



# Climate adaptation and mitigation measures for nutrition co-benefits in IFAD investments in Lesotho

Pre-Design Mission Report

Diane Bosch, Esther Koopmanschap, Moikabi Matsoai, Vuyani Monyaki



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2 Local Consultants

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# Preface

Population growth, urbanisation, dietary change, pressure on ecosystems and climate change, there is ample evidence that these factors are contributing to greater uncertainties about the future of our food and nutrition security. By 2100, it is anticipated that up to 40% of the world's land surface will have to be adapted to novel or partially altered climates, according to the Global Panel on Agriculture and Food Systems (2015). A range of climate change impacts on crop and livestock production are projected to lead to a 2% fall in agricultural output per decade through to 2050. Over the same period, food demand will rise by 14% each decade in response to population growth, urbanisation, and increased incomes.

The 2019 State of Food Security and Nutrition in the World showed an increase in chronically undernourished people worldwide to 821 million. This number has been increasing since 2015. Although that conflict and climate variability and extremes have been exacerbating the upward trend, the uneven pace of economic recovery and continued poor economic performance in many countries after the 2008–2009 global economic downturn are also undermining efforts to end hunger and malnutrition (FAO 2019). This number is expected to further increase by the end of 2020 due to the COVID-19 crisis. A further two billion people are experiencing moderate to severe food insecurity, which puts them at greater risk of malnutrition and poor health due to a lack of regular access to nutritious and sufficient food (FAO, 2019).

With this global context as a starting point, we zoomed in to the Kingdom of Lesotho, a small, mountainous, landlocked country in Southern Africa with a population of 2.2 million people.

Lesotho's recent graduation to the status of a lower middle-income country stands in stark contrast to the persistent and deep rural poverty challenges it faces. Nearly 50% of its 2.2 million people live below the national poverty line (i.e. USD 1.65 /day). About 24 percent fall below the extreme poverty line. Nearly 70% of the population lives in rural areas where they are predominantly engaged in smallholder agriculture, i.e. subsistence and semi-subsistence agriculture (World Bank, 2019; Braimoh, 2019).

Lesotho's unique environment and geophysical location render it particularly vulnerable to the threats of climate change and variability. Severe environmental degradation, exacerbated by climate change, represents a serious challenge to rural residents, leading to declining crop yields, degraded landscapes, soil erosion, and the loss of wetlands. Most households in Lesotho practice low input, low output traditional rain-fed crop farming and extensive livestock husbandry under a communal land tenure system.

As a result of increasingly erratic climatic conditions, coupled with ongoing environmental degradation and their impacts on production and productivity, they seldom produce enough food to meet their household food requirements even in what could be regarded as good years. Even if farming is done under ideal conditions, it has become increasingly difficult to realise its full potential, leading to a growing food deficit and higher levels of climate change-related vulnerability for many farming households. Reliance on crop agriculture as a main provider of household livelihoods has therefore become difficult under current climatic conditions.

Lesotho's economy suffers from the fact that it is unable to compete with the economies of scale of producers in neighbouring South Africa and the majority of food consumed in the country is imported. In this context, there continues to be a need to modernise and diversify the rural economy and, in so doing, to better balance household agricultural production with off-farm income.

Many very successful projects have been implemented in Lesotho, why have they not been institutionalised? Is it about exit strategies of projects? Is it about the maintenance capacity of

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stakeholders? Is it about political support and absence of continuous leadership? How is it possible that 50% of the population of 2.2 million Basotho live below the poverty line?

With this document, we aimed at providing climate-smart as well as nutrition-smart ideas and recommendations to facilitate further discussion and action for the development of new IFAD investments in Lesotho. We hope we have given a few useful suggestions to enhance/increase biodiversity and dietary diversity in Lesotho, thus contributing - although modestly, we know - to further pushing environmental boundaries, eradicating poverty and all forms of malnutrition!

Ir H.I.J. Bruggeman  
Director Wageningen Centre for Development Innovation,  
Wageningen University & Research



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# List of abbreviations and acronyms

CSA	Climate-Smart Agriculture
CotD	Cost of the Diet
ECD	Early Childhood Development Centre
FAO	Food and Agriculture Organization
FNCO	Food and Nutrition Coordinating Office
FNG	Fill the Nutrient Gap
GDP	Gross domestic product
GHG	Greenhouse gas
GNR	Global Nutrition Report
IFA	Iron and folic acid
IFAD	International Fund for Agricultural Development
IPCC	Intergovernmental Panel on Climate Change
IYCF	Infant and young child feeding
LBW	Low birth weight
LMS	Lesotho Meteorological Services
LSL	Lesotho (ma)loti
LVAC	Lesotho Vulnerability Assessment and Analysis Report
(UN)OCHA	United Nations Office for the Coordination of Humanitarian Affairs
MAD	Minimum acceptable diet
MDD	Minimum dietary diversity
MMF	Minimum meal frequency
NAPA	National Adaptation Programme of Action
NCD	Non-communicable disease
NDC	Nationally Determined Contribution (to the UNFCCC)
NSDP	(Lesotho) National Strategic Development Plan 2012/13–2016/17
NSDP II	(Lesotho) National Strategic Development Plan 2018/19–2022/23
P-ROLL	Project for the Regeneration of Landscapes and Livelihoods
SBs	Sugar-Sweetened Beverages
UNFCCC	United Nations Framework Convention on Climate Change
UNICEF	United Nations Children’s Fund
WASH	Water, sanitation and hygiene
WCDI	Wageningen Centre for Development Innovation, Wageningen University & Research
WFP	World Food Programme
WHO	World Health Organization
WRA	Women of reproductive age
WUR	Wageningen University & Research



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# 1 Introduction

With this document, we aimed at providing climate-smart as well as nutrition-smart ideas and recommendations to facilitate further discussion, action and recommendations for development of new IFAD investments in Lesotho. We have placed special emphasis on the change of resource use practices and contributing to reduced environmental degradation, e.g. by giving feedback on how to best support households in the adoption of environmentally sustainable and climate-resilient technologies and practices, and thinking from a landscape perspective. We also looked at improving general land and water resources management practices, by commenting on current management of planning practices, e.g. to enhance water retention of wetlands and combat (alien) invasive species in rangelands.

The team of consultants would like to stress however, that - in line with their assignment - particular focus has been put on ensuring that climate mitigation and adaptation strategies take nutrition into account. In fact, this also responds to the government's call to protect and restore agricultural production, income and assets while enhancing nutrition and diversified diets of the most vulnerable households in times of extreme drought conditions in Lesotho (OCHA, 2019).

## 1.1 Background of the assignment

Climate change and food *and* nutrition security are strongly interlinked. Firstly, increased evidence shows that, climate impacts affect nutrition by influencing food production systems, e.g. through physiological effects on crops or changes in water and soil resources, but also by facing increased weed and pest challenges, or changes in the interplay between pathogens and livestock. Water systems and their management and sanitation environments are stressed by rising sea levels, flood risks or increasing temperatures and with that the risk for vector-borne diseases, like dengue. This has an impact on livelihood choices, labour options and time allocated for caregiving and other nutrition-related activities. Therefore, climate change undermines current efforts to reduce hunger and promote nutrition. It is estimated that in all regions where stunting is already severe, climate change will increase stunting by 30-50 percent by 2050.

Food production in its turn influences climate change. Systems of food production release greenhouse gases (e.g. carbon dioxide, methane, and nitrous oxides) into the atmosphere directly and drive land use change that releases additional carbon dioxide when forests are cleared, wetlands drained, and soils are tilled or subjected to overgrazing. Food production is a prime source of methane, and nitrous oxides, which have 56 and 280 times the global warming potential (over 20 years) when compared to carbon dioxide. Methane is produced during digestion in ruminant livestock, such as cows and sheep, (or, although not in Lesotho, during anaerobic decomposition of organic material in flooded rice paddies). Nitrous oxide mainly arises from soil microbes in croplands and pastures and is affected by soil fertility management, such as fertiliser application (Willet et al., 2019).

Against this background, IFAD designed a project on adoption of climate adaptation measures, which *increase nutrition co-benefits* for smallholder farmers and their families. The project is entitled 'Climate change and nutrition in value chain development' and is funded under Phase II of the Adaptation for Smallholder Agriculture Programme (ASAP 2) and was approved on 6 August 2019. The project aims to develop a well-proven methodology and approach to support project designs, as well as mid-term reviews, and to strengthen the capacity of IFAD teams to conduct comprehensive and integrated assessments of project design that allow for the identification of adaptation and mitigation actions, while also reducing nutrition risks of food value chain investments. In order to implement most of the activities of the above initiative, the provision of high-quality technical support has been requested by IFAD to Wageningen Centre for Development Innovation (WC DI), as part of Wageningen University & Research (WUR) in Wageningen, the Netherlands.

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Technical support provided by WCDI includes three pre-design studies for three projects, in three IFAD supported countries, namely:

- Project on Regeneration of Livelihoods Landscapes (P-ROLL) in Lesotho
- Climate-Smart Smallholder Value Chain Project (SVCP) in Vietnam
- Smallholder Agriculture Cluster Project (SACP) in Zimbabwe

The technical support aims to support IFAD in developing an integrated approach for designing climate - and nutrition-smart value chains, thereby contributing to operationalising IFAD's transformational framework for mainstreaming themes and to reinforce capacities of local actors.

In line with IFAD's adapted - COVID-19 - planning schedule for the full design of P-ROLL, Lesotho and SACP, Zimbabwe were selected to be the first countries to perform the project pre-design study mission. This report in front of you is written in frame of P-ROLL.

## 1.2 Assignment objectives and scope

The objective of the pre-design mission has been formulated as:

*To conduct a pre-design study mission for Lesotho with the aim of exploring opportunities for climate adaptation and mitigation and nutrition actions for future IFAD investments in Lesotho (forthcoming: P-ROLL).*

Because of the COVID-19 crisis, this pre-design study mission was to be conducted in two separate parts. The first part of the study included a literature review for Lesotho and online interviews with selected key stakeholders. Part one of the study was implemented from 13 April to 1 May 2020. Part one of the pre-design study mission was linked to a general literature review highlighting the linkages between climate and nutrition. The general literature review especially aimed at gathering lessons learned and analysing how climate mitigation and adaptation strategies can best take nutrition into account.

A second part of the pre-design study, a one-week mission to do field visits and conduct a validation workshop on the pre-design study findings did not take place because of the prolonged lockdown in Lesotho in response to the COVID-19 pandemic.

### **Specific objectives**

Specific objectives regarding the first part (13 April - 1 May, 2020) of the pre-design study include:

- Partly based upon the lessons learned from the general literature review (conducted from March 2020 up to July 2020), explore which of the lessons learned can be applied in the context of Lesotho;
- Discuss the draft concept note for P-ROLL's project with IFAD's country director and the pre-design team and get a thorough understanding of its goals, components and priorities as well as the envisaged theory of change and the project's preliminary results framework in order to ensure proper alignment when formulating suggestions for climate-nutrition linkages;
- Consult selected key stakeholders on Lesotho's present climate adaptation and mitigation strategies and its nutrition landscape and on the targeting of vulnerable groups and stakeholder involvement;
- Formulate appropriate pathways and suitable, sustainable, significant actions that effectively integrate climate mitigation and adaptation measures to maximise nutrition in IFAD's investments (including strategies, processes and/or methodologies if appropriate) and enrich IFAD's project designs with climate-nutrition linkages;
- Suggest feasible and concrete actions that can be incorporated into the full design of P-ROLL and/or provide potential building blocks that can be further explored;
- Provide recommendations for possible project (implementation) partners or partnership development.

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At a later stage:

- Confirm the climate-nutrition linkages and partnerships suggested by the virtual pre-design study for Lesotho by conducting field visits to IFAD support projects and IFAD projects beneficiaries/targeted groups;
- Validate the findings from the study mission in a national level stakeholder workshop to learn from each other, adapt and enhance the preliminary theory of change and/or build consensus.

Detailed Terms of Reference can be found in Appendix 1.

This report is organised as follows. Chapter 2 will discuss the methodology of the literature review, the key-informant interviews and other stakeholders and the cross sectoral consultations online. The chapter will conclude with the food system approach to be used to analyse the present climate and nutrition situation in Lesotho.

Chapter 3 will focus on climate. Paragraph 3.2 will provide a concise overview of current climate trends in Lesotho and their impact. Paragraph 3.3 will discuss climate projections and paragraph 3.4 discusses the impact of climate changes on different sectors. The chapter continues in paragraph 3.5 with a description of (rural) vulnerable groups and (climate) vulnerable zones and paragraph 3.6 discusses potential pathways for mitigation and adaptation interventions. Paragraph 3.7 will discuss the initiating of climate action focusing on the selection of target areas and paragraph 3.8 will explore the climate action with nutrition co-benefits. The chapter concludes with a discussion of climate financing in paragraph 3.9.

Chapter 4 focuses on the present food and nutrition security situation in Lesotho. Paragraph 4.2 discusses the food security situation and paragraph 4.3 explores food consumption in Lesotho. Paragraph 4.4. analyses the causes of the present nutrition situation and Chapter 4 concludes with the economic impact of the current nutrition situation in Lesotho.

In Chapter 5 links climate and nutrition from a food systems perspective. Paragraph 5.1 discusses food system outcomes and paragraph 5.2 explores food System Trade-offs, while paragraph 5.3 looks at food system synergies. The last three paragraphs, 5.4, 5.5. and 5.6 zoom into the three main domains of the food system, namely the food supply chain, food environment consumer behaviour and diets.

Chapter 6 Towards climate-smart food systems for improved diets discusses the current policy landscape in Lesotho in paragraph 6.1. Paragraph 6.2 discusses the lessons learned from previous and present projects and reviews. Paragraph 6.3 discusses the Theory of change and the pathways of implementation. Paragraph 6.4 looks at the proposed targeting of the P-ROLL project.

---

## 2 Methodology

### 2.1 Literature review

Partly based upon the lessons learned from the general literature review (conducted from March 2020 to July 2020) – the team explored which of the lessons learned can be applied in the context of Lesotho. Chapter 3 will discuss the lessons learned from a climate-smart point of view, Chapter 4 looks at the lessons learned from the food and nutrition security point of view. Chapter 5 the lessons learned in climate *and* nutrition-smart interventions are discussed using a food system approach. This report will be concluded with Chapter 6 where specific recommendation will be offered to the design team to shape the P-ROLL project design.

### 2.2 Key-informant interviews and other stakeholders

The pre-design team was not able to travel to Lesotho because of the COVID-19 pandemic and conducted remote interviews with selected key stakeholders through WhatsApp and/or Zoom meetings. The initial selection of stakeholders was done in the consultation with the IFAD country representative and the local consultants given the limitation of the current working situation. Stakeholders were selected based on their roles and responsibilities in climate and/or nutrition as well as from an IFAD perspective. The initial list contained 8 stakeholders, but during the interviews and further discussions with the local consultants, it became clear that other stakeholders were also important to interview. In total, the team conducted interviews with 14 stakeholders over a two-week period.

The stakeholders included in this round of remote consultations were government partners in the area of nutrition, nutrition governance, climate, water, agriculture, forestry and range management, and agricultural research, the National University of Lesotho, FAO and WFP were also included. In the last week, the team managed to secure interviews with the Catholic Relief Services and the Second Private Sector Competitiveness & Economic Diversification programme.

The team made a list for each area with questions that provided a guide for the interview with the stakeholders. For the stakeholders that were added after the first set of interviews, the guiding questions were replaced with questions to answer specific knowledge and information gaps. Appendix 2 provides a detailed list with stakeholders interviewed and Appendix 3 the list with questions. Appendix 4 provides an overview of stakeholders and their main area of work in the field of food and nutrition security, climate, water and/or the environment in Lesotho. In addition, a list of major programmes, their implementers and the lessons learned can also be found in this appendix.

### 2.3 Cross sectoral consultations online

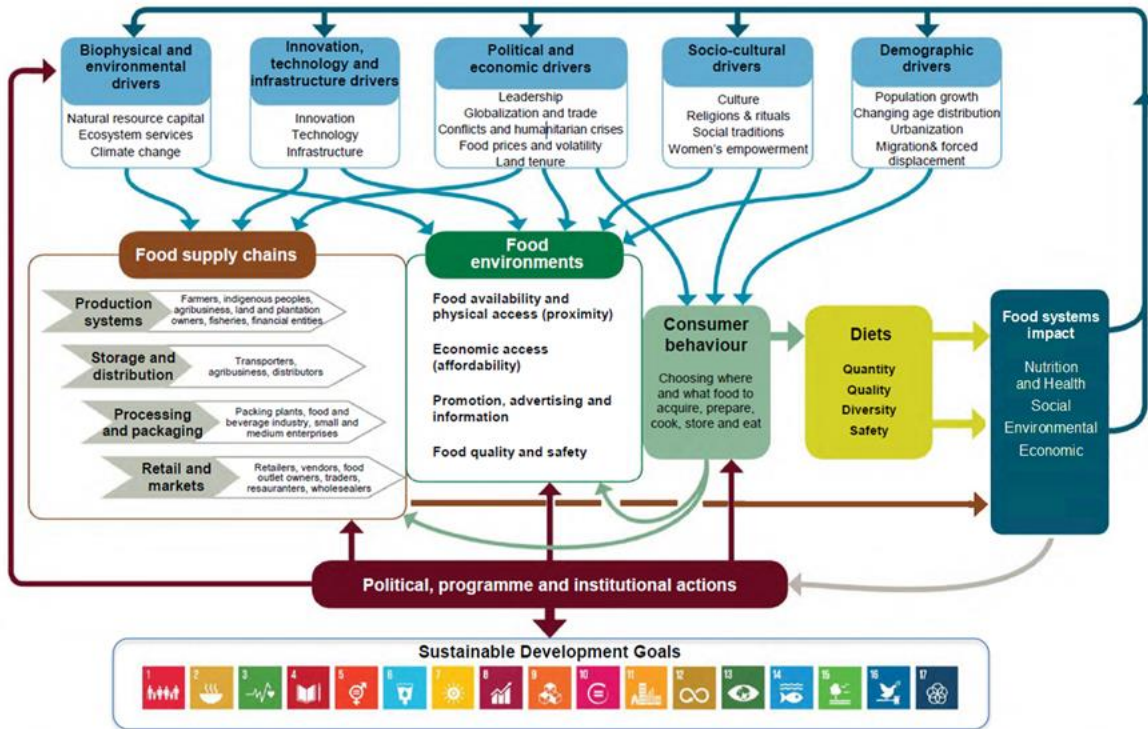
Even though we still had additional interviews afterwards, a virtual meeting was organised on Tuesday 28 April to bring all the interviewees together. During this online event, the information received and data gathered so far were discussed, specific challenges and opportunities ahead were highlighted and priorities finetuned. Few questions were left unanswered.

### 2.4 Analysis using a food systems approach

How to provide sufficient, affordable, safe and quality nutritious food to the population of Lesotho and simultaneously ensure enhanced livelihoods in harmony with and not at the expense of the



environment, biodiversity and animal welfare? To answer that question, we use the 2017 HLPE food systems approach with adaptations to reflect climate issues and clearly define the food systems outcomes, in addition to nutrition outcomes. Figure 1 presents the suitable entry points to food systems with inclusive sustainable climate-smart, improved diets and nutrition outcomes. To achieve such a food system with a more resource-efficient and sustainable farming and food sector, is it important to recognise different types of bottlenecks. Some are institutional, while others are technical or economic bottlenecks; some involve knowledge gaps and consumer behaviour. They will differ from district to district or catchment to catchment.



**Figure 1** A Conceptual Framework for Food Systems analysis (adapted from HLPE, 2017).

We know there are limitations in using a food systems approach, but according to the team of consultants this is, considering our assignment, the most comprehensive approach. The box below briefly summarises what a food system actually entails, merely as a reminder of what has been provided in the general literature review conducted within the framework of IFAD's ASAP 2 programme.

#### What are food systems?

Food systems are the sum of actors and interactions along the food value chain - from input supply and production of crops, livestock, fish, and other agricultural commodities to transportation, processing, retailing, wholesaling and preparation of foods for consumption and disposal. Food systems also include the enabling policy environments and cultural norms around food.

Food systems provide basic sustenance in terms of meeting populations' minimum caloric needs and affect nutrition, positively or negatively, through crop health, dietary diversity, and impacts on human health and the environment. Food systems also provide livelihoods for a sizable share of the global population, through agricultural labour and non-farm jobs in other segments of the food value chain. The income garnered from these jobs can be used to purchase a wide array of healthy foods, send children to school, purchase health services and medications, and more. At the macro level, food systems power local and national economies, shaped in part by governance, trade, and investment at the global level.

Ideal food systems would be nutrition, health, and safety-driven, productive and efficient (and thus able to deliver affordable food), environmentally sustainable and climate-smart, and inclusive. But to realise this vision, continued investments must be made in agricultural research and development and technological innovations, paving the way for programmes and policies that are based on sound evidence.

Source: IFPRI, 2020

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In Chapter 5, we will use the HLPE framework to describe how climate and nutrition interact in general, but also to highlight opportunities to improve nutrition outcomes using various pathways. We build on these in Chapter 6 in more detail.

In Chapter 5 and 6, we will also use the framework as a guide to briefly reflect on the opportunities the national food system offers in terms of inclusion of vulnerable groups *as partners* in this transformation.

---

## 3 Present climate situation in Lesotho

### 3.1 Introduction

'Climate change represents an urgent and potentially irreversible threat to human societies and the planet'. The Intergovernmental Panel on Climate Change (IPCC) reports confirm that the impacts of climate change are rising temperatures - particularly due to rising atmospheric CO<sub>2</sub> - shifting rainfall patterns, rising sea levels, increasing ocean acidification, and extreme events, such as floods, droughts, and heat waves.

In the following paragraphs, we wish to provide a concise overview of current climate trends (paragraph 3.2) in Lesotho by referring to several recent relevant publications, refer to climate scenarios (paragraph 3.3) and indicate the impact of climate change on the environment, on water, livelihoods and on the agricultural sector (paragraph 3.4). We specify for example how changes in rainfall affect the hydrological cycle and water availability and, thus, even education. We will also underline in what way climate change is impacting e.g. crop productivity and what the implications are for e.g. Livestock in Lesotho. The sub-paragraphs in 3.4 focus on the on the impact of climate change on specific sectors: water (resources) management; biodiversity and environment; agriculture (crop production and animal breeding) including food safety; and human health and livelihoods.

We will use throughout this chapter a food systems approach to be able to analyse the bidirectional relationships between climate change and food and nutrition (Fanzo, 2017), later on in Chapter 5 and 6. We will specifically refer to possible adaptation and mitigation interventions but with a main focus on agricultural production (and not along the whole value chain for different commodities) to move towards an inclusive climate-smart food system for improved diets.

### 3.2 Climate change trends in Lesotho and their impacts

Lesotho is the only country in the world with all its territory above 1000 metres (UNDP). This has a specific impact on Lesotho's food system, and (cf. IFPRI, 2020) therefore requires a country specific approach to climate action with nutrition co-benefits.

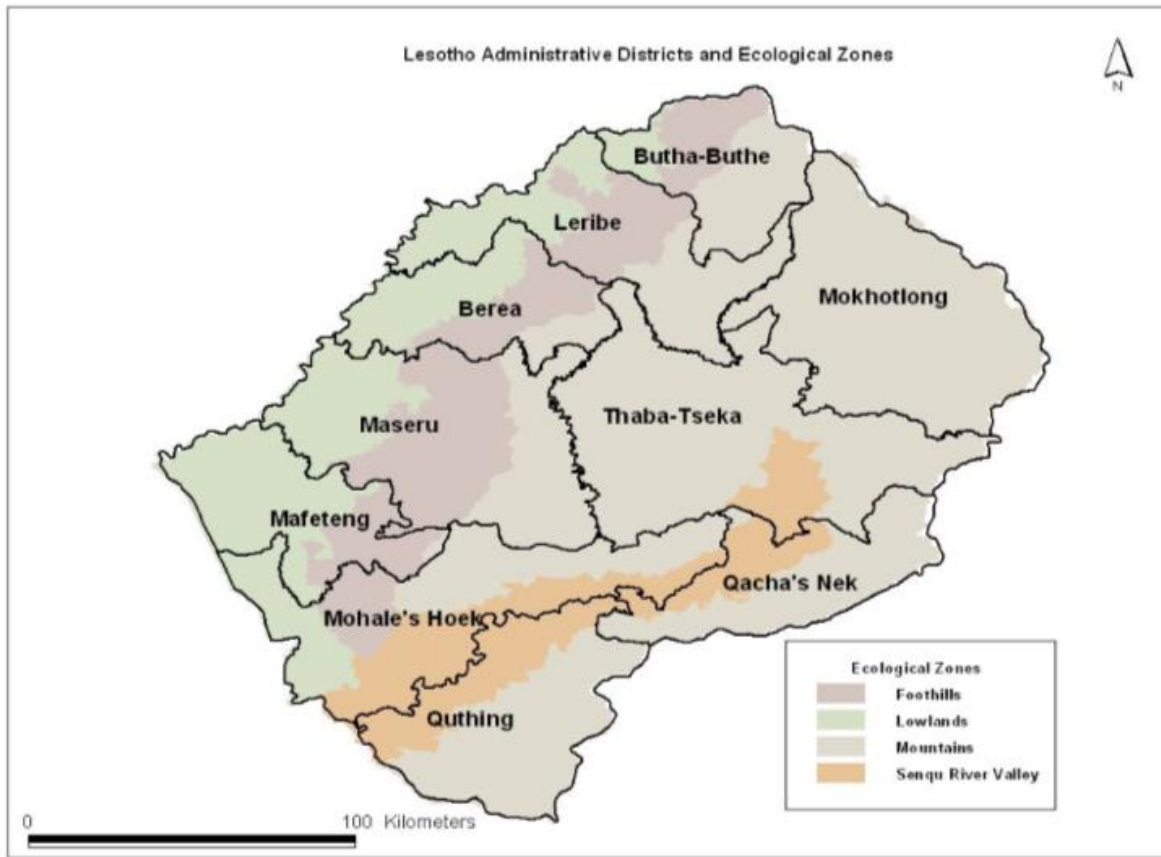
Lesotho has a continental temperate climate characterised by four distinct seasons. The average temperature ranges between -10°C in winter and 30°C in summer. The country receives most of its rainfall between the months of October to April, with an average of 700 mm per annum. Precipitation patterns are determined by regional and local climate controls. The lowest average annual precipitation occurs in the Senqu River Valley (450 mm) and the highest in the Northeastern mountain zone (1300 mm).

#### *Zooming in on climate trends in Lesotho*

The *main* climate trends visible in Lesotho are the following:

- An increase in hot days and nights and hottest days and a decrease in cold days and nights have been observed over Southern Africa in recent decades;
- Mean annual temperature in Lesotho has increased by 0.76°C between 1970-2001 (from 1880 to 2012, the average global temperature, according to the 5<sup>th</sup> Assessment Report of IPCC, increased by 0.85°C);
- There is a high variability in inter-seasonal (between seasons) and intra-seasonal (within a season) precipitation;
- Droughts are becoming more frequent in recent years;
- Recurrent droughts have resulted in a steep reduction in the production of cereals and other staple crops.

The Lesotho Meteorological Services (LMS) states that trends are carefully followed and specifically monitored for the different (agro-)ecological zones (see figure 2). At the same time, the consequences of trends are monitored and used for climate predictions.



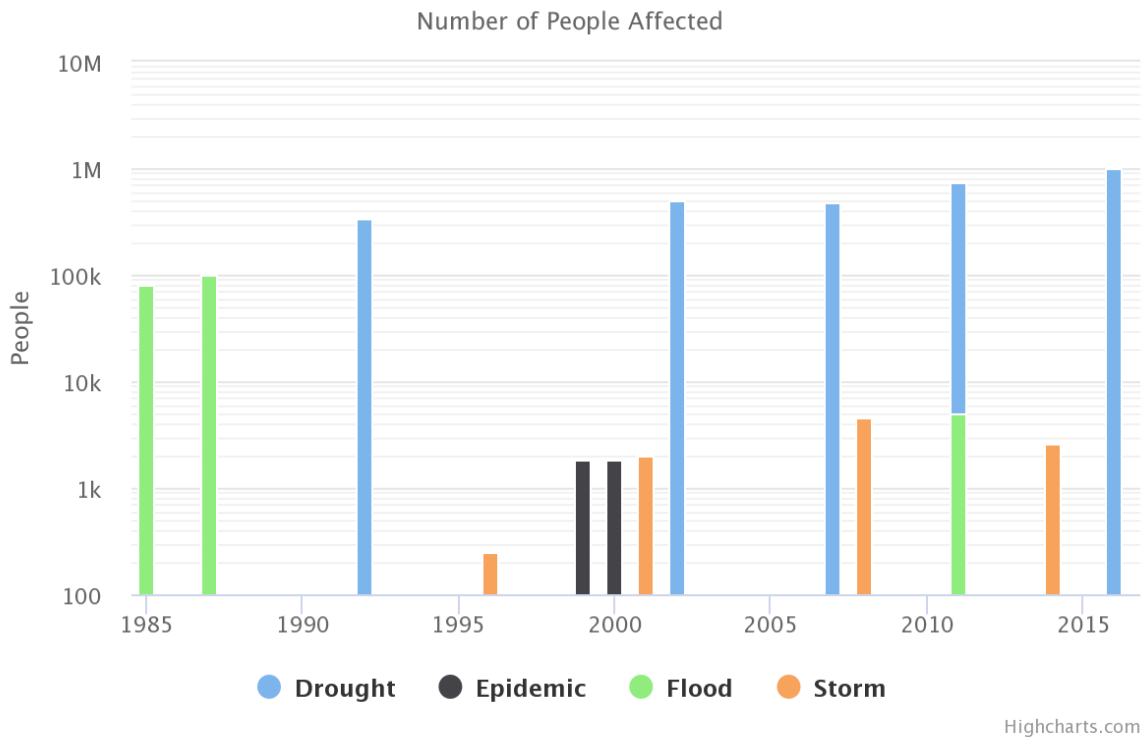
**Figure 2** The administrative boundaries and ecological zones of Lesotho.  
Source: NSDP II.

#### *Consequences of climate trends in Lesotho*

According to the National Climate Change Policy 2017-2027 of Lesotho (LMS, 2017a), Lesotho has been experiencing an increasing frequency of natural disasters and extreme weather events such as droughts, storms, and floods. The Lesotho Meteorological Services (LMS) states that Lesotho's geographical characteristics and prevailing socioeconomic conditions among the majority of its rural population make it one of the most vulnerable countries to the impacts of climate change (LMS, 2017b and pers. comm.).

Droughts repeatedly affect Lesotho and with devastating socio-economic consequences. It is the most prominent cause of crop failure and has led to the steep reduction in cereals and other staple crops in recent years and thus potentially a reduction in dietary diversity and an increase in micronutrient deficiencies. Localised floods from variable rainfall happen quite frequently in Lesotho and cause adverse impacts to the environment, economy, as well as to society. Extreme weather and climate events are also affecting health systems (WHO & WBG, 2018). Figure 3 shows the key natural hazard between 1985 and 2018. The reported epidemic in 1999 and 2000, was explained by the Minister of Health as an outbreak of dysentery ([source](#)). Problems identified were a lack of protection of latrines and inadequate water supplies. All unprotected water springs/wells which were inspected were contaminated while most of the protected springs had good quality water.

## Key Natural Hazard Statistics for 1985–2018



**Figure 3** Key Natural Hazard Statistics 1985-2018.  
Source: *Climate Change Knowledge Portal* accessed 01-05-2020).

### 3.3 Climate projections for Lesotho

The Climate Change Knowledge Portal (focus [Lesotho](#)) - provides options to visualise climate variables and indices derived from scientifically vetted CMIP5 projections<sup>1</sup> for different timeframes, statistics, emission scenarios, and climate models. Below we inserted the projections for two scenarios, namely RCP 2.6 - low emission pathway and RCP 8.5 - high emission pathway for the period 2020-2039.

#### What does RCP stand for?

Representative Concentration Pathway (RCP) of e.g. 8.5, refers to one of the four hypothetical scenarios for future global greenhouse gas emissions proposed by the Intergovernmental Panel on Climate Change (other RCPs are RCP 2.6, RCP 4.5 and RCP 6.0). Each scenario defines a pathway in terms of the concentration of carbon in the atmosphere at any date – note that these pathways are defined in terms of the concentration (i.e. the level) of carbon in the atmosphere, not the volume of carbon emissions. RCP 8.5 refers to the concentration of carbon that delivers global warming at an average of 8.5 watts per square meter across the planet.

Source: *IPCC's 5th Assessment Report (2014)*.

#### Regarding temperature

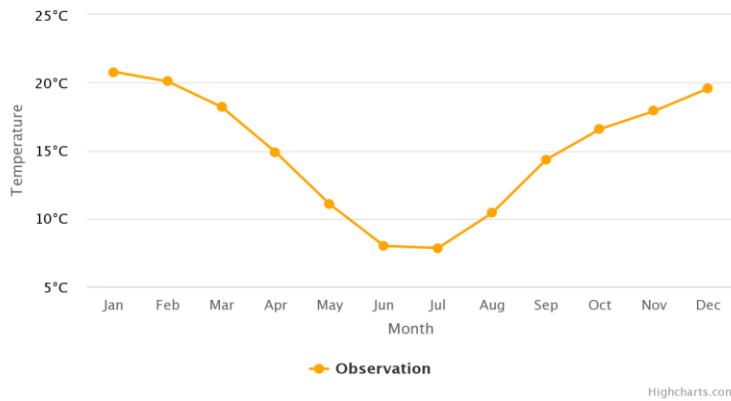
- Depending on emission scenarios, the northern areas are projected to see annual temperatures increase between 0.4-4.7°C while the southern regions will experience temperature increases between 0.2-3.8°C by 2100.

<sup>1</sup> The climate science community sources a suite of global climate models to help decision makers understand the projections of future climate change and related impacts, among the most widely used are the Coupled Model Intercomparison Project, Phase 5 (CMIP5) models included in the IPCC's Fifth Assessment Report (AR5).

- The number of 'frost' days is projected to decrease by Mid-Century (2046-2065) and Late-Century (2081-2100) under all emissions scenarios. The largest projected change in the number of 'frost' days is over Northeastern Lesotho in the Mountain livelihood zone.
- The number of 'warm' days and nights is projected to increase by Mid and Late-21st century under low, medium, and high emissions scenarios. Northwestern Lesotho is projected to see the largest increase.

The graphs below show the projected monthly change in temperature for the low emission scenario (RCP 2.6) and for the high emission scenario (RCP 8.5) in comparison with the historically observed monthly temperature for Lesotho (1986-2005).

Historical Observed Monthly Temperature for Lesotho for 1986-2005

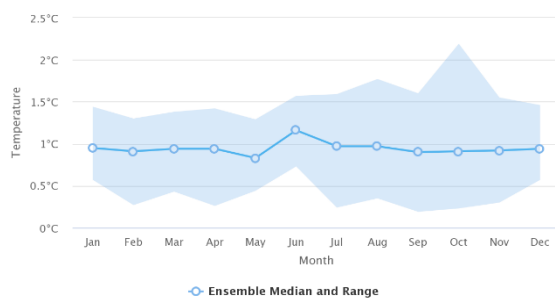


**Figure 4** Historically observed monthly temperature for Lesotho for 1986-2005.

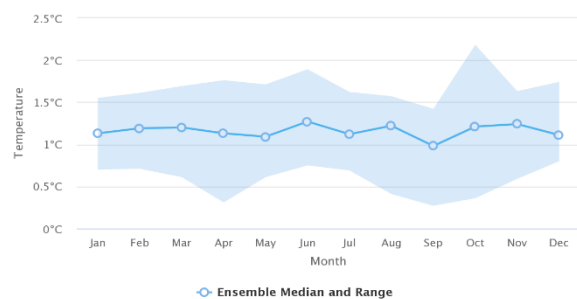
*Regarding precipitation:*

- Projections suggest a late onset of summer rains and a change in rainfall patterns that will become more erratic.
- Mean annual precipitation is projected to increase slightly by Mid (2046-2065) and Late-21st century (2081-2100), under all emissions scenarios. Southern Lesotho is projected to see average to below average precipitation in summer.
- Projections indicate an increase in the intensity and frequency of floods and droughts.

Projected Change in Monthly Temperature for Lesotho for 2020-2039



Projected Change in Monthly Temperature for Lesotho for 2020-2039



**Figure 5** Temperature projection 2020-2039 for the low emission scenario (RCP 2.6) on the left and the high emission scenario on the right (RCP 8.5).

Source: Climate Change Knowledge Platform.

The University of Cape Town has carried out an impressive Climate Risk Assessment of the agricultural sector of Lesotho for IFAD (see references: Hunter et al., 2019). In their study, they also reveal that

the predicted changes in average temperature indicate that climate change will result in consistent increases in mean temperature across spatial and temporal dimensions in Lesotho.

The report describes that a common prediction across each of the country’s 10 districts is, that mean temperature will increase in all districts by at least 1.9 °C. This is based on an RCP of 8.5 (i.e. the highest emission scenario) and is predicted for the period **2040-2069**. The hottest months of October, November and December are predicted to increase by 1.9–2.3 °C, relative to the historical average of 14.4–17 °C. Similar increases of 1.9–2.0 °C are predicted for all other months of the year, including the peak summer months that support the rain-fed agricultural season (March/April) as well as the colder winter months of April–August.

**Methodology used for the Climate Risk Assessment by the University of Cape Town**

The future effects of climate change on the historical ‘baseline’ climate in the study area were computed through analysis of 29 General Circulation Models (GCMs) downloaded from the AgMERRA dataset6, based on the methods described by Ramirez-Villegas et al (2013). Future climate changes were computed assuming the scenario of ‘RCP 8.5’ (where ‘RCP 8.5’ refers to one of four hypothetical scenarios for future global greenhouse gas emissions proposed by the Intergovernmental Panel on Climate Change). As a result of the wide variation in predictions of future precipitation generated by the 29 GCMs, a conservative average prediction of future climate was calculated based on the mean of the intermediate 50% GCMs (i.e. the average of the range of predictions from the lowest ~25% to the highest ~75%). This analysis was used to generate predictions of the effect of climate change across Lesotho, with a particular emphasis on the following three variables: i) Mean Monthly Precipitation (Precip.); ii) Monthly Mean Temperature (Tmean); and iii) Monthly Minimum Temperature (Tmin). The changes in each of these three variables were computed for the time period from the Historical baseline (the average of the period 1980–2010) to the Mid-Century (MC) future (the average of the period 2040–2069). The results of these analyses are first described in terms of the predicted spatial changes and anomalies in each variable at a national level, and subsequently at the level of each of Lesotho’s 10 districts.

Source: Hunter et al., 2019.

Comparing the earlier graphs of the Climate Change Knowledge Platform of 2020-2039 and of 2080-2099 (figure 5 and 6) with the predictions of the University of Cape Town (2040-2069) shows a logical correlation.

Cape Town University also indicated detailed temperature and precipitation changes per district in their study. For that detailed overview, we refer to the study’s report directly. However, to give at least a slightly more regional indication of climate changes to date and of predicted climate changes (which are based on past studies) we integrated two tables of the Climate Risk Assessment below.

**Table 1** Summary of observed climate changes in Lesotho to date.

Region	Average Temperature	Total seasonal or annual rainfall
National	Increased +0.76°C per decade from 1967-2006	Slight decrease in annual precipitation of +-2 - 5% per decade from 1970 to 2005 and 1982/83 to 2014/15
Central	Temperature increases most prominent in these regions	
Northeastern		Declining rainfall trend most evident in western part of Mokhotlong
Southern	Temperature increases most prominent in these regions	Declining rainfall trend less evident in Mafeteng, Mohale’s Hoek and Quthing

Source: Hunter et al., 2019.

**Table 2** Predicted climate changes in Lesotho based on past.

Region	Average Temperature	Total seasonal or annual rainfall
National	Increase of ~1°C by 2030, ~1.5°C-2°C by 2050, and ~2.5°C-3.5°C by 2080	Possibility of a slight increase in annual rainfall of up to 1.6% in rainfall by 2070
Western	Greatest increase in temperature in country	Smallest increases in rainfall (+0.7% by 2050)
Eastern and Central	Lower increases in temperature relative to Northwestern border	Eastern parts to experience the largest rainfall increases (+1.6% by 2050)

Source: Hunter et al., 2019.

### 3.4 Impact of climate change on different sectors

Already in 2007, the country's National Adaptation Programme of Action (NAPA) identified agriculture, energy, water, forestry, gender, infrastructure and human health as sectors and thematic areas which are highly vulnerable to the impacts of climate change, climate variability and extreme climate events (LMS, 2017a).

The following table gives an overview of some of the vulnerable sectors *and their vulnerabilities*. The conducted key-informant interviews revealed that vulnerabilities underlined by the NAPA are still accurate. This table has therefore directly been copied from Lesotho's NAPA of 2007. However, a note has been added to the 'livestock & rangeland sector'. In paragraph 3.6 we will further highlight required climate action, specified in, amongst others, Lesotho's first 'Nationally Determined Contribution under the UNFCCC' of December 2017 (cf. LMS, 2017b).

**Table 3** Sectors vulnerable to the impacts of climate change.

Vulnerable sectors	Vulnerabilities
Water Resources	Ground water resources are negatively affected by shortened rainfall season. This will result in inadequate annual recharge of aquifers, lower water tables and drying up of springs. In the mountains, the wetlands are drying up affecting reliability of perennial streams.
Agriculture	Crop production is adversely affected by reduced rainfall and frequent drought occurrences. Drought and high temperatures exacerbate incidences of diseases and pests. Resultant crop failures lead to famine and food shortages.
Forestry	Rural communities depend on biomass fuels as a major energy source. The resilience and regenerative capacity of forest resources are negatively affected by extreme climatic conditions. A decrease in forestry resources negatively impacts on the stability of energy supplies for both cooking and heating.
Livestock & rangelands	Livestock production is deteriorating due to the degradation of rangelands. The net effect is increased livestock mortality rates and quality of livestock products. Extreme weather conditions are conducive to disease and pest incidences.
	<i>Note: Indeed, increased evidence exists that climate change affects animal health. Climate change surely also affects the health of rangelands which in turn affects livestock production. However, we need to stress here that this remark needs to be combined with the effect that livestock itself has on rangelands due to overgrazing!</i>
Culture	The natural heritage and culture of the Basotho is closely linked to the environment. Their housing, clothing, medicine and other traditions are affected by climate change.
Health	Frequent drought occurrences result in limited availability and quality of water leading to disease outbreaks compounded by famine and malnutrition.
Energy	Climate change induced drought affects the generation of hydropower.
	<i>Note: this may therefore lead to increased deforestation.</i>
Soils	Climate change affects soil cover (range and forest resources) negatively. Soil erosion, desertification and land degradation are increased by incidences of drought and flooding. The end result is loss of soil fertility.



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Climate mitigation and adaptation measures (as further addressed in paragraph 3.6) in all sectors shown in table 3, *can* have potential nutrition co-benefits. For example, if we look at soil in particular, measures to stimulate CO<sub>2</sub> sequestration, to reduce the loss of soil humidity and improve water absorption, to improve soil organic matter content, soil aeration, soil structure and halt the loss of soil fertility are highly likely to have a positive effect on primary production, which in turn may contribute to more sustainable food systems and improved diets. The sub-paragraphs 3.4.1 to 3.4.5 first concentrate on the impact of climate change on water resources, on the environment and biodiversity, on crop and livestock production, and on health and livelihoods, before examining climate action in Lesotho (whether planned or implemented). The specified impact assessments will also address nutrition or WASH-related constraints and possibly threats.

### 3.4.1 Impact of climate change on water resources

Water resources have always been relatively abundant in Lesotho (also known as the 'Water Tower of Southern Africa'), but changes in climate are affecting and are likely to severely affect the supply of water and thus the hydrological cycle. Changes in the hydrological cycle are not only affecting water availability but often influence water quality as well (World Bank Climate Change Knowledge Portal). The projected decrease in summer and winter precipitation will decrease surface and groundwater reservoirs. Particularly high temperatures, low humidity and high winds can efficiently remove water from the land surface. More frequent and intense droughts will further diminish freshwater resources, and increased temperatures will affect evapotranspiration rates. This will in turn have an impact on runoff, soil moisture content, water levels in reservoirs, and may in addition lead to the salinisation of shallow aquifers. In other words, climate change is expected to 'enhance' the contrast between 'wet' and 'dry' and thus might change the dynamics around the balance between availability and use of water (LMS, 2017a; LMS, 2017b). Higher intensity rain and increased droughts also pose significant challenges to water supply infrastructure (World Bank Climate Change Knowledge Portal).

'Already catchments yields have waned to the extent that springs that were once perennial have run dry, the once great and robust rivers have been reduced to mere trickles and dams remain dry for most part of the year' (LMS, 2017a). The issue of management and preservation of water resources has thus become one of the very critical developmental challenges for the country (LMS, 2017a; LMS, 2017b).

Equally, the demand for water is expected to evolve under climate change, particularly as they relate to often rapidly changing demographic and economic settings. These changes generally increase the operational challenges and risk for the water sector.

Availability and access to water is critical to meet *domestic* and *industrial* water needs. Water is a major natural resource that earns the country significant income. Its importance to the economy has attracted a number of donors (including the World Bank, African Development Bank, and European Investment Bank) to invest in the Lesotho Highlands Water Project (LHWP) (CIAT; World Bank, 2018). With limited options for augmenting existing water supplies, Botswana has also approached the government of Lesotho to explore potential development options for the further transfer of water from the highlands of Lesotho (we refer here to the Lesotho Highland Water Project). This would consolidate Lesotho's position as the 'water tower' and allow for the potential development of additional, sustainable revenue streams for Lesotho based on renewable water resources. However, balancing the development of water resources *for export* against the national priority to improve *domestic* levels of access is one of the key challenges for the government (World Bank, 2016).

The sources of water in the rural communities are spring water, river flows, and the wetlands (including the 'mountain sponges'), making these communities particularly vulnerable to climate variability. Drought, especially, as water sources dry up, is negatively affecting the provision of safe water thereby increasing the risk of WASH related diseases among the vulnerable communities. (We point to figure 3 here, where storm and drought coincided with diarrheal disease). Many rural households - as was shared during one of the interviews - still collect their drinking water from unprotected sources, which are often far away and require travel. In extreme weather events when

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heavy rains cause floods, water supplies might get contaminated. Drought and heavy rains are thus both possible factors leading to a dysentery epidemic, for example.

WASH infrastructure in health facilities and schools are key to ensure safe access to water. Drought is affecting education as prolonged periods of drought affect water supply to schools which affects sanitation and hygiene. In addition, droughts affect school feeding programmes and specifically the preparation of school meals (OCHA, 2019).

### 3.4.2 Impact of climate change on the environment, ecosystems and biodiversity

Lesotho lies entirely within the grassland or grass savanna 'biome' and is incredibly rich in natural (and cultural) diversity, with unique habitats and high levels of endemism. The National Adaptation Programme of Action (NAPA) of 2007 already underlined the important role biodiversity plays in Lesotho. Indigenous plant species are used for food in addition to medicinal and cultural purposes. The National Climate Change Policy of Lesotho states more specifically how natural resources play a fundamental role in sustaining the wellbeing of Basotho, particularly for the rural poor and unemployed whose livelihoods depend heavily on rangelands, indigenous plant species, wetlands and ecotourism.

Climate change is identified as one of the major threats undermining the resilience and sustainability of these resources, even with the likelihood of driving them to extinction resulting in the loss of goods and services they yield.

Siltation, the drying up of rivers and their sources and increased aridity is leading to the disappearance of wetlands and marshlands, *including* many unique and fragile ecosystems such as sponges. Soil erosion and land degradation and diminished vegetation cover (heavily impacted by overgrazing) will result in loss of habitats for many animal and plant species. Hence, if no special conservation measures are put in place, many species, including endemic ones, and eventually complete ecosystems and the services they provide, are likely to disappear. The higher incidence of alien invasive species in rangelands (LMS, 2017a) only confirms this.

Forests cover 49,585 ha, just 1.5 percent of the country's land area, and are severely affected by deforestation and forest degradation, largely due to the use of wood as a main household cooking and heating energy source (CIAT; World Bank, 2018).

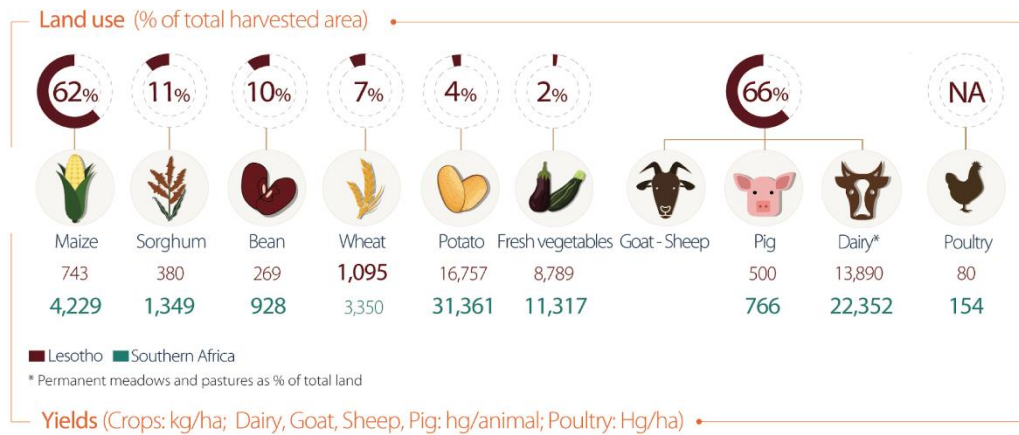
Enhancing resilience and adaptive capacity of these natural systems to climate change is ecologically, socially and economically vital.

### 3.4.3 Impact of climate change on agriculture

Stakeholders interviewed for this assignment summed up current trends generally in the same way: 'Rains are simply coming later, and when they finally arrive it is too much'. It is hard to decide for farmers when to plant. Delaying sowing to await the rains, will leave too little time for crops to complete their growth cycle. 'Then when winter sets in, and winters are harsh in Lesotho, frost may actually destroy the harvest' (pers. comm.).

Although agriculture accounts for just six percent of Lesotho's Gross Domestic Product (GDP), the sector is important for the livelihoods of 80% of the country's population (CIAT; World Bank, 2018).

The National Strategic Development Plan of Lesotho (2018/19 - 2022/23) states that most households in Lesotho practice low input, low output traditional rain-fed crop farming and extensive livestock husbandry under a communal land tenure system. Smallholder farmers are generally less than 1 ha in size and dominate the agricultural production in Lesotho. The major crops grown in Lesotho in the order of importance are maize, sorghum, wheat, beans and peas (Ministry of Natural Resources, 2007). Other crops grown to a significant scale include potatoes and vegetables, mainly tomatoes and cabbage (CIAT; World Bank, 2018). Maize is by far the most popular crop, followed by sorghum and wheat.



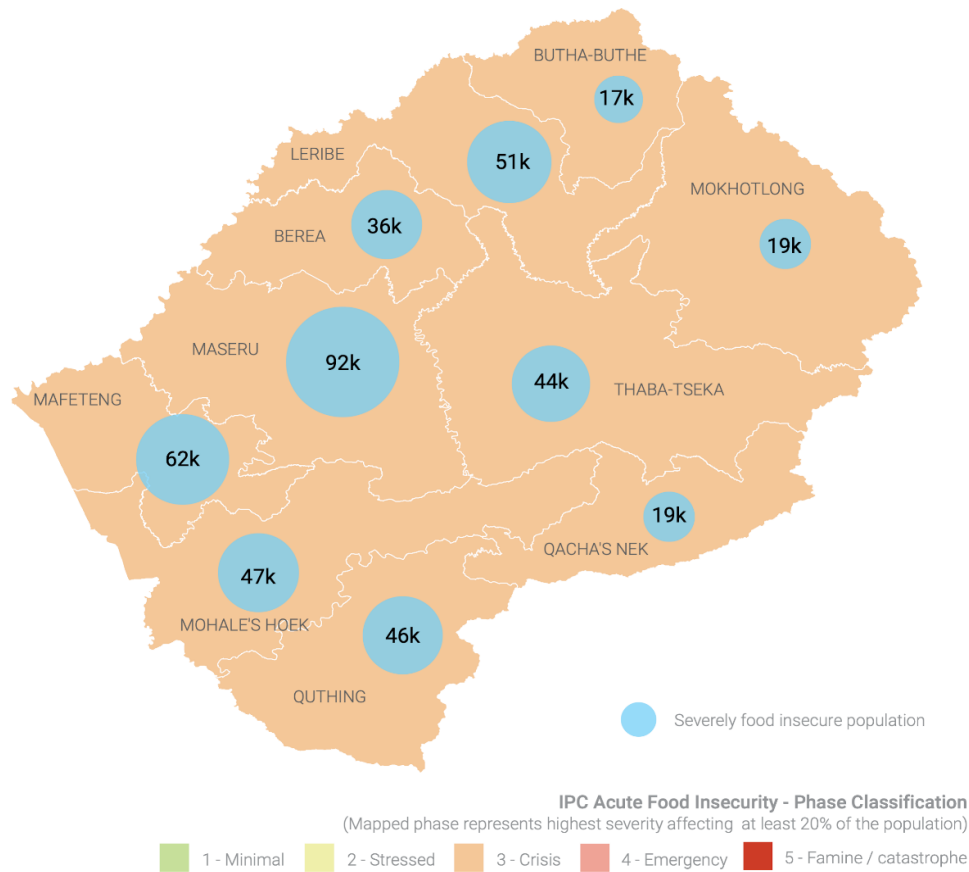
**Figure 6** Production systems key for food Security in Lesotho.  
 Source: CIAT; World Bank, 2018.

The most common production system in the country is the wheat-maize mono-cropping system, which despite its prevalence is unsustainable and insufficient to feed the country’s population. Home gardening is also an important source of horticultural produce, with an estimated 70 percent of rural households producing vegetables. Most home gardens are rain-fed, supplemented with irrigation from household and/or community domestic water supplies. The produce from home gardens is mainly for self-consumption, with limited quantities for the local markets (CIAT; World Bank, 2018).

The Climate Risk Assessment of the Agriculture Sector of Lesotho (Hunter et al, 2019) underlines that, considering the projections, the overall effect of these increases in mean temperature is likely to result in complex impacts on the agricultural sector, particularly when considered in combination with the predicted decreases and delayed timing of precipitation. The assessment conducted states: ‘Taken cumulatively over the entire growing season, the combination of reduced rainfall and increased temperature is likely to reduce agricultural production, either as a result of decreased yield or outright crop failure, particularly in the case of heat- and drought-sensitive crops such as maize and wheat’. It concludes: ‘The magnitude of this effect is likely to vary between and within each district’.

The large increases in temperature (1.9–2.3 °C) in the months of October–December will increase crop water demand and evapotranspiration (especially loss of soil humidity or decrease of soil moisture content), coinciding with the reduced rainfall predicted for the same months. Furthermore, the increased average temperatures are likely to include increased frequency or severity of heat waves and unusually hot days, further contributing to evapotranspiration losses and crop stress.

As a result of increasingly erratic climatic conditions, coupled with ongoing environmental degradation and their impacts on production and productivity, households seldom produce enough food to meet their household food requirements even in what could be regarded as good years. What is emerging is that even if farming is done under ideal conditions, it has become increasingly difficult to realise its full potential, leading to a growing food deficit and higher levels of climate change-related vulnerability for many farming households. Reliance on crop agriculture by households under current climatic conditions will increasingly affect livelihood vulnerability.



**Figure 7** Indication of food insecurity in Lesotho.  
Source: OCHA (2019).

#### Late rains and extremely hot temperatures: climate change leads to food insecurity in Lesotho

The frequent El-Niño induced drought conditions have resulted in chronic deficits in staple food grains that usually call for declarations of food emergencies and appeals for international humanitarian assistance, the last appeal having been made in December 2019 (see OCHA, 2019). The Government of Lesotho has declared a national disaster in response to the rapidly deteriorating situation. The 2018/2019 planting season was characterised by the late onset of rains and extremely hot temperatures, leading to poor harvests: production of major cereals has decreased by more than 60% compared to 2018, including a 78% decrease for maize, 61% for wheat, and 93% for sorghum. This follows a poor 2017/2018 season, leaving families across the country suffering from consecutive shocks. With the country forecast to receive below-average rainfall during the 2019/2020 season (October-March), the most vulnerable are now faced with three back-to-back failed harvests (OCHA, 2019).

More than 500,000 people in ten districts are now severely food insecure - including 433,000 people in rural areas (30% of the rural population) and above 74,700 people in urban areas (13.3% of the urban population).

The Remote Monitoring Report of Famine Early Warning Systems Network (FEWS NET) of April 2020 adds that areas of concern in Lesotho are still facing Crisis (IPC Phase 3), but it is expected that after the dry harvests beginning in May, the reliance on market purchases are reduced. From June to August, food security outcomes are expected to 'improve' to Stressed (IPC Phase 2). In September, outcomes are expected to return to Crisis (IPC Phase 3) as food stocks from harvest diminish and the impact of the decline in remittances becomes more pronounced and begins impacting household purchasing power.

We simply need to conclude that farming, as the major source of living in rural areas, is in a steady decline while food insecurity is increasing!

CIAT and World Bank (2018) state: 'Climate is a major determinant of crop yield variability. Very dry conditions can suppress yields, leading to low productivity. The variability of yield and thus production

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from year to year can be extreme and is primarily due to rainfall deficits leading to soil moisture stress and reduced rangeland productivity. There is [however] an urgent need to increase production to meet caloric food demand. To prevent cropland expansion to natural vegetation, sustainable agricultural intensification strategy is required for narrowing the agricultural yield gap. Constraints that must be overcome include weather-induced yield variability, soil fertility constraints, pest infestation, and market accessibility’.

The summarised findings of the Climate Risk Assessment (Hunter et al, 2019) indicate that several important staple crops – notably beans, maize and sorghum – are *predicted* to experience significant decreases in production. In the case of temperate fruit crops such as apples, pears, plums and peaches, a possible additional effect of the increase in mean temperature during the winter months may be that the number of accumulated ‘chilling hours’ will be reduced. For now, this effect is not certain to happen, but the predicted increase in temperatures is likely to affect various fruit species and cultivars to differing degrees (Hunter et al, 2019).

‘Different sources in Lesotho suggest a slight decreasing trend in precipitation and an increase in temperature. Although changes might seem minor, the impact on agriculture is (and is going to be) considerable!’

On the other hand, climate projections *currently* indicate that climate change generally increases yields for Lesotho’s major crops (see CIAT; World Bank, 2018 and Hunter et al., 2019): The warmer temperatures extend the growing season supported by mostly adequate moisture regimes. By extending the growing season, grain filling stages have increased that may otherwise have been curtailed by cooler temperatures. Wheat is the exception! Wheat (CIAT; World Bank, 2018 and Hunter et al., 2019) shows a general decline, with reduced winter and spring soil moisture that results in suppressed yields.

#### *Climate change, food safety and plant health*

Long-term changes in temperature, humidity, rainfall patterns and the frequency of extreme weather events are already affecting crop production and the nutritional quality of food crops. For example, climate directly (e.g. through erosion) and indirectly influences soil fertility, soil moisture content, soil organic matter content. Climate projections also show that pests and diseases may benefit from rising temperatures and different rainfall patterns. Changing conditions may favour the establishment of e.g. invasive alien species harmful to plant health (and possibly to animal health). The spread of pests among food crops is a serious threat that can have far reaching economic, social and environmental consequences ([www.efsa.europa.eu](http://www.efsa.europa.eu), accessed 13 July 2020). Pests may be invasive species, such as weeds, molluscs, such as snails, insects and mites, nematodes, fungi, bacteria and viruses. The CIAT and World Bank (2018) provide the example of the African armyworm and highlight that: ‘climate change will *likely* increase the probability of infestation in Lesotho’.

#### 3.4.4 Impact of climate change on livestock production

‘The development of climate-resilient strategies for the agriculture sector cannot be considered in isolation from the livestock production sector. In addition to the impacts on agriculture, the drought has weakened livestock production and trading’ (pers. comm.).

The climate conditions in the country currently favour livestock production (CIAT; World Bank, 2018). Production of various species of livestock for meat, wool/mohair, milk and eggs is widely practiced across the country as a supplementary or primary source of income (Hunter et al., 2019). Management of small numbers of livestock, including cattle for meat and dairy production, various sheep and goat species and poultry chickens, were noted as important contributors to income and food security within the mixed farming systems practiced in most districts.

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However, several challenges such as poor organisation of the different livestock value chain actors (which makes rearing livestock as a business challenging) and rearing of poor quality livestock breeds (resulting in low productivity) hinder realisation of the full potential of livestock production as a sub-sector (CIAT; World Bank, 2018 and pers. comm.).

A factor which challenges the climate-resilience of livestock production is the widespread degradation of grazing resources, as a result of continuous overgrazing as well as the impact of droughts. There is an increased incidence of invasive species on rangelands (LMS, 2017a), primarily caused by overgrazing. Generally, invasive plants are alien species, but Lesotho's invaders are native as they are traced back to the 1700s<sup>2</sup>. New cropping systems, high fire incidence and overgrazing initiated the process of invasion (Hae, 2016). This threatens the country's wool and mohair enterprises (and the Lesotho Highland Water Project which contributes significantly to the economy).

The limited availability of forage will reduce the overall health of the national herd, thereby increasing susceptibility to diseases and climate-related stresses. Pastures have a relatively low carrying capacity, and most farmers are unfamiliar with, or unwilling to invest in, approaches to supplement free grazing with additional fodder (e.g. through purchase of supplementary feed or through establishment of fodder banks) (Hunter et al., 2019).

Rangeland conditions deteriorated earlier than normal in August 2019, impacting on livestock body conditions, which had not fully recovered from the 2018/2019 lean season. This may affect livestock prices and the quantity and quality of wool and mohair is likely to be compromised. At the same time, disease outbreaks amongst livestock are threatening both animals and humans. An Anthrax outbreak in animals was reported in Maseru district from April to June 2019 where more than 100 people were exposed to the disease and given prophylaxis (OCHA, 2019).

The Climate Risk Assessment conducted by Cape Town University further underlined that farmers (but also extension workers) are increasingly interested in the promotion of small livestock species as an alternative to cattle herding. The study mentions this as a result of adaptable diets, which is interesting (we will return to this in Chapter 5), but of course also has to do with small space requirements and the rapid income return of small livestock. In the mountainous zones where temperatures are too low to reliably support productive subsistence farming, herding of small livestock (particularly for wool & mohair production) is a comparatively resilient source of food and income (Hunter et al., 2019).

Interventions are needed against loss of animals during periods of drought or erratic rainfall. Livestock production requires supplementary feed or forage. Hunter et al. (2019), but Lesotho's Meteorological Services (LMS, 2017a and 2017b) also recommend (or at least encourage further investigation of) approaches such as supplementary fodder banks, production of straw silage, rotational grazing management and other similar approaches to encourage farmers to experiment with novel approaches for feeding or grazing of livestock, which are not widely recognised or practiced at present.

In relation to the COVID-19 outbreak, the lockdown has delayed the start of the mohair shearing season. There is some concern that if the animals are not sheared by the end of May, breeding may be impacted and there may be an increase in miscarriages as the animals would be unable to grow new hair in time for the progressing winter (OCHA, 2019). It underlines the sector's vulnerability and the limited capacity to cope with shocks.

#### *Climate change, food safety and animal health*

Many infectious diseases have their roots in natural aquatic or terrestrial ecosystems. Global changes caused by e.g. deforestation, encroachment, environmental pollution, and climate change increasingly lead to outbreaks of new diseases and there is increased evidence that 'host-pathogen systems'

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<sup>2</sup> Invasive species include *Chrysochoma ciliata*, *Seriphium plumosum*, *Helichrysum splendidum*, *Felicia filifolia* and *Relhania dieterlenii* (Hae, 2016).

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change interplay because of climate change (McMichael and Lindgren, 2011). Around 70% of emerging viruses are of animal origin (Jones et al., 2008): zoonoses, i.e. animal infections that spread in humans.

Worldwide, nearly 75 percent of all emerging human infectious diseases in the past three decades originated in animals.

Mammals may host over 320,000 undiscovered viruses: 'What we currently know about viruses is very much biased towards those that have already spilled over into humans or animals and emerged as diseases. But the pool of all viruses in wildlife, including many potential threats to humans, is actually much deeper', according to Simon Anthony of the Center for Infection and Immunity at Columbia University's Mailman School of Public Health.

Lesotho's authorities used to send more than 2000 blood samples of cattle and other animals to South Africa and Botswana for analysis each year to verify whether the country was free of the animal diseases that are mandated by the World Organisation for Animal Health (OIE) to monitor. Lesotho currently only relies on foreign laboratories for confirmation or validation, as veterinarians at Lesotho's Livestock Services have been able to diagnose animal and zoonotic diseases themselves since 2017 (Gil, 2018).

Better understanding the factors that cause outbreaks and how they interact is crucial to safeguard environmental, plant, animal *and human* health. Given that animal, human and plant health are all affected by abiotic factors such as temperature and rainfall, climate change is expected to cause significant changes.

#### 3.4.5 Impact of climate change on human health and livelihoods

Climate variability and change present unique challenges to health systems. Everyone is exposed to changing weather patterns, but this exposure is not the same for all. Particular locations and population groups have higher levels of exposure to, for example, higher ambient temperatures or to greater risks of flooding (WHO & WBG, 2018). Particularly low and low-middle-income countries will experience higher burdens of climate-sensitive health outcomes, recognising though that climate change is likely to benefit some health outcomes in certain locations in the short term (Smith et al., 2014 in: WHO & WBG, 2018). Climate change is a stress multiplier putting pressure on vulnerable systems, populations, and regions.

The 4th Assessment Report of the IPCC already provided a considerably detailed overview of the health impacts of climate change in 2007. The IPCC flagged that e.g. meningitis is related to climate and environmental factors, in particular drought, which may affect its spatial distribution, intensity, and seasonality in the future. We already highlighted earlier that drought can increase undernourishment through impacts on crop yields. A reduction in agricultural output due to drought may further lead to a reduction in dietary diversity and lead to micronutrient deficiencies.

The World Bank's Climate Change Knowledge Portal lists the following human health outcomes due to climate variability and climate change:

### Climate change impact on human health

- Extreme heat can cause illnesses, including heat cramps, fainting, heat exhaustion, heat stroke, and death.
- (Even) subtle changes in temperature may shift the incidence, seasonal transmission, and geographic range of vector-borne diseases such as malaria and dengue fever, as well as many water related diseases causing diarrheal and skin disease outbreaks.
- Shifts in the water cycle will see increases in heavy rainfall and flooding increase can pose direct physical threats to life and property, but they also increase vector-borne, infectious, tick-borne, and zoonotic diseases such as malaria, dengue, Hanta virus and Rift Valley Fever.
- Flooding can damage infrastructure that is key for health service delivery as well as sanitation infrastructure leading to outbreaks of water-borne diseases such as cholera.
- To a large part because of higher temperatures, drought might increasingly exacerbate chronic water shortage and affect water quality, which may lead to use of unsafe water sources.
- Drought can reduce air quality, such as increased amounts of pollen and smoke in the air and increase respiratory conditions and modify the seasonality of transmission of diseases.

Source: *Climate Change Knowledge Portal*.

Lesotho's rural areas, which account for 75% of where the population resides, already experience water shortages due to unequal seasonal distribution and proximity to water resources (CIAT; World Bank, 2018). This may increasingly lead to the use of unsafe water resources.

'Rains come later than we are used to and when it falls, it pours down with tremendous force. This washes away the [nutrient-rich] topsoil. Due to overgrazing and drought, bare soil is increasing in area, which increases soil-loss rate even more'. 'At the current rate, Lesotho is losing too much of its topsoil which is directly affecting the livelihoods of, especially, the rural poor. Climate change induced soil degradation directly harms food and feed production (pers. comm.).

Soil-loss rates are going to increase because of high temperature, increasingly less vegetation cover, and more intense rainfall.

## 3.5 (Rural) vulnerable groups and (climate) vulnerable zones

The people of Lesotho have developed a range of climate change coping mechanisms 'which have served them well in the past'. According to Dejene et al. (2011) 'what has changed in recent times, however, is the apparent increasing frequency, magnitude and duration of climatic shocks, leaving little or no time to recover from the last event'. The country has experienced heightened competition for arable land due to population increase and migration to the lowlands. There is competition over land between crops and livestock (Dejene et al., 2011). The land does not get any opportunity to 'rest'. As confirmed also during the interviews, there is progressive loss of vegetative cover.

### *Vulnerable groups*

Climate-sensitive rain-fed agriculture is the mainstay of Lesotho's agro-based economy. It accounts for 7% to 10% of the GDP (down from 25% in the 1980s), furthermore, up to 80% of Lesotho's population engage in some form of agriculture related activity (LMS, 2017b). Vulnerability to climate change is caused by a number of factors, including high levels of poverty particularly in rural areas, but also the scattered nature of rural settlements, which makes the provision of and access to social services difficult. Most of the rural populations in Lesotho rely on agriculture for their income, leaving them highly vulnerable when droughts strike. This is particularly the case for female farmers, who



have even less ability to cope with shocks as their productive capacity and asset base are considerably smaller than male farmers (OCHA, 2019).

Women’s unequal participation in decision-making processes and labour markets compound inequalities and often prevent women from fully contributing to climate-related planning, policymaking and implementation (LMS, 2017b). There is a need to develop and implement gender-responsive national climate change policies (which respond to the differentiated needs, experiences, priorities and capacities).

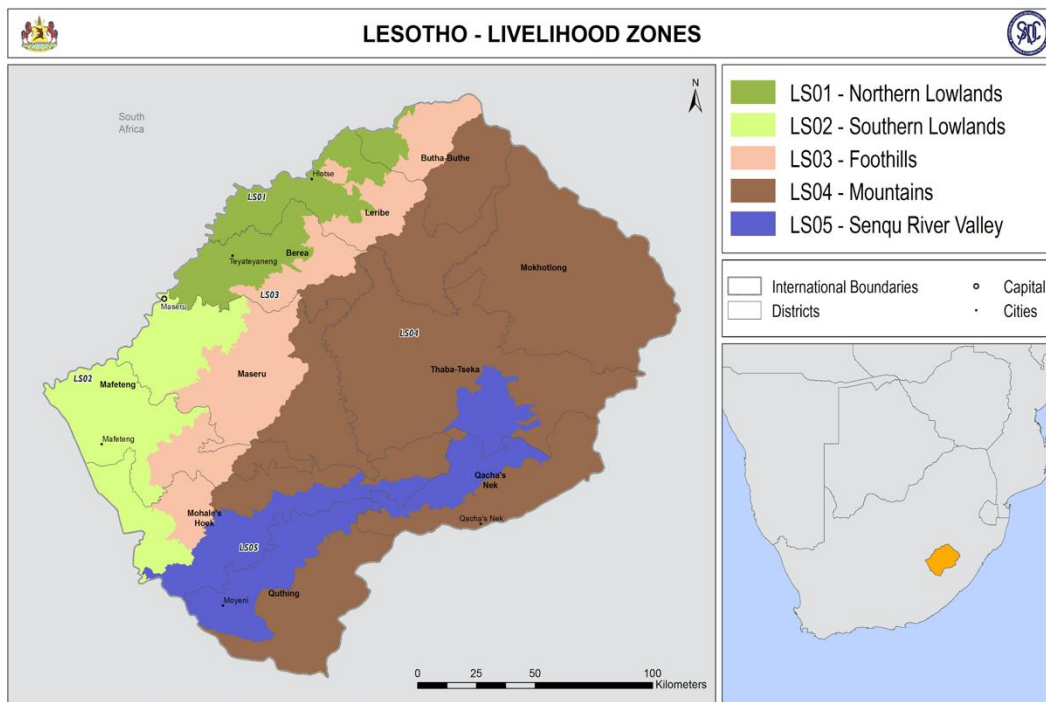
In general, off-farm employment opportunities are very limited (Dejene et al., 2011).

**OCHA (in July 2019) stated**

‘The current deterioration in the food security situation in Lesotho is driven by a severe drought and a general increase in food prices. Food availability from household production has decreased and food access has declined due to poor purchasing power. Even though the cereal deficit will be likely covered by imports from South Africa, the poor climate outlook and possible reduction in agricultural labour opportunities, together with possible price hikes, indicate that the situation is likely to deteriorate’.

Source: ReliefWeb - Lesotho snapshot July 2020.

Lesotho is demarcated into distinct livelihood zones, namely Lowlands, Foothills, Senqu River Valley, Mountains and Peri-Urban and Urban Areas. Each of these zones is characterised by types and levels of availability of resources and by agro-climatological and ecological conditions. An analysis of local livelihoods is essential for a proper understanding of the impacts of hazards associated with climate change at the community level. Livelihood patterns clearly vary from one area to another according to local factors such as climate, soil and access to markets. Where a community lives is only one factor determining its options for obtaining food and generating income. The Livelihood Zones in Lesotho more or less coincide with the agro-ecological regions (Ministry of Natural Resources, 2007).



**Figure 8** Livelihood zones in Lesotho.

Source: Famine Early Warning Systems Network (data prepared by the Lesotho Vulnerability Assessment Committee) available [online](#).

### Vulnerability Zones

The NAPA of 2007 recognised three vulnerability zones, namely: Zone I (Southern Lowlands across the Senqu River Valley), Zone II (Mountains), and Zone III (Lowlands and Foothills). Although this is a somewhat older publication, typology and characterisations used might still be quite accurate (pers. comm.), but this requires 'ground truthing'. Moreover, it requires a far more detailed assessment, either per district or per (sub-)catchment!

**Table 4** Comparison of vulnerability zones according to the NAPA of 2007.

<b>Zone I (Southern Lowlands across the Senqu River Valley) See figure 10 (LS05)</b>	<b>Zone II (Mountains Region) See figure 10 (LS04)</b>	<b>Zone III (Lowlands and Foothills) Vulnerable communities in the zone See figure 10 (LS01, LS02, LS03)</b>
Vulnerable communities in the zone include: <ul style="list-style-type: none"> <li>- Small livestock farmers (rear goats and sheep)</li> <li>- Peasant subsistence farmers (maize, sorghum and beans)</li> <li>- Poor households with either no ownership of field or livestock surviving on Government and Donor Aid</li> </ul>	Vulnerable communities in the zone include: <ul style="list-style-type: none"> <li>- Livestock farmers (rear cattle, goats and sheep for mohair and wool)</li> <li>- Crop farmers (grow maize, wheat, sorghum, potatoes, beans and peas)</li> <li>- Labourers during peak agricultural season</li> <li>- Households survive on wild vegetables</li> <li>- Eco-tourist guides</li> <li>- Small scale industry operators</li> </ul>	Vulnerable communities in the zone include: <ul style="list-style-type: none"> <li>- Crop farmers (grow vegetables, maize, sorghum, wheat, beans and potatoes)</li> <li>- Livestock farmers (rear cattle, goats and sheep)</li> <li>- Cash crop farmers</li> <li>- Dairy cattle farmers</li> </ul>
Characteristics of the zone include: <ul style="list-style-type: none"> <li>- Very high poverty levels</li> <li>- High unemployment</li> <li>- High population density</li> <li>- High malnutrition</li> <li>- Poor accessibility to clean potable water</li> <li>- Poor hygiene and sanitation</li> <li>- Increased hunger and high mortality rate</li> <li>- Lack of infrastructure (No roads, water utilities, electricity grid &amp; remote from town centre)</li> <li>- Medium literacy rate</li> <li>- High soil erosion and environmental degradation</li> <li>- High level of desertification</li> <li>- High loss and extinction of biodiversity</li> <li>- Area of recurring natural disaster (Critically drought prone with high frequency of drought occurrence)</li> <li>- High incidence of erosive thunderstorms, hail and dust-storms</li> <li>- Poor vegetation cover</li> <li>- Minimal arable land</li> <li>- Low crop production (high food insecurity)</li> <li>- Low soil fertility</li> <li>- Low livestock holdings</li> </ul>	Characteristics of the zone include: <ul style="list-style-type: none"> <li>- High levels of poverty</li> <li>- Low population density</li> <li>- Low literacy rate</li> <li>- Poor infrastructure</li> <li>- Rugged mountainous terrain</li> <li>- Area of recurring natural disasters (e.g. frequent heavy snowfall occurrence)</li> <li>- Abundant water resources</li> <li>- High frequency of windstorms</li> <li>- Extreme low temperatures (cold conditions)</li> <li>- Early frost onset</li> <li>- Relatively high rainfall</li> <li>- Abundant but deteriorating rangelands</li> <li>- Low crop production (food insecurity)</li> <li>- Inadequate arable land</li> <li>- High degradation of indigenous vegetation</li> <li>- Livelihoods supported by livestock holdings</li> <li>- High livestock holdings</li> </ul>	Characteristics of the zone include: <ul style="list-style-type: none"> <li>- Relatively improved infrastructure</li> <li>- High literacy level</li> <li>- Livelihoods dependent on cereal production and cash crops</li> <li>- High drought risk</li> <li>- High rate of soil erosion</li> <li>- High population density</li> <li>- Low soil fertility</li> <li>- Poor vegetation cover</li> <li>- Frequent hail and dust storm occurrence</li> <li>- Area of recurring natural disaster (Prone to floods)</li> <li>- Risk of water borne diseases</li> <li>- High environmental degradation</li> <li>- Marginal lands</li> <li>- Moderate crop production although still not sufficient to meet local demand</li> </ul>

Source: Ministry of Natural Resources, 2007.

Table 4 may specifically be useful in the selection of *target groups* for climate action.

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## 3.6 Towards climate action: laying out potential pathways for mitigation and adaptation interventions

By referring to lessons learned and intended climate change adaptation and mitigation actions, paragraph 3.6 - rather than preparing a longlist of possible interventions - will merely 'set the scene' for mitigation and adaptation activities that could be taken up by the Government of Lesotho, Development Partners and other partners or stakeholders. Although we will address strategies and intervention options listed by the first NDC of Lesotho (paragraph 3.6.4), paragraph 3.6.2 first focuses on possible pathways and scenarios that could be opted for regarding agricultural development. Paragraph 3.6.3 reports on the link between climate action and Disaster Risk Reduction, which may provide another perspective climate action as well as on potential partnerships. Chapter 5 and 6, after having addressed the current nutrition situation of Lesotho in Chapter 4, specifically highlights where such climate adaptation and mitigation activities may meet strategies and actions that could improve dietary diversity as well.

### 3.6.1 Towards climate action in Lesotho

Despite the fact that Lesotho has, in fact, only a limited impact on climate change in comparison with other countries (LMS, 2017b), Lesotho accepts the need to contribute to the global mitigation effort. The Government of Lesotho stresses however in particular the need for *climate change adaptation*. Still, in Lesotho's Nationally Determined Contribution (NDC), 'the adaptation options considered as top priority are those that will permit the higher co-benefits with respect to *climate change mitigation*, particularly those good adaptation practices and techniques which will permit carbon sequestration and reduction of GHG emissions at the same time' (LMS, 2017b). In other words, the Government of Lesotho prioritises adaptation, without neglecting climate change mitigation.

#### Climate action: climate change mitigation and adaptation interventions

Mitigation has been defined by the Intergovernmental Panel on Climate Change (IPCC) as 'an anthropogenic intervention to reduce the sources or enhance the sinks of greenhouse gases' (IPCC, 2007). In other words, mitigation means taking direct action to decrease the impacts of climate change. Fanzo (2017) highlights: It primarily relies on decreasing greenhouse gas emissions and increasing carbon sinks to decrease the amount of greenhouse gas in the atmosphere and limit the increase in temperature, with an overall goal of keeping this increase to less than 2°C.

Adaptation, as defined by the IPCC, is an 'adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities' (IPCC, 2007). Adaptation is action taken to cope with the impacts of climate change. We are already seeing these impacts, and they will get worse even with effective mitigation. Therefore, it is essential to take action to minimise or, when possible, utilise these effects to limit negative effects.

Lesotho's NAPA identified agriculture, energy, water, forestry, gender, infrastructure and human health as sectors and thematic areas which are highly vulnerable to the impacts of climate change, climate variability and extreme climate events (see table 3, paragraph 3.4). The outcomes of the NAPA were the identification of regions and communities *vulnerable* to climate change and prioritisation of responsive adaptation activities for implementation in vulnerable regions. The NAPA identified 11 adaptation options, most of which addressed crop and livestock production.

Dejene et al. (2011) describe the lessons learned during the piloting of priority adaptation needs in the Technical Cooperation Programme (TCP) implemented by FAO and the Government of Lesotho from 2009 until the end of 2011. These pilots were, at the same time, an effort to address the shortcomings in the NAPA of 2007. The TCP's biggest concern was that the NAPA proposed adaptation measures were too general and prioritised for excessively broad livelihood zones. The TCP focused therefore on three location-specific livelihood zones vulnerable to the most important hazards, notably drought. It resulted in the following key lessons learned as indicated in the box below.

#### Main lessons learned from FAO's TCP include

- Adaptation requires focus: NAPA adaptation options were implemented in specific zones for/with specific vulnerable groups;
- Adaptation requires an integrated approach: crop, livestock, irrigation, forestry experts working together *at* the community level;
- Adaptation requires continuous monitoring: continuous testing and validation of field practices took place to respond to agro-ecological conditions, thus ensuring relevance to local conditions and higher uptake
- Adaptation requires initial **investment**: water harvesting and/or initiating keyhole gardens would otherwise simply not be affordable.

### 3.6.2 Possible pathways for agricultural development in Lesotho

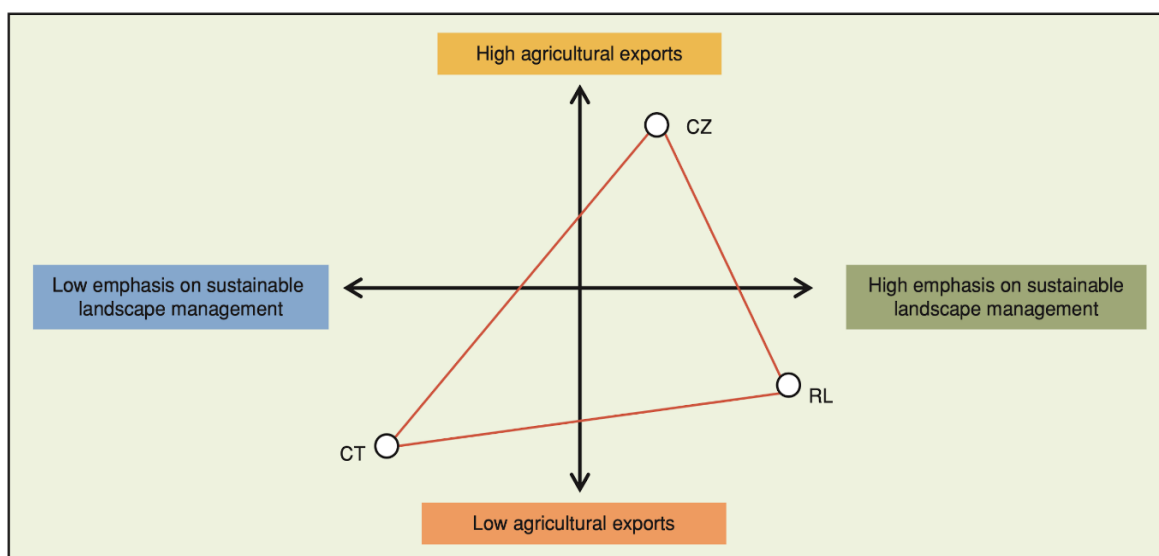
Addressing challenges and achieving SDG targets related to poverty, food security, nutrition security, environmental degradation, and climate change requires managing trade-offs across space, time, and sectors simultaneously! Laying out potential pathways and scenarios may therefore help in choosing the most positive or least negative ones. Perhaps even lead to synergies, e.g. enhancing carbon stocks in natural vegetation and soils (climate mitigation) and sustainable expansion of cropland (enhancing dietary diversity, food security, reducing poverty).

The success of climate action and possible adaptation and mitigation interventions depends largely on the integration of climate change issues into the *sectoral policies* and development plans. This was already identified as one of the priority areas of the NAPA. Inadequate institutional and technical capacity at the national, district and community levels were identified as the main barriers to implementing NAPA priorities (Dejene et al., 2011).

#### *Setting the scene for climate action with nutrition co-benefits*

To 'set the scene' for climate action *with nutrition co-benefits* requires us therefore to dive into the potential trade-offs laid out by the possible scenarios for *agricultural development*.

Based on two major drivers that *may* influence agricultural development in Lesotho (agricultural trade and sustainable landscape management) the Government of Lesotho & the World Bank (World Bank, 2019) compared 3 scenarios: following current trends (CT), commercialisation (CZ) and resilient landscapes (RL).



**Figure 9** Comparison of 3 scenarios (CT, CZ and RL) for agricultural development.

Source: Government of Lesotho & World Bank, 2019 (World Bank, 2019).

CT represents a scenario that is characterised by rain-fed subsistence farming, cereals monocropping, extensive livestock grazing, and suboptimal use of modern inputs. It basically follows the current trend or a business-as-usual mode. RL aims at resilient landscapes. The scenario assumes a lower priority to market liberalisation but prioritises a land management system that empowers smallholders with ambitions toward sustainability, socioeconomic resilience, and low ecological impact from economic growth. CZ focuses on commercialisation. It sets high ambitions for international cooperation, market liberalisation, and increased agricultural exports as a primary strategy to graduate from the United Nations (UN) ranking of least developed countries (World Bank, 2019).

#### Comparison of potential pathways

'The current agricultural production pathway in Lesotho focuses on extensive animal grazing and expansion of cropland to keep pace with food demand for the population. The pathway is characterised by agricultural support for a monoculture cropping system dominated by maize. This pathway is largely unsustainable and depletes the land resources on which production relies over time.

The commercialisation pathway is more profitable, requires larger farm sizes (greater than 2.5 hectares), takes up less land per unit of production, creates more jobs, produces more food calories, and offers Lesotho the potential to export horticulture, potato, fish, and vegetables. However, it requires strong market-oriented agricultural policies to be successful and would require developing Lesotho's agricultural value chains and ensuring the proper functioning of land markets.

On the other hand, the resilient landscape pathway produces higher yields, and is more effective in controlling land degradation and delivers about ten times more carbon benefits per hectare compared to the commercialisation pathway.'

*Cited from: Foreword by the Government of Lesotho and World Bank Counterparts (World Bank, 2019).*

Some lessons learned from the comparison of the 3 scenarios, that will affect climate action, i.e. climate change mitigation and adaptation interventions with nutrition co-benefits are listed below.

#### Comparison of 3 agricultural development scenarios: lessons learned

- Prioritising CSA practices that are adapted to a country's context is a key step toward optimising the productivity and climate benefits of the practices.
- Within the context of the CZ scenario, some nationally produced agricultural commodities, such as vegetables, orchards, and potato, could serve Lesotho's export market (CIAT; World Bank 2018 and Hunter et al. 2019).
- Though commercialisation is more profitable, it requires larger farm sizes. It is more appropriate for medium-size, emerging farmers and requires strong market-oriented agricultural policies for it to be successful.
- Commercialisation would require more private initiative and resources, for instance in developing the agricultural value chain and well-functioning land markets. This could constitute a serious barrier given Lesotho's current private sector being in an 'initial stage'.
- Commercial agriculture generates more stable jobs but will also require a transformational shift in the farming systems and this may be challenging given the current level of implementation capacity.
- Though less profitable, climate-resilient agriculture delivers 10 times more carbon benefits than commercial agriculture. Thus, climate-resilient agriculture could potentially benefit from climate finance. Climate-resilient agriculture is also more effective in controlling soil erosion.
- Climate-resilient agriculture is 30 percent costlier for the public sector but is easier to implement. It is more tailored toward adapted technologies, landscape resilience and sustainable agricultural intensification that the average smallholder farmer can practice. Considering a longer-term time perspective and assuming that ecosystem services would be able to optimally function, climate-resilient agriculture may actually be cheaper.

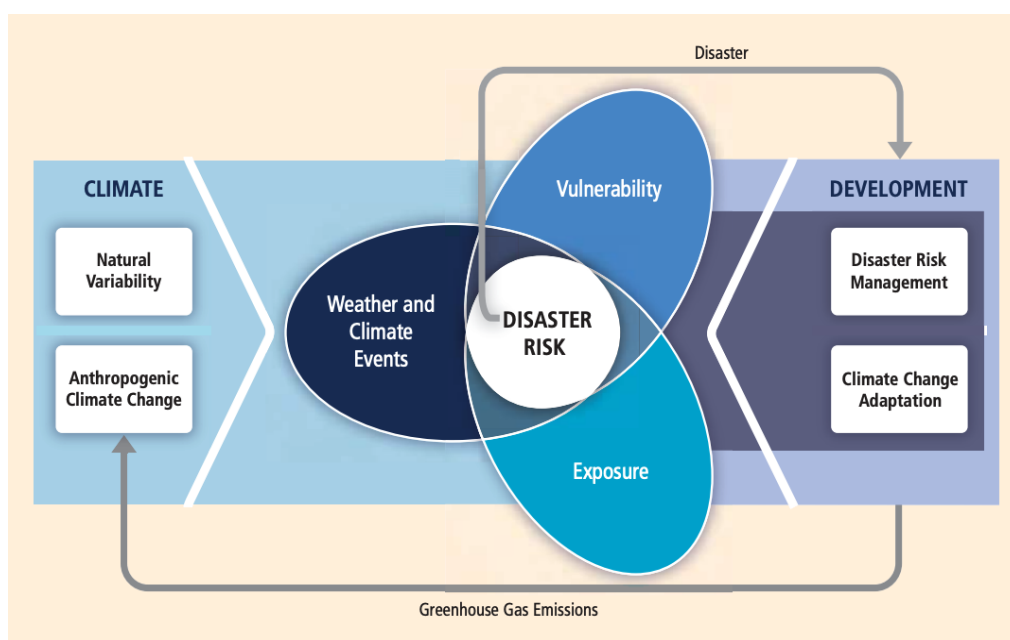
*Source: Adapted from World Bank, 2019.*

'While sustainability aims to put the world into balance, resilience looks for ways to manage in an imbalanced world. As such, resilience and sustainability are complementary approaches'.

Source: Zolli, 2012 in: WHO & WBG, 2018.

### 3.6.3 Vulnerability, exposure, adaptive capacity and risk

We know that a system is vulnerable if it is exposed and sensitive to the effects of climate change and has only limited capacity to adapt. We also recognise that a system is less vulnerable if it is less exposed, less sensitive or has a strong adaptive capacity. Despite that awareness we still deem it wise to refer to IPCC's Special Report on 'Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation' (IPCC, 2012) for a useful glossary to explain key concepts. Particularly, as we further focus predominantly on adaptive capacity in this report, we think that it is essential to still refer to the relation between Climate Change Adaptation and Disaster Risk Management. Notably, because adaptation to climate change and disaster risk management provide a range of complementary approaches for managing the risks of climate extremes and disasters and is therefore worth checking. We return to this in Chapter 5 and 6.



**Figure 1** Complementarity of Disaster risk Management and Climate Change Adaptation approaches.

Source: IPCC (2012).

## 3.7 Initiating climate action: Selection of target areas

The Climate Risk Assessment study (Hunter et al., 2019) led by the University of Cape Town, used the following adaptive capacity indicators to assess overall adaptive capacity:

- Education: % literacy rate;
- Access to financial services: % households with ability to access loans;
- Access to alternative (non-agricultural) income;
- % household heads that are employed;
- Adoption of improved agricultural practices: amount spent (Maloti/hectare) on fertiliser; amount spent on purchase of hybrid seeds; % area that has received applications of pesticide; % of farmers who have adopted irrigation; % of farmers who have adopted conservation agriculture.

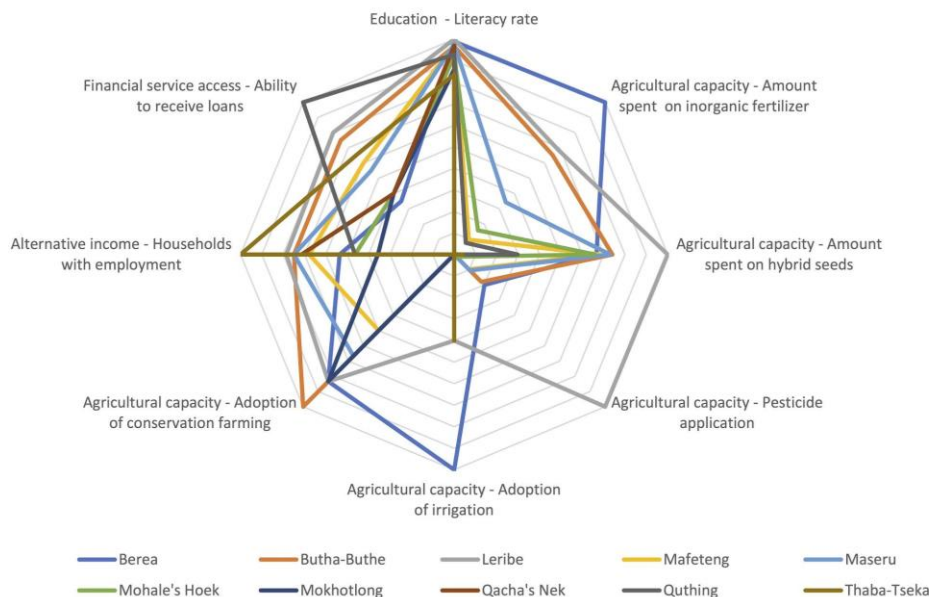
The same indicators are also shown in the table below. The *normalised scores* were used to visualise adaptive capacity in a radar chart.

**Table 5** Normalised adaptive capacity indicator scores collected for all districts.

Indicator category	Adaptive capacity indicators	Berea	Butha-Buthe	Leribe	Mafeteng	Maseru	Mohale's Hoek	Mokhotlong	Qacha's Nek	Quthing	Thaba-Tseka
Adoption of improved agricultural practices	Relative spend on inorganic fertilizer (* normalised)	100.0	65.2	68.9	9.7	34.3	15.8	0.0	0.0	7.7	0.1
	Relative spend on hybrid seeds (* normalised)	66.7	74.1	100.0	68.4	73.1	66.1	0.6	9.2	29.7	4.1
	Relative area planted receiving pesticide application (* normalised)	20.1	18.1	100.0	9.8	10.6	1.5	0.0	0.0	0.0	0.0
	Farmers who have adopted irrigation	5.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	1.0	2.0
	Farmers who have adopted conservation farming	5.0	6.0	5.0	3.0	4.0	0.0	5.0	0.0	0.0	0.0
Access to alternative income	Households with employment	15.0	21.0	22.0	19.0	21.0	13.0	10.0	20.0	13.0	28.0
Education	Literacy rate (15-24)	93.5	91.6	94.7	92.2	92.5	87.4	81.4	91.8	87.9	79.1
Access to financial services	Households with ability to receive loans	7.0	15.0	16.0	12.0	11.0	8.0	8.0	8.0	20.0	13.0

Source: Hunter et al, 2019.

The team from the University of Cape Town plotted these scores on a radar chart comparing all districts in Lesotho based on normalised capacity indicators which resulted in the figure below.



**Figure 11** Radar chart comparing all districts in Lesotho based on normalised capacity indicators (based on table 5).

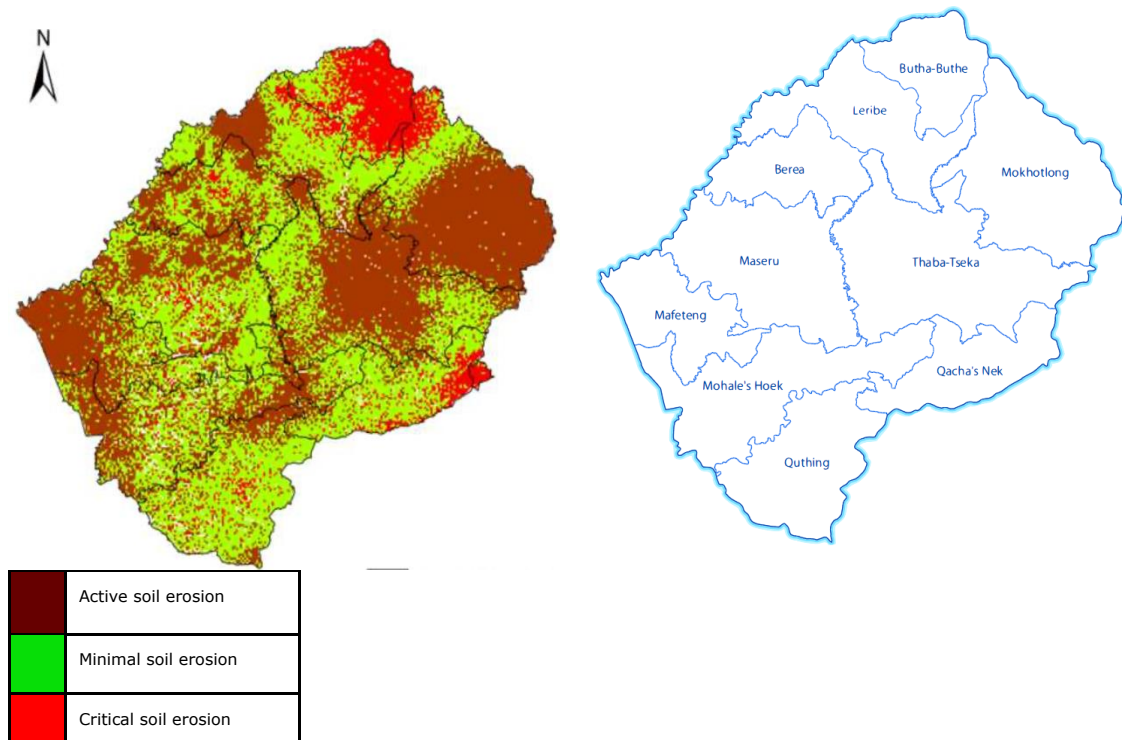
Source: Hunter et al, 2019.

We know that in order to increase adaptive capacity throughout Lesotho, having an integrated strategy is pivotal, but the radar chart clearly shows that specific interventions will also be necessary in districts or sub-catchments based on specific issues identified. Surely one size does not fit all! Specific adaptation and mitigation measures might be effective in one district or sub-catchment, but they may contribute to maladaptation in others.

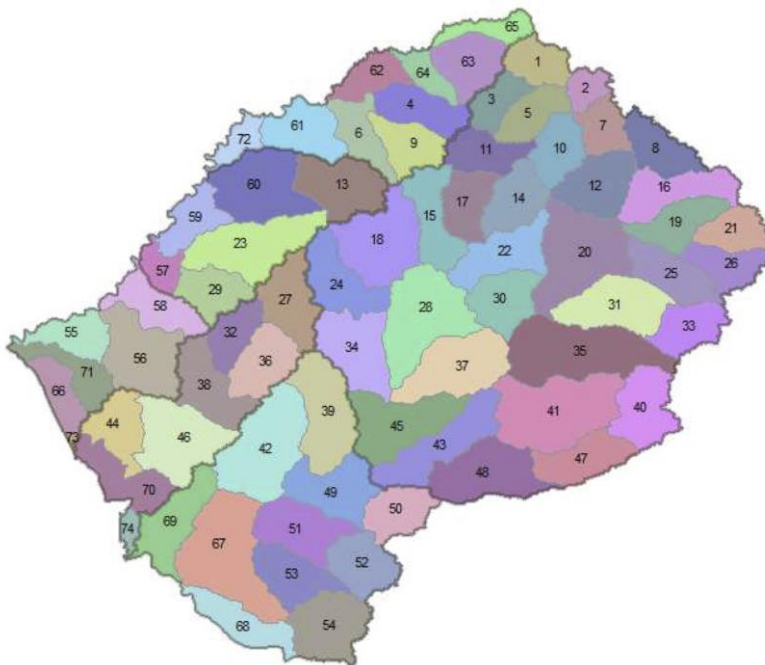
Adaptive capacity scores might actually be helpful for the selection of possible target catchments or possible target districts or for the development of specific pathways.

Below, few maps obtained from different publications are shown. Combining them in GIS software would of course be ideal to provide different perspectives for suitable pathways ahead. Especially in the overlay of diverse combinations (not only for climate-smart pathways ahead but especially for climate and nutrition-smart pathways) we may find the actual food system trade-offs as well as the

food system synergies that may be selected for the actual interventions at district or (sub-)catchment level.



**Figure 12** An indication of active, minimal and critical soil erosion (left).  
Source: Makara, 2013 in: Puri, 2016. District boundaries (right).



**Figure 13** An overview of Lesotho's sub-catchments.  
Source: Puri, 2016.

Combining for example watershed boundaries with a drought map (or projections) of Lesotho, the wetland areas (see e.g. map of Lesotho's Bureau of Statistics, 2013) as well as the areas of critical erosion will guide the selection of a target area.



It becomes more interesting if (preferably GIS) overlays can be combined with the table below, indicating adaptive capacity ranks, based on adaptive capacity scores. 'The Adaptive Capacity scores generated indicate that smallholder farmers in the districts of Leribe, Berea and Butha-Buthe have the highest overall capacities to respond to climate change's impacts (ranking 1st, 2nd and 3rd, respectively). The districts of Qacha's Nek, Thaba-Tseka and Mokhotlong have the lowest overall AC scores (ranking 8th, 9th and 10th, respectively) and therefore are anticipated to be least able to respond or adapt to climate change-related impacts', is the conclusion of the Climate Risk Assessment Report.

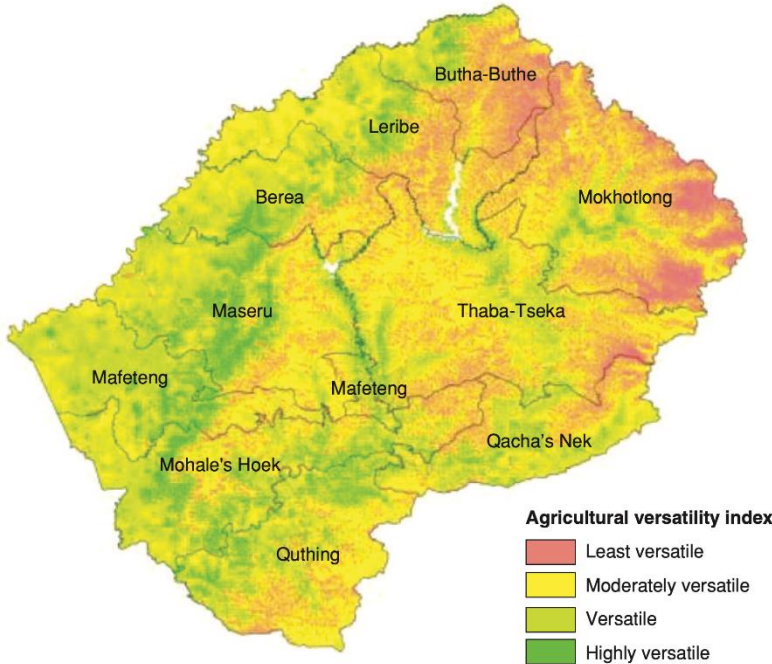
**Table 6** Adaptive capacity rank per district.

Adaptive capacity Indicator category	Berea	Butha-Buthe	Leribe	Mafeteng	Maseru	Mohale's Hoek	Mokhotlong	Qacha's Nek	Quthing	Thaba-Tseka
Adoption of improved agricultural practices	39.4	32.7	55.2	18.2	24.4	16.7	1.1	1.8	7.7	1.2
Access to alternative income	15.0	21.0	22.0	19.0	21.0	13.0	10.0	20.0	13.0	28.0
Education	93.5	91.6	94.7	92.2	92.5	87.4	81.4	91.8	87.9	79.1
Access to financial services	7	15	16	12	11	8	8	8	20	13
Adaptive capacity score	38.9	37.6	49.7	29.6	32.9	26.4	17.1	20.9	24.0	20.6
Adaptive capacity rank	2	3	1	5	4	6	10	8	7	9

Source: Hunter et al, 2019.

Hunter et al. (2019) combined the summarised adaptive capacity score with indicators for climate change-related impacts, based on climate and crop suitability analyses, to calculate comparative vulnerability index scores for each of the districts. Their report provided in more detail the effect of climate change on prioritised crops and commodities.

The Government of Lesotho & the World Bank (World Bank, 2019) came up with an agricultural versatility map that was prepared to identify the areas of Lesotho that are suited for a diversity of crops. The map below (figure 16) combines seven digital land suitability maps (i.e. the land suitability maps for orchards, vegetables, beans, wheat, maize, potato, and sorghum) as layers in one Geographical Information System (GIS). For the selection of target sites, however, it might be wiser to keep commodities separate.



**Figure 2** Lesotho agricultural versatility map.  
Source: World Bank, 2019.

What is the most suitable target area?

The (sub-)catchments that indicate low adaptive capacity and low agricultural versatility?

Or the areas with high agricultural versatility and high adaptive capacity to compare?

We aim to answer these questions in Chapter 5 and 6, especially to examine them from a combined *climate-smart* and *nutrition-sensitive* perspective what could be recommended or, better, what should be further explored for improved food-system outcomes. The areas most vulnerable to wetland loss or soil erosion for instance, which may possibly render important criteria for selection, might however not be the areas where most or optimal food system synergies can be obtained or the areas that will contribute to improved food system outcomes. Selection of target areas to initiate climate action is therefore in no way a light exercise! It requires managing trade-offs across space, time, and sectors at the same time. Carefully developing pathways, making explicit assumptions along the way and refining scenarios may therefore help in choosing the most positive or least negative ones. Perhaps even lead to synergies, e.g. enhancing carbon stocks in natural vegetation and soils (climate mitigation) and sustainable expansion of cropland (enhancing dietary diversity, food security, reducing poverty).

## 3.8 Towards climate action with nutrition co-benefits

### 3.8.1 Climate-smart agriculture production for improved diets

Agriculture emits GHGs and therefore contributes to climate change, but agriculture and food security are also threatened by climate change. Climate-smart agriculture (CSA) addresses, on the one hand, the reduction of the environmental and climate impact of agricultural activity and, on the other hand, the development of food production methods and crops that are well adapted to changing weather conditions.

#### Climate-smart Agriculture comprises three pillars

1. increasing productivity;
2. enhancing resilience and adaptation; and
3. reducing greenhouse gas emissions from the agriculture sector compared to past trends.

This report is not the place to discuss these pillars, nor to summarise their usefulness as well as the pros and cons of different climate-smart agricultural practices in general. Many other publications and/or resource portals have already successfully done this (e.g. FAO's Climate-Smart Agriculture Sourcebook). A short list of useful publications and resource portals can be found below.

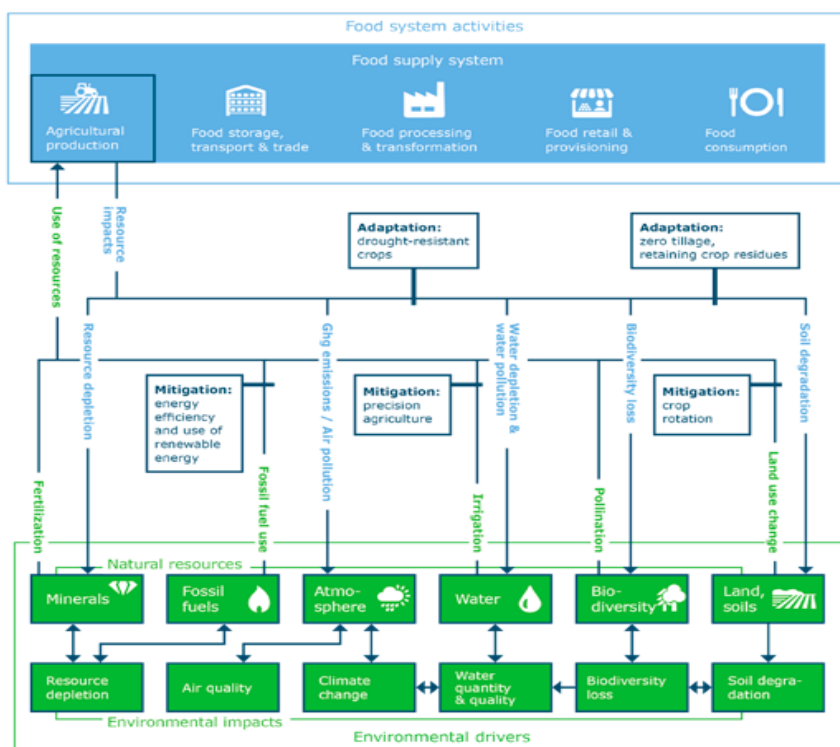
#### Examples of useful resources on Climate-Smart Agriculture

- <https://csa.guide>
- <http://www.fao.org/climate-smart-agriculture-sourcebook/en/>
- <http://www.fao.org/climate-smart-agriculture-sourcebook/production-resources/module-b10-value-chains/chapter-b10-5/en/>
- <https://www.wbcsd.org/Programs/Food-and-Nature/Food-Land-Use/Climate-Smart-Agriculture>
- <https://knowledge4food.net/knowledge-portal-item/a-climate-smart-agriculture-tool-increasing-farming-system-resilience-in-east-africa-through-adoption-and-mitigation>

Whereas the general literature review dives into few of the CSA options in more detail, this report will, in Chapter 5 and 6, refer to potential climate-smart agricultural production interventions for improved diets for *Lesotho*. Certainly, CSA principles will play an important role in climate action in Lesotho.

### 3.8.2 Climate-smart interventions using a food system perspective

In figure 15 below Van Berkum et al. (2018) explore possible mitigation and adaptation interventions focused on primary production using a food systems approach. It has been included here as an example of using a food systems framework for climate action. Using a food systems approach -this report has given preference to the HLPE food systems framework (HLPE, 2017)- will help us in understanding interventions' connectivity and not addressing them as activities in isolation. It will also help us in prioritising synergies and, in carefully weighing trade-offs. A food systems perspective notably supports addressing climate-smart agriculture not only from a 'climate-smart primary production perspective' but supports integrating climate-smart intervention *throughout* the value chains of specific commodities and *linking them to improved diets as food system outcomes*. We will analyse food system trade-offs and synergies for Lesotho in Chapter 5.



**Figure 15** Climate adaptation and mitigation interventions focused on agricultural production using a food systems approach.

Source: Van Berkum et al., 2018.

We do this using the HLPE Food Systems framework (HLPE, 2017).

### 3.8.3 Climate-smart investments in Lesotho: what is the priority?

Based on a set of projections, modelling and, in addition, consistent with Lesotho's NDC plan and other agriculture-related policies, the World Bank in cooperation with the Government of Lesotho (World Bank, 2019) identified - what they called - solutions for transforming Lesotho's agricultural sector. These 'solutions' were validated with stakeholders and will be part of a Climate-Smart Agriculture Investment Plan (CSAIP). Through the CSAIP, the Government of Lesotho is collaborating with the World Bank to integrate climate change into the country's agriculture policy agenda. The Lesotho CSAIP aims to identify climate-smart agriculture (CSA) investments that offer the best

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potential to transform Lesotho's agriculture into a more productive, resilient, and low-emissions sector.

We would rather refer to results as key components or essential building blocks, recognising that the outcomes of separate building blocks will mutually affect results in others. Although we prefer not to refer to them as solutions, we do agree with the building blocks identified, which have been slightly adapted below.

We will shortly address them here and compare them with what was already indicated in the Nationally Determined Contribution (NDC) of Lesotho (LMS, 2017b).

In Chapter 6, we will use the CSAIP 'building blocks' and the potential NDC interventions as the starting point for the development of a *climate-smart agricultural production for improved diets pathway* for Lesotho. As alignment or complementarity is recommended for any future investment programme, we will do so, only after addressing some lessons learned from former relevant projects (listed in Appendix 3) in more detail (also taking into account existing African CSA practices<sup>3</sup>).

#### Proposed key components in the CSAIP

##### *1. Sustainable landscape and integrated catchment management*

Activities under this theme would include afforestation, development of a multi-stakeholder institutional framework for integrated catchment area management (for example, through community awareness campaign, establishment of natural resource management (NRM) committees at the community level, development of village action plans, and development of catchment area management plans and functional catchment committees); land-use planning to identify and map the combination of land uses that can best meet the needs of stakeholders while safeguarding resources for the future; promotion of the conservation and sustainable management of aquaculture resources; and promotion of CSA options at the farm level for crops (for example, crop diversification and climate-ready cultivars and improved water use efficiency through appropriate irrigation).

##### *2. Improve water management in rain-fed and irrigated agriculture*

Enhanced and efficient water management is a key factor for adaptation and increasing the efficiency of other CSA measures. The Investment Plan aims at farmers increasing adoption of irrigation and expanding cultivation of high-value crops (for example, irrigated vegetable and fruit production). Increased water availability will also create opportunities for aquaculture investments according to the Government of Lesotho and the World Bank. Specifically addressed are: (a) water harvesting promotion; (b) restoration/modernisation/construction of hydraulic infrastructures and rehabilitation and modernisation of existing small-scale irrigation schemes including groundwater abstraction systems; (c) implementation of sustainable water management practices through capacity building at farmers' level.

##### *3. CSA approaches for agriculture (and aquaculture)*

Given the declining soil fertility levels in Lesotho and its adverse impacts on agricultural productivity and the critical need to build climate resilience, this component will provide investment support for soil fertility management. Special attention is also given to livestock breeding, animal feed diversification and better monitoring of animal diseases.

##### *4. Promote market access for farmers*

Strengthen the role of the private sector in CSA implementation and development of agribusiness models with smallholders. Activities to be promoted include the following: e.g. the development of Agriculture Clusters Service Enterprises as drivers of commodity value chains. These enterprises will own food processing and storage plants and will be set up as joint ventures between farmer organisations, private operators, and the government (central and local). Other activities include the promotion of smallholder inclusion in value chains; piloting weather index insurance to manage risks associated with adverse weather events; promotion of food quality standards; and post-harvest management.

Annex 6 of the CSAIP lists key intervention components in more detail (see in particular Table A6.1).

Source: World Bank, 2019.

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<sup>3</sup> We cannot neglect referring here to the Ted Talk of Ms. Chika Ezeanya Esiobu ([https://www.ted.com/talks/chika\\_ezeanya\\_esiobu\\_how\\_africa\\_can\\_use\\_its\\_traditional\\_knowledge\\_to\\_make\\_progress/transcript?language=en](https://www.ted.com/talks/chika_ezeanya_esiobu_how_africa_can_use_its_traditional_knowledge_to_make_progress/transcript?language=en))

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In the NDC of Lesotho (LMS, 2017b) the following climate change mitigation and adaptation practices/interventions were proposed:

*For the agriculture sector*

- Diversify livestock; improve range management; increase access to drought resistant crops and livestock feeds; adopt better soil management practices; provide early warning/meteorological forecasts and related information;
- Increase use of irrigation systems that use low amounts of water; increase rainwater and sustainable groundwater harvesting for use in agriculture; increase planting of native vegetation cover and promotion of re-greening efforts; and intensify crop and livestock production;
- Build adaptation capacity in climate-resilient agronomic practices for smallholder farmers;
- Promotion of climate-smart agriculture (Agro-meteorology);
- Support an expanded programme of constructing multipurpose dams for irrigation and aquaculture;
- Promote innovations in post-harvest storage and food processing;
- Promote the growing of drought-tolerant and heat-tolerant crop varieties and hardy livestock;
- Implement CA and agroforestry practices;
- Adjustment of planting dates and crop variety; crop relocation; improved land management, for example, erosion control and soil protection through tree planting.

*For the water sector*

- Implement integrated catchment conservation and management programme;
- Expanded rainwater harvesting; water storage and conservation techniques; water reuse; water use and irrigation efficiency;
- Support an expanded programme of constructing multipurpose dams to enhance water storage;
- Support the revision of water-related policies and strategies;
- Establish a national integrated water resource management framework that incorporates district and community-based catchment management.

*For the land use sector*

- Integrated approach to Sustainable Land Use Planning and Management;
- Promote improved land use practices.

Deciding on what priority investments are and translating these into intervention pathways (Chapter 6) depends on the current nutrition situation in Lesotho (Chapter 4), but also on addressing food systems trade-offs and synergies and aiming at climate-smart and nutrition-sensitive food system outcomes (Chapter 5). It also depends on establishing alignment and complementarity with ongoing or upcoming projects and programmes and taking into account lessons learned from earlier relevant projects and programmes (Appendix 4).

### 3.9 Opportunities for climate action: climate finance

Paragraph 3.9 refers to the foreword of the Climate-Smart Agriculture Investment Plan which is, as mentioned earlier, the outcome of a partnership between the Government of Lesotho and the World Bank. In the foreword of the document, the Minister of Agriculture and Food Security of Lesotho, the Minister of Development Planning of Lesotho and the Minister of Finance of Lesotho, together with their World Bank counterparts lay out the comparison between the different Agricultural Development pathways introduced (see figure 11).

They particularly highlight how, compared to the commercialisation pathway (CZ), the resilient landscape pathway could potentially benefit more from climate finance which can come from a variety

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of sources including the United Nations Framework Convention on Climate Change (UNFCCC) funding mechanisms, multilateral and bilateral funds, national and regional climate funds, and private sector investment. The resilient landscape pathway (RL) is costlier for the public sector but is also easier to implement. It is more tailored toward locally adapted technologies that the average smallholder farmer in Lesotho can practice.

**Citation:** *'Commercialisation can be prioritised largely in the lowlands and foothills—the fertile and most productive parts of Lesotho that are suitable for potatoes, orchards, and vegetables, while [the] resilient landscape [pathway] can be emphasised largely in the highlands more prone to soil erosion, suitable for afforestation and farmer-managed natural regeneration of vegetation, and where less fertile land would benefit from restoration and replenishment'* (Source: World Bank, 2019).

The effective scaling up of CSA in the country will require addressing a number of **adoption barriers**, including limited implementation capacity, insufficient access to inputs and credits, and insufficient agricultural research. Some of the policy actions to support effective scaling up of CSA identified in the study include realigning agricultural support to promote CSA. Other actions include strengthening agricultural research and extension to catalyse the agricultural innovation process, improve CSA knowledge, facilitate access to information, and provide technical advice to farmers. Highlighted as well, and this is the necessity to build capacity to access climate finance. Lesotho faces a financing gap in the agriculture sector with low capacity to climate finance access. We will return to this in Chapter 5 and 6.

**Climate action is hard without climate finance:**

**It requires financially viable opportunities for effective private sector engagement.**

Particularly interesting is that the World Bank and the Government of Lesotho underline developing payment for ecosystem services programmes that offer incentives to farmers in exchange for sustainable management of the land to provide some sort of ecological services such as carbon sequestration.

# 4 Present Food and Nutrition Security situation in Lesotho

## 4.1 Introduction

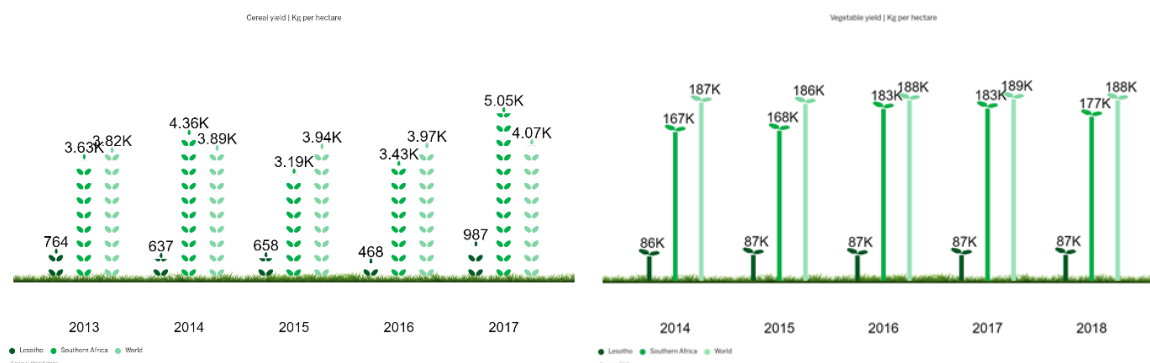
This chapter discusses food and nutrition security situation in Lesotho. A detailed description of the current nutrition situation can be found in Appendix 5. This chapter will first look into the food security situation in 4.2 and will continue in 4.2 with the food consumption data so far it is available.

Paragraph 4.4. will analyse the causes of the present nutrition situation and this chapter will conclude with the economic impact of the current nutrition situation in Lesotho.

## 4.2 Food Security situation in Lesotho

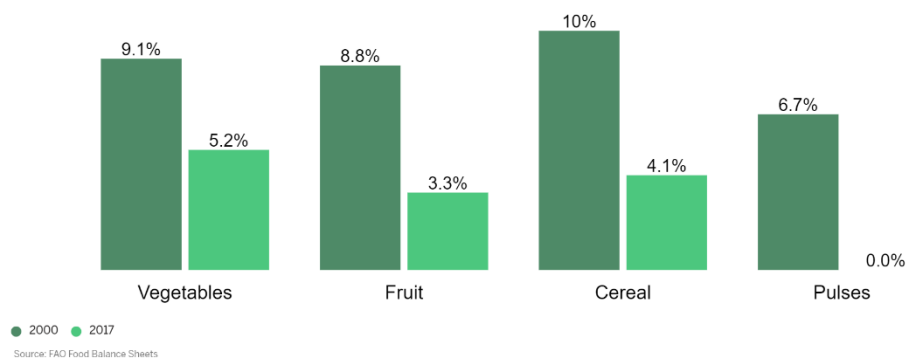
Food Security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preference for an active and healthy life (World Food Summit 1996). Data on food security as defined by the World Food Summit is available to a limited extent for Lesotho. However, based on the available data, Lesotho is in crisis with regard to food security with more than 500,000 people in ten districts severely food insecure - including 433,000 people in rural areas (30% of the rural population) and above 74,700 people in urban areas (13.3% of the urban population) (OCHA 2019). In this sub paragraph, three of the four pillars of the of food security will be discussed. The Utilisation pillar will be discussed in sub-paragraph 4.3.

Availability is determined by the level of food production, stock levels and net trade. Cereal production is very low in Lesotho as figure 15 shows below, especially compared to production in Southern Africa and the World.



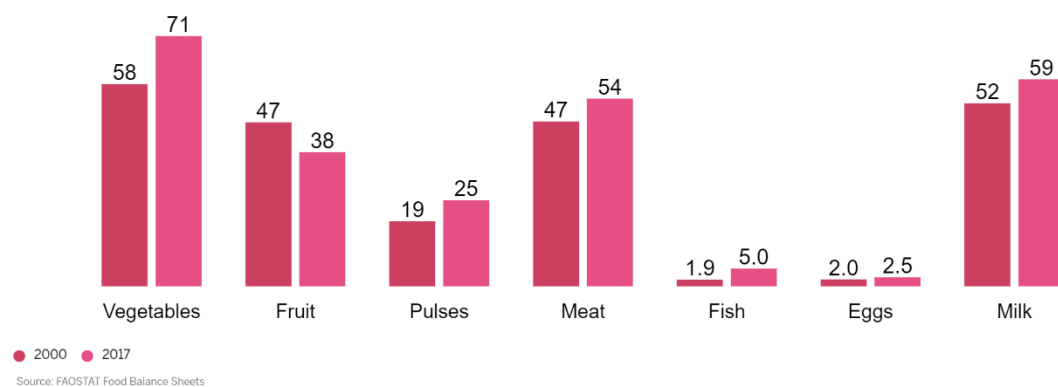
**Figure 16** The cereal yield and vegetable yield in kg per hectare over time span of 5 years for Lesotho (*Food System Dashboard*).

Figure 16 shows that Lesotho has a low yield in kg per hectare of land, in comparison with Southern Africa and the World for both cereals (including maize, millet, rice, sorghum, wheat, barley, oats, rye, among other grains) and vegetables. The availability for consumption is further decreased by the high losses that occur from post-harvest to (not including) retail as shown in figure 17. Beside the losses in cereals, losses for fruit and pulses are also included.



**Figure 17** Percentage losses of vegetables, fruit, cereal and pulse post-harvest up to (not including) retail for 2000 and 2017 for Lesotho (*Food System Dashboard*).

Lesotho relies heavily on imports from South Africa for almost all commodities, with only 30 percent of all foods consumed being produced in Lesotho (FNG 2019).



**Figure 18** Supply of vegetables, fruit, pulses, meat, fish, eggs and milk in gram per person per day for 2000 and 2017 for Lesotho (*Food System Dashboard*).

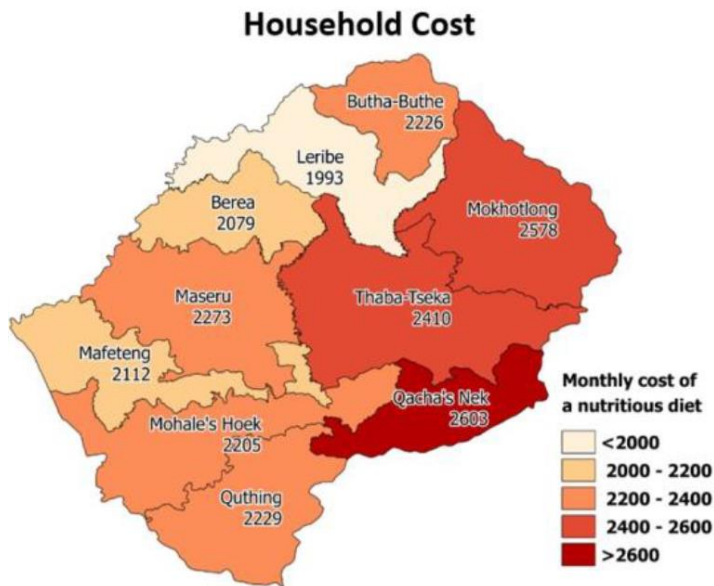
The **food availability** in Lesotho as defined above is presented in figure 18 in grams per person per day. Unfortunately, the cereals are not represented in the figure but, using the 2017 FAOSTATS data and the population data for Lesotho on all cereals (including maize, millet, rice, sorghum, wheat, barley, oats, rye, among other grains), roughly 200 gram<sup>4</sup> of cereals is available per day per capita. For all food groups presented in figure x more grams are available per day per person in 2017. However this supply does not mean that everyone have access to this supply.

**Economic and physical access to food** in Lesotho is determined by incomes, expenditure, markets and prices. The fact that food insecurity is high in rural areas is already an indication that economic access is a problem. The FNG has calculated the monthly cost of a nutritious diet by district based upon 8 food groups<sup>5</sup> (cereal, dairy, green leafy vegetables, fruit, eggs, meat, fish and pulses). Figure 19 shows the results and Quach's Nek has the highest monthly costs of 2,603 Maloti. A nutritious diet in Leribe costs 1,993 Maloti, which is the lowest in the country.

<sup>4</sup> Calculated based upon FAOSTATS (417,000 tonnes cereals produced in 2017) and 2,091 million population.

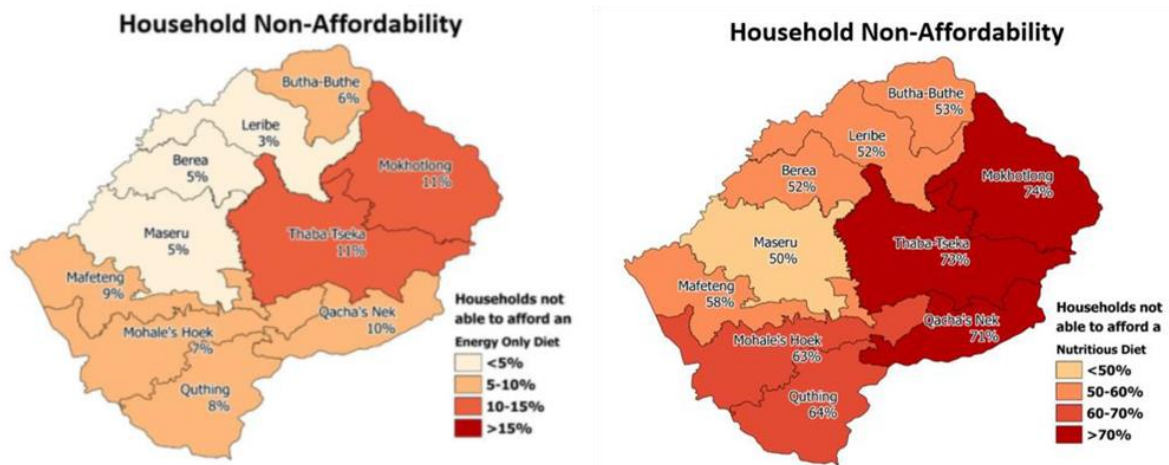
<sup>5</sup> This is different than the 10 food groups (starchy staple foods, Beans and Peas, Nuts and Seeds, Dairy, Flesh foods, Eggs, Vitamin A- rich DGLV, other Vitamin A-rich vegetables, other vegetables and fruits) that are being used for the Minimum Diet Diversity Score - Women.





**Figure 19** The monthly costs of a nutritious diet by district in Maloti (FNG 2019).

Using secondary data sources on income and prices, a validated assessment was made to determine how many households in the districts can economically afford a energy-only or nutritious diet. Figure 20 shows that 3% of households in (Leribe) and 11% (Thaba-Tseka and Mokhotlong) cannot afford an energy-only diet. Thus, in the mountainous areas, one in 10 households might not have enough money to meet their energy requirements.

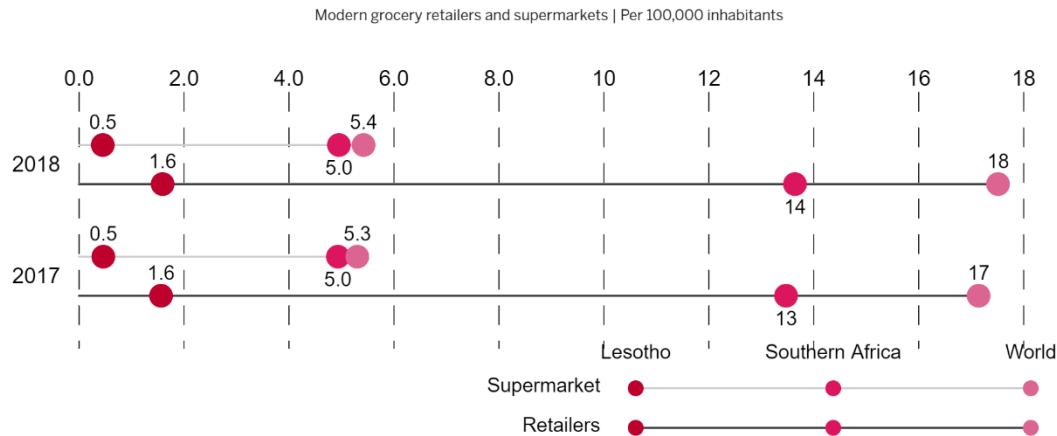


**Figure 21** Household non-affordability of an energy-only diet and of a nutritious diet, by district (FNG 2019).

Figure 21 also shows that non-affordability of a nutritious diet is particularly high in the mountainous regions (above 70 percent). Maseru has the lowest non-affordability for a nutritious diet in the country, although the absolute number of households not able to afford nutritious foods remains high (50%). This means that nationally, more than half of all households (56%) are not spending enough money on food to meet their nutrient requirements (FNG 2019).

Beside the economic access, the physical access is also a factor that undermines food security. The FNG 2019 indicates that distance to markets, especially rural areas are influencing food security. Also, access to modern grocery supermarkets and retailers is believed to increase economic and physical access to a wide variety of foods, including both fresh and processed foods ([Food System dashboard](#)). Figure 22 shows the number of modern grocery supermarkets and retailers available in Lesotho

compared to Southern Africa and the World. In 2018, there was half a supermarket and 1.6 retailers available per 100,000 inhabitants. This is very low considering that there are almost 11 times more supermarkets and about 3 times more retailers available in South Africa. This is another indication of a limited physical access to a wide variety of foods, including both fresh and processed foods.



Source: Euromonitor International, World Bank

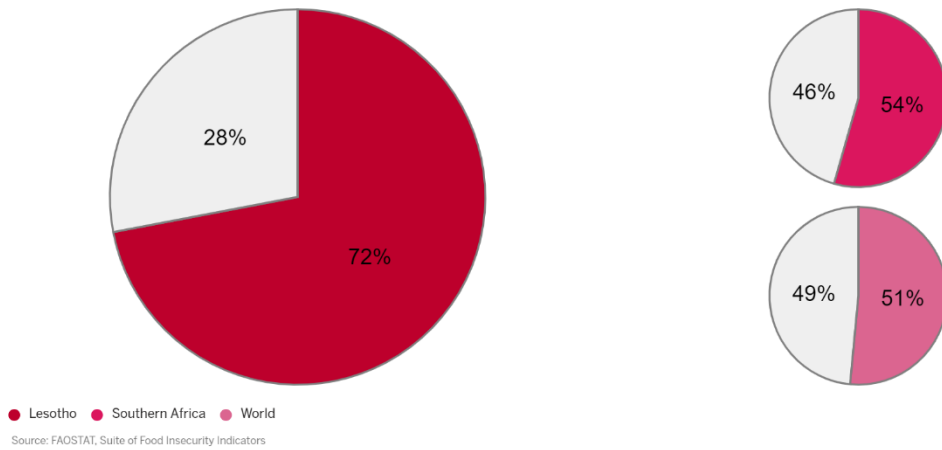
**Figure 22** Number of modern grocery supermarkets and retailers per 100,000 inhabitants in 2018 in Lesotho, South Africa and the World (*Food System Dashboard*).

Stability is also an important pillar for a food secure population. The FNG 2019 identified that seasonality is a large influence on food prices and thus on the economic access to nutritious food. Increasingly erratic climatic conditions, coupled with ongoing environmental degradation and their impacts on production and productivity will continue to pose a threat to many aspects of food security. For example, climate change can lead to decreased production, which will increase food prices and thus reduce access to food.

### 4.3 Food consumption in Lesotho

The 4<sup>th</sup> pillar of food security is the sufficient energy and nutrient intake by individuals. One way of measuring this is looking at how varied a diet<sup>6</sup> is. Diet diversity data is limited in Lesotho, although diversity is expected to be low overall in Lesotho.

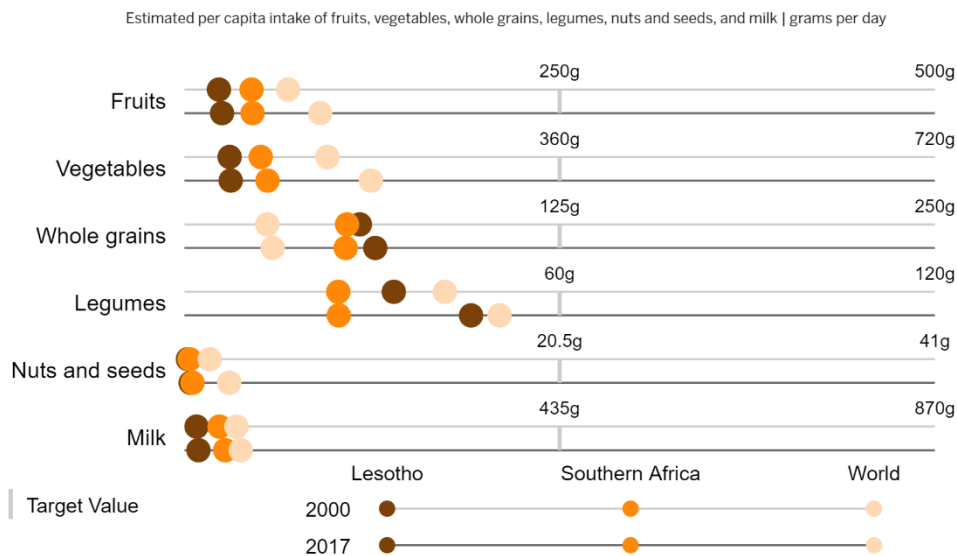
<sup>6</sup> Diet diversity among women is based on the following food groups (starchy staple foods, Beans and Peas, Nuts and Seeds, Dairy, Flesh foods, Eggs, Vitamin A- rich DGLV, other Vitamin A-rich vegetables, other vegetables and fruits)



**Figure 23** Share in percentage of dietary energy from cereals, roots and tubers in 2016, for Lesotho, Southern Africa and the World (*Food System Dashboard*).

Available data shows that the main share of energy, 72%, comes from cereal, roots and tubers and only 28% of energy come from non-staples in supply, see figure 23. This is quite high and preferably this division should be around 50-55% of energy from staples and about 50-45% of energy from non-staples in the supply (WHO).

Figure 24 shows the 2017 estimated intake per person per day of fruits, vegetables, whole grains, legumes, nuts and seeds, and milk against the target value. For all these foods Lesotho has a very low intake, further indicating that diet diversity is probably very low in Lesotho.

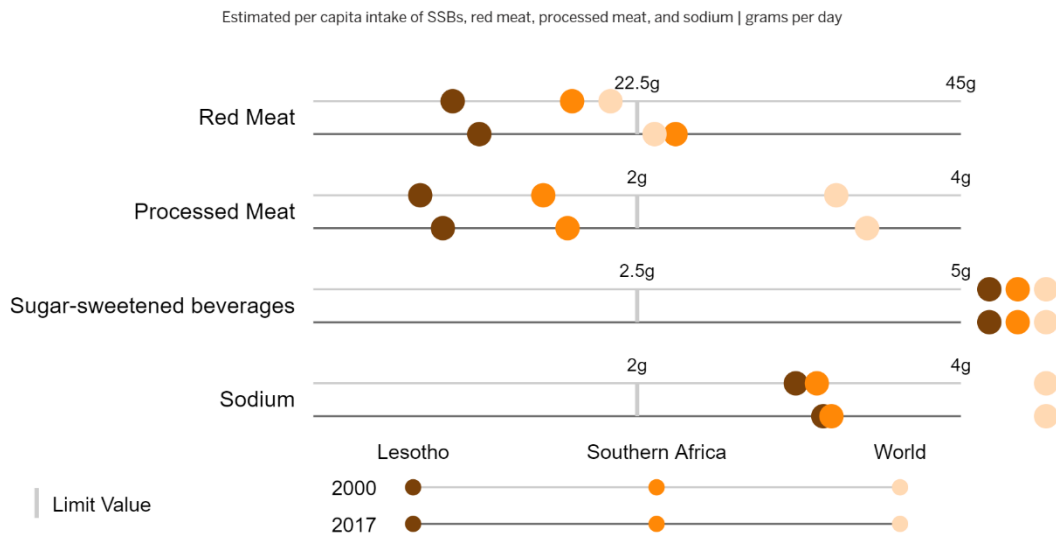


Source: Global Burden of Disease

**Figure 24** Estimated intake per person per day of fruits, vegetables, whole grains, legumes, nuts and seeds, and milk in grams per day against the target value for 2000 and 2017 in Lesotho (*Food System Dashboard*).

The last (figure 25) shows the estimated intake of sugar-sweetened beverages (SSBs), red meat, processed meat and sodium in grams per day. Although the intake of red meat and processed meat is still below the limited values, that is not the case for sugar sweetened beverages and sodium. The

high intake of SSBs could be a contributing factors to the overweight problem of certain population groups.



Source: Global Burden of Disease

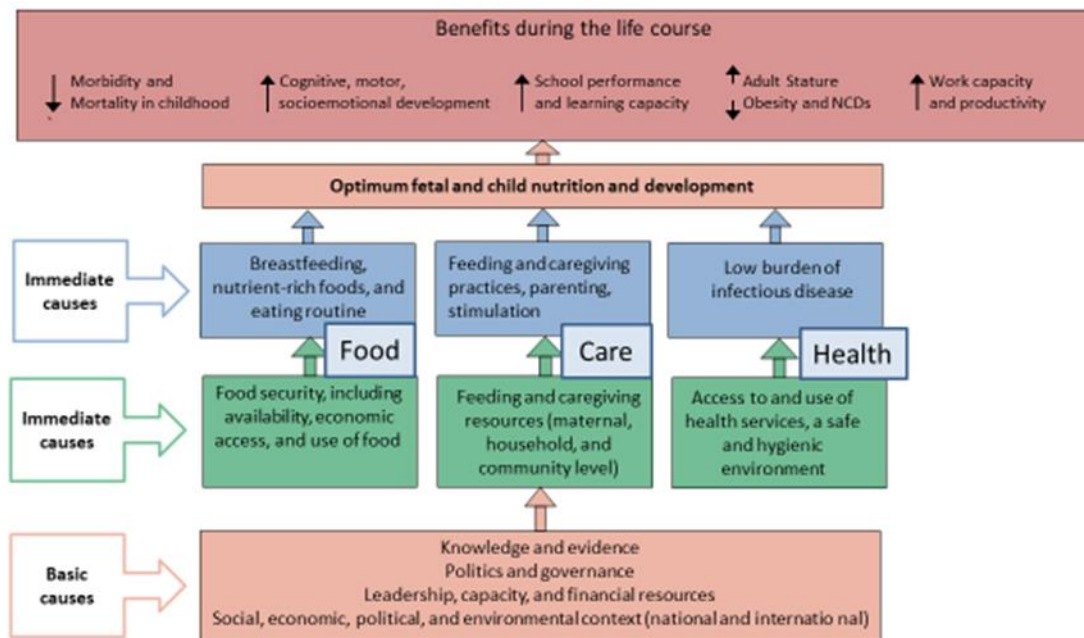
**Figure 25** Estimated intake per person per day of SSBs, red meat, processed meat and sodium grams per day against the limit value for 2000 and 2017 in Lesotho (*Food System Dashboard*).

Overall, these data suggest that the diet at the moment using supply and estimated data is not diverse enough to be adequate to meet the dietary needs and food preference of Basotho for an active and healthy life. These suggestive findings are also reflected in the low diet diversity data for children, which shows that only 17% of children of 6-23 months of age receive a diverse diet.

## 4.4 Causes of the present nutrition situation in Lesotho

Improved nutrition outcomes has benefits over the course of a life, starting with decreases in morbidity and mortality in childhood, improved school performance and learning capacity and increased work capacity and productivity (LANCET, 2013). This leads to an increase in a country's GDP as the cost of hunger, especially because of lost productivity among the adult population, will decrease as explained in 4.5.

Figure 26 shows the framework for actions to achieve optimum foetal and child nutrition and development (The LANCET, 2013). This framework distinguishes three major interactive pillars: food, care and health. When all these pillars are simultaneously achieved, optimal foetal and child nutrition and development will be achieved. The LANCET framework builds upon the UNICEF conceptual framework for undernutrition and, similar to this framework, the immediate, underlying causes, and basic causes can be distinguished.



**Figure 26** Framework for actions to achieve optimum foetal and child nutrition and development, without the actions (LANCET 2013).

This framework, is the basis to analyse the causes of the present nutrition situation in Lesotho. The food and care pillars are being discussed, as health is not within the scope of this assignment. Each part of this analysis will be linked to the appropriate food system domain and drivers).

At the moment, children in Lesotho are heavily burdened by chronic undernutrition and anaemia. In addition, 11% of children born do not have the best start in life, as they are born with a low birth weight, which puts them at increased risk for foetal and neonatal mortality, and morbidity and malnutrition.

To investigate the **immediate causes** (*Food system domain: consumer behaviour and diets*) of the present malnutrition situation in Lesotho, we will focus on the combination between (exclusive) breastfeeding practices, and consumption of nutrient-rich food and on eating routines. Breastfeeding is initiated with the first day of life in about 85%, and 59% of children receive breastmilk and only breastmilk in the first 6 months of their lives.

Only one fifth of children in Lesotho, regardless their social economic background do not receive a minimum dietary diversity. This might also explain the high levels of anaemia in children at 51% in children aged 6-59 months. However, almost 70% of children do receive the appropriate meal frequency.

The affordability of a nutritious diets for households is very low. Despite this, most families (about 90%) can afford a diet sufficient in energy based on their present income levels. However only 44% of the households can afford a nutritious diet, and in some districts only 30% of the households. The estimated intake of per capita per day for fruits, vegetables, whole grains, legumes, nuts and seeds, milk, red meat and processed meat is far below the target value for all these foods. This situation will contribute to low a percentage of children receiving a minimum diet diversity and could explain the anaemia prevalence in women and adolescent girls of 27.3% and 24.1 respectively. Unequal intra-household distribution of available food, which affects women, adolescent girls and young children might be another contributing factor, but no data in that respect are available at the moment.

**Exploring the underlying causes** (*food system domain: food supply chains and food environment*), food security focusing on food production, physical and economic access are in this respect key points of discussion. Lesotho's production is dominated by staples, with around 78% of total agricultural production focused on cereals (primarily maize) and potatoes. Although there is substantial livestock

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(half a million cattle and three million sheep and goats), very little is consumed. Most livestock are treated as an asset and traded or used for wool and mohair production (FNG, 2019).

Lesotho misses the mark on dietary energy from non-staples, which stands at a low 28%, meaning that 72% of all dietary energy comes from energy-dense foods such as cereals, starchy roots and oil. While these dietary patterns might be influenced by behavioural factors (e.g. simply by choice), the data indicate that production – and subsequently availability, are also an issue. Supply data shows that in Lesotho supply is available for vegetables, fruit, pulses, meat, fish and eggs and milk is low per capita per day, which will influence the population's consumption as well.

Distance to markets, mainly for locally produced food is also an issue, but it is unclear if this relates to the number of markets available and/or the physical access. About 70% of the food is imported (data on what kind of imported foods is not available) and its distribution through supermarkets and retailers remains a challenge, as there is only half a supermarket and 1.6 retailers available per 100,000 inhabitants, which severely affect the accessibility to a wide variety of foods, including both fresh and processed foods. In Southern Africa, there are 5 supermarkets and 5.4 retailers available per 100,000 inhabitants (Food System Dashboard).

Food prices are also affecting the affordability of a nutritious diet and there are large inter-district difference in prices and thus the cost of diets, which is influenced even more by seasonality (FNG 2019).

The GDP per capita has doubled to \$1,200 from 2003 to 2013 but the availability of vegetables, fruit, pulses, meat, fish and eggs and milk (as measured by trade balance) has remained unchanged (FNG, 2019). Food security remains a critical issue presently with an estimated one fourth of the population facing food insecurity. It is estimated that about 30% of the rural population and about 13% of the urban populations are affected (ICCP, 2019).

Looking at the **enabling environment** (basic causes) (*food system drivers*). Lesotho has several new policies for food and nutrition security that address the problems, and nutrition will be mainstreamed in all projects and programmes. From the stakeholder consultations (pre-design team interviews), it is clear that the government has not yet managed to decentralise the actions and interventions. Also, at a coordination and governance level several steps need to be made, to be able to optimise the resources (financial, human and physical) to support families in the provision of sufficient quantity and quality to meet their households dietary needs and food preferences. The Government of Lesotho realised this too and has put this issue as one of their four key priority areas in the NSDP II (Ministry of Development Planning, 2018).

**Poverty** is a basic cause, but it does have an impact on the underlying and immediate causes as well. Poverty does not lead directly to malnutrition, but it seriously affects the availability of adequate amounts of nutritious food - immediate cause - for the most vulnerable populations (Action against hunger 2020). Malnutrition at an early age can cause a spiralling effect that deepens the influence of poverty and entraps individuals and societies in what is known as the 'cycle of poverty'. For Lesotho this is also applicable as the COHA 2018 indicated that the loss in adult productivity is the major contributor to the cost of hunger.

**Unemployment** is also a basic cause, not only because it can lead families into poverty and thus has effect on the purchasing power of households, thus affecting the capability to buy and consume nutritious food. Unemployment is high, estimated at 28.0 percent overall and 43.2 percent among youths aged 15 to 24. The youth are affected by the mismatch in skills and low wages. Even though multiple educational institutions offer courses related to textiles and apparel, the skills taught do not match those required by the industry (Sulla et al., 2019).

**Unemployment and gender.** Although, women tend to have both better education and health outcomes in Lesotho, this has not translated into better opportunities on the labour market in Lesotho. Deeply entrenched social norms and stereotypes continue to negatively impacting women, resulting in women being excluded from the labour market and this shows in their low rates of economic

participation. Leading causes include the poverty rate among rural women coupled with HIV/AIDS, maternal mortality and gender-based violence. Lesotho is ranked second in the HIV/AIDS prevalence worldwide, but adolescent girls and young women between the ages of 15 to 24 are three times more likely to be infected than males of the same age group. Also women are more likely to take on the full-time responsibilities of staying home to care for HIV-ailing elders. GBV is likely but goes unreported and 86 percent of women have experienced a form of GBV at least once in their lifetime. (Sulla et al., 2019).

**Human resources for nutrition.** During the interview with key stakeholder Ministry of Health Nutrition Unit, it was mentioned that delivery of nutrition services is dependent on nurses, like in many African countries. Nutrition services are just one of the many tasks nurses have and as they often have not received proper training in this task, these services are compromised if the facility has many clients to serve. Nutrition counselling is often not possible at this health facility as there is a lot of work to be done, only education is provided.

**Supply and financial resources:** Lesotho's health system experiences regular stock-out of commodities. This is probably not uncommon in the other sectors like agriculture, although this sector is less dependent on the government for agricultural supplies and inputs, as these are often also commercially available. Reasons for the regular stock-out is due to misuse by both service providers and the community. The high dependency on donors (funds) for procurement.

## 4.5 Economic impact of the present situation in Lesotho

Malnutrition continues to be widespread across Lesotho and there has been little progress in addressing chronic undernutrition and micronutrient deficiencies, while overnutrition (overweight and obesity) has emerged as a serious concern (FNG, 2019). Child undernutrition (stunting and underweight) has cost the society of Lesotho an equivalent to 7.13 percent of GDP or an estimated 1.96 billion maloti (or US\$200 million) in the year 2014 (COHA, 2016). This report also calculated the estimated cost of undernutrition by year 2025 for three different scenarios; the baseline if no action is taken; scenario 1 in which a reduction by half of the current prevalence of undernutrition is achieved by 2025; and scenario 2 in which stunting is reduced to 10 percent and underweight children to 5 percent by 2025. Table 8 shows the estimated costs of child nutrition in 2025 for different scenarios.

### The elements used to calculate the cost of hunger

**Undernutrition** and each of its negative impacts on health, education and productivity, lead to a social as well as an economic loss to the individual and society as a whole. Thus, the total cost of undernutrition is a function of higher healthcare spending, inefficiencies in education and lower productivity.

In the area of **health**, the high probability resulting from the epidemiological profile of individuals suffering from undernutrition proportionally increases the costs in the healthcare sector. In aggregate, this is equal to the sum of the interactions between the probability of undernutrition in each age group, the probability that a particular group will suffer from the diseases because of undernutrition, and the costs of treating the pathology, which typically includes diagnosis, treatment and control. To these are added the costs paid by individuals and their families as a result of lost time and quality of life.

In **education**, the reduced attention and learning capacity of those who have suffered from child undernutrition increase costs to the educational system. Repeating one or more grades commensurately increases the demand that the educational system must meet, with the resulting extra costs in infrastructure, equipment, human resources and educational inputs. In addition, the private costs (incurred by students and their families) derived from the larger quantity of inputs, external educational supplementation and more time devoted to solving or mitigating low performance problems are added to the above costs.

The **productivity cost** associated with undernutrition is equal to the loss in human capital incurred by a society, stemming from a lower educational level achieved by malnourished individuals, a lower productivity in manual labour experienced by individuals who suffered from stunting, and the loss of productive capacity resulting from a higher number of deaths caused by undernutrition.

Source: COHA 2016.

From table 8, we can see that productivity costs are contributing about 90% to the costs of undernutrition. The potential economic benefits of reducing undernutrition are a key element in making a case for nutrition investments. The reduction in clinical cases in the health system, lowered grade repetition and improved educational performance, as well as physical capacity are all elements that contribute directly to national productivity (COHA, 2014).

The Government of Lesotho has realised the benefits of a well-nourished population for its economic growth and development. They have made strengthening human capital (health education, nutrition, social protection) as one of the four key strategic areas (Ministry of Development Planning, 2018).

**Table 7** Total estimated costs of child undernutrition, by scenario, 2014 in millions of Lesotho Loti (LSI).

	Scenarios for the Year 2025			
	2014	Baseline. The Cost of Inaction	S1. Cutting by Half	S2. Goal Scenario
<b>Health Costs</b>				
Increased Morbidity	59	56	28	27
<b>Education Cost</b>				
Increased Grade Repetition	61.3	39.4	23.2	13.7
<b>Productivity Costs</b>				
Lower Productivity in Non-Manual Activities	537	690	556	338
Lower Productivity in Manual Activities	158	121	77	46
Lower Productivity due to Mortality	618	389	229	223
<b>Total Costs</b>	<b>1 433</b>	<b>1 295</b>	<b>913</b>	<b>699</b>
Percentage Change from Baseline		-10%	-36%	-51%
Source: Constructed by the authors; estimations based on the COHA model				



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# 5 Linking climate and nutrition from a food systems perspective

A better understanding of the pathways linking climate change and nutrition is essential for developing effective interventions to ensure that the world's population has access to sufficient, safe, and nutritious food. Undernutrition can be exacerbated by the effects of climate change at all stages of the food value chain. In addition, plant, animal and human health as well as (non-)communicable diseases are affected by climate and can, in turn, increase nutrient demands and even reduce nutrient absorption (Fanzo et al, 2017). Dietary diversity and animal source foods can be important tools for improving nutrition and health in nutritionally deficient populations.

In this chapter, which is specifically dedicated to the intersection of climate change action and food and nutrition security, we use a food systems approach as we explained in Chapter 2 - Methodology (Paragraph 2.4 - explanation of using a food systems approach). This chapter merely sets the scene for linking climate and nutrition from a food systems perspective by providing examples of possible trade-offs and synergies. Examples are linked to the potential agricultural development scenarios described in Chapter 3. Further elaboration and recommendations for climate action with nutrition co-benefits that can be taken up by future programmes and/or projects are specified in Chapter 6 under the specific pathways. In Chapter 6, potential trade-offs and synergies regarding recommended interventions have also been addressed, as well as possible mitigation measures. It is important to highlight that - thinking along the entire value chain - we shall be able to identify more potential trade-offs and synergies. A start has been made, but it requires additional time, effort and reflection with pre-design teams!

In the paragraphs below, we will address specific food systems components in more detail (c.f. the HLPE food systems framework - see Chapter 2), i.e. food system *outcomes*, food system supply chain, the food environment and consumer behaviour and diets. General food systems trade-offs and synergies will be introduced in the sections below. Potential – and more specific - food system trade-offs to be made and synergies to be expected will be linked to *recommended* interventions in Chapter 6.

## 5.1 Food system outcomes

The current food system in Lesotho contributes to various outcomes. Based on the literature and the interviews conducted, the food system in Lesotho does *not* seem to generate affordable, physical and economically accessible diverse and healthier diet choices. Although *consumer behavioural* aspects play a major role, the constraints of non-affordability of the nutritious diet choices generated by the current food system are the most important contributing factor at the moment, resulting in high level of chronic undernutrition and high anaemia rates among children and women, as well as to high overweight and obesity rates in women in particular. The high level of chronic undernutrition and anaemia in children and women are contributing factors to the economic outcomes of the food system by affecting the productivity of the present workforce (paragraph 4.5) as many of them have been chronically malnourished as children.

The current food system also 'produces' *environmental and climate impacts* which in turn are again driving the food system. As indicated by figure 15 in Chapter 3, for example, micro-nutrients are needed for agricultural production. Unsustainable use of these resources may lead to resource depletion, which will negatively affect agricultural production. The same 'driver-impact' relation exists when considering, e.g.:

- the use of fossil fuels and the impact on air quality due to the increase in GHGs
- the use of water for irrigation and in turn the potential negative impact on water quality and quantity
- the need for biodiversity and biodiversity conservation to ensure pollination, and the loss of biodiversity due to e.g. eutrophication or pollution

- 
- land and soil use and soil degradation due to loss of soil fertility, loss of organic matter content, loss of soil structure and loss of soil humidity.

For Lesotho, the high level of overgrazing and the conversion of natural forests (which already account for less than 1.5% of the surface area) was already said to heavily impact the natural resource base and in turn agricultural production and the food system as a whole. Increasing agriculture production and its commercialisation is therefore difficult unless the country deals sincerely with the management of rangelands, watersheds and with the protection of the environment and biodiversity. Reversal of the alarming environmental degradation has already aggravated the country's food insecurity situation according to interviews conducted, which is confirmed by literature (e.g. LMS, 2017a).

The food system framework or approach guides the transformation to (more) climate-smart and more nutrition-sensitive food system outcomes by providing - more or less - a checklist of topics to be addressed by thinking of e.g. the driver-impact relationship as shown above. The framework approach draws attention to the vulnerabilities of the food system and helps to identify supporting and limiting factors in achieving *climate-smarter food systems for improved diets*.

### 5.1.1 Towards *more sustainable* food system outcomes: intervening in the system

As the food systems framework supports the application of a more holistic approach, it helps to understand the causes and prepare solutions for improved diets and more healthy food using a necessary multi-dimensional lens. Any interventions using a systems approach can improve the performance of the entire food system and help create resilience and capacity to supply nutritious food to all.

Regarding *climate action*, whether climate adaptation or mitigation interventions, potential mitigation measures may include a focus on energy efficiency and the use of renewable energy sources, a national shift towards precision agriculture or obligatory crop rotation. Potential climate adaptation measures include e.g. the use of drought resistant crops, zero tillage, ensuring permanent green cover by keeping crop residues in the field.

In fact, for any measure, policy makers, development initiatives, scientists, sectors etc. will all require a better understanding of how food systems affect nutrition, what entry points and policies are most effective, and what trade-offs must be made. Food systems analysis helps (and requires!) therefore to continually adapt policies as food systems evolve. Only then can the promotion of healthy *or* improved diets can be ensured and an enabling environment for positive private sector contributions can be created. Food systems analysis helps to make food systems *inclusive* and to *manage trade-offs* among different policy goals (IFPRI, 2020). And managing trade-offs is often a complicated task! Complex sustainability synergies and trade-offs benefit from a systemic approach to food systems decision-making. A food systems approach helps, but what should be noted is that in general - and this is the case in many countries - much better data are and will be needed (IFPRI, 2020).

What are possible trade-offs and synergies that can be expected in the food system of Lesotho when trying to ensure nutrition-sensitive and climate-smart food system outcomes?

## 5.2 Food System Trade-offs

Trade-offs will need to be explored between improving healthy diets and nutrition outcomes on the one hand and the need to take care of the environment and climate change on the other hand. High quality diets (from a nutrition standpoint) may have more adverse impacts on the environment. For example, the growing livestock sector in Lesotho might allow for diet with animal protein, and contributes to several positive environmental effects, such as improved soil fertility, but only if zero-grazing practices are applied. Livestock (typically in case of cattle) require large amounts of resources and directly emit methane, which creates a trade-off to be considered. There are relatively sustainable ways to raise livestock (as seen with pastoralists), but these methods also have trade-offs. Raising

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livestock on pasture that can be used to grow grasses but not crops decreases the land, water, and energy required to produce animal feed, but it produces more methane (Fanzo, 2017).

Pasture in arid areas also has lower-quality feed, leading to decreased livestock productivity and decreased feed conversion efficiency. Raising livestock on feed decreases methane emissions. Feed can be formulated to maximise these decreases as well as to increase productivity and feed conversion efficiency. However, raising livestock on feed requires food to be used for animals instead of people, and growing feed is resource-intensive (Herrero et al. 2010 in: Fanzo, 2017).

Half of the energy used in livestock production is in feed production! When production occurs through concentrated animal feeding operations, it produces large amounts of air and water pollution (Garnett 2009 in Fanzo, 2017). It is not to say that this is currently the case in Lesotho but needs to be taken into consideration as a potential food systems trade-off in case commercialisation is chosen in agricultural development (see CSAIP pathways in Chapter 3).

More efficient livestock breeds (with a more efficient feed conversion factor) could be a pathway that may be explored further. However, these (hybrid) breeds are often more prone to diseases and might not be suitable for livestock management and climate conditions in Lesotho. Using local breeds that are adapted to the environment, even though productivity is often lower, may therefore be recommendable. Another option is to further explore other animal source foods such as poultry, goats, pigs, even guinea pigs or hamsters, as well as insects to reduce reliance on beef.

Market integration while avoiding the negative environmental trade-offs of livestock intensification is a key challenge.

A similar trade-off may be expected if the commercialisation pathway is chosen (referring again to the CSAIP pathways in Chapter 3) for fruit and vegetables. Intensifying vegetable and fruit production is usually accompanied by increased use of pesticides. Pesticide residues are a considerable risk for human health. Good agricultural practices guidelines, including integrated pest management for horticulture needs to be prepared, control systems and agricultural inspections need to be established. This is not only important for human health and the domestic market, but also when export is considered.

Poverty, nutrition, and health outcomes have been shown to be related to social groupings (such as tribe or caste), climate emergencies, natural resource degradation, and conflict. In addition, understanding of the impact of gender roles and gender empowerment on inclusion and nutrition is expanding. Given a growing body of evidence on poor food system outcomes, interest in more radical approaches to supporting groups being left behind is growing (IFPRI, 2020). Women are actively involved in food systems in many roles, but their contributions are often not formally recognised, and they face obstacles to engaging on equitable and fair terms. Together with changing diets, transformation of food systems toward more efficient and sustainable production processes and longer value chains offers new opportunities and challenges for women's participation. Transforming food systems for inclusion means not just ensuring women's participation and access to benefits but also their empowerment to make strategic life choices. Entrepreneurship is often touted as a key to empowering women, but evidence indicates that it may not empower women if limited to small, household-based enterprises. Then it simply becomes another household duty that often results in less time for caring for children and nutritious meal preparation, which in turn contributes to chronic undernutrition.

By focusing on certain products, agricultural development intervention affects the nature and quantity of available foods. They may have a negative impact on energy quantities (too much or not enough) and available nutrients.

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## 5.3 Food System Synergies

The IPCC Fifth Assessment Report (IPCC, 2014) states: '*Agriculture and the food system are key to global climate change responses. Combining supply side actions such as efficient production, transport, and processing with demand-side interventions such as modification of food choices, and reduction of food loss and waste, reduces GHG emissions and enhances food system resilience*'. By addressing demand-side issues and supply-side efficiencies simultaneously, one can potentially *minimise trade-offs* for different goods and services (Benton et al. 2018). Fortunately, more and more studies are appearing on trade-offs reduction, but the scientific community still has a host of challenges to face to create more effective and productive partnerships to carefully develop pathways that *maximise synergies* (Mbow et al, 2019).

As an example, IFPRI underlined that the potential to create new jobs and better income by strengthening food system linkages is enormous (IFPRI, 2020). Such synergies can more easily be anticipated and further strengthened when a food systems framework is being applied for monitoring and adaptive planning.

When food markets are strengthened to benefit diet diversity, production systems can tend to focus locally on specialisation, potentially resulting in lower ecosystem diversity and reduced resilience at the farm and/or landscape scale (IFPRI, 2020). Across a gradient of agricultural intensification, (Baudron et al. 2017; in: Posthumus et al., 2018) have identified synergies between dietary diversity and diversity of ecosystem functions and services. IPCC reports (e.g. Mbow et al., 2019) keep on stressing, however, what works in one area does not necessarily work in another and beneficial effects will vary across regions and across social contexts. Still, we have included a few more examples.

In Lesotho, a cash transfer programme had a larger positive impact on agricultural production when combined with a programme to improve homestead gardening (Daidone, 2017). Provision of safe clean water and toilets for students indicated and promotion of hygiene and sanitation practices helped girls avoid dropping out during their menstruation and ensured the continuity of school feeding programmes (WASH programme, UNICEF). Providing school meal programmes that could reduce undernutrition, prevent the risk of developing obesity, provide income to local farmers and encourage children to stay in school and learn more when at school.

Studies indicate a potential synergy between increasing diet diversity and investing in high-value sectors of the economy. To organise the local infrastructure to supply more diverse diets, more attention will need to be paid to their production with increased availability of seeds, agro-chemicals, extension advice and cold storages (Posthumus et al., 2018).

Mbow et al (2019) mention that the reduction of food loss and waste can be considered as a climate change mitigation measure that provides synergies with food security and land use. Details are not further specified.

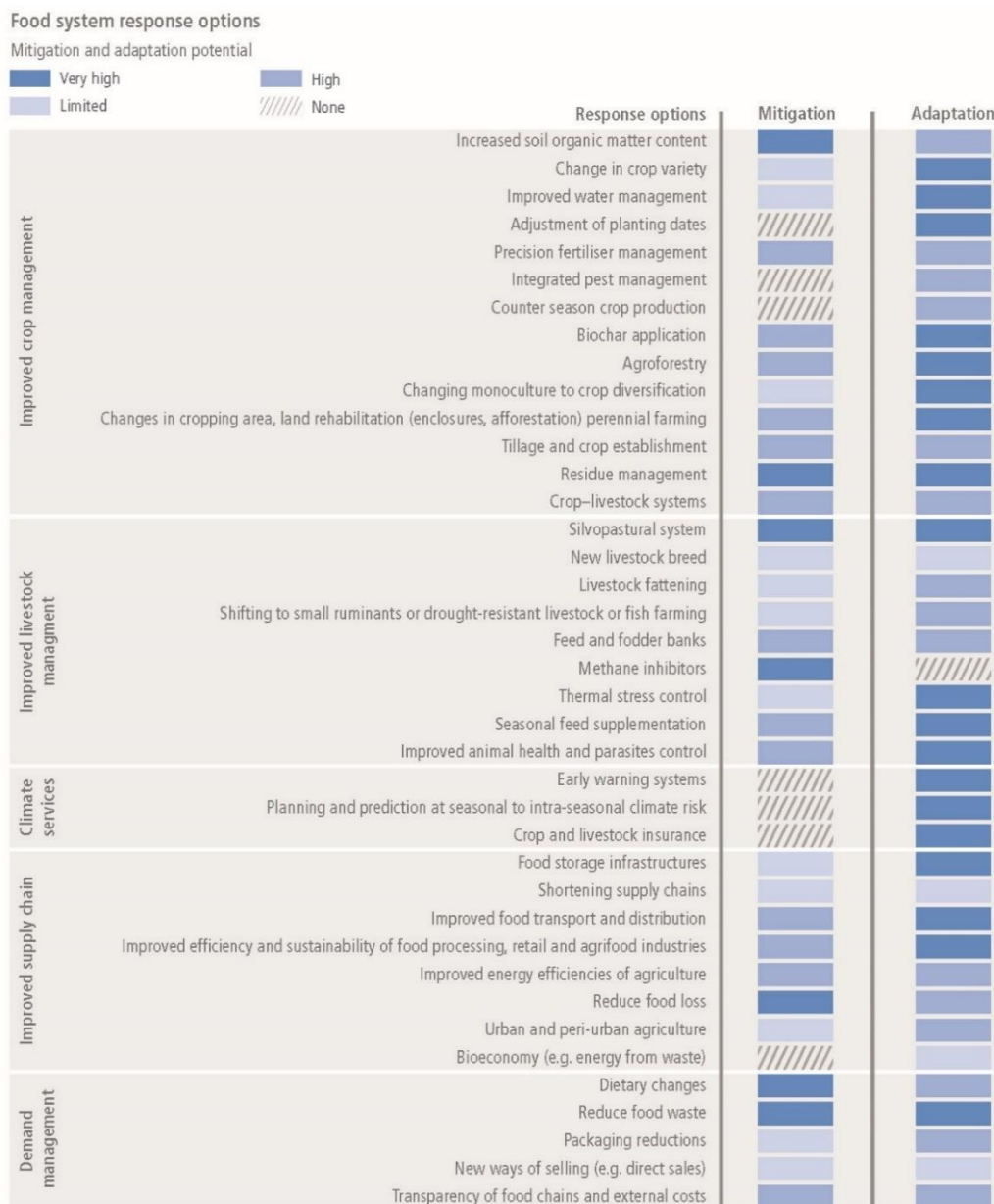
We use the food systems approach to further *zoom in* and explore potential synergies and trade-offs between the food system mitigation and adaptation options. We do this along the food system domains of the 'food supply chain', 'food environment', and 'consumer behaviour and diets'.

## 5.4 Zooming in: the food supply chain

As indicated by FAO (and we refer here to the general literature review) and many other literature sources: 'Agriculture must transform itself if it is to feed a growing global population and provide the basis for economic growth and poverty reduction' (FAO, 2014). It is certain, as confirmed by the Fifth IPCC Assessment Report that climate change will make this task more difficult under a business-as-usual scenario, due to adverse impacts on agriculture, requiring (even) spiralling adaptation and considerable investment (see also Chapter 3, paragraph 3.9 on climate finance).

We are also certain that there is a significant number of important *uncertainties* in the way climate will change, this is even magnified at regional and local scales where individual decisions are made.

Mbow et al. (2019) have included a clear overview (see figure 27 below) on possible food system interventions and their adaptation and mitigation potential.



**Figure 27** Food system response options: climate change mitigation and adaptation interventions, Mbow et al. (2019).

Identifying and supporting food production and distribution practices that are more resource-efficient and have fewer environmental externalities should therefore become a *high priority*. Considering the diversity of environmental and social settings in which food production takes place, solutions for improving sustainability, decreasing vulnerability and increasing resilience will differ.

No single approach will be universally applicable!

A profound evidence base is needed to help guide the implementation of the most appropriate, context-specific measures.

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As specified in paragraph 5.3, combining **supply-side** actions such as efficient production (including interventions for improved crop and livestock management), transport, and processing with **demand-side** interventions such as modification of food choices, and reduction of food loss and waste, enhances food system resilience. What the table indicates too, is that this *preferably* goes hand in hand with climate services such as early warning systems or crop and livestock insurances.

In addition, to achieve mitigation and adaptation to climate change in food systems *with nutrition co-benefits*, enabling conditions are needed to scale up the adoption of effective strategies (Mbow et al., 2019). Enabling conditions include, among other things, a supportive governance framework and policy environment.

Demand management links to the food environment dimension of the food system as well as the dimension of consumer behaviour and diets. We zoom into these dimensions below. Although mentioned, food system interventions in the food supply chain domain are likely to result in nutrition co-benefits, this cannot simply be assumed.

## 5.5 Zooming in: the food environment

The food environment refers to the physical, economic, political and socio-cultural context in which consumers engage with the food system to make their decisions about acquiring, preparing and consuming food (HPLC 2017). Figure 38 shows the food environment and the key domains and dimensions that influence the acquisition and consumption of the consumer (Turner C. et al., 2018).

A lesson learned from the literature is that income does not automatically lead to improved diets and nutrition, but why is that? The food environment always modifies the effect of income on dietary consumption. The interaction of income and the food environment explains why household income has a variable – and sometimes seemingly unpredictable or less than expected – impact on nutrition. This interaction can have a strong positive influence where the food environment enables its use on healthy diets. Increased income may worsen nutrition in some ways when food environments facilitate spending toward unhealthy diets. The food environment in markets is important for nutrition because it constrains and signals consumers what to purchase. It affects diets by circumscribing how income can be potentially spent on food (what kind of food is available), as well as how income is likely to be spent (based on affordability, convenience, and desirability of various foods) (Herford and Ahmed, 2015).

Also, in Lesotho, the food environment plays an important role and affordability is a key constraint in improving diets for all Basotho, and not only the Basotho with a low social-economic status. Fill the Nutrient Gap (WFP, 2019) shows that nutritious diets in Lesotho are unaffordable for more than half of the households (56%). These households are not spending enough money on food to meet their nutrient requirements. Non-affordability of a nutritious diet is particularly high in the mountainous regions (above 70%). Maseru has the lowest non-affordability for a nutritious diet in the country, although the absolute number and the percentage of households not able to afford nutritious food remains high (50%).

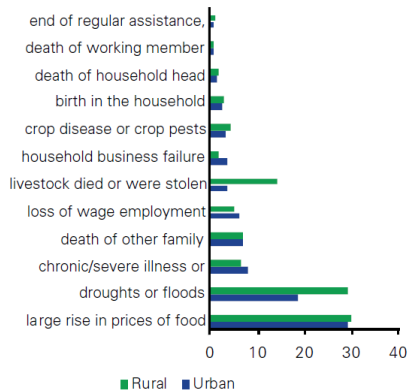
The conceptual framework of the Agriculture, Nutrition & Health Academy (ANH) Food Environment Working Group (FEWG) as shown in figure 28 depicts the food environment as the interface within the wider food system. Key dimensions are mapped to external and personal domains. Interactions between these domains and dimensions shape people's food acquisition and consumption.



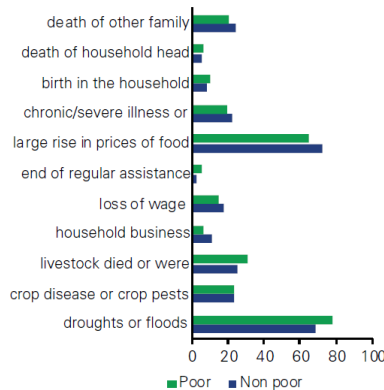
**Figure 28** The ANH-FEWG Food Environment Conceptual Framework.

Food prices, that directly influence affordability, were identified as a risk for urban and rural households in Lesotho’s Poverty Assessment. About 30% of urban and rural households indicate that they are affected by this, see figure 29 for details. When these families were asked if this occurred in the last five years, over 70% of non-poor households and over 60% of poor households mentioned that this has occurred (Sulla et al., 2019).

**Figure 119: Percentage of households affected by risk by urban/rural**



**Figure 120: Percentage that occurred in the past five years by poverty status**



Source: Calculations based on the 2017/18 CMS/HBS.

**Figure 29** Percentage of households affected by risk (urban/rural) and occurrence of this risk in the past five years (poor/non-poor).

Source: Sulla et al., 2019.

Potential interventions to improve the food environment, with co-benefits for nutrition and climate, that have been mentioned in the literature (Fanzo et al., 2017) (HLPE, 2017) include, amongst others:

- Improve transportation infrastructure in areas where the effects of climate change will limit people’s ability to access markets;
- Improve retailer access to water, electricity, and cold storage;
- Promote increased incomes for household access to nutritious food and adaptive capacity;
- Create networks of food producers to increase market access and help limit food waste;

- Increase transparency of information nutrition and environment impact on labels;
- Implement policies that make healthy foods more accessible and convenient and restrict advertising of unhealthy food;
- Regulate health claims on food and adopt a front-of-pack food labelling system;
- Strengthen national food safety standards and surveillance systems.

## 5.6 Zooming in: Consumer behaviour and diets

Consumer behaviour is defined in the HLPE 2017 report as *'all the choices and decisions made by consumers, at the household or at individual level, on what food to acquire, store, prepare, cook and eat, and on the allocation of food within the household'*. Consumer preferences, the demand for certain types of foods, and ultimately consumption patterns drive supply from farm production to the rest of the value chain, which can result in climate change triggers (Fanzo, 2017).

The EAT-Lancet Commission (Willet et al., 2019) estimated that *'changes in food production practices could reduce agricultural greenhouse-gas emissions in 2050 by about 10%, whereas increased consumption of plant-based diets could reduce emissions by up to 80%. A further 5% reduction could be achieved by halving food loss and waste. Improved production practices are less effective than a shift to healthy diets in abating food-related greenhouse-gas emissions because most emissions are associated with production of animal source foods whose characteristics, such as enteric fermentation in ruminants, have little potential for change. Increasing shift toward more plant-based diets will enable food production to stay within the climate change boundary.'*

Promoting a plant-based diet and reduce meat consumption among populations, is considered a *double-duty action* or, in other words, a food system synergy. Plant-based diets help to reduce obesity, heart disease, and diet-related cancers, and will reduce methane production from livestock (Swinburn et al., 2019).

Potential intervention in the food system, focused on the domain of consumer behaviour and diets, include:

- Increase awareness of the advantages of healthy diets
- Expand access to social protection services that help households managing shocks, promote household food security and adapt to and mitigate climate change
- Promote food cultures, including cooking skills and the importance of food in cultural heritage
- Expand access to social protection services including unconditional cash transfers and supplementary food allowances
- Increase consumption of animal source food in low and middle-income countries while educating the public about the health risks associated with overconsumption of these foods
- Improve access to safe and energy efficient cookstoves
- Reduce food waste at the consumer level (thus increasing the availability of food and reducing GHG emissions to produce food)
- Reduce overconsumption of animal source foods.

These interventions either reinforce synergies or address potential trade-offs (e.g. animal source foods and GHGs, is addressed by at least reducing overconsumption).



# 6 Towards climate-smart food systems for improved diets

In Chapter 5, it was emphasised that in order to achieve mitigation and adaptation to climate change in food systems with nutrition co-benefits, enabling conditions are needed to scale up the adoption of effective strategies (Mbow et al., 2019). Enabling conditions include, among other things, a supportive governance framework and policy environment. This chapter discusses in paragraph 6.1 the current governance landscape of Lesotho that could support climate action in the food system for improved diets. At the same time, we also dive a little deeper into the current policy arena for food and nutrition security and see where interventions in the food system initially focused on food and nutrition security have potential climate change mitigation or adaptation co-benefits.

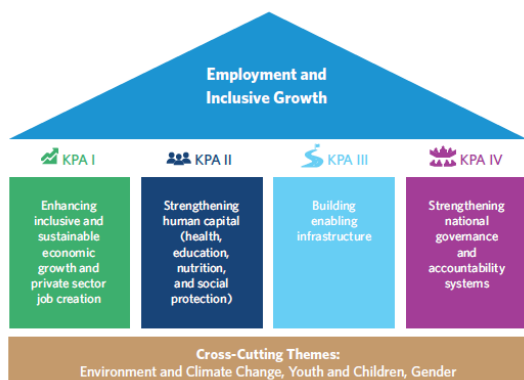
In paragraph 6.2, we then zoom in on the stakeholder arena and few lessons learned after which we, in paragraph 6.3, move on to potential (but recommended) food system intervention pathways: pathways that all contribute to a climate-smart and nutrition-sensitive food system in Lesotho.

## 6.1 The current policy landscape in Lesotho

Different forms of malnutrition can co-exist within the same country and/or community, and sometimes even within the same household or individual. They can even paradoxically be linked. It is only logical therefore that they are 'tackled' together. Hunger and malnutrition will simply not be 'self-corrected' merely by economic growth, as many people thought in the past and nor will these concerns spontaneously be addressed. On the contrary, nutrition must be integrated as an explicit objective in national policies, programmes and budgets. Cross-sectoral nutrition strategies should be designed and implemented at various levels, from global to local (HPLC, 2017).

Head of the Climate Investment Funds (CIF), Mafalda Duarte, underlines that the world's leading climate scientists have issued a 'final call' warning that we have until 2030 to prevent a no-return climate trajectory and 'as we have learned over the years, planning in silos and implementing sector-by-sector does not really work'.

If we are serious about transforming to climate-smart and nutrition-sensitive food systems, we need to think about agricultural development, and about economic development in general and aim for low-carbon and climate-resilient economies. When examining the current policy landscape in Lesotho, several supportive policies and strategies are in fact already in place.



**Figure 29** The four key priority area of the NSDP II, Government of Lesotho.

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The last National Strategic Development Plan II for the period 2018/19 to 2022/23 provides an overarching policy. The strategy encapsulates a development path to realise the development goals formulated in the field of employment, poverty eradication, shared prosperity, lasting peace and security, strengthened human capital base, and the protection of fragile ecosystems and cultural heritage (Ministry of Development Planning, 2018). The NSDP II identifies 4 key priority areas, see figure 29, to achieve the development goals by 2023.

Nutrition is part of the key area strengthening human capital, while Environment and Climate change together form a cross-cutting theme.

Nutrition is captured as immediate outcome 2.3: Reduce malnutrition with two strategic objectives; 1) Strengthen and Scale-Up Nutrition Interventions and 2) Strengthen Nutrition Governance and Capacity Development. One intervention of the second strategic objective that stands out is the 'Review and mainstream nutrition into all national plans, sector policies, and strategies'. This is in line with the lessons learned from the literature review.

Although Lesotho joined the international community in expressing concerns about the negative impacts of climate change by signing and ratifying UNFCCC, the Kyoto Protocol and the Paris Agreement, there was, until 2017, no coordinated national policy in place to address the challenge, except reference in a few policies/strategies such as the: NDSP 2012/13-2016/17, NAPA, National Disaster Risk Reduction Policy 2007, National Environment Policy 1998 and Environment Act 2008, Lesotho Food Security Policy 2005, Energy Policy 2015-2025 and Sustainable Energy Strategy, as well as Gender and Development Policy 2014. Despite reference being made to climate change issues, instruments did not yet adequately address climate change (LMS, 2017a).

The National Climate Change Policy 2017 – 2027 (LMS, 2017a), however, supports the country in effectively coordinating various climate change initiatives as well as meeting its obligations under the UNFCCC. The policy is stated to be a 'living document', requiring regular updating. It emphasises that only through a strong coordination mechanism will the policy be successful.

The policy fosters development of processes, plans, strategies and approaches that:

1. Promote climate-resilient, social, economic and environmental development that is compatible with, and mainstreamed into, national development planning and national budget-setting processes;
2. Explore low-carbon development opportunities, nationally and internationally, in order to promote the sustainable use of resources; and
3. Strengthen a framework that promotes efficient climate change governance, strong international cooperation, capacity building, research and systematic observations, clean technology development, transfer and use, education, training and public awareness and financing in a way that also benefits the most vulnerable through the implementation arrangements to be defined in the strategy.

The cross-cutting theme Environment and Climate Change in the NSDP II could be defined, also for climate action, as overarching (and perhaps even as the 'strong coordination mechanism' that the climate policy refers to). It has 5 strategic objectives, namely 1) Reverse land degradation; 2) Promote biodiversity conservation; 3) Improve national resilience to climate change; 4) Improve environment and climate change governance and 5) Improve enforcement and compliance with environment regulations and standards.

The Lesotho Food and Nutrition Policy & Strategic Plan (2016 – 2025) updates earlier nutrition policies and national plans developed and will involve and guide all stakeholders involved in nutrition in Lesotho to ameliorate current nutrition problems and put in place appropriate intervention measures. Its objective is to attain optimal nutritional requirements for the improvement of health status among the population of Lesotho, enabling them to contribute effectively to national socio-economic growth and development. It combines nutrition-specific and nutrition-sensitive programming supported by an enabling environment. This programming is built upon the framework for actions to achieve optimum foetal and child nutrition and development (see figure 26).

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The Ministry of Health's National Strategic Plan for the Prevention of NCDs 2014-2020 is a national strategic plan for the prevention and control of NCDs. The Ministry of Health (MOH), through the NCD Unit, will collaborate and coordinate all sectors and partners, integrate with other programmes in and out of the MOH, advocate for the implementation of best buys, develop laws, policies and guidelines, regularly supervise and monitor the programme, and report to the Government of Lesotho. In this strategy, nutrition is mainstreamed through the promotion and production of fruits and vegetables. This is envisioned through the Ministry of Agriculture and Food Security (MOAFS) and food preservation and household gardens will be re-invigorated.

Alongside these policies and frameworks, there are several other policies that address nutrition issues and requirements of particular population groups, such as school children, through the school feeding policy. Appendix 6 provides an overview.

There are also several policies and strategies that are still under development. The 'Scaling-up Nutrition Strategy' is currently under development. This strategy will describe the *strengthening of the coordination* and establishment of different platforms, such as the civil society and business platform. Also, a Nutrition Behaviour Change Communication Strategy for Lesotho is under development, but progress is currently hindered because of the COVID-19 crisis.

Mainstreaming climate *and* nutrition objectives in other policies will be of high importance to ensure climate-smart food systems that result in improved diets.

Unfortunately, no separate policy on agriculture was found, although Lesotho is participating in regional initiatives such as the Comprehensive Africa Agriculture Development Program (CAADP). The last review was in August 2019. It was indicated that Lesotho had to improve on several points, but no information was obtained to conclude whether Food and Nutrition Security has sufficiently been addressed by the Ministry of Agriculture and Food security.

The last policy we need to address in this landscape is the National Range Resources Policy 2014 of the Ministry of Forestry, Range and Soil Conservation. Although this policy addresses the issue of livelihoods, no specific reference is made to food and nutrition security and/or nutrition. This policy does link strongly to Lesotho's Climate Change policy as well as the cross-cutting theme of Environment and Climate in the NSDP II.

## 6.2 Lessons learned from stakeholders and COSOP review

During the interview with key stakeholders and review of available documents, several lessons learned were encountered. In this section, we will discuss these lessons that should be taken into account for the overall programme approach and design.

The COSOP review of 1998-2018 of the Kingdom of Lesotho (IFAD 2018) generated lessons learned based on all IFAD projects implemented during the course of the COSOP. These lessons learned are in the area of conducive and sustainable programming:

- **A lack of attention towards agricultural supply chains was evident** in the four completed programmes and this constrained both the income-generating potential of projects as well as their long-term sustainability post IFAD funding. During the implementation phase, basic productive resources (including seed, livestock, fertilisers, tools and other inputs) were funded and supplied by the programmes even though this was overseen by district officials. This meant that the beneficiaries were completely dependent on the programme for vital production inputs and many were unable to continue farming when IFAD funding ended.
- There are **limits to voluntarism** in community-based programmes like rangeland rehabilitation and catchment area protection, particularly amongst the very poor, and the evidence suggests that these might be more effectively implemented through public works programmes.
- **Monitoring and evaluation systems** with an established baseline and predetermined indicators must be established prior to the commencement of a project. Without such systems in place it is not

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possible to make an accurate determination of the success of projects and the extent to which they contributed to poverty reduction.

- **Comprehensive exit strategies**, which provide direction as to how project interventions might continue once IFAD funding has come to an end, should form part of the project design. This would include consideration of a minimum government budget to ensure the maintenance of infrastructure, the assignment of responsibility for continued oversight of a project by government officials, and communication with beneficiaries on what they might expect to happen. Without such exit strategies, projects often come to an abrupt halt when a funding cycle has ended.

In addition to the lessons learned described above, the Ministry of Health Nutrition Unit also had several lessons learned. We have only listed the ones that should be considered at the programme and project level.

- There is **poor coordination** amongst sectors, hence sectors work in isolation, which at times creates duplication of efforts.

This lesson was also mentioned by several other stakeholders interviewed.

These lessons learned, the interviews with key stakeholders, the discussions with the project design team, the review of all documents, global literature review and the analysis of the current situation on climate and nutrition has led the team to make the following assumptions:

#### Assumptions that shape suggested interventions - Climate & Nutrition viewpoint

1. Without action, climate change will impact nutrition through decreased food quantity and access, decreased dietary diversity, and decreased food nutritional content (Fanzo, 2018). Climate-smart food systems for improved diets will require informed decision making by partners to not only address the impact of climate on the present food system, but also to ensure that actions within the food system will not further aggravate climate change. The following actions need to be considered:
  - spatial adjustment of agricultural production to appropriate production locations; **and/or**
  - the use of a diversity of crops, the use of other cropping systems or the application of other/climate-adapted farming systems; **and/or**
  - the use of good agricultural and climate-resilient practices and techniques; **and/or**
  - exploring of and investing in value addition - including value addition for nutrition - by smallholders and connecting them to the domestic or export market; **and**
  - analysis from consumer needs and preferences towards the dynamics between supply and demand, which occurs in the food environment.
2. Undernutrition can be exacerbated by the effects of climate change at all stages of the food value chain! Chain-wide thinking (from farm to fork) and/or chain-wide approaches are essential!
3. Poverty alone does not lead to malnutrition, but it seriously affects the affordability and availability of adequate amounts of nutritious food for the most vulnerable population.
4. Achieving climate-smart food systems for improved diets will require behavioural change from all food system actors **and** behavioural change requires time, continuity, trust, endurance and continuous adaptation.
5. Climate-smart food systems for improved diets embrace diversity, circularity and inclusiveness.
6. Climate-smart food systems for improved diets is based on participatory planning (including monitoring, evaluation, adaptation) and action. Participatory planning and action means establishing multi-stakeholder partnerships (this also includes beneficiaries and/or target groups becoming partners in planning). Participatory planning and action means societal learning.
7. Effective multi-stakeholder partnerships and processes don't just happen – they need to be **designed and facilitated** to ensure learning for sustainable impact!

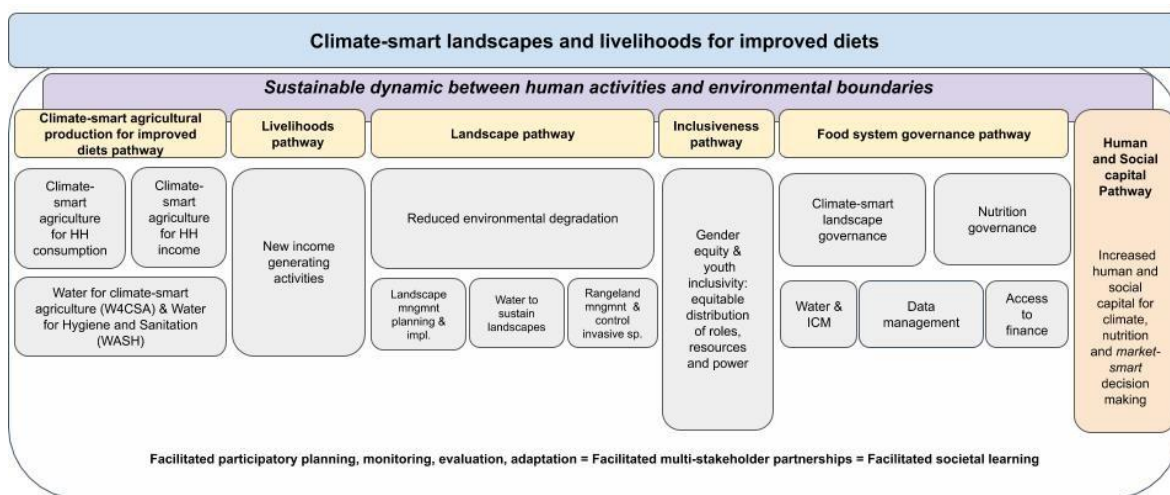
These assumptions are the foundation upon which our recommendation have been developed and (sometimes carefully) constructed.

## 6.3 Proposed climate-action informing the design

During the mission the pre-design team had several discussion and re-design the Theory of Change for the P-ROLL's to capture not only the original thinking of the P-ROLL project but also to align the project to the climate-smart food systems for improved diets thinking. The process is described in Appendix 7.

We cannot stress enough to bear in mind the wise words of George Edward Pelham Box, a British statistician, who has been called one of the great statistical minds of the 20th century: 'All models are wrong but some are useful'.

The process led to the Theory of Change as presented in figure 30, which will be the basis of the identified intervention pathways and can be found in Appendix 7.



**Figure 30** Updated Theory of Change and suggested pathways.

The pre-design team identified 7 intervention pathways (see figure 30) from the climate-smart production for the improved diets pathway to the human and social capital pathway and an all enclosing pathway focused on facilitated societal learning. For each pathway, we have listed - what we currently assume to be - the priority interventions addressing both climate and nutrition working towards a climate-smart food system for improved diets. We have listed only the higher priority intervention, but it is not an exhaustive list and other possible interventions can be found in Appendix 8.

The pathways are interlinked and all need to be implemented to achieve the expected results. We are stressing that interventions need to be tailored to the local conditions in the (sub)-catchments or districts and should cater to the needs of the target group(s). In addition, we have identified interventions that have already been implemented and have created good results and that build upon existing investments made by the community and the Government of Lesotho.

In the next sub-paragraph we will discuss the intervention for each pathway and we have linked each pathway to the P-ROLL project outcomes where we think that proposed interventions will contribute to achieving these outcomes.

### 6.3.1 Food system governance pathway

This pathway will contribute to outcomes 1, 2, 3 and 4 and is a key pathway and we suggest to start the project via this pathway. Within this pathway, 4 sub-pathways have been suggested and all these activities are priorities according to the pre-design team.

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### *District / catchment area governance*

Governance needs to take place in district and catchment areas with involvement of all partners and community representatives, especially focusing on women, youth and other minorities groups. This local governance structure should link to ongoing activities at the national level such as:

#### *Nutrition Governance*

Link to the national nutrition governance structure (FNCO) and work with them to set-up nutrition governance in district / catchment areas, to align project activities with the nutrition activities where applicable. This is to enhance the impact of nutrition services and maximise the available sources. This would include ensuring that 'Social and Behaviour Change' (SBCC) messages issued by the government also reach the project target group; coordinate project activities with health services, increase potential consumers through linking with the partners in nutrition.

#### *Landscape governance*

Promote a climate-smart multifunctional landscape approach (longer-term). Increase the percentage of cultivated farmland. Financially support farmers interested in taking farmland into climate-smart cultivation, but never without co-funding (see access to finance in governance pathway).

#### *Integrated Catchment Management/Integrated Water Resources Management*

- Strengthen currently established water institutions, support them in moving forward from paper to action;
- At least 2 participatory ICM plans developed and implementation initiated.

#### *Data Management*

- Exchange of data between ministries and data analysis in multi-disciplinary teams; this means decentralisation needs to be pushed to the next level!
- In line with CSAIP, develop the land registry system to enhance current land use overview and to ensure monitoring of agricultural production, consumption and market information;
- Introduce farm logbooks for farmers receiving subsidies or compensation for environmental services provided.

#### **Data management example from Malawi**

Malawi has established the 'National Multi-sector Nutrition Information System', which is an integrated information system which can be used by all stakeholders for Data collection (all nutrition programmes/ multi-sector), Improving data quality, Data analysis, Data visualisation, Evidence-based decision making and Planning. This system was established through extensive multi-stakeholder processes.

#### *Access to finance*

- The project may invest in small-scale but viable business plans e.g. to bring land under cultivation, to plant fruit trees, to shift to aquaculture, but never without guaranteeing co-funding of 'beneficiaries'. Please note, co-funding does not have to be provided in monetary terms! Co-funding can be safeguarded in creative ways e.g. by 'beneficiaries' supporting uprooting invasive species in rangelands;
- Invest in multi-sectoral, multi-disciplinary and integrated planning at the government level from national to local level; this means that decentralisation needs to be pushed to the next level!
- Link target groups to mobile financing;
- Stimulate value addition of produce, this stimulates private sector development.

### 6.3.2 Partnership pathway

This pathway in support of the food system governance pathway as effective partnerships are crucial for sustainable and effective implementation of the P-Roll project.

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Whether we like it or not, projects and programmes stand or fall with the energy and effectiveness of multi-stakeholder partnerships (MSPs). Designing and facilitating MSPs is a science, a craft and an art (Brouwer et al., 2019). Multi-stakeholder planning and action, means multi-stakeholder learning and, given the number of partnerships that fail prematurely or never deliver results, it is safe to assume that much can go wrong, and usually does go wrong. Our experience in brokering, designing and facilitating MSPs, and our interactions with academics and practitioners, have taught us that a *simple* set of success formulas *does not exist*. However, Brouwer et al. (2016) have identified seven principles that healthy and effective partnerships generally follow (Brouwer et al. 2016 and 2019). These 7 principles have been explained in more detail below. **Don't neglect the need for professional facilitation of partnerships and of learning!** For more details please see Appendix 8.

### 6.3.3 Human and social capital pathway

This pathway will contribute to outcomes, 1,2,3 and 4, by increasing climate and market-smart decisions leading to improved diets. This is also a pathway which is a priority according to the pre-design mission team.

- Connect to **national behaviour communication** efforts and ensure that the target group is also included in these activities;
- Increase **chain wide thinking capacity** of food system stakeholders, using IFADs Nutrition-sensitive Value Chain framework to discuss strategies and entry points for nutrition. This can easily be expanded by adding climate to the discussion;
- Encourage **independent research** and work towards agricultural knowledge and innovation partnerships e.g. by addressing specific climate adaptation techniques or addressing specific nutrition problems (see figure 46, to be used as an optional conceptual framework);
- **Training of trainers** programmes to boost CSA and CSN literacy (priority)!
- Link with the **university and research institutes** to document (and monitor!) good initiatives and practices to inform stakeholders, but also to incorporate these into existing curricula in all relevant disciplines;
- Consider **exchange visits** between communities who came up with interesting 'business initiatives' (link with livelihood pathway) or organise cooking workshops/competitions (link with CSA for household consumption);
- Link **internships and Master's thesis students** (link with inclusiveness pathway – youth inclusiveness) to P-ROLL; explore possibilities with them to address specific tasks or (research) question (priority and easy to implement!).

### 6.3.4 Climate-smart agriculture production for improved diets pathway

The climate-smart agricultural production pathway will contribute to Outcomes 1 and 3. This pathway consists of four sub-pathways both contributing to improved livelihood and/or changed resource use practices. For each pathway, we have only listed the high priority activities. Appendix 8 lists all possible actions.

#### *Climate-smart agriculture for household consumption*

- Build upon existing projects such as the SILC CRS' **Savings and Internal Lending** (SILC) for community groups, especially women's groups. With the training of private service providers (PSPs), it is easy to both address nutrition and climate issues simultaneously;
- **Keyhole gardens** may help households to produce nutritious vegetables, if this includes quality *seed packages* with a diverse number of varieties to provide the maximum number of different micronutrients. Leafy greens provide similar micronutrients, but adding a pumpkin for example increases the availability of vitamin A.



**Photo 1** Example Keyhole garden, Lesotho, FAO.

#### *Climate-smart agriculture for household income*

- **Diversification of crop production** and exploring the potential of (extended) horticulture and High-Value Crops. Climate projections indicate exploring vegetable and fruit value chains, as well as the production of seed potatoes. Current climate projections do not seem to favour wheat or maize mono-cropping. The World Bank (2019) also mentions the potential of aquaculture (carp and trout);
- Initiate **village collection hubs** for the storage, sorting, grading of fruits and vegetables (priority). This activity should be linked to producers, either directly, or through producer groups/organisations and have an outlook towards domestic (local, regional or national) market or export market opportunities, considering the investments to be made in cold chain equipment. Distance between producers and hub is an important factor to be considered;
- **Seed multiplication** of vegetables and fruit tree seedlings for improved and high quality seeds. This needs to go hand in hand with integrated seed sector development (i.e. the food system governance pathway).

#### *Water for climate-smart agriculture*

- Demonstration of **different water harvesting techniques** - water harvesting needs to be the norm!
- Building **water management capacity** at farm level. This includes the conservation of soil moisture content, soil organic matter content, improving soil fertility management. Farmers involved in the project cannot have bare soil nor is stubble burning allowed. Seeds or seedlings can be provided, but only on the basis of co-funding (see access to finance under the governance pathway).

#### *Water for household sanitation and hygiene (WASH);*

- Align with other **WASH initiatives** (e.g. UNICEF's, (I)NGO's WASH programme in Lesotho).

### 6.3.5 Livelihoods Pathway

The Livelihoods pathway will contribute to outcomes 3 and 4.

- Enhanced rural livelihood opportunities by investing in **business incubators** at the catchment, district or village level; Well-thought-through business ideas may be selected to be 'incubated' and financed; Links with micro-finance institutes is an option;
- **Village action planning** for the generation of ideas for off-farm employment;
- **Vegetable production for school feeding and hospitals**. School feeding programmes and hospitals need fresh vegetables (need to confirm with WFP and MoH) and the connection could be made through the village hubs. However, the financial structures of these programmes often are an obstacle for effective implementation;
- **Nutrition value adding** of products through processing by community groups;
- **Connect with cash for work programmes and other social protection programmes** and add on in the case of women IFA distribution (weekly or daily) and maybe receive a fresh vegetable every week. In addition, build in some additional participation criteria, that will support good nutrition practices, such as WASH, and ensure that pregnant women go for antenatal care service, allowing them back into the workplace only once having done so;



- Explore and setup **drone technology** with **youth groups** for mapping, for instance, the extent of the spread of invasive species, measuring how much crop is affected by drought, soil moisture content, rangeland fire control, etc. In Ghana, for instance, they are distributing medicines using drones (priority). Linking to the Food System Governance and the Human/Social Capital pathway to shift agriculture sector development and innovation towards the 'cool' economic sectors to explore.

### 6.3.6 Landscape pathway

The Landscape pathway will contribute to outcomes 1, 2, 3 and 4. Within this pathway, three sub-pathways are prioritised (because there are many more):

#### *Landscape management planning and implementation*

- **Land(scape) management plans** developed at the basin or catchment level as water is a major driving force for ecosystem services, for food production and for livelihood development, therefore: integrated sub-catchment management plans;
- **Reforestation/Afforestation plans** developed and implementation initiated;
- **Rangeland management plans** developed and implementation initiated: these are integrated within catchment plans, but require considerable detail, rangeland fire management will be an obligatory component.

#### *Water to sustain ecosystem services*

- **Soil conservation** measures, erosion control and gully control;
- Improve **water infiltration** to existing water bodies and ponds.

#### *Rangeland management and controlling invasive species*

- **Uprooting invasive species** - partnerships of local governments and communities (payment for environmental services provided – link with off-farm employment);
- Poor rangeland management is the primary cause of soil erosion and land degradation in Lesotho. **Integrated catchment management efforts** to address the problem need to consider, among other factors, terracing, small dams, grassland reseeding, rotational grazing, protection and demarcation of grazing reserves and fodder production as well. *Note:* using land for fodder production may be in competition with food production, in such a case, the households that wish to venture into fodder production need to be linked to markets where nutritious foods are being sold; On the other hand, only 1% of Lesotho's land surface seems to be cultivated up to now, competition might therefore be limited.

### 6.3.7 Inclusiveness pathway

This is also a cross-cutting pathway which would contribute to all outcomes.

- **Promote stakeholder partnerships** for village business initiatives and/or village action planning to address challenges;
- Ensure **involvement of youth groups** (including out-of school youth and herd boys) in multi-stakeholder planning: it is always indicated as important for sustainability but it still does not happen very often;
- Transforming food systems for inclusion means not just **ensuring women's participation** but also their empowerment to make strategic life choices. Small household-based enterprises could be interesting but should not just become yet another household task for women. Empower women to become active partners in the agricultural knowledge and innovation network (link with human and social capital pathway);
- Ensure **male participation and engagement** in gender-specific activities to address gender-based violence.

## 6.4 P-ROLL's proposed targeting

During the consultation with the design team, we discussed target groups and the selection of (sub-) catchment areas. In this section, we first discuss the targeting of the proposed target groups and we will provide some guidance on the identification of (sub)-catchment areas / district in the last part, following up on the recommendations already provided in Chapter 3 and Chapter 4.

### 6.4.1 Target group selection

Table 12 below, shows an overview of the currently proposed target groups in the P-ROLL concept note. The pre-design team reviewed specific target groups identified and assessed some of their characteristics on relevance to the project, their poverty status, and whether targeting them contributes to landscape-smart, climate-smart, or nutrition-smart food system outcomes. Please find the results of this (short) analysis in Table 13 below. Additional analysis and perhaps 'pivoting' will be necessary before a final decision can be made. Most of our suggested interventions do not exclude target groups (although schoolchildren may require slightly different interventions to a certain extent).

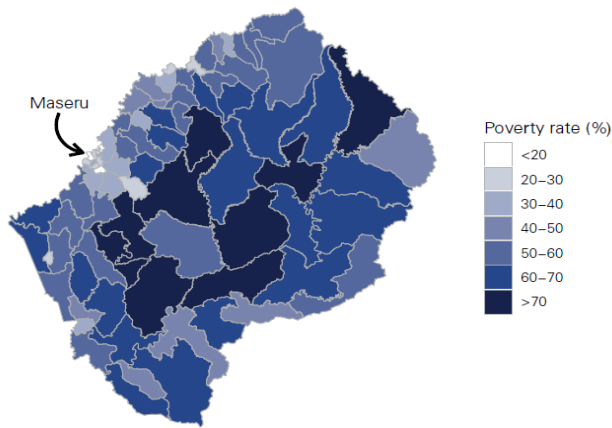
**Table 8** Currently proposed target groups in P-ROLL.

Target Group P-ROLL	Characteristics relevant to the project	Poverty status	Relevant for Landscape	Relevant for Climate	Relevant for Nutrition
<b>Poor in the community</b> (with few or no livestock)	Have limited assets (land or livestock) and limited education. Lack a voice and are often excluded from community decision making. Potentially dependent on food aid.	Poor	Yes	Yes	Yes, especially to reduce dependency on food aid, and malnutrition
<b>Women-headed households</b>	Very vulnerable, with a low asset base and limited human resources (labour). Participate less and have limited or no voice in community decisions. Some participate in local savings groups.	Poor	Yes	Yes	Yes, key entry point of children <5, adolescents and household dietary diversity
<b>School children</b>	Limited awareness of the causality of environmental degradation in the education curriculum and community	Live in poor households	Yes, future	Yes, future	Yes, limited awareness on healthier diet, window of opportunity to reduce impact of malnutrition
<b>Youth</b>					
<b>Unemployed rural youth (non-herders)</b>	Disengaged from community organisations. High unemployment but few engaged in off-farm activities apart from limited cash-for-work. A serious underutilisation of human resources.	Poor or live in poor households	Yes	Yes	Yes, especially girls are in major need of nutritious food, and high risk of early pregnancy which is also a nutrition risk
<b>Herders/Herd Boys</b>	Typically aged 13-25 with little education. Family members or labour hired to look after stock. Hard lives but activities unregulated. Future prospects limited and poverty cycles repeat	?	Yes, but might not be in control of decisions.	?	Not sure, depends on how much food they receive and take, change of prioritisation at household for food.
<b>Livestock owners</b>					
<b>Livestock owners in the community</b>	Have variable herd sizes (10-200) and variable levels of poverty. Members & non-members of the grazing association. Variable support for traditional authorities, and some are politically aligned	No	Yes, they have decision-making power and vested interests in landscape	Yes, they have decision-making power and vested interest in climate, as it affects their livelihoods	No, probably well nourished. Can be important to ensure adequate nutrition for the herd boys
<b>Livestock owners living outside the community</b>	Not solely reliant on livestock farming but some have large herds. Have connections to a community but reside elsewhere and do not feel bound by local decisions.	No			

## 6.4.2 Target area selection

The design team has been requesting support with the geographic targeting, which is indeed difficult for Lesotho. One of the obstacles is that data from the sectors are not always collected at the same level of detail. Some data are limited to district level, or ecological zones. Unfortunately, there are very little data available that focus specifically on (sub-)catchments.

Below, we present different maps that might assist with the targeting. The first map (figure 48) shows the poverty by constituency (Sulla, 2019). The second map shows an indication of active, minimal and critical soil erosion (Puri, 2016), it is a repetition of figure 14 in Chapter 3. The third map shows sub-catchments (originally figure 15), the 4<sup>th</sup> map is the agricultural versatility map (shown earlier as figure 16). The fifth map is the severe food insecurity situation (figure 9 in Chapter 3 originally). The chronic undernutrition map (figure 25) and the Non-affordability map (figure 40) have earlier been included and discussed in Chapter 4.



**Figure 31** Poverty by constituency.  
Source: Sulla, 2019.

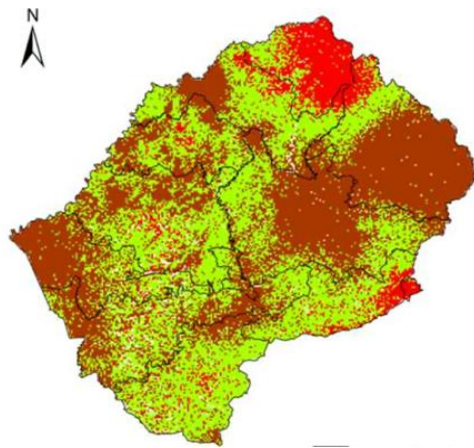


Figure 12 in this document – Erosion intensity.

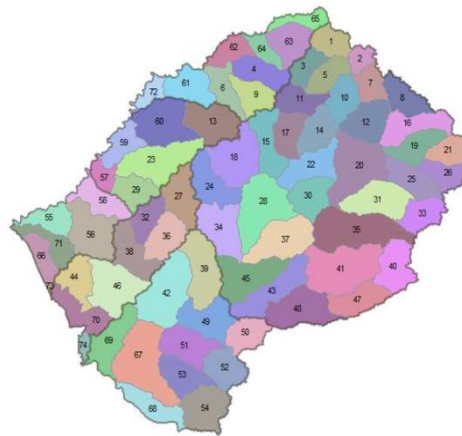


Figure 12 in this document – Sub-catchments.

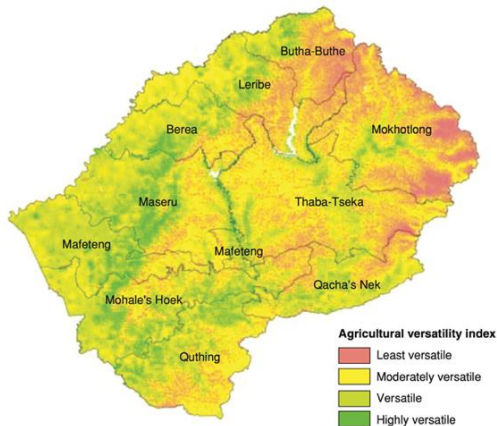


Figure 14 in this document – Agricultural versatility.

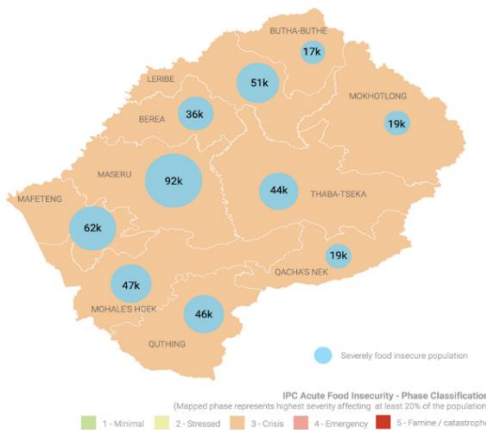


Figure 7 in this document – Food insecurity.

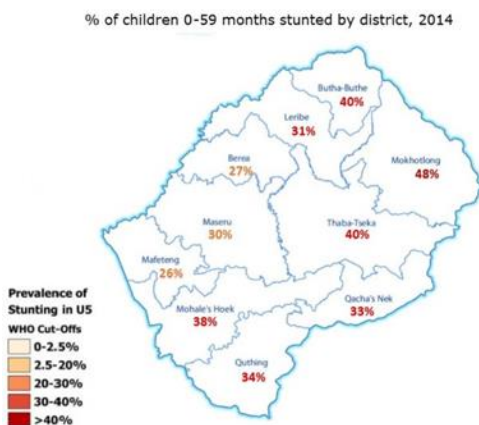


Figure 6 Appendix 5 – Stunting.

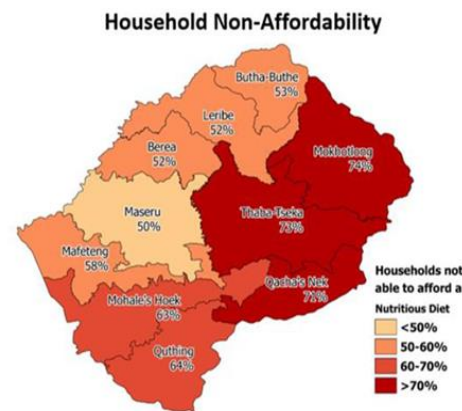


Figure 21 in this document – HH non-affordability.

We would like to repeat here the earlier suggestion made in Chapter 3 and 4, that ‘overlaying’ these maps (preferably by using GIS software) provides a better view on the most affected areas, either from a climate point of view, a nutrition point of view, a poverty point of view or perhaps even a combination of the three. Such overlays need to be combined with criteria like climate adaptation capacity, number of degraded wetlands, occurrence of successful value chains, etc., etc.

Using overlays indicating different information will most certainly guide the selection process and help to select the most relevant target group(s) to address.

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# Appendix 1 Terms of Reference

**Subject:** *Terms of Reference for the Pre-Design Study mission to Lesotho on 'Climate adaptation and mitigation measures for nutrition co-benefits in IFAD investments' (13 April – 31 August 2020)*

## **Background**

1. Climate change and food and nutrition security are strongly interlinked. Firstly, increased evidence shows that, climate impacts affect nutrition by influencing food production systems, e.g. through physiological effects on crops or changes in water and soil resources, but also by facing increased weed and pest challenges, or changes in the interplay between pathogens and livestock. Water systems and their management and sanitation environments are stressed by rising sea levels, flood risks or increasing temperatures and with that the risk for vector-borne diseases, like dengue. This has an impact on livelihood choices, labour options and time allocated for caregiving and other nutrition-related activities. Therefore, climate change undermines current efforts to reduce hunger and promote nutrition. It is estimated that in all regions where stunting is already severe, climate change will increase stunting by 30-50 percent by 2050.
2. Food production in its turn influences climate change. Systems of food production release greenhouse gases (e.g. carbon dioxide, methane, and nitrous oxide) into the atmosphere directly and drive land use change that releases additional carbon dioxide when forests are cleared, wetlands drained and soils tilled. Food production is a prime source of methane, and nitrous oxide, which have 56 times and 280 times the global warming potential (over 20 years) of carbon dioxide, respectively. Methane is produced during digestion in ruminant livestock, such as cows and sheep, or during anaerobic decomposition of organic material in flooded rice paddies. Nitrous oxide mainly arises from soil microbes in croplands and pastures and is affected by soil fertility management, such as fertiliser application<sup>7</sup>.

## **Justification for the mission**

3. Against this background, IFAD designed a project on the adoption of climate adaptation measures, which increase nutrition co-benefits for smallholder farmers and their families. The project is titled 'Climate change and nutrition in value chain development' and is funded under ASAP 2 (Adaptation for Smallholder Agriculture Programme - Phase II) and was approved in a memo signed on 6th August 2019. The project aims to develop a well-proven methodology and approach to support project designs/mid-term reviews and to strengthen the capacity of IFAD teams to conduct comprehensive and integrated assessments at project design that allow for the identification of adaptation and mitigation actions, while also reducing nutrition risks of food value chain investments.
4. In order to implement most of the activities of the above initiative, the provision of high quality technical support has been requested by IFAD from Wageningen Centre for Development Innovation (WCIDI). WCIDI support will allow IFAD to develop an integrated approach for designing climate-smart and nutrition-sensitive value chains, hereby contributing to the operationalisation of IFAD's transformational framework for mainstreaming themes and to reinforce capacities of local actors.
5. This technical support provided by WCIDI includes the three pre-design studies for three projects, in three IFAD supported countries, namely:
  - Project on Regeneration of Livelihoods Landscapes (P-ROLL) in Lesotho
  - Climate-Smart Smallholder Value Chain Project (SVCP) in Vietnam
  - Smallholder Agriculture Cluster Project (SACP) in Zimbabwe

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<sup>7</sup> Food in the Anthropocene: the EAT–Lancet Commission on healthy diets from sustainable food systems, The Lancet Commissions, February 2019.

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6. In line with the planning scheduled for the full design of P-ROLL, Lesotho was selected to be the first country where the pre-design study mission will take place.

**Main objective of the mission:**

7. To conduct a pre-design study mission for Lesotho with the aim of exploring opportunities for climate adaptation and mitigation and nutrition actions for future IFAD investments in Lesotho (forthcoming: P-ROLL). Because of the COVID-19 crisis, this mission will be conducted in two parts; first parts involve the literature review for Lesotho and remote interviews with selected key stakeholders and the second part, a one-week mission (situation-permitting) to do field visits and conduct a validation workshop on the pre-design study findings.

**Specific Objectives:**

For the first part (13 – 24 April)

- Based upon the lessons learned from the literature review<sup>8</sup>, explore which of the lessons learned can be applied in the Lesotho context;
- Discuss with IFAD country director and his team to deeply understand P-ROLL goal, components, priorities, project log-frame and theory of change in order to ensure alignment when formulating suggestions for climate-nutrition linkages;
- Consult with selected key stakeholders to describe the present climate adaptation and mitigation and nutrition landscape, including targeting vulnerable groups and stakeholder involvement;
- Formulate appropriate pathways and suitable, sustainable and significant actions that effectively integrate climate mitigation and adaptation measures to maximise nutrition in IFAD's investments (including strategies, processes and/or methodologies if appropriate) and capable to enrich IFAD's project designs with climate-nutrition linkages;
- To suggest feasible and concrete actions that can then be incorporated into the full design of P-ROLL and further flesh it out.

**At a later date:**

- Confirm the climate-nutrition linkages suggested by the virtual pre-design for Lesotho context by conducting field visits to IFAD support projects and IFAD projects beneficiaries/targeted groups;
- Validate the findings from the study mission in a national level stakeholder workshop to learn from each other and build consensus.

**Deliverables:**

8. The mission deliverables include:
  - a. A virtual pre-design study mission report for Lesotho where the application of lessons from the literature for the Lesotho context are discussed; the document also describes the stakeholder landscape, possible pathways for effectively integrating climate mitigation and adaptation measures to maximise nutrition and recommendations for target groups and opportunities for IFAD future which are validated by the stakeholders. The report includes a specific section on feasible and concrete potential interventions for consideration in the P-ROLL project in Lesotho, organised as Must Dos, Can Dos and Maybe Dos.
  - b. A power point presentation (or more, as needed) to be presented during the end of mission briefing meeting with the design team.
  - c. A review of P-ROLL Project Design Report (PDR) to ensure appropriate introduction and consideration of pre-design mission findings.
  - d. A multi-sectoral stakeholder consultation workshop to discuss the preliminary findings in Lesotho with the objective to (i) validate the recommendations and interventions proposed, and (ii) create awareness on integrated approaches and linkages between the mainstreaming themes of key stakeholders. Participants will involve different sectors such as agriculture, environment and climate, health and nutrition, gender and youth among others; they will

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<sup>8</sup> Being conducted in the month of February 2020.

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include representatives from the government agencies, UN, NGOs, research organisations, private sectors. **(postponed to a later date)**

**Mission members first part:**

**9. Internationals in the Netherlands**

- Diane BOSCH, Senior Advisor Food and Nutrition Security, Wageningen Centre for Development Innovation (WCDI)
- Esther KOOPMANSCHAP, Senior advisor Water, Nature and Climate Adaptation, Wageningen Centre for Development Innovation (WCDI)

**10. Local consultants (4 days)**

- Moikabi Matsoai, Nutrition specialist, Consultant
- Vuyani Tshabalala – Monyake, Environmental Manager, Consultant

**Mission members second part:**

**11. Internationals visiting Lesotho**

- Diane BOSCH, Senior Advisor Food and Nutrition Security, Wageningen Centre for Development Innovation (WCDI)
- Esther KOOPMANSCHAP, Senior advisor Water, Nature and Climate Adaptation, Wageningen Centre for Development Innovation (WCDI)
- Philipp Baumgartner, Country Director for Lesotho, Botswana & Namibia, ESA, International Fund for Agricultural Development (IFAD)
- Christopher Tapscott, Senior Policy Specialist, International Fund for Agricultural Development (IFAD)

**12. Local consultants (4 days)**

- Moikabi Matsoai, Nutrition specialist, Consultant
- Vuyani Tshabalala – Monyake, Environmental Manager, Consultant

**Counterpart Lesotho:** Ministry of Forestry, Range and Soil Conservation

**Duration of the mission:** First part of the mission: 9 days (13 – 24 April) Second part of the mission 7 days (to be determined)

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## Appendix 2 Stakeholders consulted

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### Monday 20 April

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10:30 – 11:30	Ntate J. Mothibe - Nutrition Head and Senior Lecturer, National University Lesotho
12:00 – 13:00	Mme Makhauta Mokbethi – Nutrition, World Food Programme
14:00 – 15:00	Mme Lisemelo Sehehri - Ministry of Health – Head of the Nutrition

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### Tuesday 21 April

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10:00 – 11:00	Mme Mahlalele Setlhako - Integrated Catchment Management Program coordinator
11:00 – 12:00	Mme Monica Lephole – Nutrition, Agricultural Research, Ministry of Agriculture and Food Security
12:00 – 13:00	Mme Tselane Ramokhoro – Food and Nutrition coordinating Office
15:30 – 16:30	Ntate Tiisetso Elias – Food and Nutrition coordinating Office and SUN focal point

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### Wednesday 22 April

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13:00 – 14:00	Ntate Mokoena France - Climate change Coordinator, Ministry of Energy and Meteorology
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### Thursday 23 April

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09:00 – 10:00	Ntate Malefetsane Joachim Nthimo - Ministry of Forestry, Range and Soil Conservation
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### Friday 24 April

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11:00 – 12:00	Explorative meeting with the design team
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### Monday 27 April

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15:00 – 16:00	Mme Motulu Molapo – Climate, Planning and Development
16:00 – 17:00	Ntate Limomane Peshane - Sustainable environment specialist, UNDP

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### Tuesday 28 April

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09:00 – 10:00	Ntate Mokitinyane Nthimo - Assistant representative programmes, FAO representative
15:00 – 16:00	Virtual stakeholder validation workshop

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### Thursday 30 April

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11:00 – 12:00	Ntate Peter Clark - Head of programmes, Catholic Relieve Services
	Ntate Tseliso Kotela - Silk programmes, Catholic Relieve Services

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## Appendix 3 Interview Questions

For the interview with nutrition and climate stakeholders the following questions guided the interviews:

### **For Nutrition Stakeholders**

1. What is the area in the overall Food and Nutrition Security in Lesotho your organisation is responsible for?
2. What is the overall status of Water Security in Lesotho?
3. From your point of view, what is the underlying cause of the present nutrition situation in Lesotho?
4. Beside the children, who do you think are the most vulnerable in the society and where in Lesotho?
5. What activities are your organisation are conducting?
6. What are the major obstacles you face in your work and reaching the target group?
7. What linkages do you see with other programmes / topics and how are you taking advantage of them?
8. What research are you conducting at the moment pertaining to food and nutrition security?
9. Who or what are you main counterparts / networks / platforms / collaborators you are working with within Lesotho?
10. Would you be available for an e-consult on Tuesday 28 April 2020?

### **For Climate Stakeholders**

1. What is the area in the overall climate change in Lesotho were your organisation is responsible for? (Building resilience, Adaptation, mitigation, monitoring etc)?
2. How are wetlands in Lesotho: are water banks of the countries?
3. What is the overall status of Water Security in Lesotho?
4. From your point of view, what is the underlying cause of the present environmental degradation situation within Lesotho?
5. Beside the children, who do you think are the most vulnerable in the society and where in Lesotho?
6. What activities are your organisation conducting?
7. What are the major obstacles you face in your work and reaching the target group?
8. What linkages do you see with other programmes / topics planned and on-going within the sector?
9. What research are you conducting at the moment pertaining to Climate change and Food Security?
10. Who or what are you main counterparts / networks / platforms you are working with within Lesotho?
11. Would you be available for an e-consult on Tuesday 28 April 2020?

## Appendix 4 Overview of other main stakeholders in Lesotho

*Stakeholders and their main area of work in the field of food and nutrition security.*

Ministry/ Organisation	Department	Main field of work	Responsibilities and/ or tasks	Location of activities
Ministry of Agriculture and Food Security	Nutrition Department	Awareness creation and income generation projects to improve household food security and nutritional status	<ul style="list-style-type: none"> <li>• Creating and promoting awareness, and educating the public on nutrition,</li> <li>• Nutrition in HIV and AIDS treatment, care and support and improved livelihoods</li> <li>• Monitoring and evaluating nutrition and home economics projects including income generating activities</li> </ul>	
	Agric Information Department	Information dissemination	MoAFS-Nutrition Department delivers Nutrition education through radio programmes facilitated through the department on Radio Lesotho	
	Agric Research	Conducts food and Nutrition Research to guide policy	<ul style="list-style-type: none"> <li>• Laboratory services</li> <li>• Product development</li> </ul>	
	Lesotho Agriculture College	Training of Home Economists		National
Ministry of Health	Environmental Health Inspectorate Unit	Food Safety	Inspectorate	National & District

Ministry/ Organisation	Department	Main field of work	Responsibilities and/ or tasks	Location of activities
	Nutrition department	Nutrition-specific activities	<p><b>Maternal nutrition</b> Nutrition assessment (MUAC), education and counselling,</p> <p><b>Infant and Young Child Feeding</b> Education, counselling and support (breastfeeding support groups at community level)</p> <p><b>Micronutrient supplementation</b></p> <ul style="list-style-type: none"> <li>• Iron folate acid given to pregnant women during the third (3<sup>rd</sup>) trimester</li> <li>• Vitamin A given to a mother immediately after delivery</li> <li>• Vitamin A given to children from 6 – 59 months at 6 months intervals, children also receive deworming tablets (albendazole) at 12 – 59 months at 6 months interval</li> <li>• Micronutrient supplementation (15 vitamins and minerals) – children 6 – 23 months currently in Mokhotlong and Botha-Bothe. MoH is in the process of scaling-up to other districts.</li> </ul>	National, District and Community
Ministry of Water	Water quality department	Management & Development of Water Resources	<ul style="list-style-type: none"> <li>• Analysis of monitoring tasks of all districts</li> <li>• Strategy development</li> <li>• Policy development</li> <li>• Water quality monitoring</li> </ul>	National,
	Department of Rural Water Supply	Rural water supply	<ul style="list-style-type: none"> <li>• Construction of water sources in rural areas</li> <li>• Sanitation &amp; hygiene services</li> </ul>	District, Community
	Water and Sanitation Company (WASCO)	Urban water supply	<ul style="list-style-type: none"> <li>• Provision of waste and sewage services in urban areas</li> </ul>	National, District



Ministry/ Organisation	Department	Main field of work	Responsibilities and/ or tasks	Location of activities
Prime Minister's Office	Food and Nutrition Coordinating Office (FNCO)	Secretariat of the Food and Nutrition Council  Coordination of nutrition activities	<ul style="list-style-type: none"> <li>• Nutrition programming and advocacy</li> <li>• Technical guidance</li> <li>• Research (Nutrition Surveys)</li> <li>• Policy formulation</li> <li>• Monitoring and Evaluation</li> <li>• SUN focal point</li> </ul>	National & district
	Disaster Management Authority (DMA)	Disaster risk reduction	<ul style="list-style-type: none"> <li>• Policy</li> <li>• Awareness creation &amp; information dissemination</li> <li>• Disaster preparedness and response</li> </ul>	National, district and community
Ministry of Education	School Feeding Programme	Improve nutritional status of school children	Provision of school meals	National, District & community
	Early Childhood Care & Development (ECCD) Unit	Childcare & development	Nutrition & Health	National, District & Community
National University of Lesotho	Nutrition Division	Offers a BSc Nutrition Programme	<ul style="list-style-type: none"> <li>• Teaching</li> <li>• Staff Research projects</li> <li>• Training of small-scale food processors on food safety aspects</li> <li>• Health promotion initiative with the public on various nutrition issues</li> <li>• Development of affordable weaning foods</li> </ul>	National Community Level – through community engagement
Ministry of Trade & Industry	Department of Standards and Quality Assurance (DSQA)	Ensuring that food safety and hygiene align to the Lesotho Standards Institute (LSI)	<ul style="list-style-type: none"> <li>• Coordination of food standards formulation, adoption and harmonisation – guided by the Codex Alimentarius Commission and in collaboration</li> <li>• Food quality infrastructure for determining mechanisms for verification, quality and safe fortified food products.</li> </ul>	National
	Consumer Section	Promotion and protection of consumer rights,	Advocacy for the consumption of safe, quality and fortified foods by the general public	National
Ministry of Small Business, Cooperatives and Marketing	Marketing Department		Import and export of essential food items, controls prices of staple foods and ensures the distribution of food from surplus regions to deficit areas.	National

Ministry/ Organisation	Department	Main field of work	Responsibilities and/ or tasks	Location of activities
WHO		Technical & Financial support	<ul style="list-style-type: none"> <li>• Policy development and implementation</li> <li>• Nutrition technical support</li> </ul>	National
WFP	Nutrition & Food Security	Technical & Financial support	<ul style="list-style-type: none"> <li>• Nutrition Policy &amp; Strategic Plan</li> <li>• Formulation of Food Fortification legislation</li> <li>• School Feeding</li> <li>• Public works – community road construction and land reclamation projects in collaboration with Ministry of Forestry, Range and Soil Conservation (MFRSC)</li> <li>• Address food insecurity among PLWHAs</li> <li>• Nutrition SBCC Strategy</li> </ul>	National, District
UNICEF		Technical & Financial support		National
FAO		Technical & Financial support		National
World Vision Lesotho (WVL)		Area development programmes	Projects: <ul style="list-style-type: none"> <li>• Food security and nutrition</li> <li>• Health and HIV/AIDS</li> <li>• Child protection</li> </ul>	National, Community
Catholic Relief Services (CRS)		Household food security	<ul style="list-style-type: none"> <li>• Key-hole gardening</li> <li>• Small livestock production</li> <li>• Fruit trees</li> <li>• Savings &amp; Internal Lending Communities</li> <li>• Orphans &amp; Vulnerable children</li> <li>• Improvement of quality of Day Care centre around factory areas in Maseru (Thetsane Industrial Areas) and Leribe (Maputsoe)</li> </ul>	National
Elizabeth Glaser Paediatric AIDS Foundation (EGPAF)		Fights against paediatric HIV through prevention, care and treatment programmes, advocacy and research	<ul style="list-style-type: none"> <li>• Health care programmes for adults, adolescents and children (HIV testing and diagnosis)</li> <li>• Maternal, newborn and childcare – including prevention of mother-to-child-transmission (prenatal treatment, safe childbirth, postnatal care)</li> <li>• Nutrition and general wellness</li> <li>• Sexual and reproductive health services</li> </ul>	National level and selected districts

Ministry/ Organisation	Department	Main field of work	Responsibilities and/ or tasks	Location of activities
Lesotho Red Cross Society			Nutrition-related projects: <ul style="list-style-type: none"> <li>• Promotion of keyhole gardens through training of 'lead farmers' in the communities</li> <li>• Food preservation and sale of surplus production for income generation</li> <li>• Water and sanitation project</li> </ul>	National and selected districts

*Key-stakeholders in the field of climate, water and/or the environment*

Actors	Main field of work	Responsibilities and/or tasks	Location of activities
Commissioner of Water	Water Sector Coordination	Strategy development Policy development Water programmes coordination	National
Ministry of Water - Water quality department	Water resources management	Water quality and quantity monitoring for surface and groundwater Water resources planning Water use allocation and licensing Pollution control and management Catchment management Strategy implementation Policy implementation	National
Ministry of Agriculture and Food Security	Facilitating climate-smart of food and nutrition at household level, advice and investments on production.		
Ministry of Education	Research and development, curriculum development, school feeding programmes	Sustainable	
Ministry of Energy - Lesotho Meteorological services		Coordination of Climate change activities within the country through a National Climate change Coordination Committee established in 2013	
Ministry of Water –	DWA Mandate: Water resources assessment and management. Water allocation, state of water resources report and water uses data base.		
Department of Water Affairs (ICM Coordination Unit)		Facilitating the coordination of land and water programmes across the 74 sub-catchment management areas within the country.	
Ministry of Environment and Tourism			
Leloaleng skills Development centre		Farm Mechanisation repairs	
Bethel	Permaculture – land water and food security training with emphasis on building resilience to climate change		
Appropriate Technology services	Farm mechanisation		
Lesotho Agricultural college			

Actors	Main field of work	Responsibilities and/or tasks	Location of activities
National University of Lesotho	<p>Sustainable Energy Programme</p> <p>The University has established a Student led product research, development and incubation hub. This directly contributes to job creation through the established NUL innovation Hub. This programme will contribute towards sustainable land use management. Communities will now recognise the monetary value of the raw materials and will make efforts towards their conservation. This will facilitate continued supply of raw materials to the Emerging industries.</p>		

Stakeholders, projects and lessons learned from a food and climate, water or environment perspective.

Project/ Programme	Main objectives and activities	Funding partner(s)	Implementing partners	Target group	Location activities	of Lessons learned
Senqu Valley project 1974 - 1977	To assist the Government of Lesotho in meeting its national objective to increase agricultural production above the present largely subsistence level and to create employment opportunity by promoting competitive earning from agricultural production <b>Activities</b> 1. Identify the constraints to rural development in the project area; 2. Determine and demonstrate the economic feasibility of overcoming these constraints 3. Strengthen the Government services to carry out the needed activities		Ministry of Agriculture Farmers			<ul style="list-style-type: none"> <li>Consider cultural barriers regarding some IGA</li> <li>Range management and crop husbandry are key community priorities</li> <li>The incentives and project inputs create a dependency syndrome</li> </ul>
LAND AND WATER RESOURCES DEVELOPMENT PROJECT LWRDP (1975-1983)	To promote incorporation of land and water use plans in all agricultural development projects Assist Lesotho farmers to adopt proper land management practices.  The specific objectives are reported as: <ul style="list-style-type: none"> <li>Skill transfer</li> <li>Adoption of technology</li> <li>Institutional development</li> <li>GOL-rural population linkages.</li> </ul>		Farmers Ministry of Agriculture			<ul style="list-style-type: none"> <li>Lack of research component in the programme.</li> <li>Failed to recognise need for institutional constraints</li> <li>Sustained yield were not assessed for continuity</li> </ul>
Land Management and Conservation Project 1987 -1992	To develop local skills in the planning and management of the use of natural resources through a participatory approach.  <b>Main activities</b> Legal reforms Resources Management Plans Civil works – office and accommodation for District Agricultural officers Training Drought recovery assistance	World Bank Government of Lesotho	Ministry of Local Government		Mokhotlong Qachas nek	<ul style="list-style-type: none"> <li>Inter-ministerial cooperation crucial for progress</li> <li>Those elected to lead local community development must have basic skills like literacy and numeracy</li> <li>Pilot phasing of programme implementation.</li> <li>Involve NGOs in project implementation i.e.. Training</li> </ul>

Project/ Programme	Main objectives and activities	Funding partner(s)	Implementing partners	Target group	Location activities	of Lessons learned
CAPACITY BUILDING WITH KNOWLEDGE MANAGEMENT (SLM)	The project aims to address land degradation through policy reforms that promote community-based approaches to natural resource management and piloting of SLM practices that restore environmental services and improve the livelihoods of local communities. The project area is a Makhoalipana Community Council (ca 110 000 ha) in the mountain areas of Maseru district, Makhoalipana Community Council.					<ul style="list-style-type: none"> <li>Using existing information will help to design better projects and avoid re-design once implementation starts</li> <li>The basis for project design should be a theory of change</li> <li>The IGAs are instrumental in promoting community cohesion and may therefore be considered as an integral part of a community-based range management strategy.</li> <li>For longer-term growth potential, access to credit and markets will be a constraint.</li> </ul>
STRENGTHENING CAPACITY FOR CLIMATE CHANGE ADAPTATION THROUGH SUPPORT TO INTEGRATED WATERSHED MANAGEMENT		Lesotho,	FAO and GEF			<ul style="list-style-type: none"> <li>Understanding implications of the project design is necessary at the inception phase to make relevant adjustments prior to implementation</li> <li>Design interventions that are aligned to the needs and capacity of the respective communities.</li> <li>Without the provision of incentives and alternative livelihood activities and inputs some activities such voluntary exclusion of rangelands for grazing by up to three years may not necessary occur.</li> </ul>

Project/ Programme	Main objectives and activities	Funding partner(s)	Implementing partners	Target group	Location activities	of Lessons learned
Africa Adaptation programme	Support integrated and comprehensive approaches to climate change and adaptation in Lesotho under the bigger Africa initiative. This programme was started in 2010 – 13. Focus on health and Energy Sectors with the overall outcome that government, local institutions and communities are able to develop and implement climate change adaptation strategies	.				
SUSTAINABLE AGRICULTURE AND NATURAL RESOURCE MANAGEMENT PROGRAMME 2005 - 2011	The overall goal of the programme was to improve food security, family nutrition and incomes for rural households in the programme area to near, or above the national poverty line.  Main activities Construction of roof water tanks Soil and Water conservation structures construction Grass reseeding Civil and goods purchases (vehicles) Formation of Grazing Associations	IFAD Government of Lesotho	Government of Lesotho	Landless, below subsistence, or small-scale farmers operating on less than 2 hectares (ha) of land	Mafeteng, Mohale's Hoek and Quthing	<ul style="list-style-type: none"> <li>• Involvement of Department of Agricultural Research is vital</li> <li>• Shared vision or approach in Soil and water conservation vital</li> <li>• Incorporation of programme into Government operations allows long-term sustainability</li> </ul>
'Reducing vulnerability from climate change in the Foothills, Lowlands and the Lower Senqu River Basin (RVCC)	to mainstream climate risk considerations into the Land Rehabilitation Programme of Lesotho (LRP) for improved ecosystem resilience and reduced vulnerability of livelihoods to climate shocks.  Main activities institutional capacity; climate change mainstreaming; climate-smart interventions on the ground, with a particular emphasis on land rehabilitation.	United Nations Development Programme (UNDP) funded by the Least Developed Countries Fund (LDCF) – Global Environment Facility (GEF).	Government of Lesotho, in particular by the Ministry of Forestry, Range and Soil Conservation (MFRSC),		Mohales Hoek Community Councils of Lithipeng, Khoelenya and Thaba-Mokhele	

Project/ Programme	Main objectives and activities	Funding partner(s)	Implementing partners	Target group	Location activities	of Lessons learned
Support to Climate Change Vulnerability Risk Assessment Adaptation and mitigation	<ul style="list-style-type: none"> <li>• Reduce vulnerability of Basotho to climate change</li> <li>• Adapt to changing climate</li> <li>• Develop and promote the use of clean and efficient technologies in an effort to drive Lesotho towards a resilient low-carbon development path</li> <li>• Improve livelihoods</li> <li>• Promote public private partnerships through development and promotion of clean technologies</li> </ul>					
ICM - programme	<p>Reduce the rate of environmental degradation at catchment level. Build Climate Change Resilient Sub-catchments while alleviating poverty by:</p> <ul style="list-style-type: none"> <li>• Introducing institutional and legal reforms</li> <li>• Drawing a baseline assessment of selected pilot catchments</li> <li>• Development of Catchment management plans for each area for future development</li> </ul>					
Comprehensive Africa Agriculture Development Programme (CAADP)	<p>Commits the country to achieving the goal of raising agricultural productivity by 6% per annum and ensuring that 10 percent of the national budget is allocated to agriculture.</p> <p>National Investment Plan for Agriculture developed (the plan is not yet approved by the government)</p>					
Smallholder Agricultural Development Programme (SADP)	<p>Supports smallholder farmers in exploiting opportunities and increasing productivity, as well as diversifying into market-oriented agriculture.</p> <p>Irrigated vegetable production, wool, mohair, dairy and poultry hatcheries</p>					
Emergency and Resilience Programme (ERP)	<p>Assists 18,500 vulnerable farming families across the country with agricultural inputs, and support the Ministry's extension staff with training on conservation agriculture, home gardening and nutrition.</p> <p>Home gardening and training of extension staff on conservation agriculture and nutrition</p>					
Wool and Mohair Promotion Project (WAMPP)	<p>To boost resilience of poor wool and mohair producers to the adverse effects of climate change in the Mountain and</p>					



Project/ Programme	Main objectives and activities	Funding partner(s)	Implementing partners	Target group	Location activities	of Lessons learned
	Foothills regions of Lesotho, while generating higher incomes and sustainably improved livelihoods The rural economies in the country is largely dependent on livestock. The quality wool and mohair exports address issues of poverty and ability to buy agricultural inputs.					
Khubelu Sponges Pilot project (2013 -	To demonstrate the methodological approach for sustainable management of wetlands. Project objectives were: Rehabilitate selected degraded wetlands Monitor the interventions Disseminate the lessons learned from the pilot Improve the livelihoods of people living in the Khubelu catchment  <b>Main activities</b> Participatory planning Construction physical rehabilitation structures High density rotational grazing Capacity building - livestock owners and minders Data collection – monitoring and evaluation	Transboundary Water Management in SADC GIZ BMZ DFID	DWA NUL Range Management	Livestock owners Herdboys Local Authorities	Khubelu Catchment – Phapong wetland Ramosetsa wetlands Mokhtlong,	<ul style="list-style-type: none"> <li>Multi stakeholder partnerships are vital for success</li> <li>Farmers adapt to changes in practices while herder do not as they don't see the monetary gains</li> <li>Beliefs and cultural norms must be known so they can be managed</li> <li>Private sector cooperation allows long-term investment in programme</li> <li>Environmental impact assessment of physical barriers construction must be done and mitigation measures adopted</li> </ul>
Wetlands Rehabilitation and Management project 2010 - 2014	To demonstrate the methodological approach for sustainable management of wetlands. Project objectives were: Rehabilitate selected degraded wetlands Monitor the interventions Disseminate the lessons learned from the pilot Improve the livelihoods of people living in the Khubelu catchment  <b>Main activities</b> Participatory planning Construction physical rehabilitation structures High density rotational grazing Capacity building - livestock owners and minders Data collection – monitoring and evaluation	Millenium Challenge cooperation GoL	MCA-L DWA MoFLR MoLG Range Management Livestock services	Livestock owners Herdboys Local Authorities	Khubelu Catchment: Koti sephola, Khalong la Lithunya, Mokhotlong, Botha Bothe	

# Appendix 5 Nutrition Situation in Lesotho

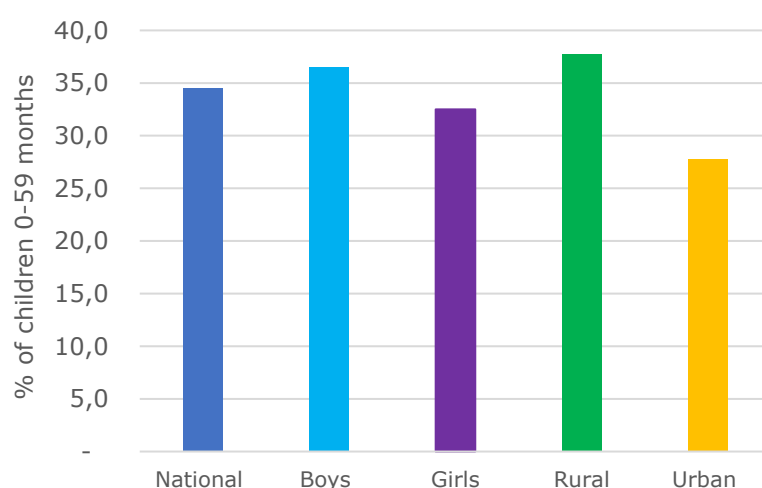
Child nutrition and development is crucial and the lack thereof has severe consequences for the individual and national development. Children with stunted growth have compromised cognitive development and physical capabilities, making yet another generation less productive than they would otherwise be. Undernutrition reduces a nation's economic advancement by at least 8% because of direct productivity losses, losses via poorer cognition, and losses via reduced schooling. Deficiencies of essential vitamins and minerals are widespread and have substantial adverse effects on child survival and development. Deficiencies of vitamin A and zinc adversely affect child health and survival, and deficiencies of iodine and iron, together with stunting, contribute to children not reaching their developmental potential. Prevalence of overweight and obesity is increasing in children younger than 5 years globally and is an important contributor to diabetes and other chronic diseases in adulthood (LANCET 2013).

This chapter will discuss the nutrition situation in Lesotho, based upon available data. Although that there are quite a number of studies done in the last decades, unfortunately not all the studies have the same level analysis. In sub-paragraphs 1.1. we will discuss nutrition situation in children, then the chapter continues in 1.2 with the nutrition situation in adolescents. The sub-paragraph 1.3 discusses the nutrition situation in adults and the chapter closes in 1.4 with Infant and Young Child feeding practices.

## A5.1 Nutrition Situation in Children under five years of age

### A5.1.1 Chronic undernutrition

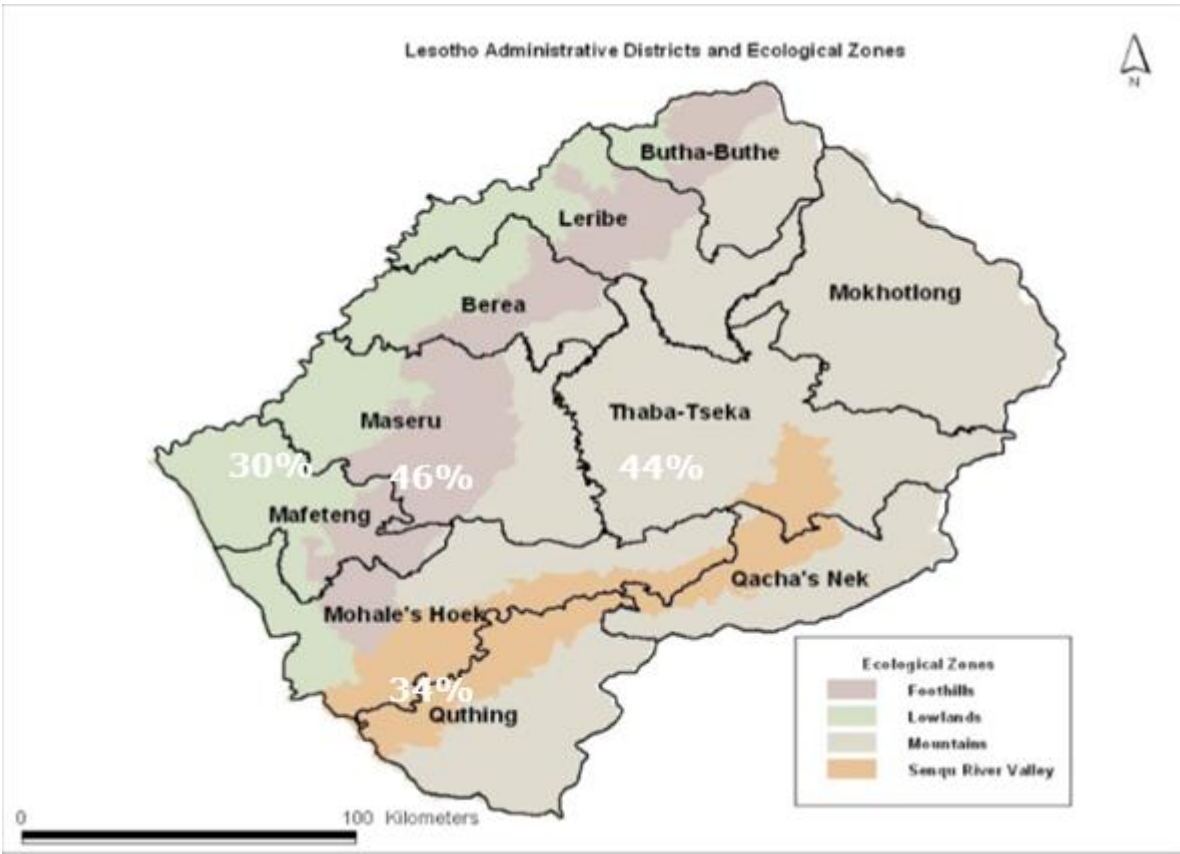
The most recent MICS survey of 2018 shows that overall 34,5% of children are stunted (chronic undernutrition). Of these children slightly more boys (36,5%) than girls (32,5%) are affected. Also, children living in rural areas are more chronic undernourished than children living in urban areas, 37,7% versus 27,8% respectively, please see figure 1.



**Figure 3** Stunting levels in children 0-59 months at national level for boys, girls and rural and Urban (MICS 2018).

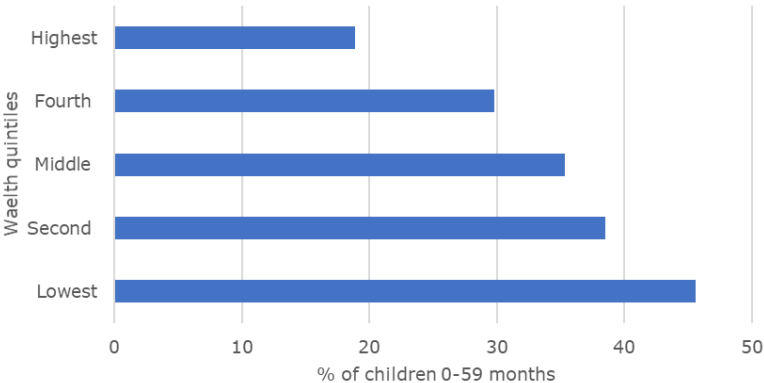
The MICS survey 2018 has no data on chronic undernutrition by district, only by ecological zones. Figure 2 shows the stunting levels by ecological zone, showing the highest stunting levels of 46% in

the foothills and the lowest stunting level of 30% in then lowlands. Unfortunately no explanation of these results are being provided, although the high chronic undernutrition situation in the Foothills stands out.



**Figure 2** Stunting levels in children 0-59 months by ecological zone (MICS 2018) and Map NSDP II.

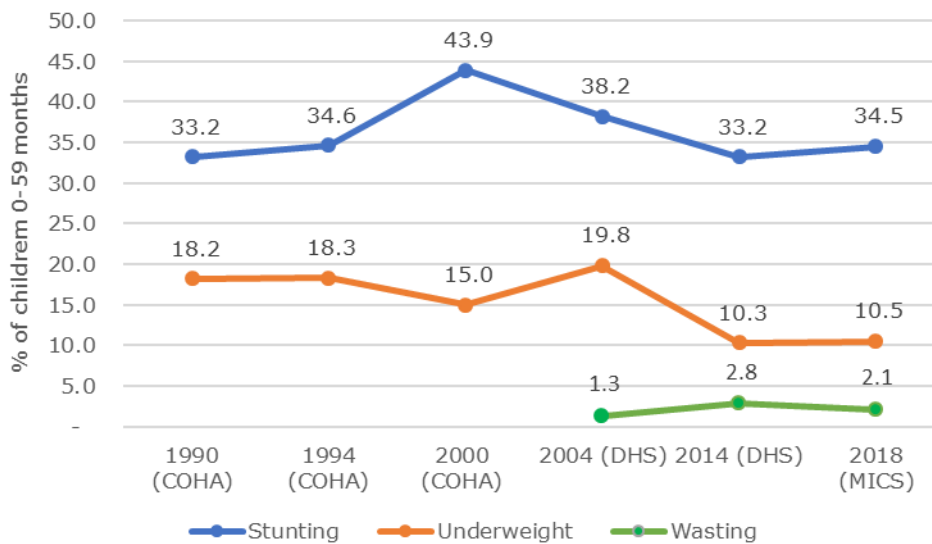
Looking at the wealth quintiles (figure 3), it can be observed that children in the poorest wealth quintile are most affected by chronic undernutrition, and children in the richest wealth quintile are less affected. The latter situation remains an area of attention as WHO classified this prevalence rate a medium level of severity (WHO, 2018), which remains quite high for this quintile.



**Figure 3** Stunting level in children 0-59 months for national level and per wealth quintile (MICS 2018).

### Trends in Chronic undernutrition

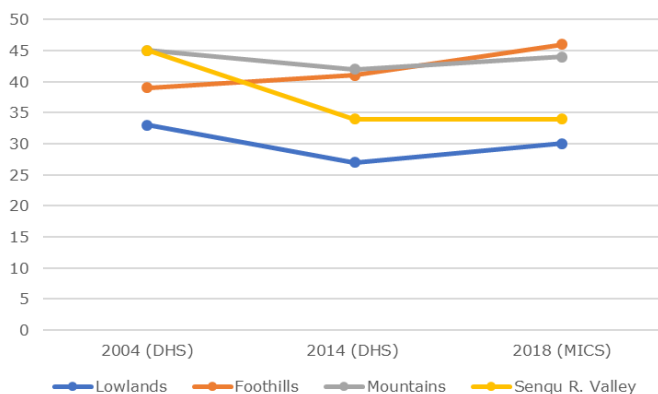
Lesotho has collected data on stunting, underweight and wasting since 1990. Please see figure 4 for the progression over time. Lesotho’s underweight and wasting prevalence thresholds are very low, although this needs monitoring no further special actions will be necessary. Looking at the progress that has been made with regard to improvement of chronic undernutrition since the 1990 then it can be concluded that Lesotho has managed to reduce the chronic undernutrition with 10 percentage points between 2000 and 2014, but this increased slightly in 2018. The situation remains alarming especially as progress seemed to have halted. The present situation will not only continue to cost the country yearly millions of Maloti, but will continue to affect the development and future productivity of many adults in Lesotho.



**Figure 4** Levels of stunting, underweight and wasting in children 0-59 months over between 1990 - 2018.

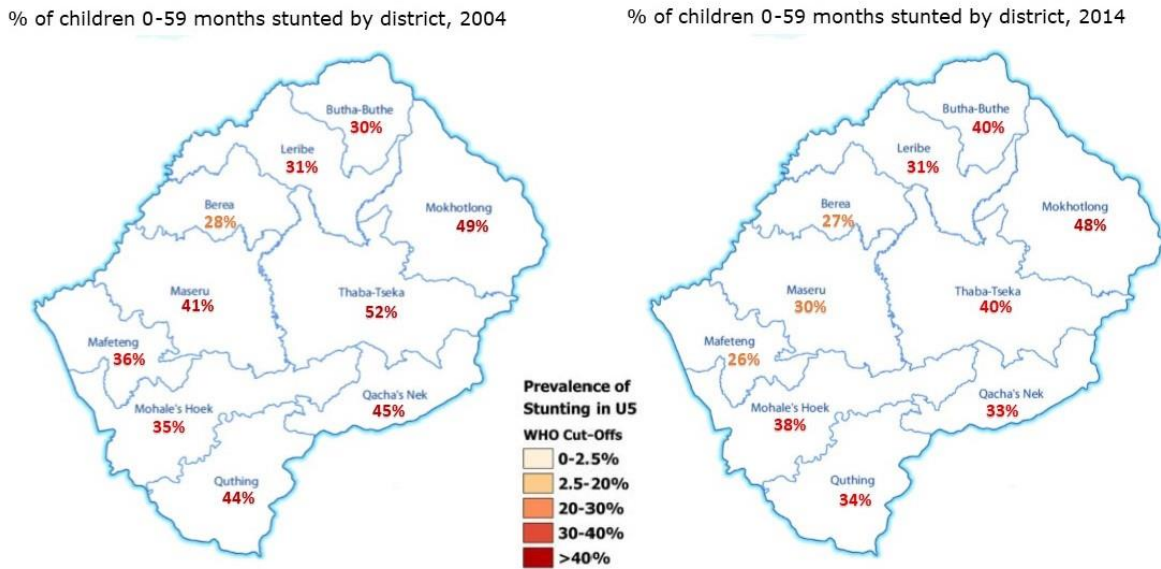
Unfortunately, only for the years 2004 and 2014 chronic undernutrition information per district is available. The MICS 2018 did not analyse the data per district. However, for the three surveys data on chronic undernutrition per ecological zone are available.

When reviewing stunting level data for the four Ecological Zones, see figure 5 for details, the foothills have been steadily increasing their stunting levels over a period of 14 years. The three other ecological zones seem to follow the trend of a reduction between 2004 and 2014 and a slight increase between 2014 and 2018.



**Figure 5** Percentage of children 0-59 months with chronic undernutrition per ecological zone, 2004, 2014 and 2018.

The data of DHS 2004 and 2014 for chronic undernutrition by district, please see figure 6 for details, shows no progress in stunting levels for the district of Mokhotlong, Leribe and Mohale’s Hoek. Only one district, Butha-Buthe, showed an increase in stunting levels from 30% in 2004 to 40% in 2014. The remainder of the districts, Berea, Maseru, Mafeteng, Quthing, Qacha’s Nek, and Thaba-Tseka reduced their stunting levels. However, all districts continue to have medium to very high stunting levels (WHO, 2018).



**Figure 6** Percentage of children 0-59 months stunted per district in 2004 and 2014 DHS (2018 WHO cut-off).

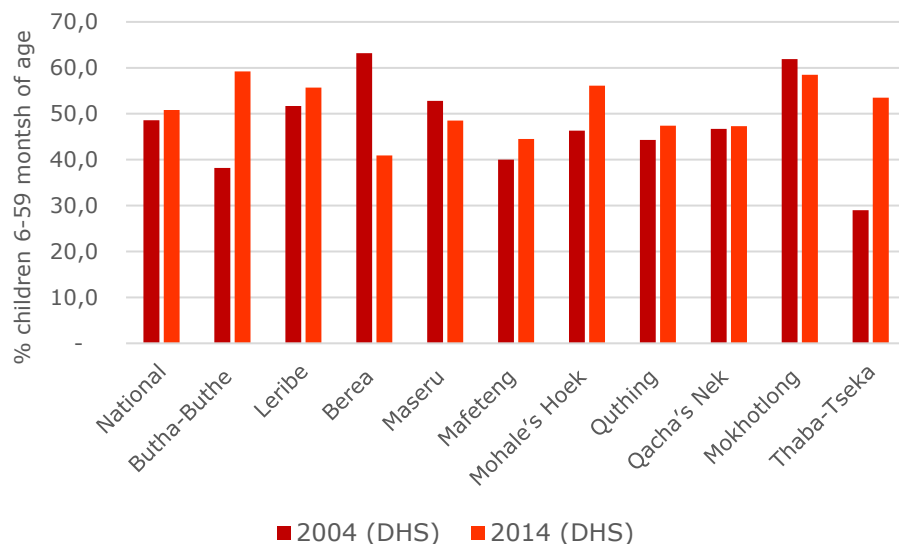
### A5.1.2 Micronutrient deficiencies

One of the triple burdens of malnutrition issue are micronutrient deficiencies. They are called micronutrients because they are needed only in minuscule amounts, these substances are the ‘magic wands’ that enable the body to produce enzymes, hormones and other substances essential for proper growth and development. As tiny as the amounts are, however, the consequences of their absence are severe. Iodine, vitamin A and iron are most important in global public health terms; their lack represents a major threat to the health and development of populations the world over, particularly children and pregnant women in low-income countries (WHO, 2020). Also, in Lesotho micronutrient deficiencies are prevalent. Data are available for 2004 and 2014.

#### Anaemia

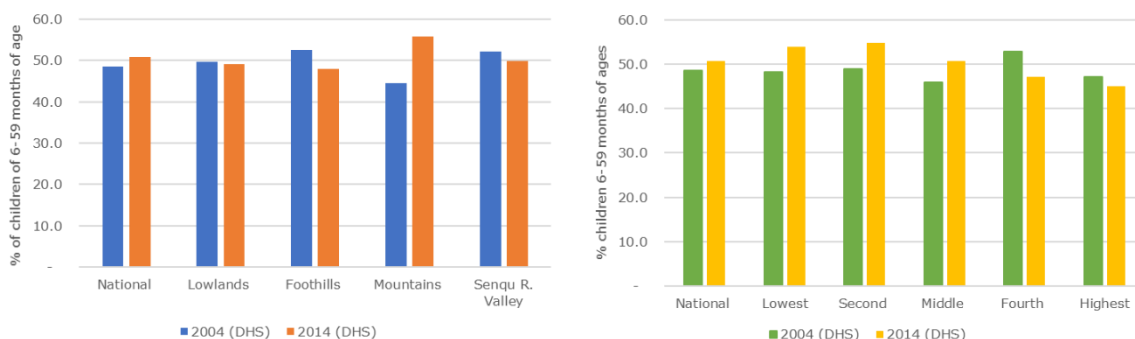
A lack of iron, folate and vitamins B12 and A can lead to anaemia. Anaemia is a condition in which there is a reduced number of red blood cells or haemoglobin concentration, causing fatigue, weakness, shortage of breath and dizziness. This can further lead to difficulties in functioning in work, education and community engagement. An estimated 42% of children under 5 years of age and 40% of pregnant women worldwide are anaemic (WHO 2020). Anaemia is also prevalent in Lesotho with an estimated 50.8% in children 6-59 months, which is one in two children is anaemic. This is higher than the estimated global average, although updated data is not available as the MICS 2018 survey did not include micronutrient deficiencies.

Figure 7 shows the anaemia level for national and district level in 2004 and 2014. Although at national level little progress has been made, there have been some positive and negative changes at district level. In half of the districts, more children are affected by anaemia in 2014 compared to 2004. In three districts anaemia levels in children improved and in one district the levels remained almost the same.



**Figure 7** Any anaemia (Hb 11<g/dl) prevalence rate in children aged 6-59 months for national and district level for 2004 and 2014.

Anaemia data per ecological zone, show that in the mountains more children are affected by anaemia in 2014 compared to 2004, see figure 8. In the other ecological zones slight improvements can be observed. In the same figure, the anaemia prevalence rates per wealth quintile show that prevalence rates do not differ very much between the wealth quintiles, although in 2014 children in the second wealth quintile are most severely affected by anaemia, while in 2004 children in the fourth quintile were most severely affected. Nonetheless the prevalence rates for anaemia remain really high, with about 1 out of 2 children suffering from anaemia.



**Figure 8** Anaemia (Hb 11<g/dl) prevalence rate in children aged 6-59 months by wealth for national level, by ecological zone and by wealth quintiles in 2004 and 2014.

### Vitamin A deficiency

Vitamin A deficiency is the leading cause of preventable blindness in children and increases the risk of disease and death from severe infections such as diarrhoeal disease and measles. Vitamin A deficiency may also occur in women during the last trimester of pregnancy in high-risk areas. Breastfeeding is the best way to protect babies from vitamin A deficiency and, in areas where vitamin A deficiency is a public health problem, vitamin A supplementation is recommended in infants and children 6-59 months of age (WHO, 2020).

There is little information available on Vitamin A status of children, but distribution of Vitamin A supplementation is being monitored. The data of the DHS 2004 and 2014 shows that the coverage of the supplementation is 54.6% and 61.3% respectively see table 1. The international recommendation for an effective vitamin A supplementation is at least 80% of children 6-59 months of age covered

every 6 months (UNICEF 2020). What stands out from the table is that there is a slightly lower coverage in the lowest two quintiles, but that coverage in the other three quintiles are similar both for 2004 and 2014.

**Table 1** Vitamin A supplementation coverage and iodised salt availability at household level at national, and by ecological zone and by district.

	2004 (DHS)		2014 (DHS)	
	Percentage given vit A supplements in last 6 months	Percentage living in households with iodised salt	Percentage given vit A supplements in last 6 months	Percentage living in households with iodised salt
National	54.6	90.7	61.3	92.7
<b>Ecological zone</b>				
Lowlands	55.2	94.4	62.2	96.0
Foothills	47.3	83.1	64.4	88.0
Mountains	52.4	83.6	57.7	87.4
Senqu River Valley	74.6	92.0	61.6	90.7
<b>District</b>				
Butha-Buthe	64.9	96.8	66.3	89.2
Leribe	52.5	91.7	58.5	94.9
Berea	40.6	91.8	63.0	96.7
Maseru	49.4	90.9	60.8	94.4
Mafeteng	69.9	89.9	73.6	93.8
Mohale's Hoek	60.3	91.4	60.3	82.3
Quthing	73.8	92.5	53.3	99.3
Qacha's Nek	34.1	63.9	53.6	84.2
Mokhotlong	66.7	89.9	58.9	91.0
Thaba-Tseka	42.0	92.5	60.5	85.1
<b>Wealth quintile</b>				
Lowest	45.9	81.9	59.1	84.3
Second	53.5	86.1	59.6	91.7
Middle	58.7	90.5	61.9	93.0
Fourth	58.5	94.8	63.2	97.1
Highest	58.1	97.7	62.9	98.5

### Iodine deficiency

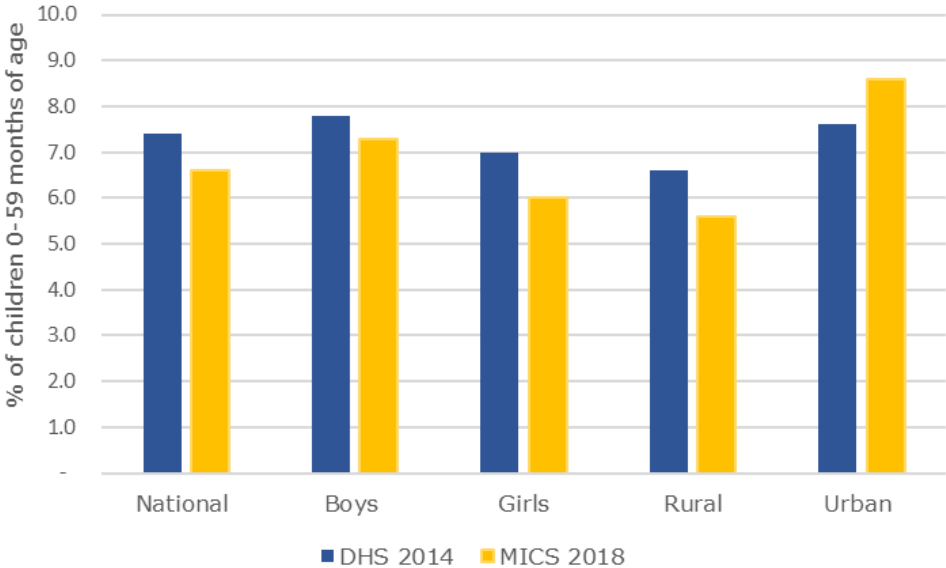
Severe iodine deficiency can lead to brain damage and during pregnancy can cause a number of issues including stillbirth, spontaneous abortion and congenital anomalies. Less severe iodine deficiency may still cause mental impairment that reduces intellectual capacity. The preferred strategy for the control of iodine deficiency remains universal salt iodisation, which requires that all food-grade salt used in household and food processing be fortified with iodine (WHO, 2020). UNICEF estimates that 66% of households globally have access to iodised salt. Lesotho had in 2004 and 2014 a very high coverage of over 90% of households having iodised salt available with adequate levels of iodisation. This sustained coverage is very high and surpasses the global percentage of 66%.

The foothills have the lowest coverage in 2014 with 88.0% of households having iodised salt, while the Lowlands have the highest coverage. With regard to the district, the district with the lowest coverage is Mohale's Hoek (82.3%) and the highest in Quthing (99.3%). The fact that all salt for human and animal consumption is imported might be contributing to this high coverage.

### A5.1.3 Overweight and Obesity

Prevalence of overweight and obesity is increasing in children younger than 5 years globally and is an important contributor to diabetes and other chronic diseases in adulthood (LANCET, 2013). For Lesotho, data is available on overweight and obesity in children under five from the 2014 DHS and 2018 MICS surveys. Figure 9 shows the data at national level, for boys and girls and for rural and urban areas. It seems that overweight in under-fives has reduced slightly from 7.4% in 2014 to 6.6%

in 2018, which is a positive development. The largest difference can be found in the increase in overweight in urban children and reduction in rural children, which is, although a positive development, reason for concern, as stunting data shows in an increase and both could be affected by the worsening food security situation in the country (figure 9 in the main text). In this age group girls are less affected than boys by overweight.



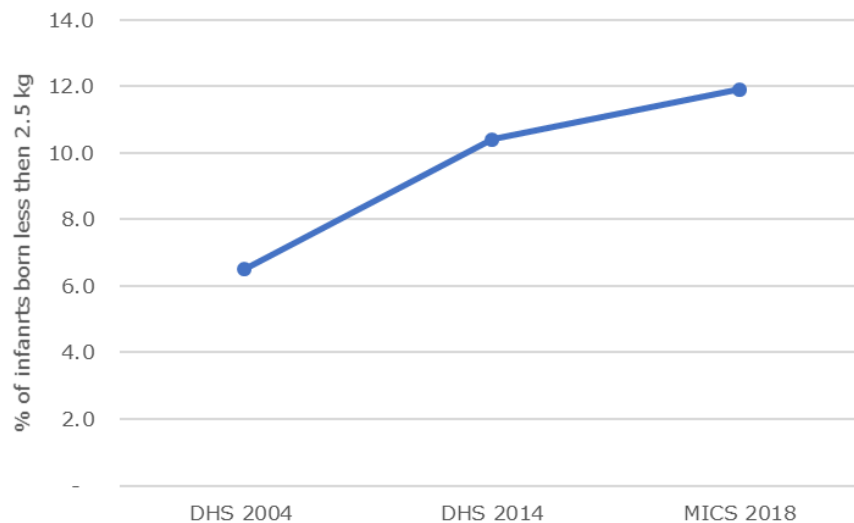
**Figure 9** Overweight levels (+2SD weight-for-height) in children 0-59 months of age at national level for boys, girls and rural and Urban (MICS 2018).

The MICS 2018 shows that children with obesity (+3SD weight-for-height) is still very low, at 1.2%.

**A5.1.4 Low birth weight**

Low birth weight (LBW) is defined by the World Health Organization (WHO) as weight at birth less than 2500 g (5.5 lb). Low birth weight continues to be a significant public health problem globally and is associated with a range of both short- and long-term consequences, such as foetal and neonatal mortality and morbidity, poor cognitive development and an increased risk of chronic diseases later in life (WHO 2014). In Lesotho the prevalence of low birth weight has almost doubled from 6.4% in 2004 to 11.9% in 2018 as shown in figure 10. Material nutrition and health is main contributing factor of birth outcomes.



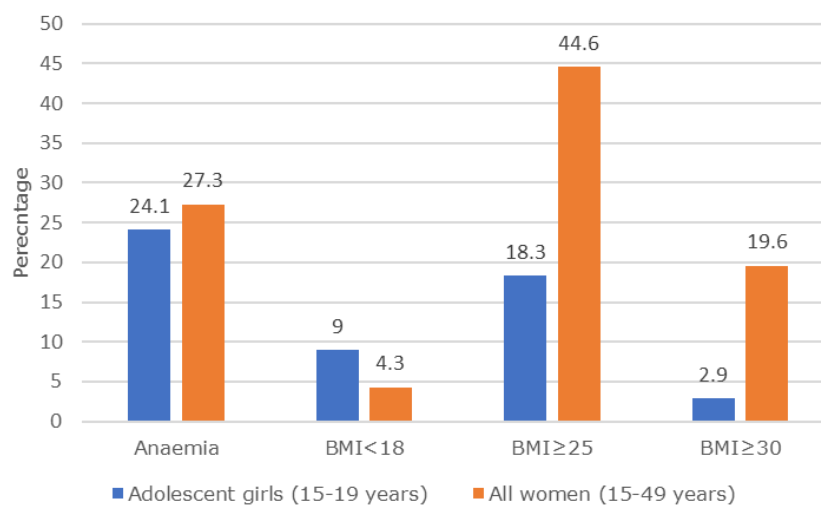


**Figure 10** Percentage of live births born with birthweight less than 2500 g in 2004, 2014 and 2018.

## A5.1.2 Adolescent nutrition in Lesotho

Adolescence (10-19 years according to the WHO) is a transit period from childhood to adulthood and this period is characterised by many changes. These could be physical, physiological and also mental changes, impacting e.g. the processing of emotions, risks, rewards and social relationships. To support these changes in the body and mind adolescents need good and nutritious diets. Especially adolescent girls, their need is especially high because the body is preparing for future motherhood (UNICEF, 2017). Adolescents (15-19 years) are vulnerable and a high rate of malnutrition in girls not only contributes to increased morbidity and mortality associated with pregnancy and delivery, but also to increased risk of delivering low birth-weight babies.

Data on adolescent girls (15-19 years) from 2014, see figure 18, show that anaemia in this group is prevalent, although not as high compared to all women (15-49 years) in Lesotho. Adolescent girls have more underweight compared to all women in the survey, although overweight and obesity are relatively low in this age group. In addition, the MICS 2018 shows that 17.8% of adolescent girls (15-19 years) have experienced one birth or are pregnant with their first child.



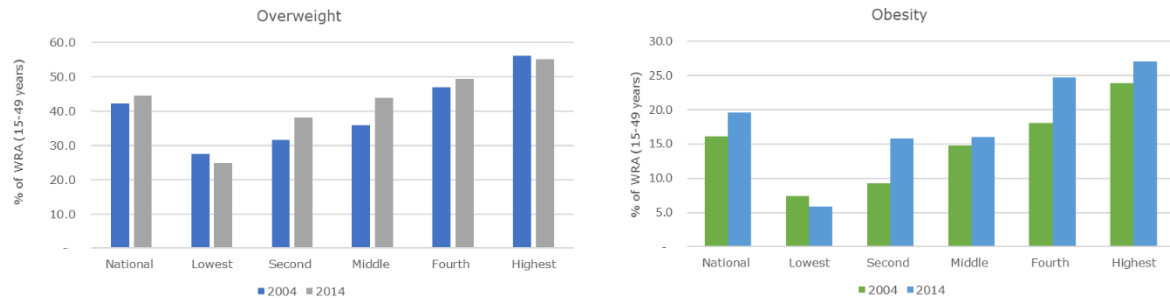
**Figure 4** Any anaemia ( $hb < 12g/dl$ ), underweight ( $BMI < 18$ ), overweight ( $BMI \geq 25$ ) and obesity ( $BMI \geq 30$ ) for adolescent girls (15-19 years) and all women (15-49 years), DHS 2014.

### A5.1.3 Adult nutrition in Lesotho

#### Overweight and obesity

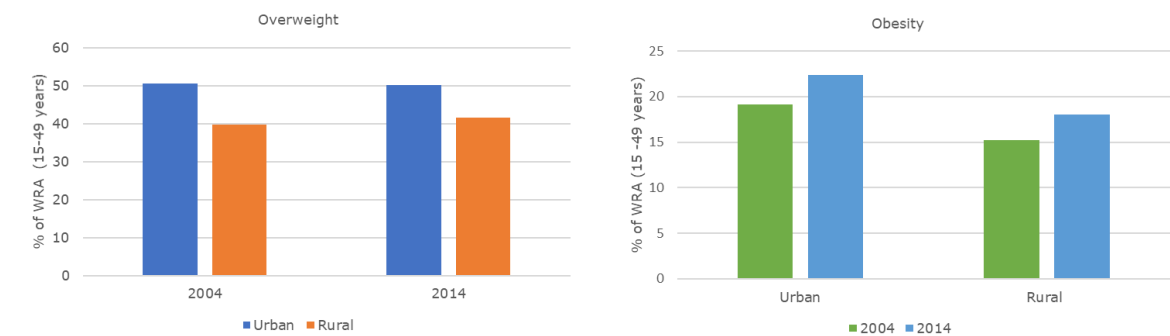
Overweight and obesity are part of the triple burden of malnutrition. In 2016, more than 1.9 billion adults aged 18 years and older were overweight. Of these over 650 million adults were obese. Once considered a high-income country problem, overweight and obesity are now on the rise in low- and middle-income countries, particularly in urban settings. Overweight and obesity are linked to more deaths worldwide than underweight. Globally there are more people who are obese than underweight – this occurs in every region except parts of sub-Saharan Africa and Asia (WHO, 2020). Monitoring of obesity levels is one of SDG indicators to evaluate the nutritional status of the population.

In Lesotho, overweight in women aged 15-49 years has slightly increased from 42.3% in 2004 to 44.2% in 2014 as shown in figure 11. The same development is found for the obesity rates which increased from 16.1% in 2004 to 19.6% in 2014. Overweight and obesity are more prevalent in the highest wealth quintiles. Although overweight slightly reduced in the highest and lowest quintiles, obesity increased especially in the second, fourth and highest quintiles. The second and fourth wealth quintile showed increased obesity prevalence with 6.5 and 6.6 percentage points respectively.



**Figure 11** Overweight ( $BMI \geq 25$ ) and obesity ( $BMI \geq 30$ ) in women of reproductive age (15-49 years) national and per wealth quintiles in 2004 and 2014 (DHS 2004, DHS 2014).

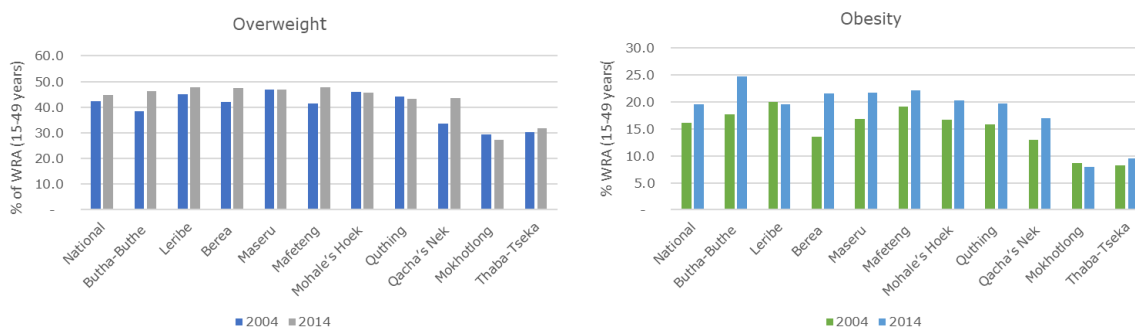
When examine the data for urban and rural areas, the following can be observed in figure 12. Overweight in urban women have remain more or less the same between 2004 and 2014, for rural women a slight increase can be observed. Increase in obesity for both rural and urban women can be observed.



**Figure 12** Overweight ( $BMI \geq 25$ ) and obesity ( $BMI \geq 30$ ) in urban and rural women of reproductive age (15-49 years) in 2004 and 2014 (DHS 2004, DHS 2014).

District level data show increased prevalence rates for overweight and obesity between 2004 and 2014 in all districts, except for Mokhotlong which shows a slight reduction in overweight and obesity rates, see figure 13. The district with the largest increase in overweight prevalence with almost

10 percentage points is Qacha's Nek. Leribe district increased their obesity prevalence with 8 percentage points and is the district with the highest increase in prevalence rates.



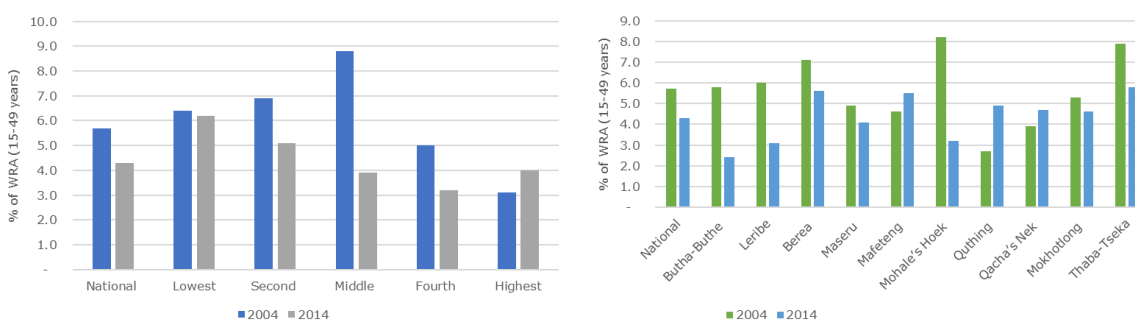
**Figure 13** Overweight (BMI ≥ 25) and obesity (BMI ≥ 30) in women of reproductive age (15-49 years) national and per district in 2004 and 2014 (DHS 2004, DHS 2014).

### Undernutrition

Nutrition is a critical part of health and development. Better nutrition is related to improved infant, child and maternal health, stronger immune systems, safer pregnancy and childbirth, lower risk of non-communicable diseases (such as diabetes and cardiovascular disease), and longevity (WHO, 2020). Undernutrition in women of reproductive age is linked to low birth weight providing the newborn not an optimal start in life, and at the same time it will also affect childbirth.

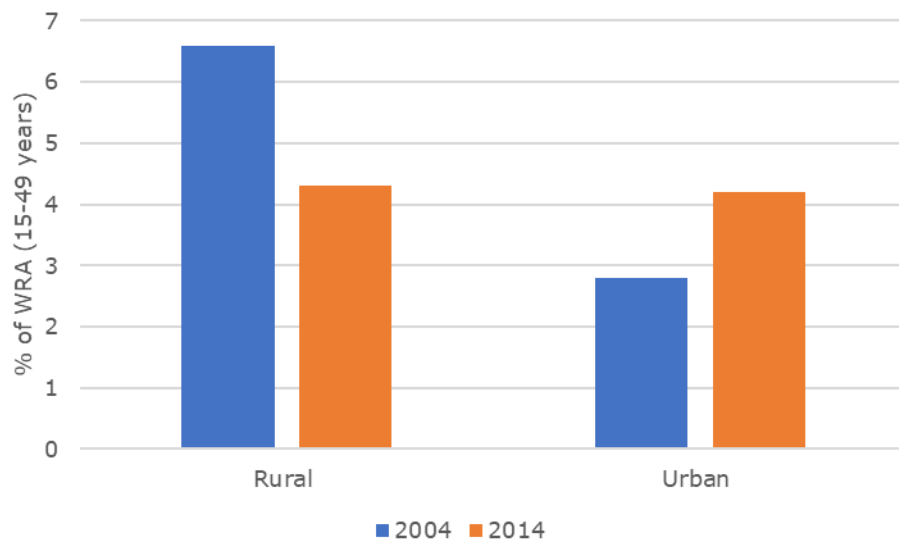
Figure 14 shows that underweight in women of reproductive ages has reduced from 5.7% in 2004 to 4.3% in 2014. Although women in the lowest quintile are expected to have the highest prevalence of underweight, in 2004 women in the middle wealth quintile were most affected by underweight. For 2014, women in the lowest quintile were indeed most affected by underweight, while the prevalence in the middle wealth quintile decreased with about 5 percentage points.

At district level, prevalence of undernutrition in women 15-49 years of age reduced between 2004 and 2014. Mohale's Hoek decreased their undernutrition prevalence with 5 percentage points. The districts Mafeteng, Quach's Nek and Quthing found that more women between 15-49 years of age were affected by undernutrition. In Quthing district the prevalence increased with over 2 percentage points.



**Figure 14** Underweight (BMI < 18) in women of reproductive age (15-49 years) national and per wealth quintile and per district in 2004 and 2014 (DHS 2004, DHS 2014).

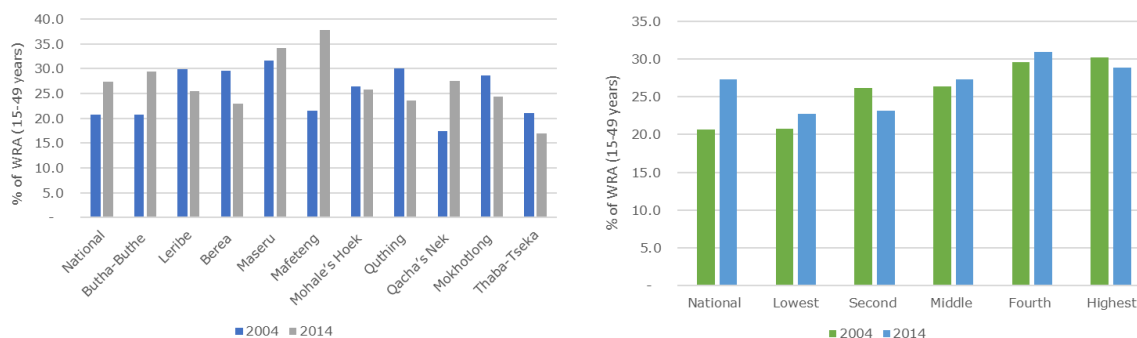
Data for urban and rural women, presented in table 15, shows that in 2004 women in rural areas are more affected by underweight compared with urban women in 2014. Although that women in rural areas are less affected by underweight in 2014 compared to 2004, the opposite is observed for urban women, where the prevalence rate increased with 1.5 percentage points.



**Figure 15** Underweight (BMI<18) in women of reproductive age (15-49 years) for rural and urban areas in 2004 and 2014 (DHS 2004, DHS 2014).

### Anaemia

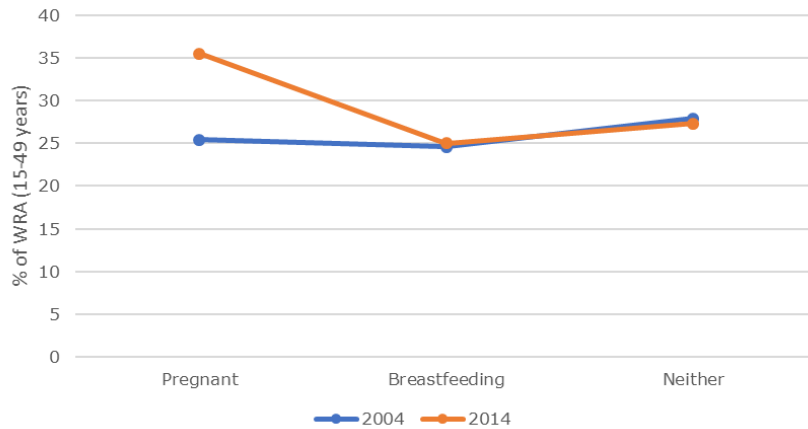
About 40% of the pregnant women worldwide are anaemic (WHO, 2020). In Lesotho, 27% of the female population suffered from anaemia. In 2014, 27.3% of women of reproductive age had anaemia, see figure 16, which is an increase of about 7% percentage points compared to 2004.



**Figure 16** Any anaemia (hb<12 g/dl) for national, by district and by wealth quintile in women of reproductive age for 2004 and 2014 (DHS 2004, DHS 2014).

The district with the highest increase in 2014 compared to 2004 is Mafeteng and also the districts of Quacha's Nek, Butha-Buthe and Maseru show increased in women of reproductive age with anaemia. The data by wealth quintile shows that women of reproductive age have a higher prevalence of anaemia than women of reproductive age in the two lowest wealth quintiles. Three of the 5 wealth quintiles show an increase of prevalence of anaemia in women, except the second and the highest quintiles, these show a lower prevalence.

The data in figure 17, show that 34.4% of pregnant women and 25.0% of breastfeeding women suffer from anaemia (HB<12g/dl) in 2014. This is an increase in prevalence of anaemia in pregnant women compared to 2004, but there is no difference for breastfeeding women.



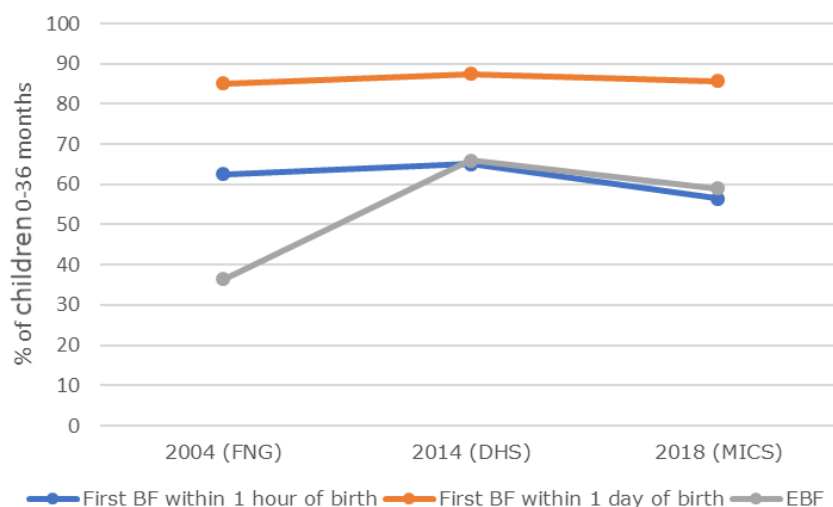
**Figure 17** Any anaemia for pregnant and breastfeeding women (hb<11 g/dl) and women that are neither pregnant or breastfeeding (Hb<12 g/dl) 2004 and 2014 (DHS 2004, DHS 2014).

### A5.1.4 Infant and Young Child Nutrition Practices

Infant and young child feeding is a key area to improve child survival and promote healthy growth and development of children under two years of age. The first 2 years of a child’s life are particularly important, as optimal nutrition during this period lowers morbidity and mortality, reduces the risk of chronic disease, and fosters better development overall. This period of the first 2 years of life has three critical phases for child health and development. The first 6 months are early initiation and exclusive breastfeeding which will help to protect the child against infections and childhood diseases.

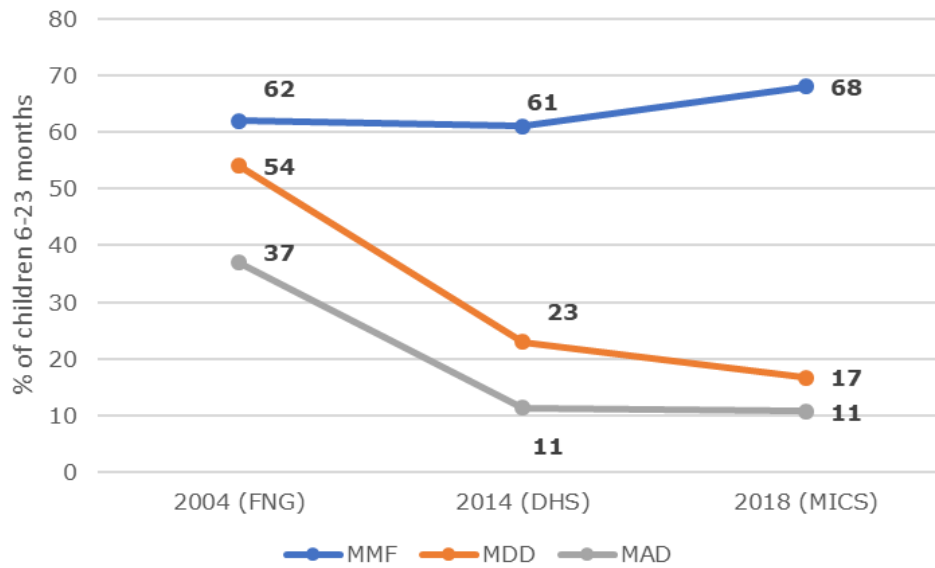
Figure 18 shows the initiation of breastfeeding within one day after birth has been around 85% over the years, although the prevalence of initiation of breastfeeding within one hour has dropped to 56.5% in 2018 from 65% in 2014. There is very little variation between the districts, in all districts 83% or more new-borns being breastfed within 1 day after birth.

In 2018 (MICS) 59% of children in Lesotho were exclusively breastfed (infant 0-5 months of age who are fed exclusively with breastmilk). As table 18 shows, this is 5 percentage point drop from 2014, despite that it is still an enormous improvement with 2004, when only about 36% of infants were breastfed. There is no recent data available at district level, and the data for the ecological zone is not complete.



**Figure 5** Prevalence of children 0-36 months who receive breastmilk within one hour or within one day after birth and who were exclusively breastfed in 2004 (DHS), 2014 (DHS) and 2018 (MICS).

Around the age of 6 months, an infant’s need for energy and nutrients starts to exceed that what is provided by breast milk, and complementary foods are necessary to meet those needs. An infant of this age is also developmentally ready for other foods. If complementary foods are not introduced around the age of 6 months, or if they are given inappropriately, an infant’s growth may falter.

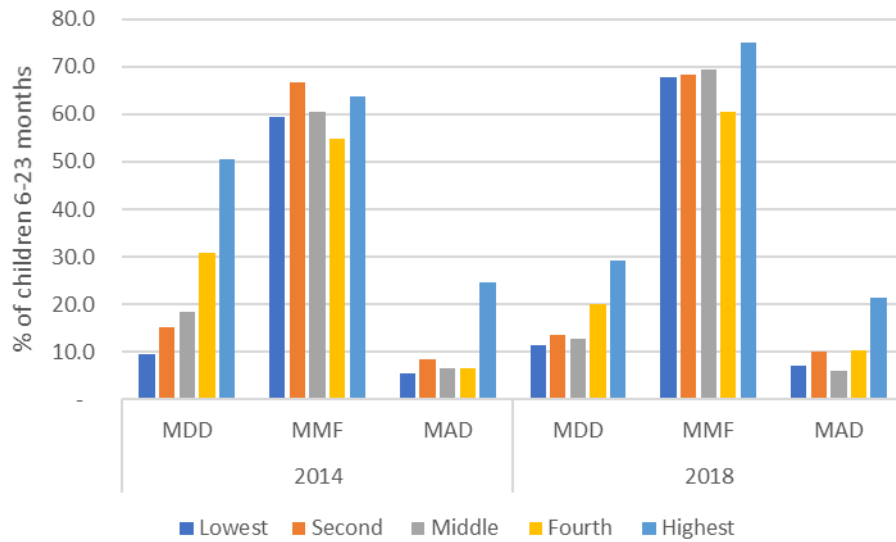


**Figure 19** Minimum Meal Frequency (MMF), Minimum Dietary Diversity (MDD) and Minimum Acceptable Diet (MAD) for children 6-23 months of age for 2004 (DHS), 2014 (DHS and 2018 (MICS)).

Figure 19 shows that the minimum meal frequency for children aged 6-23 months has improved with 7 percentage points between the last two survey from 61% in 2014 to 68% in 2018. However, the dietary diversity dropped further, although the percentage of children who received the minimum acceptable diet remains the same, probably because of the increase in children of 6-23 months who received minimum meal frequency.

Available data, see figure 20, on the three infant and young child feeding practices per wealth quintile for 2014 and 2018, show that although dietary diversity of children 6-23 year of age is higher in the fourth and highest wealth quintile in 2014, by 2018 this percentage dropped by about 21 percentage points in the highest wealth quintile. Also, the fourth wealth quintile shows a 10 percentage points decrease in the provision of diverse diets to children of 6-23 months between 2014 and 2018. Although the difference is less drastic for the second and middle wealth quintile, still also among these households less children received a diverse diet in 2018. Only the lowest wealth quintile showed an increase in prevalence of 2 percentage points.

The data show a different pattern for the minimum meal frequency. In 2014, 67% of children of 6-23 months in households in the second wealth quintile receive a minimum meal frequency, in 2018 75% of children in the highest wealth quintile were given a minimum meal frequency. In the fourth quintile about 55% and 60% of children in 2014 and 2018 respectively received a minimum meal frequency, this the lowest percentage for both years.



**Figure 20** Minimum Dietary Diversity (MDD), Minimum Meal Frequency (MMF), and Minimum Acceptable Diet (MAD) for children 6-23 months of age per wealth quintile for 2014 (DHS and 2018 (MICS).

The minimum dietary diversity and minimum meal frequency translates into Minimum Acceptable Diet for very few children aged 6–23 months. In 2014, the percentage of children receiving a minimum acceptable diet was lowest in the lowest wealth quintile just over 5% and the highest with 25% of children in the highest wealth quintile. In 2018, 21.3% children in the highest wealth quintile received a minimum acceptable diet and about 6% of children in the middle wealth quintile.

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# Appendix 6 Policies and Strategies

The list below provides a list of policies and strategies in the area of climate and nutrition. This is not an exhaustive list.

## **Climate change**

- Lesotho National Climate Change Policy 2017-2027
- National Strategic Resilience framework
- National Risk Reduction Policy

## **Land tenure**

- National Range Resources Policy 2014

## **Nutrition**

- MoH National Strategic Plan for the Prevention of NCDS 2014-2020
- National School Feeding Policy 2015
- Lesotho Food and Nutrition Policy & Strategic Plan 2016 – 2025
- Health Sector Nutrition Strategy 2013 - 2019

## **Other**

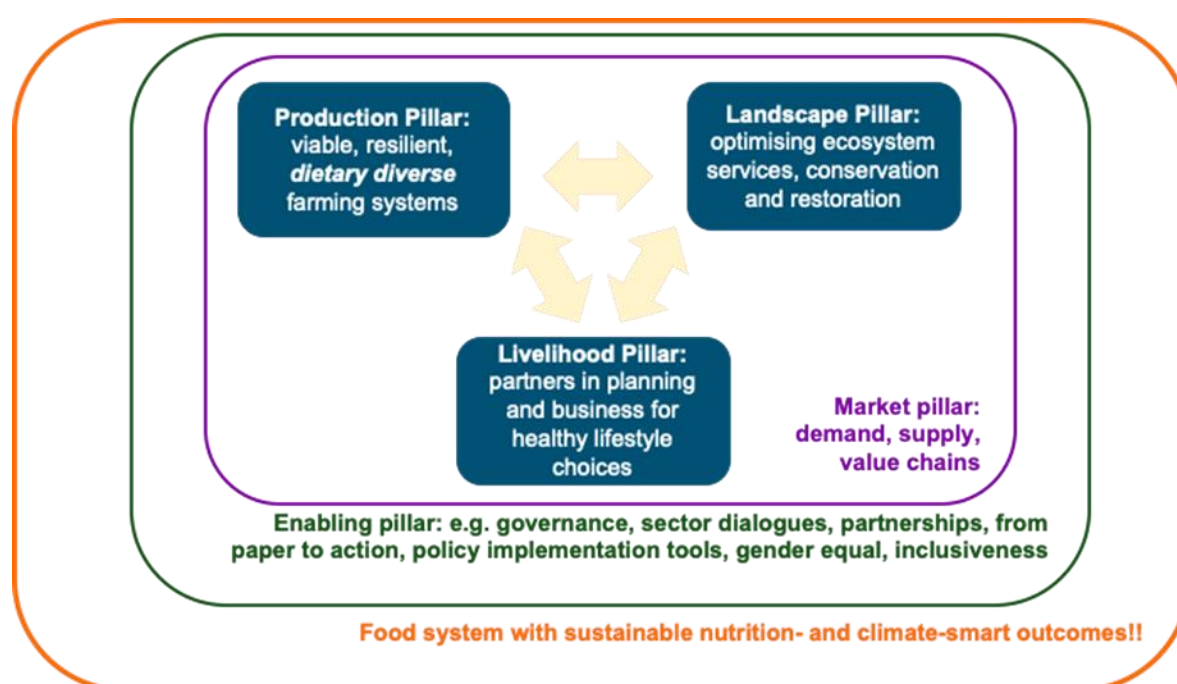
- National Strategic Development Plan II 2018-2023
- Decentralisation Policy
- Agricultural Sector Strategy 2003
- National Disaster Risk Reduction Policy 2011
- Lesotho Water and Sanitation Policy 2007



# Appendix 7 Theory of Change Development

The Theory of Change drawn up in the concept note of IFAD's project Regeneration of Landscapes and Livelihoods (P-Roll) includes pillars or key components of 1. changing resources use; 2. reduction of environmental degradation; 3. improved (community) livelihoods, while recognising that this can only be enabled with access to 4. financing mechanisms.

We tried to visualise this in the figure below. Bear in mind that we do this while repeating the wise words of George Edward Pelham Box, a British statistician, who has been called one of the great statistical minds of the 20th century: 'All models are wrong but some are useful'.



**Figure 1** Visualisation of the proposed project components for IFAD's Project Regeneration of Landscapes and Livelihoods (P-Roll).

We rephrased the components or pillars to 1. The production pillar; 2. The landscape pillar; 3. The livelihood pillar. How you position pillars visually belongs to stakeholders and project partners. You could easily argue that people and their livelihood choices and farming systems they apply happens in the landscape and use e.g. spatial dimensions in your visualisations.

Our assumption already underlined that chain-wide thinking (from farm to fork) is required. A market approach/component/pillar can therefore not be omitted in the project. For now, this is pillar 4: The Market Pillar.

Any intervention is taking place in an institutional setting (whether institutions refer to organisational structures, policy frameworks, informal agreements, behaviour patterns, relationships, cultural norms etc.). This will therefore require additional interventions to enhance, build on or benefit from supporting factors and tackle or actively reduce limiting factors, thus creating an enabling environment (Pillar number 5: The Enabling pillar).



Cartoonist: Fran.

Source: [www.cartoonstock.com](http://www.cartoonstock.com)

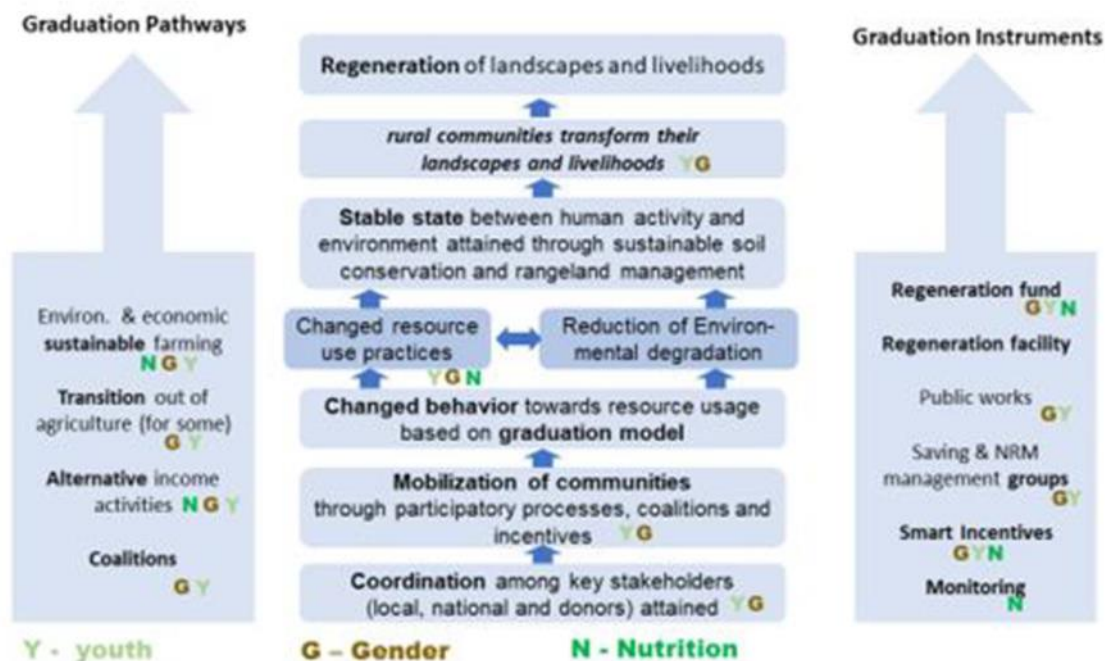
One specific pillar needs to align cross-cutting issues: accessible finance, gender equity, youth inclusiveness. It could be addressed as a separate component or pillar 6: The cross-cutting issues pillar. It is not indicated in figure 1 above.

Pillar 7 is the conceptual framework that places interventions in the larger food system context, it will help to keep the overview while zooming in and out of the food system and understand the interactions between e.g. wetland restoration activities in sub-catchment x and piloting Integrated Pest Management techniques for the production of iron-rich beans under different drought circumstances by local farmer initiative group y. A food systems approach will help planning, monitoring and adaptation, but also decision making and support how to move from on-paper policy support to effective service provision. Pillar 7 somehow 'guards', in case of this specific assignment, reaching climate-smart and nutrition-smart food systems. Pillar 7: The Food System 'Guard'.

### All pillars feature specific interventions and/or activities

We recommend that pillars or components include the description of (summarised) outcomes in proactive formulations: Viable business plans for healthy lifestyle; Multi-functional landscapes; etc.

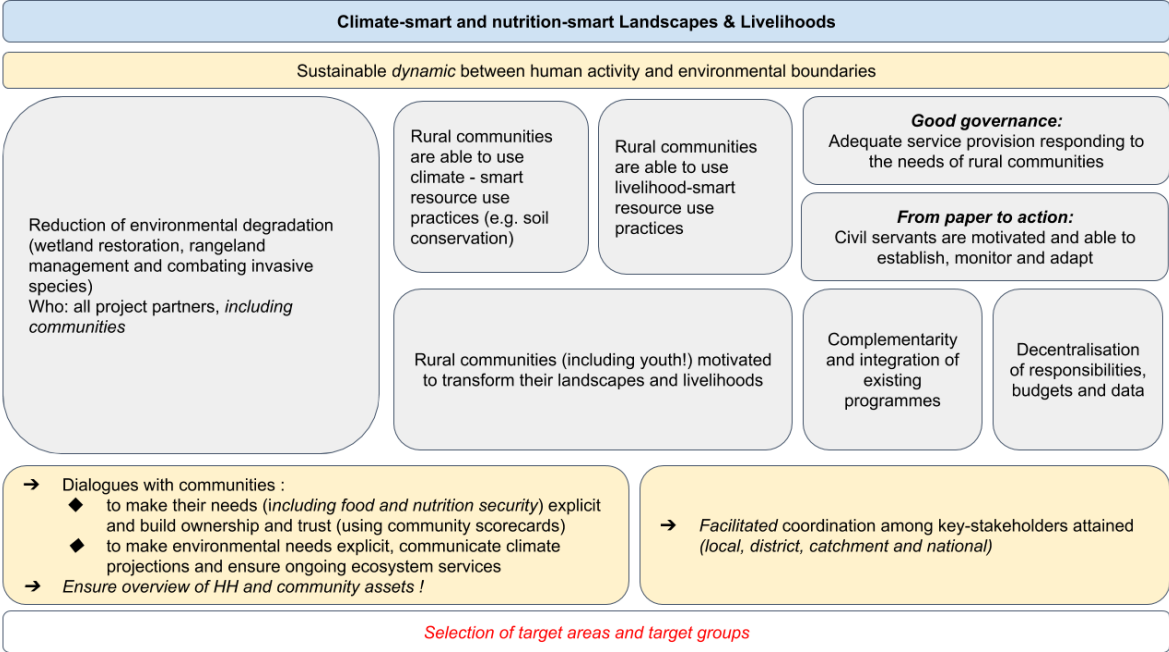
Our team analysed the current Theory of Change, see figure 2 using a Food Systems lens. The outcome of that initial analysis is shown in figure 3. The main recommendation on the current Theory of Change was that it can be used for 'forward storytelling' so that stakeholders can repeat or tell the story of 'how to go from here (where we are now/current situation) to there (the aspired situation)'. This is crucially important for partnerships to be able to be effective and efficient!



**Figure 2** Theory of Change of IFAD's Project Regeneration of Landscapes and Livelihoods (P-ROLL).

Our initially suggested Theory of Change (figure 3) was a first attempt to update the Theory of Change as now presented in the P-ROLL concept note. Meanwhile, after the initially suggested Theory of Change has been 'digested' again and updated (see updated visualisation in figure 4), we felt that in

our view the 'story forward' would benefit by integrating the pillars as we highlighted them in the earlier paragraph (figure 1). In this way, the activities (or your Theory of Action) related to e.g. access to finance, inclusiveness, climate-smart agriculture, nutrition, etc. are emerging more easily as well. Remember, a Theory of Change - as well as its Theory of Action - still remains theory: a set of assumptions that must be tested. This in itself underpins the need for a Monitoring and Evaluation component in which multi-stakeholder learning is being made explicit. A Theory of Change is never stagnant; it is alive. As assumptions are tested and confirmed or rejected, thus creating new evidence, the Theory of Change will be better 'informed'. It can then be adapted to make the 'theory of how' change happens' more explicit and contextual.



**Figure 3** Initially suggested (and discussed) Theory of Change.

The newly updated Theory of Change will be presented in the main document after recapturing the draft Intervention Logic as presented by the P-ROLL concept note.

**P-ROLL’s draft Intervention Logic**

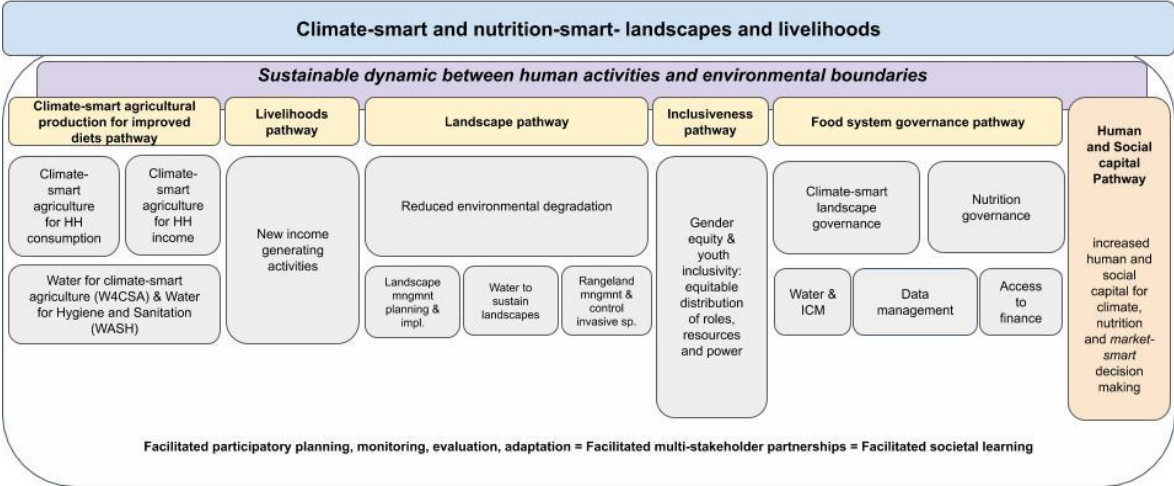
The table below provides an overview of the current draft intervention logic as was presented in the P-ROLL concept note.

**Table 1** The draft P-ROLL intervention logic.

<b>Project goal</b>	<b>Regeneration of Landscapes and Livelihoods</b> <i>The project intends to qualify as climate focussed and gender transformational</i>	
<b>Development objective</b>	Rural communities adopt transformational practices for regenerated landscapes and sustained livelihoods	
<b>Indicator</b>	<ul style="list-style-type: none"> <li>Households reporting adoption of environmentally sustainable and climate-resilient technologies and practices</li> </ul>	
<b>Indicator</b>	<ul style="list-style-type: none"> <li>Landscapes achieving improvement in socio-economic and environmental level using graduation model</li> </ul>	
<b>Outcome 1</b>	<b>Changed resource use practices</b>	
<i>Indicator</i>	<i>Households reporting adoption of environmentally sustainable and climate-resilient technologies and practices</i>	
	<b>Outputs</b>	<b>Indicators</b>
<b>Output 1.1</b>	Formation of coalitions through participation	<i>Number of coalitions formed</i>
<b>Output 1.2</b>	Groups trained in landscape management	<i>Groups supported to sustainably manage natural resources and climate-related risks</i>
<b>Outcome 2</b>	<b>Reduction of environmental degradation</b>	
<i>Indicator</i>	<i>Vegetation improvement in rangelands within target areas</i>	
	<b>Outputs</b>	<b>Indicators</b>
<b>Output 2.1</b>	Land management plans developed and implemented	<i>Land brought under climate-resilient practices</i>
<b>Output 2.2</b>	Increasing water retention of wetlands	<i>Improved water level of selected wetland sites and ponds</i>
<b>Output 2.3</b>	Invasive species removed from rangeland	<i>Hectares of invasive species removed</i>
<b>Outcome 3</b>	<b>Improved livelihoods</b>	
<i>Indicator</i>	<i>% of households reporting improved livelihood base (scorecard)</i>	
	<b>Outputs</b>	<b>Indicators</b>
<b>Output 3.1</b>	Land and water available for sustainable farming, forestry and nature conservancy enterprises	<i># of landscape coalitions reporting improved availability of grazing land and water</i>
<b>Output 3.2</b>	Off-farm enterprises promoted	<i>% of households with non-agricultural income as the principal source</i>
<b>Output 3.3</b>	New Income Generating Activities created	<i>Number of new /sustainable IGAs created</i>
<b>Outcome 4</b>	<b>Effective facility and fund established</b>	
<i>Indicator</i>	<i># partners participating in facility and fund</i>	
	<b>Outputs</b>	<b>Indicators</b>
<b>Output 4.1</b>	Number of coalitions supported through the facility	<i># of coalitions supported through facility</i>
<b>Output 4.2</b>	Investments in Mio Maloti channelled through the Fund	<i>Mio Maloti investment channelled to coalitions</i>
<b>Output 4.3</b>	Effective management of the Facility/Fund	<i>Percentage/number of plans executed on target each year</i>

Based upon the draft Intervention logic as indicated above table 1, based on the extracted 'pillars' (see figure 1) and combined with the 'original' draft Theory of Change (figure 2) and our initially

suggested one (figure 3), we will try in this section to link our suggested priority interventions to specific pathways (figure 4).



**Figure 4** Updated Theory of Change and suggested pathways.

# Appendix 8 Additional Interventions

Please find below additional interventions that could be considered to be included in the P-ROLL project, but that are not per sé priority intervention. They are arranged according to three pathways.

## Climate-smart agriculture production for improved diets pathway

### Climate-smart agriculture for household consumption

- **Fruit trees**, several fruit trees can be planted for household consumption, if this connected with household preservation techniques and appropriate household *storage* practices;
- **Enhancing storage opportunity** in general, thereby reducing food waste;
- **Promote biofortified varieties**. Lesotho has already introduced iron-rich beans. But growing other varieties should be tested as well as their consumption preference. Many of the bio-fortified varieties are often also drought resistant. See the picture for inspiration. Introduction of additional varieties will differ for each ecological zone and should go hand in hand with (action) research.


 **Iron Beans**  
Nutritional Benefits: Provides up to 80% of daily iron needs.  
Farmer Benefits: High yielding, virus resistant, heat and drought tolerant.

 **Vitamin A Maize**  
Nutritional Benefits: Provides up to 50% of daily vitamin A needs.  
Farmer Benefits: High yielding, disease and virus resistant, drought tolerant.

 **Zinc Maize**  
Nutritional Benefits: Provides up to 30% of daily zinc needs.  
Farmer Benefits: High yielding, virus resistant.

 **Iron Pearl Millet**  
Nutritional Benefits: Provides up to 80% of daily iron needs.  
Farmer Benefits: High yielding, mildew resistant, drought tolerant.

 **Zinc Wheat**  
Nutritional Benefits: Provides up to 50% of daily zinc needs.  
Farmer Benefits: High yielding, disease resistant.

 **Vitamin A Cassava**  
Nutritional Benefits: Provides up to 100% of daily vitamin A needs.  
Farmer Benefits: High yielding, virus resistant.

 **Vitamin A Sweet Potato**  
Nutritional Benefits: Provides up to 100% of daily vitamin A needs.  
Farmer Benefits: High yielding, virus resistant, drought tolerant.

 **Zinc Rice**  
Nutritional Benefits: Provides up to 40% of daily zinc needs.  
Farmer Benefits: High yielding, disease and pest resistant.

### Climate-smart agriculture for household income

- **Diversification of crop production** and exploring;
- **Seed multiplication** of vegetables and fruit tree seedlings for improved and high quality seeds (priority) This needs to go hand in hand with integrated seed sector development (i.e. the food system governance pathway);
- Improving the **poultry value chain** (poultry is nutrition and climate-smart), especially for egg production. Chickens are among the few domestic animals that have a low environmental impact and carbon footprint, and research is moving forward to develop climate-smart poultry production for African smallholders (link with development of an Agricultural Knowledge and Innovation System);
- **Nutrition smart value adding** of products through processing (link with the village collection hubs!) by community groups;
- **Market development and linking** to fresh vegetable and fruit markets at local, domestic and/or national level. When deciding on using agriculture for income, this income should be used for buying nutritious food, and then this nutritious food needs to be available nearby to buy and consume (link with food system governance pathway!);
- Increase **farmland under irrigation** in selected catchments to 70% of irrigation potential (in line with CSA targets of Lesotho); support the financing and construction of small-scale but efficient irrigation systems but not without co-funding (see access to finance) and a business plan (in case of climate-smart agriculture for household income).

### Livelihoods Pathway

- **Bee keeping** is one of the activities that is already practiced in Lesotho and seems to be successful. Caution in terms of demand and supply (as too many people are practising this, prices will drop);
- **Fodder production**, only when the producers and their families are well connected to markets where nutritious food is being sold.

### Landscape pathway

The landscape pathway will contribute to outcomes 1, 2, 3 and 4. Within this pathway three sub-pathways are prioritised (because there are many more).

*Landscape management planning and implementation*

- **Reforestation/Afforestation plans** developed and implementation initiated.

*Water to sustain ecosystem services*

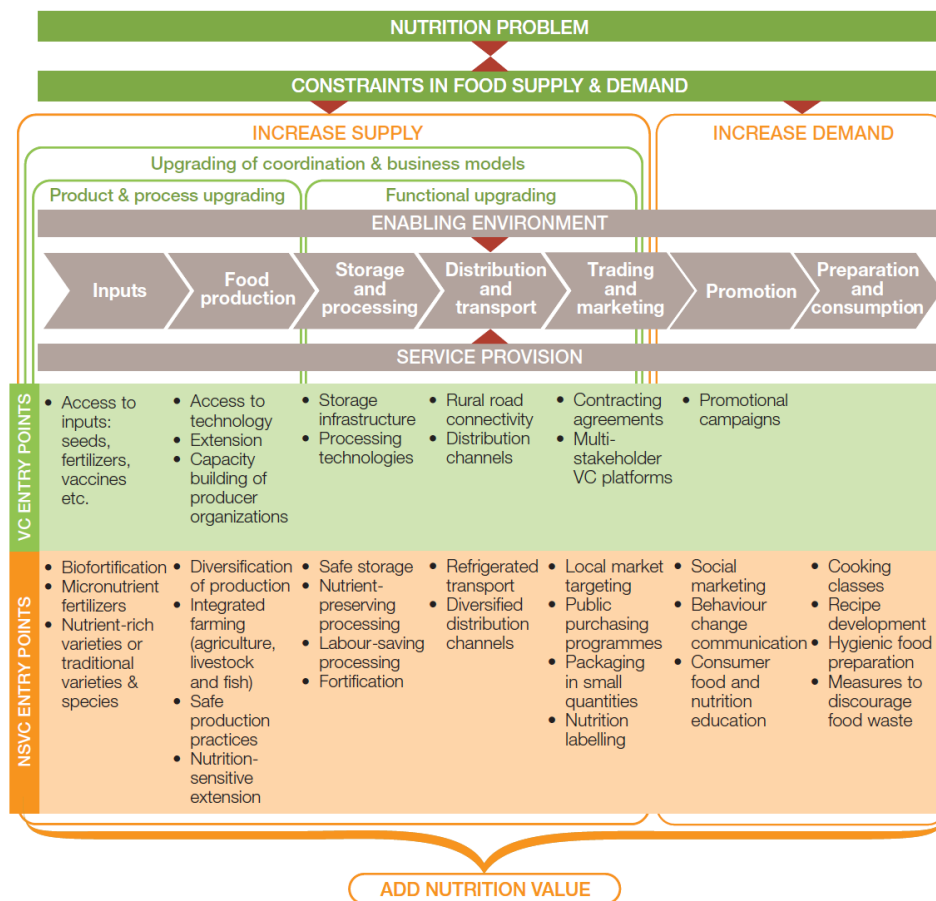
- **Flood control** and drainage measures;
- All of the above are supported by the constriction of by perpendicular stone walls/dams and/or terracing (expensive, but necessary!).

*Rangeland management and controlling invasive species*

- **Connect with business incubators:** investigate what can be done with invasive species, can they be processed to nutritious cattle feed, used for composting and manure production, used for fuel. Of course, recontamination of the land needs to be considered.

*Human and social capital pathway*

- Increasing **chain wide thinking capacity** of food system stakeholders, using IFADs Nutrition-sensitive Value Chain framework (see figure 47) to discuss strategies and entry points for nutrition. This can easily be expanded by adding climate to the discussion.



Source: De la Peña, Garrett and Gelli, 2018.

**Figure 6** IFAD's Nutrition-sensitive Value Chain Framework.

*Partnerships pathway: proposed interventions for effective partnerships and facilitating processes of change*

Whether we like it or not, projects and programmes stand or fall with the energy and effectiveness of multi-stakeholder partnerships (MSPs). Designing and facilitating MSPs is a science, a craft and an art (Brouwer et al., 2019) Multi-stakeholder planning and action, means multi-stakeholder learning and given the number of partnerships that fail prematurely or never deliver results, it is safe to assume that much can go wrong, and usually does go wrong. Our experience in brokering, designing and

facilitating MSPs, and our interactions with academics and practitioners, have taught us that a *simple* set of success formulas *does not exist*. However, Brouwer et al. (2016) have identified seven principles that healthy and effective partnerships generally follow (Brouwer et al. 2016 and 2019). These 7 principles have been explained in more detail below. **Don't neglect the need for professional facilitation of partnerships and of learning!**

**Principle 1:** Embrace systemic change. MSPs are often designed in a way that suggests that change is plannable. However, human and natural systems are complex. That means change is dynamic and often unpredictable. Uncertainty is an inescapable reality. It has to be accommodated when engaging in MSPs. Intervening in complex systems requires us to be agile to respond to emerging opportunities. We must commit ourselves to continuous monitoring, and expect and learn from failure. More diversity in an MSP is an asset – even if it produces more friction and conflict because a diversity of perspectives generates more opportunities to understand the system and fosters creativity in the pursuit of solutions.



Source: WCDI's MSP Guide (Brouwer et al., 2016).

**Principle 2:** Transform institutions. When we talk about social, economic and political change, we are also talking about changing the underlying institutions or traditions. By 'institutions' we mean the 'rules of the game', the formal and informal norms and values that shape how people think and behave. Deeply held values, established traditions and formal frameworks can be real barriers to change, but they can also be supportive and help MSPs achieve their aims. MSPs need to help stakeholders look critically at the institutions – both their own and those of others – that affect their work.

**Principle 3:** Work with power. Power can be a negative force, but we also need it to bring about positive change. Power differences and power abuses that stand in the way of desired change need to be addressed. MSPs need to include or reach out to powerful stakeholders to shift power structures in the right directions. Similarly, empowering particular stakeholder groups – helping them get into a position where they can use power constructively – can be key in developing just and equitable solutions.

**Principle 4:** Deal with conflict. Conflict arises when parties or individuals have genuinely different interests and struggle unproductively over them, rather than consulting or negotiating solutions. Conflict is an inevitable part of any MSP. It may even be necessary for change to occur. Understanding, bringing to the surface and dealing with conflict is essential in effective MSPs.

**Principle 5:** Communicate effectively. Underlying any effective MSP is the capacity and willingness to communicate in an open, respectful, honest, empathetic and critical way. This involves abilities to both listen to others and to clearly articulate your own perspectives and ideas. Process designers can ensure that space is created for exploring the worldviews that underlie stakeholders' positions. We



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also need to recognise the emotions of the people involved in dialogue. Effective communication gears decision-making mechanisms for high-quality decisions that are practically enforceable.

**Principle 6:** Promote collaborative leadership. Leadership patterns and capacities have a profound influence on the direction that MSPs take. MSPs need a strong collaborative leadership pattern, as they are about enabling people to work together, sharing responsibility and becoming empowered to tackle difficult issues. Leadership roles need to be vested in a range of actors. We use the term 'collaborative leadership' to refer both to sharing leadership responsibilities and to the particular styles of leadership likely to be most effective. Practising collaborative leadership is particularly important in MSPs, because approaches that work in a hierarchical setting where leaders have formal authority are likely to fail here.

**Principle 7:** Foster participatory learning. MSPs have to provide a space where learning can flourish – otherwise they are pointless. MSPs need mechanisms that enable different stakeholders to learn together from their collective experience. Events and activities are required throughout the life-cycle of an MSP to bring stakeholders together to talk, share, analyse, make decisions and reflect on what they are doing together. The quality of these learning events can be the difference between a successful or a failed MSP. Participatory learning and monitoring methods can foster creative, open, emotionally engaging and analytically sound interactions.

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Report WCDI-21-164

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The mission of Wageningen University & Research is 'To explore the potential of nature to improve the quality of life'. Under the banner Wageningen University & Research, Wageningen University and the specialised research institutes of the Wageningen Research Foundation have joined forces in contributing to finding solutions to important questions in the domain of healthy food and living environment. With its roughly 30 branches, 6,800 employees (6,000 FTEs) and 12,900 students, Wageningen University & Research is one of the leading organisations in its domain. The unique Wageningen approach lies in its integrated approach to issues and the collaboration between different disciplines.





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Wageningen Centre for Development Innovation supports value creation by strengthening capacities for sustainable development. As the international expertise and capacity building institute of Wageningen University & Research we bring knowledge into action, with the aim to explore the potential of nature to improve the quality of life. With approximately 30 locations, 6,800 members (6,000 fte) of staff and 12,900 students, Wageningen University & Research is a world leader in its domain. An integral way of working, and cooperation between the exact sciences and the technological and social disciplines are key to its approach.

