SAVING LIVES
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Fill the Nutrient Gap

Lesotho

Final Report

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World Food Programme

IFAD
Investing in rural people

WAMPP

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For more information please contact:

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

World Food Programme Lesotho
wfp.maseru@wfp.org
11 United Nations Rd, Maseru, Lesotho

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List of Acronyms

CHW	-	Community health worker
CotD	-	Cost of the Diet
ECD	-	Early Childhood Development
FAO	-	Food and Agriculture Organization
FNCO	-	Food and Nutrition Coordinating Office
FNG	-	Fill the Nutrient Gap
GDP	-	Gross domestic product
GNR	-	Global Nutrition Report
IFA	-	Iron and folic acid
IFAD	-	International Fund for Agricultural Development
IYCF	-	Infant and young child feeding
KAP	-	Knowledge, Attitudes and Practices
LP	-	Linear programming
LSL	-	Lesotho (ma)loti
LVAC	-	Lesotho Vulnerability Assessment and Analysis Comittee
MAD	-	Minimum acceptable diet
MDD	-	Minimum dietary diversity
MMF	-	Minimum meal frequency
MMT	-	Multi-micronutrient tablet
MNP	-	Multiple micronutrient powder
NMA	-	National Management Agents
PLHIV	-	People living with HIV
PD	-	Positive Deviance
RNI	-	Recommended nutritient intake
SNF	-	Specialised nutritious foods
SSN	-	Social safety net
UNICEF	-	United Nations Children's Fund

USD - United States Dollar

VHW - Volunteer health worker

WFP - World Food Programme

WHO - World Health Organization

WRA - Women of reproductive age

Introduction

Malnutrition is widespread across Lesotho. There has been little progress in addressing undernutrition and micronutrient deficiencies, and overnutrition has emerged as a serious concern. This growing triple burden hinders the country's potential for social and economic development. Child undernutrition has long-term consequences on health, education and productivity, which "exacerbate problems in social integration and increase or intensify poverty"[1]. In Lesotho, the total estimated losses caused by child undernutrition summed up to more than USD $200m for 2014, equivalent to more than 7 percent of that year's GDP.[2]

Thirty three percent of children under the age of 5 years are stunted and unlikely to reach their full mental and physical potential.[3] Although economic growth and overall improvements in the health sector resulted in a reduction of stunting by 10 percentage points (to 33 percent) between 2000 and 2014, the overall prevalence is still classified as very high according to World Health Organization (WHO) standards. In addition, overweight and obesity rates of adults have increased sharply over the last two decades (from 39 percent in 1999 to 54 percent in 2016) among women aged 18 or older, contributing significantly to public health problems.

Poor infant and young child feeding (IYCF) is evident by an increase in stunting over the course of a child's early life: from medium prevalence (14 percent) among children under 6 months, to high (22 percent) for children aged 6–12 months, and very high (38 percent) among children aged 18–23 months. Adding to that the high level of anaemia (51 percent among children under five) and overweight/obesity among women of reproductive age (45 percent, women aged 15-49 years), Lesotho is clearly suffering from the triple burden of malnutrition.

Factors that stand in the way of ending malnutrition include poverty, natural and man-made disasters, low consumer demand and purchasing power for nutritious food, low and undiversified agricultural productivity, lack of prioritization of nutrition issues by government agencies, and limited commitment and capacity of local government units to deliver nutrition interventions. Because of this, tackling malnutrition requires integrated, multisectoral action, as nutrition specific interventions are not enough and have not been able to significantly curtail this burden.[4]

Addressing malnutrition sustainably must take a lifecycle approach, targeting all children, adolescent girls and pregnant and breastfeeding women with a range of interventions adapted to the local context and coordinated across multiple levels and sectors of government. The Government of Lesotho recognises that addressing the malnutrition challenge requires broad cooperation and commitment

[1] WFP, "The Cost of Hunger in Africa. The Social and Economic Impact of Child Undernutrition on Lesotho Vision 2020."
[2] WFP.
[3] Ministry of Health, "Lesotho Demographic and Health Survey 2014."
[4] Perez-Escamilla et al., "Nutrition Disparities and the Global Burden of Malnutrition."

from several government agencies, public sector entities and the private sector, notably those in the food, health and social protection systems.

The commitment to improving nutrition needs to be prioritized nationally and locally, and coordination should be strengthened. Successful nutrition programming will depend on national leadership, regional resources being made available to support and encourage local actors, local will and capacity to implement effective nutrition-specific and nutrition-sensitive interventions. Coordination across all levels of government and sectors, including health, agriculture, social welfare and development, and education is essential to strengthen nutrition. Development partners also play an active role in filling the gaps in programming and technical assistance. Private enterprises and actors across the value chain hold a key function in supporting and driving this development and coordination for improved nutrition between the public and the private sector.

Several factors need to be addressed: constraints of availability, physical and economic access, and choice of nutritious food, from supply (food system) to demand (public sector services and consumers). This requires strong commitment, good understanding and clear acknowledgment of a shared responsibility to address the alarming nutrition situation.

In response to the Government of Lesotho's goal of improving nutrition outcomes, the Food and Nutrition Coordinating Office (FNCO) and the World Food Programme (WFP), with the International Fund for Agricultural Development (IFAD), the United Nations Children's Fund (UNICEF) and the United Nation's Food and Agriculture Organization (FAO), collaborated to conduct a Fill the Nutrient Gap (FNG) analysis in 2019. The FNG process brought together stakeholders from a variety of sectors including health, agriculture, social development, education and the private sector. It identified overlap and potential alignment across sectors for a strengthened nutrition response, such as the redesign of social protection programmes.

The FNG analysis and its stakeholder engagement process facilitated a greater understanding of food systems and nutrition contexts across the country. The results from the FNG are already being used to support operationalization of IFAD's country strategy by identifying and prioritizing context-specific policies and programme packages that can improve nutrient intake of target groups through improved access to, and choice of, nutritious food. Additionally, WFP used the FNG findings to redesign CBT food baskets to include food items rich in nutrients that are missing in the traditional food basket, such as iron.

Fill the Nutrient Gap Methodology

The Fill the Nutrient Gap (FNG) is a nutrition situation analysis and multi-sectoral decision-making process that combines secondary data review with a Cost of the Diet (CotD) analysis to identify context-specific entry-points for food, health and social protection systems to improve nutrition through increasing availability, access, affordability and choice of nutritious foods.

The assessment has been developed by the WFP with technical support from research institutes: 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 and UNICEF. FNG provides a framework for strengthened situation analysis and multi-sectoral decision making that identifies context-specific barriers to adequate nutrient intake among specific target groups. It engages different sectors to propose cost-effective strategies to overcome barriers. It has been used in almost 25 countries to date.

The FNG combines review of secondary data and information with linear programming analysis using the CotD software developed by Save the Children United Kingdom. The FNG analysis considers a range of factors that reflect or affect dietary intake, including local malnutrition characteristics; the enabling policy environment; type and availability of nutritious foods in local markets; affordability of nutritious foods; nutrient intake; local practices; and cost optimisation.

The consolidated information is analysed, and the findings are reviewed by a multi-sectoral group of stakeholders at relevant levels, to come to a shared understanding of the issues, context and solutions. Through this consultation process, context-specific optimal policy and programme actions, including possible entry points for interventions, are jointly identified for different sectors, in particular those across the health, social protection and food system, including stakeholders from the public and private sectors.

The overarching objective of the FNG was to bring stakeholders from sectors including health and nutrition, education, social protection and agriculture as well as academia and the private sector together to identify and prioritise context specific policies and programmes, aimed at improving the nutrient intakes of key target groups across the lifecycle. The results from the FNG are to be used to inform and complement national and subnational policies and programmes.

Fill the Nutrient Gap: situation assessment for multi-sectoral decision-making on the prevention of malnutrition[5]

Malnutrition has two direct causes: inadequate nutrient intake and disease. As its name specifies, the Fill the Nutrient Gap (FNG) assessment focuses on gaps in nutrient intake to inform a country's national policies on actions that can be taken to improve nutrition among their population, with a focus on the most vulnerable.

The FNG assesses the extent to which people have choices. It considers the availability, physical access and affordability of nutritious foods required for adequate nutrient

[5] 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

intake. It seeks to understand why people make the food choices they do. Finally, it identifies context-appropriate interventions that can be implemented by different sectors to fill nutrient gaps.

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 linear programming software developed by Save the Children (UK), and includes modelling of the economic impact of possible interventions to increase nutrient intake.

Malnutrition cannot be addressed 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 throughout the assessment.

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 and others.

The FNG assessment has been developed by the WFP with technical support from: 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.

In August 2019, the FNG had been conducted in 19 countries and started in another 8.

FNG in Lesotho: Process

The FNG process in Lesotho took place from March to August 2019, with inception meetings in March, validation of preliminary results and development of recommendations in national technical meetings in July, and the dissemination of final results with technical staff and policy influencers in August.

The analysis comprised a comprehensive literature review of available secondary data sources in combination with linear programming (LP) using the Cost of the Diet (CotD) software. The aim of the FNG analysis was to identify policies and intervention packages

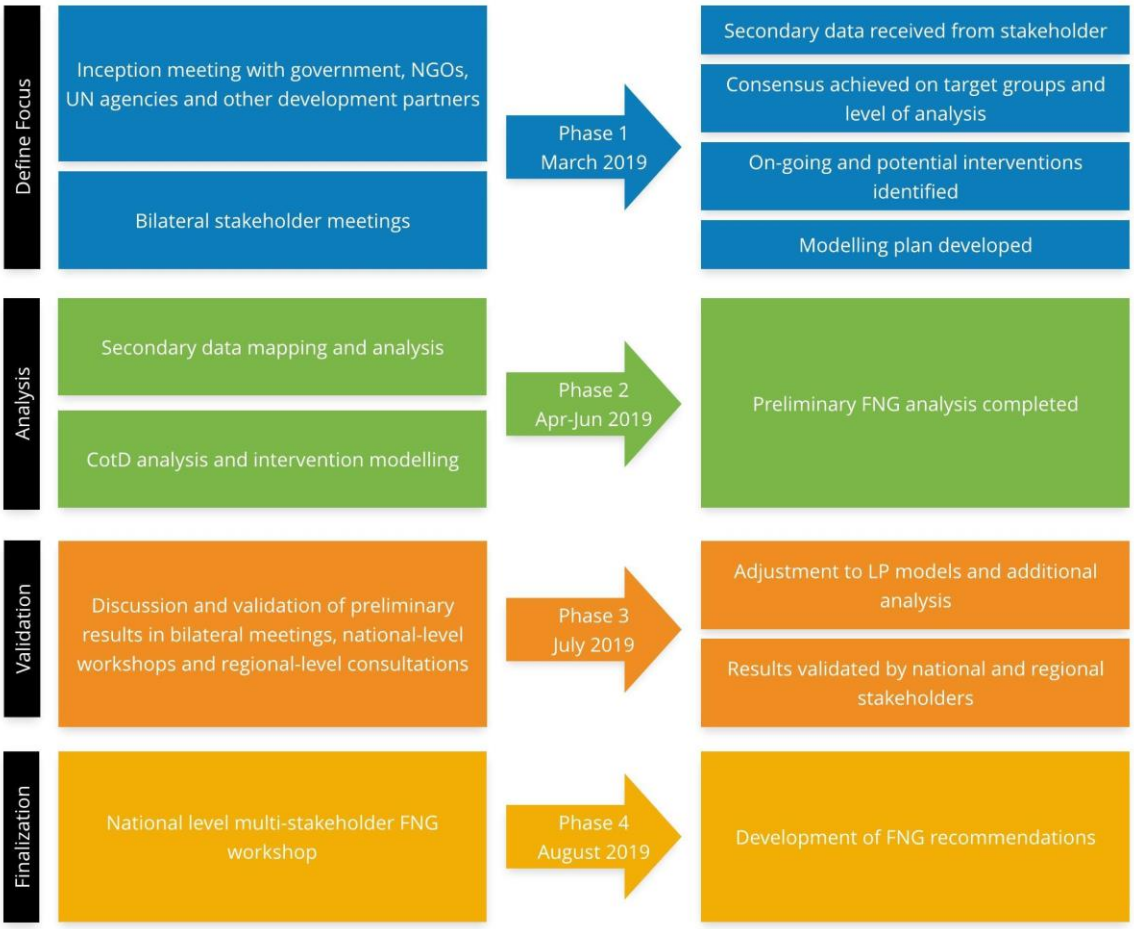
best suited to improving access to nutritious foods to meet the specific nutrient needs of vulnerable target groups. It analysed the context-specific barriers to adequate nutritious foods and modelled interventions defined by stakeholders.

The FNG assessment was led by the FNCO and the WFP country office, regional bureau and headquarters in partnership with IFAD, UNICEF and FAO. At the start of the process the Lesotho FNG team met with government, non-government, United Nations (UN), and other development partners to introduce it, collate key secondary data sources and identify interventions and entry points for CotD analysis and modelling. Stakeholders identified the target groups as the first 1,000 days from conception to a child's second birthday, preschool and school-age children, pregnant and breastfeeding women, and adolescent girls.

During the analysis phase over 150 secondary data sources were reviewed. LP analysis was conducted to estimate the cost of a nutritious diet and to calculate the percentage of households unable to afford this diet in all ten districts of Lesotho, disaggregated by urban and rural locations. CotD was used to model interventions in five priority districts identified by stakeholders (Quthing, Mohale's Hoek, Thaba-Tseka, Butha-Buthe and Maseru). These represent the five dominant and distinct economic zones in the country (four of the agro-ecological zones defined by BOS (Senqu River Valley, Southern Lowlands, Northern Lowlands and Mountains), plus the Urban zone of Maseru).

To validate the results, preliminary findings were presented to partners and stakeholders in bilateral meetings and a national workshop in July. During this validation phase, stakeholders consulted in a technical workshop to develop recommendations based on the FNG findings. Findings and recommendations were then launched in a high-level meeting with policy makers. The detailed FNG process in Lesotho is illustrated in Figure 1.

Figure 1. The FNG Process in Lesotho.



Analysis of Secondary Data

Between the months of March and June 2019, a country-specific review of secondary data and information on factors that reflect or affect dietary intake was conducted. This included malnutrition trends over time, characteristics of the food system and food environment, and population behaviour related to food and feeding.

Over 150 secondary sources were identified, consolidated and analysed. Stakeholders contributed data and sources of information considered relevant for identification of context-specific barriers and entry points. The analysis of secondary sources was conducted following the conceptual framework of food systems for diets and nutrition developed by the High-Level Panel of Experts on Food Security and Nutrition[6]. As such, the FNG framework for the analysis of secondary sources not only focuses on the immediate causes but also seeks to create an understanding of the underlying and basic causes of malnutrition.

[6] HLPE, "Nutrition and Food Systems. A Report by the Hihgh Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security."

Cost of the Diet (CotD) Analysis

The CotD software utilizes LP to calculate the extent to which poverty, food availability and 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 cost of local food that is required to provide individuals or households with their average needs for energy and their recommended intakes of protein, fat and 13 micronutrients. 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: the lowest cost nutritious diet that includes the typical staple food in an amount of two servings per day and excludes prohibited foods. This diet is referred to as the 'nutritious' diet throughout this summary. 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 districts, seasons or countries.

As part of the FNG process, CotD analysis was undertaken for all districts in Lesotho with separate analyses for urban and rural areas. The 2017 Consumer Price Index data, collected by the Bureau of Statistics, provided data on prices and availability of more than 70 food items. The 2017 Lesotho Household Budget Survey provided data on household food expenditure, including monetised consumption of self-produced food.

The lowest cost of a nutritious diet was estimated for a model household of five members which included a breastfed child of 12–23 months, a child of 6–7 years, an adolescent girl of 14–15 years, a breastfeeding woman and an adult man. Two maize-based meals per day were included to account for approximately 50 percent of dietary energy from the preferred staples. This was done for all household members except the child aged 12–23 months, who received one maize portion per day.

CotD software was used to model interventions proposed by stakeholders with the objective of improving the affordability of a nutritious diet for individuals and/or households. Based on the severity of malnutrition indicators and the prioritization of ongoing programmes, , stakeholders identified five districts for intervention modelling: Quthing, Mohale's Hoek, Thaba-Tseka, Butha-Buthe and Maseru.

The selection of potential interventions for modelling was informed by secondary data review and stakeholder consultations. It included:

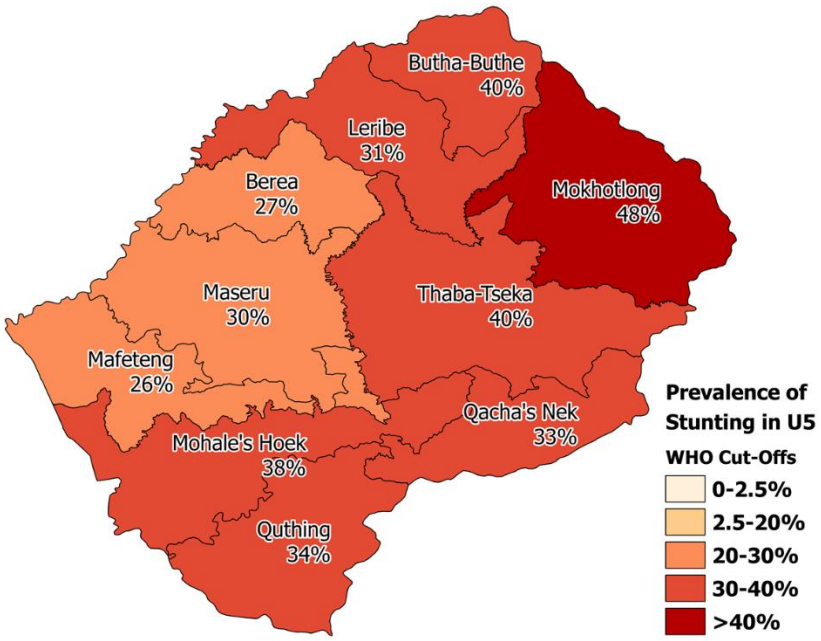
- increased availability of local nutritious food;
- different types of complementary food or specialised nutritious foods (SNF) made available through the market and/or social safety nets;
- micronutrient supplementation;
- fortification of staple food; and
- cash transfers for vulnerable households.

The modelled interventions are theoretical, and the results are not nationally representative. Actual implementation would need to be accompanied by complementary behaviour change interventions to promote nutritious choices among consumers.

Malnutrition Overview

Despite a reduction in stunting prevalence from 44 percent in 2000[7] to 33 percent in 2014[8], little improvement was seen in other indicators such as anaemia and IYCF markers. The 2014 prevalence of 33 percent is classified as very high by WHO (based on the new 2018 classifications). Stunting prevalence correlates with poverty: 46 percent of children in the poorest socio-economic strata are stunted compared to 13 percent in the richest. Stunting is higher in rural than in urban areas (35 percent and 27 percent, respectively), and varies between different districts, with the lowest prevalence of 27 percent in Berea, and the highest prevalence in Mokhotlong, with 47 percent.[9]

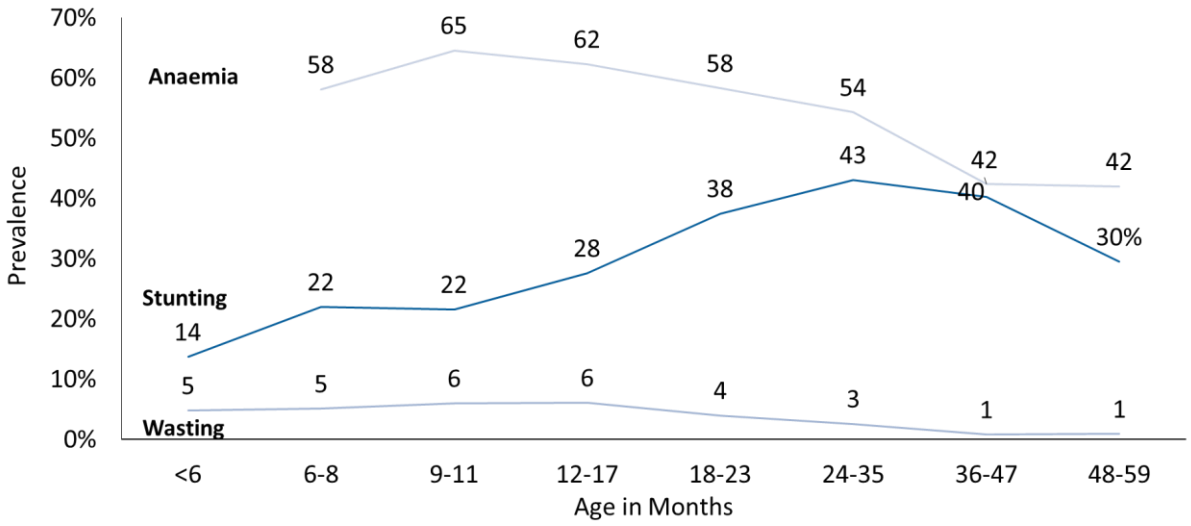
Figure 2. Stunting Prevalence by district in Lesotho. DHS 2014.



Stunting prevalence is 22 percent among children aged 6–8 months and 38 percent among children aged 18–23 months.[10] This suggests dietary inadequacies during a period of cognitive and physical development when breastfeeding should be frequent and complementary feeding should be diverse and frequent.

[7] Government of Lesotho Bureau of Statistics and United Nations Children's Fund, "2000 End Decade Multiple Indicator Cluster Survey (EMICS)."
[8] Ministry of Health, "Lesotho Demographic and Health Survey 2014."
[9] Ministry of Health.; 'Lesotho Demographic and Health Survey 2014
[10] Ministry of Health.

Figure 3: Prevalence of stunting, wasting and anaemia among children under 5, by age in months. DHS 2014.



Since 2004, anaemia rates have remained constant for women aged 15–49 and have slightly increased for children under 5 years of age (from 49 percent in 2004 to 51 percent in 2014). Rates are at 27 percent for all women aged 15–49 and 36 percent for pregnant women in that age group. Fifty eight percent of children aged 6–8 months, 65 percent of children aged 9–11 months and 62 percent of children aged 12–17 months were anaemic in 2014. Because dietary inadequacies are an important cause of stunting, other micronutrient deficiencies are also likely to be widely prevalent.

The prevalence of overweight among children has remained constant at 7 percent since 2004. In 2014, 45 percent of women and 13 percent of men aged 15–49 were overweight or obese. Overweight and obesity correlates with wealth and age: 55 percent of women in the richest socio-economic strata are overweight or obese compared to 25 percent in the poorest. Eighteen percent of women aged 15–19 are overweight or obese, while 67 percent of women aged 40–49 are overweight or obese.

Key Findings

1. Socioeconomic Drivers in Health and Nutrition

Vast improvements have been made in health, but nutrition remains a concern. The triple burden of malnutrition is an issue for almost all wealth quintiles and geographic districts.

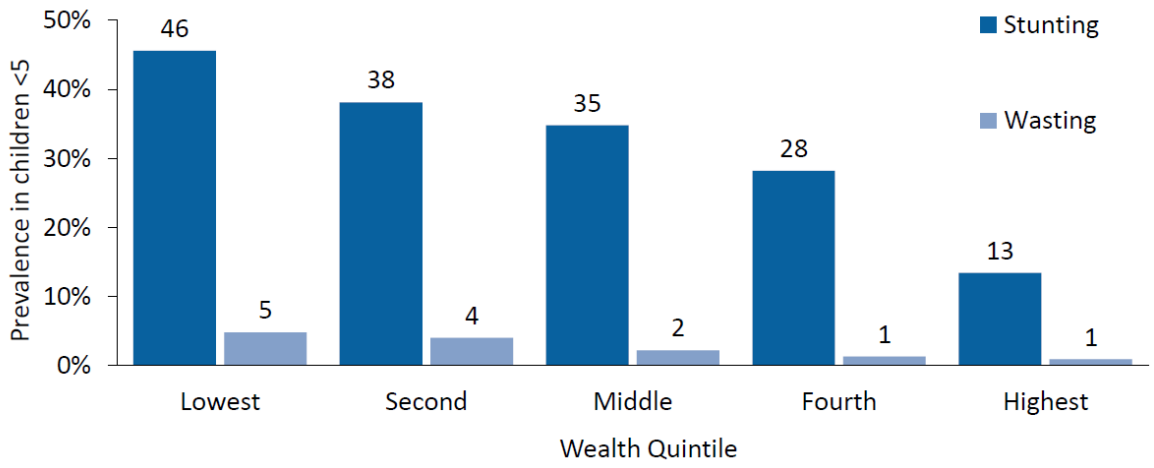
Lesotho has among the highest prevalence of HIV in the world: 26 percent of its population aged 15–49 lives with HIV[11]. Consequently, many health-related

[11] World Bank Group, "DataBank | World Development Indicators."

interventions are focused on HIV/AIDS prevention and treatment. These investments interventions and new treatment methods – such as the development of Antiretroviral Therapy - have resulted in a significant reduction in the number of new infections per year. Reduction is visible from an estimated 40,000 new infections in 1996 to an estimate of 13,000 new infections in 2018[12], as well as in an drop of HIV as a cause of death (-61 percent) during the 10 year period from 2007–2017. This trend is also true for other communicable diseases such as tuberculosis (-19 percent) and lower respiratory infections (-16 percent), indicating an overall improvement in the health system.[13]

On the other hand, malnutrition has not seen the same improvements over the last decades. Thirty three percent of children under five years of age are stunted, with significant variations between districts. The district of Mokhotlong has the highest prevalence nationwide at 48 percent, and Mafeteng has the lowest at 26 percent. It is worth highlighting again that stunting prevalence also varies depending on wealth: in the lowest wealth quintile malnutrition is three times higher than the highest wealth quintile (46 percent and 13 percent respectively). Likewise, there is a disparity by gender, with more boys being stunted than girls (39 percent compared to 28).[14]

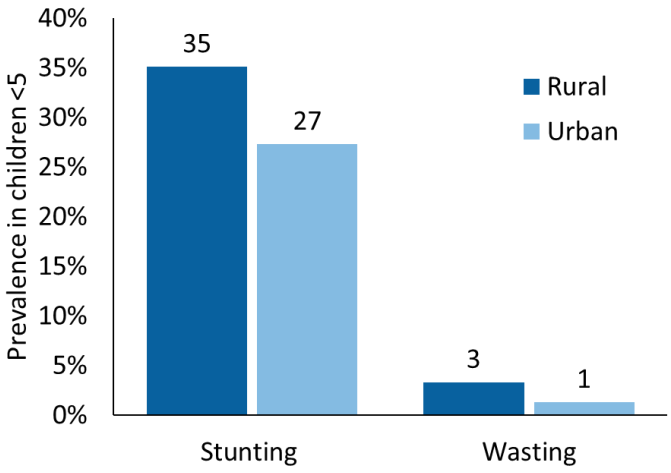
Figure 4: Stunting and wasting prevalence in children under 5 years of age by wealth quintile. DHS 2014.



Children living in rural areas are also more vulnerable to undernutrition than those living in urban areas of the country, further indicating inequalities within the country. Thirty five percent of rural children under 5 years of age are stunted, compared to 27 percent of urban children.[15]

[12] UNAIDS, "AIDSinfo."
[13] Institute for Health Metrics and Evaluation, "Global Burden of Disease | Lesotho Country Profile."
[14] Ministry of Health, "Lesotho Demographic and Health Survey 2014."
[15] Ministry of Health.

Figure 5: Stunting and wasting prevalence in children under 5 years of age by location. DHS 2014



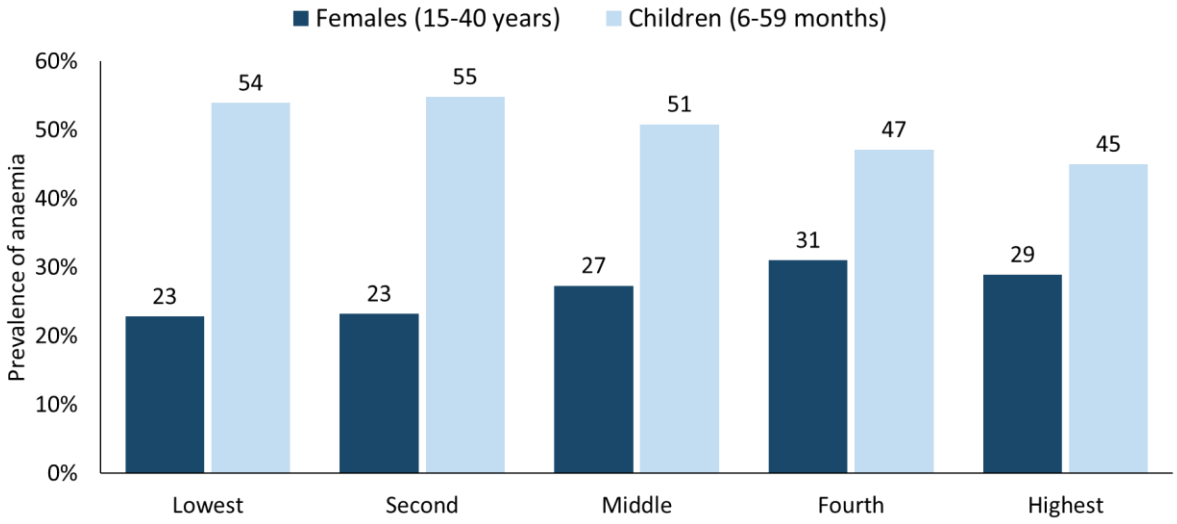
Anaemia prevalence is also high in Lesotho. More than half (51 percent) of children under 5 are anaemic, with all districts having a prevalence higher than 40 percent. More than a fourth (27 percent) of women of reproductive age (WRA) are anaemic.[16] The prevalence of anaemia in WRA has remained almost stagnant since 2004 (27 percent in 2004, 26 percent in 2009 and 27 percent in 2014).[17] Among the different wealth groups, the prevalence of anaemia does not vary much but is higher for wealthier WRAs, whereas it is lower for wealthier children. In the lowest wealth quintile, anaemia prevalence is 54 percent among children under 5 and 23 percent in WRA. In the highest wealth quintile, the prevalence is 45 percent and 29 percent respectively.[18] Among children, the trend of decreasing anaemia prevalence by increasing wealth is comparable to that for stunting, albeit less strong. The opposite trend among WRA may be related to the higher prevalence of overweight and obesity with increasing wealth.

[16] Ministry of Health.

[17] Government of Lesotho Ministry of Health and Social Welfare, Government of Lesotho Bureau of Statistics, and ORC Macro, "Lesotho Demographic and Health Survey 2004"; Ministry of Health and Social Welfare, "Lesotho Demographic and Health Survey 2009"; Ministry of Health, "Lesotho Demographic and Health Survey 2014."

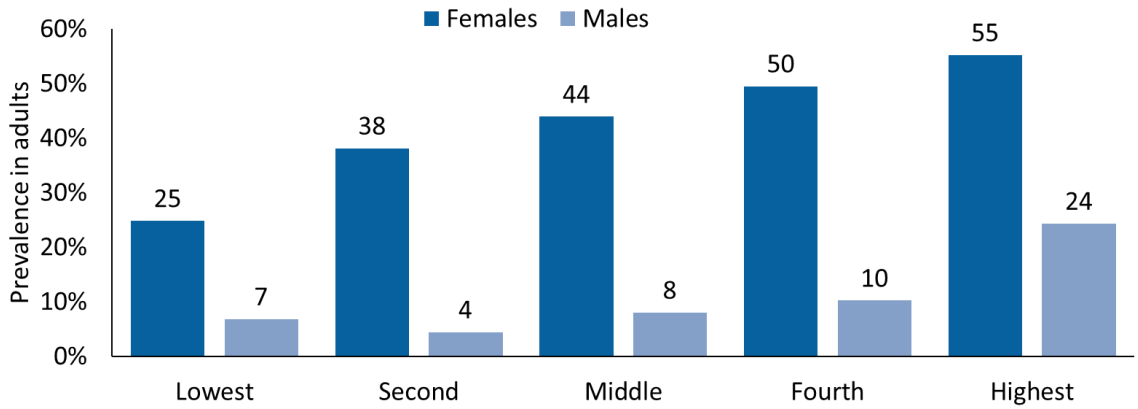
[18] Ministry of Health, "Lesotho Demographic and Health Survey 2014."

Figure 6: Anaemia prevalence in WRA and children under 5 years of age by wealth quintile. DHS 2014.



In addition, malnutrition is also present in the form of overweight and obesity in Lesotho. Within the country's adult population, overweight and obesity are present with higher prevalence for women in the highest wealth quintiles. As can be seen in the ***Figure 7*** below, the combined prevalence of overweight and obesity reaches over 55 percent of the adult women in the highest wealth quintile, compared to 24 percent of adult men. In the lowest wealth quintile, 25 percent of adult women are overweight or obese, while only 7 percent of adult men are.[19]

Figure 7: Combined prevalence of overweight and obesity in adults (15 – 49 years of age), by sex and wealth quintile. DHS 2014.



[19] Ministry of Health.

The current trends and the coexistence of undernutrition, micronutrient deficiencies and overweight and obesity, known as the triple burden of malnutrition, means that Lesotho is not on course to achieve the global nutrition targets set by the World Health Assembly. Currently, according to the 2018 GNR, Lesotho is only on course in 3 out of these 9 targets (under-5 wasting, under-5 overweight and exclusive breastfeeding), has only shown some, but not enough progress in 2 indicators (under-5 stunting, WRA anaemia), and has worsened or shown no progress in 4 other indicators (adult female and male obesity, adult female and male diabetes).[20]

2. Dietary Intake in the First 1000 Days

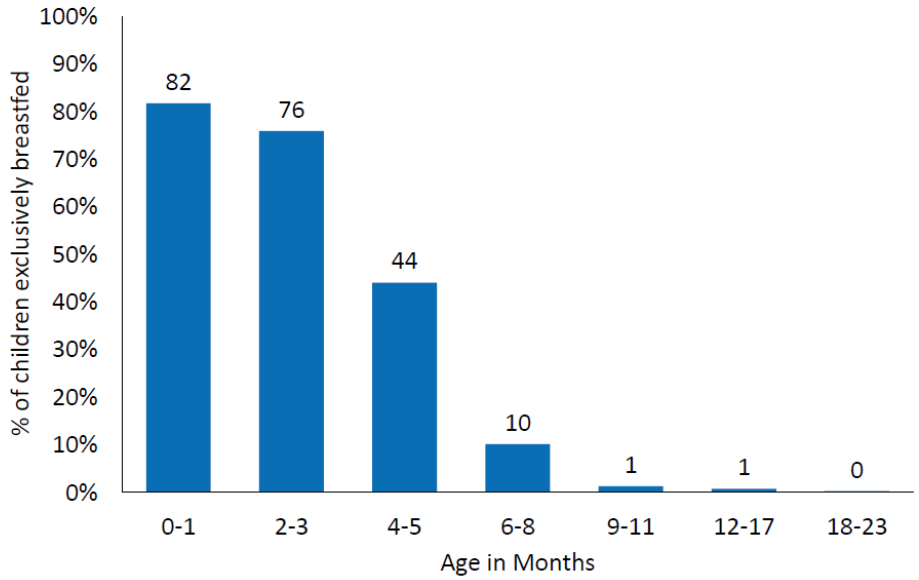
Breastfeeding and complementary feeding practices are sub-optimal. Dietary diversity needs to be improved.

According to the Demographic and Health Survey from 2014, only 66 percent of children under 6 months of age are exclusively breastfed and the median duration of exclusive breastfeeding is 4.5 months. This is on track for the target of 70 percent in 2030, if current progress continues. Exclusive breastfeeding rates are higher for younger infants, at 92 percent for those aged 0–1 month and 76 percent for those aged 2–3 months. There is a substantial drop for infants aged 4–5 months with only 44 percent being exclusively breastfed.[21] Ten percent of infants aged 6-8 months are still exclusively breastfed, which is too long, as from the age of 6 months, complementary foods should be introduced to complete nutritional needs.

Neither exclusive breastfeeding nor continued breastfeeding at 1 year of age vary greatly by maternal education. Yet, continued breastfeeding to 2 years of age does decrease as maternal education increases (39.5 percent of children whose mother has primary education only, compared to 18.6 percent of children whose mother has secondary and higher education). Yet, a recent KAP Survey performed in 3 districts found that exclusive breastfeeding was mostly practiced among women with lower education levels (primary school education). That survey also found that introducing supplementary milk - predominantly cow milk - in the diet of children under 6 months of age was a relatively common practice (approximately 30 percent of surveyed households).[22] The survey also highlights use of infant formula in the surveyed districts, but does not specify what age group receives which product.

[20] Development Initiatives, "2018 Global Nutrition Report: Shining a Light to Spur Action on Nutrition."
[21] Ministry of Health, "Lesotho Demographic and Health Survey 2014."
[22] KESI Business Solutions (PTY) Ltd, "Draft Report on Knowledge, Attitudes and Practice Survey (KAPS) on Comprehensive Maternal, Neonatal, Child Health and Nutrition in Three Districts in Lesotho."

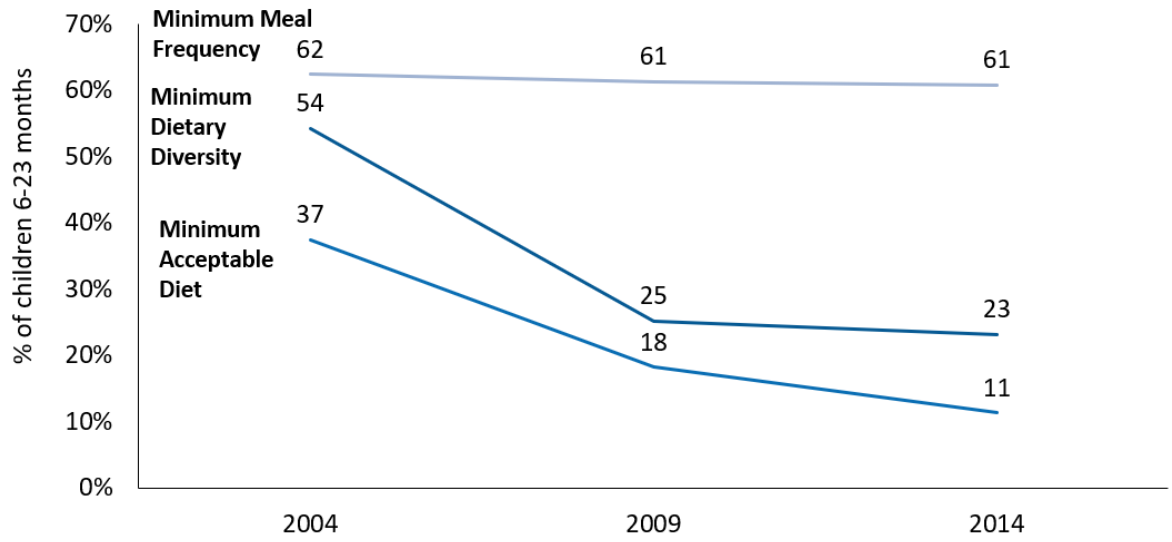
Figure 8: Percentage of children under 2 years of age who are exclusively breastfed by age in months. DHS 2014.



Indicators for adequate IYCF practices are relatively low throughout the country. In 2014, only 23 percent of children aged 6–23 months received Minimum Dietary Diversity (MDD) and 61 percent received Minimum Meal Frequency (MMF). This translates into Minimum Acceptable Diet (MAD) for only 11 percent of children aged 6–23 months. These indicators have worsened over time, MAD was 37 percent in 2004, 18 percent in 2009 and 11 percent in 2014.[23] A change in how these indicators have been defined in the Demographic and Health Surveys could partially explain the decline between 2009 and 2014, yet the definition for all three indicators remained the same between 2004 and 2009 where the biggest drop in MDD and MAD was observed.[24]

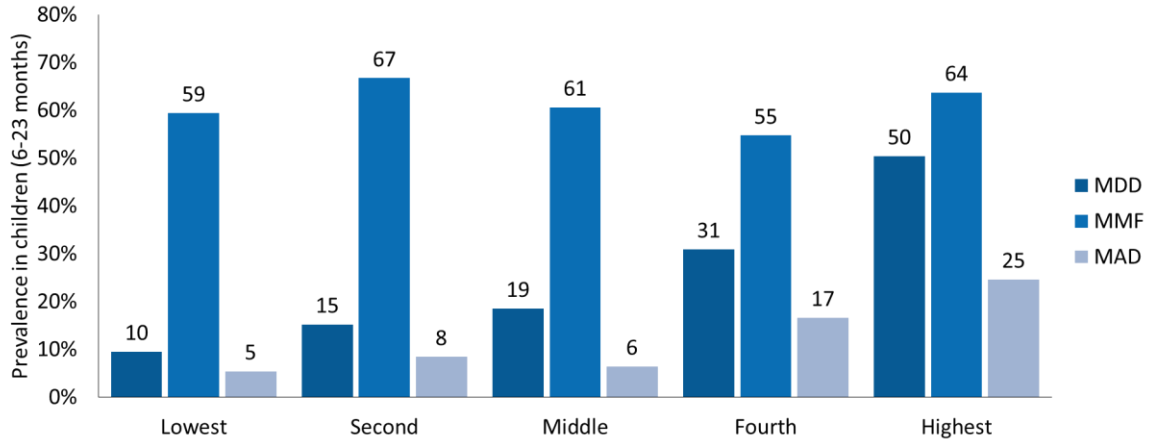
[23] Ministry of Health, "Lesotho Demographic and Health Survey 2014."
[24] Between 2009 and 2014, criteria for minimum dietary diversity were increased, from 3+ to 4+ food groups for all children and milk, consumed at least twice a day to meet minimum acceptable diet (MAD), was no longer to be counted as one of the required 4+ food groups for non-breastfed children.

Figure 9. Percentage of children aged 6–23 months who have received Minimum Meal Frequency, Minimum Dietary Diversity and Minimum Acceptable Diet. DHS 2004-2014.



Wealth shows a correlation with MDD, ranging from a 10-percent to a 50 percent prevalence between the lowest and highest wealth quintiles. On the other hand, Minimum Meal Frequency only slightly increases as wealth increases, as can be seen in the **Figure *10*** below. As such, even in the highest wealth quintile only 1 out of 4 children 6-23 months of age had a Minimum Acceptable Diet.

Figure 10: IYCF practices in children 6-23 months of age by wealth, 2014.



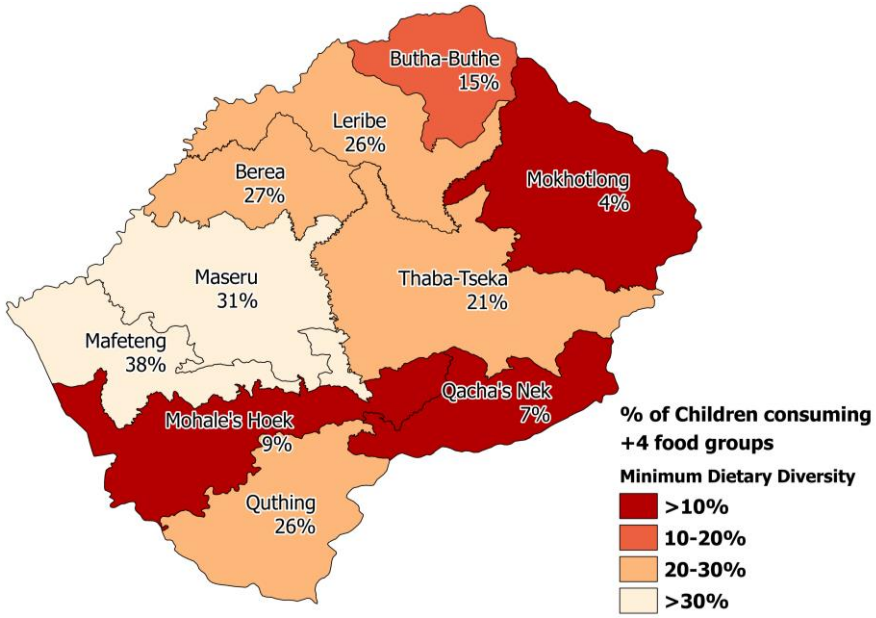
Information availability for mothers about IYCF practices does not seem to be a factor undermining their implementation - mothers and caregivers have indicated that information on breastfeeding and complementary feeding practices was received from health workers.[25] Knowledge of most key practices was indicated by most participants

[25] KESI Business Solutions (PTY) Ltd, "Draft Report on Knowledge, Attitudes and Practice Survey (KAPS) on Comprehensive Maternal, Neonatal, Child Health and Nutrition in Three Districts in Lesotho."

of that study. In addition, there is little indication of social norms or customs against breastfeeding. Other barriers different from lack of information are therefore preventing adequate implementation of IYCF practices from mothers and caregivers.

The increased burden of workload of mothers continues to be an important challenge faced for adequate breastfeeding and IYCF practices. Lesotho is a patrilineal and patriarchal society in which women are not key decision makers but are mandated to be caregivers and participate in agricultural activities.[26] The interference of husbands / partners in breastfeeding practices could also represent an important barrier, as women reported being forced to stop breastfeeding by their husbands and men reported negative attitudes towards prolonged breastfeeding practices.[27] Finally, low dietary diversity is directly related to availability and affordability of foods. MDD is lowest in mountainous areas and Senqu River Valley, indicating that economic and physical access also play an important role in IYCF practices.

Figure 11: Minimum Dietary Diversity in children under 2 years of age by district. DHS 2014.



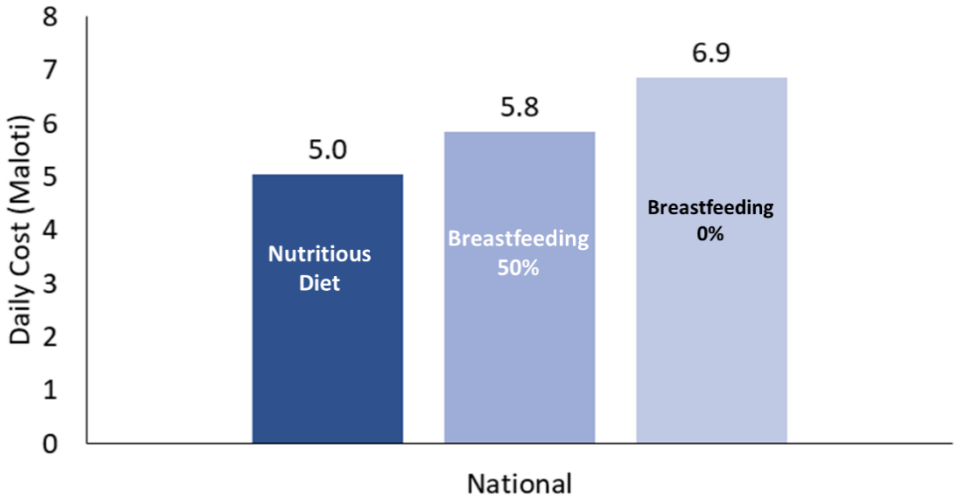
The cost of a nutritious diet for a child under 2 years of age is impacted depending on whether the child is breastfed or not, as there is a higher a need for the consumption of nutrient-dense foods when a child is not breastfed. If a child aged under 2 is breastfed in accordance with WHO standards, the daily cost of his or her nutritious diet would be

[26] National Multi-Sectoral Integrated Strategic Plan for the Prevention and Control of Non-Communicable Diseases (NCDS): 2014-2020.

[27] KESI Business Solutions (PTY) Ltd, "Draft Report on Knowledge, Attitudes and Practice Survey (KAPS) on Comprehensive Maternal, Neonatal, Child Health and Nutrition in Three Districts in Lesotho."
Though the results obtained through this KAP Survey are not nationally representative (as it was only performed in 3 districts), it can help give indication of other barriers faced by communities.

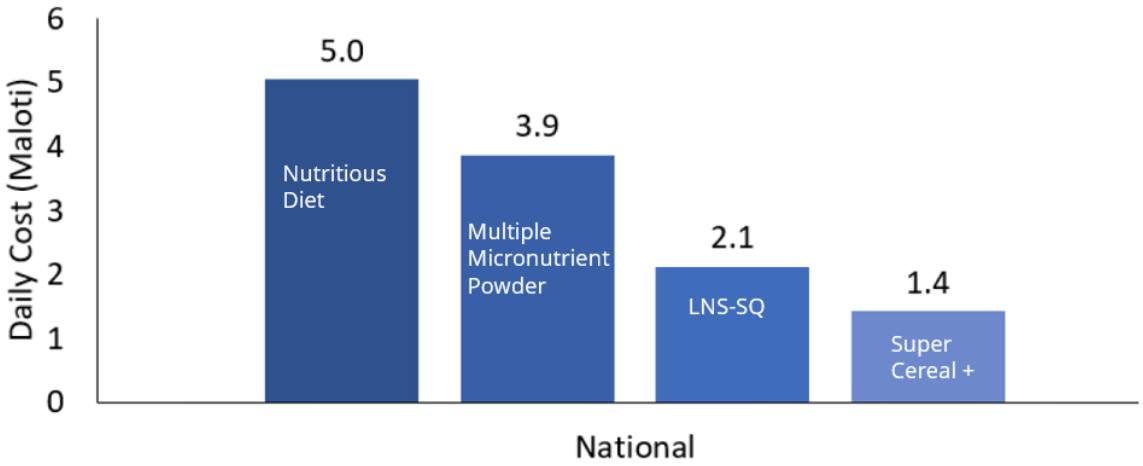
5 Lesotho maloti (LSL). If there is no breastfeeding, the cost increases by LSL 1.9, for a daily total of LSL 6.9.

Figure 12: Average daily cost of a nutritious diet for a child under 2 years of age, by breastfeeding practices. CotD 2019.



On the other hand, micronutrient-dense specialized nutritious foods can help reduce the cost of a nutritious diet. From a daily cost of LSL 5.0, 20 g of lipid based nutrient supplements (small quantity) could bring it down to LSL 2.1, while 60 g of Super Cereal+ could reduce it to LSL 1.4.

***Figure 13**: Average daily cost of a nutritious diet for a child under 2 years of age, by intervention options.*

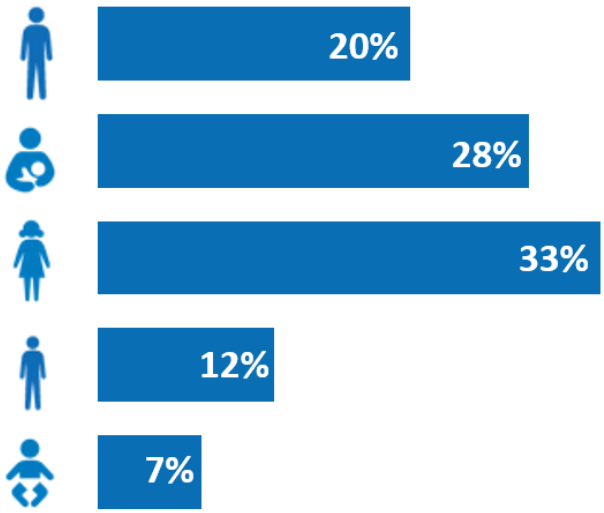


3. Vulnerability of Girls and Women of Reproductive Age.

Meeting the nutrient needs of adolescent girls and breastfeeding women costs more than meeting the needs of other target groups. They are at higher risk for micronutrient deficiencies, but little data exists to understand their vulnerabilities.

Micronutrient needs of adolescent girls and breastfeeding women are amplified. For example, they require twice as much iron per kilocalorie than an adult man or a school-aged child, so their food needs to have a 2-3 times higher concentration of iron than for other household members. They have relatively (compared to other household members) elevated requirements for other micronutrients, such as B12 or pantothenic acid. As micronutrient-dense foods are usually more expensive than foods low in micronutrients, meeting their nutrient needs becomes more expensive.[28] In the modelled households, the adolescent girl and the breastfeeding women make up more than 60 percent of the total cost of a nutritious diet.

Figure 14: Intra-household allocation of the modelled cost of a nutritious diet. CotD 2019.



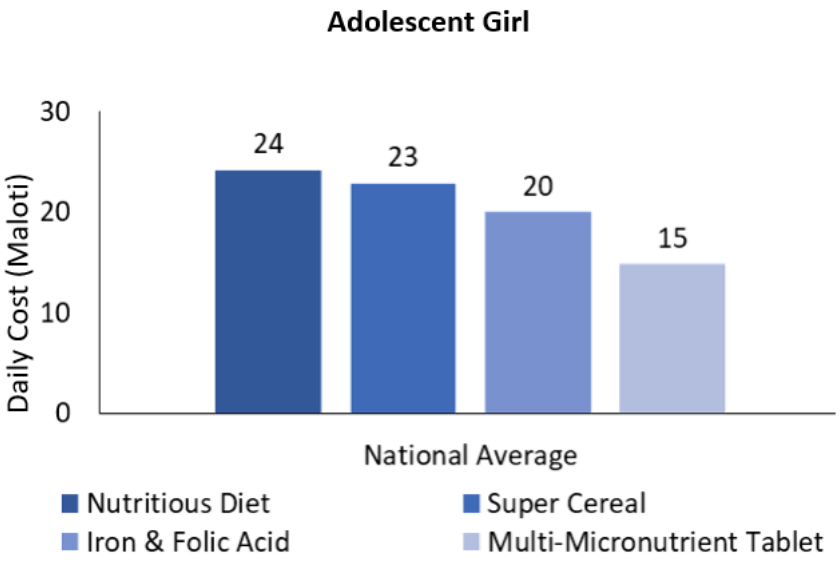
Higher cost for girls and women of reproductive age compared to other household members mean that the sharing of food would have to explicitly dedicate more nutrient dense foods to them to meet their micronutrient needs. If they are not prioritized or receive dedicated foods, they are at higher risk for micronutrient deficiencies. Targeted

[28] Note that adolescence is a critical stage for nutrition generally, including adolescent boys. However, boys – unlike girls – have elevated requirements for macronutrients, such as energy, as well. This means that for male adolescents meeting energy requirements can be a barrier, but their relative intake of micronutrients, i.e. amount of micronutrients per kcal, is lower compared to adolescent girls. The specific food environment determines what the cost-implication of those needs is. In the majority of cases meeting micronutrients is more expensive than macronutrients, but cases exist (cf. Ververs et al., "Scurvy Outbreak among South Sudanese Adolescents and Young Men — Kakuma Refugee Camp, Kenya, 2017–2018.") where the unmet high energy requirements of the boy increased their vulnerability to malnutrition.

interventions that focus on improved nutrition for adolescent girls and pregnant and breastfeeding women are an additional strategy to help break the cycle of malnutrition. The cycle of malnutrition refers to the concept that malnutrition is passed on through different stages of the life cycle. A stunted girl child, for example, is more likely to grow up being a malnourished adolescent girl. Should she become a mother, her malnourishment manifests itself in a higher likelihood of giving birth to a low birthweight baby, which in turn has higher likelihood to become stunted later in life.[29] Realizing improved nutrition at the stage of reproductivity is important to break this cycle and healthy diets are crucial to achieve this. The evidence discussed here shows that healthy diets for these individuals comes at a particularly high cost.

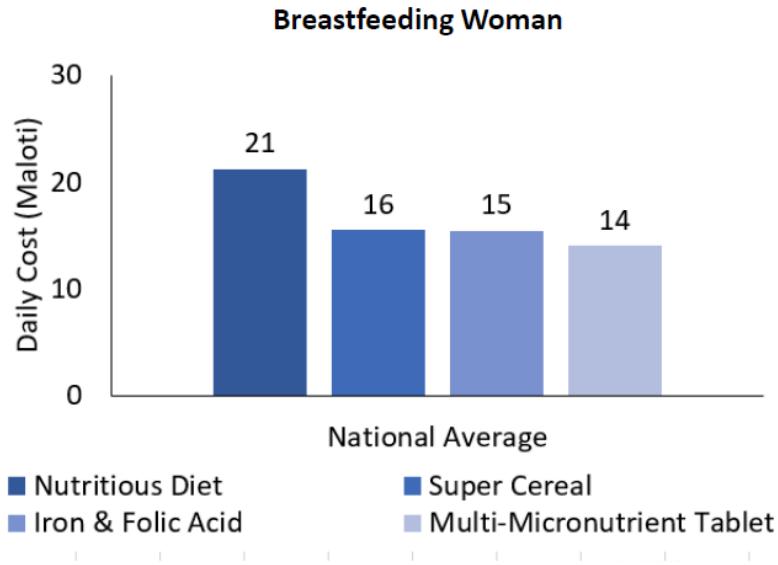
Targeted interventions could help to greatly reduce this cost, by providing micronutrient dense foods or supplements. For the adolescent girl, the daily cost of LSL 24 for a nutritious diet would be reduced to LSL 23 with 165g of Super Cereal, LSL 20 with iron and folic acid supplementation (IFA), and a multi-micronutrient tablet (MMT) would reduce it to LSL 15. For the breastfeeding woman, the daily cost of LSL 21 for a nutritious diet would be reduced to LSL 16 with 165 g of Super Cereal daily, IFA would reduce it to LSL 15, and MMTs to LSL 14.

Figure 15: Daily cost of a nutritious diet for an adolescent girl (average across modelling districts). CotD 2019.



[29] UNICEF, WHO, and World Bank Group, "Joint Child Malnutrition Estimates Data Set."

Figure 16: Daily cost of a nutritious diet for a breastfeeding woman (average across modelling districts). CotD 2019.



While supplementation is crucial during some stages of life (such as pregnancy), usage of specialized nutritious foods can be used in programmes for different periods of time. It may well be combined with or transitioned to fresh food based agricultural interventions or programmes that aim to improve the availability of nutritious foods (see key message 4 and 5). A focus on long-term sustainable solutions, as discussed in the value chain section of this report will require a longer period of time to see impact, which needs to be bridged with interventions that ensure continuity of adequate micronutrient intake.

To be able to successfully do that, some data gaps may need to be filled. Currently, there is little information to understand the specific vulnerabilities of women of reproductive age in Lesotho. Cost of the Diet analysis has shown limiting nutrients to be iron, calcium, folic acid and vitamin C for these target groups. This means that there is a higher likelihood for women of reproductive age to be deficient in those micronutrients. High anaemia rates in children aged 6-8 months indicate low iron stores from mothers.

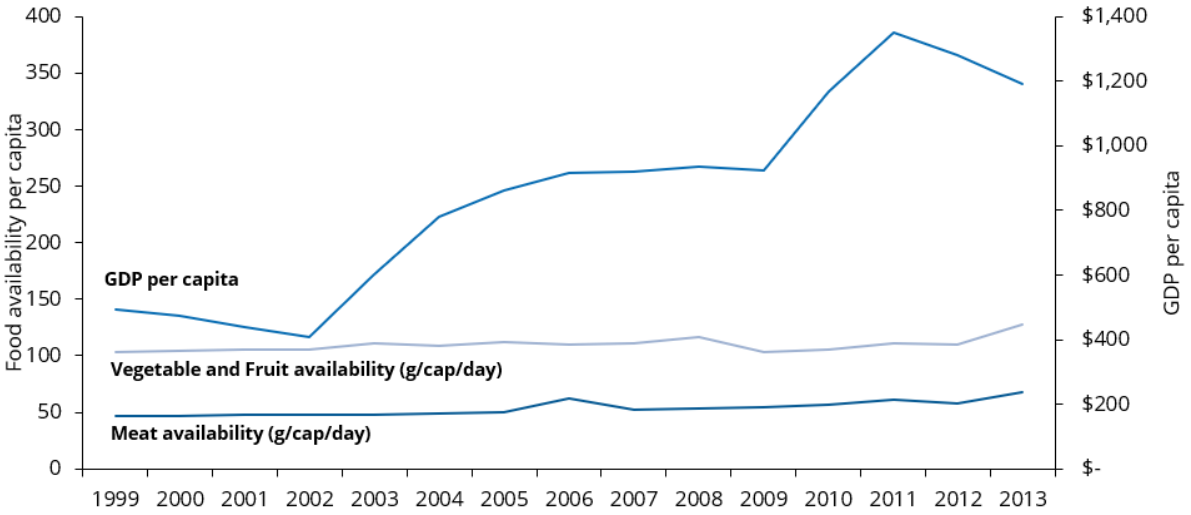
4. Access to Fresh Foods at Household Level

Household Dietary Diversity is low due to limited availability of fresh fruit and vegetables and low consumption of animal source foods. Livestock is an asset used for income generation but rarely for consumption.

Consumption of fruit and vegetables is low. Lesotho remains far below the WHO recommended intake of 400 g of fruit and vegetables per day: The 2018 Global Nutrition Report (GNR) estimated that only 68 g of fruit and vegetables are consumed on average on a daily basis, with only 128 g per person/day available throughout the country.

Similarly, Lesotho misses the mark on dietary energy from non-staples, which stands at a low 20 percent, meaning that 80 percent of all dietary energy comes from foods that primarily provide energy such as cereals, starchy roots and vegetable oil. While these dietary patterns might be influenced by behavioural factors such as choices, the data indicates that production – and subsequently availability, are also an issue. As GDP per capita has doubled to $1,200 from 2003 to 2013, the availability of vegetables, fruit and meat (as measured by trade balance) has remained unchanged.

Figure 17: GDP per capita and food availability over time. (FAOSTAT, GNR 2018)



More specifically, Lesotho's production is dominated by staples, with around 78 percent of total agricultural production focused on cereals (primarily maize) and potatoes. Although there is substantial livestock (half a million cattle and three million sheep and goats)[30], very little is consumed. Most livestock is treated as an asset and traded or used for wool and mohair production.

Access to animal source foods could be increased by focussing on commercial production of chicken and eggs and improving the poultry value chain (see recommendations). Producing eggs through homestead chicken rearing can immediately improve access to animal source foods and dietary intake locally. While such an intervention could reduce the household's monthly cost of a nutritious diet by up to LSL 100 (from 2,160 to 2,060 LSL), it is important to combine it with behaviour change communication to avoid undesired outcomes, such as consumption of the chicken if intended for egg production, or selling of eggs instead of consuming them.

A joint analysis between WFP and IFAD has been undertaken to identify potential entry points to increase availability of fresh nutritious foods from a value chain perspective. For this both poultry & eggs and vegetables were considered as good commodities to provide micro-nutrient dense foods. Taking a value chain perspective comes at the benefit of documenting the possible impact around the food system, showing how

[30] Compared to a population of two million people

changes across the food system could play out through production, distribution and consumption. More detailed information about this collaboration can be found in the spotlight below.

Despite improved analysis on the value chain in Lesotho, understanding the commodity-specific value chain for diverse foods needs improvement. Additionally, this enhanced understanding will need to be complemented with tailored interventions if Lesotho is to leverage the economic and nutritional potential of increasing domestic production. Creating an enabling environment would require interventions along the value chain, such as adequate access to inputs (seeds, fertilizers, irrigation etc.), the existence of processors (mills, slaughterhouses and packaging facilities), and distribution chains with adequate connectivity throughout the country.

This is not only true for increasing availability of foods, but also for processing of existing foods, such as maize meal.[31] Currently maize meal imported from South Africa is following fortification standards implemented in South Africa. As of 2019 Lesotho has no fortification legislation in place that mandates and enforces the fortification of staples.[32] If the domestic production of maize meal is to be increased, it is imperative to ensure that similar – or improved – fortification standards are being adhered to, to ensure that improved local production does not negatively impact nutrient content of available foods.

[31] Department of Health, "Regulations Relating to the Fortification of Certain Foodstuffs."
[32] SUN Movement, "Lesotho Country Profile."

Spotlight: Value-chain development to improve nutrition in Lesotho

Summary

Malnutrition remains a central concern in Lesotho. The Fill the Nutrition Gap (FNG) Lesotho reports that main challenges to improving the nutrition of the Basotho population are limited availability of fresh fruits and vegetables and animal source foods. This analysis suggests that strengthened value chains of vegetables and poultry could, on the one hand, support the local food system, which in turn would increase the availability of nutritious locally produced foods, and on the other hand, improve the livelihood of smallholders and rural population through potential jobs created along these value chains.

Using the nutrition-sensitive value-chain lens in Lesotho

Value chain approach is a useful tool for understanding the complexities of food systems. It is essential to identify interventions to increase production, quality, and nutrition outcomes in a given context. The use of value chain methodology to leverage nutrition is relatively recent. Traditionally, this approach was focused on improving the economic returns. Nutrition-sensitive value chains (NSVCs) improve opportunities to enhance nutrition value as well as increase the supply of and demand for safe and diverse food and adding nutrition value, for example, through the promotion of biofortified crops or minimizing food losses with improved transport and storage.

Fill the Nutrition Gap (FNG) in Lesotho 2019 finds that the lack of availability of fresh fruits and vegetables and the low consumption of animal-source food were factors associated with the poor nutrition of the Basotho population (ibid). In-country stakeholder consultations[33] highlighted that the rural households could obtain significant nutritional and livelihood benefits from development of local value chains of vegetables and poultry[34].

The exploratory NSVC analysis for Lesotho was built on the same two components as the FNG: desk review of secondary sources and linear programming on the cost of the diet (CotD). It followed the steps outlined on IFAD's guide for NSVC programming (de la Peña, Garrett, and Gelli 2018). This analysis outlines the main constraints and opportunities that intersect the value chains identified by the stakeholders consulted through individual interviews and two workshops held in the country. The findings suggest that boosting the local production and market links for vegetables and poultry products could bring several benefits, such as (1) improved livelihoods of rural households (e.g., through an increase in output and job creation) and (2) making the local food system more nutritious and accessible.

[33] As part of stakeholder consultation on the value chains development, three in-depth interviews (one farmer and two policymakers) and one focus group (policymakers and practitioners) were conducted.

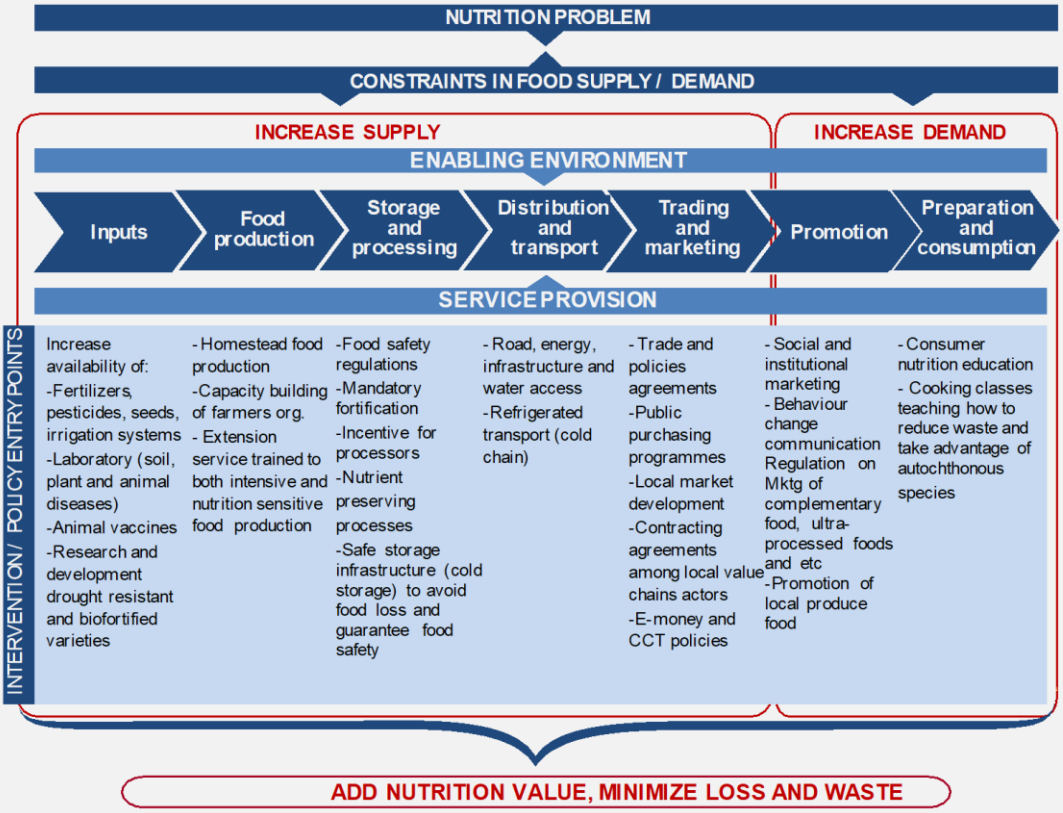
[34] The researchers are aware that NSVC analysis is performed using commodities, but a generic approach was adopted due to time and resources limitations.

Moreover, the results suggest that interventions aimed at improving access to credit for micro, small and medium agribusinesses and using tax incentives to fill the gaps within the value chains (e.g. increasing profitability of agricultural inputs outlets and processor facilities through tax reductions), as well as improving sector organization (e.g. strengthening farmers' organizations) are crucial to the development of the value chains in Lesotho. Considering the exploratory nature of this study, further research is recommended for an in-depth understanding of the pathways for developing nutrition outcomes across the value chains of different commodities.

What is a nutrition-sensitive value chain?

Analyzing all components and their links along the food value chain is essential to address nutrition and food security issues. Taking an NSVC approach allows the identification of entry points to improve nutrition in a determined context. It distinctly associates nutrition problems in target populations with the possible constraints in supply, demand, and nutrition value. Specific policies and interventions can improve supply by increasing the availability and affordability of nutritious foods while also raising incomes of project beneficiaries; promote demand, including that of recipients; and add nutrition value or minimize nutrition losses through, for example, use of biofortified crops or activities to address food loss, waste, and safety. **Figure *18*** provides some illustrative examples.

Figure 18. A framework for understanding how to shape nutrition-sensitive value chains. Adapted from De La Peña, 2018



De la Peña et al. (2018) state that interventions can affect the nutrition outcomes of a target population through three pathways: (1) improved income through the development of strategic value chains that can raise incomes of smallholder farmers, create jobs along the value chain, and, consequently, improve diets by allowing the household to purchase higher-quality food and in more appropriate quantities. (2) enhance market availability and price through improving the efficiency of a selected value chain, impact the volume produced locally, as well the diversity of food available, which would potentially result in reduced prices, (3) the assumption that consumption out of own production is based on the belief that the smallholders who produce the nutritious foods may also consume out of their production. Meanwhile, a nutrition-sensitive value chain should aim for women empowerment in its analysis and recommendation because of its positive impact on children's nutrition (for example, Cunningham et al., 2015; Malapit et al., 2015).

The NSVC approach developed by IFAD recommends four steps: (1) identify the nutrition problem (e.g., gaps in nutrient intakes related to food consumption patterns); (2) select commodities that can address the nutrition gap and are commercially viable, and therefore with good potential for NSVC development); (3) analyze the value chain of selected commodities with a nutrition lens, identify constraints and opportunities, and assess the potential for investment; and (4) identify interventions that could address the challenges and opportunities identified in the analysis. As mentioned earlier, this analysis is based on a study by the FNG team that provided the two first steps (identification of the nutrient problem and the selection of the commodities).

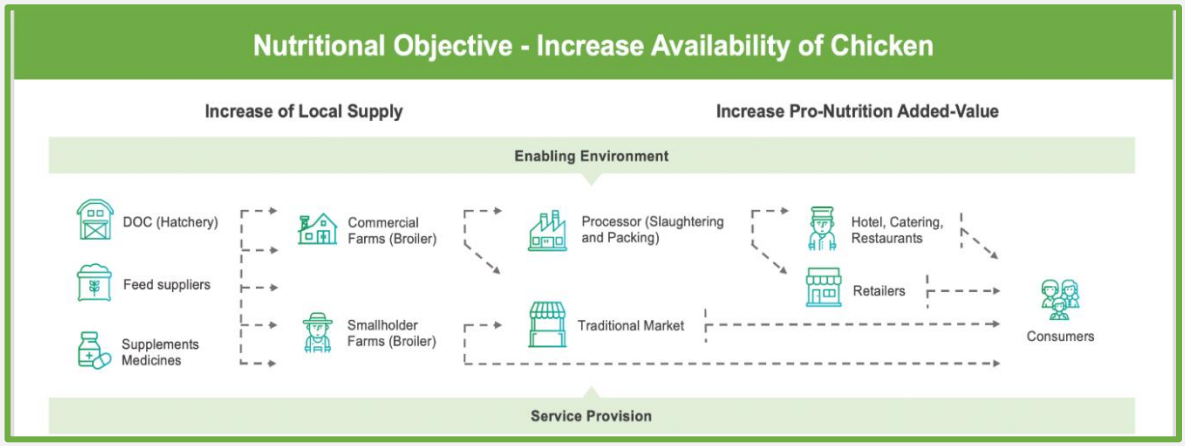
Constraints for developing value chains to improve nutrition

The FNG assessment in Lesotho suggests that lack of accessibility to vegetables and fruits and low consumption of animal foods were some of the main constraints to improving the nutrition outcomes of the Basotho population. Based on the outcomes of the consultation with the stakeholders and experts, a set of criteria, such as nutrition improvement potential, market potential, and income generation potential was used as guidance to determine which of the value chains had the potential to improve nutrition and improve the income of rural population.

Exploratory value chain analyses were conducted for the generic value chains identified by the stakeholders, vegetable and poultry, and considering the standard constraints found for groups of commodities in the selected value chains. As identified by the FNG analysis, availability is the central issue in Lesotho. Opportunities for improving nutrition through development of a value chain relies not only on enhancing the private sector in agricultural inputs sector (e.g. agro-dealers) and processing facilities (e.g. abattoirs, storages etc.) but also on the capacity building of farmers to increase yields, which also implies need for improving the market linkages, to strengthen the local food system.

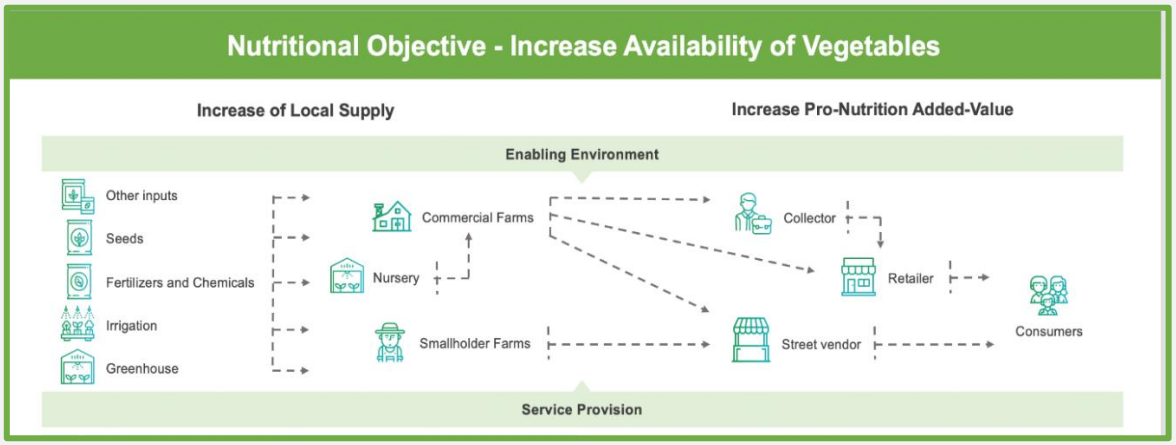
This study found the use of two main modalities that compound the generic value chains in Lesotho: (semi) commercial and traditional. (Semi) commercial[35] involves farmers having access to some level of technology and agricultural inputs and selling their produce directly to local retailers and catering sector. For example, PickNPay—a South African retailer chain that operates in Lesotho—buys vegetables directly from farmers on ad hoc basis. For broiler, for instance, farmers use their own rudimentary slabs to slaughter birds, and they sell it to local restaurants and hotels. In Lesotho, there are no middlemen, local aggregators, or industrial processors that form the linkages between retailers and farmers. In addition, the semi (commercial) channel uses informal markets to sell its produce at the farm gate (or in the informal market, street vendors, village markets, etc.). The traditional category is composed of smallholder farmers, who have limited to no access to agricultural inputs and technology. The lack of agro-dealers in the rural areas (in general these outlets are in Maseru), organization, and absence of credit lines tailored to the smallholder conditions are the main factors associated with the low yields of farmers in this category. These farmers use basically the informal market channel, that is, selling their produce at the farm gate to local markets (local vendors, village markets, etc.). From nutrition purposes, the first type of value chain channel could hold potential for improving the national produce, generate income gains, and create local employment. The second appears to have more "local consumption" potential, as the commodity remains in the area.

Figure 19: Poultry value chain.



[35] The stakeholders mentioned that the percentage of farmers that could be classified as commercial is minimal and in Lesotho semi-commercial or emerging is considered majority, but there is no official data about the profile of farmers in Lesotho.

Figure 20: Value chain for horticultural sector.



During consultation, entry points and actions to promote good nutrition at all stages of the value chain were identified. As mentioned earlier, this analysis considers the constraints and opportunities related to food supply and nutrition value, which includes as issues mainly food safety, food loss, and waste. The study findings focus on increasing supply as it recognized as a major constraint in the country by the stakeholders consulted. **Table *1*** illustrates the main findings. The main constraints related to the development of nutrition sensitive value chains were:

- Agricultural production–Scarcity of agricultural inputs, access to intensive agronomic training, lack of qualified extension service along with absence of credit lines are the main challenges to improve the yields in Lesotho. Boosting the local production would improve availability in the local markets and potentially generate jobs in rural areas.
- Processing–The lack of processing and handling facilities to transform/select raw materials, storage and preservation methods, packaging and adequate cold chain from producers to consumers to preserve the nutrients and guarantee food safety of the products, especially for animal sourced produce.
- Farmers organization–Lack of capacity of farmer's organizations to assist and improve links between farmers and retailers. These organizations could play an important role in training farmers to produce based on market demands, increase the farmers' bargaining power to negotiate agricultural inputs and to sell their produce to local retailers.

Table 1 - Constraints to develop value chains in Lesotho

Vegetables Value Chain	
Agricultural Production	Lack of local providers of agricultural inputs (e.g., seeds, seedlings, fertilizers, and pesticides). The few existing are concentrated in Maseru and do not have the capacity to meet the local demand. Farmers rely on suppliers from South Africa.[36] Farmers have limited access to production technology such as green houses, hail nets, and irrigations systems. Adverse climate conditions make it riskier to produce vegetables in rain-fed open field systems and demand knowledge on cultivation under greenhouses. Limited access to credit lines to improve the production. The few credit lines available in Lesotho are not customized to the conditions of the emerging agribusinesses and farmers. Low capacity of the extension service staff in the intensive production of horticulture and greenhouse vegetable farming.
Storage and Processing	Few or lack of storage and processing facilities. Postharvest loss and limited access to the market due to absence of packing houses, aggregators, and cold storage rooms. Limited knowledge and facilities for production of processed/dried product options to lengthen shelf life and open-up nutritional and value-added possibilities. No enforcement of food safety standards guidelines.
Organization	Inconsistency in supply and quality and low volume are the main barriers for food production in Lesotho, impeding the establishing of a sustainable market linkage with local retailers. Scarcity of farmer's organizations with capacity in market-oriented production as well as support in negotiations with suppliers and clients (increase the bargaining power).
Poultry Value Chain	
Agricultural Production	Absence of local providers of fertilized eggs and day old chicks (DOCs)s. Farmers rely on suppliers from South Africa who often are equipped to purchase high-quality fertilized eggs, thus resulting in low hatching rates in Lesotho, where eggs are of lower standard. Local feed market is controlled by only one company Limited access to credit lines to improve the production. The few rural credit lines available in Lesotho are not customized to the conditions of the emerging farmers. Low capacity in extension service for intensive poultry production

[36] The government of Lesotho implemented a policy since the early 90s, to increase the production of cereals in Lesotho, which has potentially negative effects on the private sector of agricultural inputs in the country. This policy subsidizes up to 50% of inputs such as seed, fertilizers and others. This policy only covers cereal production. However, this policy negative impacts the local private sector that sells agricultural products, reducing the range of products sold because it is not competitive to sell the same product that is subsidized by the government. It was not possible to assess to what extent this policy could affect the horticulture input provision.

Storage and Processing	Absence of bird abattoirs, processing facilities, and lack of cold chain limits local farmers to access formal markets because of no guarantee of quality standards. Poor food safety practices observed in in-farm facilities for the slaughter of birds. No enforcement of food safety standards guidelines and absence of cold chain
Organization	Scarcity of farmer's organizations capable in market-oriented production as well as support in negotiations with suppliers and clients (increase the bargaining power)

Conclusion: Interventions to improve nutrition across the value-chain

To improve the availability, affordability and safety of the selected product categories, in consultation with stakeholders in country, we identified the following value chain interventions to be most promising in addressing existing challenges.

- *Strengthen the private sector to provide agricultural inputs.* As **Table *1*** reveals, there are several gaps within the poultry and vegetable value chains. For agro-dealers/outlets providing agricultural inputs, creating targeted credit line and fostering linkages to suppliers in South Africa could be facilitated for local small and medium-sized enterprises. Fostering local entrepreneurship in the agricultural input sector (e.g., agricultural outlets, hatcheries, and parenting farms) will lead to more efficient value chain, potentially reducing costs and increasing the availability of inputs locally, leading to improved affordability.

- *Provision of incentives such as customized credit lines*. Supporting strategic activities and tax incentives could be effective in attracting entrepreneurs and improving the local provision of inputs. For example, an agribusiness credit could be designed to facilitate investments in hatchery/parenting farms. This along with technical assistance and business management, could increase the offer of DOCs in Lesotho.

- *Capacity building of extension services*. The quality extension services is essential for transmission of new technologies and adequate agronomic practices. Medium-term interventions should aim to train extension officers using online courses and periodically assess the knowledge acquired. Extension services should also include training on homestead production of nutritious food, postharvest handling, storing, processing, and marketing and choosing crops for nutritional value and resilience in the face of climate change.

- *Incentives for establishing processing and storage facilities*. Use of storage facilities would help small-scale producers and processors store raw produce after harvest until prices rise, which is increasingly important as climate change leads to fickle weather conditions and renders the traditional storage methods inadequate. Technologies should also consider how to manage food safely and

preserve nutritional value. For example, the presence of processing facilities that ensures food quality and safety is even more important for chicken meat production because of the high risk of contamination of pathogens, which could affect the health of the consumers.

- *Capacity building of farmer's organization to become market driven*. Farmer's organizations could benefit from the link between smallholders and commercial processors. Interventions could support existing producer groups to aggregate their produce and bargain with buyers. Furthermore, farmers' organizations could act as intermediates for contract farming, establishing formal agreements to stipulate standards for quality and delivery. Facilitating arrangements between smallholders and other value chain actors (e.g., input providers and retailers) can ensure that smallholders get a profitable and reliable return on their investment; and that buyers become confident of receiving quality products on time. Better linkages with local markets should also be promoted in order to ensure that nutritious products are locally available.

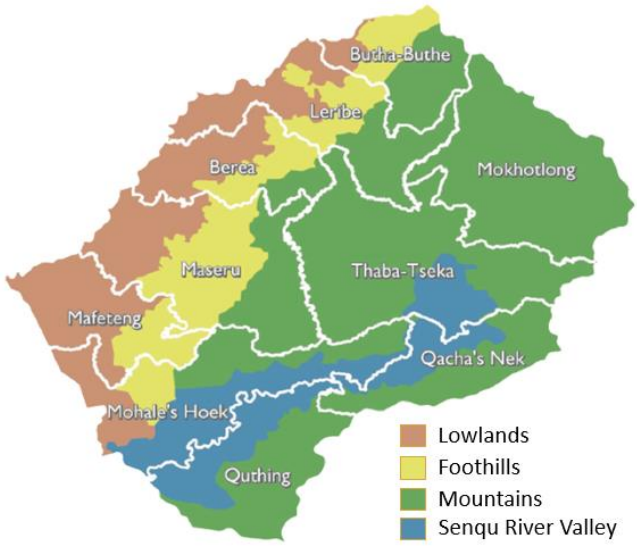
5. Drivers of Household Food Insecurity

Food insecurity and cost of a nutritious diet are higher in rural and remote areas. Vulnerabilities are increased by lack of access to markets. Seasonality has the highest effect on cost in rural areas.

Lesotho has four distinct agro-ecological zones (lowlands, foothills, mountains and Senqu River Valley, cf. **Figure 21**) with 66% of its population living in rural areas, many of which are remote[37]. Of the rural population, 42% live in the Lowlands, 29% in the Mountains, 19% in the Foothills, and 10% in the Senqu-River Valley. From 2017 onwards, food security has improved overall, but pockets of severe food insecurity remain in the south-west of the country.[38]

In rural Lesotho, food security conditions are linked to agriculture seasonality patterns. In the winter months (May to July) the supply of maize (the main crop) is at its maximum while in the summer months (November to January) own production stocks tend to be depleted forcing households to depend on the market for supply. This is why the summer months are sometimes called the 'hungry months', although other foods like fruits and vegetables actually are more abundant in summer than in winter.[39]

Figure 21. Agro-Ecological Zones in Lesotho (BoS 2016).

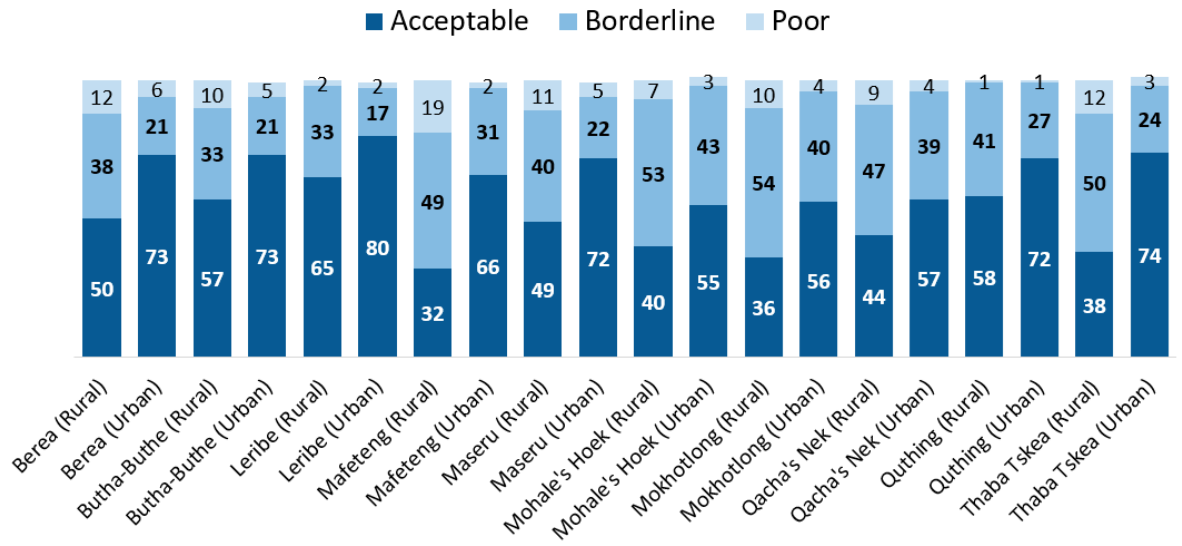


Household dietary diversity is low everywhere, but particularly in the more remote and more rural areas of mountains, foothills and Senqu River Valley. In Maseru 44 percent of urban households have low dietary diversity, it is 85 percent for rural Thata-Tseka

[37] Government of Lesotho Bureau of Statistics, "2016 Population and Housing Census. Preliminary Results Report."
[38] "Global Report on Food Crises 2018."
[39] Lesotho Vulnerability Assessment Committee (LVAC), "Lesotho Vulnerability Assessment and Analysis Report."

and 80 percent for rural Mokhotlong. Similarly, rural areas have the highest prevalence of borderline and poor food consumption score, for example 62 percent of households in rural Thaba Tseka do not have an acceptable food consumption score, compared to 27 percent in urban Maseru.[40]

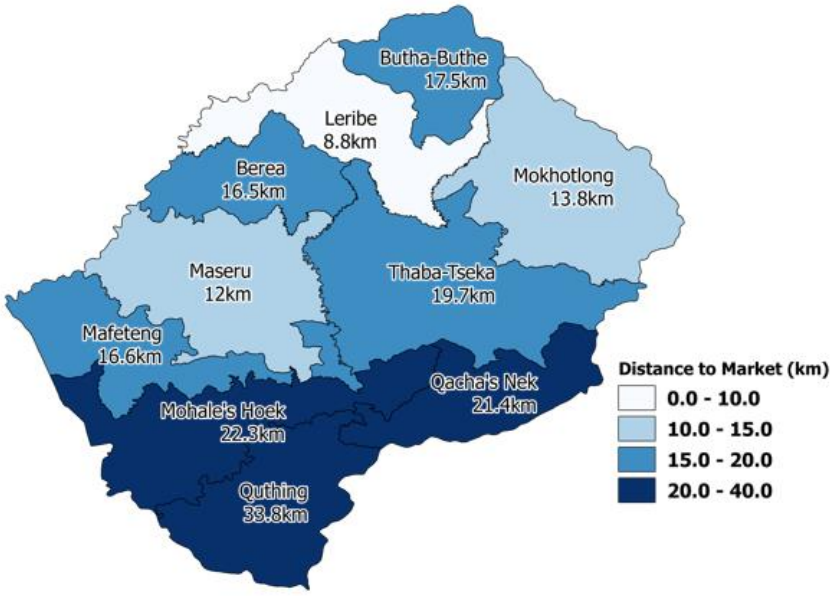
Figure 22. Percentage of households across food consumption score categories in Lesotho (LVAC 2018)



Distance to markets is also higher in remote and mountainous areas (see **Figure 23**), with some of the mountainous areas having almost twice as far to the nearest market in comparison to the average lowland and foothills regions. **Figure *23*** identifies the furthest walking distance identified by key security informants by district. As an example, with an average walking speed of 5km per hour, going to the market for some households in Quthing could take between 6-7 hours each way. Almost 3 out of every 4 households walk to the market, with only a quarter of households using public transport.[41]

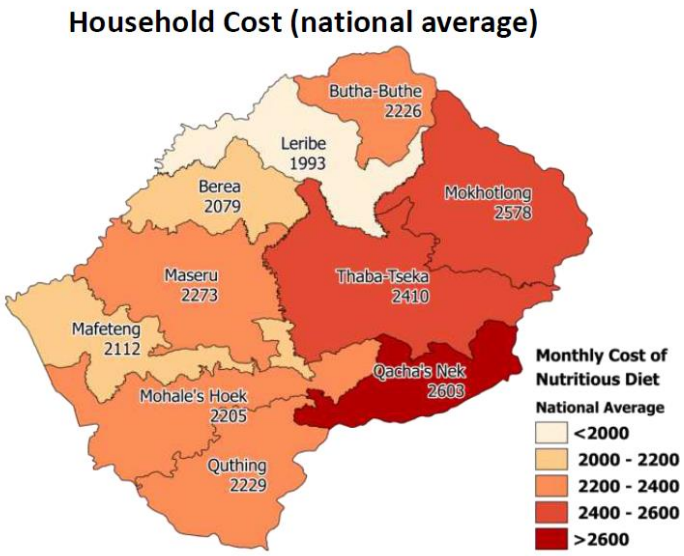
[40] Lesotho Vulnerability Assessment Committee (LVAC), "Vulnerability Assessment and Analysis Report."
[41] Lesotho Vulnerability Assessment Committee (LVAC), "Lesotho Vulnerability Assessment and Analysis Report."

Figure 23. Average distance to markets for households (LVAC 2016).



In addition to environmental factors and geographic access to markets the cost and affordability of nutritious foods plays a major role. Meeting nutrient requirements costs a household an estimated LSL 71 per day, almost four times as much as meeting energy requirements (LSL 18). While energy requirements can be met by consuming very few food groups, a nutritious diet in Lesotho requires up to 8 food groups, including dairy, green leafy vegetables, fruit, eggs, meat, fish and pulses. The distribution cost of a nutritious diet within the country differs, with the lowlands and foothills having relatively low cost and the mountainous regions being the most expensive (**Figure 24**). Likewise, the rural regions are 10+ percent more expensive compared to the urban parts.

Figure 24: Household cost for a nutritious diet (national average). CotD 2019.



This means that households in areas such as Mokhotlong, Thaba-Tseka and Qacha's Nek have a longer distance to markets, find fewer foods there, and have to spend more money on a nutritious diet than other regions. These largely rural areas, which have few urban or peri-urban sections, are impacted also more strongly by seasonality. Comparing prices between July and November 2019 showed that variation of monthly cost in the urban context is only around 10 LSL between those periods (July higher cost), but 100 LSL between seasons in rural areas.

The surprisingly low variation in cost of a nutritious diet for urban settings can be explained by more stable supply of foods which are largely imported from South Africa. Although the variation in cost is relatively low for rural settings, too, the visible increase may stem from a larger reliance on own production of staples of small holders, with high dependence on own harvest during the harvest season. Subsequently, the cost will increase if foods on the market are exclusively from South Africa, with higher transportation cost, which appears to be the case for the July prices.

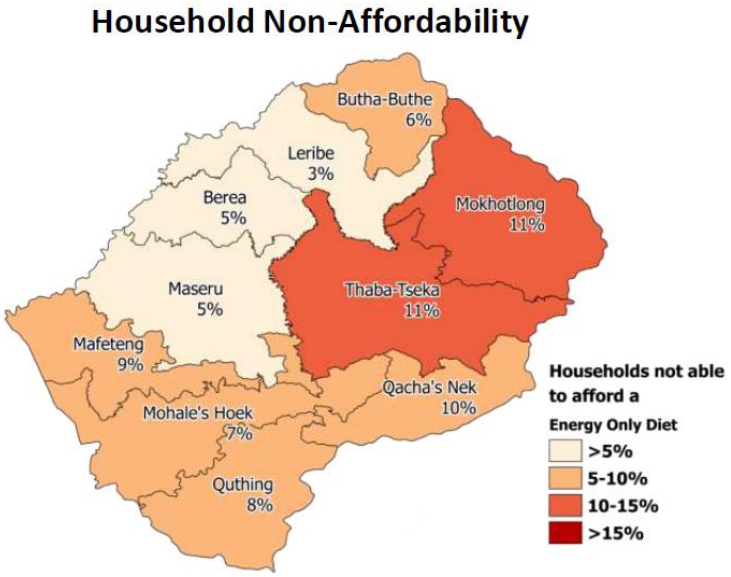
6. Economic Access to Nutritious Foods

Fifty six percent of households are unable to afford a nutritious diet. One in ten households does not have enough money to cover their dietary energy needs, which exacerbates the impact of HIV.

Poverty plays a bidirectional role in accessing a nutritious diet as those households with lower food expenditure are less likely to buy a nutritious diet, which in turns exacerbates existing vulnerabilities. The household cost to meet only energy needs ranges from LSL 500-650/month, with the diet costing around LSL 600/month in most districts. To estimate how many households would be able to afford this amount, we

used food expenditure, adjusted for household size, and compared it to the cost of a nutritious diet for our modelled household. A household that spends less than the calculated cost on food is categorized as not being able to afford the modelled diet. Applying this concept to the energy only cost, non-affordability ranges between 3 percent (Leribe) and 11 percent (Thaba-Tseka and Mokhotlong). This means that in the mountainous areas one in 10 households might not have enough money to meet their basic energy requirements.

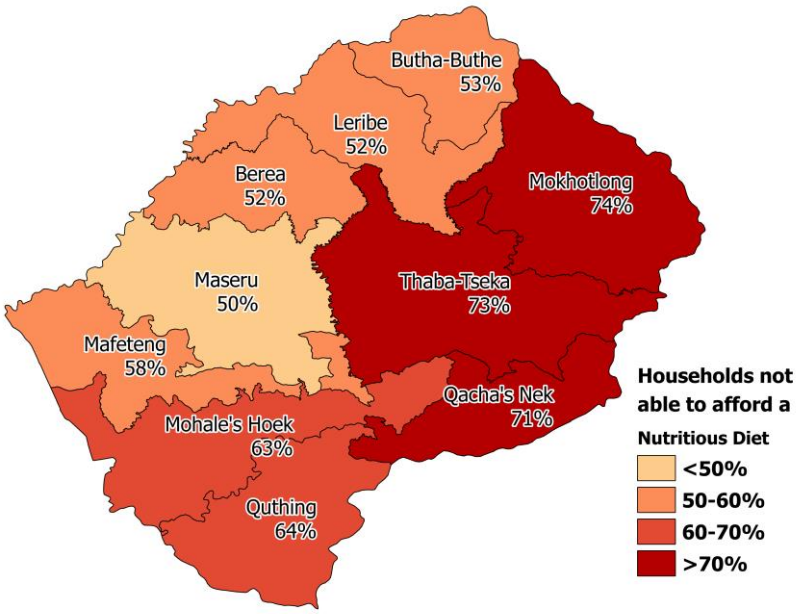
Figure 25: Household non-affordability of an energy-only diet (national average). CotD 2019.



Using that same approach for the cost of a nutritious diet, we estimate that more than half of households (56 percent) would not spend enough money on food to meet their nutrient requirements. Non-affordability of a nutritious diet is particularly high in the mountainous regions (above 70 percent), where high cost and low economic status overlap. Maseru has the lowest non-affordability for a nutritious diet in the country (50 percent), although the absolute number of households not able to afford nutritious foods remains high. These numbers are in line with other secondary sources available, referencing that 74 percent of people live with $3.20/day or less and around 55 percent with or below $1.90/day.[42]

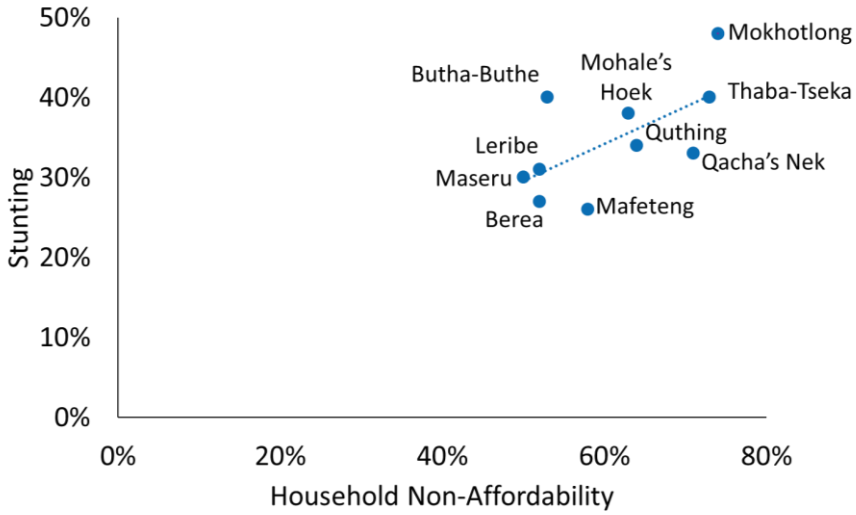
[42] World Bank Group, "DataBank | World Development Indicators."

Figure 26: Household non-affordability of a nutritious diet (national average). CotD 2019.



Being able to consistently purchase nutritious foods is a crucial part of achieving adequate nutrient intake and a strong determinant of chronic malnutrition and micronutrient deficiencies, including anaemia. Unsurprisingly, non-affordability and stunting are correlated in their geographic distribution (**Figure 27**). As with other drivers of malnutrition, non-affordability is high in those remote areas that also have a long distance to markets, low dietary diversity and increased cost. Given the association between stunting and non-affordability, we understand economic access as a major barrier to eating healthy foods that meet nutrient requirements. Although behavioural aspects play a major role, too, it is clear that large parts of the population simply do not have enough money to buy the right foods for their families.

Figure 27: Correlation between stunting and household non-affordability of a nutritious diet, per district. DHS 2014, CotD 2019.



The lack of resources to be able to afford a nutritious diet is in part due to lack of employment opportunities: Unemployment is estimated at 28 percent nationally, with the male youth affected particularly badly: One in two males aged 15 to 24 years is unemployed, compared to one in three females, due particularly to higher literacy rates and manufacturing opportunities for women.[43] Remittances, largely from South Africa, have declined as part of the GDP over the last decades, but still make up a significant amount (17 percent) of GDP in 2016.[44] Further analysis is needed whether the absolute amount of remittances nationally and per recipient household have also declined or the decline in proportion of GDP is a side-effect of overall GDP growth (see **Figure 17**). About 20 percent of households mentioned remittances as the expected livelihood source for the next 12 months.[45]

Another factor impacting financial status is the high HIV prevalence in the country, affecting labour force and raising requirements for nutrient intake. This is creating a vicious cycle of not meeting increased requirements, reduced economic activity and lower income which prevents meeting said increased requirements. Even if Antiretroviral Therapy is free, there are opportunity cost to going to the clinic and related expenses. Over 25 percent of Lesotho's adult population is currently living with HIV, and 74 percent of this population is on antiretroviral treatment.[46] HIV prevalence is highest in Mohale's Hoek and elevated in the urban and peri-urban areas around Maseru. However, since the rural population still makes up around 66 percent of

[43] UNICEF, "Political Economy Analyses in Countries in Eastern and Southern Africa."
[44] World Bank Group, "DataBank | World Development Indicators."
[45] Lesotho Vulnerability Assessment Committee (LVAC), "Vulnerability Assessment and Analysis Report."
[46] Ministry of Health, "Lesotho Demographic and Health Survey 2014."

Lesotho's native population (the Basotho), the caseload of PLHIV might be higher in rural areas.

The increased energy requirements of people living with HIV (PLHIV), indicate the need for targeting PLHIV to ensure their elevated needs are met. They have higher nutrient needs, particularly for energy (estimated 10-20 percent) and protein[47]. Nutrition plays a major role in the course of the disease because nutrient requirements are increased but appetite and ability to digest are reduced, especially if ART adherence is not good and other infections are active. While the cost implications are hard to estimate directly, HIV impacts the ability to earn an income and increases the amount of food that is needed. This means that existing vulnerabilities may be exacerbated by an HIV infection.

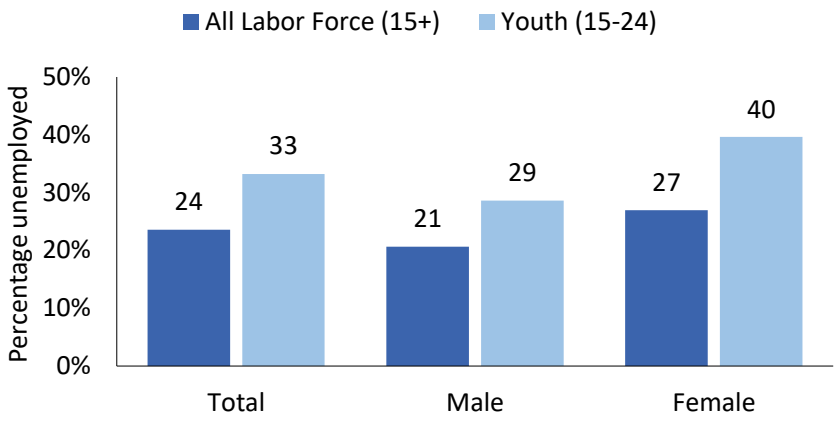
7. Socio-Economic Shocks and Social Safety Nets

Limited economic opportunities translate into a heavy reliance on social safety nets. Even though there are multiple existing programmes, they have not been able to ensure food security.

Lesotho has an unemployment rate of 24 percent and a youth (15–24 years of age) unemployment rate of 33 percent.[48] Given its geographical location remittances have played a big role in economic development of the country and employment of its labour force, with their relevance decreasing (from 72 percent of GDP in 1990 to 17 percent in 2016 (see previous section).[49] According to a case study by FAO [50], the number of mine workers going from Lesotho to South Africa has more than halved since the 1980s, limiting the sources of income for the rural population. Limited employment opportunities and declining income-generating activities, thus, represent some of the biggest challenges faced by the Basotho population.

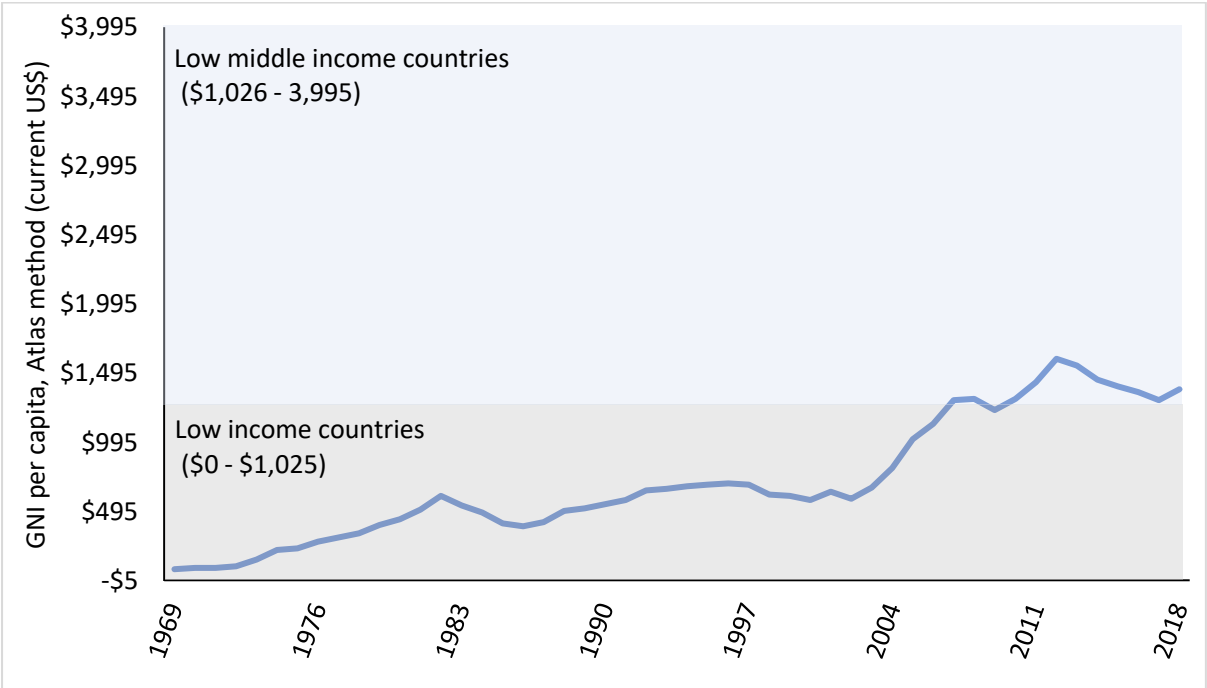
[47] Joint United Nations Programme on HIV_AIDS(UNAIDS), "Nutrition Assessment , Counselling and Support for Adolescents and Adults Living with HIV: A Programming Guide."
[48] World Bank Group, "DataBank | World Development Indicators."
[49] Peacocke, Tadesse, and Moshoeshoe, "Decentralized Evaluation. Evaluation of the National School Feeding Programme in Lesotho, in Consultation with the Lesotho Ministry of Education and Training."
[50] Ulrichs and Mphale, "Strengthening Coherence between Agriculture and Social Protection. Lesotho Country Case Study Report."

Figure 28: Unemployment rate (modelled International Labour Organization), 2018. World Development Indicators 2019



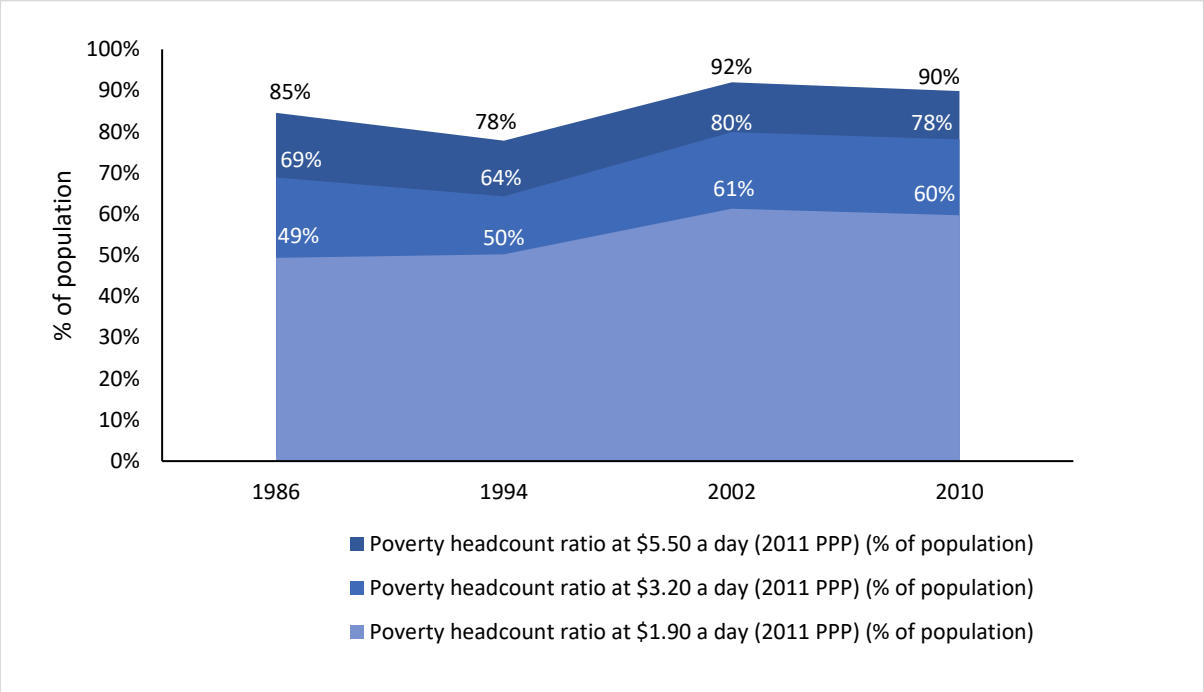
As recognized by the National Strategic Development Plan 2018/19-2022/23 (NSDPII), Lesotho remains very reliant on a few products and markets for exports, making it highly vulnerable to economic, trade and climatic shocks. Trade of wool and mohair has been used as the main strategy for economic growth and employment creation, which has resulted in an increase in GDP per capita and a graduation from a low income onto a lower middle-income country.

Figure 29: Lesotho's GNI per capita using Atlas method at current US$, 1969-2018. World Development Indicators 2019.



But this growth has not been accompanied by a reduction in poverty. As can be seen in the **Figure *30*** below, poverty rates have increased despite the economic growth Lesotho has experienced.

Figure 30: Poverty headcount ratio at $5.50, $3.20, $1.90 a day (2011 PPP) expressed as a percentage of population versus GDP per capita (constant 2010 US$), 1986-2010. World Development Indicators 2019.

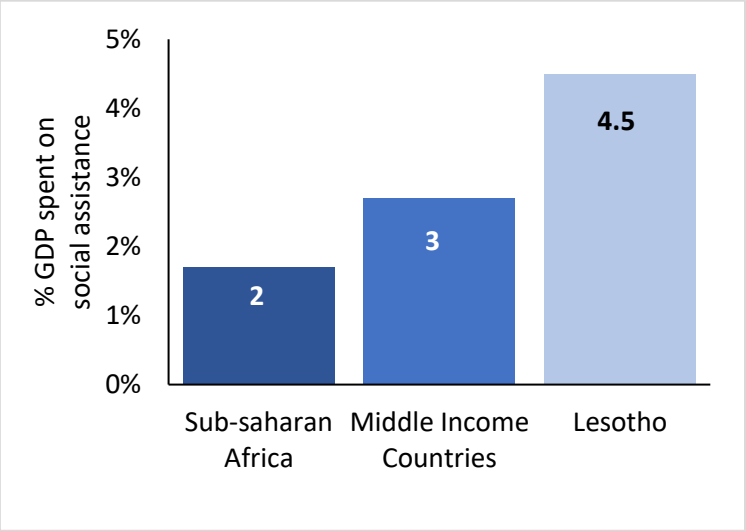


For this reason, even though economic growth and private-sector-led job creation remain at the centre of the NSDPII, this Plan also includes the objective of reducing economic and social vulnerabilities through social assistance. These strategies aim not only to strengthen social safety nets in the country specifically for vulnerable groups, but also to increase capacity of able-bodied people in order to graduate social assistance beneficiaries.[51] To achieve this, investing in human capital development needs to happen early in life, beginning with stunting prevention.

There are a number of social protection programmes being implemented in Lesotho, with different target groups and targeting strategies. These include a Universal Old Age Pension, a Child Grant Programme, a School Feeding Programme, a Cash For Work Programme, a Disability Grant and a Fertilizer and Input Subsidy Programme, managed by different line Ministries. In the case of the MOSD, FAO found that the primary target group are labour-constrained and vulnerable households. For MAFS, the main interest are those farmers that already have productive potential, despite evidence that these translated into the exclusion of smallholder farmers from the larger agricultural programmes.

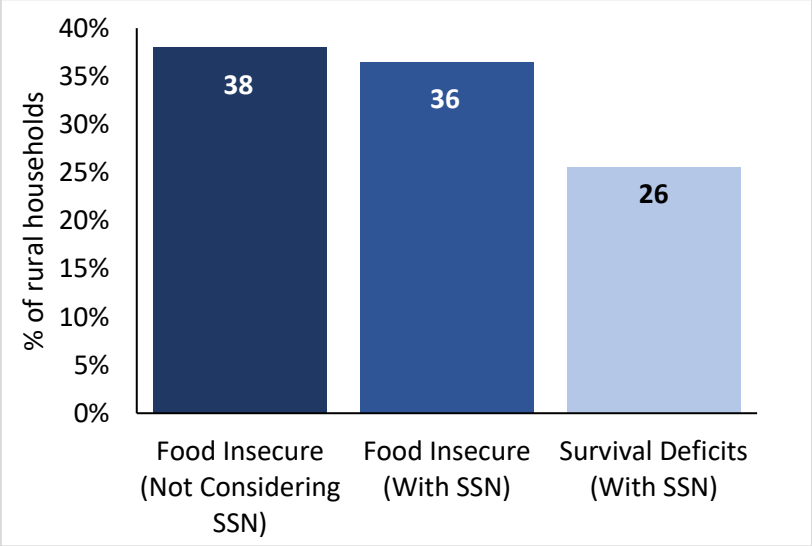
[51] Ulrichs and Mphale.

Figure 31: Percentage of GDP spent on social assistance for Lesotho, and as an average in Middle Income Countries and Sub-Saharan Africa, 2013. World Bank 2016



Given this multiplicity of programmes and their different objectives, spending in social protection and social safety nets in Lesotho is comparably high, as can be seen in **Figure *31*** above. The 2016 Lesotho Vulnerability Assessment and Analysis Report (LVAC) estimated that 30 to 70 percent of the population benefit from social safety nets (SSNs). According to such survey, households consider them one of their most important sources of income, helping them afford food requirements and other needs. Yet even when factoring in social safety nets, LVAC found that many households face survival and livelihood deficits.

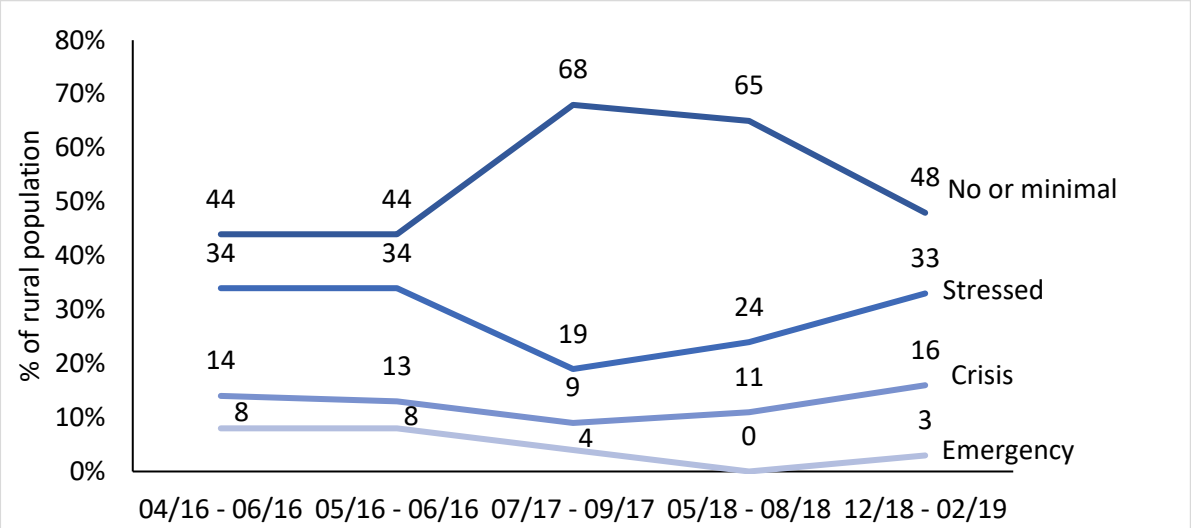
Figure 32: Food security outcome with and without social safety nets, 2016/2017. LVAC 2016.



In addition, the Integrated Food Security Phase Classification shows that in the period from December 2018 to February 2019, more than 50 percent of the rural population

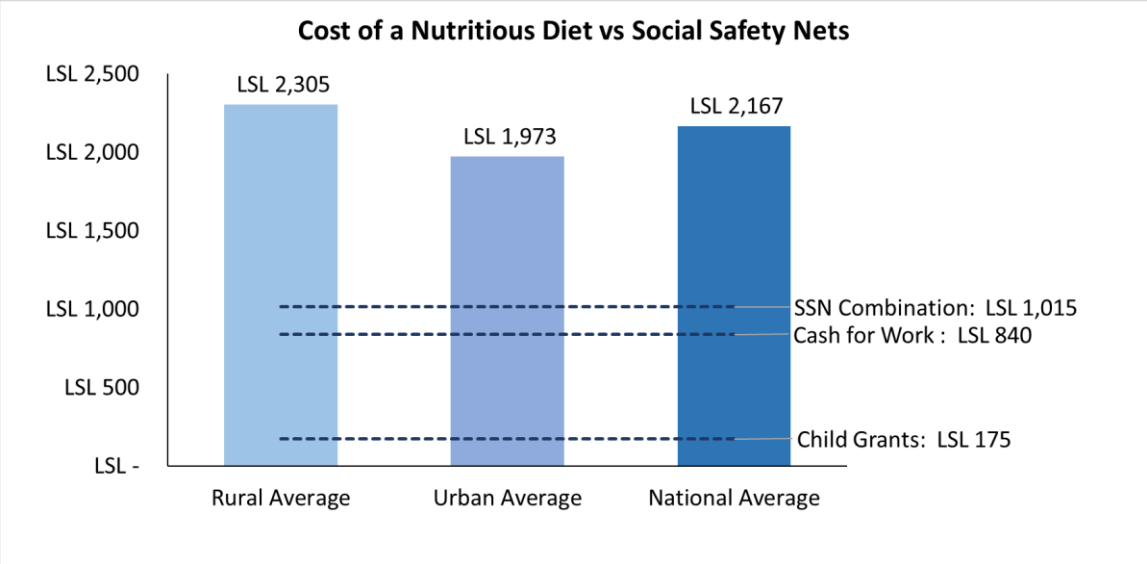
faced an acute food insecurity situation, with 16 percent in a crisis and 3 percent in an emergency situation.

Figure 33: Acute food insecurity situation in Lesotho, per period. Integrated Food Security Phase Classification, 2019.



It is not the objective of this analysis to judge whether targeting for social protection policies is adequate or whether social safety nets represent enough spending from the government. Yet, using CotD, a comparison can be drawn upon the different social safety nets that could, potentially, be accessed by the modeled household and the monthly cost of a nutritious diet for the household as a whole. The modeled households used to calculate the cost of the diet would potentially have access to the Child Grants Programme for two children and the Cash For Work Programme. With the assumption that households spend 70 percent of the cash transfers received on food, the two child grants would cover LSL 175 of food costs per month, while Cash For Work would cover LSL 840 per month. The sum of these would mean the household obtains a total of LSL 1,015 from social safety nets to spend on food. Compared to the calculated cost of a nutritious diet (national average), the model households would remain with a gap of LSL 1,152 per month. This gap would be even larger for a rural household, with a remainder of LSL 1,290 to be covered by the household. Since the food expenditure that is taken into account for this analysis is considering existing social safety nets, this may indicate that the current gap remains because of low incomes.

Figure 34: Comparison of the monthly cost of a nutritious diet for the modelled household against social safety net programmes. CotD 2019.



8. School Feeding and Education

The primary School Feeding Programme has universal coverage and represents a strategic entry point to improve children's diets.

In the 1960's. the government of Lesotho, with support of WFP, put in place a universal school feeding programme for primary schools. The programme had a gradual rollout until universal coverage was achieved in 1965.[52] Primary education became free and compulsory in Lesotho in the year 2000, with a phasing-in of this policy between 2000 and 2006. This strategy, which included free school meals for children, sought to support and increase both enrolment and attendance of primary school.

The number of out-of-school children has significantly decreased in the last decades. In 2000, there were over 95,000 out-of-school children, compared to less than 7,500 children in 2017.[53] Enrolment and attendance rates to primary school in Lesotho have been mostly constant for the last decade, for both girls and boys. The latest net enrolment rates stand at more than 90%. As a consequence, the school feeding programme reached more than 350,000 children in 2017.

[52] Ministry of Education and Training, National School Feeding Policy.
[53] UNESCO Institute of Statistics (UIS), "UIS.Stat."

At this moment, the School Feeding Programme, though universal, only covers primary schools. Yet, as discussed before, adolescent girls are the most nutritionally vulnerable members of the household given their increased micronutrient needs. Though attendance and enrolment of secondary education is not as high as that of primary, it remains higher for girls than it does for boys. In 2016, there were almost 74,000 adolescent girls enrolled in secondary education, compared to over 55,000 adolescent boys. In that same year, there was only a rate of 20 percent out-of-school adolescent girls and 28 percent out-of-school adolescent boys of secondary school age.[54] For such reason, a secondary school feeding programme could provide an entry point for targeted interventions, serving the double purpose of increasing education and nutrition outcomes.

Two schemes have been used for the implementation of the School Feeding Programme.[55] The first scheme, run by the Government, uses locally hired cooks and caterers to procure, cook and deliver the meals to each school. This scheme was set up by the MoET in regions with higher market access and greater population density. As it allowed members from the same community to be contracted as caterers for the school, the catering scheme was also viewed as one with a community economic development component.

A weekly menu was set by MoH and MAFS, including a total of 5 food groups, with a minimum of 2 food groups per day. Though the catering scheme does not include a breakfast, certain schools have set the lunch at an earlier time during the school day to offset the fact that children attend school without having had a meal before coming to school.[56]

The second scheme, run directly by WFP, was set up for the highlands, where there is limited market accessibility. The WFP scheme consists of a fixed daily breakfast and lunch, with basic foods that are procured nationally and internationally. Both the Caterers' and WFP menus can be seen in the **Table *2*** below.

Table 2: Primary School Menu for Caterers and WFP delivery models. WFP 2018.

Caterers Menu:	**WFP Menu**
• **Monday**: 150gr papa (maize porridge), 100gr moroho (vegetables); • **Tuesday**: 1⁄4 loaf of bread, 200ml of bean soup;	• **Breakfast**: 30gr of maize meal porridge with 10gr of sugar; • **Lunch**: 120gr of maize, 30gr beans/peas, 10gr of vegetable oil and 3gr of iodised salt.

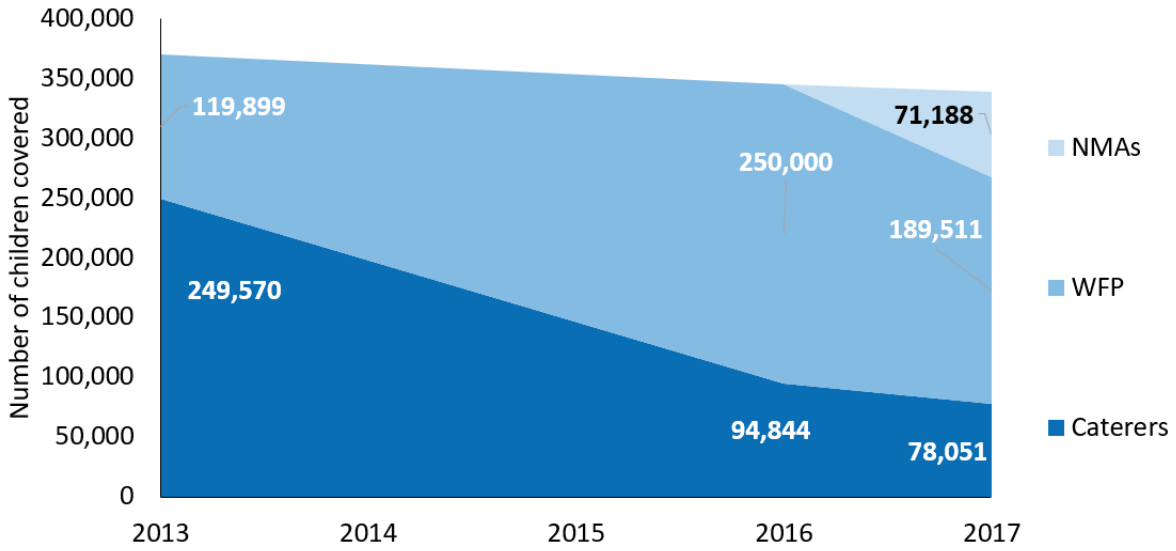
[54] UNESCO Institute of Statistics (UIS). "Rate of out-of-school adolescents and youth of secondary school age, female (%)" and "Rate of out-of-school adolescents and youth of secondary school age, male (%)"
[55] Peacocke, Tadesse, and Moshoeshoe, "Decentralized Evaluation. Evaluation of the National School Feeding Programme in Lesotho, in Consultation with the Lesotho Ministry of Education and Training."
[56] Peacocke, Tadesse, and Moshoeshoe.

• **Wednesday**: 150gr papa, 100gr moroho, 1 egg; • **Thursday**: 150gr samp (boiled maize kernels), 150gr beans; • **Friday**: 150gr papa, 250ml milk.	

The Government of Lesotho, together with WFP, has put together a plan for the government to take over the School Feeding Programme in all of Lesotho's primary schools. For these purposes, a new delivery scheme was set up in January 2017 by the Government. This third scheme consists of different private sector National Management Agents (NMAs) that are contracted directly by the government and are expected to manage the different steps required for the delivery of the school meals, from procurement to preparation.

The NMA scheme has been gradually taking over schools for the management of the SFP. They are expected to provide the WFP breakfast and the Caterers menu for lunch.

Figure 35: Number of children covered by the School Feeding Programme, per delivery model and year. WFP 2018.

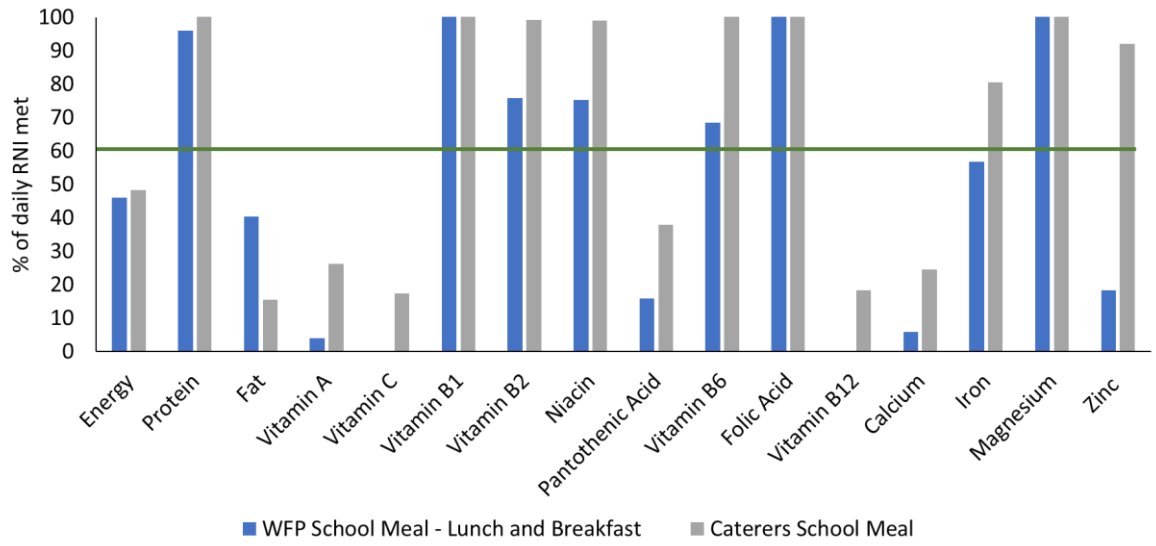


The national average cost of a nutritious diet for the school aged child calculated by CotD was LSL 8.8 per day. Taking into account that the child receives a school meal from Monday to Friday reduces the average daily cost to the household by more than 20%. Yet, the reduction depends on the menu the child receives. In the case of the WFP delivery scheme, the cost is reduced to LSL 7.1, while in the Caterers delivery scheme, the cost of a nutritious diet is reduced to LSL 6.7.

Considering both schemes make up breakfast and lunch or, in other words, at least 2 out of the 3 meals a school-aged child would eat in a day, both menus should cover around 60 percent of the daily required nutrient intake for a school aged child. Yet, as can be seen in the **Figure *36*** below, neither menu covers such target for all nutrients.

Though the Caterers scheme covers a higher proportion of most micro and macro nutrients, both menus materially underperform in the targets for vitamin A, vitamin C, pantothenic acid, vitamin B12 and calcium.

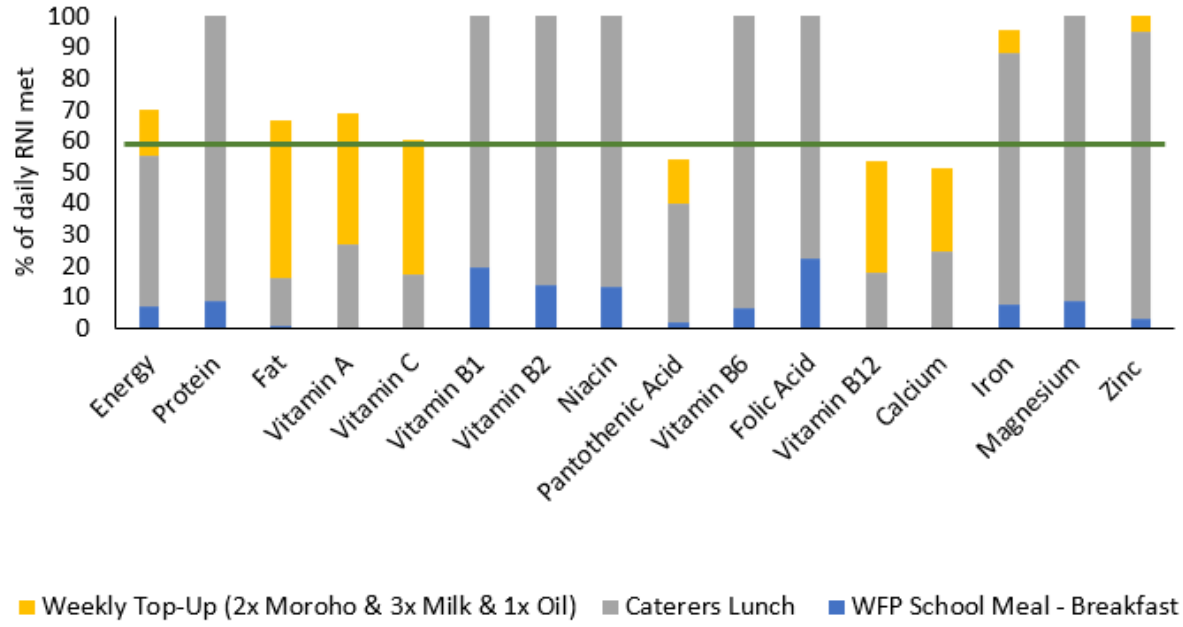
Figure 36: Percentage of daily Reference Nutrient Intake met by School Feeding Programme's menu for Caterers and WFP schemes, by nutrient. CotD 2019.



Because the new NMA menu includes both the WFP breakfast and the Caterers lunch, it delivers more of certain nutrients. Yet, as can be seen below, it still underperforms in others like fat, vitamins A, C and B12, and calcium.

To reach the target for daily required nutrient intake, stakeholders recommended the option of adding one or more portions of foods already included in the NMA menu. This top-up, per week, would consist of two servings of vegetables (like moroho), three cups of milk and a serving of oil. As can be seen below, by adding the suggested top-up, the NMA menu would reach or be close to reaching the 60 percent threshold on macro and micronutrients for a school-aged child.

Figure 37: Percentage of daily Recommended Nutritional Intake met by School Feeding Programme NMA menu and proposed top-up, by nutrient. CotD 2019.



Although the improved menu compares well to the previous menus, the adjusted school meals meet between 50-60 percent of daily requirements, which implies that the foods from home (or out of school) provide the other 40-50 percent. This might be difficult to achieve for some key micronutrients, such as Vitamin B12, Calcium and Pantothenic Acid. It is therefore crucial to not only improve the lunch menu which, at least on paper, is quite nutritious, but also the breakfast menu. For the school meals to be able to make this important contribution to nutrient intake, there needs to be an adequate implementation, which means that budget dedicated to this will also have to increase. If the sourcing of micronutrient-rich items (fortified flour, vegetables, milk) is challenging logistically or financially, adding a multi-micronutrient powder can be a good way to improve micronutrient content of the school meals.

9. Agriculture Production

Agricultural productivity is low and is expected to decrease as climate conditions worsen. Productivity is limited by sub-optimal agricultural practices but could increase through improving them and investing in infrastructure.

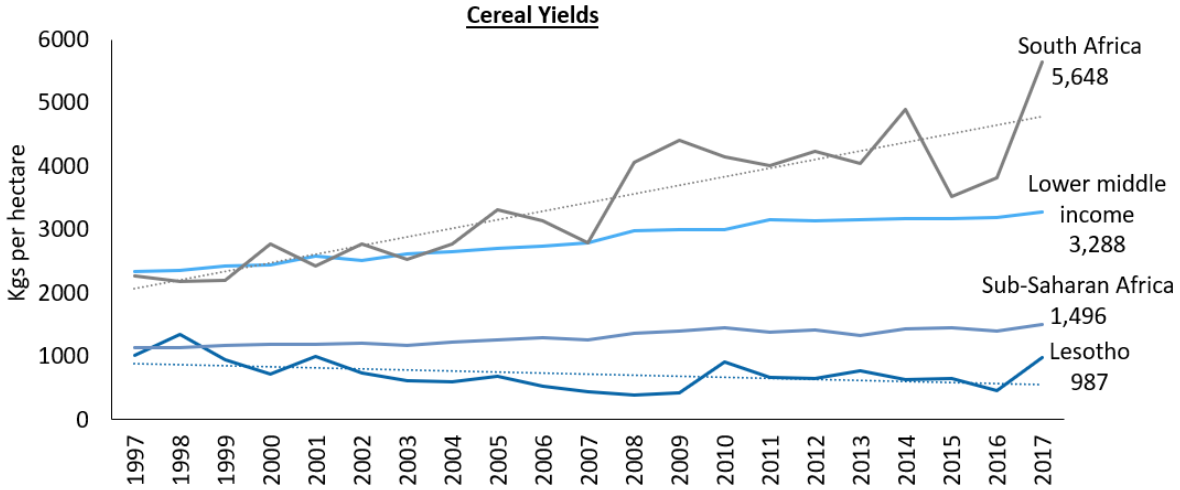
Despite having more than 70 percent of rural population, Lesotho is not self-sufficient in the production of either meat or vegetables.[57] Only 30 percent of foods consumed in the country are produced locally, and it mostly depends on South Africa to supply their

[57] World Bank Group, "DataBank | World Development Indicators."

internal market. Ninety percent of broiler meat and 80 percent of vegetables sold in the Basotho formal market are imported from South Africa.

Lesotho's production is focused on cereals, primarily maize.[58] Yet, even in the case of cereals, average yields remain comparatively low (cereal yields of 986.8 kg per hectare in 2017 and 467.7 kg per hectare in 2016)[59] and are vulnerable to climate shocks.

Figure 38: Cereal yields (kg/ha) over time. FAO 2019, World Bank 2019.



Although 78 percent of all productive land area is agricultural (meaning that it is used for crop, horticulture or livestock) and 38 percent of the economically active population engages in agriculture, agriculture contributes to only 5 percent of GDP.[60] The majority (91%) of fields for crop production are run by smallholder farmers, with yields being used primarily for own consumption. These farmers often struggle to reach a subsistence level and, in most cases, need to supplement their own production with purchased commodities. This overall deficit at the household level suggests that, currently, many smallholders are not able to sustain their livelihoods by agricultural activities.

Lesotho has also been affected by climate change. El Niño effect has caused increasingly long and intense spells of drought, leading to increased crop failure. Current trends are likely to continue and worsen, as mitigating measures have rarely been adopted. Agricultural inputs such as fertilizer and improved seeds are not widely used, and government input subsidy programmes don't effectively reach those households with small landholdings. As a result, few smallholders make use of agricultural inputs to boost their productivity (see value chain analysis above).

[58] FAO, "FAOSTAT | Lesotho Country Indicators."
[59] World Bank Group, "DataBank | World Development Indicators."
[60] Gwimbi, Patrick; Thomas, Timothy S.; Hachigonta, Sepo; Sibanda, "Lesotho"; FAO, "FAOSTAT | Lesotho Country Indicators."

Figure 39: Annual summary of drought intensity. GIEWS, FAO 2019.

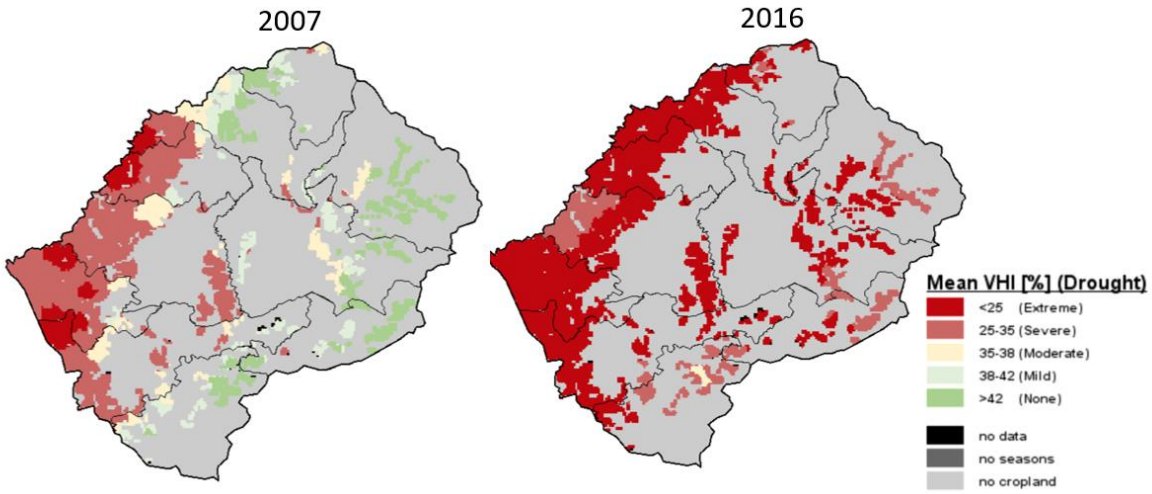
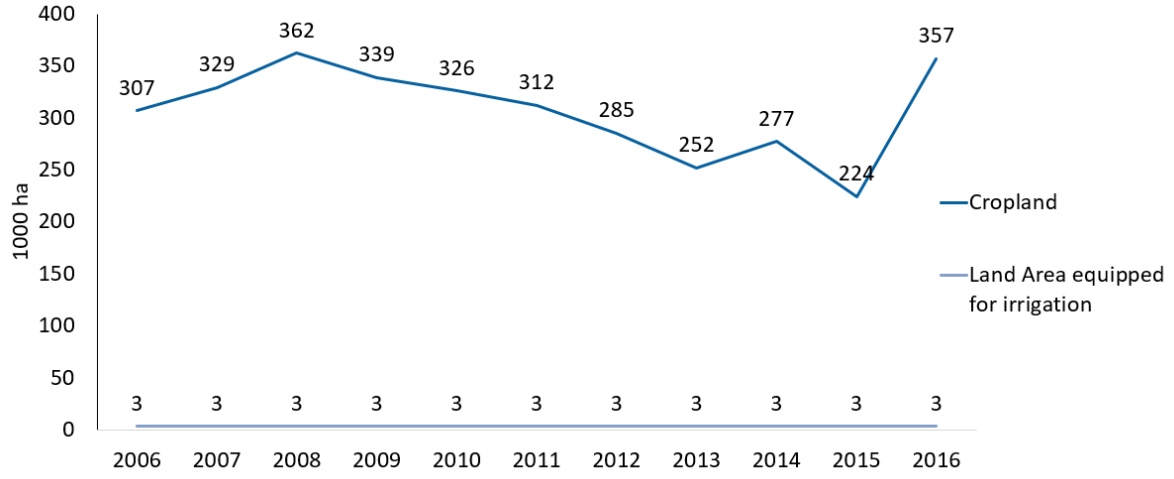


Figure 40: Cropland and land area equipped for irrigation in Lesotho (1000 ha). FAOSTAT 2019.



Less than 1 percent of cropland in the country is irrigated and no improvements have been made since 2006. With prolonged droughts, reliable water supply becomes increasingly important for agricultural productivity. For this reason, international and government stakeholders have been recently paying increased attention to improving irrigation practices. Several solutions could be appropriate, ranging from large scale infrastructure projects, such as dams, to low-tech and low-investment solutions, such as rainwater harvesting.

Access to irrigation decreases risks presented by climate conditions, translating into a more stable supply of foods and, when combined with other improved agricultural practices, an increase in yields. For Lesotho, this would mean higher availability of fresh nutritious foods from local production. As can be seen in the **Figure *41*** below, increased

yields and availability at a household level could reduce the cost of a nutritious diet. With irrigation for a diversified household garden of 35m^2, yields could be doubled and diversity at the household level could be increased. Household cost could be cut by 10 percent (200 LSL per month).

Figure 41: Diagram showing outcomes of harvesting rainwater for smallholder production. WFP 2019.

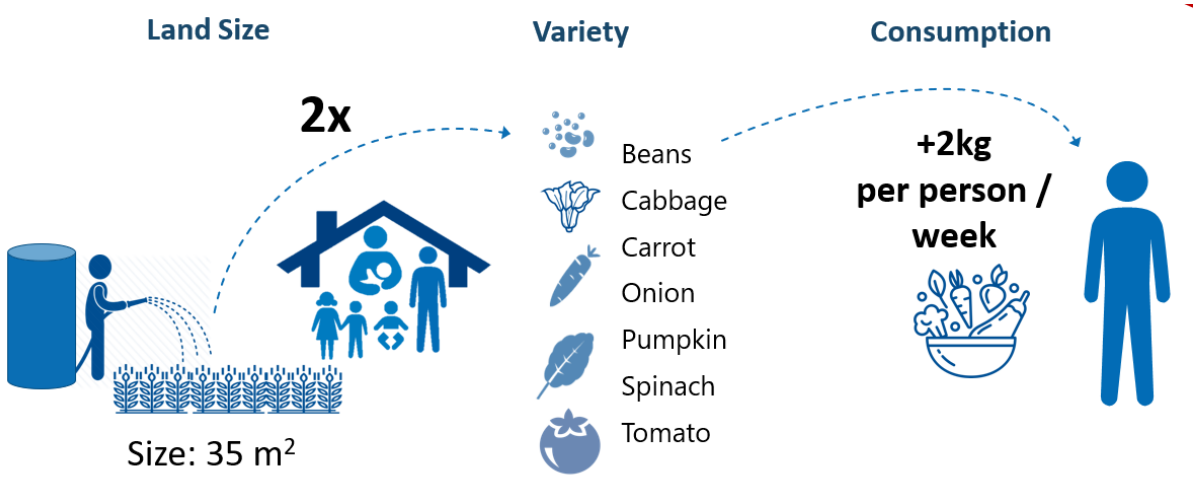
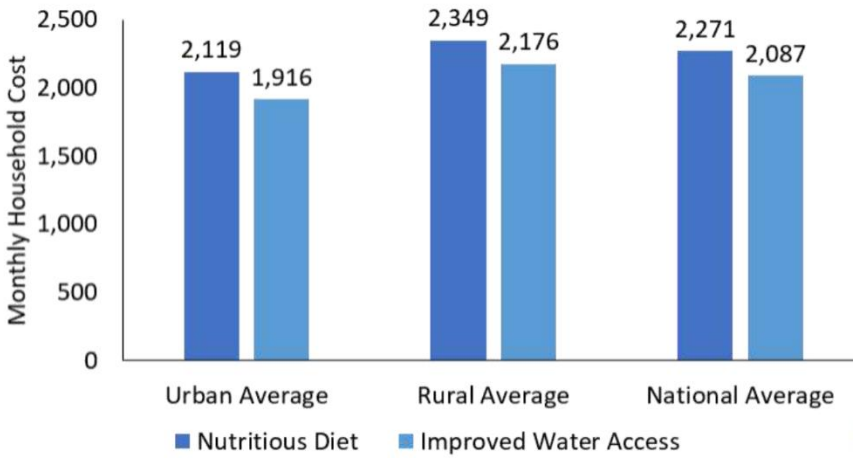


Figure 42: Monthly cost of a nutritious diet for the modelled household (average across modelled districts) with and without improved water access. IFAD, CotD 2019.



10. Smallholder Farmers Participation Across the Value Chain

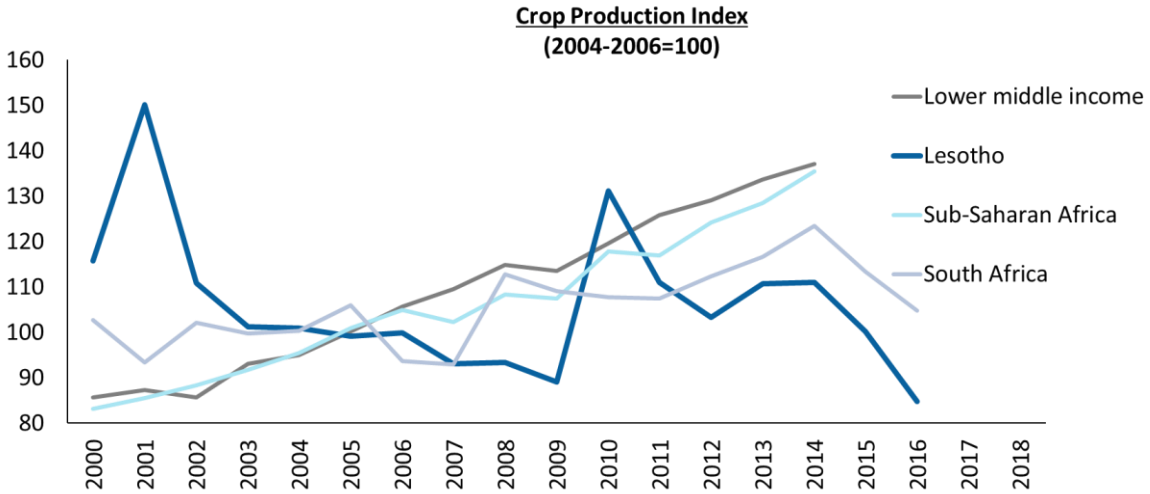
Micro, small and medium agricultural enterprises are too constrained to expand. Their participation along the agricultural value chain is limited.

The agricultural value chain is dominated by government initiatives. Local small and medium sized enterprises are rarely included in government initiatives such as seed provision. Maize that is distributed through the main trader networks in Lesotho is largely imported from South Africa, leaving maize from local smallholder production to be processed only locally and mainly consumed by the households growing it or those

nearby.[61] There are only two mills in Lesotho. Lesotho Flour Mills, owned by the Government of Lesotho and Seaboard Corporation, and Lesotho Milling Company, owned by South Africa.

Access to credit, and subsequent growth and investment, is very low (around 1 percent of farmers have access), making it difficult for farmers to increase their own production beyond subsistence farming. No agricultural insurance is available for farmers to take risks and branch out. Despite an input subsidy programme for cereals which sells inputs at 30-50 percent of retail cost, many households reported that inputs remain unaffordable. Selling inputs at such a low price also comes at the cost of inhibiting potential private sector actors that are not able to compete with these low margins. This, in turn, impacts the effective absence of private sector players that are needed for a long-term sustainable delivery model of agricultural inputs. The combination of those factors is visible in the Crop Production Index[62] over time, where Lesotho's production has been highly variable, with a sharp decrease in 2016, relative to the base period of 2004-2006.

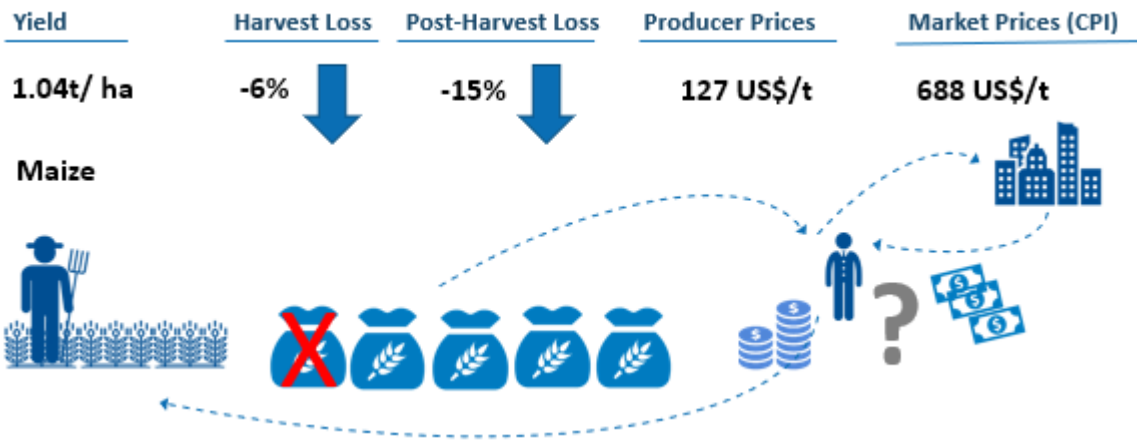
Figure 43. Crop Production Index, with base period 2004-2006. World Bank 2019.



Given such constraints, reducing losses during production of crops could be a first step to improving outputs. Small enterprises regularly experience high post-harvest losses and do not receive good profits for their products. The combination of relatively low yield for maize (1t/ha compared to 5.6t/ha in South Africa[63]), losses during and after harvest (storage), not being able to sell at competitive prices highlights some key issues of smallholder farmers in maintaining a viable livelihood (**Figure 44**).

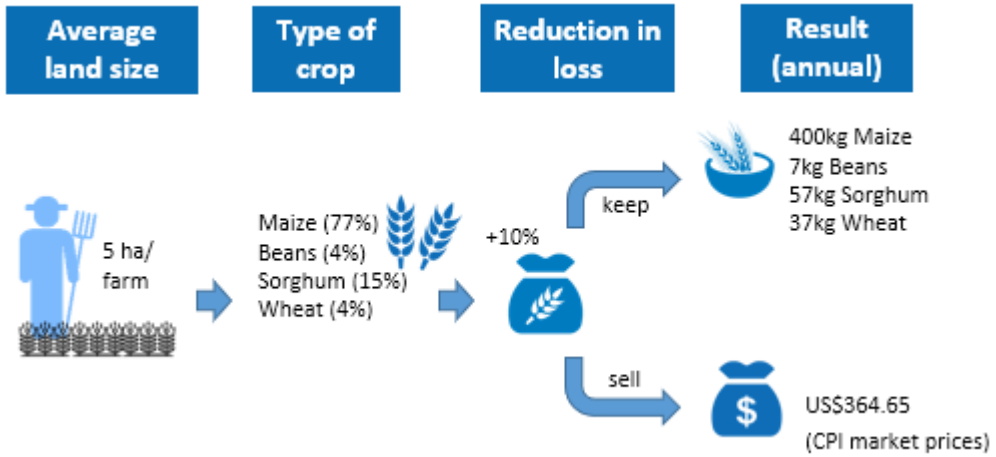
[61] Lesotho Vulnerability Assessment Committee (LVAC), "Market Assessment Report."
[62] Crop Production Index shows agricultural production for each year relative to the base period of 2004-2006. It includes all crops except fodder crops. Source: World Bank, 2019. https://data.worldbank.org
[63] World Bank Group, "DataBank | World Development Indicators."

Figure 44. Diagram showing important constraints of improving smallholder livelihood (IFAD and WFP 2019)



Improving only post-harvest losses by 10 percentage points on a 5ha farm could save half a ton of crops every year (**Figure 45**). Additionally, adequate regulation could ensure that all improvements within crop production are nutrition-sensitive. Keeping in mind the nutrient-adequacy of agricultural development initiatives is important to ensure that the nutritious quality of foods in Lesotho does not deteriorate. As an example, introducing a mandatory fortification policy as local maize production and milling increases would create the opportunity for locally produced, fortified maize meal at local markets. Ignoring such an important entry point could potentially lead to the replacement of fortified maize meal from South Africa with unfortified local maize meal, which is to be avoided.

Figure 45. Estimated impact of improved post-harvest losses for a 5ha farm. Note: Prices are CPI market prices, not current producer prices. (IFAD and WFP 2019)



11. The Potential of Multi-Sectoral Programming

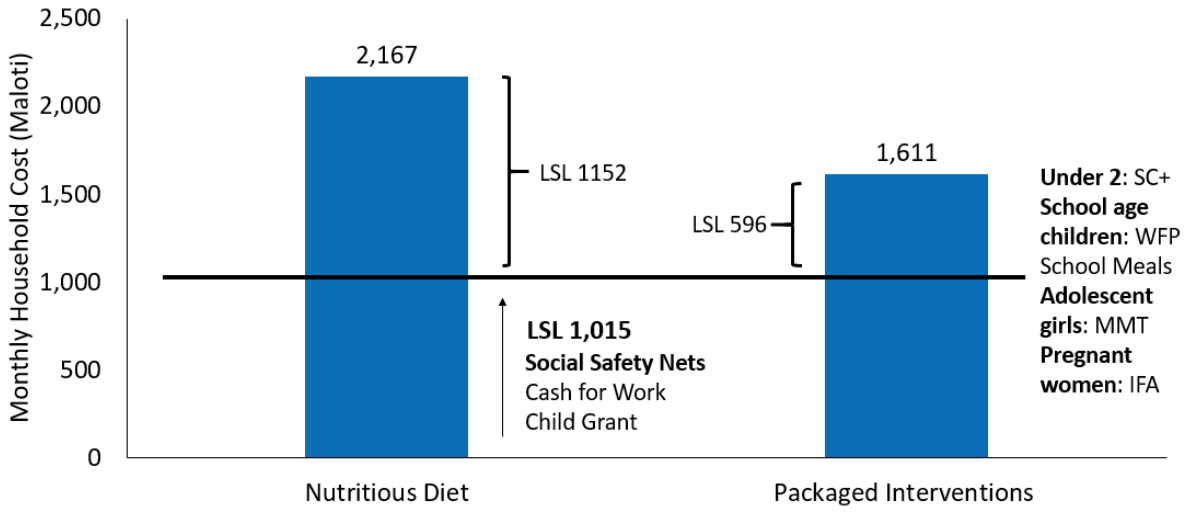
Introducing interventions from all sectors can drastically reduce the cost and non-affordability of nutritious diets.

Moving the needle on malnutrition requires actions from all sectors. To estimate the impact of combined interventions, we combined the most effective interventions into a household package that also included a cash transfer, based on the social safety nets that are available (**Table 3**). In the case of the school aged child, the ongoing WFP school meals model was selected, because implementation and feasibility of NMA school meals remains challenging and would not reflect the most likely programming for school aged children in the short to medium term. The results show that a combination of targeted interventions and a household cash transfer can reduce the money needed by the household down to just LSL 596/month (**Figure *46***).

Table 3. Interventions combined to household packages.

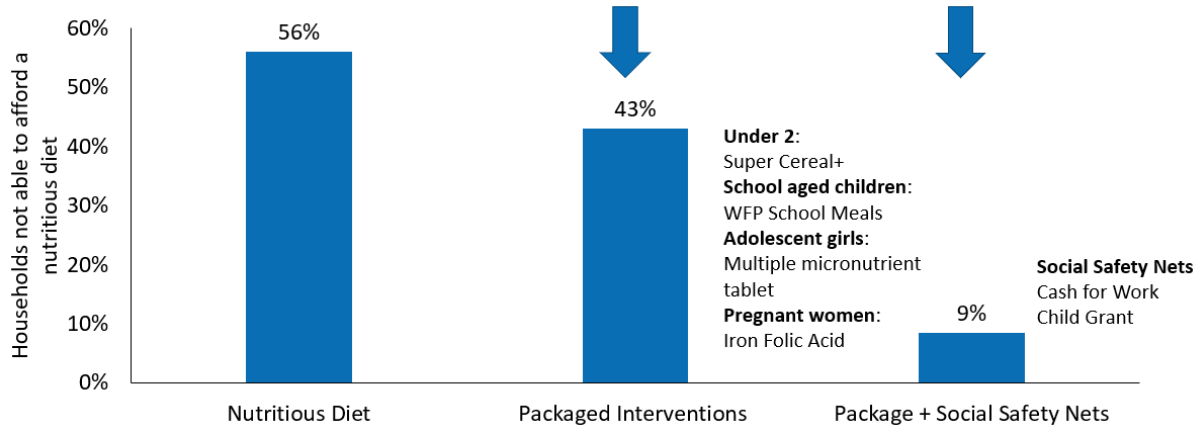
Target	Intervention	Safety net
Under 2	SC+ (60 g daily)	Child Grant
School-aged child	WFP school meals	Child Grant
Adolescent girl	MMT (1 g daily)	
Pregnant woman	IFA (1 g daily)	
Adult man		Cash for Work

Figure 46: Monthly cost of a nutritious diet with and without packaged interventions, compared with monthly transfer amount of social safety nets. CotD 2019.



Economic barriers to adequate nutrient intake can be significantly reduced with multisectoral interventions: food (agricultural interventions), health (supplementing diets with specialized nutritious foods or micronutrient supplements), education (healthy, nutritious school meals), and social protection (cash transfers for the most vulnerable). Assuming that all households would be eligible for the modelled interventions, but not necessarily widely receive them, estimated national non-affordability could be reduced from 56 percent to 9 percent (**Figure *47***). This would make a nutritious diet available for the vast majority.

Figure 47: Percentage of households not able to afford a nutritious diet, with and without packaged interventions and social safety nets. CotD 2019.



These results demonstrate the possible benefits that could be gained by increasing household access to nutritious foods via a package of interventions that is delivered across multiple entry points and by different sectors. The underlying assumption is that adequate demand-creation strategies are in place to ensure that cash transfers or vouchers provided would be spent on nutritious food which would be consumed by the targeted individuals. Similarly we assume that education and health systems are in fact able to deliver the complementing interventions.

Recommendations

During the recommendation workshop participants joined one of five sectors (health, education, social welfare, commercial agriculture and household agriculture). Based on the FNG findings each group discussed the key messages and findings related to their sector. They then identified a maximum of two interventions that they agreed were the best entry points to leverage the sectors contribution to improved nutrition. The groups then discussed if the interventions existed, the key target group (e.g. school-aged children, adolescent girls, pregnant or breastfeeding women), and the main outcomes of delivering the interventions.

To specifically provide guidance to ongoing or planned programmes, the groups then identified implementing actions for two scenarios: one where such an intervention would have increased funding but less time to achieve the desired outcomes, and one where the intervention would have the same funding but triple the time to achieve the outcomes. They also identified the stakeholders, outside of their sector, that would need to be engaged and the challenges they expected in undertaking the intervention. The purpose of the exercise was to identify a range of activities to achieve similar or identical outcomes based on time and funding constraints, to consider all the necessary stakeholders to be engaged and to consider challenges to be overcome.

Based on the sector recommendations, the FNG team summarized the following prioritized interventions and activities per sector.

Health

Universal Coverage of Iron and Folic Acid supplementation

Participants discussed the universal coverage of iron and folate supplementation (IFA) as a necessary health intervention. There are currently some programmes in Lesotho with an IFA supplementation component, but their coverage is not universal.[64]

IFA supplementation should be targeted towards three groups with increased nutritional requirements: (i) pregnant and breastfeeding women; (ii) women of child-bearing age; and (iii) adolescent girls. The key outcome of such a programme would be reduced anaemia rates in adolescent girls and women, as well as in children aged 0–6 months and could reduce minimum monthly household food cost for a nutritious diet for adolescent girls and PLW.

Procurement, transport, storage and distribution of supplements would be the main programme activities. Other activities that stakeholders agreed were important to achieve the desired outcomes were community awareness and promotion activities, and training of health workers and volunteers. This could help targeted populations understand the importance of IFA supplementation for adequate implementation. Monitoring and evaluation should be undertaken related to all programme activities, and there should be clear data to measure impact.

Stakeholder engagement should be led by the Ministry of Health and the Food and Nutrition Coordinating Office. The Ministry of Education should also be involved as education could provide an entry point for reaching adolescent girls. Civil society and community-based organizations could also provide valuable inputs and help with implementation, given their ongoing work in Lesotho. Health workers were also considered to be key stakeholders for implementation and training.

[64] It was recognized by stakeholders that multi-micronutrient supplements would fill more of the nutrient gaps and hence would have a greater impact on health and development, but participants agreed that more information and consultation would be required to shift from IFA to MMS.

The main challenges that could prevent adequate implementation were identified as being cultural beliefs and myths, and lack of acceptability of supplementation within communities. A shortage of appropriate health and other staff could also be a potential issue affecting implementation.

Improvement of Infant and Young Child Feeding Practices (IYCF)

Participants identified that IYCF practices in Lesotho need to be improved. They recommended a programme with this specific focus and two key outcomes: (i) an increase in exclusive breastfeeding for the first six months of a child's life and continued breastfeeding until two years of age, and; (ii) improving appropriate complementary feeding practices, specifically achieving higher dietary diversity and meal frequency to increase the number of children receiving a minimum acceptable diet.

This programme would primarily target pregnant and breastfeeding women and parents, or other caregivers of children aged 6–23 months. Women of childbearing age and communities could also be targeted depending on the specific activities included in the programme.

Participants suggested a series of activities that could be included within the programme depending on resource and time availability. As a priority, they identified training for village health workers (VHW) and other relevant stakeholders including the general community. They suggested recruiting nutritionists for clinics and communities and that adequate reporting systems and supervision be put in place for all workers. The potential of distributing multiple micronutrient powders (MNP) was discussed[65]. It was agreed that monitoring and evaluation of the programme would be critical.

Different line ministries and other organizations and stakeholders would need to be involved in this programme. Identified ministries included Health, Agriculture and Food Security, Social Development, and Education and Training.

As identified by the FNG, participants mentioned that low dietary diversity and meal frequency may not necessarily be an issue related to lack of knowledge, but also to low affordability and availability of nutritious foods. Additionally, cultural beliefs around breastfeeding could potentially interfere with the acceptability of training. Other challenges are Lesotho's maternity leave policy which presents an important challenge for working and breastfeeding mothers, with no consistent regulation regarding mandatory pay during maternity leave. Food insecurity and high unemployment present challenges to complementary feeding practices in addition to IYCF issues generally.

[65] Multiple micronutrient powders are packets of vitamins and minerals in powder form that can be sprinkled into any ready-to-eat semi-solid food. For more information: https://www.who.int/elena/titles/micronutrientpowder_infants/en/

Education

The group focused on school meal interventions, one for primary schools (6–13 year olds) and one for early childhood care and development (3–5 year olds). The participants highlighted that, despite the aim to provide universal coverage of school meals to children, scale-up is still needed. This is particularly in relation to accessing a nutritious school meal that could serve the outcomes of improving nutritional status (as measured through anaemia, dietary diversity and vitamin A deficiency), increase nutritional knowledge, improve school enrolment and attendance, and impact on reducing early marriage and pregnancy.

Participants suggested that on a policy level, government partners should be reviewing menus and associated guidelines for school meals to ensure they comply with reasonable targets of school feeding (e.g. one third of daily requirements per meal, or a proportion of the day's energy requirements). They also suggested establishing and enforcing a no junk food policy in schools to support healthy, sustainable diets. They highlighted that monitoring systems and accountability mechanisms for programmes need to be established to ensure cooperation with guidelines and regulation across participating schools.

Actions that were highlighted by the group primarily focused on supplementing existing national school meal programmes with locally grown, produced and/or procured foods. The main difference between interventions that required additional funds but would show results quickly and those that delivered outcomes at a slower pace but with less financial investment, was the involvement and support required from the community.

Achieving quick results at scale would require the application of more advanced technologies (e.g. hydroponics) or greenhouses at the school garden level, supplementing foods sourced at the community level. The group favoured sourcing foods through production at community level rather than national procurement to account for local preferences and food habits. This would require training and supervision. They also mentioned a general challenge with coordination, highlighting that if nutritious school meals were to be implemented through a centralized system, programme quality would likely suffer.

Identifying entry points and actions for programmes that might not have additional funds, the group focused on mobilizing existing resources. At the community level physically closest to the school, they identified traditional school gardens as a first step for parents and teachers to support the NMA diet. Actions included supporting inputs and agricultural practices as well as behaviour change and awareness programmes. Building school gardens and the needed infrastructure could be supported by the existing Food For Assets programme, where the work capacity could be directed toward digging gardens, building fences and helping set up and run the garden. To maintain school gardens all year round, a community schedule would need to be set up.

Several different stakeholders would need to be involved to achieve the desired outcomes. From the public sector, these would include the Ministry of Small Business, the Ministry of Education and Training, the Ministry of Trade and the FNCO. In addition, stakeholder engagement would need to include businesses involved in the supply chain for the school meals, as well as non-profits and other development partners.

Agriculture – Commercial

Participants identified that focused interventions on two value chains have the potential to improve nutrition in Lesotho: broiler meat and vegetables.

Improving the poultry value chain: The main recommendation was to formulate targeted interventions to attract investors to fill gaps such as the establishment of hatcheries or parenting stock farms. These could be credit or tax incentives targeted at investors willing to start a business to fill gaps in this sector. Within financial institutions and commercial banks there is a need to revisit terms and conditions in favour of the strategic development of a product that attends to the different actor's needs. For example, a credit line targeted to investors that want to start a hatchery unit/parent stock farm.

Improving the vegetable value chain: Two main bottlenecks that impede the improvement of vegetable food systems were identified: i) access to water for irrigation and ii) absence of local providers of agricultural inputs. The group indicated that providing rural credit lines, not only to farmers, but also to entrepreneurs that are willing to invest in strategic areas (such as agro-dealers, storage and processor facilities), could support farm operations and the expansion of production in strategic areas. Other interventions suggested were empowering farmer organizations through access to market information, capacity building, and building storage in order to increase farmers' bargaining power with contractors. One example are farmers' associations to build storage facilities to intermediate on negotiations and to be able to purchase higher volumes of inputs at better prices.

Agriculture – Household

Participants, including representatives from the Ministry of Agriculture and Food Security, FNCO and the non-profit sector, suggested that a homestead agriculture programme could improve access to animal source foods and fruit and vegetables for rural subsistence farmers. Such a programme should have two main components: small animals (short cycle) and homestead gardens. Though its primary focus would be household consumption, it could potentially also be used to generate income.

Desired outcomes would be to increase animal source food consumption and overall household dietary diversity, especially of vulnerable individuals such as women of reproductive age. The intervention should be targeted to rural low-income households.

As an example for a successful programme that could be scaled up, stakeholders mentioned the FAO and the Ministry of Agriculture and Food Security programme focusing on the creation of keyhole gardens for small scale fruit and vegetable farming.

This programme is favoured because it requires little input and can be set up almost exclusively with items found around the household. Due to its elevated structure and shape, it supports efficient and drought-resistant water management, increasing the likelihood of having fresh, nutritious foods available at household level, even if in small quantities.

Depending on the size of the land, a household could have one or more keyhole garden or plots for horticulture. For short cycle animal farming, the group mentioned chicken and rabbits as examples. It is known that in Lesotho people traditionally share short cycle animals once they reproduce, and the household maintains a stock of at least two while giving two to other households. In the case of chickens, the focus could be either egg production and consumption, or direct poultry consumption.

The group analysed the different components this programme needs. Education and training were prioritised and should include:

- keyhole building and preparation;
- livestock management and reproduction;
- food preparation;
- food storage and preservation techniques; and
- overall nutrition education (for example, the increased nutrient needs of adolescent girls and pregnant and breastfeeding women and IYCF practices).

Depending on budget constraints, education and training could be given in household visits (preferred) or public gatherings. Though the latter could be implemented at a lower cost, participants mentioned that some vulnerable households couldn't afford the travel involved.

In-kind transfers of inputs could be implemented for the lowest income households. Transfers should be targeted and closely monitored, and should not only include seeds and fertilizers but also building materials for keyhole construction, water collection, food processing, storage and preservation.

A baseline including indicators of interest (household dietary diversity, minimum dietary diversity for women of reproductive age, minimum acceptable diet, and animal source food consumption, among others) should be collected on and close monitoring should be a priority. Close monitoring of extension worker activities was deemed necessary to ensure adequate programme implementation. It was also agreed that close programme monitoring could help a positive deviance (PD) approach and feed into future programming (monitor, evaluation and learning).

Participants emphasized the need to include different line ministries for implementation. Ministries of Water, Agriculture and Food Security, Social Development, Health and Education and Training were seen as being the most important.

The main challenge identified was the disconnect between the many different stakeholders involved in the promotion of nutrition-sensitive homestead farming.

Duplication of efforts and clashing mandates is a common problem in Lesotho, therefore coordination should be a priority. With little knowledge among the general population of homestead farming (coverage, specific yields, crops, and diversity) understanding needs to be improved and lessons learned from programmes that have been successful.

Social Protection

Expanded School Feeding

The participants agreed that school feeding programmes provide a valuable entry point. They identified expanding school feeding to early childhood care and development centres (ECCDs) and secondary schools as being potentially beneficial interventions. Delivery methods could vary: ECCDs would provide a meal; secondary schools could explore vouchers for meals from caterers near the school. The desired outcome would be improved nutrition for children aged 2–5 years and adolescents.

Activities would include setting up the delivery system for implementing ministries and mobilising resources using public financing tools. A monitoring and evaluation system would have to be put in place. Participants identified that coordination of different programmes and systems, plus lack of political will and funding, could pose challenges for this programme. They also identified that targeting could be an issue for programme implementation, especially when related to birth registration in Lesotho.

Annex I: Interventions identified by stakeholders for modelling in Cost of the Diet

Sector	Intervention	Target Group	Description
Private Sector	Biofortification/fortification	Household	• Create and enforce mandatory policies on fortification and biofortification. Currently there are no policies, so fortification is voluntary. Bio fortification could also work for smallholder or subsistence farmers.
Private Sector	School Feeding program	School Children, Household (income)	• Increased creation of employment for caterer model. • Purchasing from local farmers (increased demand) to incentivize supply. • Have established companies contribute to school feeding programs (connection to CSR).
Private Sector	Climate-Smart Agriculture as a way to increase productivity	Household	• Drought and/or flood resistance seeds. • High-yield seeds. • Education programs for farmers, where they teach them agricultural strategies.
Private Sector	Agri-business development	Household	• Access to credit - currently there is no way to access credit for farmers. • Agricultural insurance /Microinsurance – it's a new discussion, but there are no products aimed at farmers. They need to be able to mitigate risks.
Social Protection	Keyhole / homestead gardens	Household	• Seeds, tools, training and building of the gardens is provided in-kind by Ministry of Agriculture and FAO

Social Protection	Old age pension		• Cash Transfer
Social Protection	Cash Transfers in Emergency Response	Household	• Hybrid Approach: Conditional transfer for staples, the remainder can be multipurpose.
Social Protection	Food/cash for assets with a nutrition sensitive SBCC Component	Vulnerable households (According to Nissa system)	• Food parcels or money are provided to certain households for jobs completed such as building roads.
Education	School Feeding - primary	6-13 years	• in-kind/ home-grown/ smallholder
Education	School Feeding - ECD (Super Cereal Plus)	2-5 years	• in-kind/ home-grown/ smallholder
Education	School Feeding - Reception	5 years	• in-kind/ home-grown/ smallholder
Education	School Feeding - High School	Adolescents	• in-kind/ home-grown/ smallholder
Education	Education of good practices to kitchen staff	Kitchen Staff	• Loss of micronutrients through bad cooking practices?
Health	Develop linkage strategies from undernourished to livelihood programmes		
Health	RUTF	U5	• MoH
Health	Super Cereal	PLW	• MoH
Health	Super Cereal Plus	U2	• MoH
Health	MNP	U2	• in-kind (UNICEF)
Health	IFA	PLW	• in-kind (UNICEF)
Health	MMT	PLW	• in-kind (UNICEF)

Health	Child Grant Programme Impact	U5	• in-kind (UNICEF)
Agriculture	H20 Harvesting - Boreholes, tanks (rainwater) and dams	Women, household	• Construction of small-scale water harvesting infrastructure: water storage structure such as cisterns and roof tanks (household level)
		Women, household	• Construction of boreholes (village level)
Agriculture	Promotion of local based research (indigenous knowledge)	Households	• Research grants for locally adapted (drought resistant) grains variety
Agriculture	Diversification of household production (food crops)	Household	• Technical assistance for food crops (women targeted)
		Household	• Home gardens (seeds, net and TA)
Agriculture	Development of short cycle livestock (Pork and Chicken)	Household	• Incentive (credit, tax, infrastructure) for local private breeding centre (pig and chicken)
		Household	• Credit lines for farmers interested in pig and chicken farming
		Household	• Regulations for food safety/quality standards/ management waste
		Household	• Capacity building on sanitary inspection of abattoirs - Officers
		Household	• Incentives for private abattoirs for pig and chicken
Agriculture	Income generating in commercial crop production (vegetables, staples and fruits)	Household	• Incentive (tax and infrastructure) for input provider
		Household	• Credit lines for farmers interested in crop production
		Household	• Regulations for safety/quality standards
		Household	• Incentive (tax and infrastructure) for traders (storage facilities, transport, process)
Agriculture	Bio fortification and drought resistant varieties	Household	• Change of usage of regular maize and beans seed for the bio fortified
		Household	• Change of usage of regular maize and beans seed for the drought resistance

Agriculture	Post-harvest	Household	• Post-harvesting - commercial grains (storage)
		Household	• Post-harvesting - household grains (hermetic storage)
		Household	• Post-harvesting - commercial vegetable (processing and preservation)
		Household	• Post-harvesting - household vegetable (preservation)

Annex II Assumptions for Intervention Modelling

School Feeding Programme					
Target Groups	6-7 years				
Frequency	5 out of 7 days				
Modality	in-kind				
A) Caterers					
Food	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**
Papa	150g		150g		150g
Moroho	100g		100g		
Bread		1/4 loaf			
Bean Soup		200ml			
Egg			1 egg (45g)		
Samp				150g	
Beans				150g	
Milk					250 ml
B) WFP Delivery Model					
Food	**Breakfast**	**Lunch**			
Fortified Maize Meal	30g	120g			
Sugar	10g				
Beans/Peas		30g			
Fortified Vegetable Oil		10g			
Salt		3g			
C) NMA – School Meal Consists of: 1) Breakfast of WFP Delivery Model 2) Lunch Menu of Caterers					

Micronutrient Specifications for Commodities used in modelling for FNG Lesotho (per 100 g)

Product (100g)	SC (CSB+)	SC+ (CSB++)	MNP (Children 6-59 m)	Iron & Folic Acid tablets (PLW)	MMT	MNP
Source	WFP Specs	WFP Specs	WFP Specs	WHO recommendation	UNIMMAP Specs	WFP Specs
Food group	Grains and grain-based products	Grains and grain-based products	Supplements and infant food	Supplements and infant food	Supplements and infant food	Supplements and infant food
Portion size (g)	60g child (<2y), 120-150g Adolescent girl & PLW	60g child (<2y), 120-150g Adolescent girl & PLW	1g	1g	1g	1g, 3-4 times a week
Iron absorption factor	5%	5%	7%	7%	7%	7%
Energy (kcal)	380	410	0	0	0	0
Protein (g)	14	16	0	0	0	0
Fats (g)	6	9	0	0	0	0
Saturated Fat (g)						
Monounsaturated Fat (g)						
Polyunsaturated Fat (g)						
Carbohydrate (g)						
Fiber (g)	4	1.4	0	0	0	0
Phytate (mg)	0	0	0	0	0	0
RAE (ug retinol)	1039.04	1039.04	40000	0	80000	40000

Vit C (mg)	90	90	3000	0	7000	3000
B1 (mg)	0.2	0.2	50	0	140	50
B2 (mg)	1.4	1.4	50	0	140	50
Niacin (mg)	8	8	600	0	1800	600
B6 (mg)	1	1	50	0	190	50
Folate (mcg)	110	110	15000	67000	67000	15000
B12 (mcg)	2	2	90	0	260	90
Pantothenic Acid (mg)	1.6	1.6	0	0	0	0
Calcium (mg)	362	362	0	0	0	0
Copper (mg)	0	0	56	0	200	56
Iron (mg)	6.5	6.5	1000	6000	3000	1000
Magnesium (mg)	127	36.25	0	0	0	0
Manganese (mcg)	0	0	0	0	0	0
Phosphorous (mg)	280	280	0	0	0	0
Potassium (mg)	140	140	0	0	0	0
Sodium (mg)	0	0	0	0	0	0
Zinc (mg)	5	5	410	0	1500	410

Assumptions and Specifications for homestead garden models – Henneries

Interventions:	a- Technical assistance for food crops (women targeted) **b- Hennery (hens and input)** c- Home gardens vegetables (seeds, net)
Assumptions:	(i) Indigenous chickens (5) - 1 egg per day each (ii) Beneficiaries receive TA and hennery material (iii) Egg weight is 37 grams (iv) The birds provided have 18-22 weeks. Flock production rises sharply and reaches a peak of about 90%, 6–8 weeks later. Production then gradually declines to about 65% after 12 months of lay. (v) Values for the first year
Yield:	150 eggs per month
Grams of egg per month for consumption	5550
Weekly egg total (g)	1388
Edible portion	1249

Daily Egg Intake/Individual

Individual	AME proportion	Egg (g)
U2	0.048571429	9.63
SAC	0.137142857	27.18
Ad Girl	0.222857143	44.17
PLW	0.305714286	60.60
Man	0.285714286	56.63

Assumptions and Specifications for homestead garden models – Home gardens

Interventions:

a- Technical assistance for food crops (women targeted)
b- Hennery (hens and input)
c- Home gardens vegetables (seeds, net)

Assumptions:

i) Homestead garden area of 35 m2 can produce around 230 kgs of vegetables per year (Ojiewo et al., 2010)
ii) The beneficiaries of homestead garden interventions can diversify the basket in ten vegetables crops (Bushamuka et al., 2005). For the model, we assumed 7 crops (5 m2 for each) (CRS, 2008)
iii) The productivity per area was estimated using the expected yields (likely) from the Department of Agriculture and Rural Development of South Africa (see Table 1 below), and the crop planting calendar is the same across Lesotho (FAO guidelines)

Type of vegetables:

Bean; green	Cucumber	Potatoes (Irish)
Beetroot	Egg plant	Pumpkin
Broccoli	Garlic	Rape
Butternut	Green beans	Spinach
Cabbage	Green peas	Sweet pepper
Carrots	Lettuce	Sweet potato
Cauliflower	Onion	Tomato
Chilli pepper	Peas	Turnip

Crop	Yield total per year (40 m2)	KG per month	Edible Portion Size Factor
Bean, runner, grean	7	0.6	1

Cabbage	75	6.3	0.84
Carrot, large	45	3.8	0.86
Onion	30	2.5	0.89
Pumpkin, boer	10	0.8	0.75
Spinach, true	18	1.5	0.8
Tomato	50	4.2	0.95
Total	**235**	**19.6**	

Monthly Intake/ Individual

Individual	AME proportion	Bean (g)	Cabbage (g)	Carrot (g)	Onion (g)	Pumpkin (g)	Spinach (g)	Tomato (g)
U2	0.048571429	28.33	255.00	156.64	108.07	30.36	58.29	192.26
SAC	0.137142857	80.00	720.00	442.29	305.14	85.71	164.57	542.86
Ad Girl	0.222857143	130.00	1170.00	718.71	495.86	139.29	267.43	882.14
PLW	0.305714286	178.33	1605.00	985.93	680.21	191.07	366.86	1210.12
Man	0.285714286	166.67	1500.00	921.43	635.71	178.57	342.86	1130.95

Daily Intake/ Individual

Individual	AME proportion	Bean (g)	Cabbage (g)	Carrot (g)	Onion (g)	Pumpkin (g)	Spinach (g)	Tomato (g)
U2	0.048571429	0.93	8.38	5.15	3.55	1.00	1.92	6.32
SAC	0.137142857	2.63	23.67	14.54	10.03	2.82	5.41	17.85
Ad Girl	0.222857143	4.27	38.46	23.63	16.30	4.58	8.79	29.00
PLW	0.305714286	5.86	52.76	32.41	22.36	6.28	12.06	39.78
Man	0.285714286	5.48	49.31	30.29	20.90	5.87	11.27	37.18

Table 1. Types of vegetables grown in homegardens – expected yields

Crop	Yield per kg/ harvest				
	Yield per ha	Yield per 35 m2	Yield per 5 m2*	No. harvest per year **	Yield per 5 m2 per year
Bean, dwarf, green	7000	24.5	3.5	2	7
Bean, runner, green	10000	35	5	2	10
Beetroot	18000	63	9	3	27
Broccoli	8000	28	4	2	8
Butternut	18000	63	9	2	18
Cabbage	50000	175	25	3	75
Carrot, large	30000	105	15	3	45
Cauliflower	12000	42	6	2	12
Cucumber	18000	63	9	2	18
Egg plant	20000	70	10	2	20
Garlic	10000	35	5	1	5
Lettuce	25000	87.5	12.5	4	50
Onion, large	30000	105	15	2	30
Turnip	18000	63	9	2	18
Pea, green, in pods	6000	21	3	1	3
Pepper	30000	105	15	3	45
Potato, dryland or hot areas	17000	59.5	8.5	1	8.5
Pumpkin, boer	20000	70	10	1	10
Spinach, true	12000	42	6	3	18
Sweet potato	30000	105	15	1	15
Tomato	50000	175	25	2	50

Adapted from expected yields - Dept of Agriculture and Rural Development South Africa
https://www.kzndard.gov.za/images/Documents/Horticulture/Veg_prod/expected_yields.pdf
* Estimated to accommodate 7 vegetable crops

** Estimated based on FAO material

Table 2. Types of vegetables grown in homegardens in percentage, Lesotho (1999) - (n 2015)

Type of vegetable	Percentage of sample
Green leafy vegetables	77.5
Pumpkin	18.7
Carrots	14.6
Tomato	12.5
Beetroot	10
Onion	6.7
Green beans	6.6
Green peas	4.7
Source: (Makhotla and Hendriks, 2004)	

Assumptions and Specifications for homestead garden models – Irrigation

Interventions:

a- Construction of small scale water harvesting infrastructures: water storage structure such as cisterns and roof tanks (household level)
b- Construction of boreholes (village level)

Assumptions:

i) The use of rainwater harvesting technology for irrigation have a **positive impact on the production of homestead gardens** (Baiyegunhi, 2015)
ii) Rainfall volume and distribution over the year is **sufficient** for homestead demand

iii) Potential pathways through which small-scale irrigation systems influence nutrition are production, income, and women empowerment (Domenech, 2015)
iv) Small-scale irrigation can increase yields, assuming that the HHs have access to productive inputs (Burney et al., 2010; Fraiture & Giordano, 2014).
v) Small-scale irrigation allows growing in the lean season. Crops are planted **two to three times** compared with rainfed production in Ethiopia (e.g., Aseyehen et al., 2012). We assume the adoption of irrigation system **double** yields
vi) Some studies show that greater production and crop diversity - as a result of irrigation- leads to greater intake or improved diets. For example, Burney et al. (2010) suggest HHs that use small-scale irrigation consume more vegetables with a reduction in HHs food insecurity (Burney et al., 2010). Moreover, Dillon (2008) suggests that the use of irrigation by HHs in Mali has led to greater calorie intake. Besides these pieces of evidence, it is important to highlight that production diversity does not always lead to dietary diversity; and dietary diversity is not the same as nutritional improvement (Sibhatu et al., 2015)

Type of vegetables:

Bean; green	Cucumber	Potatoes (Irish)
Beetroot	Egg plant	Pumpkin
Broccoli	Garlic	Rape
Butternut	Green beans	Spinach
Cabbage	Green peas	Sweet pepper

Carrots	Lettuce	Sweet potato
Cauliflower	Onion	Tomato
Chilli pepper	Peas	Turnip

Crop	Yield total per year (40 m2)	KG per month	KG per month - with irrigation	Edible Portion
Bean, runner, grean	10	0.8	1.7	1
Cabbage	75	6.3	12.5	0.84
Carrot, large	45	3.8	7.5	0.86
Onion	30	2.5	5.0	0.89
Pumpkin, boer	10	0.8	1.7	0.75
Spinach, true	18	1.5	3.0	0.8
Tomato	50	4.2	8.3	0.95
Total	**238**	**19.8**	**39.7**	

Monthly Intake/ Individual

Individual	AME proportion	Bean (g)	Cabbage	Carrot	Onion	Pumpkin	Spinach	Tomato
U2	0.048571429	80.95	510.00	313.29	216.14	60.71	116.57	384.52
SAC	0.137142857	228.57	1440.00	884.57	610.29	171.43	329.14	1085.71
Ad Girl	0.222857143	371.43	2340.00	1437.43	991.71	278.57	534.86	1764.29
PLW	0.305714286	509.52	3210.00	1971.86	1360.43	382.14	733.71	2420.24
Man	0.285714286	476.19	3000.00	1842.86	1271.43	357.14	685.71	2261.90

Daily Intake/ Individual

Individual	AME proportion	Bean (g)	Cabbage	Carrot	Onion	Pumpkin	Spinach	Tomato
U2	0.048571429	2.66	16.77	10.30	7.11	2.00	3.83	12.64
SAC	0.137142857	7.51	47.34	29.08	20.06	5.64	10.82	35.69
Ad Girl	0.222857143	12.21	76.92	47.25	32.60	9.16	17.58	58.00

PLW	0.305714286	16.75	105.52	64.82	44.72	12.56	24.12	79.56
Man	0.285714286	15.65	98.62	60.58	41.80	11.74	22.54	74.36

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