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Fill the nutrient Gap

Zambia

FULL REPORT

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Fill the Nutrient Gap Zambia Full Report

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Photos: WFP/Sophie Smeulders, WFP/Paul Mboshya, WFP/Archives

List of Figure Acronyms

CotD	Cost of the Diet
CPI	Consumer Price Index
DHS	Demographic and Health Surveys
ECD	Early Childhood Development
FAO	United Nations Food and Agricultural Organization
FBF	Fortified blended flours
FNG	Fill the Nutrient Gap
FSP	Food Security Pack
GLV	Green leafy vegetables
IFA	Iron/folic acid
IYCF	Infant and Young Child Feeding
LNS	Lipid-based nutrient supplements
MCDP II	First 1,000 Most Critical Days Programme
MEB	Minimum Expenditure Basket
MNP	Micronutrient Powder
NFNC	National Food and Nutrition Commission
SAN	Systems Analysis for Nutrition
SBC	Social and behaviour change
SOFI	State of Food Security and Nutrition Report
WFP	World Food Programme
WHO	World Health Organization
ZMW	Zambian Kwacha

Executive Summary

Background: The Fill the Nutrient Gap Analysis was led by the National Food and Nutrition Commission (NFNC) and supported by the World Food Programme (WFP). It estimated the lowest cost of a nutritious diet and the proportion of households able to afford that diet in the lean and non-lean seasons for each province of Zambia. Diet costs were calculated for a household consisting of five individuals across the life cycle. The analysis modelled various interventions for their potential impact on cost and affordability of a nutritious diet, enabling comparison between the potential benefits of programmes and policies aimed at improving nutrition outcomes.

The economic barrier to adequate nutrition is high: Over half the population of Zambia (53 percent) could not afford the lowest cost nutritious diet. This diet, covering macronutrient and micronutrient needs, costs on average 33 Zambian Kwacha (ZMW) per five person household per day, three times as much as a diet meeting only energy needs. In rural provinces such as Western and Northern, a third of households could not afford a diet covering only energy needs, and more than three quarters could not afford a nutritious diet. Food price inflation has increased the cost of the diet in the past 18 months and has created additional barriers to household access to nutritious diets. Since 2019, the proportion of households that would not be able to afford a nutritious diet has increased from 44 percent to 54 percent.

Targeted interventions can improve nutrient intake for all vulnerable individuals: Pregnant and lactating women, adolescent girls, and children under 2 are the most nutritionally vulnerable individuals within a household. Targeted interventions for each of these individuals can reduce their nutritious diet cost by 20–40 percent, depending on target individual and type of intervention and can fill essential micronutrient gaps. Suboptimal breastfeeding and unhealthy snacking increase the cost of the diet. This highlights the importance of a behaviour change strategy that goes beyond promotion of infant and young child feeding. Consumers need to be nudged to demand, and producers and retailers to supply, healthy and nutritious foods. Meanwhile, nutrition-specific interventions such as iron-folic acid tablets should be provided, as well as age-appropriate nutritious foods to those who cannot afford them.

Multisectoral action is required to accelerate prevention of malnutrition: Targeted nutrition specific interventions need to be complemented by actions that reduce the cost of nutritious foods and improve household income. The analysis found that the cost of the diet can be significantly reduced by a combination of interventions across sectors, such as micronutrient supplementation, social protection transfer packages, livelihood support programmes, and free nutritious school meals. When combined with support for income-generation, packages of multisectoral interventions can most effectively reduce non-affordability of the nutritious diet.

Recommendations based on FNG findings

1. Appropriate funding for the Home-Grown School Meals strategy should support expansion to adolescents and promote production of nutritious foods at school level.

2. Homestead food production needs to be diversified through increased production of nutritious foods (including horticulture, livestock and/or fish farming) and improve linkages between producers and markets to increase availability and stabilize prices of nutritious foods.
3. Policy discussion to support commercial fortification of maize and other products needs to be strengthened.
4. Coverage of current social safety nets should be expanded, specifically scaling up cash transfers to households with children under 2, and Food Security Packs to support farming households in producing fresh, nutritious foods.
5. Continue support for improved infant and young child feeding.

Introduction to Fill the Nutrient Gap (FNG)

The effects of malnutrition are globally recognized as being devastating and far-reaching. Malnutrition in Zambia takes many forms and is widespread. Despite concerted efforts it remains a major public health concern. Micronutrient deficiencies are common among children and pregnant and breastfeeding women. Anaemia has remained high at 41 percent of pregnant women, 28 percent of breastfeeding women and 58 percent of children under five(DHS, 2018) Overweight and obesity rose from 13 percent in 2002 to 23 percent in 2014, suggesting that the triple burden of malnutrition – the co-existence of chronic malnutrition, micronutrient deficiencies and overnutrition – is becoming an increasing concern (Moise et al., 2019). There are glimmers of hope: between 1992 and 2018 the national prevalence of stunting fell to 35 percent, though with significant disparities between provinces, ranging from 46 percent in Northern Province to 29 percent in Western Province(DHS, 2018).

In the past decade the government of Zambia has made progress in integrating nutrition objectives into multisectoral policy[1]and different government ministries have begun including nutrition as an objective in their respective policies(Ministry of National Development Planning, 2017). It is imperative that national stakeholders and champions now have access to evidence, data, and advocacy tools for the further advancement and integration of nutrition so that past gains are not lost and nutrition remains a national priority.

FNG in Zambia: Purpose

The overarching objective of the Fill the Nutrient Gap (FNG) analysis was to bring stakeholders together to identify and prioritize context-specific policies and programmes across different sectors aimed at improving nutrition among target groups across the lifecycle. The FNG process was initiated to support the objectives set forth by the First 1,000 Most Critical Days Programme (MCDP II), a multisectoral initiative coordinated by the National Food and Nutrition Commission (NFNC). The aim of the analysis was to identify and analyse entry points for interventions within the scope of ongoing MCDP II programmes and Zambian government policy, and to support expansion or implementation of those programmes with evidence-based advocacy messages.

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 2013 Lancet series on maternal and child undernutrition identified a variety of nutrition interventions that have proven effective. Successfully improving nutrition outcomes depends on interventions being tailored to the local context.

FNG is an analytical process comprised of a secondary literature review in combination with Cost of the Diet (CotD) linear optimization to understand the availability, cost and

[1] The Seventh National Development Plan (7NDP) identifies nutrition as a critical factor for social and economic development; the National Food and Nutrition Strategic Plan (NFNSP) focuses on multisectoral action to reduce stunting by 25% in target districts by 2022. (From the Proposal to Support Implementation of the First 1000 Most Critical Days Programme (MCDP) II)

affordability of a nutritious diet. This process – applying the CotD findings to contextual analysis and intervention modelling - is dedicated to identifying and prioritizing the scaling up of proven interventions that are most likely to be effective in a given setting.

This report presents findings from the analysis and a discussion of its process, methodology and limitations. It highlights the recommendations and priorities for advocacy messages identified by stakeholders. By identifying and contextualizing new findings, the FNG analysis contributes towards building consensus around a vision and a path forward for sustainable improved nutrition in Zambia.

FILL THE NUTRIENT GAP: SITUATION ASSESSMENT FOR MULTISECTORAL DECISION MAKING ON THE PREVENTION OF MALNUTRITION

The two direct causes of malnutrition are inadequate nutrient intake and disease. The FNG assessment focuses on gaps in nutrient 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 on nutrition 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 systems.

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 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

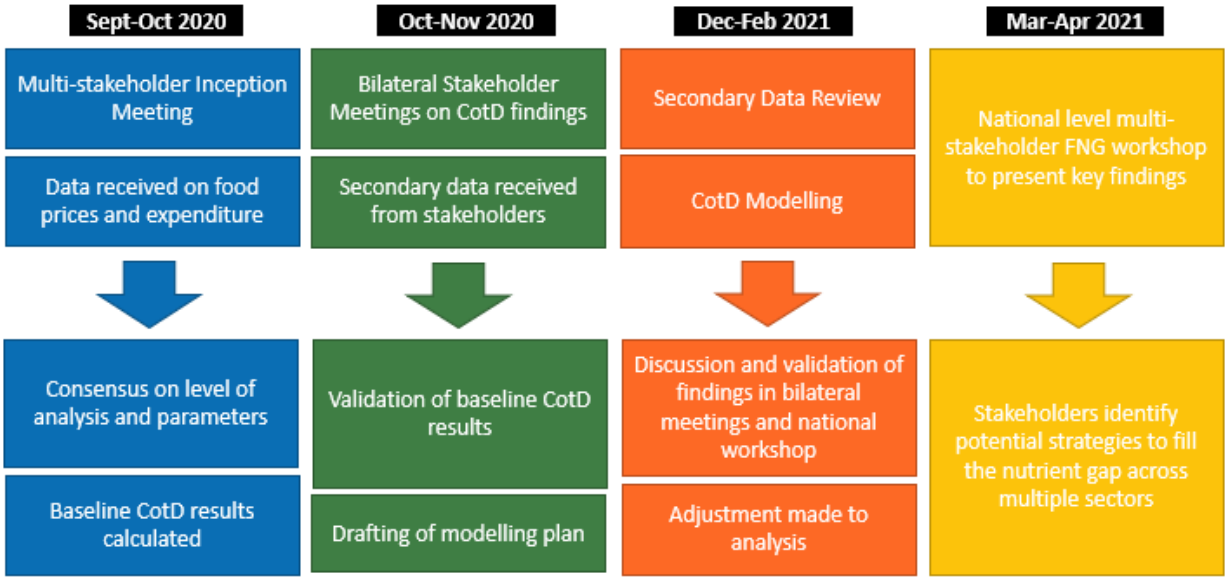
Process of the FNG analysis in Zambia

The FNG process in Zambia was led by the NFNC with WFP providing technical assistance. FNG analysis was informed by guidance and input from secondary data sources, CotD modelling, and the development of recommendations by stakeholders, specifically:

1. Civil Society Organization-Scaling Up Nutrition (CSO-SUN)
2. FAO
3. IFAD
4. Indaba Agricultural Policy Research Institute (IAPRI)
5. Ministry of Education
6. Save the Children
7. SUN Learning and Evaluation
8. The Ministry of Agriculture
9. The Ministry of Community Development and Social Services
10. The Ministry of Health
11. The Ministry of Livestock and Fisheries
12. UNICEF
13. University of Zambia
14. USAID

The process started in October 2020 with meetings between WFP and the NFNC, government, NGOs, UN agencies and other development partners. To define the focus, stakeholders established consensus on the analysis and identified ongoing and potential interventions for modelling during the inception workshop in November 2020. The FNG team then conducted preliminary analysis and validated findings with stakeholders in the first half of March 2021. Revisions to the analysis with intervention modelling were completed and final results presented at a dissemination workshop at the end of March 2021. During this workshop, stakeholders developed recommendations based on FNG main findings (**Error! Reference source not found.**).

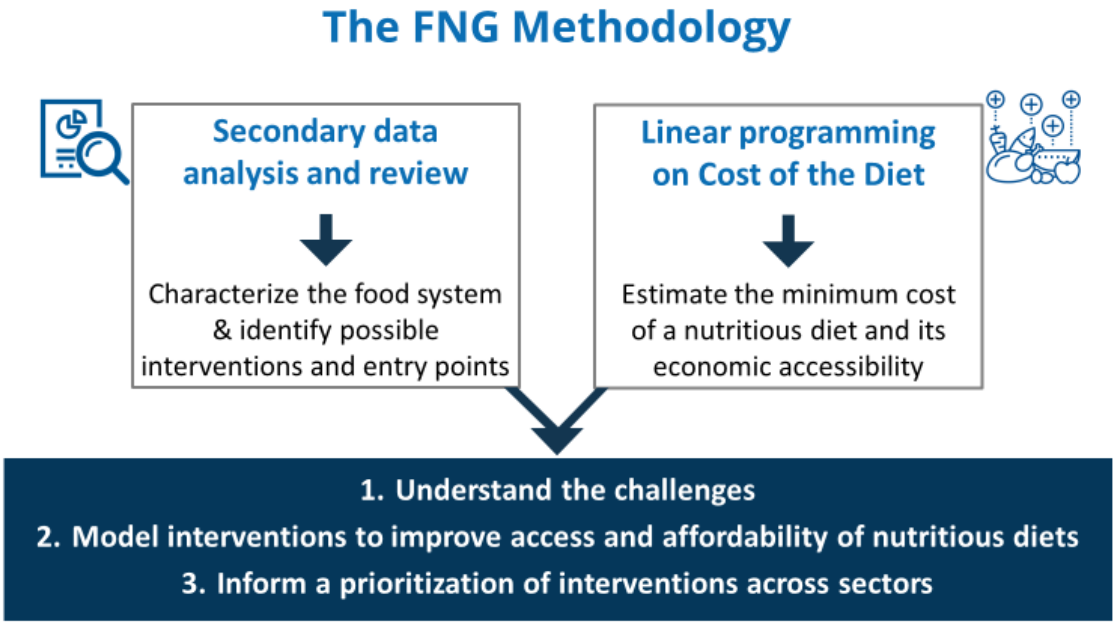
Figure 1: Stakeholder engagement timeline and process for the FNG Zambia.



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 (Figure 2). CotD analysis uses linear optimization to provide a detailed look at availability, cost and affordability of nutritious diets.

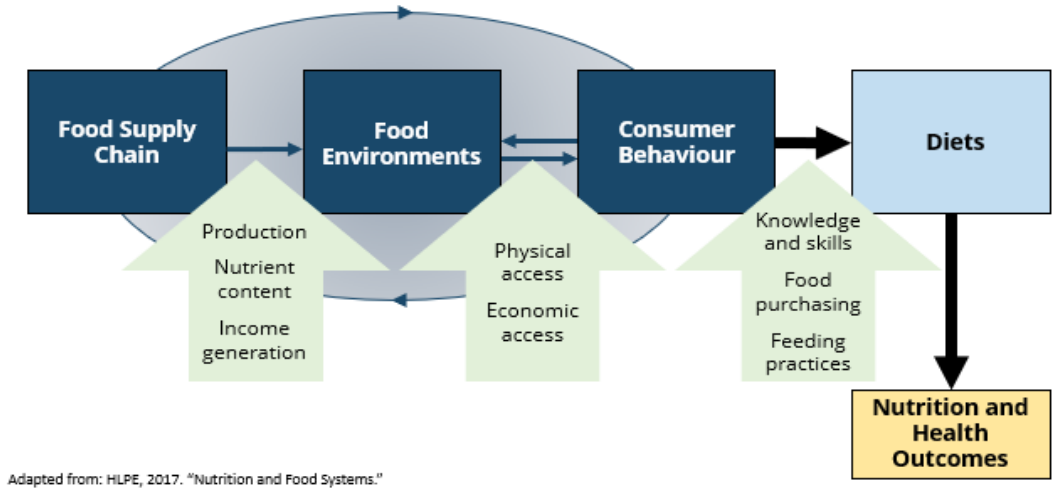
Figure 2: FNG analytical framework.



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. Long-term solutions to malnutrition require transformation of the food system along food supply chains, food environments and consumer behaviour patterns (Figure 3).

Figure 3: Food systems for diets and nutrition and health outcomes framework. (adapted from HLPE 2016)



Cost of the Diet (CotD)

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[2]. 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[3]. 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 State of Food Insecurity (SOFI) report (see also 4). For discussion of similarities and differences in methodology, please refer to the full report.

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 (Figure 4), which includes foods from several food groups and has greater diversity within food groups.

Levels of dietary quality: interpretation of the cost of the nutritious diet

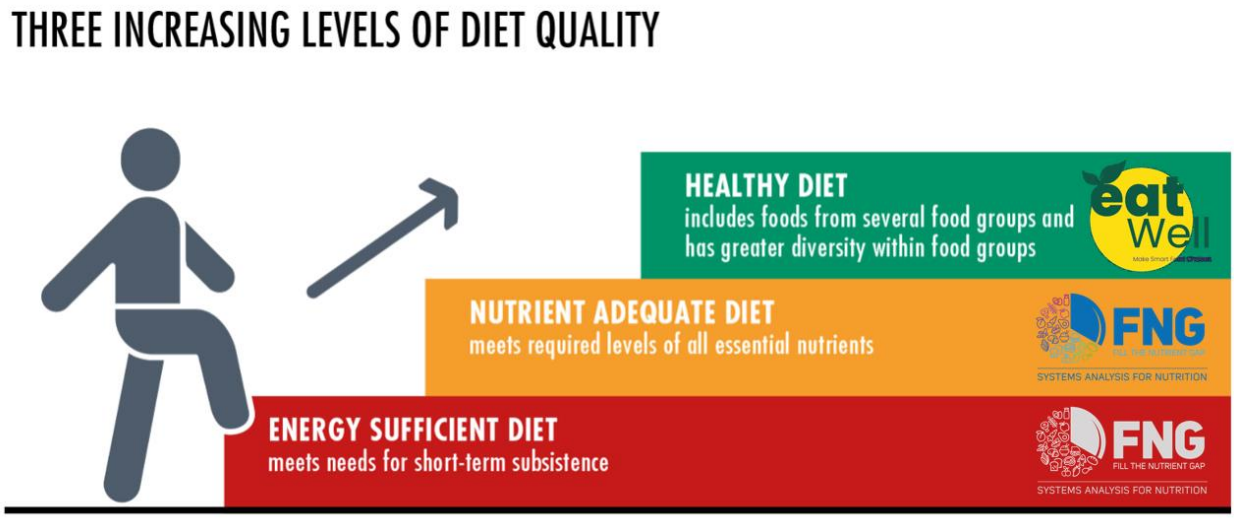
The quality of diets can be roughly categorized into three increasing levels: the energy sufficient diet, the nutritious or nutrient adequate diet, and the healthy diet (Figure 4). The energy sufficient diet just provides sufficient calories but lacks vitamins and minerals that are required for many bodily functions including protection against disease and is therefore just calculated to compare the cost of the two other diets against. A nutritious (FNG terminology, including 11 micronutrients) or nutrient-adequate (SOFI terminology, including 20 micronutrients) diet provides adequate calories and nutrients[4], and the healthy diet intends to meet all nutrient needs and prevent all forms of malnutrition through consumption of adequate amounts of a balanced variety of healthy, nutritious foods from all major food groups (as per food based dietary [FBDG] guidelines).

The FNG methodology for calculating the cost of the nutritious diet uses linear optimization to find the combination of foods which meets energy and micronutrient needs at the lowest possible cost, and therefore does not take into account food diversity, local food preferences, and desirability of the diet—specifically, this diet does not consider whether

[2] As defined by the Food and Agricultural Organization (FAO) and the World Health Organization (WHO).
[3] 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 and vary from context to context, e.g. raw meat during pregnancy in some parts of the world.
[4] A nutritious diet is similar to the nutrient-adequate diet, reflecting the needs of a five person household across the lifecycle, whereas the nutrient-adequate diet calculated in the SOFI report is based on average dietary needs, using an adult women as reference group.

the combination of foods would create realistic recipes, or whether the foods could feasibly be purchased in the portions estimated for the diet. Because of the constraints set by cost optimization, the lowest cost nutritious diet is less expensive than the lowest cost healthy diet. It should be considered an economic benchmark rather than a cost estimate of consumption of a nutritious, healthy diet.

Figure 4: Adapted from State of Food Insecurity (SOFI) Report 2020.



The cost of the nutritious diet is often compared to other diet metrics. At the time of the FNG analyses, research was on-going in estimating the cost of a minimum expenditure basket by WFP and UNHCR. Also in 2021, FAO and the University of Zambia were conducting analyses in estimating the cost of healthy diet. Although each of these diets can be costed, they are not directly comparable. Table 1 describes the differences amongst these three methods.

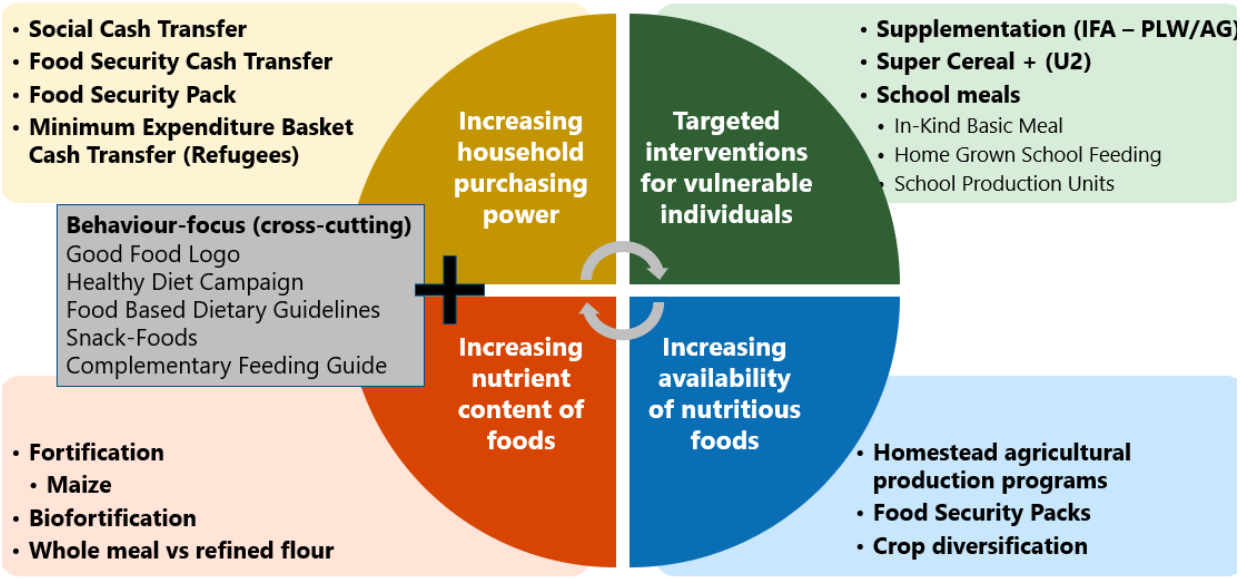
Table 1: Comparison of MEB, Least Cost Nutrient-Adequate Diets, and Food-based Dietary Guidelines Diets.

	Food Minimum Expenditure Basket	**Least Cost Nutritious Diet ("nutritious diet")**	**Food-based dietary guidelines diet ("healthy diet")**
Individuals considered	5 individuals, based on 2100 kcal/requirement	5 individuals, based on individual energy and micronutrient requirements	General population, persons aged 2-65 years
How value is determined:	By accessing the amount households spend to access a diet with acceptable food consumption and no crisis/emergency coping adoption	By calculating the minimum cost of meeting micronutrient needs (micronutrient adequacy)	By considering the amount of various foods which are likely to micronutrient needs based on dietary diversity and local food practices
Interpretations	Based on existing data on household expenditure, households must spend the MEB value to have adequately	Based on existing food prices and micronutrient needs, households must spend at least the value of least-cost nutritious diet to	Based on local practices and food diversity goals, the FBDG guidelines provide a healthy diet.Households should consume diets based

	diverse food consumption and not have to employ coping strategies.	meet energy and micronutrient needs.	on the FBDGs to meet their micronutrient needs.

Scope of intervention modelling: All interventions modelled in the FNG analysis were defined and approved by stakeholders. The focus of the modelling was defined at the initiation of the FNG, based on priorities defined by the MCDP II, the Zambia WFP Country office, and engagements with NGOs, civil society, line ministries, and UN partners. To identify concrete recommendations based on analyses, the FNG process concentrated on modelling the interventions outlined in Figure 5:

Figure 5: Entry points and interventions modelled to estimate reduction in cost of a nutritious diet.



Scope and focus of the FNG analysis

Based on discussions with stakeholders during the inception workshop, the following parameters for analysis were agreed:

Data used for estimating the cost and affordability of diets was agreed upon by stakeholders. Food price data was used in the CotD software to estimate diet costs, and data on food price expenditure was used to calculate no-affordability of diets. Table 2 provides details on characteristics and source of both data sets.

Table 2: Data sources for analysis.

	Data on Food Prices	Data on Food Expenditure
Analysis area	Province level	Province level; urban/rural

Season	Four prices points: Lean Season (February 2020, January 2021) and Non Lean Season (August 2019, August 2020)	One expenditure amount: Lean Season 2020 (adjusted from LCMS 2015). *(Kept constant to reflect income stagnation while prices rise)*
Urban/Rural Considerations	Aggregated by province; Not available by urban/rural	Available for urban/rural areas within the province
Data Gaps	Unable to access differences in costs between urban and rural areas; or access	Unable to assess changes in spending patterns between seasons
Modelling of interventions	Carried out on August 2019 and February 2020 data (lean and non-lean season modelling)	Constant expenditure levels (Lean season 2020 amount)
Source	Zambia CPI (Zambian Statistics Agency)	Living Conditions Monitoring Survey (2015)

In addition to the aforementioned data, the FNG also used CPI data on food prices to adjust 2015 food expenditure for inflation, allowing for a comparison between 2020 food prices and 2020 food expenditure.

Staple Food adjustment**:** In modelling the cost of the nutritious diet, the FNG does a staple-food adjustment, meaning that it assumed that roughly 50% of a household's calorie needs are being met through staple foods. Although in most contents, the proportions of energy coming from staple foods is typically larger, doing the adjustment allows for a more realistic diet and allows the FNG to take into account basic staple food preferences. Given the consumption patterns visible in Zambia, the following staple foods were chosen for the adjustment, shown in Table 3.

Table 3: Foods selected for staple-food adjustment by province.

Province	**Staples**
Central Province	Maize
Copperbelt Province	Maize
Eastern Province	Maize
Luapula Province	Maize, Cassava
Lusaka Province	Maize
Muchinga Province	Maize, Cassava
Northern Province	Maize, Cassava
North-Western Province	Maize, Cassava
Southern Province	Maize
Western Province	Maize

Geographic scope: Analyses were carried out at provincial level for all 10 provinces. Because food price data was not available for Muchinga separately from Northern province, estimates for diet costs for Muchinga were based on price data collected for Northern province, and modelling was not carried out for Muchinga province. Non-affordability estimates for Muchinga were based on combining cost for Northern province expenditure data from Muchinga.

Seasonality and month selection: Initial analysis and modelling were carried out for the non-lean season (August 2019 and August 2020) and the lean season (February 2020 and January 2021)[5]. The values in the baseline findings reflect the 2020 non-lean season and 2021 lean season. Modelling was carried out on 2019 and 2020 non-lean and lean season data.

Modelled household: Based on national average household size, the FNG analysis was modelled on a 5-person household which included the following individuals:

- Adult man
- Breastfeeding adult woman
- Adolescent girl
- School-going child
- Breastfed child 6-23 months old

This family composition also provides for a good per capita average. Based on requests from stakeholders, certain models were run for individuals not in the modelled household (e.g. Early Childhood Care and Development interventions for children between 3 and 5 years).

Modelling areas: Nine provinces (all provinces except Muchinga) were used for modelling. Certain models were only included for priority areas, these being Northern, Luapula, Western, and Lusaka provinces. Individual models have been carried out in single provinces based on intervention suitability (e.g. dairy production models have been included in areas where this livelihood is common and feasible). The complete list of models provided for each area is provide in Table 4.

Table 4: Modelling areas.

Location	Models
All provinces	• Breastfeeding • MNP • CSB+ • Basic School Meals • Aspirational School Meals • Biofortified School Meals

[5] Lean season months are considered to refer to the period between planting and harvesting (October to Febraury), often co-occurring with scarce job opportunities and reduction in income. The other months (March to October) are non-lean season, in the case of this analysis referring to the time after harvest.

	• Social Protection Cash Transfer (Social Cash Transfer, Disability Transfer, COVID Food Security Transfer) • IFA for the PLW and AG • Refined, Unrefined, and Fortified Maize
Priority Provinces – Western, Luapula, Lusaka, and Northern	• Package 1 • Package 2 • Complementary Feeding
Milk Production Regions – Lusaka, Western, Southern, Eastern, Central	• Heifer Milk Production Model
Individual Provinces	• **Eastern** FSP – Rainfed Agriculture • **Luapula** FSP – Irrigated Wetland Agriculture MEB Cash Transfer Diversified Production (Maize + Spinach, Carrot, Green bean) • **Lusaka** Hydroponic School Feeding Unhealthy Snack Foods Urban Garden (Milk, OFSP, Spinach) • **Northern** School Production Units (Cassava, OFSP, Beans) • **Western** School Production Units (Cassava, Rape Leaves, OFSP)

Findings

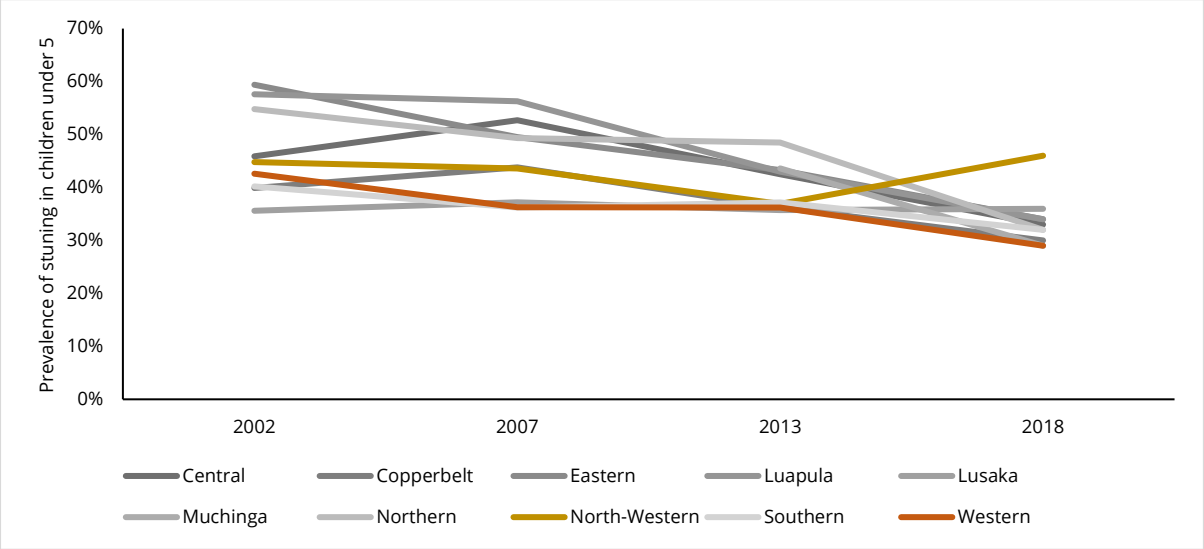
Main Message 1

Despite progress over the last years, chronic malnutrition and micronutrient deficiencies remain widespread. The double – and in some areas triple - burden of malnutrition is on the rise, as indicated by stagnating reduction of chronic malnutrition and increase of overweight.

National prevalence of chronic malnutrition has decreased from 45 percent of children under 5 stunted in 2007 to 35 percent in 2018(DHS). Changes in chronic malnutrition were not equal across all geographic areas of the country. Figure 6 shows the rates of chronic malnutrition across different provinces in Zambia between 2002 and 2018. The figure highlight that some provinces Western, shown in orange, have showed steady decline in

stunting rates, while North-Western have shown that despite a reduction in stunting between 2002 and 2013, stunting has increased between 2013 and 2018.

Figure 6: Prevalence of stunting between 2002 and 2018 by province in Zambia. (DHS 2018)



Importance of Nutrition in Zambia

Diet related indicators are causing more death and disability than 10 years ago. Estimates from the Global Burden of Disease Study show that death and disability associated with overweight and obesity has increased by over 100 percent (ranked as 7th overall), those related to high blood pressure are up by around 50 percent (6th overall), and generic dietary risks increased by over one third (now 8th highest)(GBD Diseases and Injuries Collaborators, 2019). These trends come at a cost. Between 2017 and 2026, it is estimated that the worldwide impact of undernutrition – not accounting for overweight and obesity – is a loss of 2 billion USD to the global economy, or 7.5 percent of GDP. It also has strong implications for global human capital development: 4.5 million years of schooling are lost every year that malnutrition remains unaddressed (FANTA & 360 FHI, 2017).

Malnutrition Outcomes

Child malnutrition in Zambia is prevalent across almost all wealth quintiles (ZAMSTAT, 2016)(Figure 7). There is little to no variation across wealth groups for anaemia and wasting, and only the highest wealth group has a stunting prevalence below 30 percent. Stunting is also lower in children whose mothers achieved higher education; however, this is a relatively small group and high educational attainment is correlated with wealth. There is a five percent difference between children whose mothers completed primary vs. secondary education (38 vs. 31 percent). This indicates that it is not just education and knowledge that is the barrier to adequate nutrient intake, but also the possibility to act on them (DHS, 2018).

Figure 7: Malnutrition characteristics by wealth quintiles. (DHS 2018)

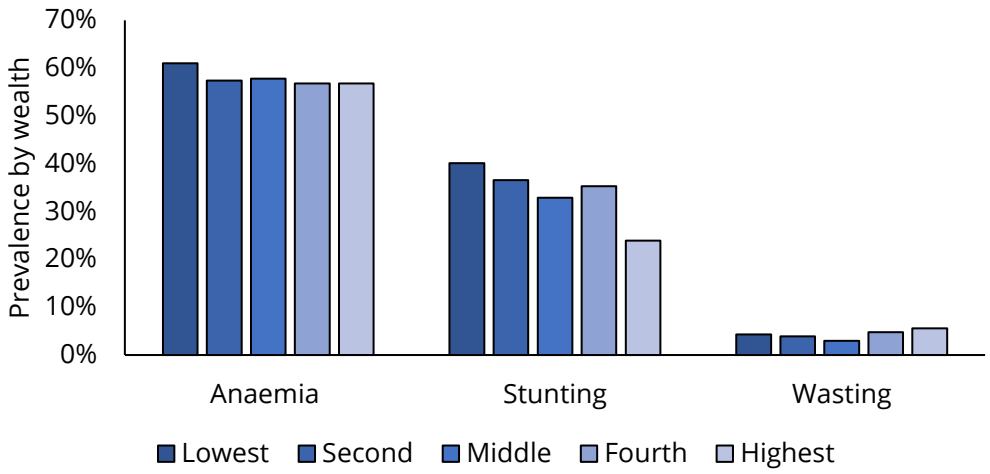
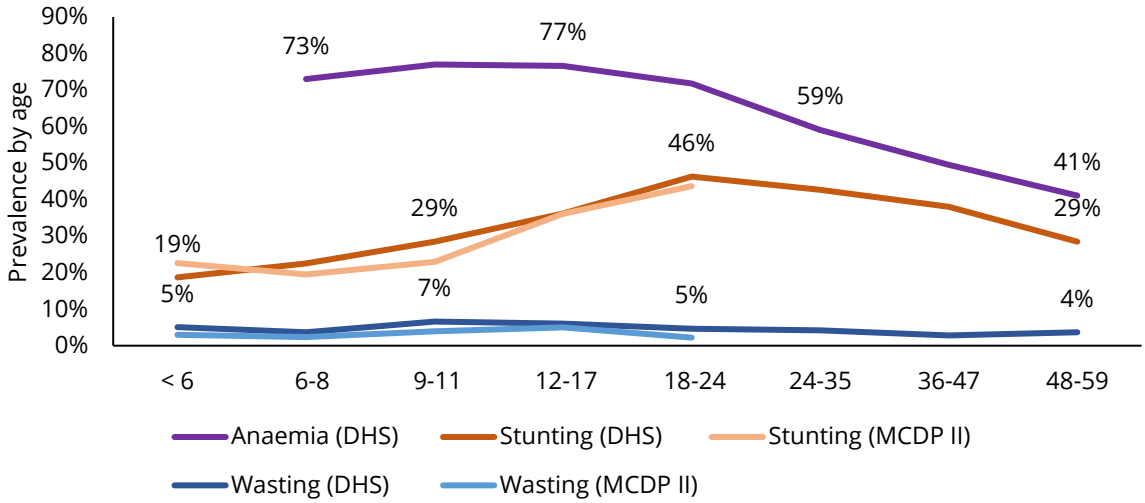


Figure 8 shows how malnutrition outcomes change between ages zero and 59 months. Malnutrition in children under 6 months of age is already high, with one in five children stunted, indicating low endowment from pregnancy. Similarly, anaemia is very high in children aged 6–8 months (73 percent), indicating low iron storage at birth in mothers. Of the 80 percent of children whose weight at birth was known, nine percent weighed less than 2.5 kg. Stunting prevalence almost doubles by the time children reach the age of two, with half of children aged 18–24 months stunted. After 24 months of age, as growth is less rapid and the need for micronutrient dense foods decreases with the increased ability to consume larger portion sizes, stunting slowly reduces to 30 percent. These trends indicate that IYCF practices are suboptimal and, equally important, that dietary intake in mothers before and during pregnancy and lactation is insufficient to support optimal growth. With teenage pregnancies particularly high (one in three Zambian girls aged 18 have had a live birth), it is particularly important to consider the dietary intake of adolescent girls (DHS 2018).

Figure 8: Prevalence of various malnutrition indicators for children between 6 months and 59 months.



Main Message 2

The nutritious diet costs on average 33 Zambian Kwacha (ZMW) per 5 person household per day. This price increased by an average of 10 percent between August 2019 and January 2021 due to higher food prices. In some provinces the increase was as high as 40 percent.

Cost of Energy Only and Nutritious Diets

Meeting the nutrient needs of a 5-person household would cost ZMW 33 per 5-person household per day. Meeting only energy needs would cost ZMW 11. A nutritious diet therefore costs three times as much as a diet providing only enough kilocalories. This is because the foods needed to meet nutrient needs are more expensive than staple foods. Whereas energy needs can be met through cereals and oil alone, a nutritious diet consists of a variety of foods from different food groups such as cereals, green leafy vegetables, other vegetables, animal source foods, fruit, pulses and oil. An example of the foods selected by the CotD software for one of the modelling areas is presented in Table 5.

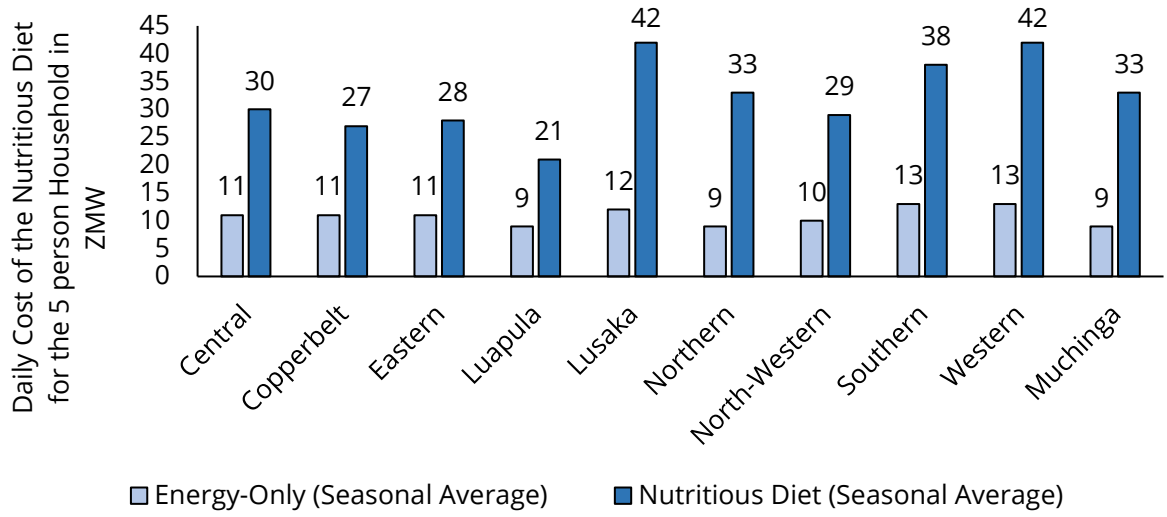
Table 5: Comparison of foods selected in the Energy-only and the Nutritious diet.

Diet	Foods included
Energy-Only	Maize Meal (Whole grain and Roller Mealie Meal)
Nutritious	Maize Meal (Whole grain) Maize, on the cob Cabbage Chicken, liver Dried Kapenta Fish Groundnut Leaf, cassava Leaf, pumpkin Spinach Rape Avocado Oil, soybean

For a full table of the cost of energy only diets for each household members in each province, see the Annex. Tables are provided for initial estimates (calculated from August 2019 and February 2020 data, as well as post-inflation estimates calculated from August 2020 and January 2021 data).

The cost to meet only energy needs is relatively stable across Zambia, ranging from ZMW 9 to 13 per household per day. However, meeting nutrient needs with the nutritious diet varies greatly across the different provinces, ranging from ZMW 21 (Luapula) to ZMW 42 (Western, Lusaka) per household per day. With the exception of Lusaka, costs are particularly high in largely rural areas.

Figure 9: Daily cost of the energy-only diet and the nutritious diet across all modelling provinces. (CotD 2021)

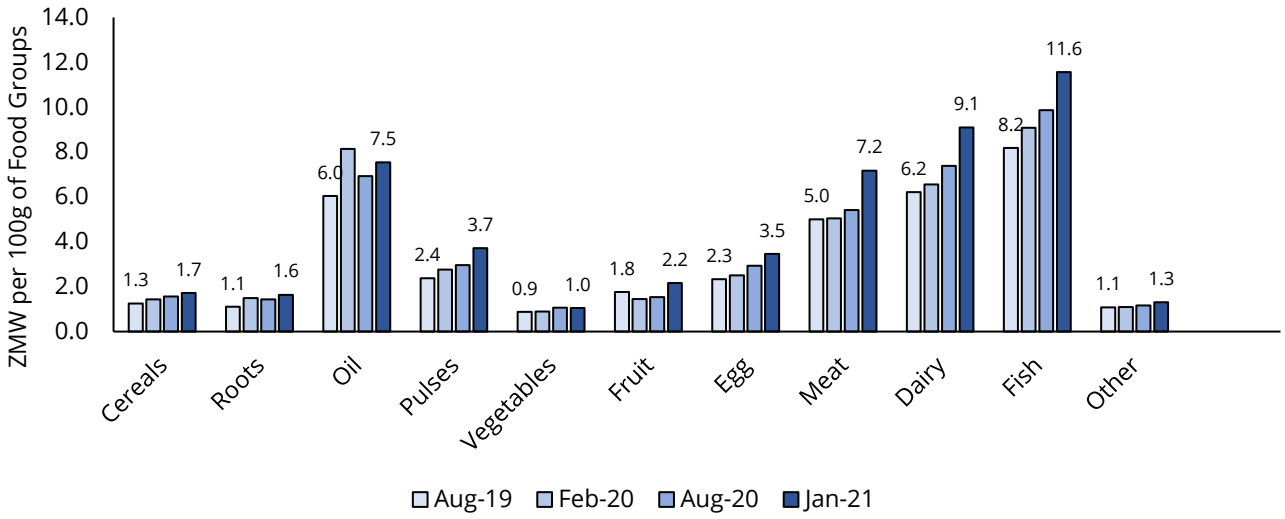


For a full table of the cost of energy only diets for each household members in each province, see the Annex. Tables are provided for initial estimates (calculated from August 2019 and February 2020 data, as well as post-inflation estimates calculated from August 2020 and January 2021 data).

Inflation and Diet Costs

Rising food prices in Zambia increase diet cost (ZAMSTAT 2020, 2021). Figure 10 shows the differences in food prices (per 100g of food group) at four time points between 2019 and 2021 by food group. Among the group, food prices have increased most sharply for animal source foods.

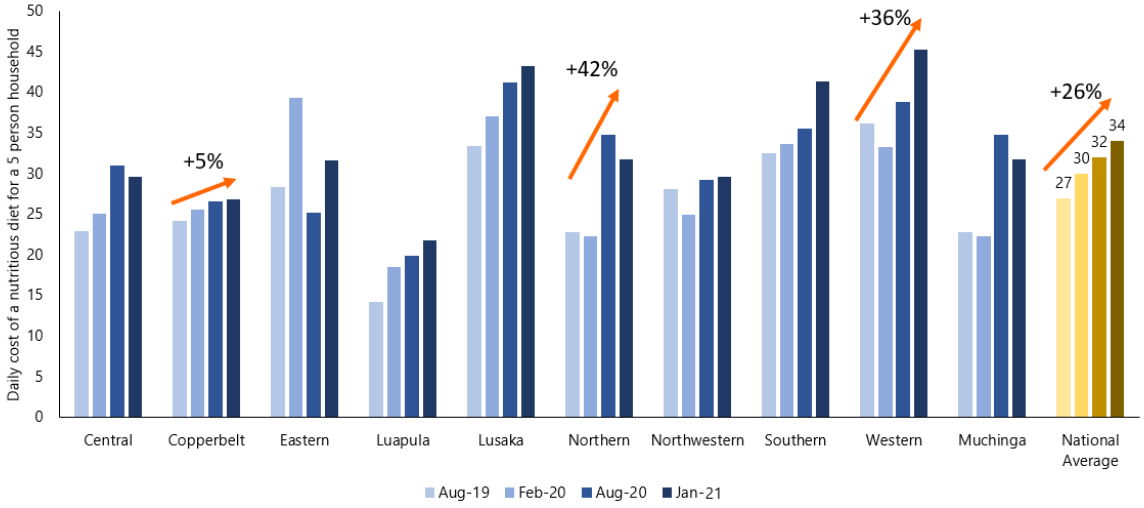
Figure 10: Food prices (per 100g) of various food groups between August 2019 and January 2021.



Higher food prices led to higher cost of nutritious diets. Between August 2019 and January 2021, the daily cost of the nutritious diet rose from ZMW 27 to ZMW 34 per household per day, representing more than 10 percent growth. As

Figure 11 shows, this increase is highest in some of the remote areas, e.g. in Western and Northern provinces, where the cost of the nutritious diet increased by more than one third over 2020. More centralized provinces with well-established infrastructure networks, e.g. Copperbelt and Lusaka, show lower and more steady increases (5 and 10 percent respectively).

Figure 11: Change in cost of a nutritious diet between August 2019 and January 2021, by province. (CotD 2021)



Main Message 3

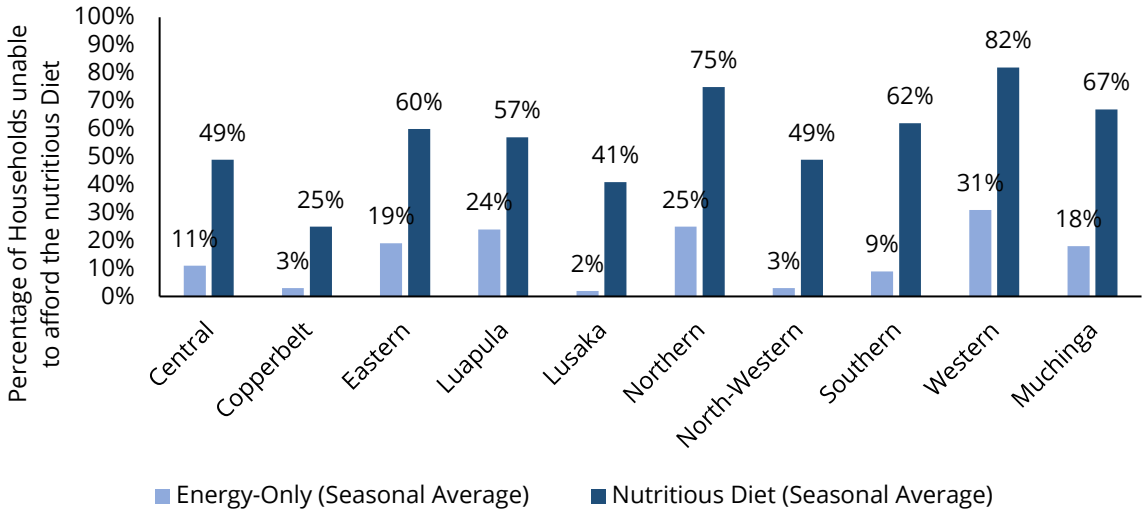
Currently, half of all households would not be able to afford the nutritious diet. Rural households are most at risk of being unable to afford the diet, with non-affordability higher than 70 percent in certain provinces.

Non-affordability of Diets

In Zambia, over half of households (53 percent) would not be able to afford a nutritious diet[6] and one in eight (13 percent) would not be able to afford an energy-only diet. Both estimates vary across provinces (see **Error! Reference source not found.**).

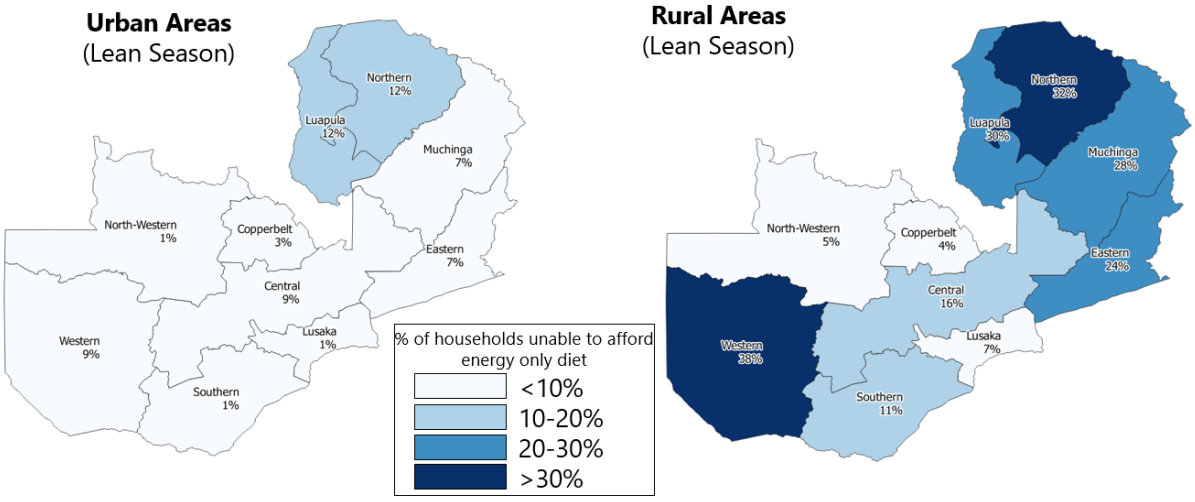
[6] Non-affordability is an estimate of the proportion of households whose food expenditure is below the estimated minimum cost of a nutritious or energy-only diet. It contextualizes the cost of a nutritious diet by placing it in relation to how much money households typically spend on food.

Figure 12: Non-affordability of the energy-only and nutritious diets by province. (CotD 2021)



Non-affordability of an energy-only diet ranges from two to 31 percent, indicating that in some provinces, for example Northern, Luapula and Western, over a quarter of households would not be able to afford an energy-only diet. Figure 13 shows the rates of non-affordability of the energy-only diet, separated for urban areas and rural areas, indicating that the depth of non-affordability significantly larger in rural areas than in urban areas.

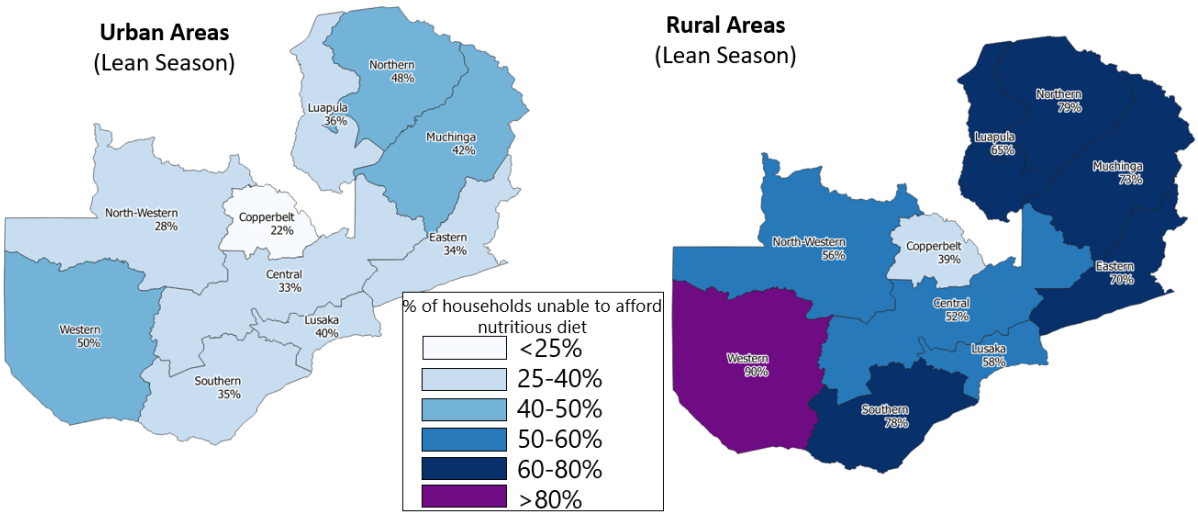
Figure 13: Non-affordability of the energy only diet disaggregated by urban and rural zones by province. (CotD 2020)



Substantially higher ranges for non-affordability were found for a nutritious diet, from 25 percent (Copperbelt) to 82 percent (Western). This range of costs (see main message 2) and non-affordability shows that variation in available foods and their cost, have an impact on the variation in the cost of a nutritious diet, and that existing income levels further exacerbate or mitigate cost levels. For example, Luapula has relatively low cost (ZMW 21/household/day) but relatively high non-affordability (57 percent), whereas it is the opposite for Lusaka, where the cost of a nutritious diet is high (ZMW 42) but non-affordability is relatively low (41 percent). Figure 14 shows the rates of non-affordability of

the nutritious diet, separated for urban areas and rural areas, indicating that the depth of non-affordability significantly larger in rural areas than in urban areas.

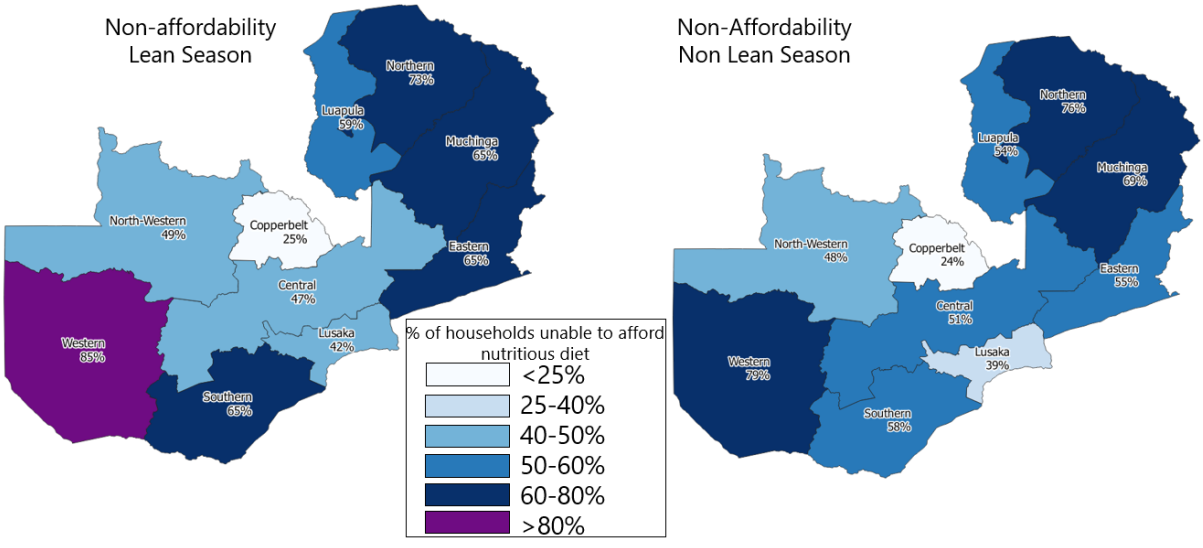
Figure 14: Non-affordability of the nutritious diet disaggregated by urban and rural zones by province. (CotD 2020)



Seasonal effects on Non-Affordability

Non-affordability of the nutritious diet is only slightly determined by seasonality. At the national level, lean season non-affordability is 3 percent higher than non-lean season non-affordability, only factoring in food price changes. Figure 15 shows that there is no consistent pattern between seasonal variation of non-affordability—for example, while non-affordability is higher in the lean season in Western province, while non-affordability is lower during the lean season in Central Province.

Figure 15: Non-affordability of the nutritious diet disaggregated by season and by province. (CotD 2020)



High diet costs do not necessarily mean households face challenges in accessing nutritious diets, therefore understanding non-affordability is crucial to identifying areas most vulnerable to price increases. The FNG findings show that increases in food prices, co-occurring with the global COVID-19 pandemic and local movement restrictions, drove non-affordability up from 43 percent to 53 percent in fewer than 18 months. It should be noted that because of a lack of data on income and food expenditure, the FNG findings were based on these being assumed to be stable, although emerging evidence is showing that incomes have in fact declined (Laborde et al., 2020).

Main Message 4

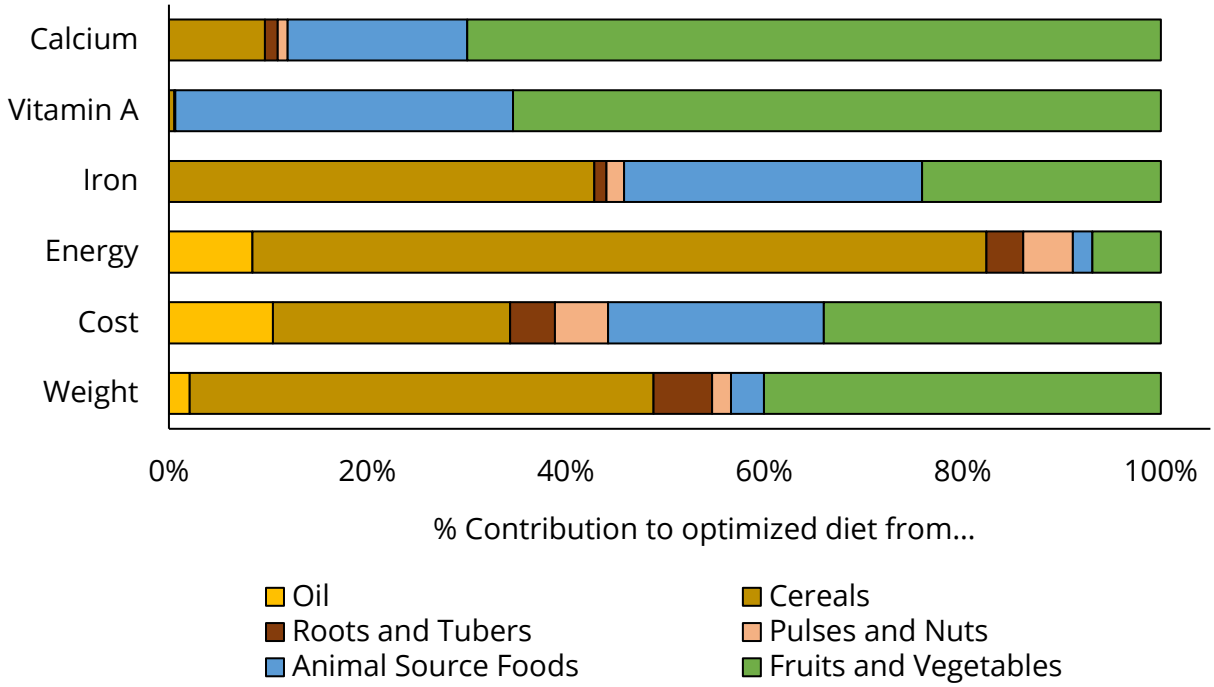
Fresh, nutrient-dense foods, which contribute most towards covering essential micronutrient needs, make up the largest share of cost in the total cost of the nutritious diet. Current food expenditure patterns indicate that diets lack sufficient quantities of fruit and vegetables.

Composition of the Optimized Diet

As no one food group is able to cover all micronutrient needs, households must consume a variety of types of food in order to cover nutrient gaps. The FNG optimized nutritious diet is comprised of the combination of foods which at the lowest cost can cover micronutrient needs—this means that the optimized diet can be used to understand which foods groups can at the lowest cost help households meet micronutrient requirements. While the optimized diet is not a recommended diet, it does give insights into how dietary diversity is necessary for accessing certain micronutrients.

Nutritious non-staple foods, such as animal source foods, fruit and vegetables, make up around 55 percent of the cost of the optimized nutritious diet (Figure 16). Staples, such as cereals, roots, oil and pulses, make up around 45 percent of cost, but contribute most of the food weight (56 percent). Staples make up the majority of energy contribution (over 80 percent) of the optimized diet, but lack sufficient micronutrients to cover all needs. Non-staple foods contribute only around 10 percent to energy, but are indispensable in meeting micronutrient needs: almost all vitamin A and around 60 percent of iron needs are met through vegetables, fruit and animal source foods.

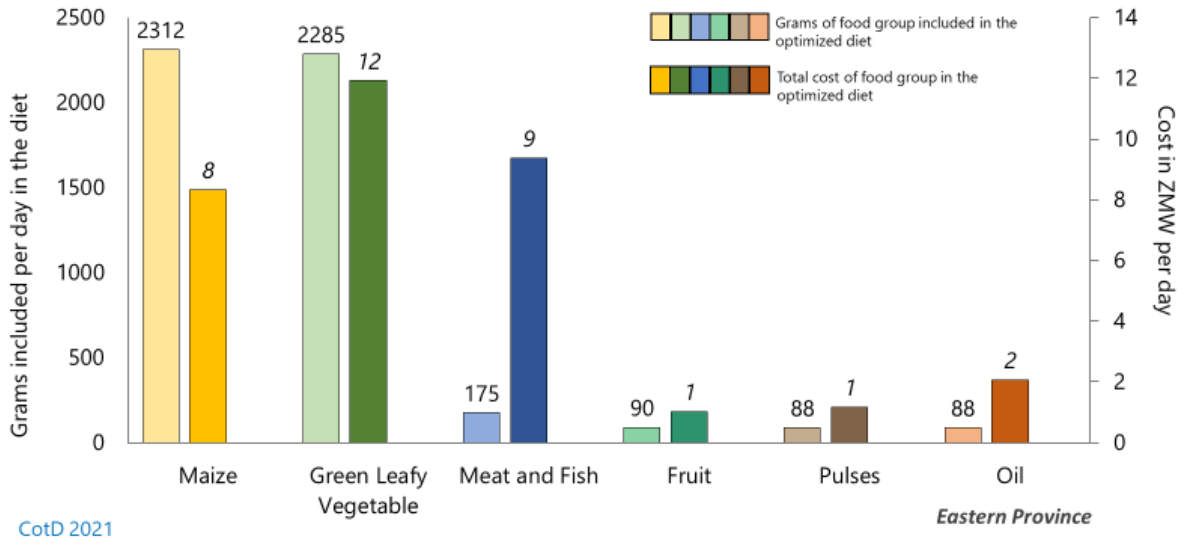
Figure 16: Contribution to optimized diet nutrient content, cost and weight from different food groups. (CotD 2021)



Cost to Quantity Ratio of Food Groups

Households must spend a relatively large share of their food budgets on small but necessary quantities of non-staple foods. Two thirds of the total household food budget would have to go towards animal source foods, vegetables and fruit, and only one third to energy dense staples such as cereals, pulses and oils in order to align with the optimized least cost nutritious diet. Figure 17 gives an example of the optimized diet for Eastern province. Bars are coupled by food group. The lighter coloured bars represent the number of grams selected by the CotD software, and the darker bar indicates the cost of in ZMW per day for the quantity defined by the lighter bar. The figure illustrates the large differences in price among foods—almost 2.5 kg of maize cost 8 ZMW per day, while 175 g of meat and fish cost 9 ZMW per day.

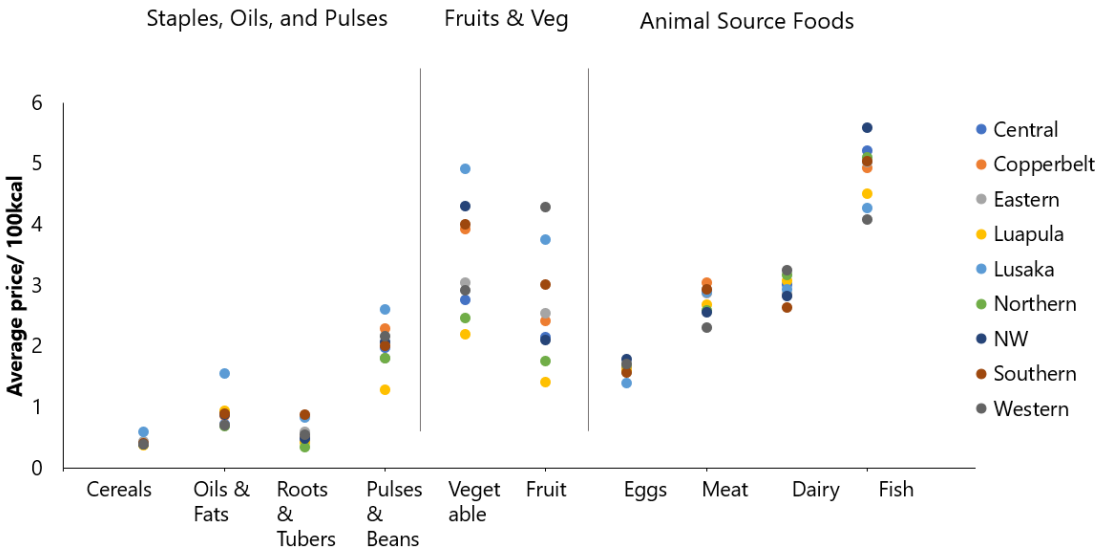
Figure 17: Comparison of the grams of specific foods and amount of ZMW necessary to purchase given amount in the optimized diet. (CotD 2020)



Food Prices and Consumption Behaviour

Given the high rates of non-affordability of energy-only diets, particularly in rural areas, households will prioritize meeting basic food needs over meeting micronutrient needs. When accessing costs of different food groups by calories, shown in Figure 18, it become evident that cereals, roots and tubers, and oils and fats are most cost efficient in meeting energy needs. This indicates that households who aim to meet their energy needs are unlikely to purchase other nutritious foods in order to prevent hunger.

Figure 18: Average price of 100 calories for various food groups by province. (CotD 2020)



Studies on dietary behaviour in Zambia suggest that more than 90 percent of households already regularly consume some animal source foods and dark green leafy vegetables but not enough of them (Caswell et al., 2018). Data from the 2015 Living Conditions Monitoring Survey indicate that for Eastern region, households spend around ZMW 14 a day on fresh, non-staple foods – below the estimated minimum level of ZMW 22. It is therefore crucial

that households have sufficient resources to buy or produce large enough quantities of non-staple foods to cover their nutrient needs, and that social and behaviour change communication (SBCC) and information on healthy diets are widely disseminated to encourage healthy, nutritious choices.

Overweight and Obesity and Unhealthy Diets

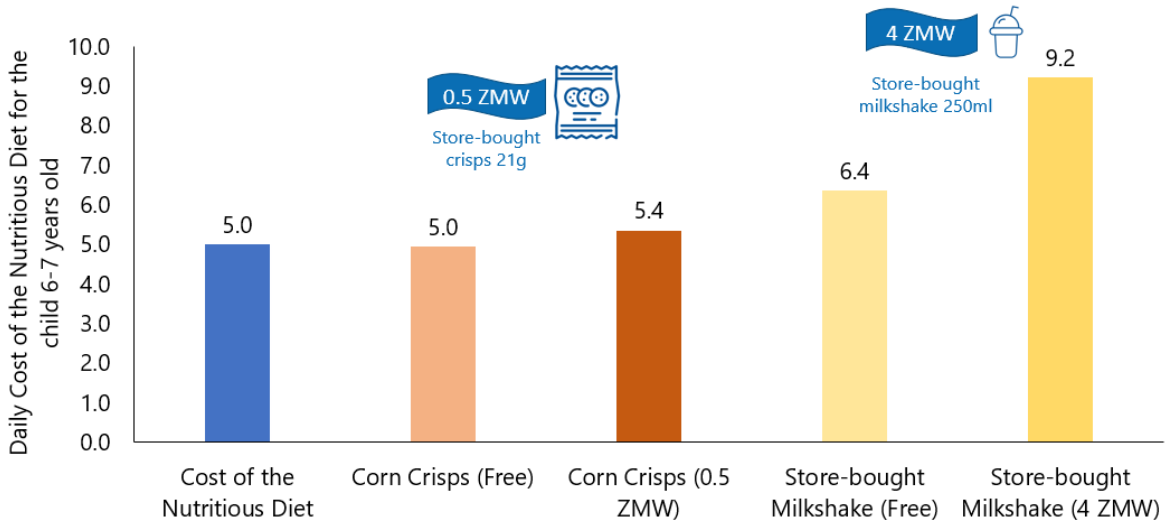
Consumption of non-diverse diets and unhealthy foods is a main driver of overweight and obesity(Romieu et al., 2017). Obesity almost doubled between 2002 and 2014 for women of reproductive age, from 13 percent to 23 percent (Moise et al., 2019). To tackle this and to prevent non-communicable diseases, behaviour change strategies are crucial in the development of healthy food habits in younger children and adolescents. Snack foods, rich in fat, sugar and salt, provide consumers with energy but don't contribute to essential micronutrient needs. Frequent consumption of unhealthy snacks puts people at higher risk of overweight and obesity.

The FNG analysis modelled the intake of non-nutritious foods for a school aged. The foods selected—slaty crisps and store-bough milkshakes—were selected by the WFP CO. The macro- and micronutrient content of these foods were taken from local packaging and supplemented using the USDA food composition table[7]. Nutrient content of both foods modelled is available in the Annex.

Figure 19 shows the average cost of a nutritious diet for a school-age child with and without the consumption of snack foods. Consuming corn crisps, even when received for free, does not reduce the cost of the nutritious diet because these foods do not contribute to micronutrient needs. A commercially produced milkshake, which is higher in calories and sugar than corn crisps, increases the cost of the nutritious diet even when received for free because it needs to be complemented by foods of even higher nutritional value but that provide less energy.

[7] Available here : https://fdc.nal.usda.gov/

Figure 19: Cost of the nutritious diet for a child aged 6–7, without and with the addition of snack foods. (CotD 2021)



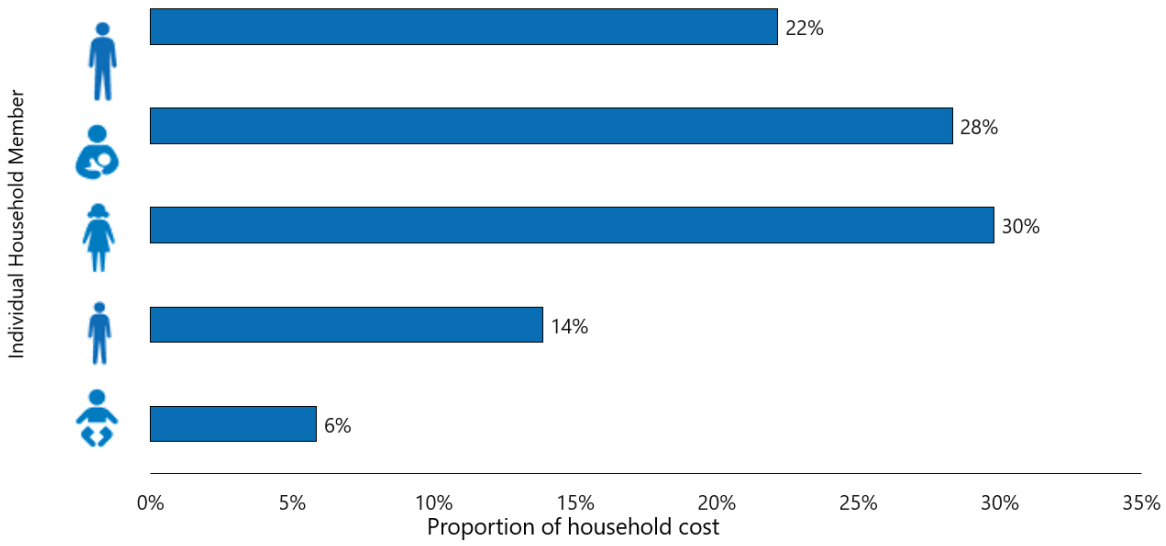
Main Message 5

Nutrition interventions and SBC for dietary intake should be targeted to improve nutrition for all vulnerable individuals. Breastfeeding mothers and teenage girls have elevated micronutrient needs and would benefit from targeted interventions to fill specific micronutrient gaps.

Vulnerable Individuals within the Household

When breaking down the cost of the nutritious diet by individual household members, the adolescent girl accounts for the largest share of cost at 30 percent, followed by the lactating woman (28 percent), the adult man (22 percent), the school-age child (14 percent), and the child of 12–23 months (6 percent), as shown in Figure 20.

Figure 20: Breakdown of the household cost of the nutritious diet by individual. (CotD 2021)



Breastfeeding practices in Zambia

For the child of 12–23 months, appropriate breastfeeding and complementary feeding practices can reduce the risk of micronutrient deficiencies. In Zambia, breastfeeding practices are generally good although median duration of breastfeeding (20 months) is slightly declining. Only 13 percent of children under 2 (one in eight) receive a minimum acceptable diet(DHS, 2018). Table 6 shows breast-feeding practices across different ages.

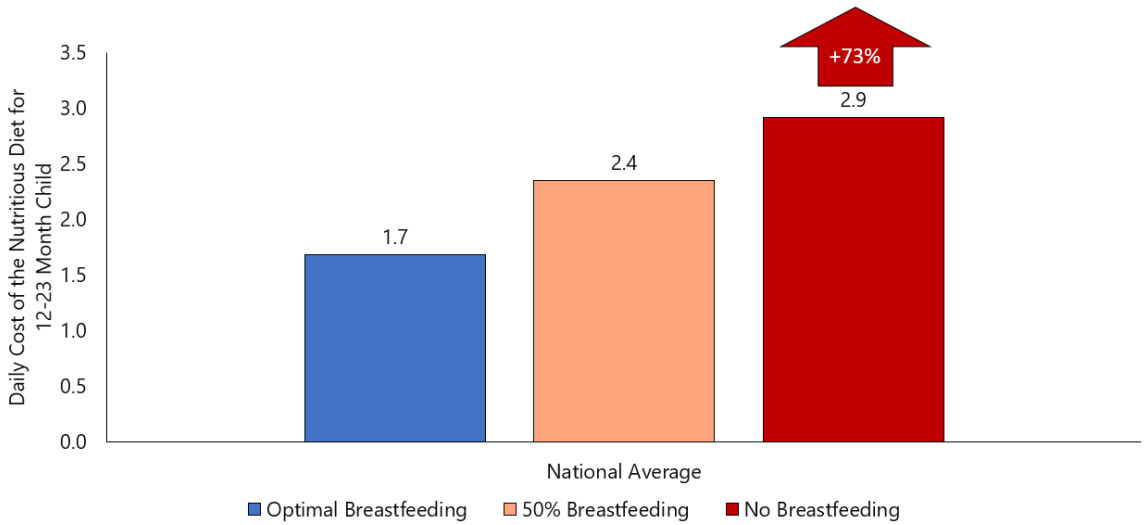
Table 6: Selected indicators on infant and young child feeding (IYCF) practices in Zambia. (DHS 2016)

Indicator	Age group	Percentage of Respondents
Exclusive Breastfeeding	0-5 months	70%
Exclusive Breastfeeding	4-5 months	42%
Continued Breastfeeding	12 months	90%
Continued Breastfeeding	24 months	30%
Age-appropriate Breastfeeding	0-23 months	70%

Importance of Breastfeeding

Optimal breastfeeding contributes significantly to covering the energy and micronutrient needs of the child under 2 and reduces the household's need to purchase additional food items. In an optimal breastfeeding scenario, the cost of the nutritious diet for the breastfed child is ZWM 1.7 per day. If the child is fed at 50 percent of the optimal breastfeeding level (without any additional formula), this cost increases to ZMW 2.4 per day, and in a scenario without breastfeeding (without additional formula) the cost increases to ZWM 2.9 per day (Figure 21). Results by province are provided in the Annex.

Figure 21: Cost of the nutritious diet for a child 12-23 months under various breast-feeding scenarios. (CotD 2021)



Complementary Feeding

Alongside breastfeeding, complementary feeding is essential at this age to ensure coverage of all nutritional needs. Nutritious recipes based on local foods (such as those found in the

Zambian Complementary Feeding Booklet) can complement nutrition provided by breastmilk. The FNG modelled two recipes described in Table 7. Figure 22 and Figure 23 show the micronutrient coverage of each recipe respectively, when added on top of optimal breastfeeding for a child 12-23 months.

Table 7: Description of nutritious local recipes in Zambia (Zambia Complementary Feeding Booklet, NPC 2015).

Complementary Feeding Recipe	Foods
Recipe 1	75g maize 156 pumpkin 28g peanut paste
Recipe 2	75g maize 38g fresh fish 9g spinach

Figure 22: Micronutrient coverage (percent of recommended nutrient intake) of optimal breastfeeding and a nutritious complementary feeding meal of maize, fresh fish, and spinach for a child 12 – 23 months old (CotD 2021).

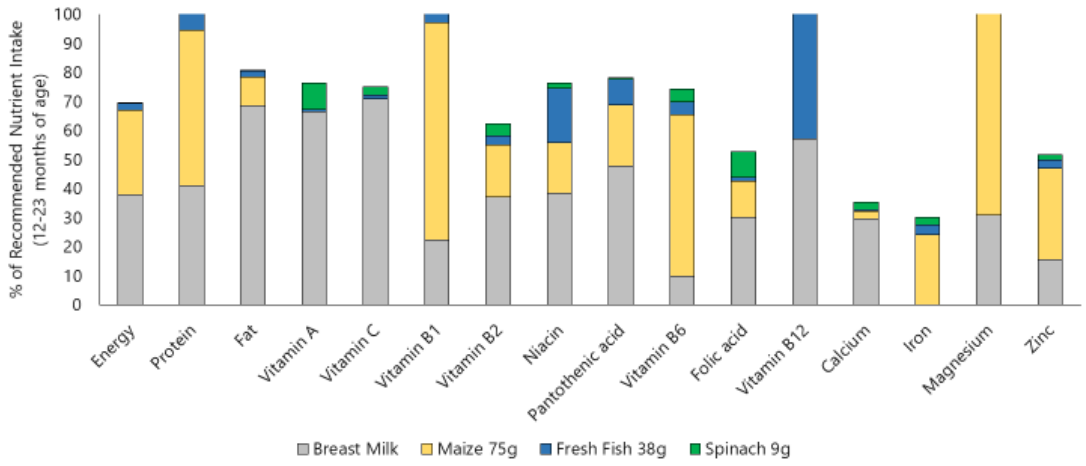
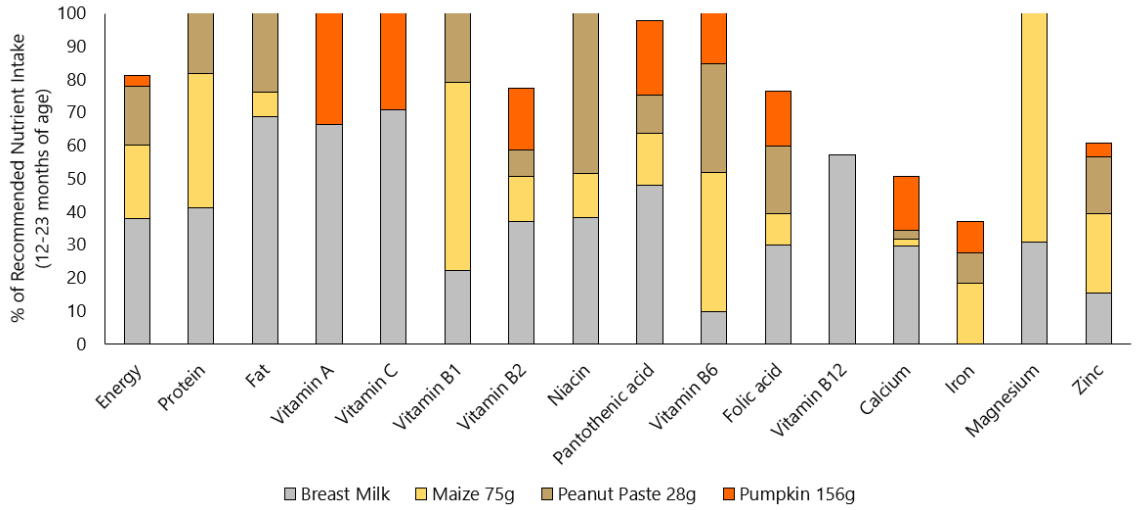
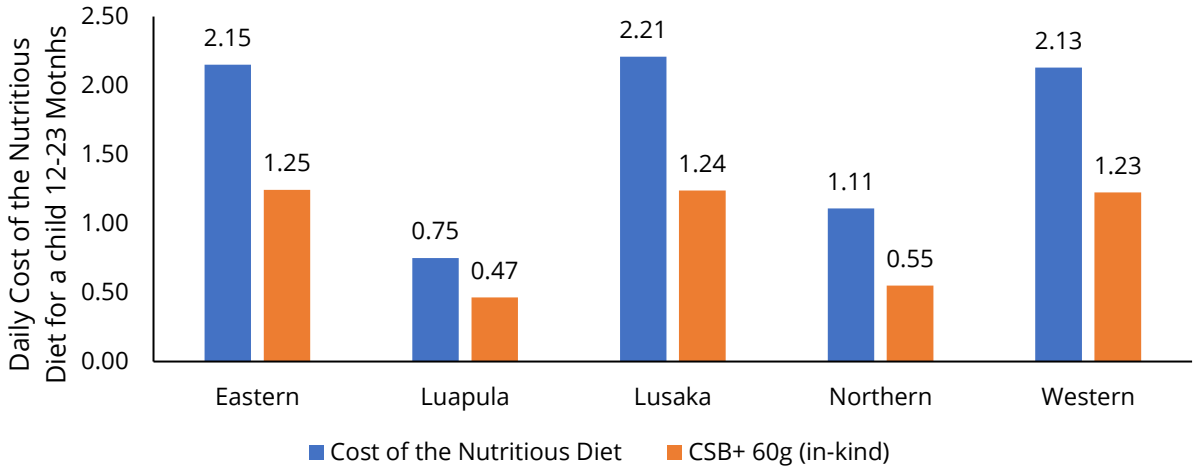


Figure 23: Micronutrient coverage (percent of recommended nutrient intake) of optimal breastfeeding and a nutritious complementary feeding meal of maize, peanut, and pumpkin for a child 12 – 23 months old (CotD 2021).



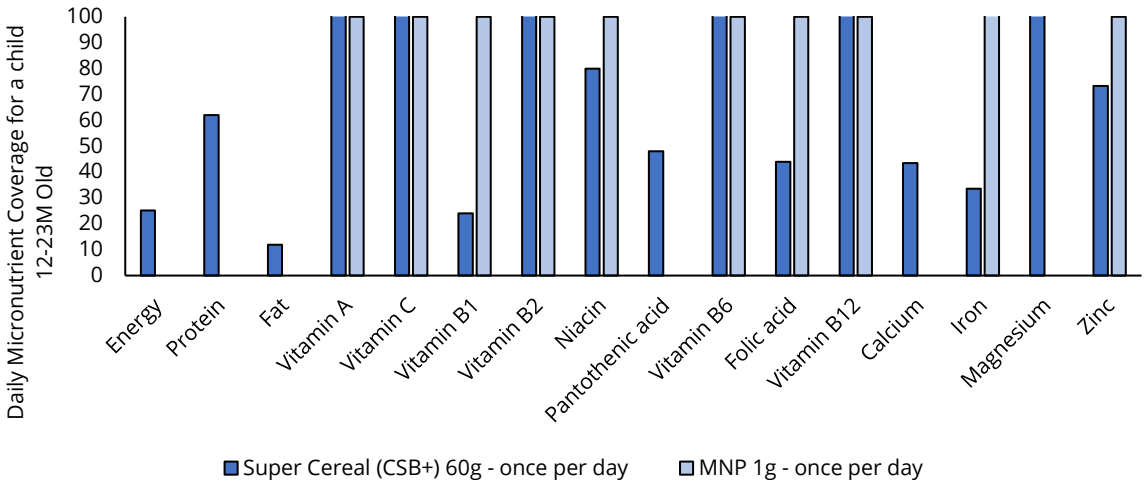
Targeted interventions given in-kind like fortified infant flours can reduce the cost of the diet. At the national level, provision of 60g of Corn Soy Blend (CSB+) given in-kind reduced the cost of the diet for the child of 12–23 months by 55 percent from ZMW 1.8 to ZMW 1. Reductions for selected modelling areas are showing in Figure 24.

Figure 24: Reduction in the cost of the nutritious diet for a child 12-23 months old without and with consumption of 60g of CSB+ given in-kind. (CotD 2021)



Similarly, provision of 1g of MNP in-kind can cover a significant portion of micronutrient needs for a child 12-23 months. At the national level, daily provision of 1g on MNP powder given in-kind to a child 12-23 months can reduce the cost of the nutritious diet from 1.8 to 1.6 ZMW/day. Figure 25 compares the micronutrient coverage of CSB+ and MNP for a child 12-23 months, showing both provide coverage of the majority of micronutrient.

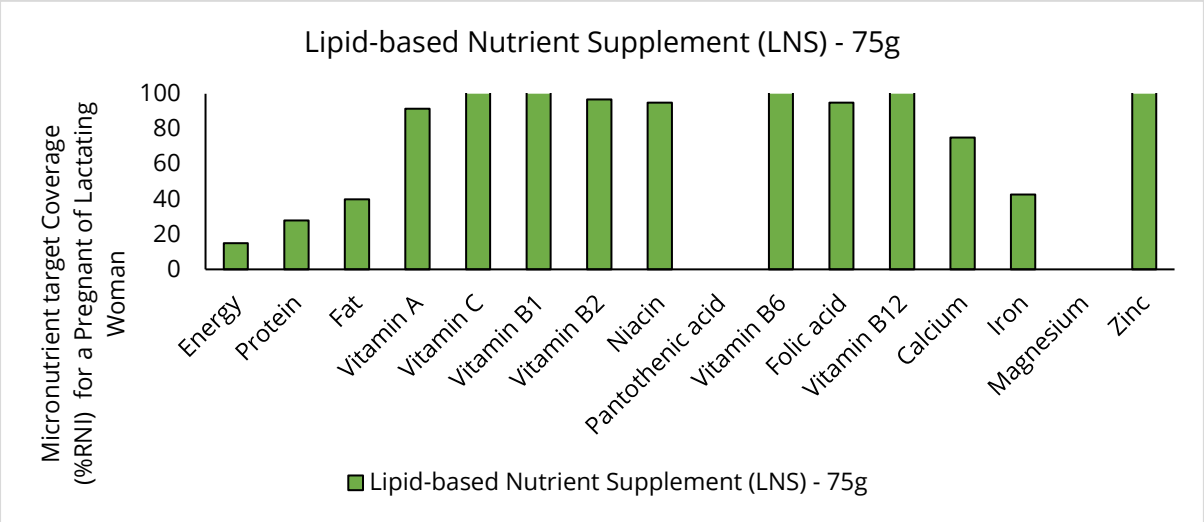
Figure 25: Comparison of micronutrient cover of CSB+ and MNP for a child 12-23 months old. (CotD 2021)



Supplementation for Women

A child's nutrition status also depends on the health and nutrition status of its mother. Pregnancy and breastfeeding elevate micronutrient needs in women of reproductive age, particularly for iron, folic acid, and calcium(WHO and FAO, 2004). Providing iron and folic acid (IFA) tablets, calcium supplementation, or lipid-based nutrient supplementation (LNS) to pregnant and breastfeeding women, could reduce the cost of a nutritious diet (ZMW 8.1) by 3 percent, 16 percent and 23 percent respectively (ZMW 7.9, ZMW 6.8, and ZMW 6.2). One tablet of IFA (1 g) covers 100% of iron and folic acid needs, and one tablet (1.5 mg) of calcium provides 100% of daily calcium needs for a lactating woman when given once a day. Macro- and micronutrient coverage provided by LNS is shown in Figure 26. Results on reduction in the cost of the nutrition diet specific to provinces are provided in the annex.

Figure 26: Micronutrient coverage of LNS for a lactating woman. (CotD 2021)



Adolescent Girls

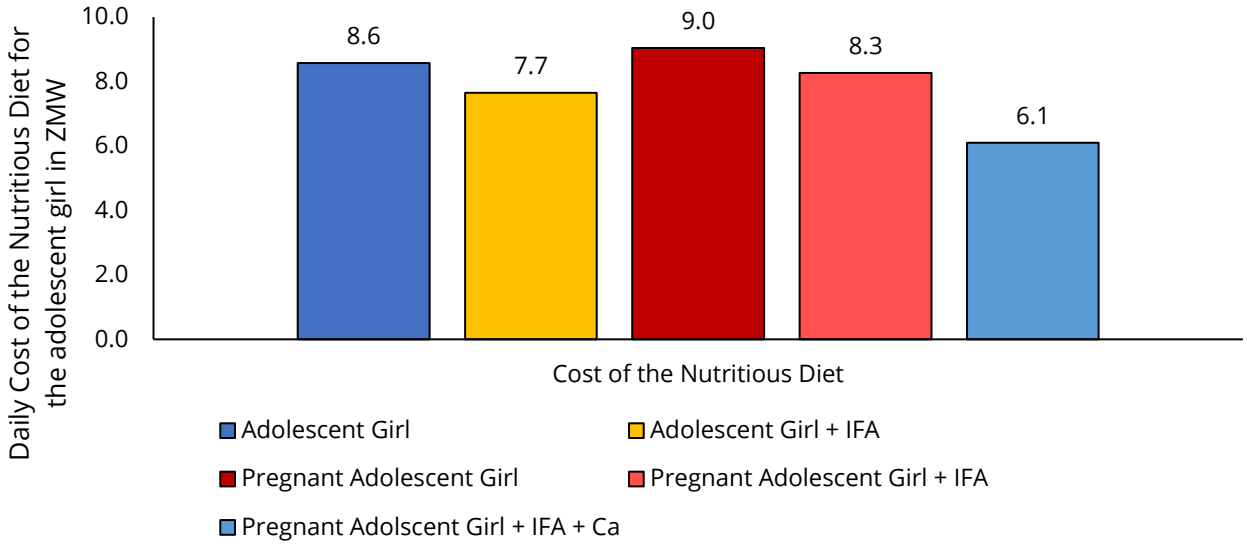
Adolescence is a critical stage for nutrition, particularly for girls. An adolescent girl has comparatively lower energy requirements than an adolescent boy, but a highly elevated need for iron to support her body through menstruation, meaning she requires foods with higher micronutrient to energy ratios—shown in Table 8.

Table 8: Comparison of micronutrient and micronutrient density requirements between the adolescent girl and the adolescent boy. (CotD 2021)

	Adolescent Girl		Adolescent Boy	
	Total Requirements	Relative Requirements (per 1000 kcal)	Total Requirements	Relative Requirements (per 1000 kcal)
Calories	2449	-	2990	-
Iron	3.1 mg	0.13 mg	1.5	.04
Zinc	7.3 mg	3.0 mg	8.6	2.9 mg

She is at a higher risk of anaemia, exacerbated by pregnancy which increases iron and calcium needs significantly (WHO and FAO, 2004). Figure 27 illustrates how pregnancy increases the cost of the nutritious diet for the adolescent girl, and how targeted nutrition-specific interventions like IFA tablets and calcium supplementation can help reduce the cost by providing adequate amounts of these specific micronutrients.

Figure 27: Cost of the nutritious diet for non-pregnant and pregnant adolescent girls under different supplementation interventions. (CotD 2021)



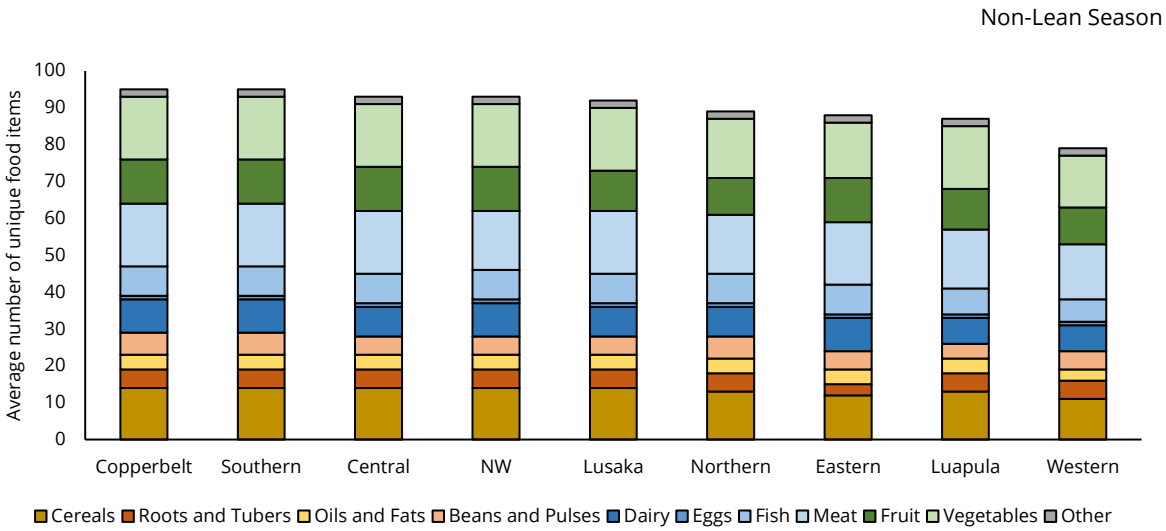
Main Message 6

Despite good diversity of produce in markets, households' access to fresh foods is determined by location and constrained by high prices. Animal source foods are among the most expensive commodities and their prices increased the most in 2020. Fortification can compensate for a micronutrient intake that is too low due to unaffordability.

Fresh Food Availability

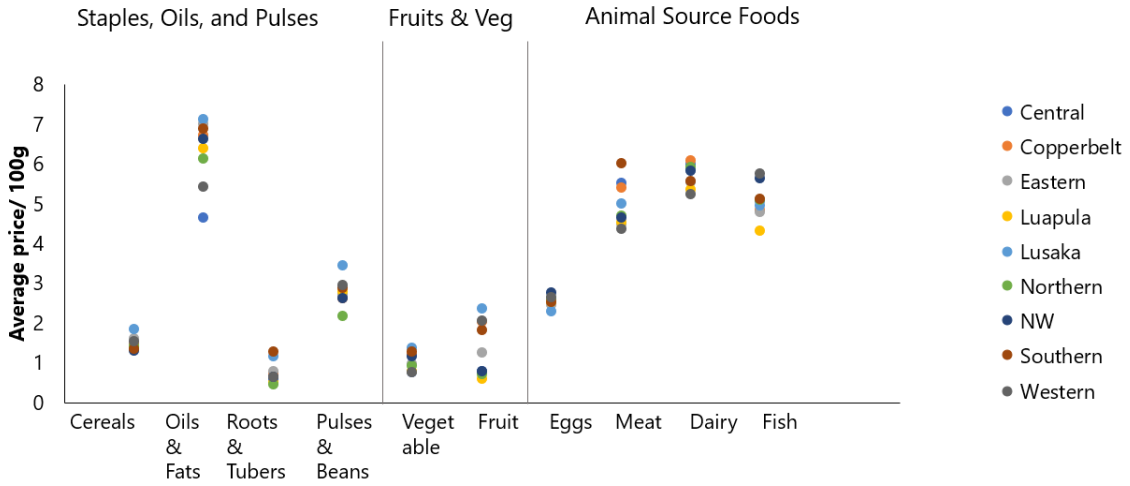
Fresh, non-staple foods can be found across all provinces and seasons, with minor differences in number of products available per food group. Consumer Price Index data, collected monthly at various retail outlets, shows that animal source foods, vegetables and fruit are available in all provinces, as shown in Figure 28. However, despite widespread availability, there are significant differences in product prices between food groups and provinces. Differences in price levels directly impact the cost of a nutritious diet in these provinces (cf. main message 2).

Figure 28: Unique food items per food group available across different provinces in Zambia. (ZAMSTAT 2020)



Cereals, eggs, and vegetables show the least variation in price among the different provinces, while the prices of oils, meat, and fruit vary more widely, as shown in Figure 29. Generally, animal source foods are the most expensive food group in Zambia. Fish are most expensive in Northern and North-Western provinces but are cheapest in Luapula and areas with comparatively developed infrastructure like Copperbelt and Lusaka. Among provinces generally, Copperbelt, Lusaka, Southern, and Western most often have above average food prices. Lusaka has some of the highest prices for non-animal source foods but has low or average prices for animal source foods.

Figure 29: Average price per 100 grams per food group across provinces in Zambia (average prices between August 2019 and February 2020). (ZAMSTAT 2021).

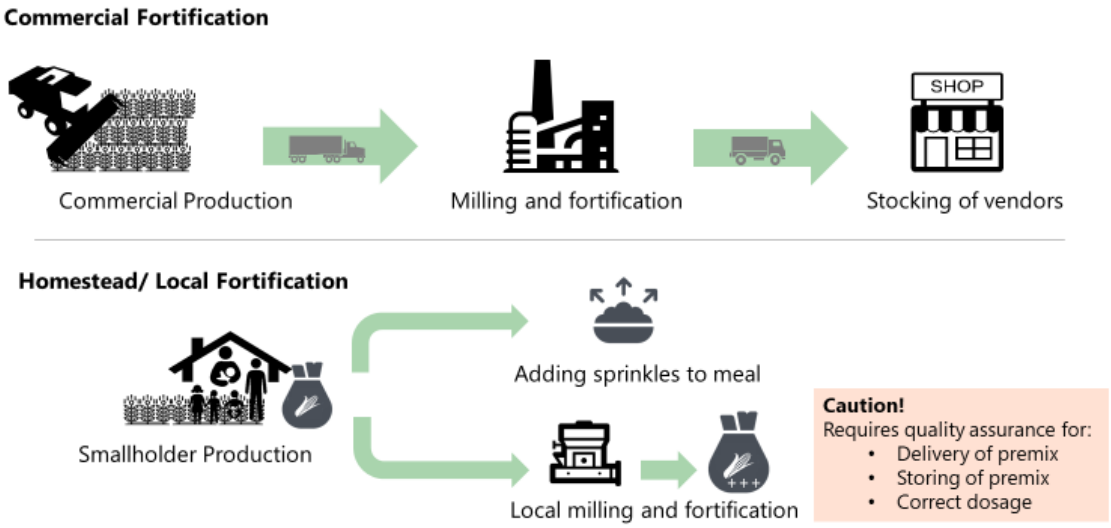


Prices have been on the rise for the 18-month period from August 2019 to January 2021, with increases particularly visible between August 2020 and January 2021. The prices for meat, dairy, fish, pulses and oil have increased at rates greater than normal inflation levels, potentially putting these foods further out of reach for many households (cf. main message 3) and increasing the risk of inadequate nutrient intake.

The Potential of Fortification

For individuals who cannot afford to regularly consume a healthy, nutritious diet, staple fortification is a pathway to improving micronutrient intake. Fortification can be done at an industrial scale or at the local level. When done locally, fortification can be done through blending fortification mixes with milled cereals, as well as through point-of-use fortification, meaning that micronutrients are added directly to food. These fortification pathways are explained in Figure 30.

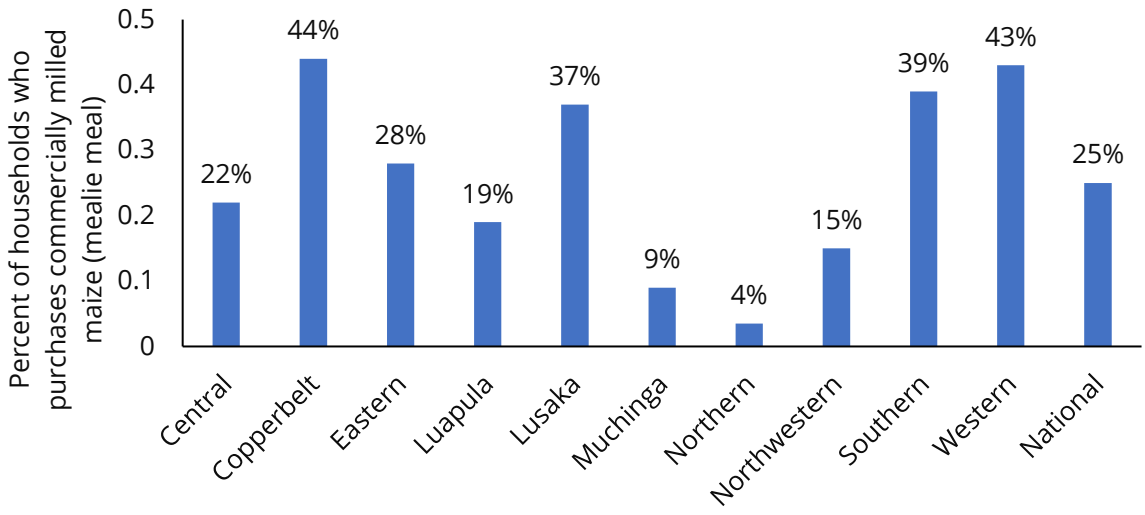
Figure 30: Pathways of fortification at the commercial and local levels, respectively.



Maize Fortification in Zambia

The FNG analysis found that industrial fortification of maize could be one pathway of improving nutrient outcomes, particularly in areas where a large share of the population purchase maize. According to RALS 2019, one in four households in Zambia purchases industrially milled maize, and more than forty percent of households in Copperbelt and Western Provinces. Figure 31 shows the percentage of Households consuming industrially milled maize by province and at the national level (Subakanya & Chapoto, 2020).

Figure 31: Percentage of households purchasing commercially milled maize across various provinces in Zambia. (RALS 2019)



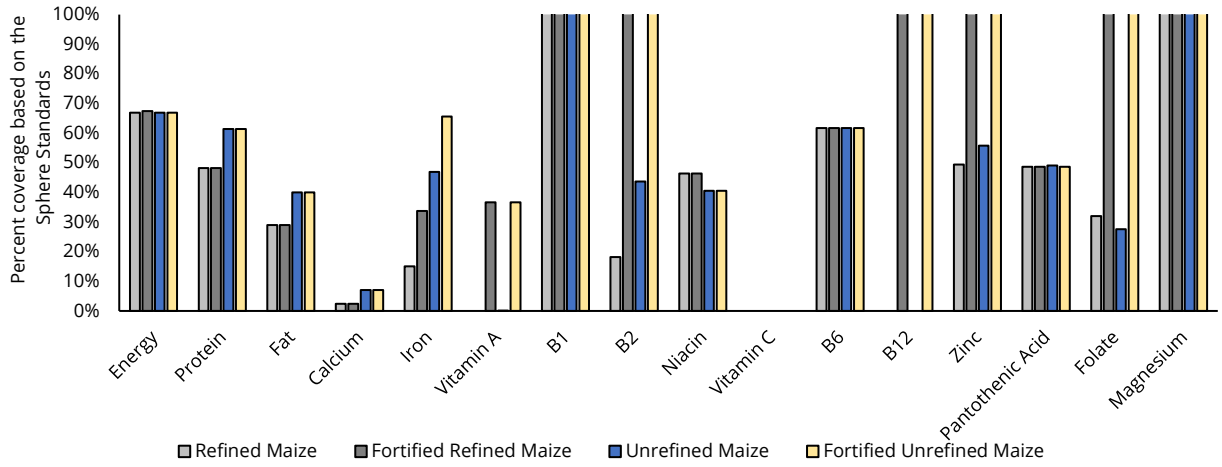
Compared to other staples like rice or wheat flour, the unrefined maize meal typically found in Zambian diets is already a relatively nutritious staple. Fortification of refined or unrefined maize meal could increase availability of key micronutrients like iron and vitamin A in the existing food environment, making them more readily available to the general population. Current proposed maize fortification standards for Zambia include addition of iron, B1, B2,

folate, B12, zinc, and vitamin A. Details on the nutrient specifications for unrefined maize and the fortification pre-mix are provided in the Annex.

Results of Maize Modelling

Figure 32 shows the different micronutrient profiles per type of maize, comparing fortified and unfortified variants of refined and unrefined maize. Consumption of three portions of fortified maize meal per day could meet over 60 percent of micronutrient needs of an average individual (as per Sphere standards) for iron and cover large gaps of other micronutrients, such as B12 and zinc, which are expensive to meet in the context of the Zambian food system because animal source foods are the only and best sources respectively.

Figure 32: Percentage of macro and micronutrient coverage provided by 400g of various maize types based on Sphere Standard requirements. (CotD 2021)



The analysis modelled how replacing maize as staple food (assuming maize consumption contributes to roughly 50% of daily household energy needs) can reduce the cost of the diet, since household no longer have to purchase additional nutritious foods, and instead access micronutrients from the fortified maize. Table 9 shows the daily cost of the nutritious diet for a 5-person household if the household were consuming various types of maize. At the national average, consumption of unrefined fortified maize results in the lowest cost of the nutritious diet.

Table 9: Cost of the nutritious diet for the household under various maize consumption scenarios. (WFP 2020, CotD 2021)

	Refined Maize	Refined Fortified Maize	Unrefined Maize	Unrefined Fortified Maize
Western	38.8	38.0	34.7	33.7
Central	27.8	27.0	24.0	23.3
Copperbelt	28.1	27.6	24.8	25.4
Eastern	38.5	37.7	33.9	32.4
Lusaka	38.6	38.0	35.2	34.5
Southern	36.5	35.9	33.1	32.5
National Average	**34.6**	**33.9**	**30.9**	**30.3**

Main Message 7

Although most households live at least partly off agriculture, the agricultural sector contributes only a small fraction to GDP. Diversifying homestead and commercial production would improve diversity and hence quality of nutrient intake and incomes.

The Agricultural Sector in Zambia

Agricultural is Zambia major employer, providing livelihoods for roughly half of the total Zambia population(Chapoto et al., 2019). The contribution of agriculture to overall GDP has been declining in absolute terms (from 1.9 billion USD in 2010 to 0.8 billion USD in 2019) and relative terms (from 9.4 total percent GDP contribution in 2010 to 2.9 percent in 2019). The details showing case this decline in value are illustrated in Figure 33. The figure shows, in brown, the total value of GDP in Zambia over time, showing steady increase. The green line shows the total value agriculture, showing a decline from a total nation valuation of USD 2 billion to less than USD 1 billion in the past decade. The blue line shows the percentage agriculture is contributing to GDP in percentage terms, showing a decline from a tenth of GDP to less than 3% (World Bank, 2021). Despite the reduction in agricultural value of the past 20 years, the value of Zambian food exports is increasing, and tripled since 2008, as shown in Figure 34.

Figure 33: GDP Value and contribution to GDP of the agricultural sector in Zambia. (World Bank 2021)

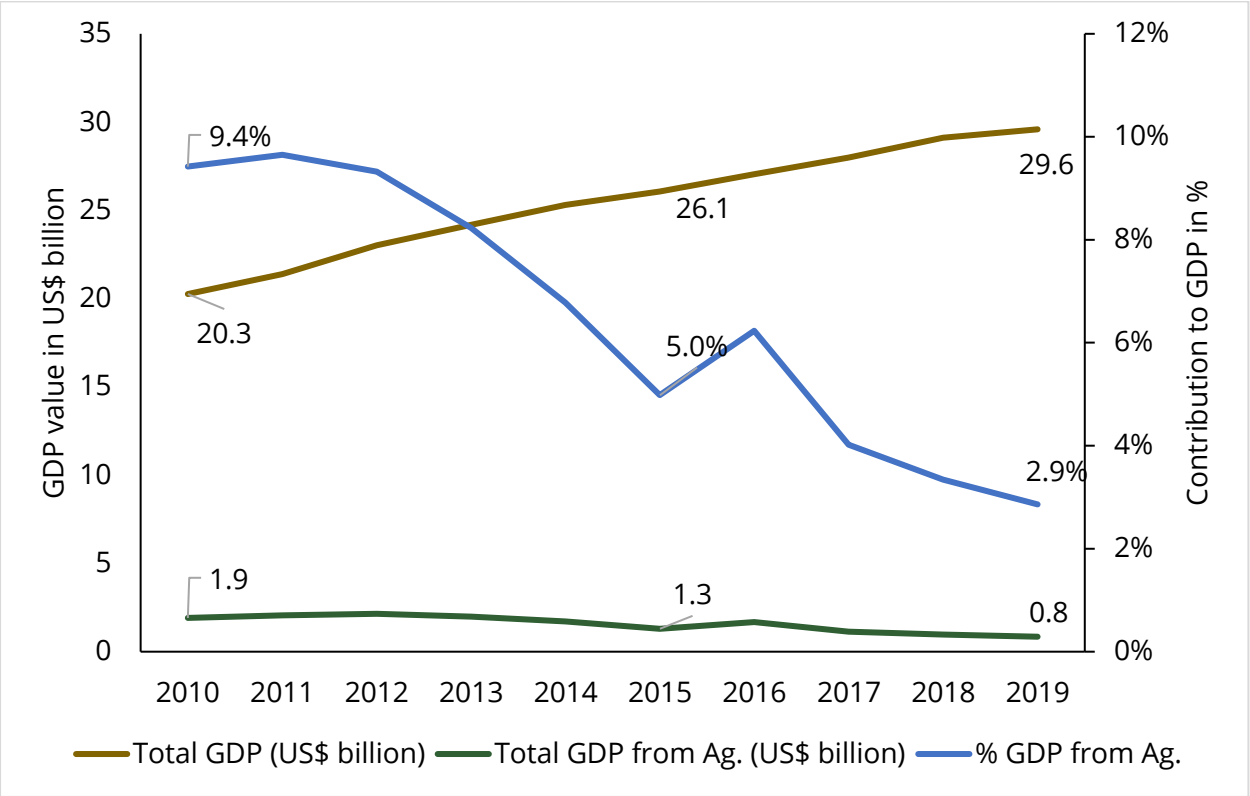
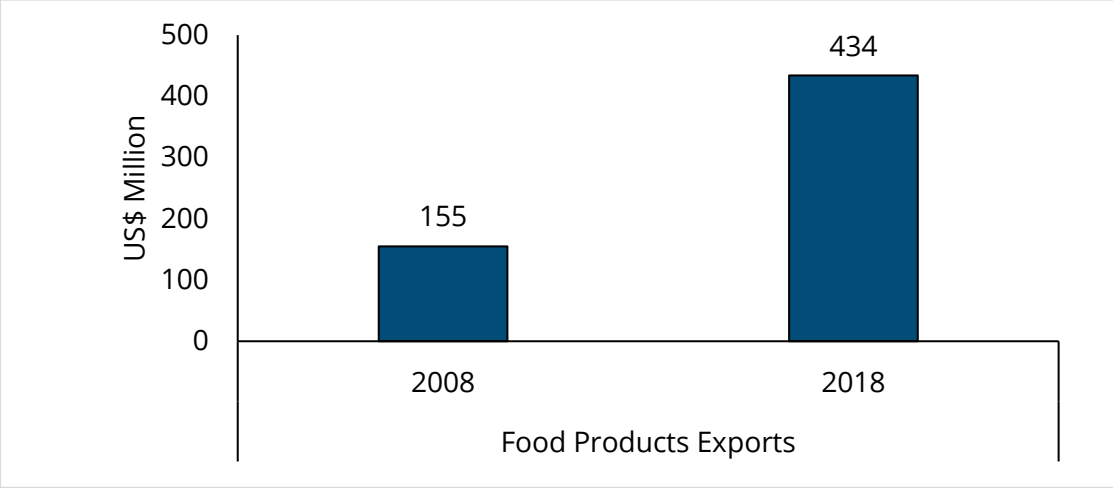


Figure 34: Value of Zambia food exports in 2008 and 2018. (World Bank 2021)



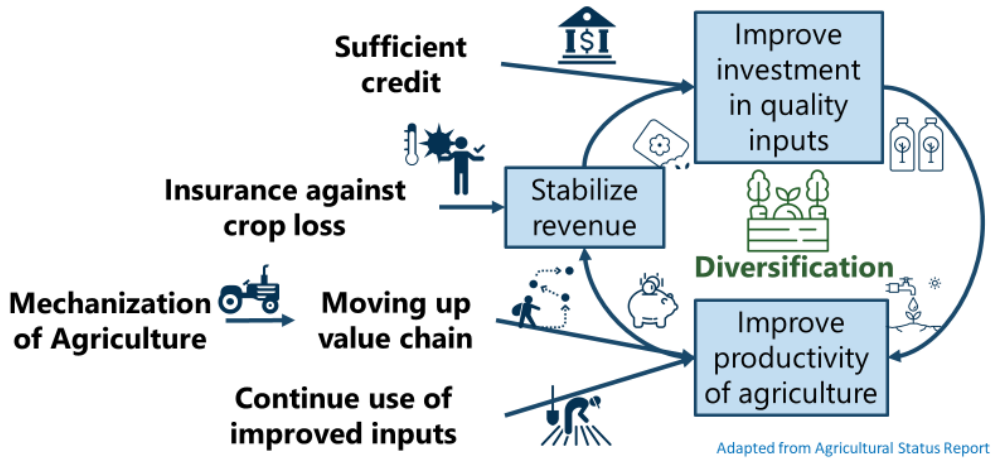
Reorientation Towards Diversified Production

Staple sufficiency has long been the agricultural policy focus for Zambia which is considered a surplus producer of maize in the region. At the national level, food balance sheets show that there is a surplus of maize available. Despite surpluses, maize exports have decreased in value and tonnage over the past years and horticulture and livestock production have not yet filled the gap. Diversification of production provides an opportunity to further improve export value of food products while adding to the availability and affordability of fresh nutritious foods in Zambia. To reach this diversification it is essential to support necessary

pre-conditions, namely mechanisation, agricultural inputs, credit lines, access to markets, digitization, insurance, and improved climate information. Under adequate conditions of financing and coordination with agro-dealers, recent policies like the Electronic Farmer Input Supply Programme (E-FISP) have excellent potential to support improvements in agriculture (Chapoto et al., 2019).

Up to one third of the total food consumed by smallholders comes from their own production. Household dietary diversity is clearly linked with size of landholdings. Smallholder farmers with less than half a hectare of land consume only five food groups, whereas farmers with more hectares consume on average seven food groups. Further disaggregating production and sale data by landholding size is required to identify whether most farmers with low landholdings prioritize staple foods in their own production, or whether some farmers with low landholdings choose to sell the more nutritious foods they grow. Existing data indicates that for almost all crops there is high market participation of farmers, but cash crops such as cotton and soybeans are almost universally sold (above 90 percent) (Subakanya & Chapoto, 2020).

Figure 35: Pre-conditions for smallholder diversification in Zambia. (adapted from Agricultural Status Report)



Modelling Diversified Homestead Production

If surpluses are sold, diversified homestead food production can improve household consumption of healthy foods and availability in the food environment at the local level. We modelled three diversified homestead interventions to estimate their impact, described in Table 10:

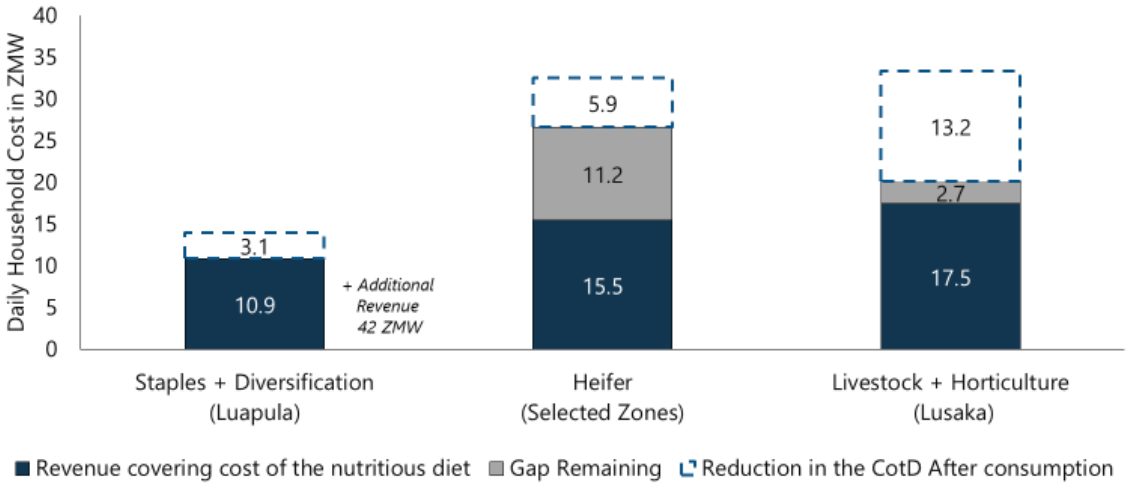
Table 10: Modelling assumptions for agricultural models used in the FNG analysis. (FAO 2021, ZAMSTAT 2020, CotD 2021)

Model	Modelling Zones	Season	Production Commodities	Yields	Post-harvest losses	Amounts Consumed by Household (weekly)	Price	Amounts sold by Household (weekly; sold only in relevant season)
Staple Food + Diversification	Luapula	Non-lean season	0.5 ha (50% maize, 16% spinach, 16% carrot, 16% green beans)	Maize: 2,381 kg/ha Spinach:12,930 kg/ha Carrot: 8,813 kg/ha Green Beans: 4,389 kg/ha	Maize: 13.5% Spinach: 44% Carrot:30% Green Beans:14%	Maize: 10 kg Spinach: 5 kg Carrot: 5kg Green Beans: 5 kg	Maize: 3.3 ZMW/kg Spinach: 0.9 ZMW/kg Carrot: 12.8 ZMW/kg Green Beans: 13.6 ZMW/kg	Maize: 12 kg Spinach: 56 kg Carrot: 47 kg Green Beans: 34 kg
Heifer Dairy	Lusaka, Western, Southern, Eastern, Central	Both seasons	1 milk-producing cow	Cow: 6 liters per cow per day	NA	7 liters	7.5 ZMW/liter	28 litres
Dairy + Horticulture	Lusaka	Non-lean season	1 milk-producing cow + 0.25 acres (50% OFSP, 50% Spinach)	Cow: 6 liters/cow/day Spinach:12,930 kg/ha OFSP: 3,586 kg/ha	Spinach:44% OFSP: 30%	Milk: 7 liters Spinach: 5 kg OFSP: 5 kg	Milk 7.5 ZMW/litre Spinach: 9.9/kg OFSP: 10.9/kg	Milk: 28 litres Spinach: 40 kg OFSP: 15 kg

The modelling was done for specific provinces to reflect different livelihood activities. In lieu of validated farm gate prices, market prices were used to estimate the impact of generating income through surplus sales.

All three models show that smallholder livelihoods can support consuming a nutritious diet and generate revenue for covering diet costs (Figure 36). Models 1 (Staples + Diversification) reduced the cost of the nutritious diet by 3 ZMW per day and generated enough revenue to cover the remainder of the cost of the diet, plus additional revenue. Models 2 and 3 did not produce additional surplus revenue but reduce the cost of the diet through consumption by 6 and 13 ZMW respectively, and provided a substantial amount of revenue for covering the cost of the nutritious diet.

Figure 36: Reduction in the cost of the nutritious diet due to consumption of diversified production and revenue earned through sale of diversified crops for three agricultural models: Staples + Diversification, Heifer Dairy Production, and Livestock + Horticulture. (CotD 2021)



Note: Models were carried out in different modelling areas on values calculated for 2019/2020 (pre-inflation adjustment). The Staples + Diversification model was carried out in Luapula where the cost of the nutritious diet is ZMW 14.1/household/day. Heifer Dairy Production was carried out in areas with the highest concentration of cattle (Lusaka, Western, Southern, Eastern and Central), and the average cost of the nutritious diet for these areas is ZMW 32.5/household/day. The Livestock + Horticulture model was carried out only for Lusaka where the cost of the diet was estimated to be ZMW 33.4/household/day.

Main Message 8

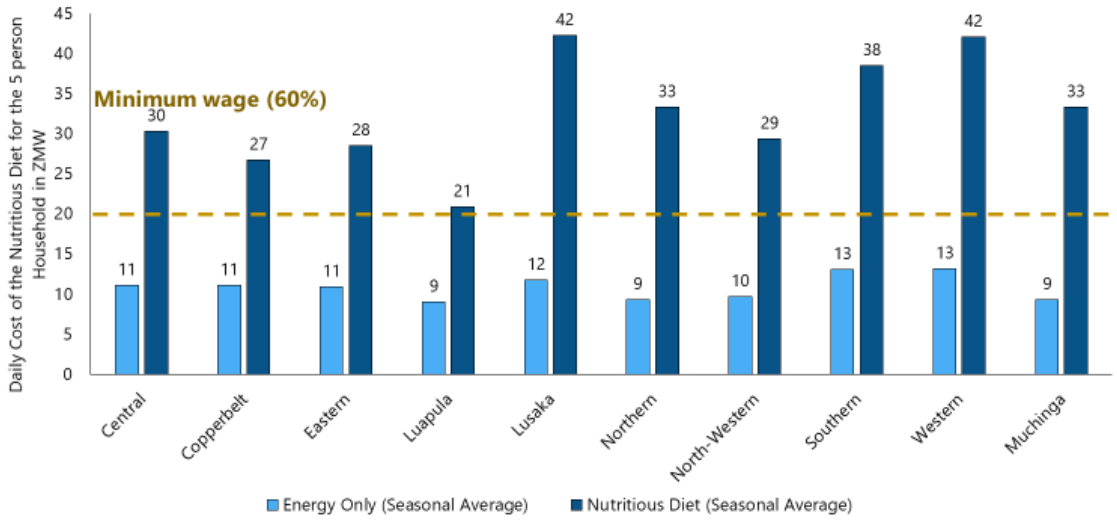
Most low-income households are far from being able to afford a nutritious diet. Current social safety nets can cover a small portion of the costs of nutritious diets. Livelihood support strategies can be an effective tool for improving household purchasing power and strengthening local food systems.

Minimum Wage

When the current minimum wage of ZMW 33 per day is adjusted for food expenditure (assuming households spend 60 percent of minimum wage on food), the remaining value of

wages is insufficient to cover the cost of the nutritious diet for the household in all provinces, assuming only one wage earner (Government of Zambia, 2018). Figure 37 compares the cost of both the energy-only and the nutritious diets with the minimum wage (portion going towards food purchases). While the value of the wage is enough to cover energy needs, it does not cover the cost of a nutritious diet in any of the provinces.

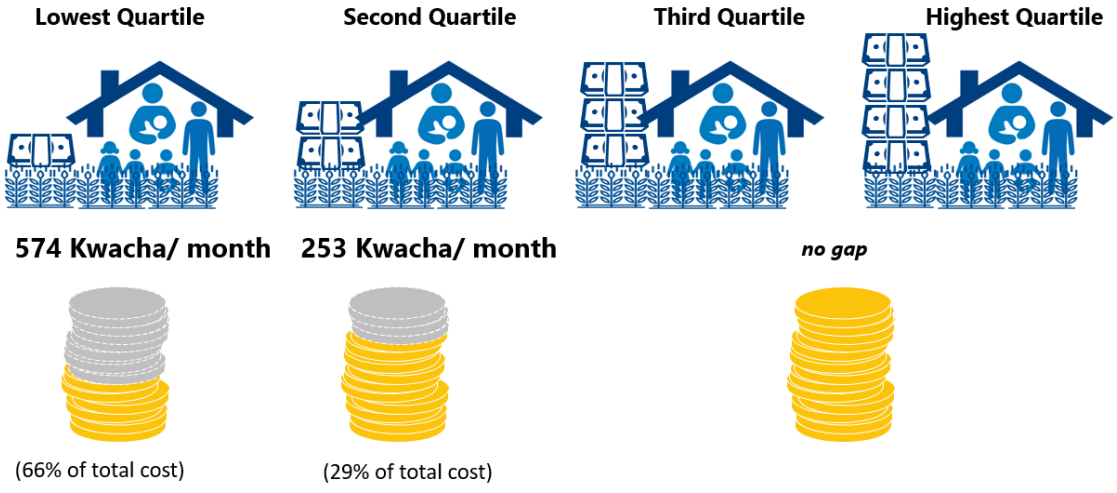
Figure 37: Comparison of the minimum wage and the cost of the nutritious diet for a 5-person household. (Government of Zambia, CotD 2021)



Non-Affordability Gap

Households in the bottom two quartiles of food expenditure face significant gaps between the amount they currently spend on food and the amount they need to cover the cost of the nutritious diet. For the poorest rural quartile, this gap is ZMW 574 per month (66 percent of the total cost of the nutritious diet), and for the second poorest this gap remains high at ZMW 253 per month (29 percent of the total cost of the nutritious diet), as illustrated in Figure 38.

Figure 38: Non-affordability of the nutritious diet by wealth quartiles. (LCMS 2015, CotD 2021)



Social Protection for Nutrition

Given the large economic barriers to accessing nutritious diets, social protection interventions provide a pathway to improve household purchasing power. Social protection can be made more nutrition-sensitive by better considering nutritious needs of beneficiaries and targeting economic barriers beneficiaries face in accessing nutritious diets. Specifically, social protection can be made more nutrition sensitive in the following ways:

Removing economic barriers

Ensuring transfer sizes are sufficient enough to help households access nutritious diets. This requires an analysis of the extent to which transfers can improve access to nutritious foods, taking into account the value and availability of nutritious foods in the food environment.

Reaching underserved populations & vulnerable groups

Social protection must be targeted at the most vulnerable households, and within those households, the most nutritional vulnerable individuals. It is imperative to identify food environments/periods when nutritious diets are least affordable and organize social protection to provide support for those periods. Additionally, it is critical that programs prioritize meeting the needs of nutritionally vulnerable individuals, namely women (particularly when pregnant or lactating), children and adolescent girls.

Set preventing malnutrition as objective

Social protection programs can be oriented to ensure that households channel resources toward healthy, diverse diets. Using market based approached, this can be done through voucher programs for fresh foods and cash programs that have formal agreements with fresh food vendors. Additionally, social protection programs can include provision of fortified foods, like fortified staples or specialized fortified foods for targeted individuals.

Connect transfers to health and other services that can fill nutrient gaps

Social protection programs can be linked to existing health interventions through conditionalities. Beneficiaries could be incentivized to participate in vaccination campaigns, pre-natal acre, or supplementation with cash transfer programs.

Cash Transfers in Zambia

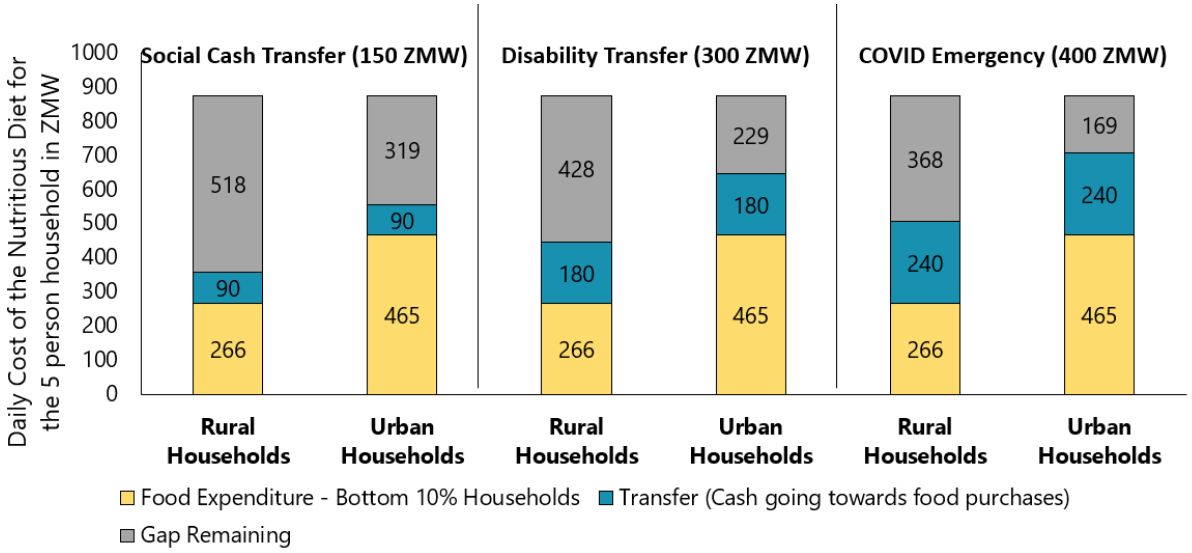
The FNG Zambia examined three ongoing social protection programmes and assessed the gap between household expenditure of the poorest decile and the cost of the nutritious diet after receiving social safety nets (of ZMW 150 per household per month, of ZMW 300 per household per month, and of ZMW 400 per household per month).

Table 11: Descriptions of three selected cash transfers and coverage of the cost of the nutritious diet provided by the transfers. (WFP 2021, CotD 2021)

Transfer	Value (per month)	Proportion (65%) of Value estimated to go to food purchases (per month)	Proportion coverage of the cost of nutritious diet (household)
Social Cash Transfer	150	90	10%
Social Disability Transfer	300	180	21%
COVID Food Security Transfer	400	240	27%

Figure 39 illustrates that for the poorest 10 percent of households, current transfers still leave a gap towards covering the cost of the nutritious diet, and that rural households face significantly larger barriers than their urban counterparts in affording healthy diets.

Figure 39: Coverage of the daily cost of the nutritious diet for the 5-person household by food expenditure of the poorest 10% of households. (CotD 2021)



Note: Calculations assume that 60 percent of transfer value is going towards food purchases.

It is important to note the regional variation in coverage provided by a cash transfer. Figure 40, Figure 41, and Figure 42 show the how each cash transfer provides coverage of the cost of the nutritious diet amongst the different provinces in Zambia. These figures illustrate that is is necessary to consider geographic variation across food systems and food prices when planning social protection measures intended to help households access nutritious diets.

Figure 40: Coverage of the cost of the nutritious diet for a 5-person household by the social cash transfer program (150 ZMW). (CotD 2021)

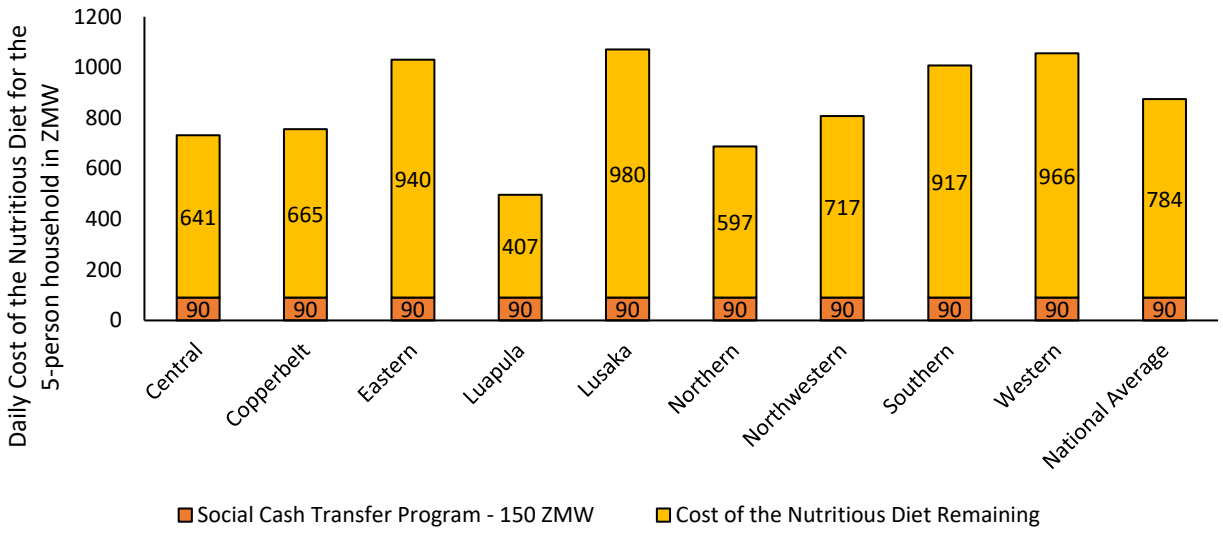


Figure 41: Coverage of the cost of the nutritious diet for a 5-person household by the disability cash transfer program (300 ZMW). (CotD 2021)

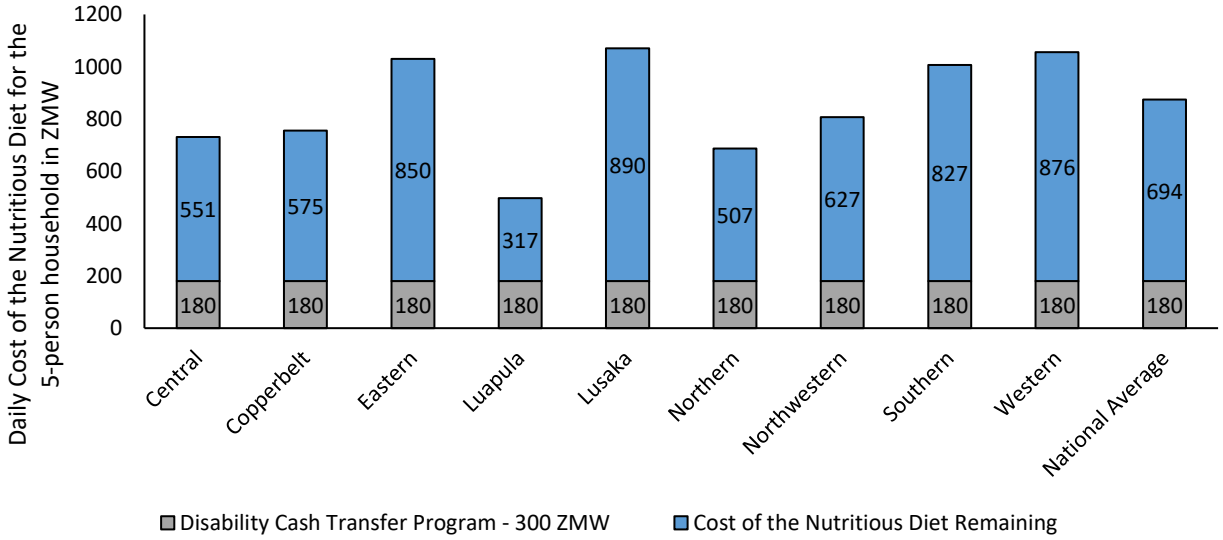
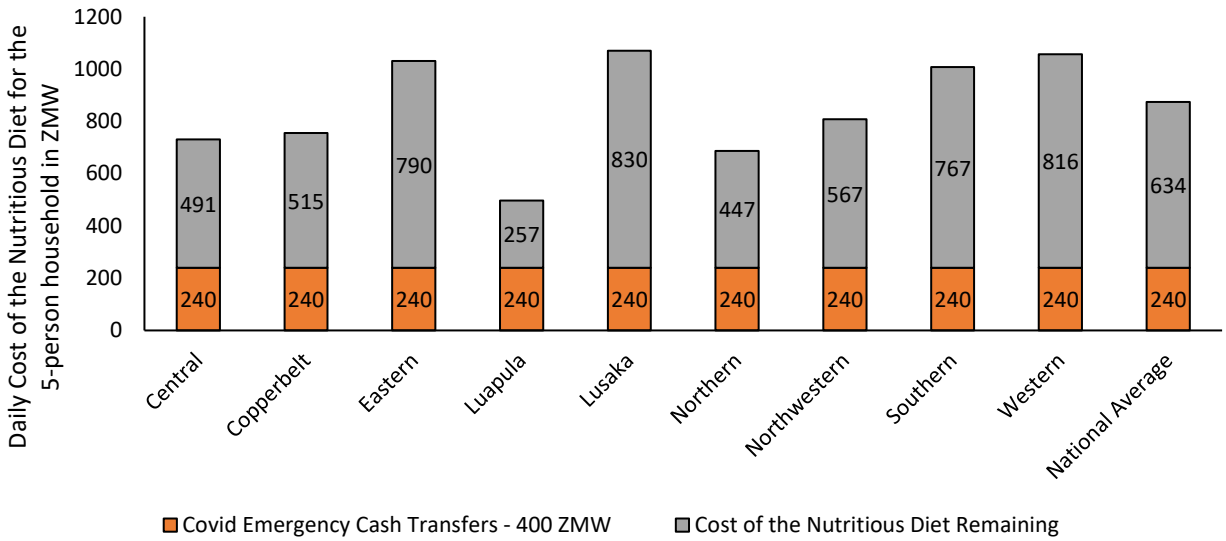


Figure 42: Coverage of the cost of the nutritious diet for a 5-person household by the Covid-19 emergency cash transfer (400 ZMW). (CotD 2021)



Food Security Pack

Agricultural programmes like the Food Security Pack (FSP) rolled out by the Ministry of Community Development and Social Services (MCDSS), provide another alternative to improve incomes for households that are identified as vulnerable but not labour-constrained. The FSP promotes various livelihood support strategies, including production of staple food and cash crop production through rainfed agriculture, vegetable production through irrigated agriculture, and alternative livelihoods related to animal husbandry and fish ponds (Ministry of Community Development and Social Services, 2019). The FNG Zambia analysis estimated potential income gains from two FSPs: irrigated production of vegetables and tubers and rainfed production of maize, soybeans, and peanuts. Modelling Assumptions and sources for assumptions are provided in Table 12.

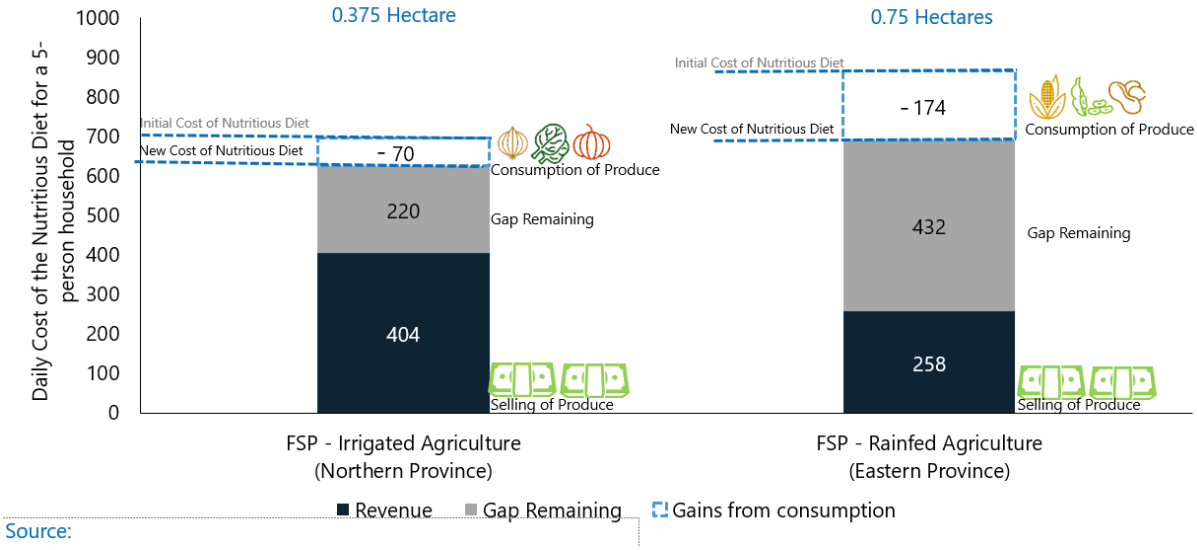
Table 12: Modelling assumptions for the Food Security Pack modelling. (FAOSTAT 2020, ZAMSTAT 2020, CotD 2021)

Model	Modelling Areas	Season (source: FAO Crop Calendar)	Land Size	Crop Yields (source: FAOSTAT 2020)	Monthly Household Consumption	Market Price (per kg) (source: ZAMSTAT CPI)
Food Security Pack 1: Irrigated Agriculture	Northern Province	Non-Lean Season	Area 1.5 lima (0.375 Hectare)	onion (5804 kg/hectare), pumpkin (8906 Kg/hectare), and spinach (12930 Kg/hectare)	20 kg of onion, 20 kg of pumpkin, and 20 kg of spinach	onion 7.4 ZMW, pumpkin 1.8 ZMW, spinach 2.8 ZMW
Food Security Pack 2: Rain-fed Agriculture	Eastern Province	Non-Lean Season	2 Lima (0.5 Hectare)	maize (2200 kg/hectare), soya beans (1580 Kg/hectare), and groundnuts (700 Kg/hectare), (FAOSTAT 2020).	20 kg of maize, 20 kg of soybean, and 4 kg of peanut	Maize 2.3 ZMW, Soya beans 19.6 ZMW, peanut 13.3 ZMW

In Food Security Pack 1: Post-harvest losses were assumed for each crop. Revenues calculated for harvesting seasons between 2–7 months but divided for 12 months. It is assumed 56 percent of revenues are going towards food purchases (LCMS 2015 for rural HH). In Food Security Pack 2: Post-harvest losses were assumed for each crop. Revenues calculated for harvesting seasons (between 1–4 months) but are divided for 12 months). It is assumed 56 percent of revenues are going towards food purchases (LCMS 2015 for rural HH).

The models illustrate the potential gains if households are able to consume a portion of their harvest and sell part of their production. Under the irrigated agriculture FSP modelled for the Northern province, the sale of the farmed commodities allows households to cover most of the cost of the nutritious diet if foods are sold at market price. Under the rainfed agriculture FSP modelled for Eastern province, households were not able to cover the total cost of the nutritious diet through consumption of production and surplus sale, as indicated by the gap in grey in Figure 43. Although modelling specifications for the two models differ, comparison indicates that production of higher value non-staple foods has good potential to increase household income while also improving supply of these foods in the food system.

Figure 43: Reduction in the cost of the nutritious diet due to consumption of Food Security Pack (FSP) crops and revenues earned due to sale of FSP crops for both the irrigated agriculture package and rainfed agriculture package. (CotD 2021)



Source:

Minimum expenditure Basket

The FNG Zambia also considered assistance programmes in refugee settings, specifically the preliminary estimate for the Minimum Expenditure Basket (MEB), calculated for Mantapala District in Luapula province. The food MEB for households with acceptable food consumption and no crisis/emergency coping adoption was estimated at ZMW 820 per 5-person household per month (or ZMW 164 per person per month). This aligns with the findings from the FNG Zambia in which a lowest cost nutritious diet in Luapula costs ZMW 638 per 5-person household per month, although the two analyses are not directly comparable due to varying geographic areas and methodologies. Table 13 provides details comparing the two analyses.

Table 13: Comparison of the Food MEB in Mantapala and cost of the nutritious diet in Luapula. (WFP/UNHCR 2020, CotD 2020)

	Food Minimum Expenditure Basket	Least Cost Nutritious Diet
Value in ZMW	820	638
Geographic Area	Refugee setting in Mantapala District, Luapula	General Luapula Province
How value is determined:	By accessing the amount households spend to access a diet with acceptable food consumption and no crisis/emergency coping adoption	By calculating the minimum cost of meeting micronutrient needs (micronutrient adequacy)

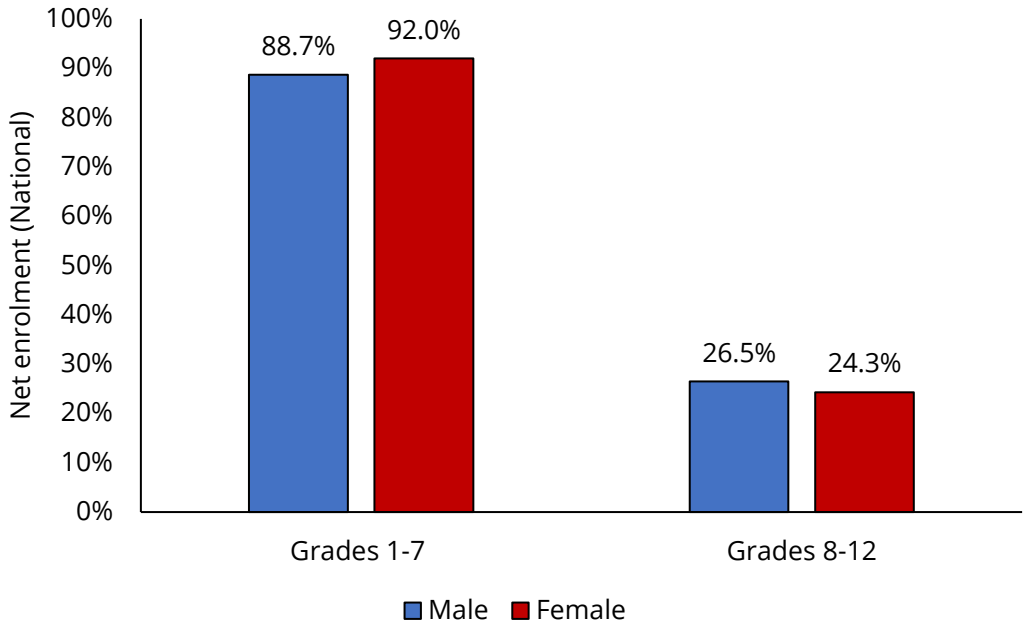
Main Message 9

School meals serve as an opportunity to provide learners with essential micronutrients that they may otherwise not consume. A diverse, nutritious meal can contribute significantly to covering micronutrient needs and reduce household cost in feeding the school-going child.

School Enrolment in Zambia

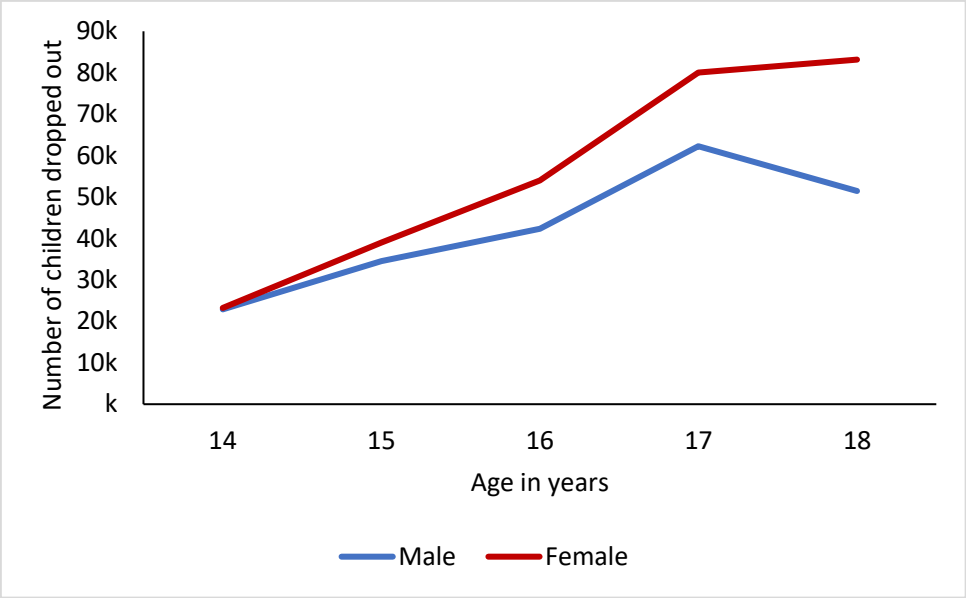
In Zambia, primary school net enrolment is high at 88 percent but reduces significantly in secondary school, where net enrolment is only 25 percent. In primary school, both sexes are equally represented (1.0 Gender Parity Index), but this shifts somewhat between primary and secondary school: 24 percent of girls are enrolled in secondary school, compared to 27 percent of boys (Ministry of General Education, 2016) (Figure 44).

Figure 44: Percentage of students in age-approproate schooling disaggregated by sex. (Ministry of General Education Zambia 2016)



The difference in attendance is particularly visible when comparing total dropouts by sex and age. While at 14 years of age there is no visible difference between girls and boys, at 16 years of age 12,000 (28%) more girls have dropped out than boys, further rising to a 32,000 (62%) difference between 18-year-old girls and boys. This difference is likely to be explained with different socioeconomic and cultural barriers for boys and girls (Ministry of General Education, 2016) (Figure 45Figure 46).

Figure 45: Number of dropouts by age group disaggregated by sex in Zambia. (Ministry of General Education 2016).



Economic Incentives for Retention

Provinces with lower per capita income have a lower percentage of school-going children, as shown in Figure 46, which compares median per capita income at the province level to rates of school enrolment. Furthermore, provinces with lower median income have higher dropout rates for adolescent girls, as shown in Figure 46. These areas also have a higher difference in dropout rates between boys and girls which indicates that in economically weak provinces, adolescent girls are more affected by poor economic circumstances than their male counterparts (Figure 47).

Figure 46: Plotted correlation between rate of school going children and per capita income. (RALS 2019, LCMS 2015)

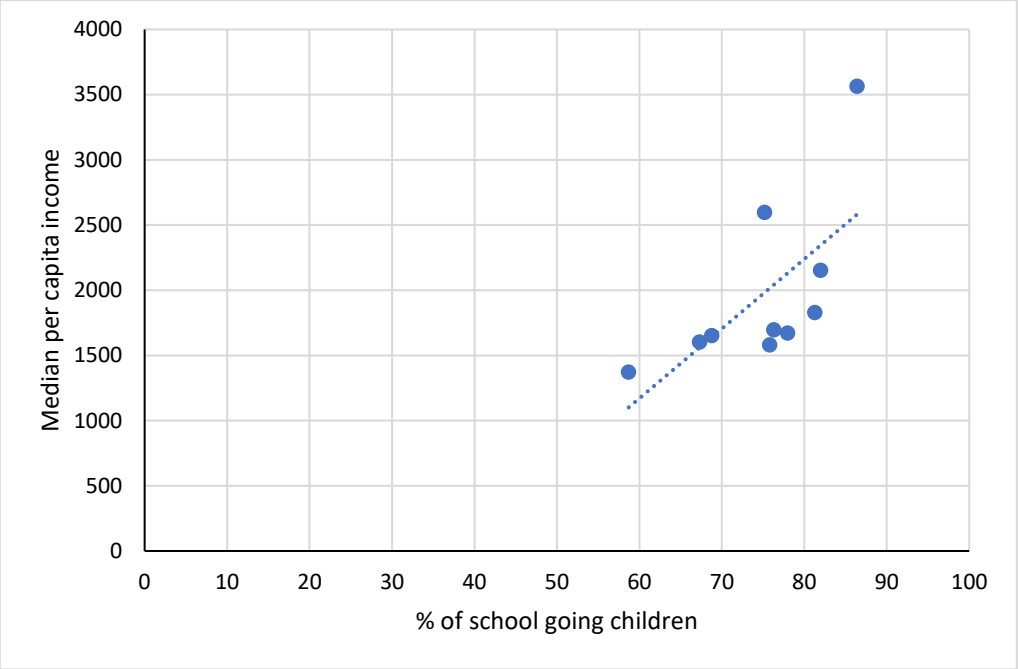
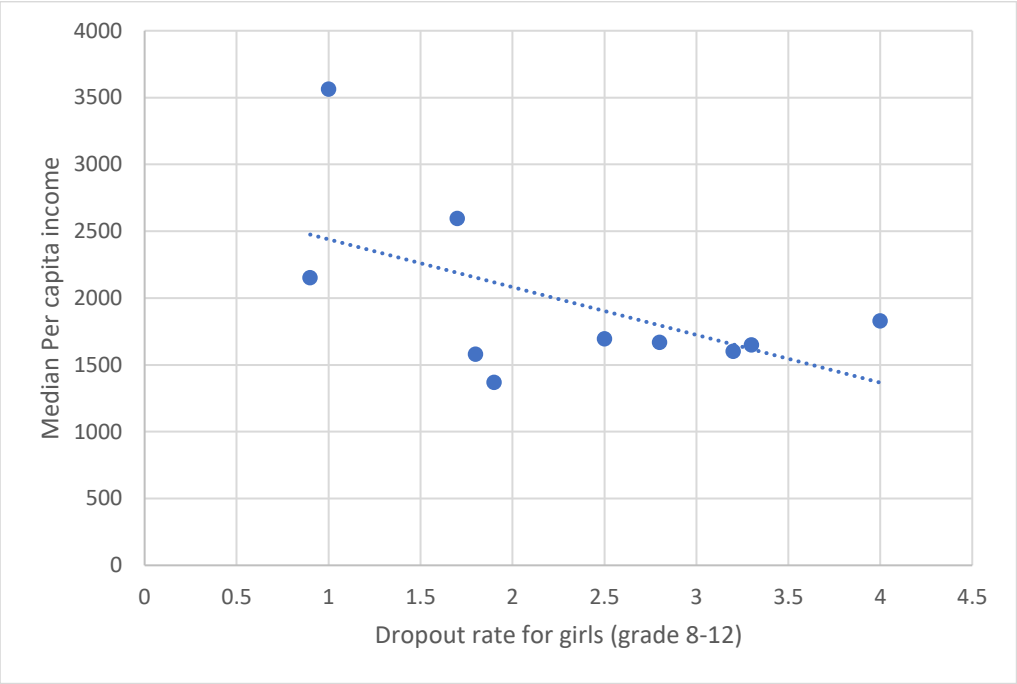
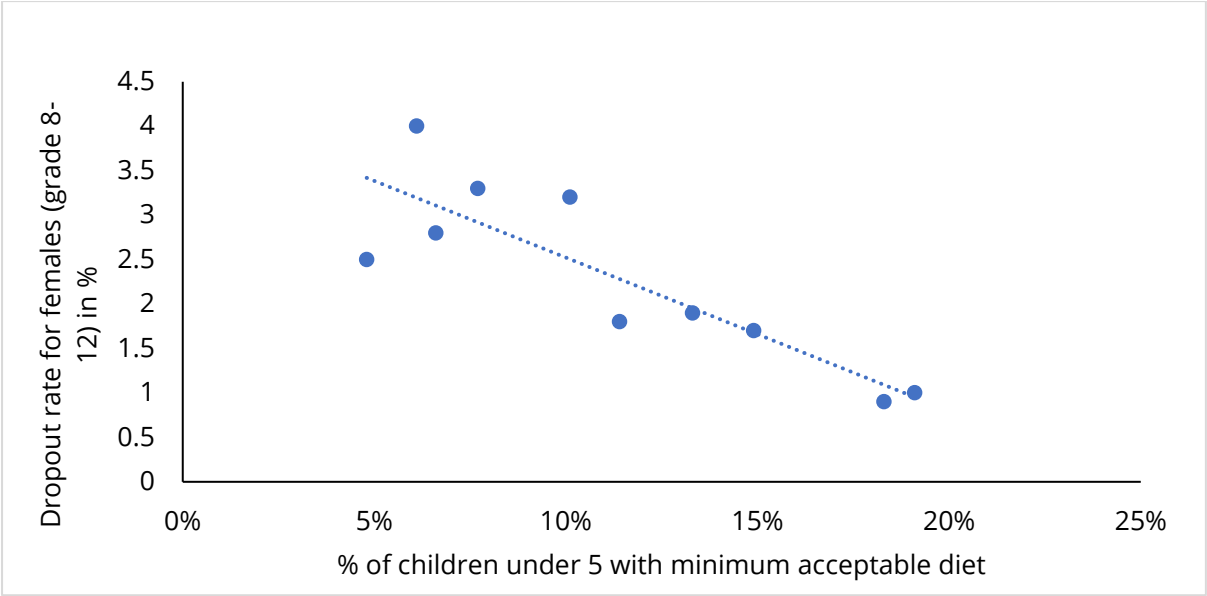


Figure 47: Plotted correlation between dropout rate for girls and per capita income. (RALS 2019, LCMS 2015)



Socioeconomic factors driving decisions related to education status of girls can also have consequences for nutrition outcomes, as maternal education is a known driver of infant nutrition. Comparing enrolment data with information on dietary intake also shows that where more girls are dropping out of school, fewer children under 5 consume a minimum acceptable diet (Figure 48). School meals can therefore serve as an economic incentive to keep children and adolescents in school, as well as serve as an opportunity to improve micronutrient intakes for better health among learners and develop healthy dietary habits (Subakanya & Chapoto, 2020) (ZAMSTAT, 2016).

Figure 48: Correlation between percentage of children under 5 with minimum acceptable diet and the dropout rate for females. (MoGE 2016, DHS 2016)



Zambia's Home-Grown School Feeding Program

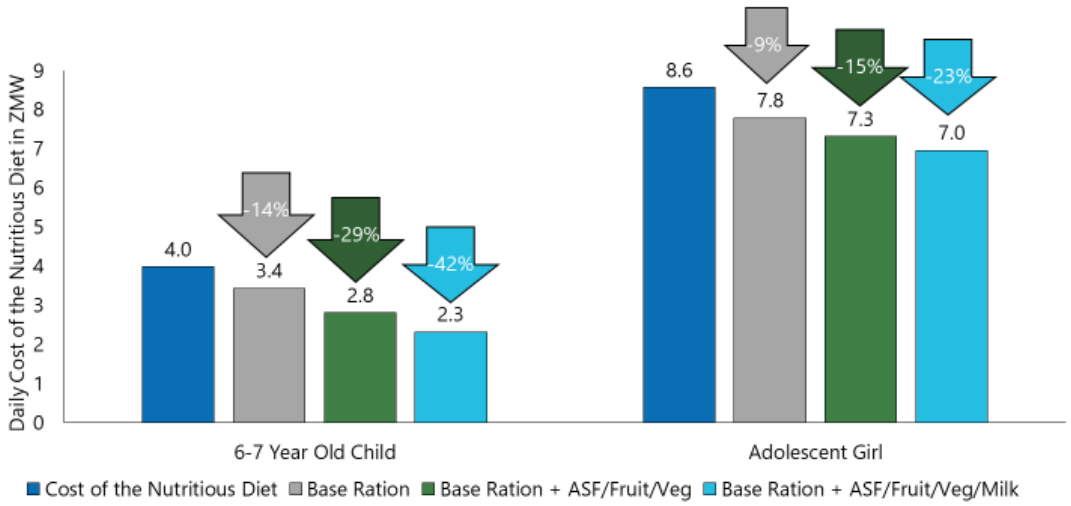
Zambian school meal programmes are being reoriented towards a more diverse school ration by the Ministry of General Education Home-Grown School Feeding Programme. The FNG Zambia analysed the potential reduction in the household's cost of feeding the school-going child if they received the standard base ration (120g maize, 20g dried beans, 10g fortified oil, and iodized salt) plus a diverse combination of vegetables, fruit, and animal source foods. School rations modelled by the FNG are shown in Table 14.

Table 14: Composition of rations modelled in the FNG analysis of home-grown school feeding programs.(CotD 2021)

Ration	Basic School Ration	Additions
Base Ration	• 120g maize • 20g dried beans • 10g fortified oil • iodized salt	No Additions
Base Ration + ASF/Fruit/Veg		• 50g Rape • 10g Dried Kapenta • 40g Mango
Base Ration + ASF/Fruit/Veg/Milk		• 50g Rape • 10g Dried Kapenta • 40g Mango • 120ml Milk

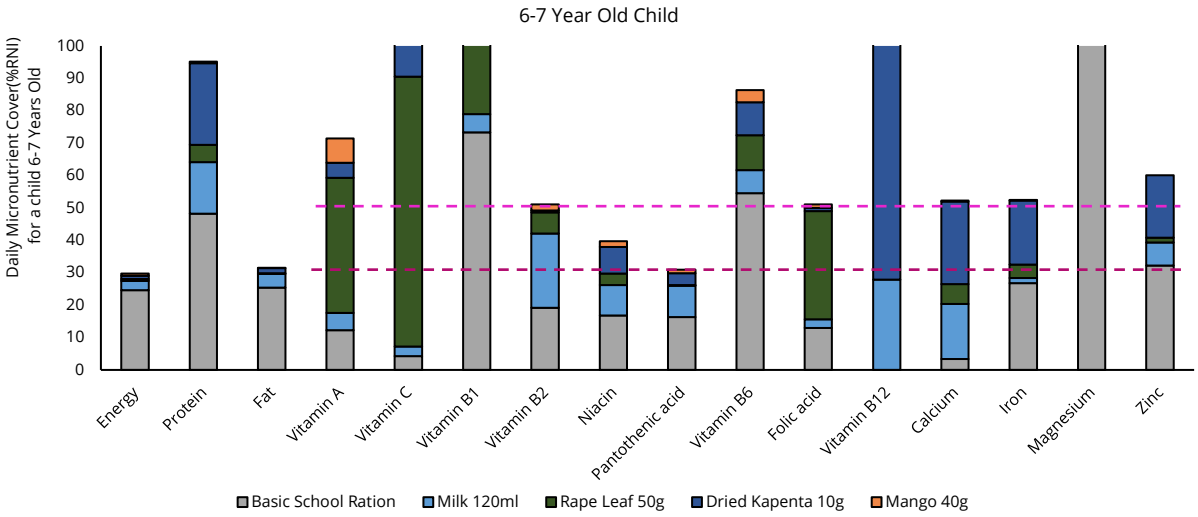
Costs were also estimated with the addition of a glass of milk (120 ml) to aid in coverage of calcium, a micronutrient essential for bone growth for this group but expensive to access in the Zambian food system. Figure 49 shows that the diverse school meal, without and with the addition of milk, can significantly reduce the cost of the diet for both the school-aged child and adolescent girl, thereby reducing the cost burden for the household of feeding learners.

Figure 49: Cost of the nutritious diet for a child aged 6–7 years and an adolescent girl aged 14–15 years without and with consumption of aspirational school meals. (CotD 2021)



Micronutrient coverage of the *Base Ration + ASF/Fruit/Veg/Milk* school meal is provided in Figure 50. Dashed lines are provided at the 30% and 50% RNI levels to provide a point of reference in this meals micronutrient coverage. This school ration covers all micronutrient needs at above the 30% when it includes vegetables and animal-source foods, which are providing additional quantities of B12, calcium, B2, and iron.

Figure 50: Micronutrient coverage of the improved school mean for a child 6-7 years old. (CotD 2021)



Fortification and biofortification have potential to improve micronutrient content and reduce the cost of the nutritious diet. The FNG analysis modelled several variations of fortified and bio-fortified school meals to analyse the impact on the cost of the nutritious diet and on the improvement to the micronutrient profile of the school ration, indicated in Table 15.

Table 15: Composition of rations modelled in the FNG analysis of bio-fortified and fortified school meals. (CotD 2021)

Ration	Basic School Ration	Additions
Base Ration	• 120g maize • 20g dried beans • 10g fortified oil • iodized salt	No Additions
Base Ration + FUF		Replacement of unrefined flour with fortified unrefined flour
Base Ration + FUF + BF Beans		Replacement of unrefined flour with fortified unrefined flour + replacement of beans with biofortified high-iron beans
Base Ration + FUF + BF Beans + OFSP		Replacement of unrefined flour with fortified unrefined flour + replacement of beans with biofortified high-iron beans + 60g orange-flesh sweet potato

Modelling a school meal consisting of 120g of fortified maize meal, 20g of biofortified pulses, 10g of oil and 50g of orange flesh sweet potato, reduced the cost of the diet by ZMW 1 per day for school-going children in the household. Despite this relatively low reduction in cost, it is important to highlight that this improved school meal would meet more than 60 percent of micronutrient needs of a child aged 6–7 years with seven essential micronutrients (vitamins A, B1, B2, B6, folic acid, magnesium and zinc), and more than 40 percent for iron and vitamin B12 (Figure 52).

Figure 51: Cost of the nutritious diet for the school-aged child and the adolescent girl with and without consumption of bio-fortified and fortified school meals. (CotD, HarvestPlus 2021)

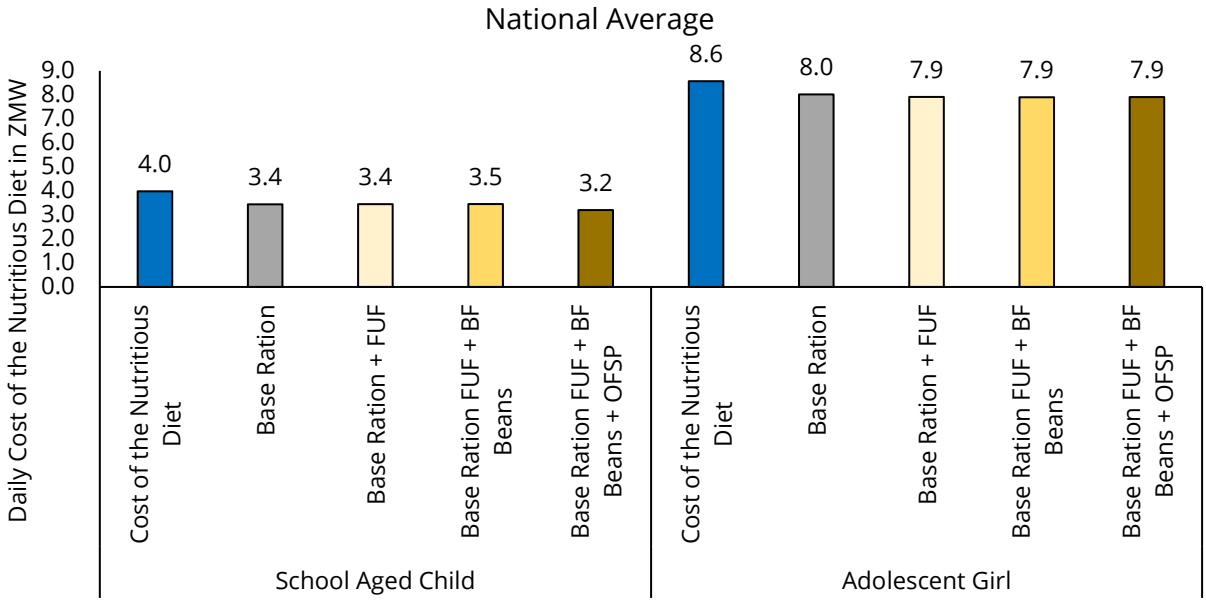
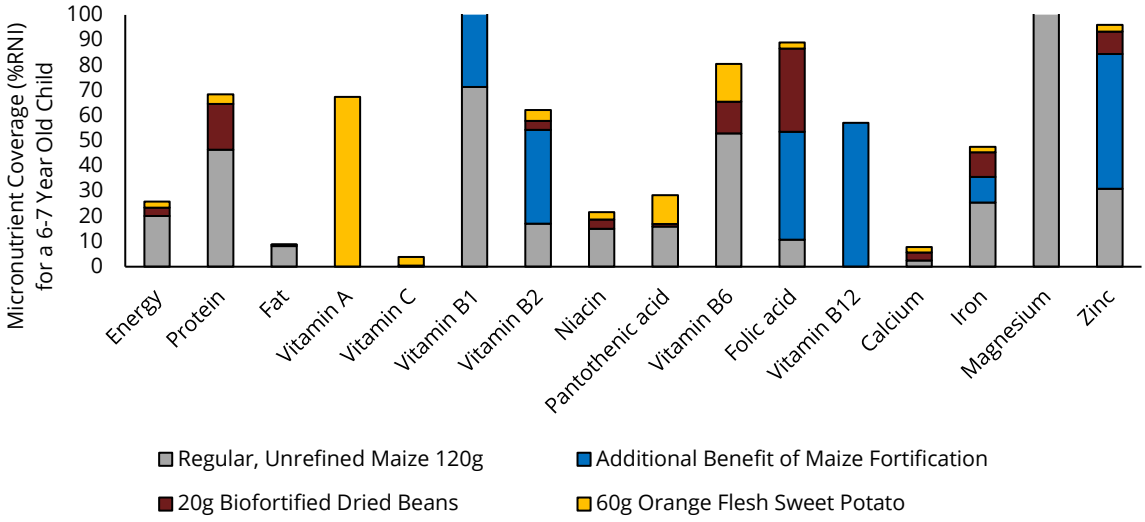


Figure 52: Micronutrient coverage of a fortified and bio-fortified school meal for a child 6-7 years old.



Current school meal programmes in Zambia are also exploring innovative approaches for income-generation for schools, and own production for school meals. School Production Units provide a pathway for schools to produce a variety of foods on the grounds of the school, and/or sell the commodities in their local marketplace to generate revenue to pay for school supplies, foods for school meals, or other necessities. To estimate the impact of school production units on generating income for the schools, the assessment included three models: school farming of mainly staples, school farming of staples and green leafy vegetables, and hydroponic production of vegetables (Tables 16 - 18).

Table 16: Parameters for school production models School Farm 1 in Northern Province (0.5 Hectare production).

	Cassava	Beans	Sweet Potato
Area Planted	45%	45%	10%
Estimated Generated Income (Annual)	26,939 ZMW	5,261 ZMW	276 ZMW
Price per KG (Markets prices for Western Province – Non Lean Season)	5.9 ZMW	17.2 ZMW	2.2 ZMW
Estimated Increased Food Supply (Annual Kg)	4,535 KG	305 KG	126 KG

Table 17: Parameters for school production models School Farm 1 in Western Province (0.5 Hectare production).

	Cassava	Green Leafy Vegetables	Sweet Potato
Area Planted	10%	54%	36%
Estimated Generated Income (Annual)	8667 ZMW	8054 ZMW	2146 ZMW
Price per KG (Markets prices for Western Province – Non Lean Season)	8.6 ZMW	4.9 ZMW	3.8 ZMW
Estimated Increased Food Supply (Annual Kg)	1008 Kg	1644 Kg	565 Kg

Table 18: Parameters for school production models School Farm 3 in Lusaka Province (greenhouse 9mx24m)

	Spinach	Cabbage	Rape Leaf	Eggplant
Area Planted	25%	25%	25%	25%
Amount Harvested (KG per month)	318	318	318	318

If a school were to use the food for its school meals instead of for sale in the marketplace, they would be able to provide school meals which could reduce the cost of the nutritious diet for learners and fill certain micronutrient needs. Table 2Table 19 summarized the reduction in the cost of the nutritious if food harvested from school production units was given in the form of school rations, as well as the micronutrient covered at or above the 10% threshold with consumption of these meals (coverage shown for both the school-aged child and the adolescent girl). Figure 53 and Figure 54 provide details of how foods harvested from School Farms and

Figure 55 provides details on how foods harvested from the hydroponic garden provide nutrient coverage for a child aged 6-7 years.

Table 19: Summary of modelling results from consumption of produce from school farms in cost reduction and micronutrient coverage for school-aged children and adolescent girls.

Model	Cost reduction (in percent) for 6–7 year old and adolescent girl	Micronutrients contributed (>10% of RNI)
School Farm I	-15% (average across both school-going children)	Vit C, B6, Vit A
School Farm II	-11% (average across both school-going children)	Vit A, Vit C, Vit B1, Vit B6, Folate
Hydroponics	-10% (average across both school-going children)	Vit A, Vit C, B1, folate, magnesium

Figure 53: Micronutrient coverage of the reduced base ration and food produced by the school production unit (School Farm 1) for a child 6–7 years old. (CotD 2021)

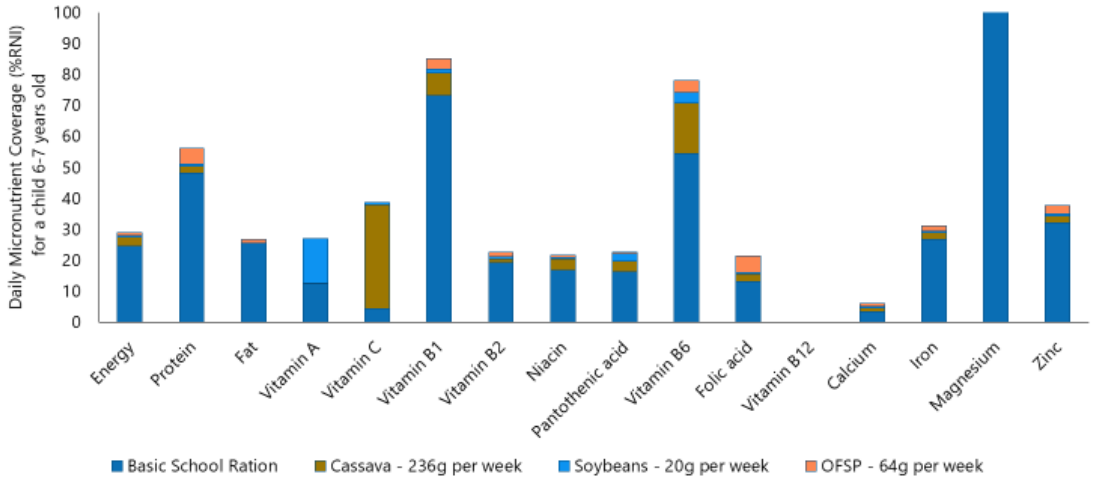


Figure 54: Micronutrient coverage of the reduced base ration and food produced by the school production unit (School Farm 2) for a child 6–7 years old. (CotD 2021)

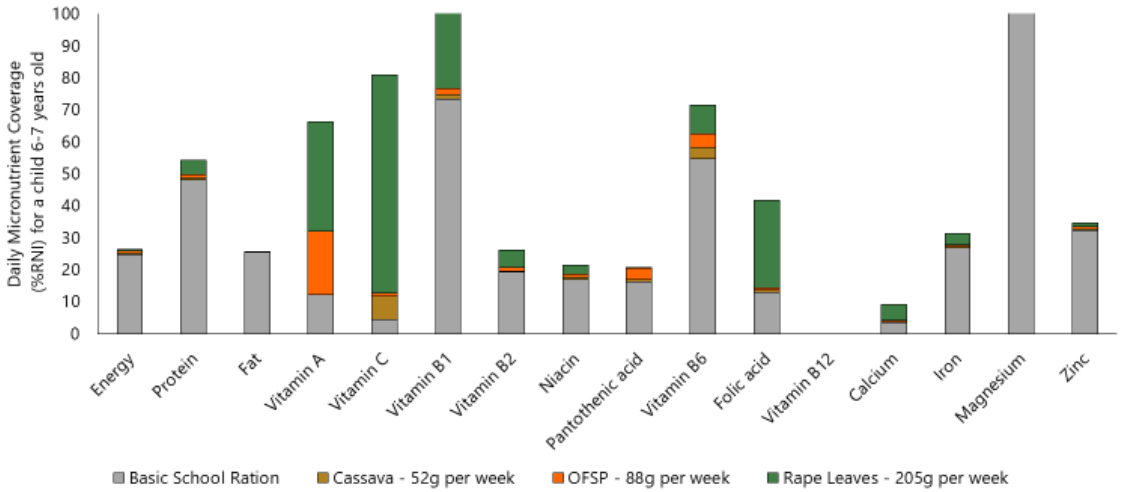
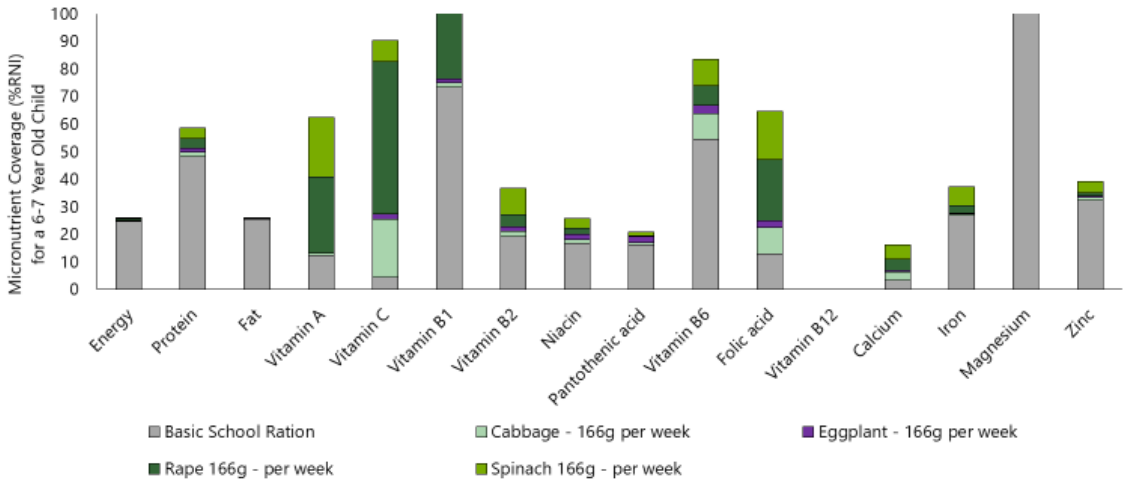


Figure 55: Micronutrient coverage of the reduced base ration and food produced by the school hydroponic garden for a child 6–7 years old. (CotD 2021)



Main Message 10

Multisectoral action is needed to sustainably reduce malnutrition. Combining interventions from different sectors has the potential to cut the cost of a nutritious diet in half. Adding sustainable improvement of livelihoods and ensuring adequacy of social safety nets could make a nutritious diet affordable for all.

Need for Multi-Sectoral Coordination

There is no silver bullet for ending all forms of malnutrition. A combination of interventions is required to enable households and individuals to access nutritious diets. Multisectoral interventions can reduce non-affordability through combining the following: targeted interventions for vulnerable individuals (supplementation, school meals); increasing the availability of nutritious foods (market-based interventions, smallholder production, diversifying homestead gardens); increasing nutrient content of foods (staple food fortification); and increasing household purchasing power (cash transfers, income-generation).

Modelling Packages

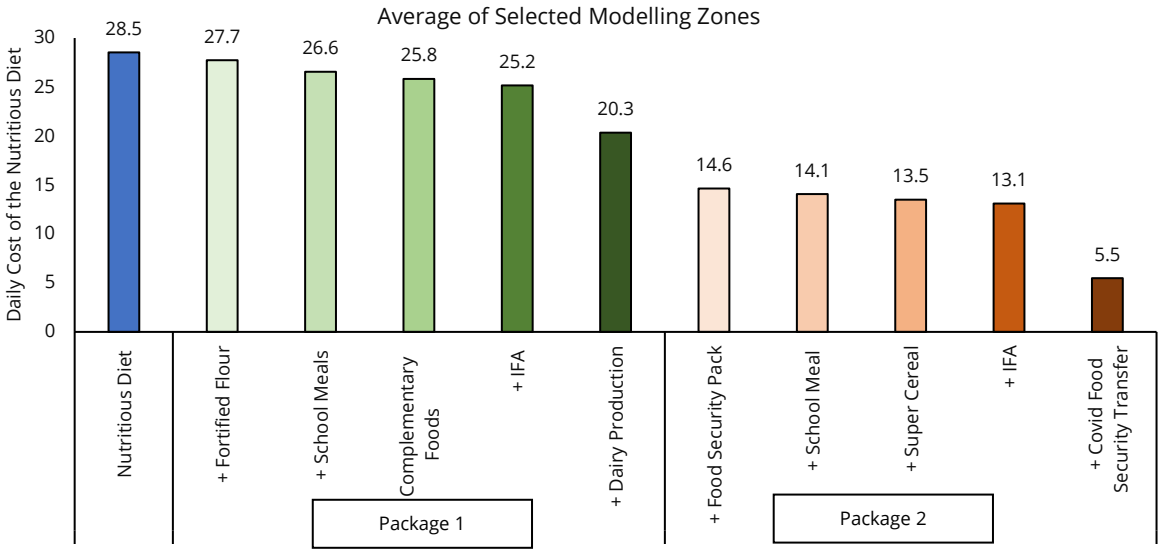
The FNG analysis estimated the daily cost of a nutritious diet for two intervention packages. Household Package 1 includes: nutritious complementary feeding (in-kind) for a child of 12–23 months; school meals for a school-aged child and adolescent girl; IFA daily for the breastfeeding mother; replacement of unfortified maize with fortified maize meal; and dairy production (1 litre consumed per day) for the household. This intervention would reduce the daily cost of the nutritious diet for the household from ZMW 28.5 to ZMW 20.3

Household Package 2 is intended for crisis-affected or particularly vulnerable households. This package includes: daily portion of fortified infant flour (in-kind) for a child 12–23 months; fortified school meals for a school-aged child and adolescent girl; IFA daily for the breastfeeding mother; rainfed agriculture Food Security Pack; and COVID Food Security transfer (ZMW 400 per month). Without the addition of the cash transfer, the intervention could reduce the cost of the nutritious diet from ZMW 28.5 to ZMW 13.1 per household per day. With the addition of the cash transfer, the gap left for the household to cover the cost of the nutritious diet is further reduced to ZMW 5.5.

Table 20: Description of FNG packages.

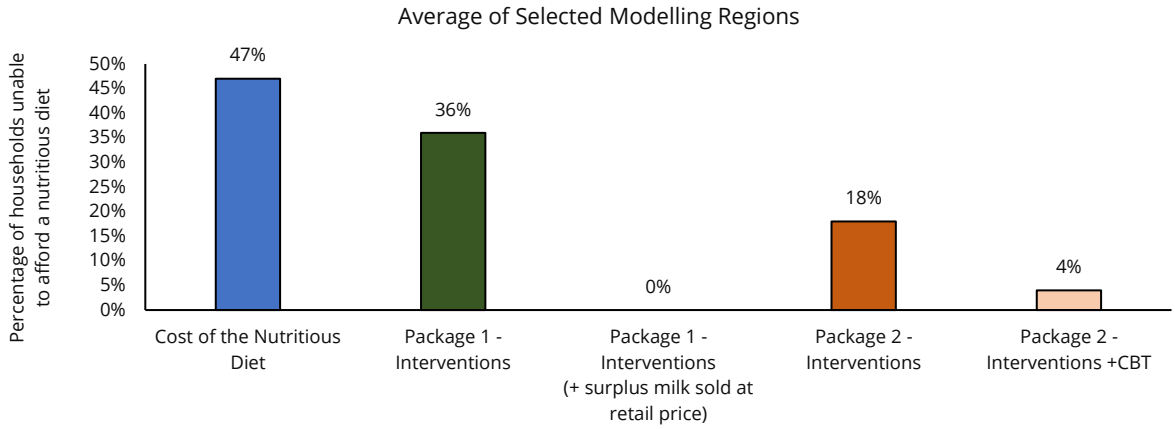
Target Group	**Household** **Package 1**	**Household Package 2**
Under 2 year old:	Complementary Foods (for free)	Corn Soy Blend+
School-Age Child/ **Adolescent Girl:**	School Meal (Fresh)	School Meal (Fortified)
Breastfeeding Mother:	IFA	IFA
Household Intervention:	• Fortified Flour (through market) • Dairy Production (Heifer Model)	• Food Security Pack (rainfed agricultural) • Covid Food Security Transfer (400 Kwacha)

Figure 56: Multisectoral household intervention packages and their respective reductions in the cost of the nutritious diet for the 5 person household. (CotD 2021)



The combination of all of interventions of Package 1 without income generation through dairy production could reduce non-affordability of the nutritious diet from 47 percent to 36 percent. The additional income generated through dairy production could reduce non-affordability to zero percent, as the income could cover a large share of diet costs. The combination of interventions in package 2 could reduce non-affordability in modelling areas from 47 to 18 percent without a cash transfer, but could reduce it to 4 percent with the additional cash transfer (Figure 57).

Figure 57: Reducing in household non-affordability of the nutritious diet



Addressing the drivers of malnutrition requires concerted efforts through all sectors and entry points. Line ministries, humanitarian actors and development partners must consider scaling up short- and long-term nutrition interventions. FNG analysis has provided evidence that by combining incremental efforts through targeted and coordinated action, the vision of a healthy, nutritious diet being available, accessible, and affordable to all Zambian households is achievable.

Recommendations

The FNG Zambia recommendation workshop took place on March 23rd, 2020. Due to Covid-19 restrictions, the event was held both virtually an in-person. Ministerial focal points attended in person (a total of nine people) at the Radisson Blue Conference center in Lusaka, Zambia, and online participants (a total of 40 people) attended using the Microsoft Teams platform. During the dissemination and recommendation workshop, participants were asked to provide inputs and evaluate findings from the FNG to identify priority actions moving forward.

To facilitate information gathering from online participants, two software platforms were used to survey responses; Menti Meter and Mural. Based on a predetermined list of interventions drawn directly from the FNG analysis, all stakeholders were asked to rank interventions they felt should be prioritized. Using open-ended questions, participants were asked to highlight key actions by sector and then suggest areas to develop advocacy messages for would best demonstrate the importance of addressing malnutrition Zambia (results from these activities are provided below).

Using these inputs, sector focal points (attending in person) from the Ministry of Agriculture, Ministry of Health, Ministry of Livestock and Fisheries, Ministry of Community Development and Social Services, plus Education represented by WFP's school feeding focal point, developed advocacy messages by sector[8]. These messages consist of a main recommendation and highlight the supporting FNG evidence. Recommendations are ranked in order of priority, as identified by the stakeholder group.

Recommendation 1: Increase funding to operationalize the Home-Grown School Meals strategy. Funding should support expansion of coverage of programme to include adolescent learners, production of nutritious horticulture crops, promotion of nutrition knowledge using the innovative and climate smart nutrition gardens as teaching aids, and generation of farming revenues for school incomes.

Evidence from the FNG:

- Nutritious, diverse school meals including animal source foods, fruit and vegetables, can reduce the amount a household has to spend to provide adequate nutrition to children by up to a third. (MM 9)
- School meals offer an incentive to go to school. Provinces with lower per capita income have a lower percentage of school-going children and a higher dropout rate for adolescent girls. (MM 9)
- School Production Units can benefit learners by providing income to schools and providing nutritious foods to school meal programmes. They can educate this generation on the benefits of growing and consuming healthy, nutritious foods. (MM 9)

[8] Additional recommendations focusing on actions in Capacity Building and Coordination can be found in the full report.

Recommendation 2: Diversify homestead agricultural production with nutritious crops (including biofortified crops) and small livestock and/or fish farming. Provide mechanisms for creating linkages between producers and established output markets.

Evidence from the FNG:

- In rural areas, up to one third of the total amount of food consumed comes from own production, indicating that household production is a major pathway to support consumption of nutritious foods. (MM7)
- In the minimum cost nutritious diet, fruit, vegetables, and animal source foods contribute most significantly to covering essential micronutrient needs (MM3).
- Consuming produce from own production can reduce household cost by up to one third. (MM 7)
- The production and sale of high value non-staple foods can generate additional revenue, helping households to cover the cost of the diet and, in some provinces, generate surplus income. (MM 7)
- Smallholder farmers should be targeted by diversification programmes as data shows household dietary diversity increases with cultivated land size, indicating vulnerability of smallholder farmers. (MM7)

Recommendation 3: Support policy discussion for engaging relevant actors in commercial fortification.

Evidence from the FNG:

- Fifty three percent of households could not afford to purchase the diversity needed to consume a nutritious diet. (MM 2)
- For those individuals who cannot afford to regularly consume a healthy, nutritious diet, staple fortification is an effective pathway to improving intake of micronutrients otherwise lacking from a low-diversity diet. (MM 6)
- Consumption of three portions of fortified unrefined maize meal could meet over 60 percent of micronutrient needs for iron, and cover large gaps of other micronutrients like B12 and zinc. (MM 6)
- Despite a higher market price, consuming fortified maize will reduce the cost the household has to bear for a nutritious diet. (MM6)

Recommendation 4: Expand coverage of current social safety nets; specifically scale up social cash transfers to households with children under 2 and scale up Food Security Packs to support farming households that are vulnerable but not labour-constrained.

Evidence from the FNG:

- A nutritious diet costs on average ZMW 33/household/day. (MM1)
- Over the 18 months from August 2019 to January 2021, the number of Zambian households that could not afford nutritious diets increased by 10 percent. (MM2)

- The poorest 50 percent of rural households are missing ZMW 250+ per month to buy a minimum cost nutritious diet. (MM8)
- Minimum wage levels are insufficient to meet basic nutrient needs in almost all provinces. (MM8)
- Livelihood support programmes like the Food Security Pack show potential to cover the cost of a nutritious diet, especially if the household produces high-value, fresh, nutritious foods. (MM8)
- A combination of a cash transfer and a nutrition-specific intervention for nutritionally vulnerable groups reduces their risk of malnutrition the most. (MM10)

Recommendation 5: Continue support for improved infant and young child feeding practices, including appropriate complementary feeding. Home fortification could be considered to support particularly vulnerable households.

Evidence from the FNG:

- Suboptimal breastfeeding practices can increase the cost of the nutritious diet of the child aged 6–23 months by up to 70 percent. (MM 5)
- Fresh, nutritious foods like those found in the Zambian Complementary Feeding Guidelines, complement breastfeeding by contributing to filling micronutrient gaps such as those of iron, zinc, and magnesium. (MM5)
- Low minimum acceptable diet is correlated with high non-affordability, highlighting the need for complements to the diet that can fill the nutrient gap, such as micronutrient powder. (MM 5)

Recommendation 6: Prioritize sectoral coordination through common platforms at national and subnational levels to guide integrated nutrition programming.

Evidence from the FNG:

- A nutritious diet is unaffordable for 35 percent of the urban and 63 percent of the rural population, showing the need to develop programmes specific to each context. (MM2)
- A package of interventions targeting the most vulnerable households with assistance interventions from different sectors, can reduce the cost of a nutritious diet by up to 80 percent, making the diet affordable for almost all (MM 10).
- The cost of a nutritious diet can be reduced by around 30 percent with a package of interventions from different sectors that come together at household level to target vulnerable but not labour-constrained households with agricultural support for income generation. Support from the different sectors could include dairy production (agriculture), fresh school meals (education) and improved feeding practices (health and IYCF). (MM10)

Stakeholders

Stakeholders who attended first workshop for developing modelling plan

Lusaka, Zambia

November 24, 2020

Institution	Name
WFP	Edmore Mangisi
WFP	Miyanda Chisanga
FAO	Lucia Rakotovololona
WFP	Philio Nembeye
USAID	Joseph Hirsch
University of Zambia	Pamela Marinda
Save the Children	Brian Ng'ambi
WFP	Marjolein Mwanamwenge
NFNC	Boniface Kanjere
NFNC	Sosten Banda
MOA	Nalakui Sakala
MOGE	Tresphor Chanda
IAPRI	Rhoda Mofya-Mukuka
UNICEF	Josephine Ippe
SUN LE	Patricia Sakala
MOFL	Andela Kangwa
CSO SUN	Mathews Mhuru
NFNC	Freddie Mubanga
Other	Chipo Mwela
University of Zambia	Chiza Kumwenda

Stakeholders who attended first workshop for developing modelling plan

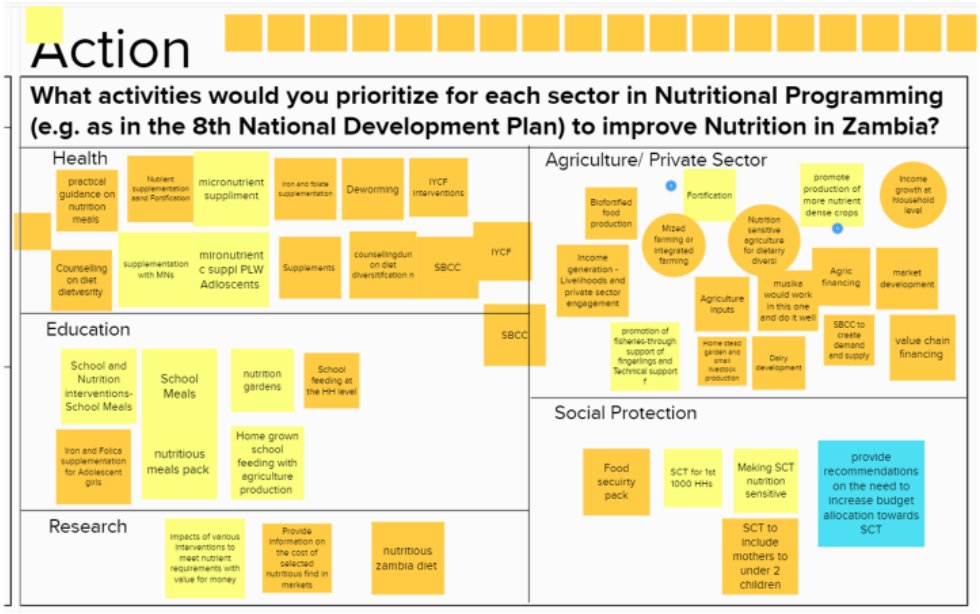
Lusaka, Zambia

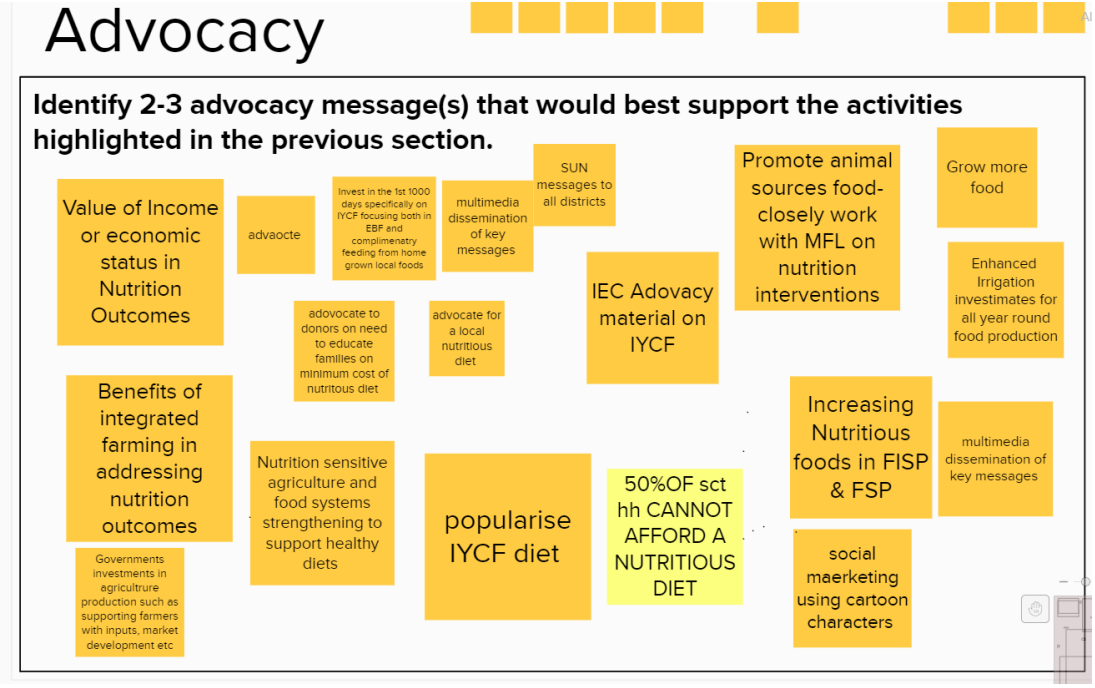
March 23, 2021

Face to face meeting for Government staff	
	Focal point person
NFNC	Freddie Mubanga
NFNC	Boniface Kanjere
WFP	Janosch Klemm
WFP	Zuzanna Turowska
WFP	Marjolein Mwanamwenge
MOH	Dorothy Sikazwe
MCDSS	Lwiindi Kabondo
MCDSS	Wilbroad Zimba
MOA	Nancy Sakala
MFL	Andela Kangwa

Virtual meeting	Focal point person
NFNC	Gladys Kabaghe
NFNC	Sosten Banda
NFNC	Boniface Kanjere
NFNC	Idah Chama
MCDSS	Wilbroad Zimba
MCDSS	Lwiindi Madabali Kabondo
MCDSS	Mwaka Mukwiza
MCDSS	Susan Musonda
MCDSS	Florence Banda
MOA	Sibeso Mulele Nancy Sakala
MoGE	Maybin Lulu
MoGE	Tresphor Chanda
CSO-SUN	Matthews Mhuru
FAO	Celestina Lwatula
FAO	Mercy Chikoko
SUN LE	Patricia Sakala
GIZ	Mwazanji Phiri
Save the Children	Brian Ng'ambi
IAPRI	Rhoda Mofya
UNICEF	Sumit Karn
USAID	Joseph Hirsch
SUN TA	Beatrice Kawana
SUN LE	Matthews Onyango
Swedish Embassy	Audrey Mwendapole
WFP	Taylor Quinn
WFP	Stephen Omula
WFP	Allan Mulando
WFP	Herbert Matsikwa
WFP	Emmanuel Kilio
WFP	Edmore Mangisi
WFP	Phililo Nambeye
Other Participants	

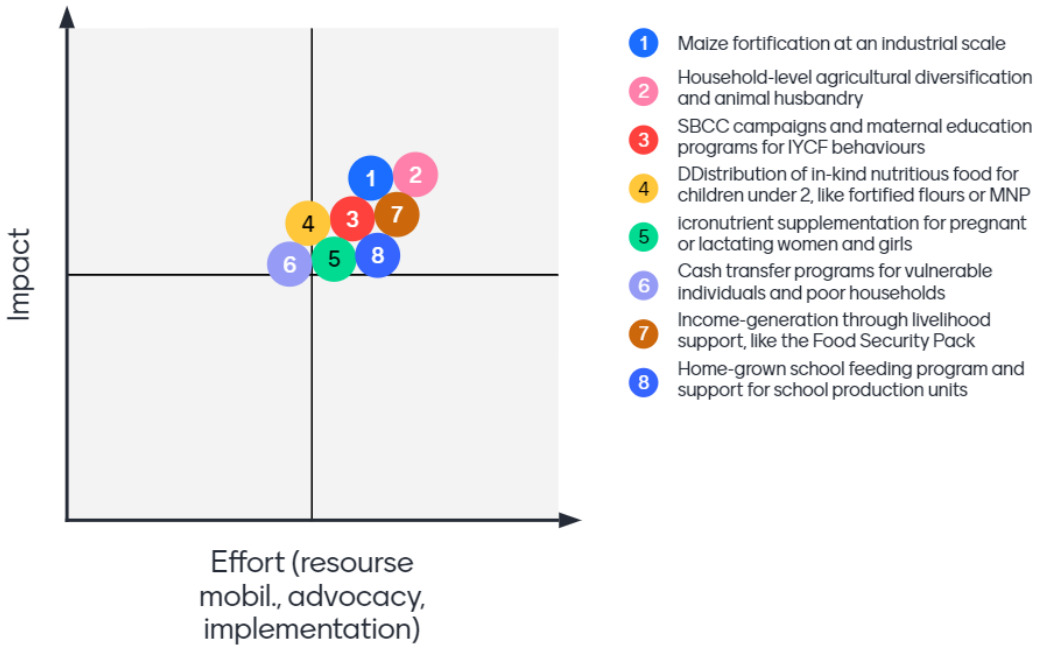
Responses from Online Group: Mural Activity



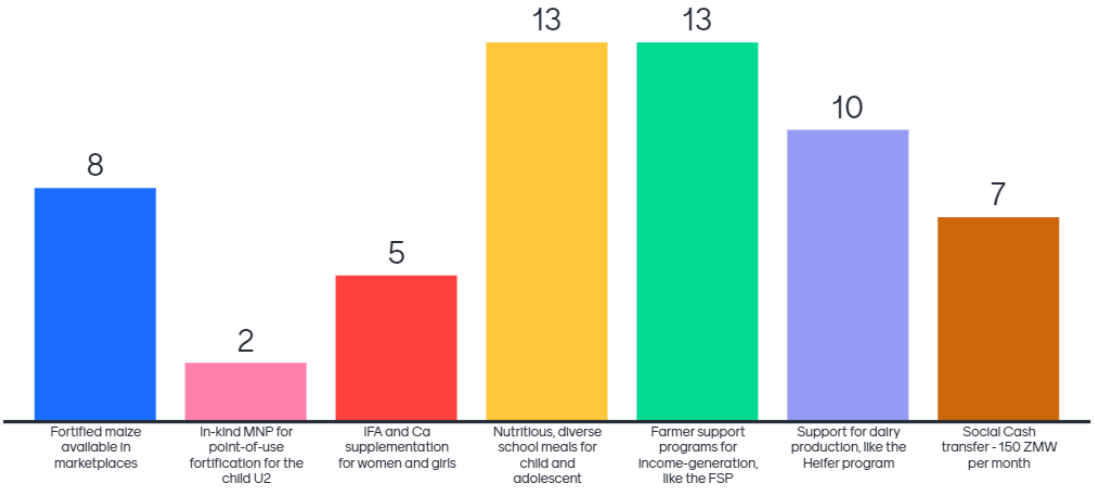


Responses from Online Group – Menti Meter

Question 1: 19 Respondents



Question 2: 20 Respondents



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Annex

Cost of the Energy Only Diet for both seasons, by individual household member.
Pre-Inflation estimates, data from August 2019 (Non Lean) and February 2020 (Lean).

Region	Season	Child 12-23 months	School aged child	Adolescent girl	Man	Lactating woman	Daily Cost
Central	Lean	0.7	1.89	3.09	3.59	3.63	12.9
	NonLean	0.45	1.34	2.18	2.54	2.64	9.15
Copperbelt	Lean	0.67	1.93	3.15	3.67	3.77	13.19
	NonLean	0.45	1.32	2.16	2.52	2.6	9.05
Eastern	Lean	0.65	2	3.27	3.8	3.96	13.68
	NonLean	0.37	1.17	1.91	2.22	2.34	8.01
Luapula	Lean	0.6	1.63	2.66	3.1	3.12	11.11
	NonLean	0.29	1	1.64	1.9	2.05	6.88
Lusaka	Lean	0.75	2.09	3.4	3.96	4.02	14.22
	NonLean	0.45	1.35	2.21	2.57	2.67	9.25
Northern	Lean	0.62	1.67	2.73	3.18	3.2	11.4
	NonLean	0.37	1.06	1.73	2.01	2.06	7.23
Northwestern	Lean	0.62	1.67	2.73	3.18	3.2	11.4
	NonLean	0.34	1.14	1.86	2.17	2.32	7.83
Southern	Lean	0.83	2.32	3.79	4.42	4.49	15.85
	NonLean	0.53	1.51	2.46	2.86	2.93	10.29
Western	Lean	0.77	2.23	3.63	4.23	4.35	15.21
	NonLean	0.53	1.61	2.62	3.05	3.18	10.99

Cost of the Energy Only Diet for both seasons, by individual household member.
Post-Inflation estimates, data from August 2020 (Non Lean) and January 2021 (Lean).

		Child 12-23 months	School aged child	Adolescent girl	Man	Lactating woman	Daily Cost
Central	Lean	0.58	1.78	2.9	3.38	3.53	12.17
	NonLean	0.4	1.23	2	2.33	2.43	8.39
Copperbelt	Lean	0.53	1.45	2.37	2.76	2.79	9.9
	NonLean	0.46	1.34	2.18	2.54	2.61	9.13
Eastern	Lean	0.59	1.68	2.74	3.18	3.25	11.44
	NonLean	0.4	1.34	2.18	2.54	2.71	9.17
Luapula	Lean	0.48	1.46	2.38	2.77	2.95	10.04
	NonLean	0.37	1.28	2.09	2.44	2.62	8.8
Lusaka	Lean	0.52	1.46	2.39	2.78	2.85	10
	NonLean	0.46	1.31	2.14	2.49	2.54	8.94
Northern	Lean	0.46	1.52	2.48	2.89	3.07	10.42
	NonLean	0.37	1.17	1.91	2.22	2.34	8.01
Northwestern	Lean	0.44	1.2	1.96	2.28	2.31	8.19
	NonLean	0.35	0.97	1.58	1.83	1.86	6.59
Southern	Lean	0.42	1.2	1.95	2.27	2.35	8.19
	NonLean	0.42	1.23	2	2.33	2.4	8.38
Western	Lean	0.64	1.81	2.95	3.43	3.5	12.33
	NonLean	0.5	1.54	2.51	2.92	3.05	10.52

Cost of the Nutritious Diet for both seasons, by individual household member.
Pre-Inflation estimates, data from August 2019 (Non Lean) and February 2020 (Lean).

		Child 12-23 months	School aged child	Adolescent girl	Man	Lactating woman	Daily Cost
Central	Lean	1.3	3.46	7.35	5.77	7.24	25.12
	NonLean	1.29	3.14	7.12	5.01	6.41	22.97
Copperbelt	Lean	1.35	3.52	7.54	5.73	7.38	25.52
	NonLean	1.42	3.44	6.83	5.34	7.13	24.16
Eastern	Lean	2.56	5.35	11.89	8.86	10.71	39.37
	NonLean	1.74	3.81	9.09	5.77	7.99	28.4
Luapula	Lean	0.82	2.55	5.69	4.28	5.15	18.49
	NonLean	0.67	1.86	4.79	3.05	3.83	14.2
Lusaka	Lean	2.27	5.16	11.07	8.06	10.49	37.05
	NonLean	2.15	4.85	9.27	7.55	9.53	33.35
Northern	Lean	1.08	3.09	6.88	5.23	6.07	22.35
	NonLean	1.13	3.17	7.04	5.34	6.15	22.83
Northwestern	Lean	1.22	3.37	7.74	5.73	6.9	24.96
	NonLean	1.69	3.62	9.28	5.8	7.75	28.14
Southern	Lean	2.03	4.6	9.95	7.62	9.49	33.69
	NonLean	2.04	4.65	9.31	7.12	9.43	32.55
Western	Lean	1.96	4.49	9.65	6.98	10.18	33.26
	NonLean	2.3	5.12	10.47	8.08	10.22	36.19

Cost of the Nutritious Diet for both seasons, by individual household member.
Post-Inflation estimates, data from August 2020 (Non Lean) and January 2021 (Lean).

Region	Season	Child 12-23 months	School aged child	Adolescent girl	Man	Lactating woman	Daily Cost
Central	Lean	1.6	4	9.23	6.34	8.47	29.64
	NonLean	1.85	4.27	9.56	6.47	8.83	30.98
Copperbelt	Lean	1.4	3.55	8.82	5.59	7.43	26.79
	NonLean	1.5	3.61	8.45	5.64	7.4	26.6
Eastern	Lean	1.71	4.16	10.47	6.43	8.92	31.69
	NonLean	1.4	3.2	8.67	5.16	6.75	25.18
Luapula	Lean	1.03	2.87	7.43	4.51	5.96	21.8
	NonLean	1.03	2.61	6.58	4.13	5.56	19.91
Lusaka	Lean	2.73	6.18	13.08	9.54	11.68	43.21
	NonLean	2.46	6.32	12.71	8.1	11.6	41.19
Northern	Lean	1.66	4.26	10.1	6.97	8.74	31.73
	NonLean	2.25	5.11	10.35	8.21	8.89	34.81
Northwestern	Lean	1.67	4.18	8.78	6.97	7.95	29.55
	NonLean	1.71	3.86	9.88	6.35	7.4	29.2
Southern	Lean	2.58	5.57	12.73	8.98	11.52	41.38
	NonLean	2.05	4.93	10.76	7.08	10.75	35.57
Western	Lean	3.07	6.08	14.42	9.74	11.97	45.28
	NonLean	2.33	5.67	10.86	8.57	11.39	38.82
Muchinga	Lean	1.66	4.26	10.1	6.97	8.74	31.73
	NonLean	2.25	5.11	10.35	8.21	8.89	34.81

Results of Modelling for 12-23 Month Old Child

		Cost of the Nutritious Diet	Optimal Breastfeeding - No Interventions	50% Optimal Breastfeeding	No Breastfeeding	Recipe 1 - Maize, pumpkin, peanuts	Recipe 1 - Maize, spinach, fresh fish	CSB+ 60g (in-kind)	MNP 1g
Central	Lean	1.3	1.3	1.91	2.53				1.27
	NonLean	1.29	1.29	1.79	2.38				1.19
Copperbelt	Lean	1.35	1.35	2.01	2.53				1.28
	NonLean	1.42	1.42	2.05	2.63				1.34
Eastern	Lean	2.56	2.56	3.33	4.16	1.72	2.13	1.43	2.44
	NonLean	1.74	1.74	2.3	3.08	1.33	1.47	1.06	1.57
Luapula	Lean	0.82	0.82	1.33	1.75	0.4	0.47	0.49	0.79
	NonLean	0.67	0.67	0.94	1.32	0.37	0.43	0.44	0.54
Lusaka	Lean	2.27	2.27	3.08	2.92	1.64	1.81	1.4	2.09
	NonLean	2.15	2.15	3.04	3.84	1.37	1.86	1.08	2.03
Northern	Lean	1.08	1.08	1.66	2.09	0.58	0.66	0.58	1.03
	NonLean	1.13	1.13	1.63	2.04	0.6	0.69	0.52	1.07
Northwestern	Lean	1.22	1.22	1.88	2.41				1.18
	NonLean	1.69	1.69	2.11	2.69				1.4
Southern	Lean	2.03	2.03	2.78	3.48				1.87
	NonLean	2.04	2.04	2.89	3.69				1.94
Western	Lean	1.96	1.96	2.55	3.29	1.23	1.32	1.27	1.81
	NonLean	2.3	2.3	3.29	4.1	1.44	1.71	1.18	2.27

Results of Modelling for 6-7 Year Old Child

		Cost of the Nutritious Diet	Base Ration	Base Ration + ASF/Fruit/Veg	Base Ration + ASF/Fruit/Veg/Milk	Base Ration + FUF	Base Ration FUF + BF Beans	Base Ration FUF + BF Beans + OFSP	Milkit - 5 times a week (market cost)	Amigo Munchos (market cost)	Milkit (free)	Amgio Munchos (Free)	School Production Units – Farm 1	School Production Units – Farm 2	**School Production Units - Hydropnics**
Central	**Lean**	3.46	2.89	2.48	2.14	2.86	2.86	2.65					-	-	-
	NonLean	3.14	2.72	2.24	1.87	2.68	2.69	2.48					-	-	-
Copperbelt	**Lean**	3.52	2.94	2.51	2.16	2.9	2.9	2.67					-	-	-
	NonLean	3.44	3.01	2.44	2.01	2.98	2.99	2.73					-	-	-
Eastern	**Lean**	5.35	4.73	3.67	2.98	4.71	4.71	4.57					-	-	-
	NonLean	3.81	3.41	2.64	2.10	3.4	3.41	3.21					-	-	-
Luapula	**Lean**	2.55	2.21	2.03	1.86	2.17	2.17	2.01					-	-	-
	NonLean	1.86	1.53	1.33	1.19	1.48	1.49	1.4					-	-	-
Lusaka	**Lean**	5.16	4.56	3.62	2.93	4.56	4.55	4.13	9.82	5.49	6.96	5.09	-	-	4.39
	NonLean	4.85	4.42	3.28	2.50	4.42	4.42	4.04	8.61	5.22	5.76	4.82	-	-	4.26
Northern	**Lean**	3.09	2.23	1.97	1.75	2.31	2.3	2.18					-	2.36	
	NonLean	3.17	2.63	2.16	1.91	2.57	2.57	2.46					-	2.59	-
Northwestern	**Lean**	3.37	2.84	2.44	2.15	2.77	2.77	2.65					-	-	-
	NonLean	3.62	2.27	2.64	2.18	3.22	3.23	2.96					-	-	-
Southern	**Lean**	4.60	3.98	3.22	2.69	3.95	3.96	3.63					-	-	-
	NonLean	4.65	4.18	3.22	2.56	4.18	4.2	3.79					-	-	-
Western	**Lean**	4.49	3.92	3.43	2.72	3.9	3.92	3.52					3.91	-	-
	NonLean	5.12	4.64	3.50	2.67	4.59	4.59	4.34					4.46	-	-

Results of Modelling for Adolescent Girl

		Cost of the Nutritious Diet	Base Ration	Base Ration + ASF/Fruit/ Veg	Base Ration + ASF/Fruit/Veg/Milk	IFA	Base Ration + FUF	Base Ration FUF + BF Beans	Base Ration FUF + BF Beans + OFSP	Pregnant	Pregnant + IFA	IFA - once per week	Pregnant + IFA + Ca	School Production Units – Farm 1	School Production Units – Farm 2	**School Production Units - Hydroponic**
Central	**Lean**	7.35	6.76	6.43	6.14	6.10	6.66	6.65	6.65	7.76	6.88	6.44	5.82	-	-	-
	NonLean	7.12	6.72	6.30	5.99	5.72	6.61	6.60	6.60	7.38	6.45	6.07	4.92	-	-	-
Copperbelt	**Lean**	7.54	6.96	6.74	6.57	6.19	6.84	6.83	6.93	7.88	7.07	6.46	6.03	-	-	-
	NonLean	6.83	6.34	5.84	5.46	6.31	6.31	6.31	6.14	7.59	7.19	6.46	5.18	-	-	-
Eastern	**Lean**	11.89	11.15	10.13	9.55	10.42	11.07	11.06	11.04	12.88	11.54	11.06	6.45	-	-	-
	NonLean	9.09	8.55	7.75	7.42	7.54	8.45	8.43	8.53	9.51	8.51	8.10	4.85	-	-	-
Luapula	**Lean**	5.69	5.26	4.95	4.84	4.22	5.09	5.08	5.49	5.54	4.89	4.34	4.89	-	-	-
	NonLean	4.79	4.48	4.20	4.12	3.17	4.33	4.32	4.63	4.59	3.62	3.56	3.48	-	-	-
Lusaka	**Lean**	11.07	10.43	9.16	8.75	9.45	10.28	10.22	10.44	11.32	10.47	9.79	7.51	-	-	10.26
	NonLean	9.27	8.76	7.62	6.98	9.27	8.76	8.75	8.48	10.63	10.30	9.27	6.19	-	-	8.60
Northern	**Lean**	6.88	6.20	5.75	5.64	5.35	6.01	6.00	6.00	6.56	5.96	5.40	5.32	-	6.08	-
	NonLean	7.04	6.54	6.04	5.87	5.62	6.38	6.37	6.37	6.81	6.14	5.80	5.00	-	6.42	-
Northwestern	**Lean**	7.74	7.19	6.83	6.60	5.95	7.00	6.99	6.99	7.70	6.57	6.19	5.86	-	-	-
	NonLean	9.28	8.97	8.42	8.18	6.68	8.78	8.76	8.76	9.28	7.56	7.55	5.38	-	-	-
Southern	**Lean**	9.95	9.33	8.52	8.15	8.35	9.21	9.20	9.20	10.45	9.43	8.90	8.39	-	-	-
	NonLean	9.31	8.75	7.85	7.27	8.80	8.70	8.70	8.41	10.22	10.03	8.96	6.83	-	-	-
Western	**Lean**	9.65	8.97	8.24	8.02	7.85	8.83	8.80	8.80	10.24	9.43	8.41	9.22	8.94	-	-
	NonLean	10.47	9.91	8.70	8.04	9.90	9.88	9.89	9.89	11.73	11.07	10.20	7.13	9.67	-	-

Results of Modelling for Pregnant and Lactating Woman

		Cost of the Nutritious Diet	Calcium – 1.5g	LNS - 75g	IFA – 1g
Central	Lean	7.24	6.73	5.37	6.73
	NonLean	6.41	5.57	4.33	6.13
Copperbelt	Lean	7.38	7.01	6.2	7.09
	NonLean	7.13	6.08	5.97	6.94
Eastern	Lean	10.71	7.27	6.52	10.26
	NonLean	7.99	5.87	5.36	7.64
Luapula	Lean	5.15	5.15	4.4	5.11
	NonLean	3.83	3.83	3.2	3.72
Lusaka	Lean	10.49	8.35	8.29	10.49
	NonLean	9.53	6.79	6.67	9.53
Northern	Lean	6.07	6.07	5.02	5.84
	NonLean	6.15	5.7	4.69	5.79
Northwestern	Lean	6.9	6.57	5.59	6.53
	NonLean	7.75	6.53	6.69	7.37
Southern	Lean	9.49	8.4	6.9	9.14
	NonLean	9.43	7.17	7	9.43
Western	Lean	10.18	9.57	8.86	9.23
	NonLean	10.22	7.58	8.07	10.04

Results of children aged 3-4 and aged 5-6 years

		3-4 Year Old		5-6 Year Old	
		Cost of the Nutritious Diet	School Meals - Base Ration	Cost of the Nutritious Diet	School Meals - Base Ration
Central	Lean	2.6	2.1	3.4	2.8
	NonLean	2.4	1.9	3.1	2.7
Copperbelt	Lean	2.6	2.0	3.5	2.9
	NonLean	2.5	2.1	3.4	3.0
Eastern	Lean	4.2	3.6	5.3	4.7
	NonLean	2.8	2.4	3.9	3.5
Luapula	Lean	1.9	1.4	2.5	2.0
	NonLean	1.4	1.1	1.8	1.5
Lusaka	Lean	3.8	3.2	5.2	4.6
	NonLean	3.6	3.1	5.0	4.5
Northern	Lean	2.4	1.8	3.0	2.5
	NonLean	2.5	2.1	3.1	2.7
Northwestern	Lean	2.6	2.1	3.3	2.7
	NonLean	2.8	2.4	3.6	3.3
Southern	Lean	3.5	2.8	4.6	3.9
	NonLean	3.4	2.9	4.7	4.3
Western	Lean	3.2	2.6	4.6	4.1
	NonLean	3.9	3.4	5.2	4.8

Nutrition Value of Foods modelled in Snack Food Models

Salty Crisps – 100g

Energy (kcal)	503.00
Protein (g)	6.03
Total Fat (g)	22.50
Retinol Activity Equivalent (mcg)	107.00
Vitamin C (mg)	0.00
Vitamin B1 (mg)	0.00
Vitamin B2 (mg)	0.00
Niacin Equivalent (mg)	0.00
Vitamin B6 (mg)	0.00
Folate (mcg)	0.00
Vitamin B12 (mcg)	0.00
Pantothenic Acid (mg)	0.00
Calcium (mg)	71.00
Iron (mg)	1.29
Magnesium (mg)	0.00
Zinc (mg)	0.00

Store-bought milkshake – 100g

Energy (kcal)	275.00
Protein (g)	1.27
Total Fat (g)	1.08
Retinol Activity Equivalent (mcg)	91
Vitamin C (mg)	0
Vitamin B1 (mg)	0.03
Vitamin B2 (mg)	0.66
Niacin Equivalent (mg)	0.21
Vitamin B6 (mg)	0.06
Folate (mcg)	0.00
Vitamin B12 (mcg)	0.22
Pantothenic Acid (mg)	0.00
Calcium (mg)	38.00
Iron (mg)	0.46
Magnesium (mg)	13.00
Zinc (mg)	0.57

Corn Soy Blend Plus - Nutrient specifications per 100g

Energy (kcal)	380
Protein (g)	14
Total Fat (g)	6

Retinol Activity Equivalent (mcg)	1039.4
Vitamin C (mg)	90
Vitamin B1 (mg)	0.2
Vitamin B2 (mg)	1.4
Niacin Equivalent (mg)	8
Vitamin B6 (mg)	1
Folate (mcg)	110
Vitamin B12 (mcg)	2
Pantothenic Acid (mg)	1.6
Calcium (mg)	362
Iron (mg)	6.5
Magnesium (mg)	127
Zinc (mg)	5

Multiple Micronutrient Powders for children 6-23 months - Nutrient specifications per 100g

Energy (kcal)	0
Protein (g)	0
Total Fat (g)	0
Retinol Activity Equivalent (mcg)	40000
Vitamin C (mg)	3000
Vitamin B1 (mg)	50
Vitamin B2 (mg)	50
Niacin Equivalent (mg)	600
Vitamin B6 (mg)	50
Folate (mcg)	15000
Vitamin B12 (mcg)	90
Pantothenic Acid (mg)	0
Calcium (mg)	0
Iron (mg)	1000

Magnesium (mg)	0
Zinc (mg)	410

LNS - Nutrient specifications per 100g

Energy (kcal)	275.00
Protein (g)	1.27
Total Fat (g)	1.08
Retinol Activity Equivalent (mcg)	91
Vitamin C (mg)	0
Vitamin B1 (mg)	0.03
Vitamin B2 (mg)	0.66
Niacin Equivalent (mg)	0.21
Vitamin B6 (mg)	0.06
Folate (mcg)	0.00
Vitamin B12 (mcg)	0.22
Pantothenic Acid (mg)	0.00
Calcium (mg)	38.00
Iron (mg)	0.46
Magnesium (mg)	13.00
Zinc (mg)	0.57

Fortified Maize - Nutrient specifications per 100g

	Unrefined Maize, dry	Refined Maize, dry	Fortification Pre-Mix
Energy (kcal)	351	354	
Protein (g)	9.67	7.6	
Total Fat (g)	4	2.9	
Retinol Activity Equivalent (mcg)	0.08	0	54.55
Vitamin C (mg)	0	0	
Vitamin B1 (mg)	0.5	0.38	0.44
Vitamin B2 (mg)	0.12	0.05	0.26
Niacin Equivalent (mg)	1.4	1.6	
Vitamin B6 (mg)	0.37	0.37	
Folate (mcg)	25	29	100
Vitamin B12 (mcg)	0	0	0.8
Pantothenic Acid (mg)	0.56	0.56	
Calcium (mg)	17.5	6	
Iron (mg)	3.75	1.2	1.5
Magnesium (mg)	93	83	
Zinc (mg)	1.73	1.53	3

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