estimates of the costs of the energy-only and nutritious diets reported here should be interpreted as a cost reflective of minimally viable diets, or as an economic benchmark based on what is available in markets. They should not be interpreted as desirable diets or diets reflective of actual or current consumption patterns. The assessment does not estimate the costs of the diets for all zones of Ethiopia as CPI data were not available for all zones. The list of food items included in the CPI data may not capture the full extent of availability despite it being comprehensive. Foraged or wild foods and less common highly seasonal foods may be missing from the list and, therefore, the analysis.

The cost of the diet estimates reported here have not been adjusted for inflation, thus reflect the prices of the data period November 2018 to October 2019 (with the exception of the 2020 cost of the diet estimates reported for Addis Ababa). Affordability estimates for the eastern regions (Somali, Harar, Dire Dawa, Afar) and western regions (Gambella and Benshangul Gumuz) were calculated based on food expenditure (ESS 2015–16) for the groups of regions (because of representativeness of the samples in the survey); thus, affordability estimates for these regions could be underestimated or overestimated.

The cost reducing effect of the interventions modelled is reflective of the extent to which macro- and micronutrient specifications for individuals can be met by the foods at a lower cost, thus bringing nutritious diets closer to households' economic reach. Interventions modelled for the purpose of this analysis are a result of stakeholder consultations; however, the full extent of interventions being implemented in Ethiopia is not captured here.

Findings

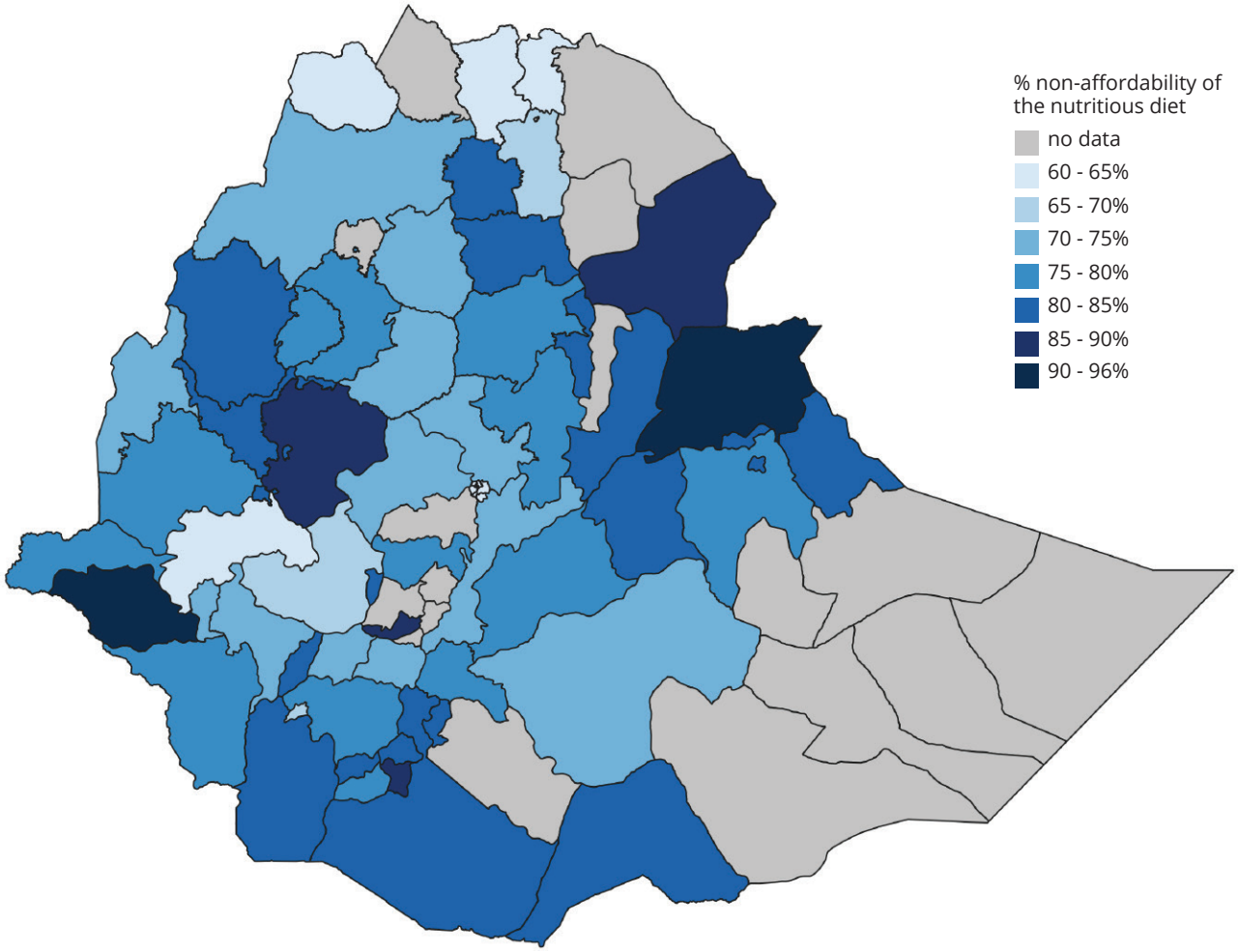
1.

ALMOST ALL HOUSEHOLDS IN ETHIOPIA WOULD BE ABLE TO AFFORD TO MEET THEIR ENERGY-ONLY DIET NEEDS. HOWEVER, ONLY ONE OUT OF FOUR HOUSEHOLDS WOULD POTENTIALLY HAVE ACCESS TO A NUTRITIOUS DIET.

The FNG CotD assessment revealed that a diet modelled to meet only energy requirements for a household of five people in the assessment zones would cost ETB 609–1093 per month. In contrast, meeting the needs of multiple nutrients would cost ETB 2401–4384 per month. Nutritious diets were most expensive in the Somali and Afar regions and least expensive in Amhara, SNNP and Gambella. Diets containing multiple nutrients would cost between three to five times more than energy-sufficient diets.

Nutritious diets tended to cost more in areas where fewer foods were found on local markets (correlation coefficient =-0.62), possibly reflecting a difference in availability of nutritious foods in some zones. Almost all households (93 percent) would be able to afford diets modelled to meet energy requirements, yet only 26 percent would be able to afford the nutritious diet. Considerable gaps were revealed between the amount that poorer households (at bottom decile of wealth) currently spend on food and the cost of a nutritious diet, with the latter estimated to cost at least five times more than what a household in the lowest expenditure decile spent on food. These findings suggest that interventions would be needed to increase the availability, and lower the cost, of nutritious foods, as well as interventions to increase income. Behaviour change interventions (BCC) would also be needed to improve diet quality and nutrition outcomes.

Figure 5: Percentage of households in each assessment zone that would be unable to afford nutritious diets



2.

CURRENT DIETS IN ETHIOPIA ARE POOR AND NON-DIVERSE, WITH LITTLE INCLUSION OF ANIMAL SOURCE FOODS, VEGETABLES AND FRUIT. NUTRITIOUS, DIVERSE AND NUTRIENT-RICH DIETS ARE A PREREQUISITE FOR PREVENTING MALNUTRITION.

The diversity and quality of diets are poor for all groups of the population across Ethiopia. Consumption is largely based on staple grains and oils, with 77 percent of kilocalories derived from starchy staples, and only 3 percent from fruit and vegetables and 1 percent from animal source foods. Few adults (<15 percent) consume fruit and vegetables daily and only 2 percent meet the WHO recommendation of five daily portions (5,6). Only 38 percent of urban households and 14 percent of rural households reported (over a seven-day recall period) consuming meat, and consumption of eggs was only reported by 29 percent of urban households and 10 percent of rural households (4). Food types identified in the CotD assessment as important and affordable sources of micronutrients included green leafy vegetables (spinach, kale), eggs and dairy (milk and yoghurt).

Throughout the year there are designated fasting periods in Ethiopia's Orthodox calendar when adherents abstain from consuming any animal products (7). Pregnant and breastfeeding women and children below the age of seven years are exempt from fasting in principle and this is promoted by health and religious leaders, but not always adhered to (8). The exclusion of animal source foods was modelled in CotD and led to a sharp increase in the cost of the diet. It was not possible to meet requirements for vitamin B_{12} for all household members and iron for adolescent girls (Figure 6). Given that fasting would increase the nutritional vulnerability of target groups, existing messages about the high nutritional needs of specific individuals (pregnant and breastfeeding women and children) and their exemption from fasting practices should continue to be promoted. The nutritional vulnerability of adolescent girls should be highlighted as well.

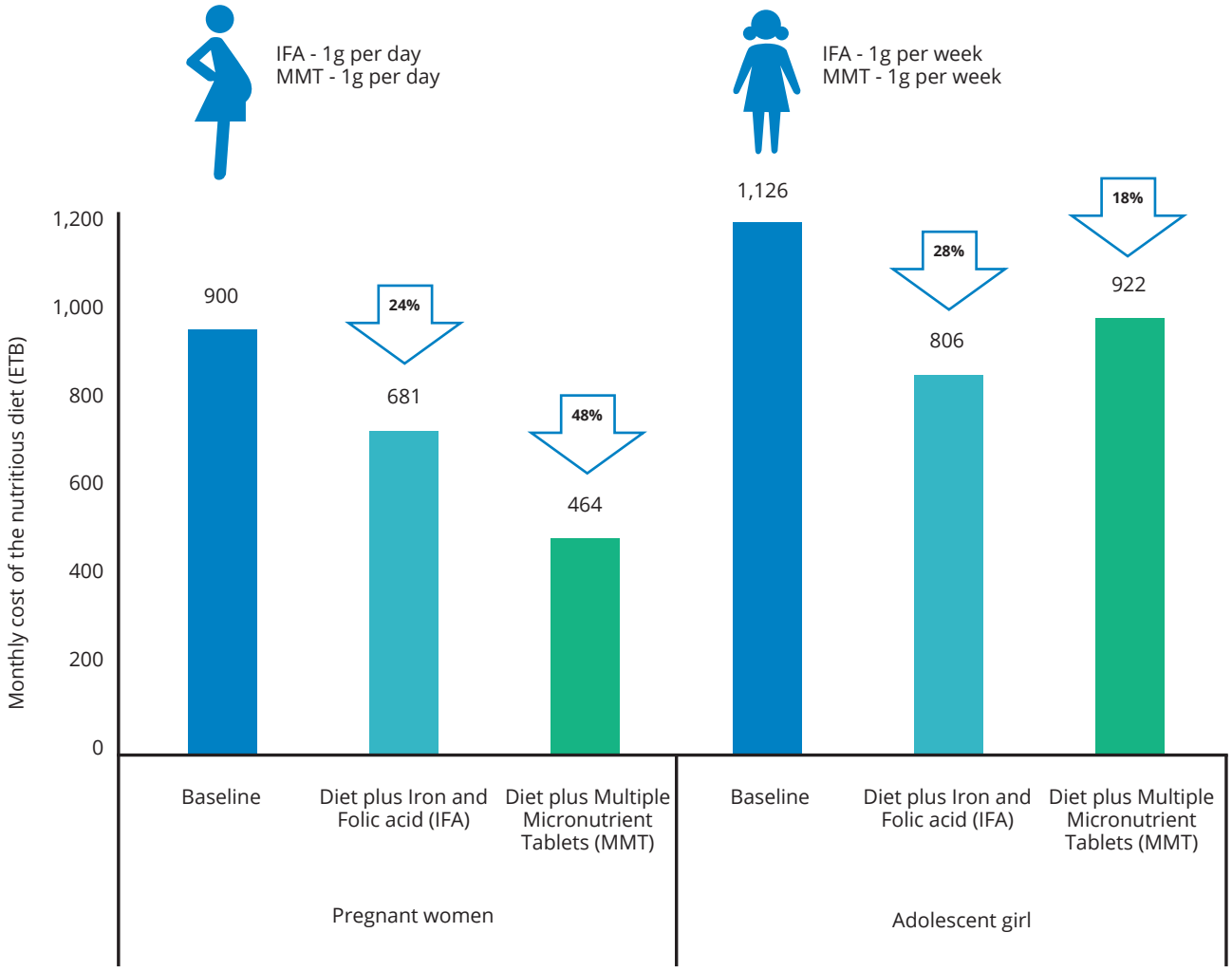
Figure 6: Monthly costs of three household diets modelled in the CotD software: a) nutritious diet in which any local foods could be included; b) fasting diet in which animal source foods cannot be included, except for children and breastfeeding women, and; c) standard fasting diet in which animal source foods could not be included in the diet for any household members

3.

ADOLESCENT GIRLS AND PREGNANT AND LACTATING WOMEN ARE MOST AT RISK OF INADEQUATE DIETS AS THE COST OF MEETING THEIR NUTRIENT REQUIREMENTS IS HIGHEST. DIET COSTS ARE PREDOMINANTLY DRIVEN BY REQUIREMENTS FOR MICRONUTRIENTS SUCH AS VITAMIN B_{12}, IRON AND CALCIUM, FOR WHICH ANIMAL SOURCE FOODS ARE IMPORTANT.

In the modelled households, adolescent girls' and pregnant and lactating women's (PLW) diets make up more than two thirds of the total household's cost of a nutritious diet. Nutritious diet costs are highest during adolescence and adult years for girls and women, reflecting their needs for growth and reproduction. During adolescence, pregnancy and breastfeeding, women require twice as much iron per kilocalorie as adult men or school-aged children. Such micronutrient-dense foods (e.g., animal source foods) usually cost more than foods low in micronutrients, making it more expensive to meet their nutrient needs. Iron and folic acid (IFA) supplements and multiple micronutrient tablets (MMT) could reduce the cost of the diet for PLW and adolescent girls. For PLW, daily IFA or MMT could reduce the cost of the diet by 24 and 48 percent respectively. For adolescent girls, weekly doses of IFA and MMT could reduce the cost by 28 and 18 percent respectively (Figure 7).

Figure 7: Estimated impact on the cost to households of a nutritious diet if iron and folic acid supplements or multiple micronutrient tablets are provided (at zero cost to household) to pregnant and lactating women and adolescent girls (national average)



4.

DIETS OF BREASTFED AND NON-BREASTFED CHILDREN ARE SUBOPTIMAL. ENCOURAGING AGE-APPROPRIATE BREASTFEEDING AND PROVIDING ACCESS TO DIVERSE AND NUTRITIOUS COMPLEMENTARY FOODS COULD REDUCE THE COST OF MEETING NUTRIENT REQUIREMENTS.

Diets are especially poor for infants and young children in Ethiopia where fewer than 1 in 10 young children have acceptable diets of adequate diversity and frequency (6,9). Rates of exclusive breastfeeding between 0-6 months of age have increased in recent years to above the WHO target of 50 percent, but there is substantial regional variation. Modelling in the CotD tool showed that nutritious diets that include appropriate quantities of breastmilk during the complementary feeding period (6–23 months) would cost 39 percent less than nutritious diets modelled without breastmilk.

Complementary feeding is suboptimal and characterised by the delayed introduction of complementary foods and inadequate inclusion of nutrient-rich foods (6,9). Dietary diversity and quality are suboptimal for breastfed and non-breastfed infants and young children, with low consumption of vegetable and animal source foods (9). Diets of infants and young children would need to include significantly more whole grains, fruit, vegetables, legumes and animal source foods, and they would need to reduce sweets, which make up almost a tenth (of the total weight) of observed diets for this age group (10).

Almost half of all children aged under 5 years in Ethiopia are deficient in zinc, underlined by low consumption of animal source foods (11). Diets based on plant source foods, including cereals, generally contain large quantities of non-digestible elements (e.g. phytates and dietary fibres) which inhibit the absorption of micronutrients, including iron and zinc. This limits the potential to absorb what small quantities of dietary zinc may be consumed and contributes to deficiency (11). The CotD modelling assumes that zinc bioavailability is moderate; if low bioavailability were used, a nutritious diet for a child under 2 would increase by 540 percent, much steeper than the overall increase of 25 percent at household level. This suggests that zinc is a crucial nutrient at all life cycle stages, but most challenging to provide in sufficient quantities for infants and young children.

Adding nutrient-dense foods could improve the micronutrient content of the complementary feeding diet. Recipes recommended in the book "Sustainable Undernutrition Reduction in Ethiopia", include a base of sorghum, fava beans and ghee (enriched recipe) with milk or egg (12). Dishes incorporating milk or eggs would meet at least a third of the daily requirements for energy, protein, fat, vitamins B_1, B_2, B_3, B_6, B_{12}, folic acid, iron and zinc. A costing exercise found that some of the enriched recipes would cost as much as twice more than a modelled nutritious diet for a child aged 12–23 months. Based on these recipes, covering the cost of just one complementary meal would require 12– 21 percent of the total daily household food budget for the poorest decile of the population.

In addition to promoting appropriate complementary feeding practices, providing improved access to nutritious foods through vouchers or in-kind, could reduce the cost of meeting nutrient needs for this age group. For example, providing a daily 10 g portion of locally produced egg powder, the equivalent of one egg[3], could reduce the cost to the household of a nutritious diet for a child aged 12–23-months by 31 to 39 percent, depending on the region.

5.

THE AVAILABILITY AND INTAKE OF NON-NUTRITIOUS PROCESSED FOODS IS INCREASING, ESPECIALLY AMONG CHILDREN AND ADOLESCENTS IN URBAN AREAS. THE REAL COST OF NUTRITIOUS DIETS WOULD BE HIGHER WHEN ENERGY-DENSE AND MICRONUTRIENT-POOR SNACK FOODS ARE FREQUENTLY CONSUMED.

Obesity and overweight prevalence are increasing faster than projected trends in Ethiopia. Eleven percent of adult women and 5 percent of adult men were overweight or obese according to the 2016 DHS, and these figures are expected to have increased (13). Just under half of all deaths in 2016 were caused by non-communicable diseases, estimated to cost the country ETB 31 billion (USD 810 million) in premature death and loss of productivity annually (14,15).

CotD modelling to estimate the impact of ultra-processed food and locally prepared snack foods consumption showed that if adolescent girls were consuming these foods regularly, it would cost up to 70 percent more to meet their nutrient requirements using local foods without exceeding average energy requirements. The same models run for school-aged children suggested that nutritious diet costs could increase by as much as 100 percent (results not shown). These findings lend evidence to support calls for safe, healthy and affordable snack food options, policy actions, and social behaviour change (SBC) to shift diets away from excess consumption of ultra-processed and fried and sugary snack foods sold at street vendors and markets (16,17).

[3] Portion sizes were selected to represent one whole egg (¬60g), based on published trials from Ecuador and Malawi in which one egg was provided per day to children in the complementary feeding period, with positive effects on nutrient intake (47–50).

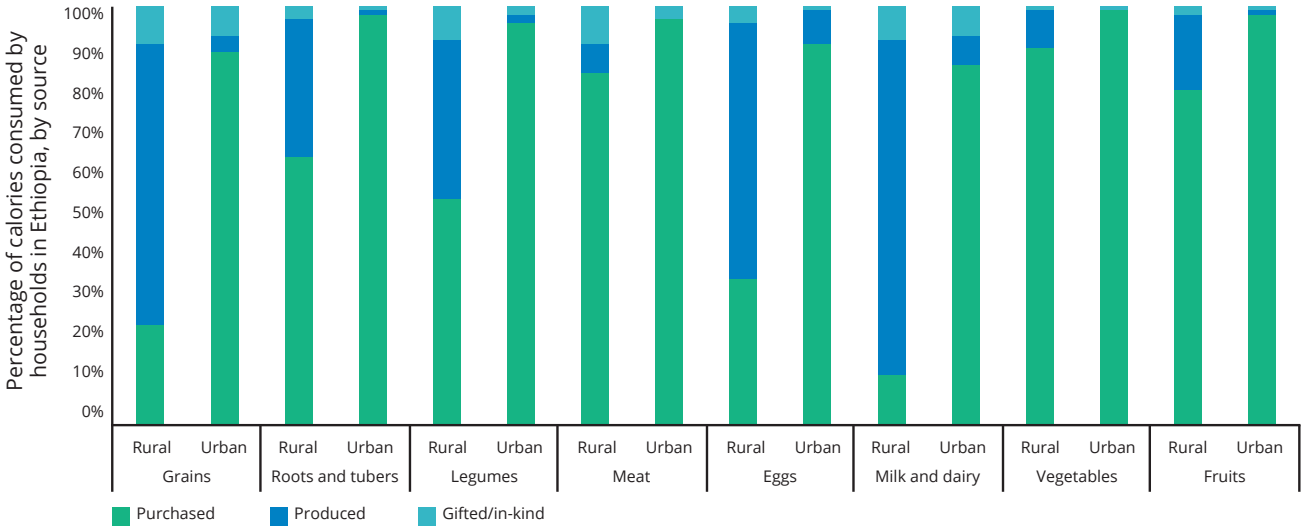
6.

HOUSEHOLDS MOSTLY DEPEND ON MARKETS FOR ACCESS TO FRESH, NUTRITIOUS FOODS SUCH AS VEGETABLES, FRUIT, AND MEAT, WHILST GRAINS ARE SOURCED FROM OWN PRODUCTION. PRICES OF THESE NUTRITIOUS FOODS HAVE INCREASED IN RECENT YEARS, WHILST GRAIN, SUGAR AND OIL PRICES HAVE DECREASED, MAKING ACCESS TO NUTRITIOUS DIETS MORE DIFFICULT.

Consumer price data shows that micronutrient-rich foods, including vegetables, legumes and meat, are subject to greater seasonal fluctuations in price compared to staple grains and oil (2). A recent IFPRI study showed that prices of nutrient-rich foods such as vegetables, dairy, meat and eggs, have increased in recent years, whilst prices of calorie-rich staple grains, sugar and oil have decreased (18), thus can be purchased at much lower prices per weight than nutritious foods.

Consumption data from the most recent socioeconomic survey suggests that most households in rural and urban areas access fresh, nutritious foods such as vegetables, fruit, meat and eggs, from markets (Figure 8) (4). In contrast, staple grains, eggs and dairy consumed were from own production in rural areas and from markets in urban areas (Figure 15). Given the high reliance on markets for access to many fresh, nutritious foods, and the low consumption of these foods (as presented in message 2), there is potential for interventions to strengthen markets' ability to supply these foods at more affordable prices.

Figure 8: Sources of calories consumed at household level by food group and area, national averages from the 2015–2016 Socioeconomic Survey (Central Statistical Agency of Ethiopia, 2017); authors' own calculations



7.

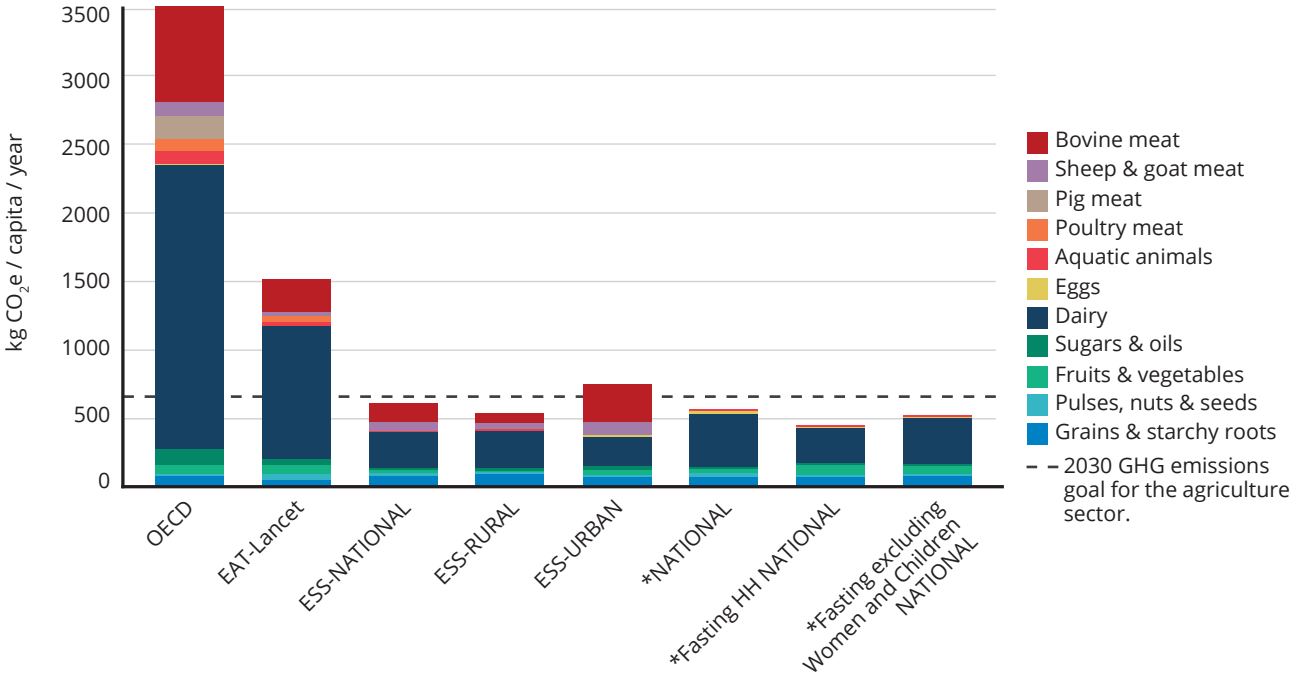
IMPROVING ACCESS TO NUTRITIOUS DIETS AND ASSOCIATED CHANGES TO CONSUMPTION PATTERNS CAN HAVE IMPLICATIONS FOR CLIMATE OUTCOMES AS WELL AS NUTRITION. ENABLING AND PROMOTING NUTRITIOUS, SUSTAINABLE, DIETS SHOULD BE A PRIORITY.

Ethiopia is faced with the challenge of up-scaling agricultural production to improve national diets yet there is a need to limit global greenhouse gas (GHG) emissions. The agricultural sector contributes 85 percent of Ethiopia's total emissions, 42 percent of which derives from livestock (19).

GHG emissions of the current Ethiopian diet are relatively low, especially when compared to the Organisation for Economic Co-operation and Development (OECD)[4] and the EAT-Lancet planetary health diets, which include larger amounts of dairy and bovine meat (Figure 9). Nevertheless, although current diets are below Ethiopia's 2030 goal for emissions from agriculture, they do not currently meet the nutritional needs of all. To achieve nutritional goals, consumption would need to be increased, including of animal source foods, which could increase GHG emissions. Figure 9 shows that the optimized diets, which meet nutrient needs, remain below the GHG emissions target, whereas the current urban diet (ESS Urban), which does not meet nutrient needs, is slightly above the GHG emissions target. The difference is explained to a large extent by the animal source foods that were selected for the optimized diet, which have lower GHG emissions than the bovine meat in the current diet. A recent study highlighted the fact that some countries would increase their food production emissions when adopting the EAT-Lancet planetary health diet, which reflects the fact that their current diets are inadequate to meet health goals. Ethiopia was among the countries where the adoption of such a diet would increase GHG emissions by over 50 percent (20).

[4] The "OECD diet" represents the average consumption patterns of high-income OECD countries.

Figure 9: Average per capita diet related GHG footprints for current diets and diet scenarios. Diets preceded by an asterisk (*) were optimized for nutrients and cost



8.

AGRICULTURAL PRODUCTION IS LARGELY FOCUSED ON STAPLES WHILST THE SUPPLY AND AVAILABILITY OF FRESH, NUTRITIOUS FOODS, SUCH AS FRUIT AND VEGETABLES, IS INSUFFICIENT. CURRENT LEVELS OF DOMESTIC PRODUCTION ARE NOT ABLE TO ADEQUATELY MEET THE NUTRIENT REQUIREMENTS OF A GROWING POPULATION.

Nationally, 72 percent of agricultural production (by weight) in 2017 was staple grains, roots and tubers, 9 percent animal source foods, 6 percent legumes, 6 percent oil crops and 5 percent was fruit and vegetables (21). Based on 2018 production, 38 g of vegetables and 21 g of fruit are available per capita per day across Ethiopia, a low amount compared to neighbouring countries such as Djibouti (194 and 73 g respectively) and Kenya (139 and 151 g respectively) (22). At regional level, fruit and vegetables account for fewer than 1 percent of daily calories produced, whilst staple grains, roots and tubers account for 85 percent on average (17). Although food production has generally increased in recent years, the focus has been on staple foods, whilst production diversity has decreased in the same period (23,24).

Recent analysis has shown that the production of macronutrients, including protein and energy, is adequate to meet the needs of the population. However, whilst the production of micronutrient-rich foods has improved in the past 25 years, it is still insufficient to meet the needs of the population for vitamin B12, vitamin A and iron (25). In the Somali and Afar regions, production levels are insufficient to meet caloric needs and households rely on food imports from other regions (17). Climate, geography and livelihoods could limit the potential to improve production in these areas.

9.

AGRICULTURAL PRODUCTION IS MOSTLY SMALL SCALE AND SUBSISTENCE BASED WITH LIMITED OPPORTUNITY FOR GROWTH AND DEVELOPMENT. ACCESS TO NUTRITIOUS DIETS COULD BE IMPROVED BY INNOVATIVE AGRICULTURAL PRACTICES, DIVERSIFIED PRODUCTION AND THE ADOPTION OF HIGH-QUALITY SEEDS AND BIOFORTIFIED AND FORTIFIED COMMODITIES.

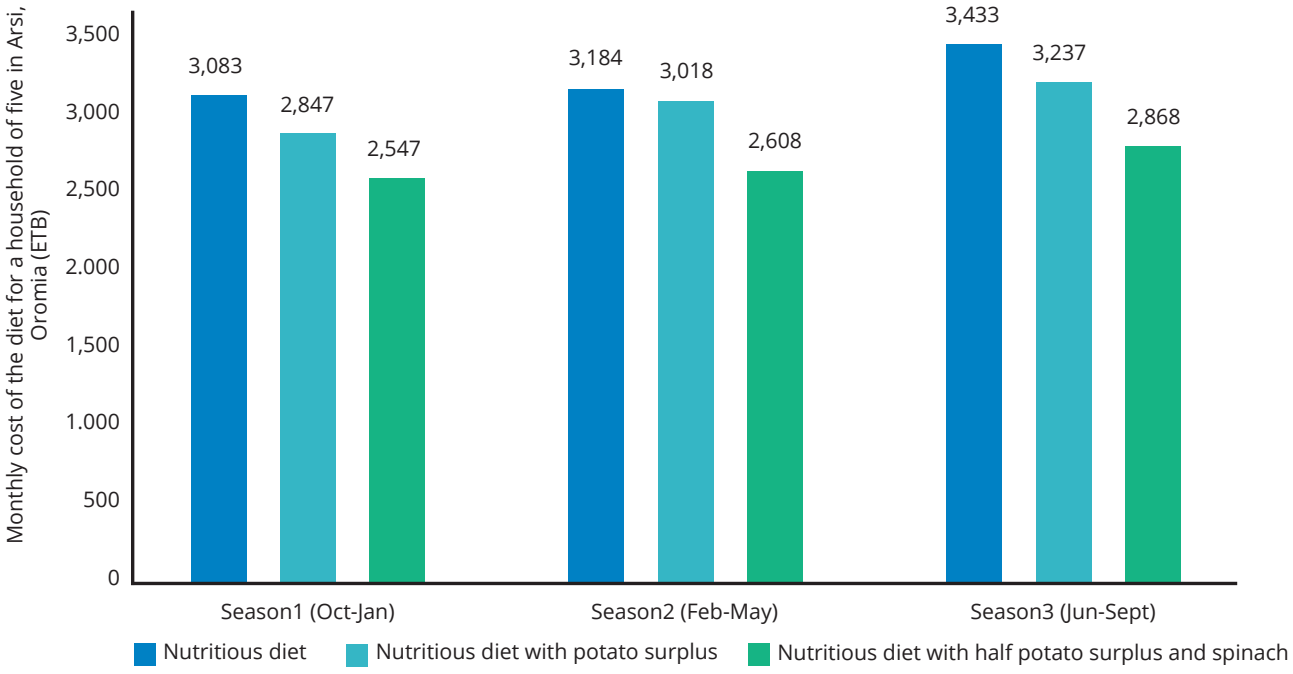
Almost three quarters of the Ethiopian workforce (72 percent) is employed in the agricultural sector, which contributes to 37 percent of gross domestic product (26). Ninety six percent is occupied by smallholder farmers (27) with average farm sizes of less than a hectare (26). These small family farms have limited access to technologies or inputs that could improve productivity. The majority of production is for subsistence with only 21 percent of produce sold (26). Although 43 percent of agricultural workers are women and 21 percent of farms are female-led, women's productivity is limited by small plots of land and low access to inputs, extension programmes and credit compared to male workers (28). Whilst there is great potential for improved productivity, opportunities to achieve this are limited, which has implications for national food supply (26,29). These difficulties highlight the dire need for equitable investment in smallholder production to improve availability of, and access to, nutritious food.

Projects aimed at improving production have shown that improved irrigation systems paired with high quality agricultural inputs, including training, improved seed varieties, appropriate pesticides and fertiliser use, can lead to a large increase in smallholder yields (30,31). For example, projects of the Second Agricultural Growth Project (AGP-II) spearheaded by the Ministry of Agriculture and Horticultural Livelihoods, Innovation and Food safety in Ethiopia (Horti-LIFE), provide support, advice and training to small scale farmers.

Horti-LIFE showed that an average increase in vegetable yields of 107 percent was associated with annual incomes of USD 3000–9000 per hectare (30). The project under AGP-II led to greater yields which could further support household consumption and generate more income. Modelling in CotD showed that surplus of a potato monocrop could reduce the household cost of the diet by 6 percent, whilst diversifying production to include spinach could lead to a 17 percent reduction in the cost (Figure 10) (32). Small home garden interventions were modelled but larger vegetable quantities would need to be produced to have a more substantial impact.

If nutrition sensitive approaches are adopted in such projects, nutrition could be improved via a number of avenues such as use of increased income for nutritious foods and health expenditures, home consumption of nutritious produce and improved local market availability of nutritious foods (33).

Figure 10: Monthly cost of a nutritious household diet with no intervention, if potato surplus (20 quintals) was kept for home consumption and if production was diversified with 10 quintals of potato and 2.5 quintals of spinach kept for home consumption (additional impact of income generation not included in model)



10.

INFRASTRUCTURE AND ACCESS TO MARKETS FOR SALE AND PURCHASE ALSO DETERMINE HOUSEHOLD ABILITY TO ACCESS NUTRITIOUS, DIVERSE DIETS. INVESTMENT IN ROAD NETWORKS, TRANSPORT AND MARKET FUNCTIONALITY COULD POSITIVELY IMPACT NUTRITION OUTCOMES.

There is a relationship between transport networks and market access which determines nutritious diet access (34). Nutritious diet cost estimates using the CotD were lowest in central areas of Ethiopia, where the Rural Access Index, a measure of access to all-seasons road, is higher, compared to other parts of the country (34). Access and proximity to transport infrastructure, populated areas, and health facilities are also associated with higher dietary diversity (35). In contrast, geographic elevation and low proximity to local markets were associated with lower dietary diversity (35). Improving national transport networks and market access are crucial for agricultural development. Poor access to markets and infrastructure can discourage efforts to commence new activities or improve agricultural productivity as farmers have little incentive to increase yields they cannot sell (36). This is especially the case for highly perishable foods or foods that are difficult to transport, including some fruits and vegetables, dairy, eggs and livestock, because of the lack of adequate infrastructure for movement and storage. The potential for agricultural area expansion in Ethiopia's densely populated highlands is limited and reaching its maximum, but, according to recently published evidence (37), western parts of Ethiopia could have high productivity potential if connectivity improved. When considering the potential of agricultural production to improve access to nutritious

diets, strengthening market linkages is crucial to enable producers to access markets and to increase the supply of nutritious foods to consumers, at a lower cost.

11.

LARGE-SCALE, POST-HARVEST FORTIFICATION COULD IMPROVE ACCESS TO VITAL NUTRIENTS THAT ARE LOW IN THE NATIONAL FOOD SUPPLY OR UNAFFORDABLE FOR MOST HOUSEHOLDS. BIOFORTIFICATION THROUGH IMPROVED SEEDS AND SOIL FERTILIZERS COULD ALSO IMPROVE NUTRIENT INTAKE.

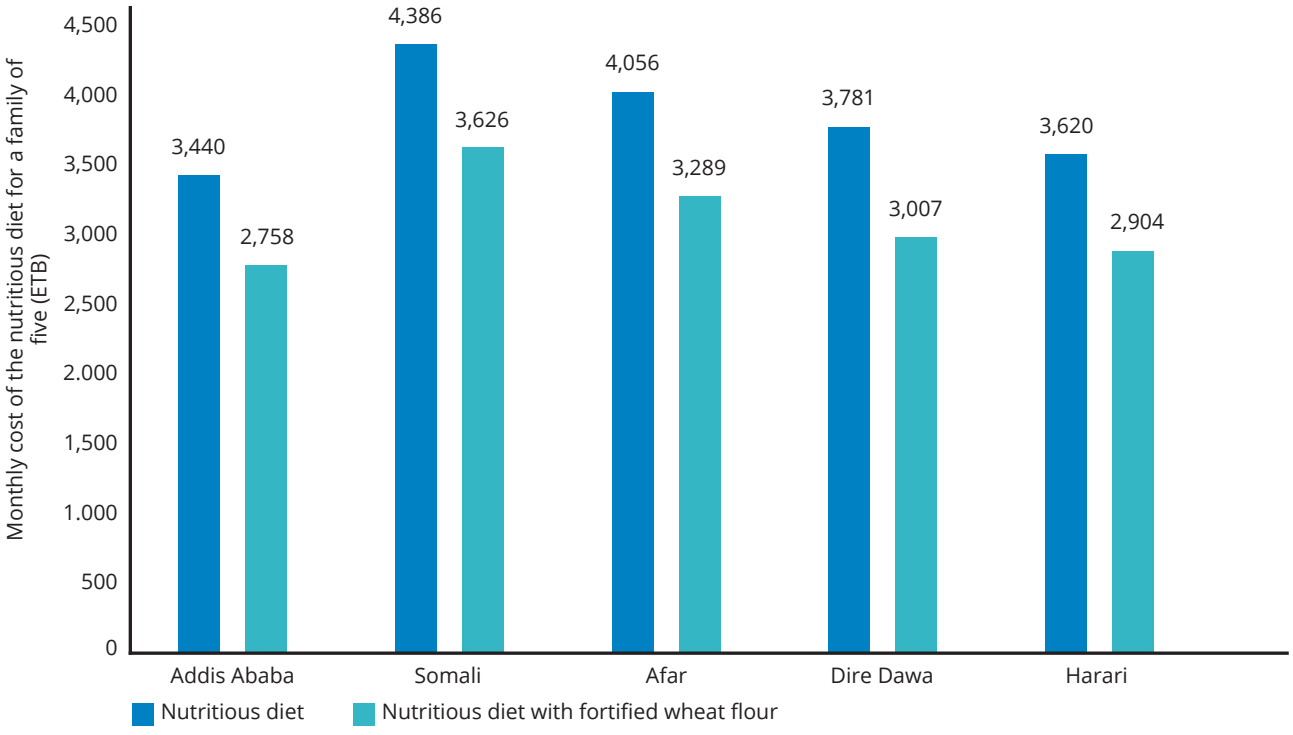
Post-harvest fortification and biofortification are food-based approaches to improving the nutrient content of local staple foods and can reduce the cost of meeting nutrient requirements (38).

Studies in Ethiopia have found that optimized fertilisers could increase the zinc quantity in teff by up to 36 percent, maize by 23 percent, rice by 7 percent and wheat by 19 percent (39,40). CotD analysis found that if households had access to maize with a 23 percent higher zinc concentration (at the same price as standard maize), the cost of meeting nutrient needs could be reduced by 14 percent in SNNP, 7 percent in Oromia and 8 percent in Benishangul-Gumuz.

Biofortified varieties of maize could contribute to meeting the requirements of individual micronutrients if used in place of standard staples. For example, if vitamin A biofortified maize were used to make injera (fermented flatbread), a half portion could cover 60 percent of daily vitamin A requirements for children under 2, and between 28 and 53 percent for other household members. Similarly, high zinc maize used in the same proportions could meet over 100 percent of daily zinc requirements for children and 85 percent of requirements for adolescent girls, adult men and pregnant and lactating women. Adding biofortified orange flesh sweet potato to bread recipes, currently promoted through a project by the International Potato Centre, would improve the content of vitamins A, C, and B6 and other micronutrients (41). Nutrient content would be further improved if consumption of sweet potato leaves were also promoted, increasing dietary diversity.

Another option for increasing the micronutrient content of staple foods is by adding micronutrients at the processing stage, i.e. post-harvest fortification. Whilst mandatory standards for wheat flour fortification are not currently in place, the Ministry of Trade and Industry has developed an optional profile for fortification premix. Depending on geographic location, if households had access to fortified wheat flour[5] through local markets, the cost of a nutritious diet could be reduced by as much as 20 percent (Figure 11). In addition to legislation to make such fortification mandatory or incentives to encourage voluntary fortification, support for the operationalisation of fortification and monitoring of adherence would be required for this intervention to have the intended impacts on nutrition.

Figure 11: Cost of a nutritious household diet if the household could access fortified wheat flour on the market (at the same price as non-fortified wheat flour)



[5] Fortifying premix profile from the Food, Beverage and Pharmaceutical Industry Development Institute of Ethiopia (FBPIDI).

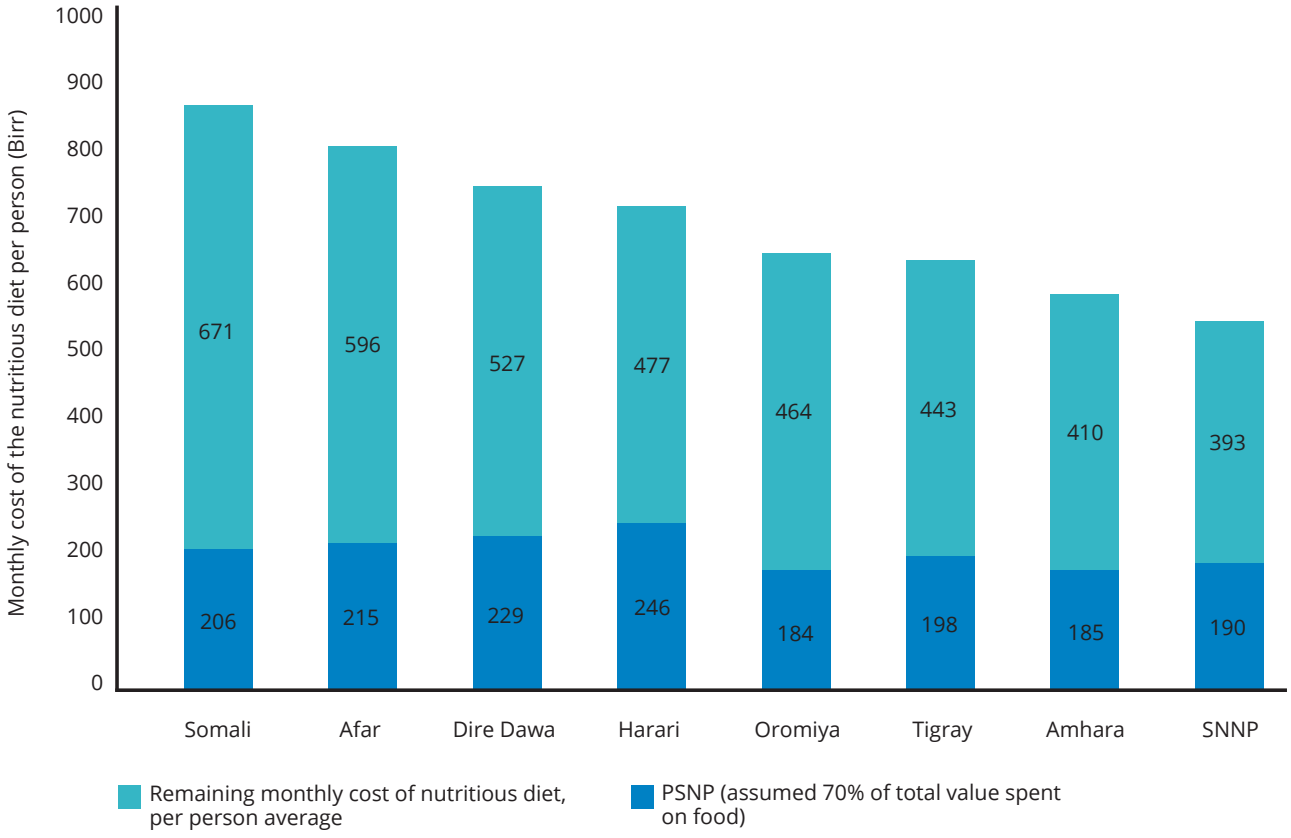
12.

POVERTY IS A BASIC CAUSE OF MALNUTRITION AND LIMITS ACCESS TO NUTRITIOUS DIETS. SHOCKS CAN SIGNIFICANTLY HAMPER PROGRESS TOWARDS POVERTY REDUCTION AND FURTHER LIMIT NUTRITIOUS DIET ACCESS. NUTRITION SENSITIVE SAFETY NETS COULD INCREASE RESILIENCE AND ACCESS TO NUTRITIOUS DIETS.

Shocks exacerbate the overall poverty and food insecurity of vulnerable population groups. In the past year, communities across Ethiopia have experienced multiple and simultaneous shocks, including the desert locust invasion, floods, drought, civil unrest and the COVID-19 pandemic. These shocks have led to lost livelihoods and income, increased food prices, reduced access to markets, and increased food insecurity. In Addis Ababa the COVID-19 pandemic was found to be associated with job and income losses, decreased access to transport and markets, a shift to cheaper sources of calories and a slight decrease in household dietary diversity (42). An updated CotD analysis using prices of food from Addis Ababa (January to May 2020) found that the cost of a nutritious diet increased over this same period.

Transformative cash transfer programmes, such as the Productive Safety Net Programme (PSNP), have been reported to improve nutritional outcomes at household level by allowing spending on nutritious foods, especially during shocks (43,44). Current PSNP values could cover an average of 30 percent of the cost of a nutritious diet (Figure 12) if provided as cash or vouchers for nutritious foods. It is recommended that such programmes be made nutrition sensitive by such actions as focusing on increasing production and availability of nutritious foods, improving household purchasing power, and utilizing social and behaviour change strategies to encourage consumption of nutritious foods (43,44). Coverage of nutrition interventions from other sectors should also be ensured, especially those targeting vulnerable groups (micronutrient supplementation, school meals, etc.). Regular monitoring of the cost and affordability of diets could assist in highlighting nutrient gaps and ensuring timely and appropriate responses during shocks.

Figure 12: Per capita cost of a nutritious diet per region and amount that would be covered by PSNP cash transfers



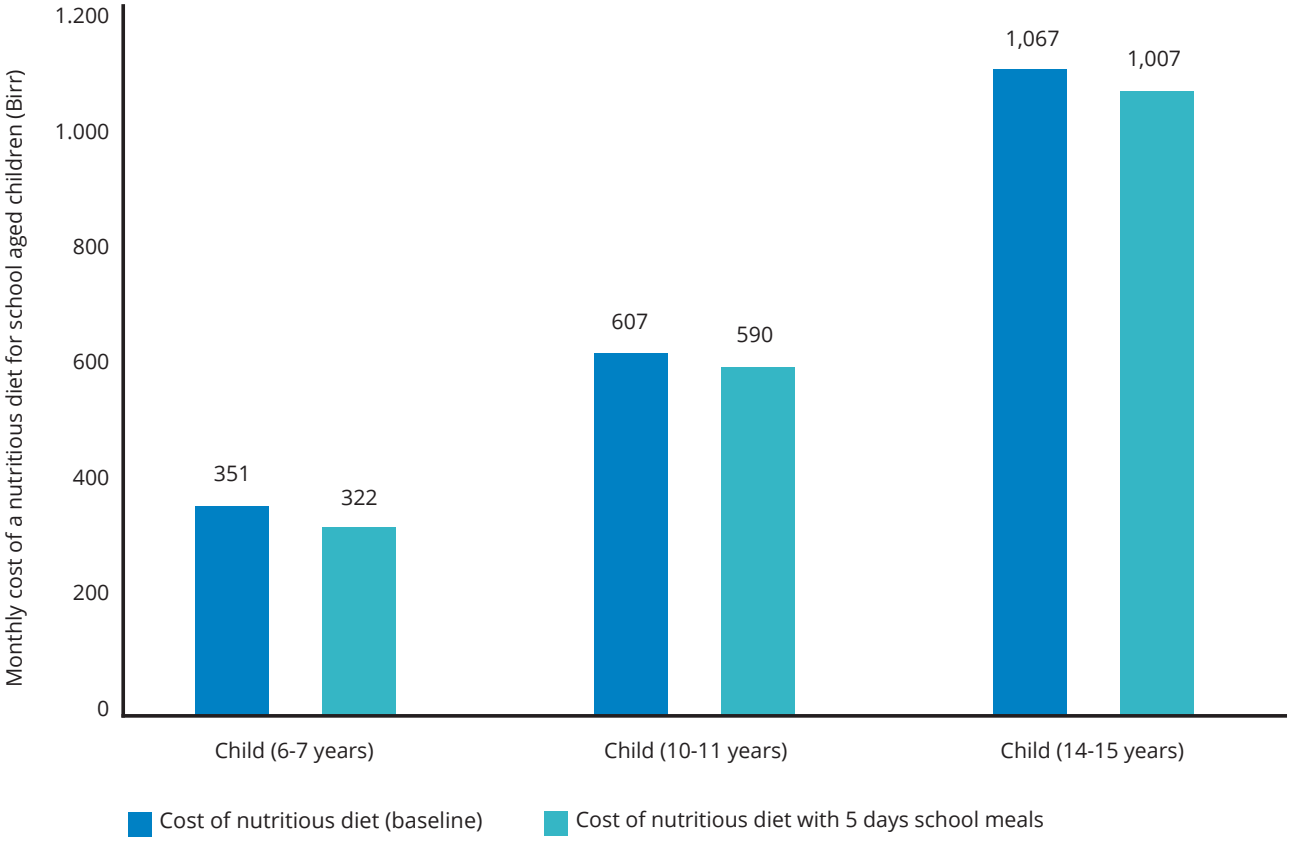
13.

SCHOOL MEALS HAVE THE POTENTIAL TO IMPROVE NUTRITIOUS DIET ACCESS FOR CHILDREN AND ADOLESCENTS. HOWEVER, MENUS NEED TO INCLUDE MICRONUTRIENT-DENSE FOODS.

Micronutrient deficiencies are prevalent among children across Ethiopia. Thirty six percent of school-age children are deficient in zinc, 11 percent in vitamin A and 9 percent have iron deficiency anaemia (45). These are indicative of poor diets in general, which are risk factors for a much wider range of nutrient deficiencies, including other limiting nutrients identified in the CotD analysis such as vitamin B_{12} and calcium. Limited data are available on micronutrient deficiencies during adolescence. However, it is expected that many adolescent girls also suffer from micronutrient deficiencies because of their high nutrient requirements and poor dietary quality and diversity. There is significant variation across Ethiopia in the proportion of adolescent girls attending secondary school and the proportion of 15–19 year old girls who are pregnant or have already had children (13). Adolescent pregnancy or childbearing tends to be higher in regions where secondary school attendance is lower (correlation coefficient -0.66, own calculation based on DHS 2016 data (46)).

School meal programmes are only implemented in some regions of Ethiopia, predominantly targeting children of primary school age. Modelling in CotD found that meals based on current menu guidelines[6] could reduce the cost of nutritious diets for children and adolescents, but only marginally due to the limited diversity and low inclusion of nutritious foods (Figure 22). Adding fresh, nutritious foods such as green vegetables, milk and eggs to school meals could dramatically increase the percentage of micronutrient requirements met for primary school children; for most nutrients at least 50 percent of requirements could be met through the addition of just two additional ingredients. For adolescent girls, however, interventions would be required to meet micronutrient targets. This could include the provision of further nutritious foods through school meal platforms if extended to include adolescent girls, or the provision of micronutrient supplements as discussed in message 3.

Figure 13: Cost to the household of a nutritious diet for children and adolescent girls without intervention and with 5 school meals per week, based on current school meal guidelines. (The small cost reduction indicates low nutritional value of the school meals)



[6] Current menus include options such as 1. Maize flour (100 g) and soya bean (25 g) porridge, 2. Cracked wheat (100 g) with haricot beans (30 g), 3. Rice (100 g) with haricot beans (30 g), and kale (10 g).

Stakeholder recommended priorities

During the series of virtual thematic workshops held in December 2020 and attended by the wider group of stakeholders involved in the FNG process, the main findings of the FNG analysis were shared and discussed with participants to formulate recommendations. During each of the three workshops, four virtual breakout rooms were facilitated to allow participants to identify priority areas of intervention and brainstorm ideas for possible actions and entry points. Based on the sector recommendations, the study team summarized the following prioritized interventions and activities by sector.

Sector	Priority	Possible actions	Relevant stakeholders
Health and Nutrition	Advocacy and education to bring about a change in mindsets from focusing on the need for kcals (energy) to the need for diets that are healthy and meet nutrient need.	• Advocacy and education based on the FNG findings and other information sources to encourage a change of mindset to stimulate behavioural change. • Incorporation of nutrition goals (based on nutritious diets) into government strategies and performance indicators. • Develop a social and behaviour change strategy • Incorporate SBC components in PSNP. • Incorporation of nutrition targets into school health policy.	• Private Sector • Media • High level decision makers (policy, budget, etc.)
	Demand creation for consumption of nutritious foods such as fruit and vegetables.	• Conduct formative research to inform future demand creation activities. • Plan SBC communication activities and other components across a range of entry points to encourage demand for nutritious foods, linking with media and private sector partners.	• Private sector • Agriculture • Media • NGOs
	Address increasing access to ultra-processed and unhealthy snack foods.	• Investigate possibility of introducing price controls for ultra-processed and unhealthy snack foods, including locally prepared foods (e.g. street vendors) whilst simultaneously making nutritious foods more accessible and affordable.	• Ministry of Health • Ministry of Education • Ministry of Trade and Industry • Legislators • Ethiopian Food and Drug Administration (EFDA) • Private sector • Academia
	Promotion of behaviours and actions that contribute to good nutrition.	• Prioritize region specific SBC messages focused on exclusive and continued breastfeeding and timely introduction of appropriate complementary foods. • Continue to prioritize WHO recommendations to exclude children and PLW from fasting, involving local religious leaders. • Finalize the national SBCC strategy and make sure the recommendation points are included and then make it operational. • Investigate novel entry points for reaching vulnerable groups such as adolescent girls with SBC messaging.	• Ministry of Health and regional Health Bureaus • Ministry of Education • NGOs • Academics • Religious leaders and organizations

Sector	Priority	Possible actions	Relevant stakeholders
Agriculture	Prioritize production of, and access to, nutritious foods.	• Revise horticulture products prioritized under government extension services. • Encourage crop diversification through extension services for mid and small-scale producers, including home and school gardens. • Support the establishment or scale-up of poultry production or horticulture within the proximity of schools to ensure supply of nutritious foods for school meals. • Ensure short dairy value chains and best practices around production of milk for school consumption. • Improve and increase agricultural extension services, including quality of training and number of trained staff. • Monitor effective implementation of the National Nutrition Sensitive Agriculture (NNSA) Strategy	• Purchasers' association • Markets • Schools via Ministry of Education • Ministry of Health
	Address issues of poor productivity in the agricultural sector, especially regarding nutritious food.	• Apply food systems assessment to explore bottlenecks across the regions and different agroecological zones (improved seeds, fertilizer, technology, mechanization, post-harvest technology, food safety regulations etc.).	• Policy makers • Donors • Private sector
	Promote climate smart agriculture.	• Assess needs and potential solutions for climate change resilient agriculture. • Incorporate feasible technologies and knowledge sharing into extension services.	• Ministry of Agriculture • Academics • NGOs
	Encourage increased participation and inclusion of women in agricultural production.	• Assess the needs of women farmers, especially smallholders, and the extent to which their needs are met by current services. • Scale up extension services and other activities targeting women farmers. • Encourage and support these farmers to produce diversified, nutritious foods.	• Ministry of Agriculture • NGOs • Women groups
Education	Improving the nutrient content of school meals.	• Cost interventions to improve content of school meals (e.g. diversification). • Include multiple micronutrient powders in school meals. • Consider use of fortified staples in school meals.	• Ministry of Health • Ministry of Education • School meals agency
	Improving nutrition knowledge.	• Improving nutrition knowledge through school curricula in collaboration with religious leaders.	• Schools • Ministry of Education • Religious leaders • NGOs
	Diversifying school meals.	• Implementing or scaling up school gardens by providing inputs to schools in the form of skills training, infrastructure, tools and seeds. • Procuring fresh nutritious foods for school meals from local producers (home-grown school feeding).	• Schools • Ministry of Health • Ministry of Agriculture

Sector	Priority	Possible actions	Relevant stakeholders
Social Protection	Actions to make the Productive Safety Net Programme (PSNP) more nutrition sensitive.	• Consider cost and affordability of nutritious diets when selecting transfer value and modality/content. • Actions to diversify diets of beneficiary households. • Introducing conditions that promote nutrition (e.g. fresh food vouchers). • Prioritize complementary interventions for households that include children under 2 years of age and pregnant and breastfeeding women to address stunting. • Target PSNP households with SBC.	• NGOs • Multisectoral offices • Ministry of Agriculture • Ministry of Labour and Social Affairs • Ministry of Health • Seqota Declaration coordination • Ministry of Education • Ministry of Women, Children and Youth • Nutrition Cluster • SUN movement platforms • Ministry of Peace/ National Disaster Risk Management Commission (NDRMC) • Food Security Cluster • Prioritization Committee
Private Sector	Encourage and support activities that would increase the availability of nutritious convenience and healthy snack foods.	• Consider the importance of convenience and time associated with food preparation.	• Ministry of Health • Ministry of Education
	Improve the micronutrient content of staple foods and pulses.	• Communicate evidence on the efficacy of fortification and biofortification from the global and national experience. • Consider the feasibility and benefits of introducing mandatory fortification of cereals and other staple foods to improve micronutrient content. • Encourage or introduce legislation to support the introduction and adoption of biofortified varieties of grains, pulses and other foods to increase their micronutrient content. • Support local multiplication and dissemination of seeds and inputs for production of biofortified foods. • Accelerate development of biofortified maize seed varieties and to scale up the use of vitamin A-rich orange flesh sweet potato.	• Ministry of Trade and Industry • Private sector • SUN • Supporting partners such as GAIN, Harvest Plus and CIP
	Encourage the local production of nutrient supplements and fortified special foods.	• Explore options for local production of iron and folic acid and multiple micronutrient supplements • Explore food based alternative product options, such as egg powder.	• Ministry of Trade and Industry
Infrastructure	Improve infrastructure related to access to, and provision of, power and water, including solar, to facilitate production, processing and transport of nutritious foods.	• Scale-up of existing interventions that have been successful, such as solar. • Improve access to and availability of clean water to enhance school meal hygiene and provide access to potable water.	• Transport and Roads Authority • Ministry of Water, Irrigation and Energy
	Improve infrastructure associated with markets and access to markets (transport, roads, cold chain, storage and facilities) in order to improve the availability of, and access to, nutritious foods and encourage/ increase demand for their production.	• Assess needs and feasibility for range of interventions (roads, storage, cold chain, etc.) • Advocate to government and donors for resources to improve infrastructure.	• Ministry of Finance • Ministry of Public Works • Government at federal and regional levels • Private sector • Donors

References

1. Ethiopian Public Health Institute, Ministry of Finance. The Cost of Hunger in Africa Implications for Growth and Transformation of Ethiopia. 2013.
2. Central Statistical Agency of Ethiopia. CPI Price Data, January 2017-August 2020. Addis Ababa; 2020.
3. FEWS NET. Ethiopia. Seasonal Calendar: Typical Year. 2013.
4. Central Statistical Agency of Ethiopia. LSMS-Integrated Surveys on Agriculture Ethiopia Socioeconomic Survey (ESS) 2015-2016 [Internet]. Report. Addis Ababa, Ethiopia; 2017. Available from: https://microdata.fao.org/index.php/catalog/1315/related-materials
5. Gelibo T, Amenu K, Taddele T, Taye G, Getnet M, Getachew T. Low fruit and vegetable intake and its associated factors in Ethiopia: A community based cross sectional NCD steps survey. Ethiop J Heal Dev. 2017;(31).
6. Baye K, Hirvonen K. Accelerating progress in improving diets and nutrition in Ethiopia. 2020;(June).
7. Zellelew TB. Meat abstinence and its positive environmental effect: Examining the fasting etiquettes of the Ethiopian Orthodox Church. Crit Res Relig [Internet]. 2014 Jul 9;2(2):134–46. Available from: https://doi.org/10.1177/2050303214535002
8. Vandevelde S, Minten B. Fasting, Food, and Farming Evidence from Ethiopian producers on the link of food taboos with dairy development. 2020;(April).
9. Ethiopian Public Health Institute. Ethiopia Mini Demographic and Health Survey [Internet]. Addis Ababa, Ethiopia; 2019. Available from: https://dhsprogram.com/methodology/survey/survey-display-551.cfm
10. Ethiopian Public Health Institute. Ethiopia National Food Consumption Survey. 2013.
11. Berhe K, Gebrearegay F, Gebremariam H. Prevalence and associated factors of zinc deficiency among pregnant women and children in Ethiopia: a systematic review and meta-analysis. BMC Public Health. 2019;19(1663):1–11.
12. Salasibew MM, Moss C, Ayana G, Kuche D, Eshetu S, Dangour AD. The fidelity and dose of message delivery on infant and young child feeding practice and nutrition sensitive agriculture in Ethiopia: A qualitative study from the Sustainable Undernutrition Reduction in Ethiopia (SURE) programme. J Heal Popul Nutr. 2019;38(1):1–11.
13. Central Statistical Agency of Ethiopia. Ethiopia Demographic Health Survey 2016 [Internet]. Addis Ababa, Ethiopia; 2016. Available from: https://dhsprogram.com/methodology/survey/survey-display-478.cfm
14. World Health Organisation and United Nations Development Programme. Prevention and control of noncommunicable diseases in Ethiopia The case for investment, including considerations on the impact of khat. 2019.
15. World Health Organization. Ethiopia Non-communicable Diseases (NCD) Country Profile, 2018. 2018. p. 1.
16. Trübswasser U, Baye K, Holdsworth M, Loeffen M, Feskens EJM, Talsma EF. Urban Food Environments through the Lens of Adolescents in Addis Ababa, Ethiopia [Internet]. Addis Ababa, Ethiopia; 2020. Available from: https://www.ifpri.org/publication/urban-food-environments-through-lens-adolescents-addis-ababa-ethiopia
17. Hirvonen K, Wolle A. Consumption, production, market access and affordability of nutritious foods in the Tigray Region of Ethiopia. Addis Ababa, Ethiopia; 2019.
18. Bachewe FN, Minten B. The rising costs of nutritious foods: The case of Ethiopia. 2019;(August).
19. Federal Democratic Republic of Ethiopia. Intended Nationally Determined Contribution (INDC) of the Federal Democratic Republic of Ethiopia. 2015;1–13. Available from: http://www4.unfccc.int/submissions/INDC/Published Documents/Ethiopia/1/INDC-Ethiopia-100615.pdf
20. Semba RD, de Pee S, Kim B, McKenzie S, Nachman K, Bloem MW. Adoption of the 'planetary health diet' has different impacts on countries' greenhouse gas emissions. Nat Food. 2020;1(8):481–4.
21. Food and Agriculture Organisation of the United Nations. FAOSTAT: Ethiopia Production Data 2017 [Internet]. FAOSTAT. 2017 [cited 2020 Dec 1]. Available from: http://www.fao.org/faostat/en/#home
22. Food Systems Dashboard. Food Environments [Internet]. Food Systems Dashboard. 2020 [cited 2020 Dec 18]. Available from: https://foodsystemsdashboard.org/countrydashboard
23. Baye K, Id KH, Dereje M, Remans R. Energy and nutrient production in Ethiopia, 2011-2015: Implications to supporting healthy diets and food systems. 2019;2011–5.
24. Berhane G, Minten B, Bachewe F. Chapter 3: Crop Productivity and Potential. Dorosh PA, Minten B, editors. Ethiopia's agri-food system: past trends, present challenges, and future scenarios/ edited by Paul Dorosh and Bart Minten. Washington D.C: IFPRI; 2020.
25. Geyik O, Hadjikakou M, Bryan BA. Spatiotemporal trends in adequacy of dietary nutrient production and food sources. Glob Food Sec [Internet]. 2020;24(June 2019):100355. Available from: https://doi.org/10.1016/j.gfs.2020.100355

26. Food and Agriculture Organization. Small Family Farms Country Factsheet. 2018.
27. Beyene A. State policies and questions of agrarian transformation. In: Beyene A, editor. Agricultural Transformation in Ethiopia: State Policy and Smallholder Farming [Internet]. 1st ed. Uppsala, Sweden: Nordic Africa Institute; 2018. Available from: http://www.diva-portal.org/smash/get/diva2:1256803/FULLTEXT01.pdf
28. The World Bank. Ethiopia Gender Diagnostic Report: Priorities for Promoting Equity. Washington D.C; 2019.
29. Biru WD, Zeller M, Loos TK. The Impact of Agricultural Technologies on Poverty and Vulnerability of Smallholders in Ethiopia: A Panel Data Analysis. Soc Indic Res [Internet]. 2020;147(2):517–44. Available from: https://doi.org/10.1007/s11205-019-02166-0
30. Ethiopian Ministry of Agriculture, SNV. Final report Horti-LIFE. Addis Ababa, Ethiopia; 2019.
31. The World Bank. In Ethiopia, Water + Seed + Fertilizer + Know-How= Improved Yield, Changed Lives [Internet]. Second Agricultural Growth Project (AGP II). 2019 [cited 2020 Dec 1]. Available from: https://www.worldbank.org/en/news/feature/2019/08/12/in-ethiopia-water-seed-fertilizer-know-how-improved-yield-changed-lives
32. The World Bank. In Ethiopia, Water + Seed + Fertilizer + Know-How = Improved Yield, Changed Lives. Second Agricultural Growth Project (AGP II). 2019.
33. Ruel MT, Quisumbing AR, Balagamwala M. Nutrition-sensitive agriculture: What have we learned so far? Glob Food Sec. 2018;17(September 2017):128–53.
34. The World Bank Group. Measuring Rural Access: Using New Technologies. [Internet]. Washington DC; 2016. Available from: https://openknowledge.worldbank.org/handle/10986/25187
35. Mekonnen DA, Talsma EF, Trijsburg L, Linderhof V, Achterbosch T, Nijhuis A, et al. Can household dietary diversity inform about nutrient adequacy? Lessons from a food systems analysis in Ethiopia. 2020;(Mdd).
36. Tilahun H, Schmidt E. Spatial Analysis of Livestock Production Patterns in Ethiopia. 2012;
37. Schmidt E, Thomas TS. Cropland Expansion. In: Dorosh PA, Minten B, editors. Ethiopia's Agrifood System Past Trends, Present Challenges and Future Scenarios [Internet]. Washington, D.C.; 2020. p. 485. Available from: http://ebrary.ifpri.org/utils/getfile/collection/p15738coll2/id/133982/filename/134194.pdf
38. Cakmak I, Kutman UB. Agronomic biofortification of cereals with zinc: a review. Eur J Soil Sci. 2018;69(1):172–80.
39. Joy EJM, Stein AJ, Young SD, Ander EL, Watts MJ, Broadley MR. Zinc-enriched fertilisers as a potential public health intervention in Africa. Plant Soil. 2015;389(1–2):1–24.
40. Haileselassie B, Bedadi B, Kidanu S, Mamo T. Effect of Zinc Containing Fertilizers on Yield and Grain Quality of Tef [(Eragrostis Tef (Zucc .) Trotter] in some Soils of Tigray Region, Ethiopia. Ethiop J Agric Sci. 2018;28(2):23–35.
41. International Potato Center. Quality Diets for Better Health in Ethiopia. 2019;2018–9.
42. Hirvonen K, Abate GT, Brauw A De. Food and nutrition security in Addis Ababa, Ethiopia during COVID-19 pandemic. 2020;(May).
43. Irenso AA, Atomsa GE. Implications of ethiopian productive safety net programme on household dietary diversity and women's body mass index: A cross-sectional study. Food Nutr Res. 2018;62(3):1–11.
44. Baye K, Retta N, Abuye C. Comparison of the effects of conditional food and cash transfers of the Ethiopian Productive Safety Net Program on household food security and dietary diversity in the face of rising food prices: Ways forward for a more nutrition-sensitive program. Food Nutr Bull. 2014;35(3):289–95.
45. Ethiopian Public Health Institute. Ethiopian National Micronutrient Survey Report. 2016.
46. Agency CS. Demographic Health Survey 2016. 2016.
47. Lutter CK, Caswell BL, Arnold CD, Iannotti LL, Maleta K, Chipatala R, et al. Impacts of an egg complementary feeding trial on energy intake and dietary diversity in Malawi. Matern Child Nutr. 2020;(February):1–11.
48. Iannotti LL, Lutter CK, Stewart CP, Riofrío CAG, Malo C, Reinhart G, et al. Eggs in early complementary feeding and child growth: A randomized controlled trial. Pediatrics. 2017;140(1).
49. Prado EL, Maleta K, Caswell BL, George M, Oakes LM, Debolt MC, et al. Early Child Development Outcomes of a Randomized Trial Providing 1 Egg per Day to Children Age 6 to 15 Months in Malawi. J Nutr. 2020;150(7):1933–42.
50. Lutter C, Caswell B, Arnold C, Iannotti L, Prado E, Maleta K, et al. The Effect of Providing Eggs Early in Complementary Feeding on Energy Intake and Dietary Diversity: The Mazira Project Randomized Controlled Trial. Curr Dev Nutr. 2020;4(Supplement_2):863–863.

Acronyms

AGP II	Second Agricultural Growth Project
BCC	Behaviour Change Communication
BMC	British Medical Journal
CLF	Center for a Livable Future at Johns Hopkins University
COVID-19	2019 Novel Coronavirus
CPI	Consumer Price Index
CSA	Central Statistical Agency
DHS	Demographic Health Survey
EPHI	Ethiopian Public Health Institute
ESS	Ethiopia Socioeconomic Survey
ETB	Ethiopian Birr
FEWS NET	Famine Early Warning Systems Network
GAIN	Global Alliance for Improved Nutrition
GDP	Gross Domestic Product
GHG	Greenhouse gases
HCES	Household Consumption and Expenditure Survey
Horti-LIFE	Horticultural Livelihoods, Innovation and Food safety in Ethiopia
IFA	Iron and folic acid (supplements)
IFPRI	International Food Policy Research Institute
LSMS	Living Standard Measurement Study
MMT	Multiple micronutrient tablets
NCD	Non-communicable diseases
NNP	National Nutrition Policy and Nutrition Programme
NNSA	National Nutrition Sensitive Agriculture
OECD	Organisation for Economic Co-operation and Development
PLW	Pregnant and lactating women
PSNP	Productive Safety Net Program
SBCC	Social and Behaviour Change Communication
SNNP	Southern Nations, Nationalities, and People's Region
UN	United Nations
UNICEF	United Nations Children's Fund
USD	United States Dollar
WFP	United Nations World Food Programme
WHO	World Health Organization

Contributors

The Ethiopian Public Health Institute under the Ministry of Health, with particular thanks to Andinet Abera Hailu, Dr. Aregash Samuel, Tesfaye Zeru, Dr. Masresha Tessema and Tibebu Moges; the Center for a Livable Future at Johns Hopkins University, with particular thanks to Brent Kim; the Systems Analysis for Nutrition team at the WFP HQ Nutrition Division, with particular thanks to Frances Knight, Claudia Damu, Neil Mirochnik, Dr. Saskia de Pee, Nora Hobbs and Jane Badham; the WFP Ethiopia Country Office team, with particular thanks to Filippo Dibari and Zebiba Ayenew. Donors supporting this analysis are KFW, German Cooperation, and USAID.

Photo Credits

Cover page: Ethiopian Public Health Institute
Photo page 4: WFP/Michael Tewelde
Photo page 5: WFP/Kiyori Ueno
Photo page 6: WFP/Michael Tewelde
Photo page 9: WFP/Michael Tewelde
Photo page 11: WFP/Petterik Wiggers
Photo page 12: WFP/Petterik Wiggers
Photo page 25: WFP/Kiyori Ueno

Nutrition Division (OSN)
World Food Programme
Via Cesare Giulio Viola, 68/70
00148, Rome, Italy - T +39 06 65131
wfp.org

This Fill the Nutrient Gap Analysis was funded by:

german cooperation
DEUTSCHE ZUSAMMENARBEIT

KFW

USAID
FROM THE AMERICAN PEOPLE