Diversifying Malawi's food security: Cassava's promise as a dual-purpose crop

A case study from the Lilongwe District

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Abstract

Food insecurity is a major global problem, affecting millions of people, especially in developing countries. Although food insecurity is considered solvable, various development strategies have failed to ensure food security in many regions. Recently the cassava crop has increased in importance as a promising option to improve food security, as well as the income of smallholder farmers, in the rural areas of developing countries. However, cassava is already an integral agricultural product in specific regions of Malawi. Therefore, this thesis analyses the value of cassava from the famers' perspectives, accessed through interviews and observations. This analysis includes how the farmers of the Lilongwe District of Malawi actually use cassava and how it is integrated in the farmers' lives. The research further examines how cassava is valued by the farmers and to what extent it contributes or influences farmers' food security and income. Thereby, the thesis strongly focuses on the farmers' specific awareness of food security and why this must be considered when addressing the topic of food security. Further, the market options for cassava are clarified, through a brief overview of cassava processing possibilities. This study found that cassava is used by the majority of farmers as both a food and a cash crop and that this dual usage, in combination with cassava's very flexible cultivation period, is pivotal for the farmers' decision to plant it. Furthermore, the results indicated that the farmers' awareness of food security is based exclusively on maize; nevertheless, cassava influences the farmers' food security.

Keywords: Malawi, smallholder farmers, cassava, food crop, cash crop, food security

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1 Introduction

This thesis aims to provide an all-encompassing understanding of the significance of cassava for the smallholder farmers in the Lilongwe District of Malawi. Therefore, the thesis used a qualitative case study approach to examine how cassava is integrated in the farmers' lives and why they cultivate that crop. The focus of the study is more specifically on cassava's impact on both the farmers' food security and their income, and it should present how the farmers assess and describe the value of cassava. The main part of this research is based on the opinions and experiences of the farmers; their knowledge is the foundation of this study. The first chapter starts with a brief overview about the link between cassava and an increase in both income and food security in Malawi, and the chapter also discusses the possibility of strengthening this link in the near future. Then the explanatory statement of the thesis is presented, followed by the thesis' purpose and its research questions. After this, the thesis gives basic information about the current situation in Malawi. The introduction chapter ends with a roadmap of the thesis to introduce the structure of the entire paper.

1.1 Context of the Study

For almost 6o years, and after spending billions of US dollars, the international community has worked together to reduce poverty and combat famine and malnutrition. Although this collective effort has shown success in some regions, the overall situation in Sub-Saharan Africa is still alarming (Cardoso et al. 2017, 248). Due to the global open economy, every nation is interlinked and heavily affected by global economics. Thus, countries' improvements are dependent on numerous national and international trends, and there is no universal miraculous formula for successful development which brings prosperity and food security to everyone. Especially in Sub-Saharan Africa, efforts have had merely minor success, and the rural populations of these countries still suffer from longstanding and well-known problems. One persistent serious problem is the volatile food security situation. In 2016, 22.7% of the population in Sub-Saharan Africa was undernourished, and, according to various predictions, this percentage will increase in the future (FAO 2017a, 6).

There recently arose an increasing interest in cassava, a tropical root crop cultivated in more than 100 countries. Especially in parts of eastern, central, and western Africa, Cassava already plays a traditional role as a food security crop, but it recently drew even more attention as one of the promising crops which could improve Africa's food insecurity and income significantly. A few years ago, cassava became known as profitable cash crop because of its great processing potential, and this might generate new markets. Through this value-adding process, cassava can become a lucrative product for farmers (Parmar, Sturm and Hensel 2017, 907ff.). In some African countries like Nigeria and Ghana, cassava has already extended its influence and is now used as a food and cash crop, and this trend has been adopted in other countries of Sub-Saharan Africa with the intent of ensuring food security and increasing income (Essiet 2014; Terazono 2014; Veras 2016).

One of the countries showing interest in promoting the cultivation of cassava is the Republic of Malawi (FAO 2015b). Malawi is one of the poorest countries in Sub-Saharan Africa, ranked in 2015 at 170 out of 188 countries with regard to the Human Development Index (UNDP 2016). Food security and poverty are two of the major problems affecting millions of smallholder farmers. According to the annual Malawian food security assessment conducted in May 2016, 6.5 million people of the Malawian population "will not be able to meet their annual food requirements during the 2016/17 consumption period", which indicates "an increase of 129 percent compared with the corresponding figure of 2.8 million people for the 2015/16 consumption period". Serious droughts caused massive crop failures, and thus about 6.5 million people, most of them smallholder farmers, were threatened by hunger (Mangani 2016). Due to Malawi's agricultural structure, rapid population increase, and climate change, this situation will most likely become worse. To reduce the rural farmers' poverty and overcome their recurring food insecurity, Malawi's government has started to identify new approaches. For that purpose Malawi is trying to diversify its agriculture, which is currently dominated by maize and tobacco. Besides oilseeds like groundnuts, soybeans, and sunflowers, Malawi has also recently begun focusing more intensely on cassava as a promising crop for improving food security and income. International development aid decision makers claim that since cassava has a traditional role as a food security crop and is also raising international significance as a cash crop, it should be used to

increase the income of the Malawian farmers and contribute to their food security (GIZ 2016; FAO 2018; AGRA 2017,).

1.2 Rationale and Significance

When driving through Malawi, one sees endless signs on the roadside referring to implemented social projects. Following these signs, one usually finds a small, abandoned village with little or no evidence of any external support. Most of the social projects are ineffective, and, as soon as the help stops, the impacts of the projects also vanish. Often these projects were implemented without the inclusion of the local farmers and without considering their specific needs. Especially in Malawi, every region is different, with its own habits and traditions. To implement successful and sustainable development, one must analyse and consider the specific characteristics in every locality. Malawi's smallholder farmers have been exposed to national development strategies or international organisations implementing numerous attempts to increase food security for a long time, and most of them unfortunately failed. Promoting cassava is a new attempt, and for it to succeed, analysing how the smallholder farmers in Malawi evaluate cassava and identifying exactly how cassava can be used is essential. Although cassava is already established in a large part of Malawi, it was mostly considered an emergency crop to be utilised when the maize harvest failed and the population was endangered by food shortage.

During my five-month internship in Lilongwe for the German Society for International Cooperation (GIZ), I supported, among other things, the team which worked on strengthening the cassava value chain. Although my study background was often linked to food security and development aid, only once I was in Malawi did I really identify cassava as an important and promising crop. Visiting rural villages in central Malawi was always characterised by the noise of fresh cassava being chewed by the people surrounding us, and during my journeys I saw people everywhere eating cassava while riding their bikes or sitting next to the road. Since cassava is not really known in Germany, I was very interested in its value for the Malawian population. According to all the people I talked to in the first few weeks of my internship, including development workers, Malawians living in Lilongwe and rural villages all appreciated cassava as an important crop for Malawi, albeit for different reasons. However, this Malawian passion

for cassava and the increasing interest of national and international institutions to promote cassava as a food and cash crop for the smallholder farmers motivated me to write my thesis about this still-neglected crop and to reveal its value for the farmers. This thesis is meant to illuminate the opinions of the smallholder farmers and give them a room to present their own views about cassava and its unique value. Since the opinion of the local population is often neglected or ignored, the following thesis is meant to be the voice for the cassava farmers of the Lilongwe District. I wanted to give them the opportunity to express their perspectives and appraisals of the crop cassava.

1.3 Purpose of the Thesis and Research Question

The purpose of the thesis is to examine how cassava is integrated into the lives of the smallholder farmers of the Lilongwe District in Malawi and reveal how important cassava is for the local farmers and in what ways it is important to them.

The thesis should contribute to a contemplative understanding of cassava's role for the farmers, so the research therefore emphasises and is based on their experiences and knowledge. It should analyse why and how cassava is presently integrated into the farmers' daily lives. Furthermore, the thesis should reveal how cassava is linked to the farmers' food security and income. Thus, the following key question is the basis of the thesis:

How has cassava affected the lives of rural smallholder farmers in the Lilongwe District of Malawi and how do these farmers evaluate the importance of cassava and its impact on them and their food security?

The thesis is framed by three interrelated sub-questions, which substantiate the key question:

- Why do farmers decide to cultivate cassava, and what are the advantages and limitations or challenges of cultivating cassava, from their perspectives?
- How is cassava used and assessed as a food crop by farmers, and to what extent does this influence the farmers' food security?

- How do farmers use cassava as a cash crop, and what are the strengths and problems of cassava as cash crop, from their perspective?

1.4 Brief Overview of Malawi

The following sub-chapter presents information about Malawi's social and ecological situation. This general background on Malawi should help make a meaningful impression of Malawi and embed the research questions in a local context.

1.4.1 Geography - Environment

The Republic of Malawi is a landlocked country in Sub-Saharan Africa which borders Mozambique, Zambia, and Tanzania. Its climate is sub-tropical with a dry warm season from April to November and a rainy cold season from November to April. The average temperature can vary from 14 to 32 degrees Celsius between elevations. The 118,484 km^2 country has a varied landscape with a large mountain massif in the south and high plateaus in the other two regions. It contains a variety of different fauna and flora with tropical rainforest, woodland, open grassland, and savannah. The country is demarcated into three administrative regions: Northern, Southern, and Central which are divided into 28 districts. The capital city Lilongwe is located in the Central Region and hosts the national administration. In the Southern Region, Blantyre City an important urban centre and is known as the economic capital (UN Malawi 2014). The Anopheles mosquito, which transfers malaria, inhabits Malawi, and there is a year-round risk of infection, especially during the rainy season. Malaria is still heavily responsible for morbidity and mortality and infects young children under five and pregnant women especially often, but death rates are falling: they were 5.6% in 2004 and 3.4% in 2009 (WHO 2010-2018). Malawi is very vulnerable to climatic impacts due to its general weather characteristics and its population's dependency on agriculture. Drastic climate changes over the year and extreme climate conditions like heavy rainfall and long droughts necessitate precise considerations of when and what farmers should cultivate. Lately, these climate conditions have become more unstable and extreme. An annual temperature increase of 0.9 degrees Celsius since 1960 and the occurrence of more extreme weather events like floods or droughts have been recorded. Although estimating the impact of global warming is still difficult, scientific experts predict that

Malawi will experience a further temperature increase of 1.1 to 3.0 degrees Celsius by 2060, and the country will very likely more frequently suffer from negative climate effects like those mentioned above. Further, a study by the World Bank predicts a shortening of the rainy seasons, and this will affect agriculture and probably result in massive maize crop failures (Irish Aid 2016, 5). Human impacts may additionally worsen the climate conditions. In 2016, Malawi's forest area was 31.5 thousand km^2, but it has shrunk due to an annual deforestation rate of -0.99%, one of the highest rates among the countries of the Southern African Development Community. This is caused by transforming forests into agricultural land, infrastructure development, and the high demand of wood as fuel, and in small local areas this has already caused problems like precipitation decrease and landslides (Naidoo et al. 2013, 9).

1.4.2 Population/Social Context

Malawi had an estimated population of around 19 million in 2017 with a population growth rate of 3.31%. The population is estimated to pass 29 million by 2030 and 45 million by 2050 (UN Malawi 2014). Over 90% of Malawians practice subsistence agriculture and almost all people living in the rural areas are dependent on their harvests for their food security and income (GCCA+ 2012). In 2017, 16.6% of the population was living in urban areas, and there was an estimated annual rate of urbanisation of 4%. Most of these people live in the cities Lilongwe (905,000) and Blantyre-Limbe (808,000). Consequently, over 80% of the Malawian population lives in rural areas. The country's main roads between the major cities are almost completely paved (6,951 km in 2011), but most of the roads connecting small cities or villages are unpaved (8,499 km) or nonexistent (CIA 2018). Most of the villages are totally isolated during the rainy season because the unpaved roads are impassable due to mud, landslides or growing potholes. In 2013, just 9% of the population had access to electricity, representing 32% of the urban and 4% of the rural population. Further, the power plants cannot produce enough electricity, which leads to power outages, especially during the rainy season. The average number of years of education was 11 years in 2011, and the rates similar for males and females. The literacy of the population over 14 years old was 62.1% in 2015, with rates of 69.8% for males and just 55.2% for females. In 2015, the maternal mortality ratio was at 634 deaths per 100.000 live births, and the total fertility rate lied at 5.49 children born per woman, and a mother's average age at the time of her first

child’s birth was 18.9 years. The HIV/AIDS distribution rate among the 15-49 year old adults was 9.2% in 2016, and 24,000 people died because of the illness' effects. The median age of the Malawian population is 16.5 years, and life expectancy at birth is 61.7 years, an increase from the 46-year expectancy in 2000. Further, its total dependency ratio is 91, which is extremely high and "indicates that the working age population and the overall economy face a greater burden to support and provide social services for youth and elderly person, who are often economically dependent" (CIA 2018).

1.4.3 Political System

After its independence in 1964, Malawi was ruled by a one-party dictatorship which lasted for almost 30 years. Since May 1994, Malawi has been a presidential republic with a multi-party system. In comparison to other countries in Sub-Saharan Africa, it is characterized as stabile and safe (Auswärtiges Amt 2017). However, corruption is a ubiquitous problem. The corruption perception index of 2017, which evaluated countries "by their perceived levels of public sector corruption according to experts and businesspeople" gave Malawi a score of 31, with 100 being very clean and 0 highly corrupt. This put Malawi at rank 122 of 180 (Transparency International 2018).

1.4.4 Economy

For many years Malawi has had weak economic performance restricted "by policy inconsistency, macroeconomic instability, poor infrastructure, rampant corruption, high population growth, and poor health and education outcomes that limit labour productivity" (CIA 2018). With a GDP of 5.43 billion US dollars in 2016 and an annual GDP growth of 2.5%, Malawi is among the least-developed countries. Although this represents a great increase in comparison to the GDP in 2000, which was just 1.74 billion US dollars, it still implies a GNI per capita (Atlas method) of just 320 US dollars in 2016, making Malawi’s rank 215 of 216 countries (World Bank 2017a, Country Profile). Thus, Malawi remains one of the poorest countries in the world, with 50.7% of its population living under the poverty line of 1.90 US dollars per day in 2014. Malawi is highly reliant on economic aid from the World Bank, IMF, and individual donor countries.

In 2017, Malawi's GDP originated from services (55.9%), agriculture (28.6%), and industry (15.6%) (CIA 2018). Malawi's economy is mainly "dependent on its natural resources, either from the land (agriculture), biodiversity (agriculture, forestry, tourism) or water (agriculture, fisheries, energy, health) and is thus predominately agricultural" (GCCA+ 2012). Thus, the landlocked country has an agriculture-based economy, as agriculture accounts for more than 80% of the total export revenue. In 2017, Malawi's total export revenue was 1,443 billion US dollars while its import expenses were 2,388 billion US dollars, resulting in a negative trade balance of 945 billion US dollars. Malawi has had a negative trade balance since 1998 (OEC n.d.). Most of its industries are also based on agricultural products, such as tobacco, tea, and sugar (CIA 2018). Additionally, 80% of Malawians are working within the agricultural sector (FAO 2015, 1). As reliance on manual labour is high and mechanization is rather low, productivity is on a low standard, with only one third of Malawi's GDP being generated by the agricultural sector. Thus, 80% of the total population generates only one third of Malawi's GDP. This clarifies the deficiency of Malawi's agriculture. However, due to the current negative situation, Malawi's agriculture will remain its most important sector for the foreseeable future.

Overall, one can evaluate Malawi's overall performance with the HDI, which is an indicator "of average achievement in key dimensions of human development: a long and healthy life, being knowledgeable and have a decent standard of living" (UNDP HDI). Malawi's population has one of the lowest HDI scores in the world (2015: 170 from 188), and although one can see improvements in some fields, the overall living situation is still deplorable. Considering all these facts about Malawi, one can gain a basic understanding of Malawi's current situation and vulnerabilities.

I presented these four categories because not only do they collectively bestow an overall insight into the current situation of Malawi, but also because they are heavily interwoven with each other and influence Malawi's agriculture. For example, when trying to strengthen agriculture by opening a new tea factory, one must also consider the unreliable electricity, insufficient transportation, and frequent worker shortages due to malaria or HIV/AIDS. The general poor conditions of all important local systems make implementing new projects extremely difficult, since one must calculate all these

requirements and more for successful implementation. This also relates to the planned spread of cassava, as it is more complex than just distributing cassava to farmers.

1.5 Roadmap

This thesis is structured into eight chapters. This introductory chapter has given a short overview of the subject of the thesis and its research questions. The second chapter describes the methodological approach and explains why a qualitative research design, with specific data collection methods, was chosen. The third chapter presents the thesis' theoretical perspectives, giving an understanding of different aspects of food security and poverty, while discussing the concepts of food and cash crops. This is done to help the reader understand the outcomes of the research. The fourth chapter gives an overview of Africa's agriculture and cassava cultivation, in order to provide information needed for the empirical research. Chapter 5 describes the evaluation of the farmers regarding the advantages and disadvantages of the cultivation of cassava. The farmers' answers lead directly to the differentiation of food crop from cash crop, wherefore Chapter 6 presents the empirical results of cassava being used as food crop, while Chapter 7 analyses cassava as a cash crop. This allows an evaluation of the farmers' two-dimensional usage of cassava. The last chapter gives a summary of the results of the empirical study and offers a conclusion.

2 Methodology

The next chapter introduces the approach and methods used to conduct this study's research. In the beginning it gives insight into what a research approach necessitates and what must be considered to choose the correct approach. This will explain and justify why qualitative research was the chosen approach. Afterwards, the research design is presented in the form of a case study. This is followed by a summary of my own experiences during fieldwork and a description of the specific local conditions that influenced the research.

2.1 Rationale for the Research Approach

The chosen research approach guides the whole thesis, and for that reason finding the most suitable approach is essential. However, there are no all-encompassing instructions on how to find the right approach, nor is there even a strict definition of the different approaches. Within social science there exist many different opinions and discussions about different approaches and their characteristics. As discussing the different trends and views would overstep the scope of this thesis, only the approach chosen for this research and an explanation of why it was considered the best option are presented. The most common views were summarised, and the most popular researcher in the study field of qualitative research was discussed. This is not a comprehensive discussion, but will serve the purpose of explaining the choices in this thesis.

According to Creswell (2014, 3), research approaches "are plans and the procedures for research that span the steps from broad assumptions to detailed methods of data collection, analysis, and interpretation". Creswell named three different research approaches: qualitative, quantitative, and mixed methods. The researcher's philosophical assumptions, research design, research methods, and research questions are pivotal for the choice of research approach (see Figure 1), and this approach is then decisive for how the data are analysed.

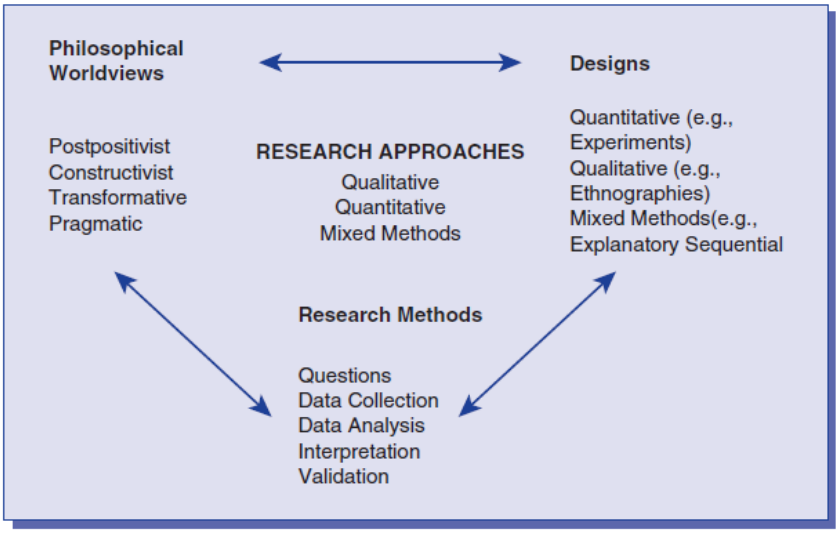


Figure 1. A Framework for Research - The Interconnection of Worldviews, Design, and Research Methods (Creswell 2014, 5)

2.1.1 Qualitative Research Approach

For the following thesis, a qualitative research approach was considered to be the best methodology for dealing with the question. To justify this decision, qualitative research must first be defined.

For a long time, qualitative research was simply defined by what it is not. For example, Strauss and Corbin (1998) defined it as "any type of research that produces findings not arrived at by statistical procedures or other means of quantification" (quoted in Snape and Spencer 2003, 3). Since qualitative research became a term which "is used as an overarching category, covering a wide range of approaches and methods found within different research disciplines" (Snape and Spencer 2003, 2), forming one definition is clearly not possible. Due to recent growing interest and increasing application in many study areas, qualitative research has developed its own identity. Its approach is to illuminate and examine the world from a position of insight in order "to understand, describe and sometimes explain social phenomena" (Flick 2018, xii). David Hume (1711-1776), who is commonly known as the founder of empirical research, recognized that individual experiences create knowledge and understanding of the world, and these experiences are acquired via awareness (Snape and Spence 2003, 6). Thus, qualitative research does not provide general statements; it rather reveals how people construct and perceive the world around them.

Instead of formulating a definition of qualitative research, Yin (2011), in his article "Qualitative Research from Start to Finish", introduced five common features which describe the essential characteristics of qualitative research. First, Yin claimed that qualitative research "involves studying the meaning of people's lives, under real-world conditions"(8). Studying people in their familiar environments, instead of in a laboratory, is the best option for analysing their behaviour without any external influences. The second characteristic is "[qualitative research's] ability to represent the views and perspectives of the participants of the study"(8). Gathering perspectives enables a researcher to reveal subjects' understanding of the world and how and why they constructed it the way they did. This is an excellent trait, as it allows researchers to analyse "the meanings given to real-life event by the people who live them" (8) and thus undertake a more unbiased analysis. The third feature draws special attention to contextual conditions, such as environments, societies, or institutions. Considering different contexts is essential for qualitative research since they affect people's living conditions. Interestingly, the context in which the study is performed is often neglected by other social science methods. According to Yin's fourth feature qualitative research is "contributing insights into existing or emerging concepts that my help to *explain* human social behaviour"(8). This means that qualitative research not only describes actual occurrences and people's actions, but it also aims to explain different behaviours and social processes to understand the motives behind them in consideration of existing or emerging theories. The fifth feature highlights the importance of collecting and applying information from a wide range of sources. Through triangulation, the explored data can be adapted to each other. Using different sources increases the likelihood of explaining all essential influencing factors and thus strengthening the research's reliability and validity (9).

For an encompassing comprehension of qualitative research, demonstrating how qualitative research is conducted is also crucial. According to Yin (2011, 10), Flick (2018, xiii), and Snape and Spencer (2003, 4), a flexible research design is favourable to be able to adapt adequate adjustments to the research process if new results demand a realignment of the chosen methods. Additionally, a focus on non-numeric data is preferred, and these are acquired through qualitative methods like in-depth individual interviews, focus groups, observations, documents, and biographical methods. Further, the researcher is often in close contact with the participants when conducting a study, so

she/he is the "primary instrument" and must be aware of her/his impact on the participants and her/his own bias (Snape and Spencer 2004, 4).

In conclusion, qualitative research is meant to give an in-depth understanding and explanation of social phenomena and real-world occurrences through the implementation of diverse sources of evidence which analyse "people's social and material circumstances, their experiences, perspectives and histories" (Snape and Spencer 2003, 22). Data-collection includes the study's context and is mainly based on observation, interviews, and analysis of texts and documents.

This approach seems to be the correct choice for this thesis, as it is supposed to reveal the individual experiences and usages of cassava of the smallholder famers in Lilongwe District, as well as their own perspective of food security. I wanted to learn how cassava is integrated into the daily lives of farmers and how it influences the farmers' food situation and income. The context in which the farmers live is influencing their behaviour, and qualitative research yields another valuable feature in that it considers these contextual conditions. A purely quantitative research approach would not be preferable, since understanding the role of cassava through numbers and statistics is not possible. For achieving a deep understanding of cassava's local influence, multiple research methods, such as interviews and observations, are necessary, and this also necessitates a qualitative research approach.

2.1.2 Worldview Influencing the Research

This decision of choosing a qualitative research approach is supported by my social constructivist worldview, and this also affects my research design (Creswell 2014, 5f.). Worldviews, also often labelled as 'paradigms' by Lincoln, Lynham, and Guba (2011) or Mertens (2010), were explained by Creswell (2014, 6) "as a general philosophical orientation about the world and the nature of research that a researcher brings to a study". Every researcher is in some way influenced by a diverse set of principles which "combines beliefs about *ontology* (What kind of being is the human being? What is the nature of reality?), *epistemology* (What is the relationship between the inquirer and the known?), and *methodology* (How do we know the world or gain knowledge of it?)" (Denzin and Lincoln n.d., 26). A social constructivist worldview considers that people have a subjective understanding of the world and are not able to consider it objectively.

Our own experiences distort the reality and construct a new one which is for us real. Consequently, researchers holding a constructivist perspective do not aim to reveal the objective truth, but they rather want to understand and present the truth as their research participants perceive it (Creswell 2014, 8f.). This thesis' research question is not about the general potential of cassava as a food and cash crop or how food security is universally defined, but the focus is rather on the Malawian smallholder farmers' unique reality about cassava, how they understand and describe food insecurity, and to what extent they associate food security and cassava. Of course, the farmers' reality might be true for them, but analysing their reality is essential for understanding their behaviour. The research's results will not give a general answer which is representative of the connections between food security, income, and cassava worldwide. It merely reveals and explains the situation of Malawian smallholder farmers in Lilongwe District. Just changing the location from the Central Region to the Southern or Northern Regions of Malawi might deliver different results.

These constructivist reflections are actually especially important when working in development cooperation. Too often is one general view applied to multiple different situations, and this neglects the broad differences between people. For example, during my internship for GIZ I worked on a tutorial which was supposed to explain to the rural farmers what a proper diet looks like. Before developing a strategy, I spoke to my Malawian team colleagues and the expert of GIZ's Malawian Food and Nutrition programme to understand how a typical Malawian farmer diet looks. I also wanted to know the specific local challenges the farmers are able to understand. The first thing I learned was that defining one general statement about nutrition in Malawi is not even possible. There are many variations within the country's regions that influence nutrition in different ways, such as the varying definitions and knowledge of staple foodstuffs, and this must be considered to correctly to address improvements in nutrition. Additionally, describing to the farmers how much food is appropriate for a day was challenging, as Malawi's farmers are unfamiliar with calories. In the end, my GIZ office got the order to adapt the already-existing nutrition tutorial for Sub-Saharan Africa, as they want to present a uniform strategy for Sub-Saharan Africa. This tutorial was already developed in Germany and did not consider Malawian circumstances at all. The results of my research should therefore also demonstrate how important considering local conditions is, as development cooperation often fails when they are not

considered. Too often do people in development cooperation believe they know everything and know it better while neglecting large differences between localities and populations. First, this disregards the knowledge of the farmers, a great resource which development cooperation often fails to use when developing improvement strategies. Second, just because development cooperation implements a new strategy does not mean that farmers adopt it. Implementing strategies which do not match farmers' personalities is very difficult and demands that farmers change their minds. First understanding the local conditions and then developing an improvement strategy which considers them is advantageous, but this unfortunately requires much time and many resources.

2.1.3 Case Study Approach

"Case research is an in-depth investigation of a problem in one or more real-life settings (case sites) over an extended period of time. Data may be collected using a combination of interviews, personal observations, and internal or external documents.[...] The strength of this research method is its ability to discover a wide variety of social, cultural, and political factors potentially related to the phenomenon of interest that may not be known in advance" (Bhattacherjee 2012, 40).

Case studies are one method of conducting social science research. Other strategies are, for example, surveys, experiments, histories, and archival analysis. Stake argues that the object of research is pivotal for the decision to use a case study design and that the research's purpose is to gather in-depth information about a specific topic which is hardly explored (Njie and Asimiran 2014, 37). According to Yin (1994), one can decide with three conditions which research strategy is the most suitable: "(a) the type of research question, (b) the control an investigator has over actual behavioural events, and (c) the focus on contemporary as opposed to historical phenomena"(1). The types of research questions can be summarised with "what", "who", "where", "why" and "how". While "what" questions are rather exploratory and "who" and "where" questions are more predictive and often investigated in economic research, the "why" and "how" questions have an explanatory character. So considering Yin's conditions, a case study design should be the taken when (a) the research questions are "how" and "why", (b) the researcher is not in a position to manipulate the participants' habits, and (c) the focus is on a contemporary event (4ff.) Of course, the different strategies are not mutually exclusive, however, if "a 'how' or 'why' question is being asked about a contemporary

set of events over which the investigator has little or no control" (9), then the case study design is the advisable choice. Additionally, Yin states that a case study "investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident" (13), and thus it also emphasises the importance of the context which might exert a significant influence on the event. Thus, a case study enables the researcher to explain an event under consideration of its influencing context using a variety of different data sources. Yin (2003, 2006) and Stake (1995) also consider a constructivist paradigm (or a constructivist worldview, as previously defined) the foundation of the case study approach (Baxter and Jack 2008, 545).

2.2 Conducting Fieldwork in Malawi

I lived from April to October 2017 in Lilongwe and stayed with a Malawian woman who rented two rooms in her house. I worked for five months as an intern for the GIZ programme *Green innovations centres for the agriculture and food sector*. During that time, I gained deep insight into the work of GIZ and especially gathered information about Malawi's food security and poverty. In the first two weeks of my internship, I travelled with Malawian enumerators through Central and Southern Malawi to collect data of cassava cooperatives which process cassava into starch or flour. This was my first contact with cassava, and my interest constantly increased during my stay, as I recognized the outstanding role of cassava to the Malawian people. Thanks to my GIZ superior, who supported my research, I was able to combine my work and data collection. Due to my interest in cassava, I was allowed to participate in many meetings and workshops concerning GIZ's interest in strengthening the cassava value chain. I thus also acquired insights into cassava processing and the efforts of the project *Cassava: Adding Value for Africa* (C:AVA), which is specialised in establishing value chains for High Quality Cassava Flour (HQCF). However, I was focused on the cassava farmers, and thanks to my internship I had the opportunity to talk to them and observe them during their daily lives.

2.2.1 Study Site

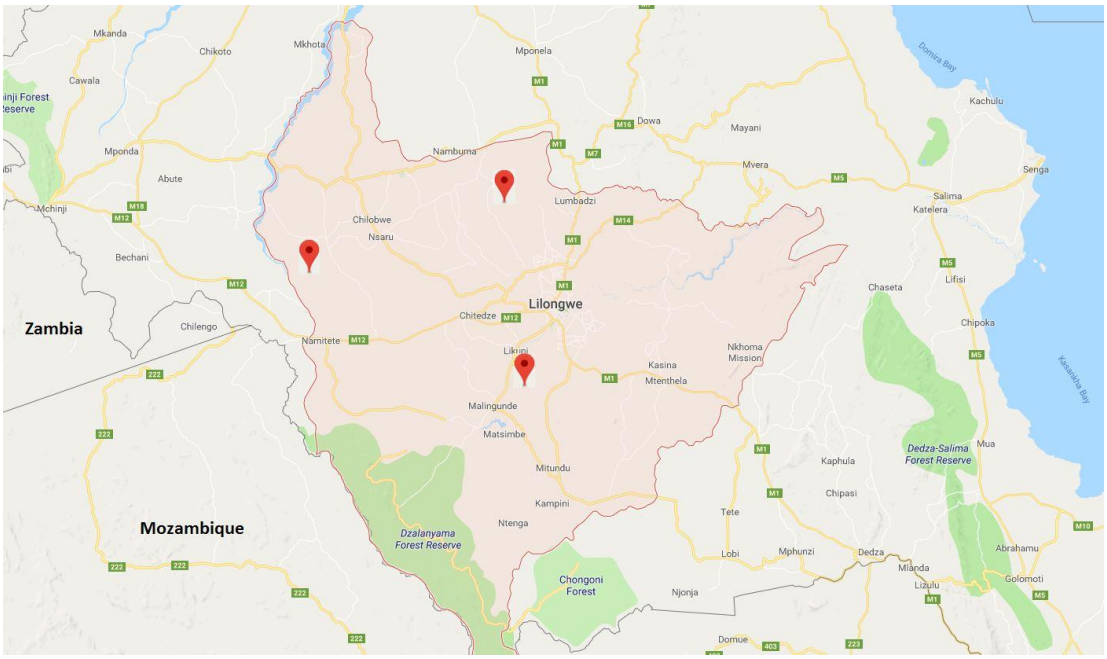


Figure 2. Map of the Study Site (Google maps)

My study site was Lilongwe District, and via GPS I tracked the three locations where I, together with three enumerators, conducted qualitative interviews with a questionnaire (see Figure 2). Near every location we conducted one-to-one interviews or a focus group discussion when farmers did not want to participate in the one-to-one interviews. Although I only marked these three locations, my empirical inquiry was conducted in the entire district, as I was able to conduct additional observations and conversations with cassava farmers on multiple occasions.

I chose Lilongwe District, which is located in the Central Region of Malawi, as my study site because in that area cassava cultivation is relatively new. In the Northern Region cassava is known as staple food alongside maize, and in the Southern Region cassava is primarily used as cash crop for the HQCF production supported by C:AVA. The prevalence of cassava in the Central Region, however, is quite unknown and unexplored.

Thanks to my internship, I was allowed to use GIZ contact details for the farmers. I called the leaders of the villages and explained my concerns to them, and they helped me gather the farmers together at one location at a fixed date on which to conduct the study. Since this contacting connected me to GIZ, I emphasised my role as a neutral student and explained my study's purpose to all of the participants.

2.2.2 My Influence as a Researcher

As already mentioned above, my "unique researcher attributes have the potential to influence the collection of empirical materials"(Pezalla, Pettigrew and Miller-Day 2012, 166). During my fieldwork, I experienced that I influenced the research's participants in a specific way. I often experienced that my origin from a rich industrial country intimidated people in less-developed countries, and they attributed more importance and validity to my opinion than theirs. For me, first clarifying that I was equal to the Malawian farmers was very important. That's why I emphasised to the famers that they have unique knowledge about cassava and that I'm here to learn from them. Since the majority of the rural farmers cannot speak English, I learned to introduce myself to the participants in the villages in Chichewa, the local language, and I also wore the traditional Chitenje (a long skirt over my trousers). I could see that the farmers greatly appreciated that I respected their society. When the farmers listened to my attempts to speak Chichewa, they smiled and tried to help me with pronunciation, thereby establishing a connection.

Another major unfamiliar challenge I experienced in Malawi was that I always attracted attention and created specific assumptions because of my blonde hair and white skin. Of course, in the city of Lilongwe there are many white-skinned people, and the inhabitants are accustomed to them, but elsewhere I was always recognized as a foreigner. My presence in the small villages in rural Malawi attracted particular attention and was symbolically charged, as white people typically represent development aid to average Malawians. Of course, there are some white tourists and businesspeople, but the majority of white people there work for development cooperation. Thus, the farmers automatically associated my research with aid, and this might have influenced their answers. I introduced myself at every study site as a student of the University of Oslo and explained the purpose of my study with the help of the enumerators, distancing myself from development cooperation institutions. However, since it is so prevalent, it affected the collection of data, as the farmers expressed their answers so as to seem desirable for receiving development aid. Additionally, they often also mentioned and emphasised how important development aid is, even though it was never mentioned in the questionnaire.

In summary, research is never conducted in a totally neutral environment. As a researcher, one might influence the research merely via appearance, and the topic of the research might also influence data collection. In Malawi, I experienced that my appearance is interlinked with development cooperation and that this assumption influenced my data collection methods, namely 'interviews' and 'focus group discussions'.

2.2.3 Impacts of Using Malawian Enumerators

Although English is, together with Chichewa, the official language of Malawi, the majority of Malawian rural farmers do not know English. Since I do not know Chichewa and learning the language within my timeframe would have been prohibitively difficult, I needed to hire enumerators for my research.

With support of my GIZ colleagues, I was able to contact three female Malawian enumerators. All of them held bachelor's degrees and had already gathered experience as enumerators for government institutions or NGOs. We first met in my GIZ office in Lilongwe, and I explained the purpose of my research to them. After that, we went through my questionnaire, and I explained why I would pose each question and what the intention behind it was. They gave me some advice based on their own experiences as to how the famers would understand the questions. With the enumerators I visited three different locations, and they helped introduce me and explain the purpose of the study to the farmers. After that the enumerators conducted the one-to-one interviews with the farmers. Since I was not able to conduct the interviews myself, I could not vary or adapt questions within the interviews. I was thus not able to neither ascertain new findings nor deepen interesting answers by posing new questions. This is quite a negative aspect of using enumerators, but it was unfortunately unavoidable. However, I analysed every questionnaire immediately after each interview, and if I found interesting answers I asked the enumerator to translate additional questions. Nevertheless, through the use of enumerators it was more difficult to identify the interesting findings of the interviews in time and ask further questions to analyse these findings. This is much easier when conducting the interviews.

This was also one of the reasons why I conducted focus group discussions in addition to the one-to-one interviews, as I was able to talk to the farmer groups directly while the

enumerators translated our speech. This enabled me to lead the conversation in the direction I wanted for my research. After the fieldwork, I met the enumerators at my GIZ office again, and we worked through the given answers. I asked for clarification when some answers were not understandable to me, and the enumerators also shared their observations.

2.3 Data Collection

For the following data collection, different qualitative methods were used: interviews, focus group discussions, observations, and document reviews. Using different methods enables a researcher to obtain a deeper and broader understanding of topics. Each method has its advantages and disadvantages; by using multiple methods one can compensate for each method's weakness and additionally illuminate the research topic from different perspectives.

As already pointed out, the specific research questions and the purpose of the study affected the selection of qualitative methods. Knowing the goal of one's research and thereby finding the most appropriate methods to gather data is imperative. These qualitative methods can be divided into "those that focus on naturally occurring data and those that generate data through the interventions of the research" (Ritchie 2003, 34f.). Naturally occurring data are, for example, participant observations, observations, documentary analysis, discourse analysis, and conversation analysis. Generated data, however, require some kind of "reconstruction" (Bryman 2001, quoted in Ritchie 2003, 36), so the collected data are already reprocessed by the participants, and this yields insight into the participants' perspectives and interpretations. Generated data refer mainly to interviews, group discussions, and biographical methods. In the following section, the utilised methods of inquiry will be presented. How the different methods were conducted will further be explained, as well as what was experienced during the study.

2.3.1 Qualitative Interviews

Even in ancient history, conversations were used to obtain systematic knowledge. Socrates talked to his Sophist opponents and thus generated philosophical knowledge, and Thucydides based his information about the Peloponnesian War on his

conversations with participants of the war. Since the seventeenth century, the term “interview” has been commonly used and "is literally an *inter-view*, an interchange of views between two persons conversing about a theme of common interest” (Brinkmann and Kvale 2018, 6). Nowadays, social sciences often base their research primarily on qualitative interviews. For this thesis’ research, semi-structured interview was used, which "is a qualitative data collection strategy in which the researcher asks informants a series of predetermined but open-ended questions" (Ayres 2013, 810). The purpose of these kinds of interviews is to "obtain descriptions of the interviewees' lived world with respect to interpretation of the meaning of the described phenomena" (Brinkmann and Kvale 2018, 14).

Interviews and focus group discussions comprised the major part of this research. During the fieldwork, 29 one-to-one interviews and three focus group discussions were conducted with smallholder farmers. At first, the plan was to hire one translator who would translate the one-to-one interviews. However, after arriving in Malawi and acquiring insights into the conditions and routines in Malawi, I decided to hire enumerators to conduct the one-to-one interviews. Whereas translators just translate the interviews, enumerators are trained to conduct interviews by themselves and to filter and summarise the needed information. I made the decision to hire enumerators, because Chichewa is quite a complicated language; the enumerators required three times as much time to interview in Chichewa than in English, and if they had had to translate everything to me, the interviews would have required too much time. Since arranging meetings with the farmers in the first place was challenging, specific times were not able to be arranged with every farmer. When such interviews are conducted in Malawi, the leaders of the villages usually gather the farmers together at one specific day and time, as the leaders are the only ones who can be reached due to being the only people with phones. So when we arrived at the arranged meeting point, many farmers were already waiting for us, and I wanted to ensure that everyone who came was interviewed and that no one had to wait excessively. Since coming to the villages was resource-intensive, driving to the villages multiple times every day just to interview two or three farmers was not possible. The rental cost for an adequate car was quite high, but due to the well-trained enumerators and our preliminary discussions, the collected data was suitable for my study.

Additionally, I conducted two interviews with two leaders of cassava processing factories who spoke English. They guided me through their cassava factories and explained how they process cassava. I recorded the conversations in my notepad, which I always took with me during my fieldtrips to cassava farmers

For the one-to-one interviews, a questionnaire with three different sections was designed (see the Appendix A, page 130).The first one asked general questions about the farmer's situation and cassava cultivation. The second part is about cassava as a food crop, the third part about cassava's role as a cash crop. Mainly open-ended questions were used in the questionnaire to ensure that the interviews covered the research questions, and this also gave the farmers the opportunity to explain what was important to them regarding the research. The questionnaire varied depending on the answers the farmers gave. So, for example, a farmer who only grew cassava for home consumption was not interviewed about the cash crop section. The enumerators were introduced to the structure of the questionnaire at the first meeting before the fieldwork started and were therefore familiar with the intended application. For the focus group discussions and the interviews with the cassava processors I used an interview guide, which allowed me to add further questions (see Appendix B, page 133). It was not necessary to develop a questionnaire for these interviews since I conducted them by myself.

Developing the Questionnaire

When the questionnaire was being designed, different aspects had to be considered. First, what my research questions were and what the questionnaire was meant to ascertain had to be clarified. The second challenge was to adapt the questions to the smallholder farmers' understanding. For example, it originally was planned to have a food security section in the questionnaire for the one-to-one interviews which should have been conducted by the enumerators. However, when I tried to design the questionnaire's food security section it was particularly challenging. Including a description of the food security situation during the last few years was intended, but formulating an appropriate analysable question was ultimately too difficult. Asking them about whether they had enough food would not have produced an answer which would imply that they actually had enough to balance their energy consumption as it is medically defined. The farmers often lacked knowledge of how many and what kinds of nutrients the body needs, so the question would have been too complex. However, this

introduced a specifically Malawian understanding of food security, and it thus engendered reconsideration and revision of the research questions. This demonstrates that qualitative research is not a linear, but rather a circular, process in which every phase influences the others, and revising some choices might be necessary if new findings require realignment. However, reflecting on every new finding would be too time-consuming, so looking at decisions critically at the project's beginning is important; adjusting them afterwards is not realistically possible (Hogan et al. 2009, 2; Gray 2004 ,4). Since the food security topic is quite complex and I was not able to develop a suitable food security section for the questionnaires, I decided to conduct additional focus group discussions with the farmers. With this method I would lead the conversation and the enumerators would act as translators and translate between the farmers and me. So I would have the chance to clarify my questions and to react directly on the farmers' answers about food security.

The third challenge was that I could not conduct the interviews myself, so developing a logical structure which the enumerators could easily follow was necessary. After designing the first questionnaire, I talked to two Malawian colleagues and asked for their advice. After considering their advice and improving the questionnaire, I conducted two pre-tests by myself with English-speaking cassava farmers I met at a GIZ meeting in Zomba. This interview was not included in my actual data collection, but it helped me test the questionnaire and improve it again. As the last step, I asked the enumerator for additional notes. After that we went through the questionnaire together, and then I developed the final questionnaire.

Evaluating the Questionnaires

Already when the enumerators conducted the interviews, I started to read the answers which were reported through the enumerators. If I had further questions I asked the enumerator to translate between the farmers and me. However, when analysing the questionnaires back in the office, I identified some ambiguities. Most of them were clarified through the enumerators during our next meeting, though question 22 was not answered how I intended it to be (see Appendix A, page, 132). The question actually aimed at identifying the reasons why the farmers had started to plant cassava. Instead many of the farmers answered what has changed for them after they planted cassava. When I spoke to the enumerators, they told me that they assumed that the farmers did

not know exactly what has changed for them to start planting. Since all of the enumerators understood the intended purpose of the question since all of them submitted questionnaires filled out with the intended purpose of the question, it would have been very interesting for me to analyse why the farmers interpreted the question differently. However, as already mentioned in chapter 2.2.3, when using enumerators one is not as flexible and it is more difficult to include and analyse new findings.

2.3.2 Focus Group Discussions

Although focus group discussions are often subordinate to qualitative interviews, this topic is presented here separately because these discussions made a significant contribution to the research. The debate about whether one-to-one interviews or focus group discussions generate the most authentic dataset often arises in qualitative research. In general, qualitative research is based primary on one-to-one interviews, which are considered the "gold standard" (Silverman 1993 quoted in Barbour 2018, 56). However, instead of arguing about which method is more significant, one should recognize that the methods generate parallel datasets which can be used to explain or supplement each other. However, if one-to-one interviews and focus group discussions present different results, then analysing why this happened would be the purpose of qualitative research (Barbour 2018, 57).

Since I was not able to conduct the one-to-one interviews personally, I decided to implement additional focus group discussions, as they gave me an opportunity to talk directly to the farmers. We conducted 3 focus group discussions with group sizes between 5 and 9 people; in total 22 farmers participated in the focal group discussions. While conducting the discussions, farmers joined and left the groups, but it remained more or less the same group size. I posed the questions in English and my enumerators translated them into Chichewa, and the farmers' answers were translated into English for me. For the focus group discussions, I designed an extra interview guide with open-ended questions and with a focus on the food security definition of the farmers (Appendix B, page 133). Within the discussion I was able to vary the questionnaire and pose further questions responding to the farmers' answers. Furthermore, I decided to conduct focus group discussions because they are "particularly useful for exploring people's knowledge and experiences and can be used to examine not only what people think but how they think and why they think that way" (Kitzinger 1995, 299). I thus

focused the group discussions on the farmers' perceptions of food security and its connection to cassava, and this led to a lively discussion between the participants.

2.3.3 Observation

Since I lived for almost six months in Malawi and, due to my internship, often worked with cassava farmers and visited them in their villages, I was able to observe their interactions with cassava and how it was implemented in their daily lives. This qualitative observation method collects and analyses naturally-occurring information "in which the researcher does not participate in the interactions" (Harrell and Bradley 2009, 6).As Gray (2004) recommended to write down the observations as soon as possible I always had my notepad with me when I accompanied my GIZ colleagues to write down my observations right in the field (244).

I observed and recorded when I saw cassava and how it was used by farmers. On two occasions I was able to observe the processes of harvesting cassava and selling it to vendors. I also visited a cassava factory three times to observe how flour is processed. Additionally, I observed the group discussions implemented by the GIZ staff and learned that women were often the dominant participants when the questions concerned cassava. According to Schnell et al. (2013), the mere presence of the researcher influences and often changes the behaviour of the participants (393). Since I made some of the observations after joining a GIZ team at a village for another purpose, those farmers were not aware that I was actually additionally observing their usage of cassava for my thesis. In summary, the diverse observations I made during my stay in Malawi gave me an initial introduction to cassava and helped me develop my research question, giving me more comprehensive knowledge about this crop.

2.3.4 Legal Documents

In addition to my own conducted research, I referred to data collected through governmental documents, participations at conferences or workshops, and official statistics to deepen my understanding.

2.3.5 Secondary Data Sources

In additional to the aforementioned data collecting methods, which can be labelled primary sources, I also used secondary sources, which "are datasets that are already in existence"(Harrell and Bradley 2009, 7), meaning they contain information which was generated through another source. I expanded my knowledge about Malawi's general food security and the impact of cassava through multiple literature reviews, reports from NGOs, and articles in journals or newspapers. Further, I compared my own results with secondary sources to verify that my results are in accordance with the general knowledge of the topic.

2.3.6 Triangulation

After analysing the findings from my data collection, I applied triangulation to verify whether the different methods generated data that were concordant with each other. Using different methods is more likely to reveal contradictions or discrepancies. Through triangulation, one compares the findings which "confirm or disconfirm each other's result" (Barbour 2018, 56). When contradicting results are found, a challenge often follows to determine which results are more reliable. However, instead of arguing about which method is more precise, one should analyse why different results occurred. Further, Richardson (1994) proposes using the term 'crystallization' instead of 'triangulation', because this "emphasizes the value of looking simultaneously at the same issue or concept from a variety of different angles" (Barbour 2018, 57). I compared my research's findings with each other and further verified them with results from other sources. When I found contradictions within the findings, I used background knowledge to explain why this discrepancy was there. For example, I interviewed one cassava farmer who told me that he also has a small factory which processes starch. But when I visited the factory, I observed that there was no processing activity. He told me there was just a short break because the building was being painted, but I could not find any paint or painting activities at all. After that I learned that he was receiving financial support for the starch factory and might have encountered problems if the donors learned that there was no production. Here I would like to point out again that I guaranteed full anonymity to my participants, but there nevertheless might have been hidden reasons for participants to give intentional incorrect answers. Using different

types of methods increases the likelihood of revealing these discrepancies and sometimes even explaining them.

2.4 Conducting Research in Malawi

Conducting research in Malawi is quite a challenge. Before arriving in Malawi, I was aware that I would need to hire translators since I wanted to focus on Malawian farmers. Due to my internship, I had a good starting position to contact the participants I would need to collect appropriate and sufficient data for my research. However, before coming to Malawi and driving through the country, I was not able to imagine how far away people live from any infrastructure. Most of the Malawian villages are absolutely isolated with either no or very shoddy roads. So, besides the translators, I also needed a good car which was able to drive over sand tracks and a driver who knew the difficulties of such paths. Additionally, finding the correct locations was difficult, as there are no street names. Finding the villages was only possible with the help of other Malawians who guided us in the right directions. Thus, conducting research in Malawi is very time-consuming and expensive. Furthermore, I am very grateful to all the smallholder farmers who enabled me to conduct the research. Since many of the farmers had no mobile phones, I entirely relied on the village leaders to inform the other farmers about my interviews. Further, this was also time-consuming for the farmers, as they had to come from their houses to the meeting places and wait to be interviewed. As a conclusion, conducting research in Malawi with rural farmers is very challenging for the researcher and the participants. The spatial distribution of the farmers' houses and the unkempt road system demand effective organisation and scheduling to ensure that everyone is comfortable.

2.5 Limitations

The preceding sentence also outlines the first limitations of the study. Lack of financial resources and time limited the number of participants and locations. Additionally, the use of enumerators, which is quite common when conducting research with Malawian farmers, complicated data collection, as the enumerators necessarily filtered the given information. Although they were advised about important information, they still could

miss or misjudge interesting statements from the farmers. Moreover, the researcher is not able to adapt the questionnaire to unexpected information.

Furthermore, the limitations of this study are caused by its particular research question and its qualitative approach. The purpose of qualitative research is not to give general knowledge which is applicable and transferable to other social phenomena. Thus its scope of application is often very minor and is only meaningful in the researched context. Thus, the research topic is a limitation, as the results merely present the specific context of the research. Although I tried to develop my research topic with an unbiased open mind and analyze the gathered data without personal interpretation, there must have been some individual assumptions that influenced and distorted my research outcome. All qualitative research is subjective and is influenced by aspects of the researcher's person, such as gender, education, class, or personal experiences.

2.6 Ethical Considerations

According to Gray (2004), one must guarantee an ethical involvement of the participants by obtaining informed consent. For that purpose, I presented not only myself to the participants, but also the purpose of the thesis, which people comprised the pool of participants, and the kind of information the thesis was meant to generate. Participation was voluntary and anonymous and the farmers could refuse to answer questions when participating in the study. The farmers were informed about the enumerators and how long the interview or focus group discussion would require. After the introduction, I gave the farmers the opportunity to ask questions about me, the thesis, or the further procedure (59). Before conducting the interviews, the enumerators asked every farmer for consent. Since some of the farmers already knew me as GIZ intern, I asked the enumerators to emphasise that the study was independent from GIZ and that the study's outcome would not have any impact on their future collaboration with development cooperation agencies. I stressed the fact that my study would not help them receive financial help or any other support. While interacting with the farmers, I ensured that the farmers were aware of the purpose of the research and their role in it. These ethical considerations needed to be reconsidered with regard to observation. Since I conducted covert observations, meaning that the people I observed were not informed about my intentions, the farmers never gave me permission to observe nor

analyse them (Gray 2004, 239). However, since my observations are spread over the entire Lilongwe District and I do not present personally sensitive observations, the conducted covert observations and its results should not harm anyone. Ethical considerations would be in order if I had observed for a long time in the same location and analysed private personal behaviour, but my observation was only conducted in public locations and focused on the general usage of cassava, not individual behaviour.

3 Theoretical Perspectives

The preceding chapter gave a theoretical framework of this thesis' subject. It presented different theories and discussions which relate to the thesis research question and clarified the theoretical basis of the thesis. The information provided in the following chapter will enable the reader to develop a deeper understanding of the research topic. First this paper will highlight food security, since this research's aim is to analyse farmers' specific understanding of it. For that purpose, different conceptual frameworks of food security will be introduced. A brief discussion will then present the interdependence between food security and income. As this research is meant to understand how smallholder farmers use and assess cassava referring to its impacts on food security and income, this paper must discuss agriculture's impacts on food security and income, and to what extent agriculture can exert influence on the farmers. After that, the theoretical concept of food and cash crops will be introduced and analysed. This knowledge will then be applied to the outcome of the study which researched how cassava is used as a food and cash crop by the farmers of Lilongwe District and how they describe its benefits and limitations.

3.1 The Concept of Food Security

We live in a world where of the 80,000 edible plants used for food, only about 150 are being cultivated, and just eight are traded globally. In a world where we produce food for 12 billion people when there are only 6.3 billion living, 800 million suffer from malnutrition (Shiva 2007 in Asayehgn 2016, 1)

In 2018, undernourishment is still one of the greatest obvious problems endangering people worldwide. The most recently published numbers in September 2017 indicate that 815 million people were undernourished in 2016, which corresponds to 11% of the world population. Although this number lies below the level in 2000, which was 900 million, it represents an increase of 38 million people compared to 2015 (FAO et al. 2017, 2). Even though undernourishment is a global phenomenon, certain regions suffer disproportionately, with the highest rates in Eastern Africa (33.9%) and Central Africa (25.8%) (FAO et al. 2017, 6). According to current projections, the current rise of undernourishment will probably continue due to climate-related shocks and violent conflicts (27).

However, among all the worldwide problems, hunger is actually the one which is considered the most solvable (BMZ 2015; WFP 2012; UN 2016). Since the World Food Conference in 1974, which stated that "every man, woman and child has the inalienable right to be free from hunger and malnutrition in order to develop fully and maintain their physical and mental faculties" (OHCHR 1996-2018, Point 1), the drive to end hunger, undernourishment, and food insecurity has been in the global agenda. After the expiration of the Millennium Development Goals in 2015, which sought to halve the proportion of people who suffer from hunger, the second Sustainable Development Goal planned to end hunger by 2030 (UN 2017, 5).

A political-economic perspective claims that understanding how a problem is created is essential to being able to find a suitable solution. Thus, correctly developing a theory of food security and its challenges is necessary to create a successful strategy to diminish or end food insecurity (Young 2012, 71). Understanding how food security is defined in general will be useful in analysing and reflecting on the individual perspectives of the smallholder cassava farmers in Malawi.

3.1.1 Important Terms of Food Security

The next part introduces the main terms of food security, and these are necessary to be able to differentiate between the different occurrences of food insecurity. The following terms are common and frequently used within the discourse of food security.

Malnutrition is defined as an intake of nutrition which is too low or high with regard to an individual's need (Weingärtner and Trentmann 2011, 20). The different types of malnutrition are undernutrition (being underweight, stunting, and wasting), dietary deficiencies of vitamins or minerals (also known as hidden hunger), obesity, and secondary malnutrition (WHO 2017, Key facts; Young 2012, 43). Different forms of malnutrition, e.g. child undernutrition or adult obesity, often coexist in the same countries (FAO et al. 2017, II). Since this thesis' research is about smallholder cassava farmers of Lilongwe District, the following section only discusses the different terms for a lack of calories or nutrients, since overnutrition is a negligible problem for famers in that region.

Secondary malnutrition is defined by the multilayered interdependencies between diet and diseases. An inadequate diet can be a cause of diseases, as undernourished people have weaker immune systems and are therefore more easily infected by diseases like influenza or measles. Additionally, some afflictions, such as diarrhoea, respiratory illnesses, intestinal parasites, and HIV/AIDS, cause malnutrition-inducing symptoms. These include poor nutrient uptake, a lack of an appetite, and nutrient theft by parasites (Young 2012, 43f.).

Undernutrition "refers to the outcome of insufficient intake, and/or poor absorption and/or poor biological use of nutrients consumed" (FSIN 2018, 12). There are four sub-forms: being underweight, stunting, wasting, and deficiencies in minerals or vitamins (WHO 2017, Introduction). These different sub-forms can occur simultaneously or separately. One is diagnosed as underweight when one's weight is too low for his age. Stunting is visible when one's height is too low for his age. This is particularly caused by recurring or long-lasting undernutrition. Impacts of this sub-form are difficult to compensate and hinder the development of cognitive and physical abilities in affected children. This most likely impairs affected children for the duration of their lives (Weingärtner and Trentmann 2011, 24f.). A low weight for one's height is an indication of wasting and is often the result of a current famine and/or illness. As long as the condition does not last an extended period, the physical effects are treatable (WHO 2017, Introduction).

In contrast to the objective definitions mentioned above, *hunger* is first described as a subjective feeling people experience when they have not eaten for a certain time. Although the term is used worldwide by people in their daily lives, within the specific context of food insecurity *hunger* implies that there is insufficient food to stop the hunger. Broadening the term to *chronic hunger* and *acute hunger* would be more precise. Acute hunger is often equated with *famine*, which is declared when (I) extreme food shortages affect at least 20% of the local population, (II) acute malnutrition is faced by at least 30% of the children, and (III) the daily death rate is doubled (FSIN 2018,17). Especially in international media, "famine" is a buzzword and is thought to be the worse condition and cause the most fatalities. This incorrect perception neglects the danger of *chronic hunger*, which actually causes 90% of the global hunger-related deaths; famine is responsible for the remaining 10% (Young 2012, 48f.). The term

hidden hunger describes the effect of satiating hunger with food which lacks necessary nutrients like vitamin A, iron, zinc, and iodine. This causes severe physical and psychological medical concerns (Biesalski 2013, 26ff). *Hidden hunger* is quite intricate, as it is very difficult to reveal due to affected people often not recognising their own dangerous physical conditions. In 2012, approximately two billion people worldwide were faced by hidden hunger (Jones et al. 2013, 482).

3.1.2 Development of the Food Security Concept

The meaning of the term 'food security' has varied over time and undergone significant transformation due to changing political, social, and economic theories.

The concept of food security was first introduced in 1974 at the World Food Conference and considered as a challenge which needed to be solved on a global level:

> *As it is the common responsibility of the entire international community to ensure the availability at all times of adequate world supplies of basic food-stuffs by way of appropriate reserves, including emergency reserves, all countries should co-operate in the establishment of an effective system of world food security (OHCHR 1996-2018, Point 12).*

Within the last 40 years, more than 200 different definitions were formulated, each trying to describe the concept and include all important variables (Maxwell 1996). The first development phase of the concept can be labelled the 'food availability approach' or the 'Malthusian approach'. The original definition of food security was developed during a time of worldwide food crisis:

> *Availability at all times of adequate world supplies of basic food-stuffs to sustain a steady expansion of food consumption and to offset fluctuations in production and prices (UN 1974 in Burchi and De Muro 2012, 3).*

This specific formulation contained a strong emphasis on food supply, which led to a strong equation of food security and food production. This assumption guided the following food security discussions to the topics of ensuring sufficient world food stocks, national self-sufficiency, and food import stabilisation schemes. This was supposed to ensure global food security by producing enough food to meet the demand of the global population (Cardoso, Ferrão and Fernandes 2017, 250; Maxwell 1996, 156). The assumption that food insecurity is caused by a lack of food has been a

dominant explanation since approximately 1850. This dates backs to Thomas Malthus, who wrote an essay in 1798 which identified the growing population as the root of malnutrition and poverty. He lived in Great Britain during its industrialisation and observed an increase in population and poverty. Since they occurred at the same time, he assumed that they were mutually dependent and concluded that the growing population caused poverty, eventually leading to starvation. He postulated that population increases exponentially while food production improves arithmetically. Thus, food production would very likely not be able to match population increase, and this would then cause severe food shortages (Young 2012, 74f.).

These arguments about overpopulation and insufficient food are still popular 200 years after Malthus' publication. Scientists who subscribed to the neo-Malthusian's approach believed that population growth within developing countries was the reason for the diverse famines during the 1960s and 1970s. They argued that the increase in population overstrained the national and worldwide food supply (Westengen and Banik 2016, 115). Presently, Neo-Malthusianism’s approach to food security focuses on the finite capacity of worldwide food production and therefore demands a sustainable society in which needs are adjusted to agricultural production which does not overburden resources (Scanlan 2003, 96). Thus, discussions about food security are still often influenced by demands to regulate population growth and/or produce more food. Influential global agribusinesses advertise genetically modified crops, high-tech solutions, high-quality pesticide, etc., which should lead to an increase in food production and thereby induce a decline of food insecurity. The fact that there is already enough food throughout the world is often neglected and not addressed at all (Burchi and De Muro 2013, 4). While cereal production increased from around 0,742 billion tons in 1961 to 2,849 billion tons in 2016 (World Bank 2018a, Data), the population grew at the same time from 3,032 billion to 7,444 billion (World Bank 2018c, Data). Whereas cereal production increased by 284%, the population “only” grew by 145%. Also, the general food production index, which contains all nutritious crops and is referenced to 2015 with the value 100, rose from 31,5 to 124,2 between 1961 and 2014, which illustrates that the food supply would be sufficient for the entire population (World Bank 2018b, Data). These numbers are proof that food production is not the cause for the current conditions of food insecurity, since agriculture produces enough

food for the entire world population. However, this statement is still on the global food security agenda.

Through Amartya Sen and his entitlement approach, a new perspective entered the food security discussion in the 1980s and changed it fundamentally. While the food availability approach considered food supply as the crucial component to food security, Sen objected to that assumption:

> *Starvation is the characteristic of some people not having enough food to eat. It is not the characteristic of there being not enough food to eat. While the latter can be a cause of the former, it is but one of many possible causes (Sen 1981, 1)*

Sen argues that people starve even though food is available, and thus he identifies access to food as the decisive variable in his approach. While the food availability approach might be applicable in pure subsistence farming, where a family cultivates all its needed food by itself, the entitlement theory analyses the causes for famines in exchange economies, wherefore the approach is also labelled 'exchange entitlements' (Sen 1977, 34). However, the approach's purpose is not to identify one single reason for the occurrence of famines, but rather present a "general framework for analyzing famines" (Sen 1981, 162). According to Sen, the problem of starvation is located in and must be analysed within the entitlement system (1). Crucial for that system is that the purchase of food is governed by a legal system which regulates the exchanges which acquire food. The focus of the approach lies on the "*ability* of people to command food" (45, emphasis added), and this is embedded in the legal system. Sen considers the law to be the important instrument that "stands between food availability and food entitlement" (166). The entitlement approach claims that every person has some endowments, such as land, animals, technical equipment, or non-material resources like labour, knowledge, or skills. A person can exchange these endowments with commodities, e.g. food or services. All the products and services a person is able to exchange with her/his endowments are designated as an 'entitlement set' which is comprised of all the individual 'entitlements'. For example, a pastoralist has a goat (this pastoralist's 'endowment') and he trades it with a farmer for 50kg of maize (this pastoralist's 'entitlement'). Thus his endowment, a goat, provided him 50kg of maize, an entitlement. Swap ratios such as one goat for 50kg of maize are labelled 'exchange entitlement mapping'. The individual endowment set enables the person to purchase food ('entitlement'). If the individual endowments cannot provide the entitlement set with

enough value to exchange for adequate food, the individual faces starvation. Thus, whether there is food is not pivotal, but instead whether people have the ability to acquire the food. An individual's ability determines whether he has access to food, and thus famine can occur even though food is available (Devereux 2001, 246). The causes for starvation are to be found within the entitlement system, as a person's starvation can be caused "if some change either in his endowment (e.g., alienation of land, or loss of labours power due to ill health), or in his exchange entitlement mapping (e.g., fall in wages, rise in food prices, loss of employment, drop in the price of the good he produces and sells)" (Sen 1986, 9). In conclusion, Sen's entitlement approach has had a lasting effect on food security discussions and broadened awareness from merely food supply to the accessibility of food. This new mindset also influenced the current general definition of food security and is, together with the availability approach, one of the most influential approaches to the concept.

According to Maxwell (1996), these two main development phases of the food security concept were embedded in three overarching paradigm shifts that have shaped the different perceptions of food security since the World Food Conference: "(a) from the global and the national to the household and the individual, (b) from a food perspective to a livelihood perspective, and (c) from objective indicators to subjective perception" (156). Each of the different shifts provided a new definition or perception about food security and the possible strategies to establish food security.

The first development of the food security concept shifted the awareness of food security from the global to the individual (or household) level by recognizing the individual's ability to access food, which is relatively independent of the global or national food supply, as the important component of food security. Guided heavily by the World Bank and its report *Poverty and Hunger (1986)*, the general discourse established a connection between food insecurity and poverty within the population. Additionally, it first distinguished between chronic and transitory food insecurity, which opened the way for a better understanding of the different reasons for food insecurity (FAO 2003, 27). Therefore, the definition and following strategies of food security needed to consider the household level rather than the national level. Consequently, the new and most influential definition, published in 1986 by the World Bank, has a clear focus on the individual:

*Food security is access by **all people** at all times to enough food for an active, healthy life (FAO 2003, 27, emphasis added)*

The second shift was influenced by the onset of famines in Africa 1984/85. Until that time, the awareness of food security was limited to the condition of whether people had immediate access to food. Observations by different researchers had revealed that people chose to suffer hunger even though they had comestible commodities. Instead of consuming them immediately, they saved these commodities in order to not suffer even more hunger later. So, if possible, they decided not to eat seeds they would need for future planting or animals they would need for future breeding. This guided awareness from a pure food security perspective to a livelihood perspective. Food security was then considered to be dependent on the outputs of different livelihoods and their resilience to shocks. Households were categorized by their vulnerability to these shocks and their impacts on the food security situation. Thus, livelihood security received attention as an essential condition for ensuring food security within the global food security discussion (Maxwell 1996, 158).

According to Maxwell (1996), the last paradigm shift was from food security being judged by more objective indicators to more subjective ones. He therefore demonstrated that the objective measurements of food consumption, on which the food security approaches were based, were imperfect due to two leading causes. First, determining an adequate food intake which is broadly applicable is problematic. One must not only consider body indicators like size, age, and gender, but also the impacts of work activity, behaviour, and environment. Thus, food security strategies which are based on pure calorie requirements might fail to identify the correct amount of nutrition and then fail to incite the desired results (159). The second cause is the qualitative aspects which are largely excluded by the quantitative measurements of food security. Quantitative techniques neglect the different nutrient content of the foods. They do not take into account the different qualities of food, and therefore even a sufficient calorie intake can lead to a specific type of food insecurity. This reflection was particularly influenced by the results of the Green Revolution, which indeed provided the people with enough food but failed to provide all the needed nutrients (vitamin A, iron, etc.). Due to the book by Allan Berg published in 1973, *The Nutrition Factor: Its Role in National Development*, nutrition science has been consulted for development strategies and thus nutrient content has increased in importance within the food security debate. It has mainly

influenced the aspect of utilisation, which is integrated into the currently universal definition of food security (Westengen and Banik 2016, 117). Furthermore, subjective determinants like local eating habits or cultural acceptability were not included in the quantitative approaches at all. The belief that merely providing food is enough neglects the important subjective value of food, and this is important because it influences eating habits. This can distort the real dimension of food security and influence the success of strategies which target its improvement. In 1988, Maxwell considered the possible subjective dimensions in his definition of food security:

> *A country and people are food secure when their food system operates in such a way as to remove the fear that there will not be enough to eat. In particular, food security will be achieved when the poor and vulnerable, particular women and children and those living in marginal areas, have secure access to the food they want (Maxwell 1996, 159)*

Together, these three paradigm shifts demonstrate the development of the concept of food security from its beginning in 1974 to these days. The discussion has changed from a pure focus on mere food supply and price on the national level to a comprehensive understanding of food security as a complex concept. The concept is now recognised as being shaped by people's subjective awareness and construction of food security as well as the importance of analysing food security within individual lives.

In summary, this sub-chapter demonstrates that many different new findings and social currents influenced and changed the concept of food security since its inception. However, economic interests are also strongly integrated into the current understanding of food security and shape it to their own advantage.

3.1.3 The Current Definition of Food Security

Although the previous discussion showed that the concept of food security is undergoing a constant transition and might even later reveal more influencing variables, a generally-accepted definition facilitates narrowing and identifying the different challenges. This is significant for developing joint strategies to establish global food security. The current definition was developed at the World Food Summit in 1996. In 2001, the word 'social' was added to the definition in *The State of Food Insecurity 2001*, and since then the definition has remained the same including. This includes the latest

publication of *The State of Food Security and Nutrition in the World* in 2017, which identified food security as:

> *A situation that exists when all people, at all times, have physical, **social** and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (FAO et al. 107, emphasis added)*

The small emphasis was added to reflect Sen's contribution, developed in *Poverty and Famines* (1981), to additionally understanding food security as a social construct underlying different power relations (FAO 2003,28). As the concept was formulated at the World Food Summit, four main dimensions were identified with different determinants (FAO 2006b; FAO 2008; Gibson 2012, 19 f.):

Dimension	Explanation and Determinants
1. Availability of food:	The first dimension encompasses the supply of food and is dependent on the domestic food production, import capacity, stock levels and also food aid
2. Access to food:	This addresses the physical and economic access to food, since a sufficient national or global food supply does not guarantee food security at the household or individual level. Policy focus concerning food access is mainly focused on expenditure, markets, income and prices of food security commodities
3. Utilisation:	The third dimension emphasizes the person's ability to absorb effectively the nutrient food which is ensured through a qualitative and diversified diet, proper sanitation, clean water and health care. This illustrates that also non-food inputs influence the condition of food security

4. Stability: The stability dimension is belonging especially to the first two dimensions - availability and access - and emphasizes that a stable access to a sufficient amount of food throughout the entire year is essential. Therefore both dimensions must be able to intercept abrupt shocks like climate or economic crisis.

All of these four dimensions, which are also often labelled the 'four pillars of food security', must be fulfilled simultaneously to ensure food security. Food insecurity exists if people do not have the physical, social, and economic access to food as described above. To reduce food insecurity, providing for the four dimensions and improving the specific determinants which affect them is essential.

There are two general types of food insecurity: 'chronic' and 'transitory'. While chronic food insecurity lasts over a longer time or is even continuous, transitory food insecurity is a short-term event. Chronic food insecurity indicates the condition when the "people are unable to meet their minimum food requirements over a sustained period of time" (FAO 2008, 1). This is often the consequence of a long-lasting poverty, a lack of assets and insufficient access to financial or productive resources. Transitory food insecurity arises after an unexpected and abrupt shock which reduces food production or impedes access to food, leading to inadequate food intake. This development is caused when availability and access to food is interrupted due to varying national food production, household earnings, and food prices. Additionally, international aberrations might influence local transitory food insecurity. 'Seasonal food security' is located among these two main types of food insecurity. Its occurrence is dependent on different events which often follow a specific pattern and are foreseeable. Further, seasonal food insecurity is mostly ephemeral, but it reappears when the same events occur again. These events can be summarised as a "cyclical pattern of inadequate availability and access to food" (1), such as seasonal fluctuations in the cropping pattern, climate, diseases, and employment opportunities.

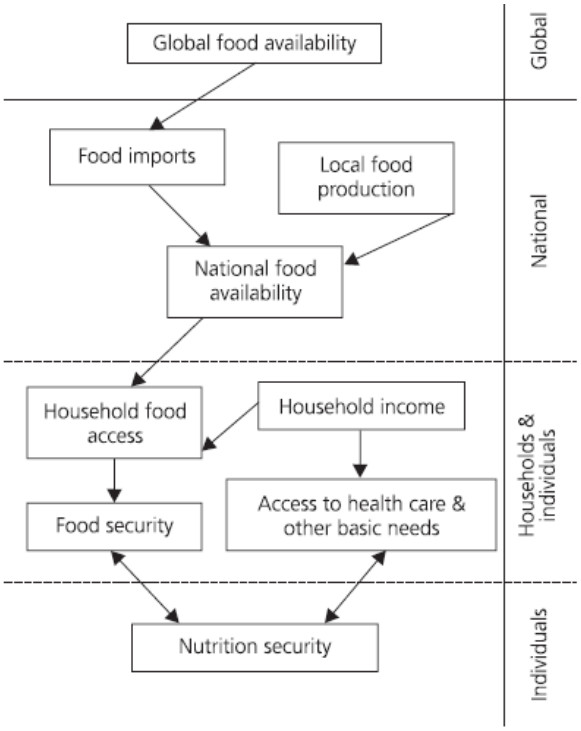
3.1.4 Challenges and Limitations of the Food Security Concept

The definition of food security and its description are quite superficial and obscure in revealing both its interdependencies as well as the causes for its failure and subsequent

insecurity. Therefore, one must develop concepts which demonstrate the different linkages within food security and identify which factors or indicators are crucial for its different stages. For that purpose there is a variety of approaches which try to identify the complex connected system of food security.

Pérez-Escamilla and Segall-Corea (2008), for example, explained the concept of food security "through a multi-level analysis taking into account global, national/regional, as well as local, household and individual-level factors" (16). Figure 3 shows how the authors unravel the concept and which factors are, in their opinion, pivotal for food security.

Figure 3. Factors of food security



Food security is often analysed on the global, national, household, and individual levels. A secure food security situation on the national level does not imply the same situation for households. Even within one household, food security can differ between individuals. This can depend on different food distribution between the members or on the individual's physical condition (Sassi 2018, 35).

Moreover, the FAO's Inter-Agency Working Group on the 'Food Insecurity and Vulnerability Information and Mapping Systems' identified 15 so-called 'information domains' which are critical for food insecurity because they affect poor nutritional status

and low food consumption. Each of these 'information domains' contributes to the concept of food security, and a failure in one domain will lead to a condition of food insecurity. For that purpose, four main indicators were identified with associated 'information domains'. The *National and Sub-national Context Indicators* can be classified as the fundamental conditions of food security and contain these domains: 'demographic conditions', 'economic conditions', 'environmental conditions and natural resources', 'political conditions', 'social and cultural conditions', and 'risks, hazards and shocks'. The *National Food Economy Indicators* are located on the national or regional level and consist of 'food availability', 'stability of food supplies and access', and 'food access'. The *Household Context Indicators* are 'care and feeding', 'household characteristics', and 'health and sanitation', and are, as the name already implicated, the food security indicators for the household level. On the individual level, the *Individual Outcome Indicators* encompass 'food consumption status', 'health status', and 'nutritional status' (FIVIMS 2002, Tools and tips). To each domain belong diverse possible variables which can be measured and monitored, and they are thus able to give a statement about the specific risk or presence of food insecurity. From this list, "seven core food security and nutrition indicators have been selected by the Committee in World Food Security for monitoring progress toward the World Food Summit goals on a global level" (3) (see Appendix C, page 135).

This reveals another challenge of food security. Besides the difficulty of understanding the interlinked concepts of food security and identifying its determining factors, the measurement of food security is also quite complex. First, putting the identified important indicators of food security into a measurable and standardised form is necessary. Second, one must develop appropriate measuring methods for these indicators to be able to give valid statements about the food security situation. The different approaches for measuring food security differ extremely based on the type of data they analyse. According to Pérez-Escamilla and Segall-Corea (2008), there are five commonly-used methods that examine food security. Four of them are based on indirect or derived measurements: ’the FAO method', 'household expenditure surveys’, ‘dietary intake', and 'anthropometry'. The FAO method analyses the national calories per capita to define the national food security condition, the household expenditure surveys evaluate the household's money spend on food, the dietary intake method records the consumed food of the participants, and the anthropometry method measures people's

height and weight to define their food security situations. The fifth method, 'experience-based food insecurity scales', is a qualitative fundamental measurement which is based "on the perception or experience reported by the affected individuals" (21). Researchers from Cornell University and Tufts University in the United States, as well as nongovernmental organisations, developed the foundational work on which diverse new measurement tools were based. This new methodology introduced a completely new approach in contrast to the conventional method. It evaluated food security directly and indirectly through determinants such as access to food or food availability. It also assessed through the measurable consequences of food insecurity, such as anthropometric failures (Ballard, Kepple and Cafiero 2013, 5).

One of these popular methodologies for monitoring and measuring food insecurity is the 'Food Insecurity Experience Scale' (FIES). This statistical measurement scale collects its data by directly asking people 8 brief questions about their own experiences of food security within the last 12 months:

Figure 4. FIES questionnaire (FAO n.d., 3)

	Standard label	Question wording
1	WORRIED	During the last 12 MONTHS, was there a time when You were worried you would not have enough food to eat because of a lack of money or other resources?
2	HEALTHY	Still thinking about the last 12 MONTHS, was there a time when you were unable to eat healthy and nutritious food because of a lack of money or other resources?
3	FEWFOODS	Was there a time when you ate only a few kinds of foods because of a lack of money or other resources?
4	SKIPPED	Was there a time when you had to skip a meal because there was not enough money or other resources to get food?
5	ATELESS	Still thinking about the last 12 MONTHS, was there a time when you ate less than you thought you should because of a lack of money or other resources?
6	RANOUT	Was there a time when your household ran out of food because of a lack of money or other resources?
7	HUNGRY	Was there a time when you were hungry but did not eat because there was not enough money or other resources for food?
8	WHOLEDAY	During the last 12 MONTHS, was there a time when you went without eating for a whole day because of a lack of money or other resources?

To these questions the interviewees can respond with yes or no[1]. Although this being a subjective measure, as the interviewees' answers depend on their subjective awareness, it nonetheless can be used as a quantitative tool which provides a general statement about the prevalence of food security and can be used to compare it between countries.

[1] Additional answer options are 'do not know' or refusing to answer a question. Both options do not count for the statistic.

The individual level of food security depends on how often the interviewee responds with yes or no (Ballard, Kepple and Cafiero 2013, 6&10).

All of the presented five methods have their unique advantages and disadvantages, and, due to their different measuring approaches, they achieve different results. A complementary usage of different methods facilitates insights from different perspectives. The choice of method should be primarily based on the question the research is meant to analyse and answer. Developing an appropriate measurement is especially important "for targeting food and economic aid; supporting early famine warning and global monitoring systems; evaluating nutrition, health, and development programs; and informing government policy across many sectors" (Jones et al. 2013, 481). Although the discussions about the different measurements of food security are very interesting and complex, this theoretical chapter merely provides a brief insight into that topic, as this research is about specific Malawian farmers' definition of food security and not a measurement of their current food security situation. Thus, an emphasis was placed on the development and definition of food security and not on the different measurement methods. The written should sensitize the reader to this multifaceted definitions help to relate the Malawian farmers' perspective, which is discussed later, into wide map of food security assessments.

In summary, food security is widely accepted as a multidimensional concept which undergoes constant change. Today, many different approaches and measurement methods address the problem of food security and attempt to find a solution. However, the different kinds of food security and their complex backgrounds and side effects demand a unique definition for the specific local circumstances instead of a general definition which tries to fit all kinds of food insecurity. This universal approach would fail to identify the specific local indicators causing food insecurity and thus would not lead to a successful strategy, as the real causes for the local food insecurity would not be detected.

3.1.5 Interdependency of Food Insecurity and Poverty

Food insecurity and undernourishment are currently often analysed through three approaches which have causal relations to each other (von Braun 2015, 19). The first and more traditional approach considers food insecurity and undernourishment to be

caused by poverty. That is, people do not have enough food because they are poor. The second perspective presents a newer mindset by declaring that poverty is a consequence of food insecurity and undernourishment, meaning that people do not have enough money because they are undernourished. Another approach is based on the declaration of food security as a human right by the Committee on Economic, Social and Cultural Rights of the UN in 1999 and explains undernourishment as a result of a lack of rights (19). This considers "poverty reduction and food security through a human rights lens" (Westengen and Banik 2016, 119) and criticises development strategies which are based on the assumption that economic growth leads to fulfilling the economic needs of the entire population. Rather, one must focus on a secure legal status and the accountability of politicians to consider, improve, and strengthen the specific conditions, especially those of the vulnerable, discriminated, and ostracised population groups, to achieve food security. This right-based approach identifies a declaration of a human right to food as the only solution which ensures the food security of impoverished people. This demonstrates that food insecurity is often associated with poverty. Each approach makes sense and is arguable, and each necessitates different strategies to ensure food security. The first approach requires targeting poverty, e.g. through social policy or economic growth, which would lead to a reduction in hunger. The second approach requires a direct focus on undernourishment, as an improvement of food security is crucial for further developments like economic growth. The third approach requires a national legal system which is qualified and obliged to intervene if the right to adequate food is not fulfilled (von Braun 2015, 20).

Food insecurity and poverty are two conditions which seem to always occur together. People who are poor usually face a situation of food insecurity and vice versa (Mahla, Bliss and Gaesing 2017, 24; Norton, Alwang and Masters 2015, 4). FAO (2008) follows the OECD definition of poverty, which states that food insecurity is one dimension of poverty and that a reduction in poverty combined with political measures which ensure food security would be the optimal strategy for eradicating poverty and food insecurity (3). Poverty is caused by food insecurity because its consequences prevent people from working effectively. Further, food insecurity is caused by poverty, as the affected people have no money to purchase food. Thus poverty and food insecurity are a deeply interrelated cycle (see Figure 5).

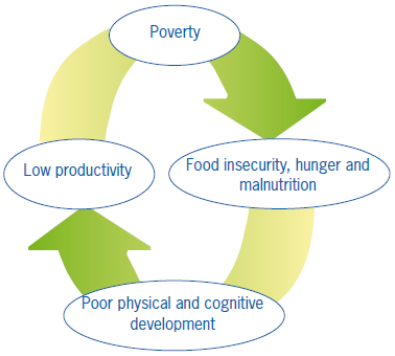


Figure 5. Interdependencies between poverty and food insecurity (FAO 2008, 3)

However, the real links between food insecurity and poverty are quite difficult to identify and measure. As Asayehgn (2009) demonstrated through analysing different developments in Ethiopia, the connection between rising income and food security is not demonstrable; despite steadily increasing income, the food security situation remained heavily volatile within the Ethiopian population (2). One cannot be certain that an increase in income and economic growth will surely lead to food security, since too many other factors exert influence on local food security conditions. Further, Asayehgn also emphasised that one still cannot causally ascertain "whether food security contributes to economic growth or economic growth includes food security or whether there is a two-way causal relationship between the two variables" (8f.).

Additionally, as Mahadevan and Hoang (2015) demonstrate in their article, research into the link between poverty and food security is very complicated and often achieves varied and inconsistent results. It is not possible to determine an overarching general statement about the interdependency of poverty and food insecurity. Of course, there are further studies[2] which present a connection between increasing income and improving food security, but the empirical data is very vague on that topic.

One can superficially state that an increase in income, or rather inclusive growth, will lead to an improvement of food insecurity, but the entire extent cannot be predicted, as diverse factors affect the outcome (Achterbosch, van Berkum and Meijerink 2014, 30). Thus, the possible effects of the interrelations between poverty and food insecurity within specific locations must be analysed to ascertain in which way and to what extent they affect each other and how this is useful for improving both conditions. The

[2] For example: Kuma et al. (2016) implemented a study in Ethiopia and exclusively analysed the influence of the cash crop coffee and thereby identified a positive impact on the coffee farmers' food security

connection and interdependency between poverty and food insecurity can be different in each case.

3.1.6 Reasons for Food Insecurity

To complete the theoretical perspectives about food security, the next part presents the commonly-mentioned reasons for food insecurity. Although some causes were already discussed in the previous parts, this sub-chapter is supposed to present a brief summary of the diverse causes for the consistency of the thesis' structure. Further, this will better demonstrate how complex and interrelated the different positions are.

According to the *Global Report on Food Crises 2018*, published by the Food Security Information Network (FSIN), the main drivers of food insecurity in 2017 were climate shocks, conflicts, and displacement. Climate shocks triggered food insecurity in 23 countries and affected over 39 million people. Conflicts caused food insecurity in 18 countries and affected almost 74 million people (5).

A further prominent explanation of food insecurity, which was already mentioned above, claims that current agricultural production is not able to supply the global food demand and thus an increase in agricultural production is necessary. This would be achieved through synthetic fertiliser, modern technologies, pesticides, etc. Climate shocks and conflicts are often reasons which led to a decrease in food production and thus additionally strengthen the arguments for increasing it. As already mentioned, this argument neglects the important factor of access to food. For instance, smallholder farmers who lose their harvests due to weather shocks very likely will not be able to purchase imported food. Thus, compensating crop failure with higher production somewhere else is not an effective solution, as a sufficient global food supply does not guarantee a sufficient national or local supply, nor does it guarantee access even if there is enough food.

Other arguments consider increasing food price to be the main cause of food insecurity, and this is influenced by different global developments. Rising energy costs increase the prices of fertilisers and pesticides, making them less affordable for rural farmers, and this very likely results in lower yields. Additionally, the increasing prices for fossil fuels put pressure on food crops which can also be used as cash crops, as in the production of

biofuel or biogas. Only 47% of the global production of wheat, maize, and rice is used for nutrition (Donath 2012, 54; Weingärtner and Trentmann 2011, 51,). Furthermore, changing consumer patterns destabilise and restructure the global food system. The growing middle classes of emerging economies have an increasing demand for meat, and this has led to a rising demand of wheat because it is used as inexpensive animal feed. Moreover, many poor harvests were recorded in the last decade in Australia, Pakistan, Somalia, and India which were caused by droughts, floods, and overexploitation. These crop failures influenced the global food supply, especially wheat, and led to enormous price increases for wheat imports, and this specifically affected developing countries. Although the impacts of climate change on harvests cannot be forecasted in detail, an increase in extreme weather conditions is highly probable (Donath 2012, 54).

Estimating the degree to which these different factors influence worldwide food insecurity is impossible. However, all of them affect the food supply shortfalls on the world market, and these have aroused the interest of speculators since the financial crisis. These speculators then also contribute to price fluctuations. The world market is not to be misinterpreted as a food distribution but a profit generating place. Hence the pure existence of enough food does not lead to an adequate distribution, which only can to be triggered by a relevant margin that is achievable on the specific local markets. The enduring aftermaths of the financial crisis weakened the economies of developing countries and led to a decline in employment opportunities, and this facilitated and intensified destabilisation of food security (Donath 2012, 54).

Jarosz (2009) extended the discussion by identifying the problems of malnutrition and food crises "as rooted in the social relations of agricultural production and the political, cultural, and economic relations of food access, distribution and consumption. These relations are socially and spatially constructed and through long-term historical processes across the globe and within specific regions and places" (2066). She emphasised that food insecurity is often pictured as something natural, and thus one neglects the fact that the global system created through political and economic interests caused the situation of food insecurity. This approach illustrates a different line of argumentation than the other notions and is gaining in importance. It demands a new structure of the global food system in which food is no longer traded as a consumer

good for profit, and it further demands the enforcement of a human right to food security, as already mentioned in the sub-chapter 1.1.5.

Young (2012) tries to distinguish between these two main approaches and argues that there are two categories of factors which explain food crises and undernutrition: *proximate* factors and *structural* factors. Proximate factors are those which obviously cause food crises or undernutrition, whereas structural factors are difficult to identify because they affect problems more indirectly and are often located in the structure of the global political economy (7). Thus, Young states that both factor types influence food security, but she identifies structural factors as the core causes. Without changing the current global food system, a substantial improvement of food security is not feasible (12).

The possible reasons for food insecurity are diverse and quite difficult to identify. Since they are all deeply connected in some way, finding the original source is a complex task. Due to the different identifications of food insecurity's causes, there is an enormous variety of different development strategies targeting this problem. Approaches which demand a restructuring of the global food system are especially unlikely to succeed. However, one should analyse the different reasons for local food insecurity directly and develop situation-dependent food security strategies which consider local findings.

3.2 Agriculture's Impacts on Food Security and Income in Rural Areas

In developing countries, three-quarters of the people identified as poor live in rural areas and rely on their own agricultural products to ensure their subsistence. A survey from Castañeda et al. in 2016 showed that almost two-thirds of the extremely poor working adults above 15 years of age who earned less than $1.90 per day earned their living via agriculture (12). Consequently, the agricultural sector is the obvious central starting point for reducing poverty and combating hunger, as this increases the likelihood of giving help to those who need it most (UNCTAD 2015,V; World Bank 2007; Block 2010, 2; FAO 2006, 2). Improvements within agriculture are "two to four times more effective in raising incomes among the poorest compared to other sectors" (World Bank 2017b). In rural areas, one can escape poverty through wage employment

in agriculture, smallholder farming, and/or employment in the rural non-agricultural economy. However, most people rely directly or indirectly on the agricultural sector (World Bank 2007, 18).

Although agriculture is not enough to completely eradicate poverty, it is often the first step on the path to overarching economic growth. Especially in agriculture-based countries, ensuring food security and a rise in income depends on the improvement and growth of agriculture and agricultural-based industries, and this can be realised through smallholder farmers of rural areas. For these countries, the agricultural sector has the potential to "be the lead sector for overall growth" (6). Besides the fact that agriculture is one of the largest sectors in such countries, two further arguments for agriculture being the most promising approach to delivering overall growth were sought by the World Bank (2007) against the background of a neo-liberal trade liberalisation. First, many rural regions of Sub-Saharan Africa need to attain agricultural self-sufficiency, as transportation costs are too high to be profitable and locally-preferred staple foods are often difficult to transport due to their perishability. These regions are often isolated and thus relay on their own production. However, this condition offers the opportunity to establish local agriculture without any influences and distortions from outside. Food prices are dependent on local agricultural productivity, which also sets the minimum wages that workers must then earn to be able to live off of wage labour. Through low local wage labour costs, the region has a competitive advantage over regions with higher costs. Second, the local focus on agriculture will endure due to lack of investments in manufacturers and resource endowments like land and manpower, and this therefore will provide a comparative advantage. This comparative advantage enables the region to export a wide range of processed and unprocessed agricultural products, which is compared to the productions of other region much cheaper. This earns foreign exchange and thus generates growth in the tradable agricultural sector, and this will then expand to other national sectors (7). This could be observed in many formerly low-development countries in Asia which were able to generate economic growth by first improving agricultural productivity (which was supported by the Green Revolution). However, although this might look positive on national GDP statistics, the living conditions of the population who facilitate that economic growth are characterised by unfair wealth distribution, poor working conditions, and a strong

dependence on employers. Thus, adopting this development might not be favourable to Sub-Saharan Africa as soon as the regional conditions allow it (8).

Since this thesis concentrates on the unique context of smallholder farmers in Lilongwe District and their usage of cassava to improve their food security and income, analysing the further agricultural impacts on the entire national economy is not necessary. However, this part clarifies the importance and unique position of food production in rural areas as the first and often exclusive approach for the population to ensure their food needs and generate income.

3.3 Cash Crops' Impact on Food Security

Especially for developing countries, numerous governmental, non-governmental, national, and international organisations elaborate different strategies for improving food insecurity. Attempts to combat hunger from multiple approaches were often designed by external entities and applied in a top-down manner. These approaches mainly target local agriculture and promote either new technologies which facilitate production or improved varieties of plants which are more resistant to adverse environmental conditions, produce higher yields, or bear more nutrients.

One approach for improving food security is the focused cultivation of cash crops. Cash crops are defined as crops "grown for direct sale or for market sales rather than for subsistence food or for household consumption. Cash crops could be classified into two categories: first, crops that are exclusively grown for sale (i.e. non-food), which include crops such as cotton, coffee, cocoa or tea, and second, food crops that may be consumed by the household or sold at markets, such as rice or maize, and also certain fruits and vegetables" (Kuma et al. 2016, 1). However, when talking about the approach of cash crops rather the first classification is addressed. The reasoning behind growing cash crops is that they provide higher returns for a smaller amount of labour and land.

During the 1970s, the cultivation of cash crops was quite controversial, since, as already discussed, at that time the food supply was considered the key factor of food security. The fear was that cash crops would displace food crops, decreasing the local as well as national food production and thus food supply and thus worsen the food security condition. Due to the paradigm shift within the international food security discussion

one decade later, which was caused mainly by Amartya Sen, access to food was highlighted as essential for the food security situation, and the population's income and food prices therefore gained attention. Poverty was recognised as decisive for food status, and cash crops were thus promoted as promising sources of income for rural smallholder farmers. Cash crops were supposed to be used for the national economy and also be exported, generating foreign exchange and triggering industrialisation. To facilitate this development, diverse structural adjustment policies were implemented in the developing countries as part of the Washington consensus (Achterbosch, van Berkum and Meijerink 2014, 17). The World Bank or the International Monetary Fund (IMF) loaned money to developing countries, and this created a commitment to implementing national policy reforms aimed at liberalising their economic systems and open their national markets to the world (Oberdabernig 2017, 1). Around the year 2000, a realisation was reached that these export-led or industry-led development strategies did not succeed in reducing poverty and increasing overarching incomes, so new approaches were implemented, leaving agriculture unattended. The agricultural sector was further strained by export taxes on farm products, overvalued exchange rates, and inefficient marketing systems, and this led to a weakening of agriculture. Due to recent food price hikes, which caused serious food crises, the importance of a functional agricultural sector has risen again (Achterbosch, van Berkum and Meijerink 2014, 17).

The approach of cultivating cash crops to improve food security is implemented especially for rural populations of developing countries with a large agricultural sector. It is meant to target subsistence farmers who cannot make a living from their harvests, and the approach should therefore provide these farmers with substantial supplementary wages and job opportunities (7). Kuma et al. (2016) identified four different channels related to how cash crops can affect food security. First, the farmers can increase their overall incomes via the cultivation and sale of cash crops, as the margin of profit of these crops is higher than that of food crops. This enables farmers to buy food and products which improve their standards of living, including food security. Second, the impacts of cash crop production also affect non-cash crop farmers, as cash crops are often labour-intensive and thus create further job opportunities. Third, the increase in income through cash crops results in general poverty reduction and diversified livelihoods within the rural population because more money is in circulation. This also enables households with no direct contact with cash crops to create market options and

thus purchase food and other products. Fourth, cash crops make farmers less restricted by a lack of money so that they can easily invest in food crops (1). Achterbosch, van Berkum, and Meijerink (2014) used the 4 dimensions of food security to determine and analyse the impacts of increasing income via cash crops on the 8 factors which influence food security (see Figure 6 below) (20). The physical availability of food is dependent on three factors. Through the cultivation of cash crops, a greater producer price is achieved and farmers' income within the agricultural sector is increased, leading to further cultivation of cash crops and spreading economic growth. The factor of food production remains quite the same. Cash crops compete with food crops for acreage, and thus food production is very likely to decrease since most of the cash crops are inedible. However, the increased income via cash crops enables the farmers to invest in food production and improve it.

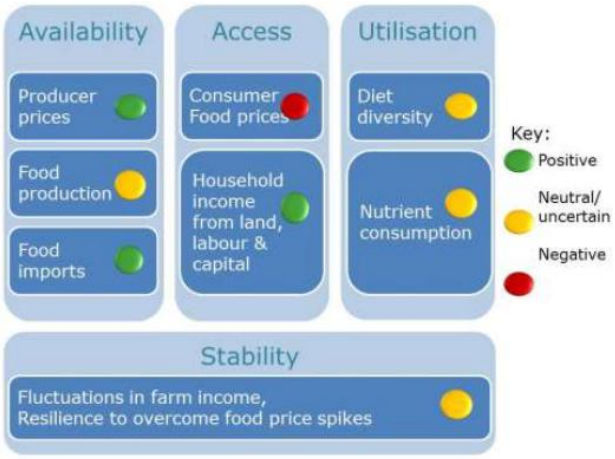


Figure 6. Cash crops impact on the four dimension of food security

Food imports achieve a positive effect due to funding from revenues of cash crop exports. Access to food is likely to become worse, as consumer food prices will rise due to a local decrease in food production and a higher food demand from the cash crop farmers. However, farmers and workers who generate an income through the cash crops are more likely able to meet their food needs. A diversified diet and nutrient-rich food are important factors for food security, though a higher income does not imply a higher consumption of healthy food or the adoption of an improved diet. Also, the factor 'stability' is assessed as neutral, since cash crop prices are very unstable. Investing or saving surplus income to compensate for years with a lower profit is therefore essential (21). This demonstrates how complex an analysis about the impacts of cash crops on the food security situation is. As demonstrated in chapter 3.1.5, the real impact from a

higher income on the food security situation is not predictable. This leads to the conclusion that the impact of cash crops on the food security situation must be analysed for every location since cash crops will have different impacts in the different locations.

Maxwell (1996) assessed balanced cultivation of food and cash crops as the most promising approach of food security, "following the principle of long-term comparative advantage rather than of self-sufficiency for its own sake." (164). As long as cultivation remains diversified to avoid risks of mono-cropping, and as long as national policies guarantee the rights of the poor, cash crops are a promising approach.

So, through the cultivation of cash crops farmers generate income which enables them to afford food and other products like clothes, medicine, and education. Further, they can invest in their farms by buying fertiliser, sowing higher-quality seeds, implementing irrigation systems, etc., and this might lead to yield increase and counteract overuse of soil. Additionally, farmers can accumulate cash reserves to compensate for external shocks which decrease crop yields, cause price fluctuations, or induce other personal issues which impact harvests (such as illness).

There can also be negative impacts facilitated by cash crops alongside the positive ones. The income generated through cash crops can heavily fluctuate between harvest seasons. Farmers in developing countries are particularly vulnerable and quite incapable of resisting price fluctuations due to the lack of information and communication between the different market actors. This poor market and information structure is typical in developing countries (Achterbosch, van Berkum and Meijerink 2014, 31). Moreover, governments must implement reliable economic and political institutions which facilitate efficient market structures, ensuring the same rights for everyone. Further, the agro-ecological conditions of cash crops can be highly risky. Long maturation periods demand a large initial investment and a long interval before the first revenue. Price fluctuations or plant diseases can put more pressure on the financial plan. Long and expensive investments are very risky, since setbacks are difficult to compensate. Additionally, cash crops were often cultivated in large areas, and this mono-cropping has a higher risk of plagues and diseases. It can also lead to tremendous soil degradation if the cultivation method is not appropriate (36). All of these negative impacts must be considered and analysed within localities before making the decision to grow cash crops.

In summary, the main objective of growing cash crops is reducing poverty via generating income, and this should improve food security. Though, as already discussed in the sub-chapter 3.1.5, the conducted research has not yet provided a consistent result of whether, how, and to what extent rises in incomes affect food security. However, as already demonstrated in the previous chapter, agricultural growth is the promising sector for the rural poor with regard to improving their livelihoods, including food security. Consequently, an individual evaluation of the different localities is inevitable. First, one must accurately assess possible impacts on food security via increased income through cash crops, and second, one must analyse the extent to which negative factors occur at the location and whether they are solvable.

4 Background

The following chapter provides a brief overview of the current condition of Sub-Saharan and Malawian agriculture. Afterwards it provides basic information about the cassava plant.

4.1 Agriculture in Sub-Saharan Africa

Agriculture, the tilling crops and rearing of domesticated animals to produce food, feed, drinks, and fiber, has been the principal enterprise of humankind throughout recorded history (Domosh, Neumann and Price 2015, 317)

Sub-Saharan Africa's agriculture holds great unused potential. However, focus mainly lies on its slow development and problems like hunger and poverty. National and international strategies to strengthen African agriculture have mostly failed, and apparently no strategy will achieve sustainable success as long as there is no exact analysis of the factors which influence and inhibit the sector. A great number of these development strategies did not succeed because they were not implemented correctly or were undermined by other strategies which took precedence over agriculture. The agriculture sector is specifically interlinked and dependent on other policy areas like trade, industry, education, research, energy, infrastructure, and so on. Often these areas have other interest and do not consider the needs of the agriculture sector. To clarify, there might be good strategies which could improve agriculture, but so far national and international institutions have failed because they did not find this important enough or they did not have the resources or capability to realise these plans (Brüntrup and Kessler 2015, 81).

4.1.1 Agriculture Current Performance

Most of the Sub-Saharan African countries can be identified as agriculture-based, and they are inhabited by over half a billion people, of which 68% are located in rural areas and 49% living on less than $1 per day. Agriculture-based countries were defined by the World Bank in 2007 as countries with high proportions of agriculture in their GDPs and a high percentage (around 70%) of their poor living in rural areas (4). Between 1993 and 2005, one third of the overall growth of these countries was based on agriculture (30), and the real annual GDP growth from this agriculture in Sub-Saharan Africa

increased from 2.3% in 1980s to 3.8% at the beginning of the 21st century (229). 44% of Africa's land is agricultural, and this is the highest proportion worldwide (Grant 2015, 239).

As already mentioned, Sub-Saharan Africa's agriculture is very complex and affected by multiple areas. This is also reflected through its diverse challenges and undesirable developments. Although agricultural productivity is quite high, as mentioned above, it is just enough to compensate the growth of population. This increase in production is mainly based on an extension of acreage (see Figure 7, left). Although other regions improved their agriculture through increasing work productivity, Sub-Saharan Africa made no significant progress in productivity (see Figure 7, right). Further, Sub-Saharan Africa has in comparison with the other countries still a low yield, even though it has increased its yield since 1961 (see Figure 7, right)

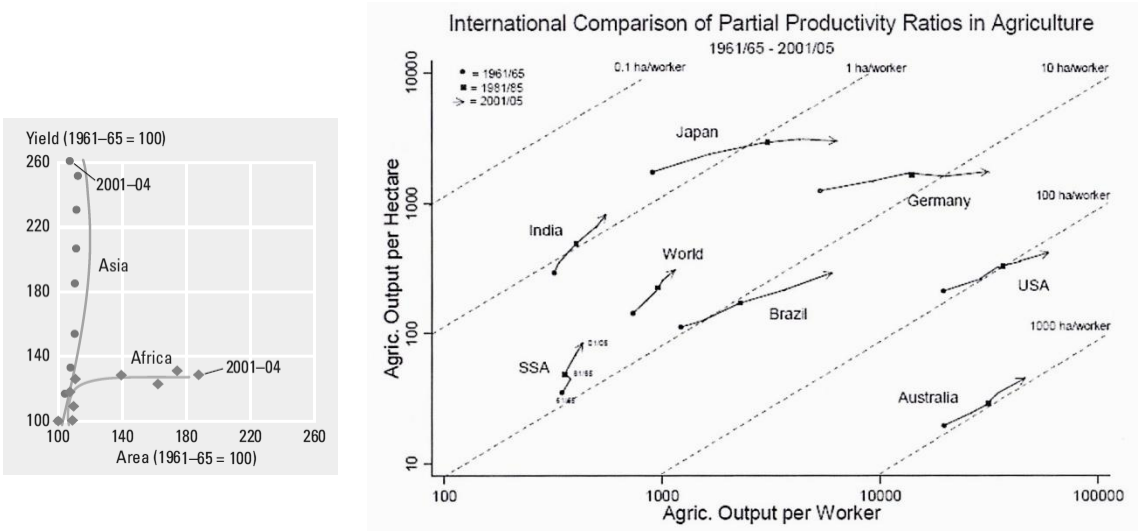


Figure 7. Expansion of cereal production (World Bank 2007, 55) (left), and international comparison of yield and work productivity (Brüntrup and Kessler 2015, 84) (right)

Furthermore, the African region fails to implement useful technologies to adapt sustainable cultivation methods and increase willingness to invest in its agriculture sector (Grant 2015, 246). Asian countries, for example, managed to irrigate 30%-50% of their arable land, but Sub-Saharan Africa merely irrigated 10% and is extremely dependent on the weather. Sub-Saharan Africa used 10 kg/ha of mineral fertilizer while China used 200kg on the same area. Compared with global consumption, Sub-Saharan Africa used just 10% of the average global amount of fertilizer. The overexploitation of

the soil without any input of fertilizer or sustainable cultivation methods caused a land degradation of 550 million hectares, which corresponds to 60%-70% of the total Sub-Saharan African agricultural land (Brüntrup and Kessler 2015, 85).

In addition, the agricultural share of the world market has been declining since 2000, and Sub-Saharan countries have started to transform from formerly net exporters to net importers of agricultural products. While food imports and exports were balanced in the 1960s, by 2011 food imports had increased drastically and produced a food trade deficit of up to $30 billion (Yu and Shimokawa 2016, 985; Grant 2015, 245). 88% of these food imports are imported from non-African countries, mainly from Asia or Europe, which implies that just around 20% originate in the region. Especially local crops like cassava and taro dampened the negative commercial balance of the needed food imports (Grant 2015, 245).

This led to a greater dependence on the global market. Moreover, Africa's agriculture is based on just a small number of agricultural products, and the value added is mostly generated in South Africa or outside the continent (Grant 2015, 246). For example, raw cacao and sugar are exported from African countries to Germany, where value is added by producing chocolate. This end product is actually sometimes then imported by the African countries which had produced the ingredients, generating a negative commercial balance.

4.1.2 Reasons for the Current Agricultural Performance

The desolate agriculture of Sub-Saharan Africa is caused by specific conditions within rural areas and macroeconomic policy strategies. First, the region's physical characteristics complicate agricultural cultivation through nutrient-poor and weather-beaten soils, animal and plant diseases, and pest attacks. Second, the sparse population makes implementing necessary investments, like streets, difficult, since they would affect only a small number of people and therefore be ineffective. The cost of transport is too high to economically exploit the geographically dispersed growing regions. The third condition which makes improving agriculture difficult is its own diversity. Due to the original great variety of crops like yams, sorghum, and millet, implementing an overarching strategy is more complex. The crops common in Africa differ from those of developed countries and thus were never focused on, researched, and improved like

other crops. The Green Revolution of the 1960s and 70s transformed Asian and South American agriculture but failed in Sub-Saharan Africa, as it focused on wheat and rice, which must be cultivated in irrigated land. In contrast to Asia and South America, Sub-Saharan Africa has not had the basic knowledge or the required infrastructure to successfully cultivate the crops on a large scale (Brüntrup and Kessler 2015, 88).

Furthermore, Sub-Saharan Africa's agriculture was heavily influenced by the different colonial powers, which designed agriculture to suit themselves. Thus, Africa's agriculture never experienced a change to developing for the needs of the local populations. Rather, its agricultural landscape was characterised by crops like tea, cotton, cacao, bananas, oil palm, groundnuts, and coffee, and these were exported to the colonial powers and abandoned after decolonisation. The new local authorities were not able to organise profitable cultivation of the plantations due to conflicts about new power structures and working conditions, as the colonial powers had not needed to deal with real economic efficiency. In summary, Africa's agriculture was not developed to feed local populations; it rather was used to meet the needs of the colonial powers. This created a very detrimental initial situation which still negatively affects the agricultural situation (Grant 2015, 239). The fourth challenge is the legal uncertainty relating to land ownership and land acquisition. This condition inhibits investments in agricultural inputs like fertilisers, plant protection products, and new farmland, as there is no guarantee that these efforts will profit since the farmers can lose the land (87).

On the macroeconomic level, one had to notice the insufficient markets of agricultural inputs, technical advice, and other services. Since the structural adjustment programmes of 1980/90, which ended the public distribution system for agricultural inputs like seeds or fertilizer, the private sector has failed to establish a functioning market system which provides the rural population with the needed products (World Bank 2007, 12). This is because of the difficult access to credit for farmers who often have no financial reserves to buy additional agricultural inputs to increase yield, such as high-quality seeds or pesticides. Contracts between agro-traders and farmers about pre-finance are rare due to the uncertain legal situation which regulates the compliance of the contracts. Additionally, the poor infrastructure leads to an increase of the prices, which further worsens the demand for agricultural inputs. Furthermore, poor storage, interrupted cold periods, and long transportation times can damage the products, leading to a loss of

confidence by the farmers after purchasing scarce goods. Supplementary state interventions which are frequent and arbitrary heavily affect the market and lead to market distortions, and these deter potential investors (Brüntrup and Kessler 2015, 90).

Most of the agricultural challenges were caused by African governments due to their neglect of agriculture and rural areas. According to Brüntrup and Kessler (2015), only a small amount of the revenues from selling agricultural export products in the world market were received by the farmers (90). Additionally to these constraints, poor governance and armed conflicts prevent the establishment of a functioning agricultural structure and production. Most of these violent conflicts are within the countries and destroy fertile areas, force farmers to abandon their fields, and worse (FAO 2006, 3)

4.1.3 Agriculture in Malawi

Agriculture is the driver of the Malawian economy and the foundation of poverty reduction in rural areas. 84% of the Malawian population lives in rural areas. The average per person access to arable land is 0.23 ha[3] (FAO, IFAD and WFP 2014, 34). Most of the Malawian farmers practise subsistence agriculture, which means that they are just able to cultivate enough agricultural goods "to supply the minimum food and material necessary to survive" (Domosh, Neumann and Price 2015, 319). The produced food is needed to meet the demands of the family or local community. If the harvest provides food surpluses, these are sold at the local market. This agriculture is not industrialised at all and mainly based on human labour. Less than 3% of the total arable land is irrigated (Matchaya, Nhlengethwa and Chilonda 2014, 148).

In accordance with most of the Sub-Saharan countries, Malawi's agricultural growth is based more on the accumulation of labour and land than on significant improvements of cultivation methods. However, scarcity of further arable land and enormous population growth, which led to one of Africa's highest population densities and declining farm sizes, will end this procedure of increasing agricultural production. Additionally, most of the farms practise rain-fed agriculture, and this exposes the farmers to the risk of weather shocks. These are very likely to become worse in the near future due to climate change's impacts. The occurrence of droughts and flooding has already intensified in recent years, and this caused food insecurity for 40% of the Malawian population in

[3] The average in Sub-Saharan Africa is 0.40 ha per person

2015/16 and again for 27% in 2017 (IMF 2017, 3; FSIN 2018, 5). However, Malawi has achieved promising initial result by reaching average cereal yields of about 2 tons per hectare. This implies, for example, an increase of maize yields from an average of 1.3 tons/ha in 2000 to over 2.1 tons/ha in 2013. Even though this is a positive development, but when compared to the average cereal yield of 4 tons/ha in Asia or OECD countries, Malawi still needs to further optimise its cereal productivity (Matchaya, Nhlengethwa and Chilonda 2014, 144).

Malawi's agriculture is quite diverse, including, among other things, tobacco, sugarcane, tea, maize, sweet potatoes, cassava, sorghum, pulses, cotton, groundnuts, macadamia nuts, coffee, cattle, and goats (CIA 2018). Despite this diversity, until now only two crops have had an essential role for Malawi. Tobacco is Malawi's most important cash crop, constituting 55% of total exports, followed by dried legumes (8.8%), sugar (6.7%), and tea (5.7), whereas maize is by far Malawi's most important food crop and is cultivated on 70% of the agricultural land (OEC n.d.; FAO, IFAD and WFP 2014, 34). Farmers' first choice is to increase their income, and tobacco is generally very profitable, but the impacts of climate change and unpredictable price fluctuations have changed this during the last decade. Due to the dropping prices on the global market, the revenue from tobacco cultivation is decreasing, and it is thus no longer a reliable income source (GIZ 2016). Additionally, tobacco's production and selling process is mainly controlled by powerful companies, wherefore smallholder tobacco farmers are dependent on a very small number of buyers. It thus only has a very limited demand on the local market, as tobacco is just a cash crop for the international market and not alternatively usable as food crop for the farmers. Consequently, new market options are needed to replace tobacco, and a new structure of Malawi's agriculture is currently being developed with the goal to identify promising national export strategies and new suitable cash crops (Malawian Ministry of Industry and Trade 2012).

Maize is Malawi's national staple food, crucial for its food security, and cultivated by 80% of the country's smallholder farmers (FAO 2015a, 2). In recent years, maize cultivation has decreased due to extreme weather conditions, depleted soils caused by constant mono-cultivation, and a lack of access to agrarian inputs. This development is expected to intensify in the near future, and this is mainly caused by El Niño and climate change, which cause droughts and heavy rainfall in Malawi which have already

led to massive maize crop failures (Gronemeyer, Fink and Metzger 2015, 9; Stevens and Madini 2016, 2; Vidal 2016; Rae 2016)

This prioritisation of the two crops was strongly influenced by deliberate government policies, and these two crops are still strongly supported by the Malawian government. For example, the *Farm Inputs Subsidy Programme (FISP)* was launched in 2005 and subsidized fertilizer, pesticides, and improved planting material (Kankwamba, Kadzamira and Pauw 2018, 324; Matchaya, Nhlengethwa and Chilonda 2014, 144f.). These assistance measures were designed "to enhance food self-sufficiency by increasing smallholder farmers' access to and use of improved agricultural inputs", which should lead to an increase in income and improved food security (Chibwana & Fisher 2011, 1). The largest shares of the subsidised inputs were for maize and tobacco. On account of this, the participants of the programme reallocated their acreage and increased the area for maize at the expense of other crops like cassava, soybeans, sweet potatoes, and groundnuts. This led to a change in land use of 17 % in favour of maize (Chibwana et al. 2011, 131).

Today, maize is Malawi's most important food crop while tobacco is its most important cash crop. Both major crops have faced various problems within the last decade, and a new approach is needed to compensate their insufficient performance.

4.2 Cassava

Cassava is an edible root and, after rice, maize, and sugarcane, the most important source of carbohydrates for over 600 million people who live in (sub-) tropical countries. 70% is directly consumed by humans either raw or after having been cooked or processed. The remaining 30% is used as animal feed or processed into starch and used for industry. Cassava is grown in countries "between 30°N and 30°S and from sea level up to 1,800m" (Raemakers et al. 2017, 317). Cassava has a long tradition as a food security crop and is especially consumed by the rural poor of developing countries. Recently cassava gained importance as a food and cash crop.

4.2.1 Overview Cassava Development

Between 1980 and 2011, global cassava production rose by more than 50% from 124 million tonnes to 252 million tonnes. Within the same timeframe, cassava's worldwide cultivation area has increased from 13.6 million hectares in 1980 to 19.6 million hectares in 2011. Thus, the global harvest area increased by 44% in these 21 years, which is the highest percentage growth compared to the other five key food crops. Until 2000, this growth was based on the extension of the cultivation area, but the annual increase in yield stagnated at 0.6%. After 2000, cassava yields increased annually by 1.8%, and thus the cassava yield grew from 10.4 tonnes per hectare in 2000 to 12.8 tonnes in 2011. However, cassava has not reached its actual yield potential, which is estimated to be around 23.2 tonnes per hectare (Howeler, NeBambi and Graeme 2013, 6f.). In 2015, worldwide cassava production increased to 277 million tonnes, of which 44.1% were traded on the global market. Cassava production has constantly increased during the last two decades, but 2017 was the first time within 20 years that cassava production dropped (a reduction of around 1 million tonnes compared to 2016). Nevertheless, cassava is still "one of the fastest expanding staple crops at the global level" (FAO 2017a, 35). However, forecasting cassava production is quite challenging, since data collection about planting intentions and harvest expectations is exceedingly rare, especially for the largest cassava-growing region, Sub-Saharan Africa (36).

Recently, cassava has become more important in the common cassava-growing regions, and it also has even aroused international interest (van Vark 2013). First, cassava is an essential food crop and is especially useful as famine reserve crop. It is a staple food for approximately 800 million people, "most living in least industrialised tropical and sub-tropical region" of Africa, Asia, and the Americas (Parmar, Sturm and Hensel 2017, 908f.). Due to climate change and a decrease in maize and wheat production, which are the foundation of diets of developing countries, cassava is considered an effective solution. It can be intercropped with maize and compensate if droughts or heavy rainfalls lead to maize crop failures. Additionally, local cassava production would make developing countries less dependent on food imports (Grant 2015, 245). Cassava's adaptability in light of estimated future effects of climate change makes it highly promising and valuable for future agriculture, especially for Africa (Jarvis et al 2012, 26).

Second, cassava has great potential because of its diverse possibilities as a cash crop. Between 1980 and 2011, global cassava production increased from 124 million to 252 million tonnes, which accompanied new industrial applications (FAO 2015, 6).

Cassava as food crop can be the first step to guaranteeing food security, which might be essential to paving the way for a county's development. This means economic growth, poverty reduction, health, etc. After ensuring food security, it can be further used to increase smallholder farmers' incomes. Cassava is known as the "food of the poor" because it is mainly cultivated by rural low-income farmers, which ensures that a positive development of the cassava sector will directly affect smallholder farmers (Howeler, NeBambi and Graeme 2013, 6, FAO 2001, The Global Cassava Strategy). Thus, cassava has promising potential as both a food and cash crop, and it is therefore considered to be a new chance for developing regions to improve their food security and economies. This promising potential of cassava was recently recognised by various institutions and integrated in their struggle against food insecurity.

In 2001, for example, FAO adopted its 'Global Cassava Strategy for Cassava: Transforming a traditional tropical root crop'. In the FAO, the International Fund for Agricultural Development, private and public sector partners and 22 cassava-producing countries worked together for four years with the joint vision that cassava's potential is "not only to meet food security needs, but also to provide an engine for rural industrial development and a source of higher incomes for producers, processors and traders" (Howeler, NeBambi and Graeme 2013, 13). They developed a strategy with a demand-driven approach that will promote and support industries which process cassava. Cassava is considered a promising food source, especially for rural poor households, and it is also seen as a cash crop which "will spur rural industrial development and raise incomes for producers, processors and traders" (FAO 2001, Global Cassava Strategy).

4.2.2 The Cassava Plant

Cassava originally grew in South America and was first cultivated by American Indians as a staple food alongside maize, peanuts, and potatoes. Its role in food supply for the tropics can be compared to the role that maize and potatoes have had in other regions (Jones 1995, 4).

Cassava is a shrub plant with a wooden trunk which usually splits into three main branches, looking almost like a small tree (see Picture 1). When cultivated, it reaches heights from 1.5 to 3.6 meters with large palmate leaves that have varying numbers of lobes, typically five to eleven, on the ends of slender petioles. The leaves only grow at a branch's end, and previous leaves leave nodes along the branch. The main branches may further separate into small branches as well. This makes the plant look scraggly and open when seen from below, but the leaves form a closed green canopy when seen from above (Jones 1959, 20; Howeler, NeBambi and Graeme 2013, 41).

Picture 1. Cassava plant (WordPress 2008)

Even though the young shoots and leaves are also edible and indeed used as food, cassava is mainly planted for its tuberous roots, which are very nutritious. Their dry matter consists of up to 80% starch (Raemakers et al. 2017, 317).

Cassava is not planted by using seeds, but from cuttings. When seeds are used, the root yield of the newly seeded plants appears to be less than that of the parent plants. Also, only about half of planted seeds successfully grow. If planted from a cutting, the new plants have identical properties to the parent plants and build new roots very quickly (see Picture 2). But to breed new varieties, the use of seeds is of course inevitable (Jones 1959, 20).

Picture 2. Cassava cuttings (Lawton 2014)

In the first months, some of the thin roots of the cutting will swell to about 30 to 60 centimetres long and have a diameter of 5 to 15 centimetres. It is important that the mother plants are free from diseases and pests (Malawian Ministry of Agriculture and Food Security et al. 2010, 8). With a weight of one to five kilograms, they accumulate valuable reserves of starch. One plant's yield can be up to 8 kilograms of roots, but the typical amount is two to three kilograms per plant. There are different varieties of cassava, with some being edible when cooked and others requiring more processing (Jones 1959, 5).

Some improved cassava varieties only require six to eight months between planting and harvesting. However, most varieties are left in the ground for a longer time, as the optimum yield for domestic food purposes is around 12 to 18 months. Cassava will produce yet more starch if left in the soil up to 48 months, but the roots become more wooden then, so the effort to prepare them increases as well. This prolonged growing period is therefore more relevant for commercial production with more industrialized processing steps. Taking into account the yearly cycles of rain and crop rotation in fields, the most common harvesting period of cassava is within 12 months (22).

This possibility to harvest cassava over a wide range of time offers some advantages, especially for regions like Sub-Saharan Africa (22):

1. The flexibility in harvesting prevents overlapping with harvesting periods of other crops. This minimises the risk of losses in yield due to lower availability of labour.

2. Uncertainties about weather during harvesting seasons are less important, as cassava can simply be left in the ground.

3. If used as a cash crop, it helps farmers react to fluctuating market prices. If the price is low, the harvest can be postponed until prices rise again.

4. If some plants are left in the ground, they can function as a very inexpensive form of food storage to counteract periods of food shortage.

Additionally, cassava is very drought-resistant crop and can also withstand heavy rainfall. This characteristic is especially important with regard to the recent increase in the frequency of extreme weather events. Moreover, cassava is quite a cheap crop, as farmers can use cuttings from previous cassava plants. It also does not need inputs like fertiliser. Further, cassava is cultivable almost everywhere in the (sub-) tropics due to its tolerance to acidic soils (Howeler, NeBambi and Graeme 2013, 3). Moreover, cassava can be mixed with other crops, like maize, groundnuts, or upland rice. This intercropping method "protects the soil from direct impact of rain, reduces soil erosion from runoff, and limits weed growth during the early stages of cassava development" (28).

However, cassava also faces many different challenges and disadvantages. When reading about cassava, one might notice that most of the literature does not distinguish between the two important classifications of cassava: *bitter* and *cool/sweet*. Mkumbira et al. pointed out in 2003 that cassava in Malawi is always distinguished between the variety which can be eaten raw, *cool/sweet*, and the other one, *bitter*, which must first be processed due to its content of toxic cyanogenic glucosides. In the thesis I use the term bitter and sweet, since during my stay in Malawi it was common to revert on this denominations. Both of the varieties have advantages and disadvantages; whereas cool/sweet cassava does not contain cyanogenic glucosides and thus does not need to be processed before consumption, its starch content is also lower. This is why bitter cassava is preferred for processing (7). Furthermore, cassava is very vulnerable to specific diseases and pests. Particularly in Sub-Saharan Africa, the mosaic disease and the brown streak disease cause significant damage and crop failures. Diverse varieties of both categories were developed with different improvements, such as higher yield and resistance to the mentioned diseases and pests like the green mite and mealy bug. The starch content of the bitter cassava varieties was increased, making them more fruitful when processed into flour or starch (Malawian Ministry of Agriculture and Food Security et al. 2010, 2ff.). However, since cassava was neglected for a long time, which

also meant a lack of scientific research, potential improvements to cassava cultivation have not been extensively explored. Further, the research focus was on the bitter varieties, since these are more important for the industry. Thus, there are more improved bitter varieties than cool/sweet varieties, which tempt the farmers to cultivate rather the bitter varieties.

Moreover, cassava is very perishable and must be consumed or processed within two days of harvesting (16). This is especially disadvantageously, since in many of the developing countries, which cultivate cassava, have bad roads and a badly developed road network. This makes it very difficult for the farmers to transport cassava form the farmers' fields to the markets or processing factories in time.

4.2.3 Cassava in SSA

Cassava was brought to Sub-Saharan Africa from Brazil by Portuguese traders and explorers in the 16th and 17th centuries. Within 200 or 300 years, it had spread over Sub-Saharan Africa and replaced traditional staples like yam, sorghum and millet. It was primarily used as a famine reserve crop due to its durability when in the ground, so cassava was used as food during the common hungry season before the harvest started again. Its resilience against droughts and locusts also contributed to this popularity. (FAO and IFAD 2005, Preface).

In Sub-Saharan Africa, cassava is used for food security and income and is labelled the 'food of the poor' (Howeler, NeBambi and Graeme 2013, 13). Its role will very likely increase in importance alongside Africa's quickly-increasing population and slowly-growing economy. Maize is the key food crop for most Africans, but its decrease in yield and unreliability will probably weaken its role as a key staple crop. Cassava is already an essential food crop in Sub-Saharan Africa and has the ability to grow on degraded soils and adapt to new weather conditions caused by climate change (FAO and IFAD 2005, Preface).

Cassava production in Sub-Saharan Africa almost increased by 50% (from 48.3 million tonnes to 95.9 million tonnes between 1980 and 2000) based on a 25% increase in yield and a 56% growth in the cultivation area. Between 2000 and 2011, the expansion rate of cassava cultivation areas dropped back to 18%, but the yield increased from 8.6 tonnes

per hectare to 10.8 tonnes, doubling regional cassava production (Howeler, NeBambi and Graeme 2013, 9). At the turn of the millennium, 40 African countries produced more than 50% of the global cassava, and this is estimated to increase to over 60% by 2020. In 2015, 139 million tonnes of the global 277 million tonnes of cassava were produced in just 13 countries of Sub-Saharan Africa. The region also has the highest cassava consumption rate per person, with 108.8 kg per year (FAO 2017a, 34)

For Sub-Saharan Africa, cassava plays an important traditional role as a food crop, and there is also a growing interest in its viability as a cash crop. Cassava is mainly cultivated by smallholder farmers, a substantial number of them female, using traditional farming methods (van Vark 2013). Since Sub-Saharan Africa struggles with food insecurity and a desolate economic situation, a crop which can be used in a versatile manner for both challenges could be reliable und useful for farmers. In various Sub-Saharan African countries, cassava is promoted as the new possibility for stimulating development in rural areas, and a growing number of farmers have begun or extended cultivation of cassava.

5 The Cassava Farmer of Lilongwe District

In the following three chapters I present my research results. These are mainly based, as already mentioned, on interviews and focus group discussions I conducted with cassava farmers of the Lilongwe District of Malawi. I further conducted two one-to-one interviews with cassava processors, which gave me a profound insight on cassava as a cash crop. To broaden my insights, I also conducted interviews with cassava vendors, who purchase cassava from the farmers. Additionally, the experiences and observations I made during my stay in Malawi and especially during an internship at the GIZ expanded my research findings and enabled me to deepen my understanding of the local situation. Moreover, through my internship I gained additional background knowledge from an outside perspective about the farmers' situation, which helped me to set the farmers' own statements in a broader context. Further, my research addresses the varieties of sweet cassava. It was necessary to select one of the two varieties for a detailed examination, because their influence on the farmers is too disparate to analyse them as one entity. I chose the sweet varieties, because the bitter varieties are already better represented in research. Further, in the Lilongwe District the sweet varieties are more popular.

The first chapter of my empirical study outlines the general process of cassava cultivation. The findings presented in this chapter are primarily based on the 29 one-to-one interviews conducted. If information based on a different source is presented, this is clarified within the text. First of all, this chapter provides insight into cassava cultivation by the farmers of Lilongwe District and examines why the farmers cultivate sweet cassava. Then I emphasise the specific features of cassava, as assessed by the farmers. Finally, I illuminate the differences between the sweet and bitter varieties and how these affect the Malawian farmers. Although this is often disregarded, the varied features of these two categories are of great significance to the farmers. Since different institutions and projects in Malawi (e.g. C:AVA) tend to support und promote the bitter varieties, I analysed the cassava farmers' opinion and evaluation of both the sweet and bitter varieties.

5.1 Overview of Cassava cultivation in Lilongwe District

Through the one-to-one interviews I gathered questionnaires from 29 sweet cassava farmers. Fifteen of the interviewed farmers were female and 14 were male. This reflects that cassava is a crop that is relatively strong cultivated by women. Although agriculture is rather dominated by men, the crop cassava is often under female authority. During my internship, when working with cassava famers, I also recognized that a high number of women were involved, and during group discussions women often led the conversation. This is linked to the fact that cassava needs to be prepared swiftly after harvest, which is still predominantly woman's work in Malawi. Seven of the interviewed famers had no education, 18 had a primary education level, and four had a secondary education level. All of them cultivated sweet cassava varieties. Additionally, all of the farmers also cultivated maize. Thirteen cultivated maize as food crop and cash crop, and 16 just as food crop for home consumption. With the exception of four farmers, who planted only sweet cassava and maize, all of the farmers interviewed grew between three and six different crops, such as soybean, groundnuts, peas, sweet potatoes and tobacco. The acreage of every farmer varied between two and 15 acres, with an average of 3.8 acres. Cassava was planted in an area of between 0.25 and 3 acres, with an average of 1.3 acres. Only five of the interviewed farmers cultivated sweet cassava before 2000. The first started cultivation of cassava in 1977 and the other four in 1990. Twelve farmers began between 2000 and 2009, and 12 started after 2010.

Picture 3. Cassava field in Malawi (source author)

Except for one farmer, all of the other farmers interviewed would like to increase their cassava plot. The one farmer who does not want to increase his cassava plot explained that the price for sweet cassava is too low, and he only cultivates it to have an income during the dry season, when his other crops are already sold.

The other farmers consider sweet cassava a generally profitable good, wherefore they would like to extent their cassava fields. The farmers said that they do not have enough money to acquire more land or sweet cassava cuttings. Although one can use planting materials from old plants, it is advisable to use new cuttings that are improved and clean, which means free from disease. Often the farmers use cuttings from diseased mother plants, and so they risk losing all of their plants.

When I asked the farmers how they acquire new cuttings, they said that this is very challenging for them. Eight farmers said that they do not use improved cuttings. One farmer explained that he had tried improved cuttings, but he had the same yield as with the local cuttings, which are free or cheaper. Another farmer said that he had never heard about improved cuttings and uses the cuttings he gets from the shop for agricultural inputs (named 'Farmers World'). The other farmers stated that they do not have enough money to purchase improved varieties or have no access to them, since improved cuttings are very rare in Malawi.

The other farmers who used improved varieties confirmed the problem of getting cuttings. They said that they get the improved cuttings from donors, NGOs and extensions workers. However, the distribution is very unstructured and uncoordinated. They never know whether they will get new improved cuttings, when they get them, or how much the new improved cuttings cost. One farmer, who is a member of a cooperative, told me that a NGO assured the cooperative they would provide them with improved cuttings for a fair price. However, when the cuttings arrived, it was already too late to plant them, since it is important to plant them during the first days of rain, so he and his cooperative lost the harvest for one season. Since they trusted the commitment of the NGO, they also had no other seeds available and so they could not cultivate any other crop. This put the farmers in a very difficult position. Therefore, the farmers said it would be very helpful for them to establish stable access to improved or clean cuttings. Thereby it is important that cuttings are affordable for the farmers and that the selling points are not too far away. One farmer suggested mobile outlets which

would come at an agreed upon time to the village to sell the cuttings. Another farmer said that he had once bought bad cuttings, and that the cassava cuttings are very vulnerable to long transportation ways and warm storage and thus one never knows if the cuttings are still good when one buys them. So he lost his trust and only uses cuttings from fellow farmers. He added that he knows that he would achieve a higher yield with improved cuttings, but the risk of investing in damaged cuttings again is too high for him. He said that he is very careful about which plants he uses for his cuttings and, until that time, he had never used diseased cuttings. Thus, the distribution of the improved varieties within the Lilongwe District is quite limited. Most of the farmers do not have access to the improved varieties, either because of lack of money or of lack of availability of improved cuttings or seeds.

When asked about further problems with cassava, the answers most frequently given were distance to market and disease. Since the farmers live far away from the markets, they often need middlemen who buy the cassava from them at the field. These middlemen, in contrast to the farmers, have the ability to transport the cassava to the local markets, because they have more time or means of transportation. Most of the farmers perceive that these middlemen take advantage of them and pay too little. The farmers also identified them as a problem. They would prefer to sell their cassava directly to the end user and, thus, achieve higher prices. This proceeding also separates the farmers from the markets in the sense of information flow and makes it even more difficult for them to get pricing information. Moreover, diseases cause problems for the farmers. In contrast to the improved bitter varieties, the sweet variety is susceptible to cassava mosaic disease, which is widespread in Malawi. The farmers suggested developing more sweet varieties with different disease resistances, so that they would be able to decide, based on their experiences or the current situation, which disease resistance is the most suitable for them. Further, one farmer emphasised that these varieties also needed to be affordable and accessible to them.

Although sweet cassava cultivation is challenging and needs improvement, the farmers who were interviewed evaluate sweet cassava as a promising and profitable crop for them. Even though they are still in a difficult financial situation, they recognized future potential in their sweet cassava varieties.

5.2 Reasons for Planting Cassava

When asked why they cultivated sweet cassava, 25 farmers responded that they cultivate it as food and a cash crop, whereas four farmers used cassava as cash crop alone, not additionally for home consumption. As already mentioned in chapter 2.3.1, question 22 of the farmers' questionnaire was interpreted differently. However, I clarified and reflected the answers with the enumerators in the debriefing and decided to consider them for following analysis, differing between the two interpretations.

The initial intention of question 22 was to analyse what had changed for the farmers that made them to decide to grow cassava. Farmers who had just recently started to cultivate cassava explained that they made this decision to increase their income. One farmer told me that she was very poor, and cassava was the only option for her to generate income, since she had no financial resources. So, she decided in 2015 to cultivate sweet cassava alongside maize and it continues to be very profitable for her. The fact that cassava is also known as the crop of the poor is based on its relatively low-input needs, in comparison to other crops; it is therefore often the only cash crop possible for the poorest farmers to cultivate. Most of the other cash crops need financial resources or specific knowledge about cultivation methods and, thus, are not feasible for the poor farmers. Another farmer told me that she started planting cassava in 2012, because other farmers had told her about the advantages of cassava. Now her household has a much higher income. Another farmer explained that she started cultivating cassava in 2016, due to climate change. When I asked her what she means by climate change, she said that her maize harvest, which is the only other crop she is cultivating, has decreased strongly due to changing weather conditions, like droughts and floods. She knows that cassava is a better crop for these conditions and so she decided to plant cassava additionally. For that purpose, she reduced her maize acreage from 1.5 acres to 1 acre and now cultivates cassava on the 0.5 acre.

To sum up, cassava is the only crop that generates a profitable income, which can be cultivated by the farmers without external assistance. Thus, strengthening cassava would clearly address and benefit the poorest smallholder farmers.

However, most farmers answered the question with reference to the benefits that their recently started cultivation had provided them. They interpreted question 22 to ask what

has changed for them after planting cassava, rather than what changed that made them decide to grow cassava.

Most of the farmers said that since they began to cultivate cassava, their income has increased. One farmer explained that, after he started growing cassava in 2012, he was able to buy bricks for his house, pay the school fees for his children and also pay household expenses like soap, salt and hospital bills. Other farmers were able to buy an additional plot or livestock (pigs or goats). The farmers also used the income they generated though cassava for the cultivation of other crops, especially maize. Two farmers said in the one-to-one interviews that they use the money to purchase maize seeds and fertilizer. Since the farmer's questionnaire did not explicitly ask whether they use the cassava income for buying maize supplies, this could be the case for more of the farmers. I decided to include this question in my questionnaire for the focus group discussions; the participants in these discussions affirmed that they use their income from cassava for maize (see Chapter 7, 109). The farmers added that they buy maize for household consumption and maize supplies, like seeds and fertilizer. Although the farmers did not answer why they started cultivating cassava, the given answers stated that they achieved an increased income since planting cassava, and thus it can be assumed that this is the desired outcome of cultivating cassava.

In summary, most of the farmers cultivate sweet cassava primarily to generate income. The feature that sweet cassava is also edible is an additional advantage, but they would not cultivate the same amount of cassava, were it not saleable.

5.3 Specific Features of the Cassava Crop and their Advantages for the Famers

Most of the farmers stated that the biggest advantage of sweet cassava is that it is usable as a food crop and a cash crop. An additional essential advantage is the long shelf life of cassava when left in the soil. This combination of usage and storage is very promising, as it provides lower vulnerability against famine and price fluctuations.

According to the farmers, the main advantage of sweet cassava as a food crop is that it can remain in the ground for a long time. It is easy to consume and when it has matured, after 9 to 12 months, the farmers can decide to harvest it whenever they want. If there is

not enough food available, they can just go to their field and take what sweet cassava they need. Thus, the farmers described sweet cassava as a reliable and important food reserve. One farmer responded that this is especially valuable in the hunger time between February and March.

This possible storage in the ground is also one of the main reasons that the farmers consider sweet cassava a promising cash crop. In Malawi prices are very unstable and farmers who need to sell their products within a certain period often take large losses. Cassava can be left in the ground until the prices are profitable for the farmers.

Additionally, the farmers often emphasised during the one-to-one interviews that this storage option provides them an income during the dry season in October, as well, when their other crops are already sold. This may not be a rational argument, but in the Malawian context it is very important. During my internship I observed that long-term planning is quite difficult and elusive for Malawian farmers. This can be applied to their economic planning, but also to their food consumption habits. My GIZ project even developed strategies to teach farmers long-term thinking, since this deficit causes many problems. For example, a family needs one bag of maize for one month to meet the food demand of the family. Even if they had only one bag for two months, it is very likely that they would consume the same amount of maize as usual in the first month, and then have nothing left for the second month, instead of rationing. The same behaviour can be observed regarding money. Available money is quickly spent, and no reserves are built up to buy planting materials or supplementary fertilizer for the next season. Of course, the farmers have little money and extra costs, such as doctor's bills or materials needed for the house, often cannot be paid. It appears hypocritical, living in the abundant German world, to demand that the farmers forego all the goods, no matter how cheap, as long as they are not absolutely necessary, and save the money for the future. However, it should not be neglected that the lack of long-term planning skills is important to understand some of the answers, and teaching it is, rightly, a focus of development aid. These behaviour patterns, which seem very irrational for us, are important to an accurate perception of the local situation and to find a suitable starting point for development strategies. Sweet cassava may not be the most profitable cash crop, but with respect to the advantage of providing income during the dry season, it is a favourable cash crop for the Malawian farmers.

Additionally, the cultivation of sweet cassava is well-known in Lilongwe District, so farmers can decide by themselves to grow cassava and do not need direct help from outside. Furthermore, they can sell their cassava on the local markets and do not need external assistance for that. This is especially adverse for the other cash crops like tobacco, as already mentioned, or the newly promoted ones, which are mostly oilseeds. These need special treatments, which the farmers are often unaware of. The farmers also need support of regular purchase transactions, namely, to find buyers. So, for the poorest farmers with no resources and no external support, cassava is often the only way out of poverty. However, if they would not find suitable consumers or markets, they would use it for home consumption. They are not reliant on selling the product, because they can use it for themselves. This is one very important feature, since I observed that the tobacco farmers were very dependent on their buyers. They had no other option than selling their tobacco to them, regardless of whether the price was profitable for them.

Due to its use as a food and cash crop and the possibility to store it in the ground, the Malawian farmers have a decision-making power and they are aware of this advantage. They can independently decide if they want to consume, sell or store it in the ground, which gives them flexibility and adaptability to price fluctuations and own needs. This implies also the problem of the bitter varieties, since they are not as suitable as a food crop.

5.4 The Differences between Sweet and Bitter

All of the farmers I talked to during the focus group discussions consume only sweet varieties. There was not one famer in the focus group discussions who ate bitter varieties. They said that they cannot buy bitter varieties here at the local markets, but they also do not want to consume them. They clearly preferred sweet varieties, because they are much easier to prepare. These reservations about bitter varieties were also found in the one-to-one interviews. Just four of the 29 farmers interviewed cultivate bitter varieties. Three of them use them as food and a cash crop, and one just as a cash crop. Most of the farmers responded that they do not cultivate bitter varieties because they cannot use it for home consumption and it is very difficult to find adequate markets for the bitter varieties. If these farmers cultivate bitter varieties, they would become

dependent on buyers or need to adapt their food processing to bitter varieties, which is much more complicated and needs more attention due to the cyanogenic glucosides.

During a meeting in Zomba with representatives of C:AVA, the project which promoted cassava for processing HQCF, I observed that the project just supports and promotes the cultivation of bitter varieties. Since bitter varieties are economically meaningful due to the higher starch content, the efforts in Malawi to strengthen cassava as a cash crop is mainly limited to the bitter varieties. At this meeting I talked to a GIZ development worker and he had a critical stance towards this development. He admitted that since Malawi's economy is very volatile and the cassava industry in particular is unpredictable, a strong increase in the cultivation of bitter varieties would primarily be favourable for the industry, but not for the farmers. He continued that the cultivation of pure cash crops is especially risky for the farmers and it would be rather advisable to promote crops which provide more opportunities for the farmers. I also asked one of the C:AVA staff, if it is also possible to process sweet varieties and if he can estimate how this would reduce the profit. He briefly answered that processing of sweet varieties is not profitable and they only recommend processing bitter varieties.

However, when I talked to one of the cassava processors in Lilongwe District, I asked him whether he had experience with processing sweet varieties. He responded that he processes only sweet varieties. He knew that the same quantity of bitter varieties would produce more flour or starch, yet he processes sweet varieties. When I asked him why, he told me that he understands the situation of the cassava farmers, because he is also a farmer. Since he can never estimate in advance how much cassava he needs for the next season, because that depends on external orders, he cannot arrange contracts with the farmers about the specific amount of bitter varieties he will buy from them. Therefore, he decided with the farmers to process their sweet varieties, but to pay a lower price for the sweet varieties than he would pay for bitter varieties. The processor and the farmers agreed on this compromise. Thus, sweet varieties enable the farmers to be flexible and, as long as both parties can make a living with the sweet varieties, the processor will continue his cooperation with the sweet cassava farmers. Unfortunately, I could not find any study that distinguished between processing sweet and bitter varieties.

As mentioned above, the development of improved varieties has mainly focused on the bitter varieties. The Malawian Ministry of Agriculture and Food Security et al. (2010)

recommended 10 improved cassava varieties for cultivation in Malawi. Of these, only one is sweet. The breeding programmes were able to increase the yield and the starch content of the new improved varieties, but it applied to the bitter varieties only (3). Since improvement through breeding programs is possible, it would be reasonable to also develop sweet varieties with increased yield and starch content, so that they would be more beneficial for processing. This would strengthen the farmers' position and be a pivotal enhancement for their preferred sweet varieties.

I asked the farmers about the advantages and disadvantages of sweet varieties in comparison with bitter varieties. Seven farmers said they had not experienced any disadvantages so far. Sixteen farmers argued that the sweet varieties are often stolen from the field. Since they are eaten raw as a snack, people who pass by the field just steal and eat them. This is not happening to the bitter varieties, because they must be processed before consumption. Three farmers also added that livestock destroy the plants and they have to spend a long time in the fields chasing them away. One farmer built a fence to protect his plants. According to two farmers, another disadvantage is the higher risk of disease compared to the bitter varieties. Further, two of the farmers interviewed said that, since sweet cassava is so easy to consume on household level, there is often not much left in the field when they want to sell it. Another two farmers mentioned that the price for bitter varieties is higher, but the advantages of sweet varieties are still greater.

The responses about specific advantages are much more uniform than the answers about disadvantages. The main advantages mentioned by the farmers are:

- sweet varieties are easier to sell (more market options)
- sweet varieties do not require processing before consumption, wherefore they are a better food crop than the bitter varieties
- sweet varieties mature earlier than the bitter varieties

The first advantage mentioned by the farmers contradicts the general opinion that bitter varieties are the better option as cash crops. However, the farmers explained that it is difficult to find adequate markets for the bitter varieties, since they need to be processed before they can be used so in the Lilongwe District because the farmers can sell the

bitter varieties to processors only. Since sweet varieties are consumed by the local population, there is always the possibility to sell it on the local market. This makes the sweet varieties a better source of income than the bitter varieties, although the bitter varieties achieve higher prices when sold to processors. The farmers who were interviewed for this research stated that, for them, sweet varieties are the better option. Cultivating bitter varieties would place pressure on the farmers to find a suitable buyer for their product, which they could not use for direct consumption. Additionally the people of the Lilongwe District consume just the sweet varieties. Although in other regions of Malawi it is common to eat the bitter varieties, in the Lilongwe District the people feel not sure consuming the bitter varieties, since they are habituated/used to to the sweet varieties only and not familiar with the processing process which makes the bitter varieties edible. The third advantage enables them to harvest the crop earlier if necessary.

6 Cassava Food Crop

In the second part of this empirical study, I analyse the importance of cassava as food crop for the farmers in Lilongwe District. First, I demonstrate the integration of farming and food in Malawians' daily lives and the special value of food for the Malawian population. This should provide an understanding of the Malawian awareness of food and food security. Additionally, I outline how cassava is integrated into the farmers' eating habits. This is followed by a reflection on how the farmers describe food security and to what extent cassava might contribute to it.

6.1 The Role of Food Awareness in Malawi

The value of food can be perceived differently and food can be a significant determining element in daily life. I grew up in the 90s and lived almost my entire life in a German city. I am used to going to the supermarket, and simply buying all the food I want there. I did not think too much about food and bought the products without questioning it. Once, when I was babysitting a six-year-old girl, she asked me to make a ham sandwich for her. While preparing it, I asked her if she knew what ham actually was, and she said, 'No, it's just ham'. She was not aware that meat and sausages are made from animals. Of course, when she grew older she realised what meat actually is, but this demonstrates how far removed from actual food production we grow up. Especially through the globalisation and the increased demand of processed food, as consumers, we neglect what we actually consume. Food has become something abstract for us, and we have lost our connection to it.

Agriculture and the production of food is something one perceives in Germany rather marginally: when driving on the highway next to agricultural land and the smell of manure enters the car, when a tractor blocks the road or when one takes a hiking trip in the countryside. In everyday life, one does not often question where food comes from and how it was produced - with money, one is able to buy it in one of the numerous shops. Above all, for most German consumers, food needs to be cheap. The average price in Germany for pork chop or steak is approximately 5.60 euro per kg and the willingness to pay more is rather low. Consumers go into the supermarket and buy their chicken breast there, without really reflecting on how many steps it took to bring this

piece of chicken breast to the supermarket and what the low price implies, regarding the quality and the production processes, or what happens to the rest of the chicken.

However, during the last few years one can observe an increase in public awareness of the food's origins and different cultivation methods, among the German population; the consequences of individual food consumption has begun to be critically considered. Different social movements have illuminated our distorted understanding of the value of food, and organic food and fair-trade products have risen in importance. Nonetheless, this movement is still very small in Germany.

Generally speaking, the German people have lost an awareness of the value of food. Food is an anonymous product bought in a store, often well-packed with a 'best before date'-sign, which can be stored in the refrigerator or freezer until consumption. Food, or the purchase of food, for the great majority, is not a significant part of their daily lives, nor a significant portion of their income.

Living in Malawi revealed a completely different value and awareness of food. While in Germany today, food has more a subordinate, secondary role in people's lives, food in Malawi is a primary part of most people's lives.

During my stay in Malawi, I observed different consumption patterns. I lived with a Malawian woman who has multiple different businesses. Besides renting rooms, she also had a photocopy service and a real estate agency. She belonged to the upper-urban class and her food consumption habits were almost the same as mine in Germany. In the upper-urban population of Lilongwe and Blantyre, food has almost the same role as in Germany. A few supermarkets opened in the big cities and offer a similar range of processed and unprocessed products to European supermarkets. Most of these products were imported from South Africa and are very pricey, fourfold as expensive as the same products at the local market in Lilongwe. In these supermarkets most of the consumers are not Malawian and work for international institutions. The Malawians who are able to buy there often have businesses which are somehow connected to international organisation. My landlord, for example, was often booked for copy jobs by the European Union or other international development organisations. Most of the upper-urban class owe their income to international institutions. They are able to purchase

products in the supermarket and also visit cafes and restaurants, which are unaffordable for the general Malawian population.

However, most of the population, whether rural or urban, does not have the income to go shopping in the supermarket and, thus, buy their food at the rural or urban markets, unless they practice subsistence economy which proves enough food to fulfil their demand. In Lilongwe and in the rural areas, people sit at the side of the street or in parking spaces for the whole day, selling their food products. When bicycling through Lilongwe, chickens cross the street in front of my bike and I observed people picking fruit from the trees next to the streets. The livelihoods of most Malawians depend on food. Food is a key element in their lives. Most people grow food, sell food, or worry about food. Even people who work in the city and earn a high income, by comparison to the average Malawian, often struggle to meet their food demand. Food is, in relation to the Malawian average income, quite expensive. In Germany, food has an average share of just 10.21% of the income, while it is almost four times more in Malawi, at 42.81% of the income (Statistisches Bundesamt 2018). For example, the cleaning lady in my office, who said she gets a fair wage for her work, told me that she struggles to feed her family. Whereas living space is somehow organisable, and health issues are mostly temporary, the struggle to get enough food is perpetual and needs to be fought every day. This is firstly caused by the high number of children in Malawian families. The incomes of the parents need to fulfil the demand of food for many children. Second, I observed that Malawians who have a regular income often have to take care of their siblings or nephews and cousins, if they do not have a sufficient livelihood. Since the Malawian state offers no social welfare, family members need to take responsibility for each other, which puts pressure on wage earners, who are in the minority.

Consequently, food and food insecurity is an omnipresent topic in Malawi. Especially in the rural areas, most livelihoods are based on food, wherefore food and the production of food is the determining factor of people's life course.

6.2 Impact of Food Consumption Habits

The following sub-chapter first analyses eating habits, followed by the role of cassava as food crop for the farmers. The final part of this sub-chapter evaluates the specific

awareness of farmers about food security, and how local eating habits and food security awareness interact with another.

6.2.1 Eating Habits in Lilongwe District

The typical meal in Sub-Saharan Africa, as well as in Malawi, usually consists of two parts. The major calorie contributor is a paste or porridge made from starchy plant matter, such as cereal or roots, eaten in small chunks by hand. These are dipped into a sauce or relish: the second component of a typical meal. The relish is made from varying ingredients which depend on locality and season. It typically provides additional vitamins, fats, proteins, and minerals, being made from different plants, meat, spices, or fish. If possible, the porridge and relish is supplemented by meat or fish (see Picture 2).

Picture 4. Typical Malawian meal: Cassava flour (kondole) nsima served with small fish (kapenta) and green vegetables (Malawian Ministry of Agriculture 2015)

The base of the porridge, however, is made of very limited plants. Porridges are commonly made from maize, sorghum, rice, potato, or cassava. Flour made of one of these crops is boiled with water and then shaped, with the help of a big wooden spoon, into a number of pieces, with a consistency slightly more solid than regular porridge when on the plate. In Malawi this thickly mashed porridge is called *nsima*. When the Malawians talked about nsima, they always mean nsima made out of maize flour. If nsima is not made from maize flour, the other crop from which it has been made is mentioned.

Living in Malawi showed me how eating habits vary within the Malawian population. As mentioned above, I observed that my landlord had almost the same relationship to food as my own. She used the money she earned from her non-food-related businesses and bought the food she wanted in the supermarket after work. Her eating habits were also very similar to mine, since she ate the same products as I did. Of course, she cooked typical Malawian dishes, but also common Italian, Indian or Thai dishes. She did not consume nsima often, preferring rice and pasta as staple foods. She told me that nsima is a typical hangover dish for her and that she actually prepares nsima for the next day, when she goes out at night and expects to have a hangover.

For the Malawian upper-urban class it is quite common to have employees who help in the house or take care of the garden. Due to the security situation, most of the properties were fenced and security guards were engaged to watch the entrance to the houses. My landlord engaged one housemaid, one gardener, and, together with the owner of the other house which was on the property, three security guards. These employees lived in small villages and needed 1.5 hours on average to walk from their houses to ours in Lilongwe. Just one of the security guards was able to afford a bicycle. They told me that they live in small villages without any electricity outside Lilongwe. Most of the other villagers are farmers. All of our staff ate nsima made out of maize flour every day. They met during lunch time and always ate nsima. Once I asked the housemaid how often she ate nsima, and she said, if possible, three times a day. Asked why she eats nsima so often, she told me that nsima is very tasty, healthy, easy to prepare and cheap. She sometimes eats nsima with a relish made out of different vegetables, occasionally also with meat, but often without any supplements. Thus, the entirety of her food consumption consists mainly of maize-flour-based nsima.

When the farmers in the focus group discussions were asked, all of them said they eat nsima every day and confirmed that maize is the most important, exclusive staple food for them. They also mentioned that they often eat nsima as a meal without any supplements, because of a lack of money or too little harvest of the other plants. If possible, they add a relish made out of vegetables, like tomatoes, onions, cabbage or cassava leaves. For the farmers, nsima is an appropriate meal as breakfast, lunch and dinner. They said they really find nsima tasty and have no problem eating it every day.

However, they would prefer to consume the nsima with supplement ingredients more often.

These answers are consistent with FAO (2017b) statistics, in which it is clear that maize is the most important food for the Malawian population (see Figure 9).

	Food Supply *[kcal/capita/day]*	**Share of Total**		**Food Supply Quantity** *[kg/capita/year]*	**Share of Total**
Total	2161	100%		513	100%
Maize and Products	1125	54.6%		129.24	28.3%
Potatoes and Products	249	12.1%		131.69	28.8%
Cassava and Products	147	7.1%		76.62	16.8%
Other Pulses and Products	101	4.9%		10.62	2.3%
Wheat and Products	88	4.3%		11,77	2.6%
Groundnuts (Shelled Eq)	70	3.4%		4,98	1.1%
Pig Meat	61	3.0%		5,45	1.2%
Rice (Milled Equivalent)	47	2.3%		4,75	1.0%
Beans	38	1.8%		4.12	0.9%
Bananas	35	1.7%		21.25	4.7%
Other	100	4.9%		56	12.3%

Figure 9. Food supply and food supply quantity of Malawi 2013 (design: author)

More than 54% of the average calorie intake is based on maize, and yearly consumption of maize is 129 kg per capita. Maize, or nsima, is the most important staple food in Malawi. In the other countries of southern and eastern Africa the calorie intake consists of only 20-30% maize. Only the Zambian population has a higher maize-based caloric intake than the Malawian population (Minot 2010, 1).

As maize, potatoes and cassava combine to contribute 74% of the caloric intake, it reveals that the supplementary relish does not have a prominent role in the supply of calories. This might be due to the relish being consumed only at some meals, because the average Malawian farmer is often not able to cultivate vegetables and does not have enough money to buy the additional ingredients. So the meals often consist of nsima alone. Additionally, especially high-calorie ingredients, such as oils, meat or animal fats, are not affordable and the relish primarily consists of low-calorie ingredients, like tomatoes and leaves.

Different influences in Malawi, including political support, led to the abandonment of other food crops that were originally popular in Malawi, such as sorghum or millet. This

boosted the strong focus on maize and the reliance of the rural population today on maize as staple food, except for the lake shore region where cassava is recognized as a staple food equivalent to maize (Minot 2010, 4; Gronemeyer, Fink and Metzger 2015, 15). However, this one-sided consumption stimulates a strong dependency on maize by the Malawian population, which bears with it many risks.

In conclusion, there is a big difference in the eating habits in the Lilongwe District between the small upper-urban class and the rest of the population. For most Malawians, maize, prepared as nsima, is the most important food and is consumed up to three times daily. Further, it is often the only food which is consumed in any sizeable quantity.

6.2.2 Role of Cassava as a Food Crop in Lilongwe District

In the differentiation between staple food and supplementary food, cassava fills both roles in almost every section of Sub-Saharan Africa. This means that cassava is used as staple food in main dishes, but also as an additional calorie intake during the day, as a snack (Jones 1959, 3). In Malawi this statement applies only to the lakeshore region. Everywhere else, maize is the only real staple food for the Malawian population.

However, cassava is a food crop which has been cultivated for a long time in Malawi and, together with millet and sorghum, it was one of the most important food crops in Malawi before the change to maize as the only staple food around 60 years ago. For many reasons, mentioned above, it is likely that the maize harvest will decrease in the future and that it will be necessary for the Malawian population to diversify its food consumption and integrate additional food into their daily diet.

Although maize is undoubtedly essential to the Malawian population, during my fieldtrips around Lilongwe District as part of my internship, I observed that cassava is eaten everywhere. This food, so unfamiliar to me, attracted my attention, and I first talked to 10 of my Malawian GIZ colleagues about their consumption of cassava. All of them, independent of their age or education level, said that their staple food was maize. Just two of my colleagues added rice as second staple food. At this point I should clarify that, although GIZ pays a fair loan to their local employees, they consider the average Malawian income and adapt their wage level to this average, to avoid large pay gaps

within the population in Lilongwe. Unlike my landlord, my local colleagues did not earn enough to purchase their food in the supermarket. I think this is one reason that their eating habits remain similar to the rural population.

However, many of my Malawian colleagues told me that they do eat cassava, often as a snack, but also as a main dish. When I asked them why they do not have staple foods supplementary to maize, they said that they are used to eating nsima every day and there remains no reason to change that. Four colleagues also argued that not enough cassava was being cultivated to fulfil the demand of the population in their district. Five of the colleagues stated that they could imagine eating cassava as a staple food, whereas the other five could not imagine changing their habits.

This demonstrates how difficult it is for many people to be open minded to changing habits, and, thus, it is necessary for the success of cassava that people accept it as proper food. It is clear that cassava is an edible crop which, in combination with its feature as a cash crop, might be very interesting to the Malawian farmers. However, if farmers will not accept cassava for their diet, this promising combination is worthless.

However, when asked, 25 of the 29 farmers of the Lilongwe District responded that they do use cassava as food crop. Twelve of them eat cassava between one and five times a week, 13 on a daily basis and two of them even twice a day. All of the farmers who eat cassava on a daily basis or more often consume it as a main dish, and just six of them also eat it as a snack. The farmers who eat it between one and five times a week all consume it both as a main dish and as a snack.

When the farmers prepare cassava as a main dish, it is usually boiled in water. Just five of them make cassava flour and prepare *Nsima ya kondole*, which means nsima made out of cassava flour. When eating cassava as a snack, the farmers use their teeth to peel the cassava and then they eat the raw white cassava flesh (see Picture 5). This is only possible with the sweet varieties.

Picture 5. Raw, peeled Cassava, which is eaten as a snack (source: author)

Seven farmers also use the cassava leaves and prepare them as a relish or as vegetable. A farmer who also worked as a cassava processor told me that he burns the dry cassava stems and uses the ash as salt replacement, since it is very salty. One farmer explained that he often eats cassava with fried tomatoes, and another farmer added that he prepares a relish made out of tomatoes to eat with boiled cassava.

In the focal-group discussions, I asked the farmers how important cassava was for them as food crop. They answered that cassava was very important to them, because they knew that if something happened to their maize harvest, they could get the cassava out of the ground and eat it. Then I asked whether they consume cassava only as an emergency or famine crop; they replied in the negative and told me that they also eat cassava when they have maize, but that cassava is usually a better cash crop, so they try to keep the cassava in the ground and use it as a cash crop when they need money. When I posed the question of how important cassava was as a food crop, compared to maize, they said that nothing is as important as maize and that they are used to eating maize. I asked the farmers whether they could imagine stopping eating maize every day and replacing it with another staple. They laughed, shook their heads and said they cannot imagine that, because maize is too important and they prefer eating nsima every day.

At first, this seemed very strange to me, but then I realized that, for many farmers, maize is the only staple they actually know and are familiar with. In Germany, we have an old proverb, which goes, 'what the farmer does not know, he does not eat'. This indicates that German farmers were likely resistant to crops they did not know as well.

The difference is that, during the last 50 years, German food consumption habits have changed significantly, due to external influences. Our bread- and potato-based diet was changed especially through migrant workers, who came to Germany after the Second World War and incorporated their cultural food in our eating habits. This went hand in hand with the economic miracle, which enabled people to choose their food almost independently of cost. Today, pasta, rice, kebab, and so on, are essential elements of our diet. However, this process took time and changing this diet completely would be also very challenging for me. Pasta, pizza, rice, and so forth, are unfamiliar foods to many Malawians who grew up with their daily nsima. Considering this, it is understandable that they cannot imagine changing their food consumption.

The questionnaire for the one-to-one interviews also asked a question about which products they know that are made out of cassava, and into which products cassava can be processed. They listed a lot of different products like flour (HQCF), starch, glue, milk and pastries, like doughnuts, scones, and biscuits. This demonstrates that, firstly, the farmers know about the multiple uses of processed cassava and its potential profitability, and secondly, it confirms that processed cassava can be used for many products. It is an especially good substitute for wheat flour. Through my internship, I met one baker who told me that more than 50% of her pastries are made out of cassava flour, and there is no difference in production or taste. In recent years, she changed from wheat flour to cassava flour because she can buy cassava flour from local processors at the market. However, she would like to produce even more from cassava flour, but there is often not enough cassava flour at the local market. She added that, for her customers, it does not matter which kind of flour she uses for her pastries.

To summarise, when analysing the different data, it can be said that cassava is already integrated in the lives of the farmers interviewed: in their agriculture, but also in their diets. However, the mind set and evaluation towards it, in comparison with maize, is an important topic that needs to be improved for if cassava to play a more dominant role in Malawian food production and consumption.

6.3 Food Security Awareness by the Malawian Farmer

Before coming to Malawi, I was aware of the poor food security situation in Malawi. In the media and scientific literature, food insecurity and its consequences, like undernourishment or food crises, are often named in a Malawian context. Reading about Malawi always raises the topic of an uncertain food supply. When I heard or read about food insecurity, my first association was people who have nothing to eat and, thus, have to starve. I imagined withered, empty fields and no signs of food anywhere.

However, a Malawian man I was passing once, who sold his potatoes next to the street, asked me to buy some of his potatoes; I told him that I do not need any potatoes. Then he responded that he needs something to eat and he would be hungry if I would not help him out and buy some of his potatoes. I was perplexed, pointed at the potatoes and said that he can eat his potatoes. Then he looked perplex and incredulous and responded that he needs to sell the potatoes to get money to buy maize so that he would not be hungry anymore. This was the first time that I started to think comprehensively about the concept of food security, what food security actually means for the people and the complexity inherent in this topic.

Another event demonstrated how interlinked is the concept of food security. When I was hiking in Ntchisi I talked to an old Malawian man who guided me through the rainforest. Although Ntchisi is not located in the Lilongwe District, I assessed that his experiences and observations were valuable and meaningful.

He told me that he had lived his whole life in this area, next to the rainforest. The cultivated areas of the farmers reached out to the rainforest. When he was young, there was plenty of uncultivated land covered with trees, between the cultivated areas. By now, almost all of them have been cut down, and the entire area is cultivated. Since he was 10 years old, he helped on the farm, and he felt that something changed after all the trees were cleared and the farmers started to cultivate only maize everywhere. He also observed a change of consumption habits in favour of maize. Thirty years ago, he started to plant scattered tress on his plot, and after monocropping maize for a few years, he diversified his agriculture and also used intercropping. He said that today, he is the only one who is not struggling with his harvest, since, because of the

intercropping and the trees, his soil is more nutritious and can save water more efficiently. Additionally, he often goes into the forest to pick fruits and other things he can use to enrich and diversify his food consumption. He explained that all year long different fruits mature in the forest and that this helps him to have a proper diet the entire year. However, he mentioned that most other farmers forgot about these fruits from the forest and that they only consume maize from their fields, and if the maize harvest is too little, they face serious nutritional problems. He tries to raise awareness in the other farmers, about the different food options of the forest, but they neglect his advice. He emphasized that this strong focus on maize has diverse negative impacts. Monocropping has negative impacts on agriculture, like depleted soils and maize harvest failures, which cannot be compensated through other crops. Additionally, food security is strongly dependent on maize, and people have lost their knowledge and the capacity to use food options other than maize. He added that the people are satisfied to eat nsima made out of maize. This development of turning away and neglecting food options other than maize happened everywhere in Malawi.

Due to this informative conversation, and also due to my internship, where I was often confronted with the topic of food insecurity, I realised that food security is much more complex and versatile than one might think, based on its definition. I realized that different interpretations of the concept exist and, since this awareness is crucial to understanding the diverse influences that determine the specific local food security situations, I decided to analyse the perception of food security specific to the famers living in Lilongwe District.

The most suitable method to research this multifaceted topic is focus group discussion. For this reason, I developed an interview guide, which allowed me to add new questions. My research thereby focuses on awareness and perception of food security, rather than analysing the current, local food security situation.

For that purpose, I opened the discussion with the question of how the farmers describe food security. After the interviewer posed this question to the different focus groups, the discussions that followed were quite short and consensual. All agreed that they feel food secure when they have a rich maize harvest and, thus, enough nsima to consume. I asked them how it affects their food security awareness, if they have access to other foods like cassava or potato. They said that this is not the same as having maize, and

that, if they cannot eat nsima, they feel food insecure. This demonstrates that the farmers say that they feel food insecure, when they do not have enough maize to eat. It does not matter if they have access to other food. As long as they cannot eat maize or, more precisely, nsima they feel food insecure.

This focus on maize started with the governmental promotion of maize by subsidising seeds and fertilizer in 1960. However, I was wondering whether there were specific advantages to maize that could explain the exceptional increase of importance for the Malawian population, and the replacement of the original staples of millet and sorghum, as well as of cassava, which was introduced to the African continent at the same time as maize (Smale and Jayne 2003, 9).

For this reason, I asked the farmers in the one-to-one interviews about the advantages and disadvantages of maize and sweet cassava. The arguments in favour for maize were that maize matures faster than cassava, maize can be stored in locked granaries (for protection against thieves) and maize seeds are always available and much cheaper than improved cassava cuttings. One farmer added that cassava is often stolen by farmers who did not plant cassava, and have no more maize left. Eight of the 29 farmers could not identify one disadvantage of sweet cassava in contrast to maize.

When asked about the advantages of cassava, in comparison to maize, the farmers' main answers were that cassava needs no costly fertilizer, it is less expensive to grow, cassava and its cuttings can be sold for a higher income than maize, and cassava is tolerant of drought. This last has gained in importance recently due to weather changes, according to the farmers. One farmer added that he can use everything from the cassava plant: the leaves and the root as food and the stems as firewood, whereas he has to throw away the maize stalks. Other farmers argued that it was advantageous that they do not need granaries to store cassava. Thus, the answers did not provide any answer to the question of why maize became the only essential staple for the farmers, which may indicate that the main reason for this development was the intervention of the government through its maize subsidies. It was implied that nsima made from maize is very tasty; I, however, did not find the difference between nsima from maize or cassava flour notable.

However, comparing the nutrients of these two crops, maize is more nutrient-rich than cassava; especially comparing the carbohydrates (see Figure 10). Anyhow, cassava is nutritious enough to be used as staple. However, both crops lack in important nutrients, and thus are not sufficient for a balanced and healthy diet if not complemented.

	Cassava[4]	**Maize**[5]
	per 100 g	per 100 g
water	60 g	12,5 g
carbohydrate	35 g	64,2 g
fat	0,3 g	3,8 g
fibre	1,4 g	9,7 g
Phosphor	75 mg	215 mg
Calcium	35 mg	8 mg
Iron	0,7 mg	1,5 mg
Vitamin A	traces	185 µg
Vitamin C	36 mg	Not specified
Vitamin B1	50 µg	360 µg
Vitamin B2	30 µg	200 µg
Niacin	700 µg	1500 µg
kcal per kg	**1490**	**3530**

Figure 10. Nutrients cassava and maize (design: author)

When the farmers discussed what was so special about nsima, one interviewer translated that they feel satiated when they have eaten nsima. One interviewer translated that the farmers said that, after eating nsima, 'their stomach feels for them fuller than eating other food'. I must admit that after I tried nsima, I felt replete, but also suffered stomach pain and digestive problems. Of course, my stomach was not used to nsima, but eating nsima, in my experience, does give the feeling that something is in one's stomach. Since many of the farmers know the feeling of starvation, they may appreciate the feeling that their stomach is full.

Of course, if other food is around, they eat this before going hungry, but they would affirm that they suffer food insecurity when the question was asked. During a conversation with a development worker, he told me that the food insecurity situation in Malawi is sometimes not as bad as described by development aid associations. In his

[4] Vincent E. Rubatzky, Mas Yamaguchi: World Vegetables: principles, production and nutritive values. 2. Auflage. Aspen Publishers, Gaithersburg 1999, ISBN 0-8342-1687-6, S.147–161, S. 812.
[5] Deutsche Forschungsanstalt für Lebensmittelchemie (DFA), Garching (Hrsg.): Lebensmitteltabelle für die Praxis. Der kleine Souci · Fachmann · Kraut. 4. Auflage. Wissenschaftliche Verlagsgesellschaft mbH, Stuttgart 2009, ISBN 978-3-8047-2541-6, S.229.

experience, the Malawian farmers often said that they feel food insecure, although they have enough food to eat, because this food is not maize. If the farmers do not eat nsima, they would answer that they suffer food insecurity. However, I do not want to suggest that food insecurity and famine are not serious problems in Malawi, becoming even more severe through an increasing population and the influence of climate change. The point raised is that, when researching and evaluating the food security situation, one must very sensitively formulate questions and differentiate between answers given.

My first reaction was a lack of understanding. How can one feel unsecure although there is food available and accessible? However, when reflecting upon this statement, I must admit that I probably would behave the same way if I were in the same position as the farmers. Although my diet, in contrast to the farmers, is very diversified and I would claim that I am open to new foods, I would also state that I was food insecure, if the only food to which I had access was, for example, insects and offal. Some people might argue that it is a difference, if I had to change my diet from maize to pasta or rice, as from a typical European diet to insects and offal, since maize is almost the same as pasta or rice. Maybe they would even argue that insects and offal are disgusting and inedible, whereas pasta and rice are normal food. However, this is a highly subjective perception and very connected to what we are used to eat, especially with what kind of food we grew up. Especially in Germany, there exists something I would describe as 'acceptable-eating cult', which describes an unwritten rule of which foods are commonly acceptable. This implies that, for example, a dinner for friends is set, everyone knows which kind of food one can serve, and which kind of food would be inappropriate. This is firmly established in Germany, although there is no logic behind it. We are used to ordering chicken breast or chicken wings at the meat counter, and the rest of the chicken is not usable for our diets. In Malawi, it is completely normal for the chicken's head, feet, and offal to be ingredients of the diet. Further, the German conception of what is generally acceptable to eat and what is not is even more inexplicable, which I demonstrate through an example from everyday experience. We have in Germany a very popular type of sausage that everyone eats. It is called liver sausage and, as the name implies, liver is one ingredient of the sausage. Although almost every German meat eater eats this liver sausage, most of them would reject eating a fried liver, because that is disgusting. I recognised this contradictory statement, because I eat liver, about which some friends made snide comments. In contrast to my friends, I grew up with a

father who eats liver, so it was also normal for me to eat it. The same phenomenon can be analysed with gummy bears. We start eating them when we were children and, even after we found out that they contain gelatine made from pig bones, most of us continue to eat them, although we would not consider pig bones appealing in other contexts.

Our social environment shapes our food consumption habits, and we often reflect and adopt these eating habits without questioning them. This demonstrates that specific food preferences are a determining factor in the concept of food security. This is also considered in the current definition of food security, which emphasises availability and access to people's 'food preferences' (see Chapter 3.1.3.); however, the extent of this subjective factor is underestimated. During focus group discussions, I observed that the discussions were mainly about maize and that availability or access to other foods were rarely addressed. The Malawian farmer's perception of food security is highly linked to their primary staple of maize.

When I asked them whether cassava influences their food security, they said that they eat cassava on a regular basis, but it is not nearly as important as maize. However, they harvest and eat the cassava primarily when they feel food insecure because they do not have enough maize. So, cassava is not important when they are food secure, but when they are food insecure (which means, for them, having no more maize), then being able to eat cassava helps them a lot. However, they added that they often use the income from selling cassava to buy agricultural inputs they need for planting maize, like seeds, fertilizer and pesticides. Because of cassava, they have enough money to purchase improved maize seeds more often. Thus, cassava is important for the farmer's food security primarily as it enables them to cultivate maize. Furthermore, cassava is considered a support, when they are feeling food insecure because of a lack of maize. Consequently, cassava used as food does not influence the food security awareness of the farmers, since this is based exclusively on maize.

It might seem at first that this specific awareness of food security does not affect the 'real' food security situation, when farmers really starve because their calorie intake is too low compared to their physical needs. However, when analysing the overall concept of eating habits and the resulting perception of food security, one must ascertain that these heavily interact with another. The specific eating habits of the farmers determine their own perception of food security. Food insecurity perceived by Malawians is

heavily interlinked with their unique consumption habits. They are used to eating Nsima every day and, consequently, their entire subjective feeling about food security depends upon maize.

However, this led to further developments which are mutually dependent. The unilateral maize-based eating habit led to an increase in the cultivation of maize. The focus on maize influenced the entirety of Malawian agriculture, which became strongly dominated by maize, which is currently cultivated on 80% of the arable land. This monocropping of maize worsened food security, since the soils are now lower in nutrients which has led to a decrease in the maize harvest. Additionally, monocultures are prone to disease and pest infestation, because they offer large areas of suitable host plants without any barriers, such as other plants. The predicted impacts of climate change will very likely also lead to a decrease of the maize harvest (Gronemeyer, Fink and Metzger 2015, 15ff.). Thus, the specific Malawian eating habits actually burden and worsen the food security situation.

Moreover, this one-sided nutrition is also very malicious to the body, since maize, especially processed into flour, does not contain enough essential nutrients and vitamins. Although the farmers' calorie intake might be sufficient, they might still suffer from deficiencies of minerals and vitamins. This phenomenon is known as hidden hunger and is very complicated to discover (see Chapter 3.1.1.). Thus, characteristic Malawian eating habits alone cause a situation of malnutrition, without the external factors of crop failures causing a publicly noticeable situation of food insecurity or famine.

Consequently it is necessary to ensure Malawi's food security by diversifying the food cultivation and promoting the planting of more different food crops supplementary to maize. To clarify, the aim should not be to replace maize with cassava or any other crop, rather it is to diversify the diet of the farmers in a way that they consume different staple foods, but also add more other food such as vegetables and fruits to their daily diet. The current consumption habit is food insecure not just because they do not have access to food, but also because they prefer a one-sided diet based on maize. It is essential to extent the variety of supplementary food crops and therefore one need, on the one hand to change the mindset of the farmers and, on the other hand, to extend the farmers' knowledge about feasibly and promising plants and their agricultural practices.

With regard to the probability that maize harvests become more insecure due to climate change effects, cassava is offering a reasonable option to compensate for that as in contrast to maize it is insensitive to droughts and floods.

In summary, one can definitively draw the conclusion that maize is the decisive element of the farmers' food security perception in the Lilongwe District. However, there is no sufficient explanation by the farmers for why they have this strong focus on maize, since they could not list substantial arguments for their maize preference. Further, cassava currently contributes to the farmers' food security situation primarily as cash crop, rather than as a food crop. Although cassava is consumed by the farmers, it cannot compete with maize and is often used as instead as a reserve crop in case of famine, which, from an outside perspective, means that cassava does improve the food security situation.

7 Cassava Cash Crop

This final chapter covering this empirical study examines the role of cassava as a cash crop. It demonstrates how the processes of selling and processing are structured. Additionally, it illuminates the problems that these cassava farmers face and the advantages they see in cassava as cash crop. Finally, this chapter considers how the farmers assess cassava as a source of income, and how cassava as a cash crop influences the farmers' food security.

7.1 Selling Process of Cassava

All of the cassava farmers interviewed declared that they cultivate cassava as a cash crop. They explained that they sell their cassava raw (meaning unprocessed) and usually to middlemen, who were commonly described as vendors. Two farmers who participated in the one-to-one interviews added that they infrequently also sold their cassava to individual customers; four other farmers, with irregular access to a bicycle, also sold at the local markets.

The vendors own bicycles and pass through the villages, searching for farmers who want to sell their cassava roots. If the farmers need money and want to sell cassava, they try to arrange a mobile phone and call a vendor. When asked how they know the mobile numbers of the vendors, they answered that they know the vendors who come to their area. The common sales process and sales talk with the vendors takes place directly at the cassava plots. The famers inspect the cassava plants with the vendor and agree on a price. This happens before they harvest the cassava and, thus, before seeing the actual quantity and size of the cassava roots. When farmers were asked whether this leads to conflict, they admitted that when the quantity or size is too small, the vendors want to renegotiate the price. For this reason, they have started to first harvest one plant, set a price, and assume that the other cassava plants have the same quantity and size of roots. When asked why they do not harvest first and then decide on the price, the farmers answered that, if they cannot agree on a price, the farmer would likely lose his harvest, since it would be difficult to find another vendor before the cassava perished. The farmers explained that it is challenging to agree on a price, since they have no information about current price ranges.

During the focus group discussions, the farmers mentioned that it is actually the vendor who harvests the cassava roots and not the farmer. I was surprised by this, because I assumed that the farmer would do the hard labour. The farmers added that this is fair, in their point of view, because the vendors pay them a low price for the cassava, in comparison to what the vendors earn when selling the roots at the local markets. This confirmed the findings of the one-to-one interviews in which all but five of the consulted farmers indicated a *less satisfied* or *dissatisfied* relation to the vendors. Five of the 29 farmers of the one-to-one interviews said that they were *satisfied* with the vendors. The main charge of the farmers against the vendors was that the farmers felt exploited by vendors, because of the low prices they offer. The farmers would prefer to sell the cassava direct to the end user without any middleman. When the farmers were asked why they do not sell the cassava at the local markets by themselves, they responded that transportation was the main problem. However, even the four farmers who have infrequent access to a bicycle indicated that transportation was a problem, because it is exhausting to transport the roots with a bicycle on the sandy streets. One farmer had an ox cart and was, thus, able to transport his roots to the markets, but he preferred selling his cassava to the vendors, because it took a long time to sell the roots at the market or in residential areas. When I pointed out, during the farmer group discussions, that it seemed a suitable compromise, in my opinion, to divide the work within the famers, who plant the cassava, and the vendors, who transport and sell the cassava, the farmers disagreed, because in their opinion the vendors make more profit than they do.

When the interviewers and I were conducting the interviews, we observed one sale between a cassava farmer and two vendors. After they finished the purchase transaction, one enumerator asked the vendors whether they wanted to participate in a brief research survey. During this conversation, an enumerator translated between the vendors and me. When the vendors were asked how they would describe their relationship with the farmers, they responded that it is quite difficult, because the farmers assume that they take advantage of the farmers and exert downward pressure on the prices. They admitted that they achieve higher prices in the local markets and the residential areas, but the farmers fail to recognise that the vendors risk not selling the cassava in time; therefore, it is necessary to set a lower price with the cassava farmers to compensate for when they find no consumers. Further, the vendors also have to invest money in their

bicycles, which often need repair. Additionally, being a cassava vendor is hard labour, because they have to harvest the cassava and then transport it a long distance in the sun over sandy streets. Selling cassava at the local market or in the residential areas also takes a long time. The vendors added that the farmers know that and are actually content having the vendors do the hard work for them. The vendors did not understand why the farmers did not appreciate the work they do, which actually also benefits the farmers. Further, the vendors said that they often have problems setting a price with the farmers, because the farmers assume the vendors are exploiting them. The vendors said that they think the farmers have misconceptions about what vendors earn from selling cassava, and the farmers do not understand, or ignore, the risks and expenditures for which the vendors have to compensate. Finally, the vendors added that being a vendor was the only occupation they could pursue, without their own plot or an education. This is the only option for them to generate income in this rural area. When asked what would improve this situation, the vendors responded that a better price and market information would prevent false accusations by the farmers, since the farmers know that the vendors re-sell the cassava, but do not know the price. This statement was confirmed in the evaluation of the one-to-one questionnaires, in which the farmers responded that they knew that the vendors sold the cassava at the local market or in residential areas, but not the 'new' price. However, they expected that the new price was much higher.

The one-to-one questionnaire contained questions about the size of the cassava fields, the amount of cassava the farmers produced, how much they sold and the price they achieved. These questions were included in the one-to-one questionnaire to understand the extent to which cassava was a cash crop. However, when analysing the questionnaire, it was not possible to draw any conclusions from the answers given.

First of all, it was not possible to determine the quantity of the cassava harvest, since the farmers and vendors have no access to scales, which would determine the actual weight of the cassava roots. One of the farmers interviewed declared her cassava harvest in kilograms; other farmers declared how many cassava plants they sold to the vendors, or how much money they got for selling the whole cassava plot. Thus, it is not possible to compare the different prices or determine the average price of cassava, since one cannot determine the specific amount of harvest of the different cassava trees. Furthermore, the

farmers were not able to give the price of cassava in previous years or to say how high their income was from selling cassava.

Second, when analysing the famer's answers to the questions about the annual cassava prices and how much cassava they sold in a year, they often responded with the annual price of a single cassava plant and, instead of how much they sold in kilograms or number of plants, they responded with what they earned for selling the whole cassava plot (see Appendix A, p. 132, questions 33 and 35). When comparing these two answers, the quantity of plants the cassava farmers would have needed to sell, in order to achieve the reported income, is not realistic, based on the plot sizes indicated (see Appendix A, page 131, question 7).

This suggests that the cassava farmers do not have a comprehensive view of their previous cassava profits and that they do not calculate potential cassava income for the upcoming season. They do not have an overview of the expense of planting cassava or a calculation for the necessary price they need to achieve for a positive profit margin. However, in this specific Malawian context, it is almost impossible to calculate properly, since there are too many variables that the farmers cannot influence, foresee, or access relevant information about, such as price fluctuations, price and availability of cuttings, and actual crop yield.

7.2 Cassava Processing

Two of the interview locations were close to cassava factories, where cassava was processed into flour (or HQCF) and starch. Both cassava processors offered me a tour of the factory. Since they were also cassava farmers and spoke English, I conducted the interviews with them myself. Both processed sweet varieties, since the farmers close to the factories preferred the sweet varieties.

Cassava can be easily processed to HQCF or starch. These are used as ingredients in a wide range of other processed products, such as glue, pharmaceuticals, glucose syrup, papers, and bakery products. Cassava flour can replace 10-30 % of regular wheat flour without any difference in the end product, replacing a largely imported good with a local, processable, and therefore value generating, product (C:AVA 2018).

Processing Cassava into High Quality Cassava Flour (HQCF)

Cassava can be left for a long time in the soil for storage, but when harvested, it needs to be processed within one or two days to ensure a high quality. After the harvest, the cassava is checked and sorted for quality and then peeled, as the first step of the production process. This reveals the white pulp of the roots and they are washed. Then, the clean cassava pulp is ground to small pieces in a cassava grater driven by a diesel engine, due to a lack of electric power supply, as shown in Picture 6. All of these steps are usually done by hand, generating jobs and, thus, the opportunity for income for unskilled workers. Because the visit took place when the factory did not produce HQCF, no current processing could have been photographed.

Picture 6. Cassava grater and diesel engine (left), and view into the grater (right) (source: author)

After the cassava has been cut into small pieces, two drying steps take place. The first step is mechanical; water is squeezed out of the cassava mash by a large manual press. Thereafter, the cassava is put in permeable bags and stapled with the machine shown in Picture 7 (left). The bags are then covered by wooden boards to equally distribute the pressure generated by the manual press gear (screw press). After most of the water has been squeezed out of the cassava pieces, they are scattered in a thin layer on drying tables in the sun, as shown in Picture 7 (right).

Picture 7. Cassava press (left) and drying station (right) (source: author)

This step is followed by the final milling, in which the coarse-grained cassava is turned into cassava flour. If this process is done properly, meaning that no fermentation has taken place, high quality cassava flour can be packed into bags for delivery or sale (see Picture 8). These process steps can be completed within one day.

Picture 8. HQCF (source: author)

Processing Cassava into Starch

When processing starch from cassava, the first steps are the same: harvesting, sorting, peeling, washing, and grinding, but instead of the subsequent drying process, the cassava pieces are watered and wrung out in a tub. This process washes the starch from

the fibre. The particulate material is separated from the liquid using a textile filter. Both steps are shown in Picture 9.

Picture 9. Processing cassava starch

The starchy liquid then slowly flows through wide canals. This reduces the speed of the flow over a distance, so that the starch can separate and sink to the bottom of the canals (see Picture 10 and 11).

Picture 10. Starch settling tanks

After finishing this process, a layer of starch can be recovered from the canal floor.

Picture 11. Cassava starch

After this procedure, the starch is sun-dried and, finally, packed for sale.

Statements of the Processors about Cassava as Cash Crop

Both cassava processors process sweet cassava and evaluated processing sweet cassava as profitable, although the profit margin was higher with bitter varieties. However, both processors clarified that the sweet varieties are currently a better crop for the farmers.

As demonstrated, processing cassava into flour or starch is not a complicated process; most of the steps can be done manually. One main challenge is the purchase of a diesel engine, grater, and mill, but after these machines have been funded, their maintenance can be done by the farmers and they need have no further cost. Thus, the two processors evaluated cassava as a promising cash crop for the farmers, since they can also participate in and benefit from the creation of value through the processing. Cassava factories are easy to run, which is promising to the spread of cassava processing in the rural areas of Malawi.

One processor said that until a few years ago even Carlsberg used cassava starch for brewing its beer in Malawi. However, the main challenge is to connect all actors in the cassava value chain. Cassava flour and starch are in high demand in Malawi, since it is cheaper to use locally processed cassava flour or starch than expensive imported products. However, the processor further explained that the cassava processors generally claim that the farmers do not produce enough cassava, while the farmers claim that they do not find suitable cassava buyers. The market potential is there, but the different actors need a platform where they can meet and coordinate the cassava value chain. In the opinion of the two processors, this is the main barrier to implementing a functioning value chain, from which the farmers can also benefit.

7.3 Evaluating Cassava as Cash Crop by the Farmers

The approach of planting cash crops to increase farmers' income is not new in Malawi. Tobacco is Malawi's oldest and most widely used cash crop and is exported worldwide. Additionally, the majority of Malawian famers plant tea and sugar as cash crops for export. Since the farmers produce primarily for export, they are heavily dependent on the international market. If prices fall or demand is satisfied, the crops become worthless to the farmers.

The farmers who participated in this study cultivated cash crops like tobacco, groundnuts, or soybeans, in addition to sweet cassava. When the farmers in the focus group discussions were asked about the advantages of sweet cassava, in contrast to the other cash crops, the first key advantage of cassava emphasised was the ability to use cassava as a food crop. Although cassava is not perceived by the famers as a food crop equivalent to maize, they consume cassava on a weekly or daily basis and value cassava as famine reserve crop. Thirteen of the 29 farmers of the one-to-one interviews also infrequently sell the surplus of their maize harvest which they do not need for their own food demand. They stated that they only sell maize when they had a rich harvest which provided them a surplus over their own food needs. However they added that maize is not a lucrative crop and they wouldn't cultivate it with the purpose of a cash crop. Sixteen of the interviewed farmers cultivated maize as food crop only, as it is not profitable as cash crop for them. This confirms that cassava is the only crop which is used mainly as cash and food crop. Additionally the farmers of the one-to-one interviews cultivated groundnuts and soybeans as cash crop. These are more lucrative on the one hand as sweet cassava but are not able to contribute as a food crop in the same way as sweet cassava can, and therefore make them more market dependent (see Figure 10).

	Food Supply *[kcal/capita/day]*		
	1993	**2003**	**2013**
Sweet Cassava and Products	34	114	147
Groundnuts (Shelled Eq)	11	56	70
Soybeans	0	4	16

Figure 11. Food Supply from Farmers' Cash Crops (FAO 2017b)

This low contribution of groundnuts and soybeans to the food supply might be explained by the fact that the farmers are unfamiliar with the handling and preparation for food of soybeans and groundnuts. Figure 10 shows that all of these crops increased their share of calorie intake within the last two decades; however, the farmers interviewed only attributed the promising dual usage as a cash and food crop to cassava.

Further, the farmers explained that, unlike cassava, they are not familiar with groundnut or soybean cultivation or post-harvest handling. For example, the incorrect handling of groundnuts will lead to an attack of the fungi *Aspergillus flavus* or *Aspergillus parasiticus*, which produce the mycotoxin *aflatoxin*. Regular and long-term

consumption of aflatoxin-contaminated food causes malnutrition, immune suppression, liver damage, and growth disturbance in children, while high-level absorption can be deadly (ICRISAT 2016, 1f.). This high aflatoxin level is a serious problem for the export market, since the policies about the permitted aflatoxin level are strict on the international market. This has already led to a sharp decline in the Malawian groundnut export (Gourichon, Cameron and Pernechele 2017, 6). Thus, the farmers need external advice to handle groundnuts and soybeans correctly.

Furthermore, the farmers said that cassava offers them more market options than the other cash crops. It was easy for them to find a buyer for their cassava root, but access to buyers of tobacco, groundnuts, and soybeans are very limited, since they cannot be easily sold in the local market. The farmers need external help to arrange sales contacts.

Thus, the advantages of cassava include the long-lasting experience with cultivation and the use of cassava as staple food; farmers are not necessarily reliant on people showing them how to cultivate and harvest the crop or connecting them with markets. Cassava gives the farmers a kind of independence, because they can decide by themselves what to do with their cassava.

According to the farmers, the low price is the only disadvantage of cassava as a cash crop, in comparison with the other crops. However, the unpredictability of future prices and large price fluctuations also affect the other cash crops, like tobacco, groundnuts, and soybeans.

7.4 Cassava's Impact as Cash Crop of the Famers' Income and Food Security

When the farmers in the one-to-one interviews were asked whether cassava was an important crop for them, 23 farmers responded that it is a *very important* crop and six that it is an *important* crop, because it is their main source of income and provides a steady income throughout the entire year. When asked whether cassava is a profitable crop for them, one farmer said it was not and explained that the vendors' prices were too low. The other farmers responded that cassava was a profitable crop for them. Although cuttings can be expensive, they are the only input the farmers need to purchase; thus, they do not have the other agricultural expenses, like fertilizer, needed for other crops.

Although it is not possible to analyse how much income the farmers generate from cassava, chapter 5.2 presented what the farmers funded through their cassava income: school fees, bricks for the house construction, medical bills, and so on. Even though the farmers did not have a structured cost-benefit balance, they could identify what has changed for them after cultivating sweet cassava and therefore assessed cassava as a profitable crop for them.

As mentioned in chapter 5.2, the evaluation of the farmers' one-to-one questionnaires demonstrated that the income generated by cassava is used to buy maize and maize inputs. The question "Do you use your income which was generated through cassava for purchasing maize and/or maize agricultural inputs?" was integrated in the interview guide for the focus group discussions (see Appendix A, p. 134). In the focus group discussions, the farmers affirmed the result from the one-to-one interviews that they usually use the income generated through cassava for buying maize. The farmers explained, when asked if cassava is essential for their food security, that it was very important, because they could buy maize for home consumption and agricultural inputs for their maize cultivation with their cassava income. They often sell cassava in November or December, just in time for the maize sowing, to fund maize-planting materials and further agricultural inputs for maize cultivation, like chemical fertilizer, which increases the maize yield.

8 Conclusion

The purpose of the thesis was to analyse how cassava affects the farmers of the Lilongwe District of Malawi, how they use cassava in their daily lives and why they chose to cultivate cassava. The thesis presents the benefits and importance of cassava as a food and a cash crop for farmers and further illuminates the relation between cassava and the farmers' food security. Thereby, the thesis focuses on the specific awareness of food security by the farmers.

Therefore, the first part of the empirical study examined the current cultivation conditions of cassava for the farmers in the Lilongwe District and illuminated the farmers' motives for planting cassava. In this analysis, the aim was to assess the benefits and limitations of cassava and investigate how the farmers evaluate the different features of the sweet and bitter varieties of cassava. The second part of the empirical study considered the role and importance of cassava as food crop for the farmers in the Lilongwe District, and how cassava is integrated into the farmers' eating habits. Additionally, this section outlined the role of cassava as perceived by the farmers. It further discussed how the farmers described food security, to what extent cassava contributed to it, and where its limitations lay. The third and final empirical section focused on cassava as a cash product in the rural areas of the Lilongwe District. It investigated the selling process, the problems that farmers face in the selling cycle, and how cassava is processed in the region. This thesis further analysed the impact of cassava as a cash crop on the lives of farmers and how the farmers evaluated cassava’s potential and limitations as a cash crop.

One of the key finding of the study was that cassava is used by most of the farmers interviewed as a food and a cash crop, and that it is first and foremost cultivated because of that dual purpose. Even though it is more important for the farmers as a cash crop, the additional usage as a food crop is crucial for the farmers' decision to cultivate cassava. This is also presented in the findings, since nearly all of the interviewed farmers use cassava equally as food and cash crops. In comparison with other crops, cassava is the only crop that the majority of farmers assigned to both categories. This attribute is one of the key advantages of cassava, since it provides the farmers with two possibilities, whereas they indicated that other crops offer only one. In the Malawian

context, this is highly significant, since unpredictable external influences, such as strong price fluctuations, local food supply or weather events, have a strong impact on general access to food and the specific value of crops. Through this special characteristic of cassava, farmers are able to use cassava as a food or cash crop, whichever is more suitable for them at the specific moment.

Cassava as a food crop is primarily considered by the farmers as a famine reserve, because it can be stored by simply not harvesting it for up to two years; thus, it facilitates farmers' access to food whenever they need it. However, the findings demonstrate that cassava is also consumed by farmers on a weekly or daily basis, as snack or main dish. Although they prefer to keep it in the ground, as a kind of food and cash reserve, the data reveal that it is an integral part of their diet. Nevertheless, the research results clearly state that the exclusive essential component of the farmers' diet is maize.

The second major finding was that the farmers' awareness of their food security situation is based exclusively on the availability of and access to maize. Their perception of food security depends on whether they can consume their traditional dish *nsima* (maize porridge). Thus, the findings imply that the farmers' eating habits influence their subjective awareness of food security. Evaluating the influence of cassava on this subjective awareness of food security showed that cassava, as a food crop, does not significantly affect the farmers' subjective food security awareness. Thus, the availability of and access to cassava, or any other food, does not influence their definition of a positive food security situation. Even with access to their cassava reserve, they would describe their situation as food insecure, without access to maize. This demonstrates the great significance of individual eating habits on the specific awareness of food security and, further, points out how important it is to analyse and understand site-specific and culturally variable eating habits and their possible impacts on a local understanding of food security. Food security should be considered a subjective and social construct, rather than as a universally valid and definitive term. I argue that the different food consumption habits have a strong influence on the awareness of food security. In the Lilongwe District maize is elementary for the daily food supply and this is also reflected in the farmers' awareness of food security, which, in their perception, just depends on their access to maize. However, analysing the

findings, I draw the conclusion, that cassava has an essential impact on the famers' food security. Firstly, as a food crop, due to its function as a famine reserve crop. Analysing the data one can assume that cassava is more common in the farmer's daily eating habits as they would indicate, since cassava is integrated significantly in their eating habits. Secondly, cassava influences the farmers' food security situation indirectly as cash crop, since it facilitates the farmers to purchase maize.

The use of cassava as a possible cash crop is a crucial attribute for the farmers' decision to cultivate it. The data indicate that cassava's feature of a flexible harvest time is also a decisive factor for its potential as a cash crop, as well as food crop, since it enables the farmers to harvest when they need money or when a profitable price is offered. The study reveals that it is easy for the farmers in Lilongwe District to find markets for their cassava. One market option is offered by the local market. Although maize is the main staple food in Malawi, cassava is frequently consumed by Malawians in the district and, thus, local markets offer the farmers a selling option. The second market option is the cassava industry, which processes cassava into flour or starch. For example, cassava processed into flour can be used to replace expensive imported wheat flour and used for pastries, and the Malawian branch of Carlsberg brewery had used starch made from cassava for brewing beer. Although these promising industrial markets for processed cassava exist, the research conducted illustrates that different actors in the value chain did not manage to establish a functioning supply chain, which destabilized the market situation. Processors were not able to continuously source enough cassava to fulfil demand, while the farmers did not find access to processors to sell their cassava. Moreover, the research demonstrated that the processing of cassava is uncomplicated, requiring only simple and robust machinery. Therefore, it is also advisable to establish the cassava processing industry in rural areas, which provides further opportunity for unskilled workers and increases the value of cassava in the region.

When evaluating cassava as a cash crop, the data present cassava as a profitable and important source of income for the farmers. The data show that income generated though selling cassava enables the farmers to purchase maize for home consumption and agricultural inputs for planting maize, such as maize seed or fertilizers. Thought the farmers assessed maize as the only element essential for their food security, cassava contributes indirectly to the famers' food security, even if as a cash crop, rather than as a

food crop. Thus, this third mayor finding identified cassava, through its function as cash crop, as a crucial contributor to the farmers' subjectively perceived food security situation. Although it is, generally speaking, not clear how income and food security interact with each other, the findings for the specific case of the farmers of the Lilongwe District indicates that their income affects their specific food security situation.

To summarize the key findings, the positive evaluation of cassava by the farmers is based especially on its possible usage as a food crop and a cash crop with an outstandingly long harvesting period. This facilitates the farmers' decision about which type of use will benefit them better, making them quite independent market actors. They can decide freely whether they want to use it as a food crop or a cash crop and, even as cash crop, they can further decide whether they want to sell it to individual consumers as a food crop on the local market, or to processors to be used as industrial product. Furthermore, the farmers of the Lilongwe District are familiar with cassava and know how to cultivate and use it and, therefore, they do not depend on external help. Thus, cassava provides the farmers with a certain kind of independence.

To be able to apply this special advantage of cassava as a food and cash crop, the specific variety of cassava plays a decisive role, since the sweet and bitter varieties have essential differences. The study shows that bitter varieties were not consumed by the interviewed farmers and the local population of the Lilongwe District, as these must be prepared for consumption due to the hydrogen cyanide content. Thus, the bitter varieties are not suitable as a food crop for the farmers of the Lilongwe District. The farmers consequently prefer to plant sweet varieties, since they can use them for their own food consumption. The research additionally shows that the sweet varieties are a profitable good on the local market, since the local population has integrated the sweet varieties into their usual consumption habits. For farmers, this easy market access clearly prevailed over the disadvantage of the lower starch content of the sweet varieties and their lower prices at the processor market.

However, current developments that promote cassava in Malawi, initiated by development aid associations or projects like C:AVA, focus on the bitter varieties, since these are more profitable as an industrial product for processing flour or starch. Although they are better for processing, my data indicate that they impel the dependence of the farmers on the industry, since bitter varieties cannot be sold at the

local market to individual consumer. The farmers of the Lilongwe District are not familiar with processing the bitter varieties into food. Thus, when turning to bitter varieties, the food crop aspect and the ability to sell at the local market would be lost and the farmers would become dependent on a limited number of cassava processors as suitable buyers. This dependency and its consequences can be observed in the case of Malawian tobacco farmers, who are strongly dependent on international tobacco companies and have no option other than to sell to them. Consequently, it is important for cassava farmers to maintain this special advantage of sweet cassava, utilize it for their needs and ensure their independency.

Final Words and Outlook

The thesis demonstrates that it is necessary to analyse food security at the different localities since it varies significantly within the different regions. Finally, the case study approach was very suitable for my research since it enabled my research to include and consider the different and important opinions of the farmers. Thus, I would argue, that the case study approach is very recommendable as basis for development cooperation strategies. These strategies often have a too undifferentiated approach which does not consider the unique local habits.

During my time in Malawi, and through the numerous experiences and conversations with the farmers of the Lilongwe District, I received the impression that cassava is a crop that is deeply rooted in Malawian culture and highly appreciated by the population. Although Malawians often neglect the actual importance and dimension of cassava in their lives, because of their close focus on maize; it is, nevertheless, clearly a crucial element in and basis for their livelihood. Cassava is currently the only crop that is cultivated by the farmers as both a food and a cash crop and assessed as promising in both functions. Thus, it provides the farmers with a unique chance to stabilize and improve their food security and income situation. This appreciation by the farmers also makes cassava a promising crop for development cooperation.

Although the study did not evaluate whether cassava is overall a profitable crop, my findings clearly indicate that cassava is strongly support by the farmers and the population. This acceptance by the local population is, in my opinion, essential for developing and implementing a successful development strategy, since it would be very

likely to be adopted and supported by the locals. My findings indicate that cassava was chosen independently by the local Malawian population and support of this implementation through development cooperation would strengthen a bottom-up approach, which highly increases the chance that the impact of a development project outlasts its own narrow timeframe.

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Appendix A - Questionnaire One-to-One Interviews

Questionnaire Farmer's One-to-One Interview:

1. When did you start working as a farmer?
2. What is the size of your cultivable land?
3. Which crops do you plant?
4. Why do you plant **bitte**r cassava varieties?
5. Why do you plant Maize?
6. Which **sweet** cassava varieties do you plant?
7. What is the size of your **sweet** cassava varieties plot?
8. If the size was varying within the last 4 years, on what did the size depend?
9. How much **sweet** cassava (in kg) did you produce in 2016? On which land size did you plant it?
10. What are the advantages of the **sweet** cassava comparing to the **bitter** varieties?
11. What are the disadvantages of the **sweet** cassava comparing to the **bitte**r varieties?
12. What are the advantages of **sweet** cassava comparing to **Maize**?
13. What are the disadvantages of **sweet** cassava comparing to **Maize**?
14. Which cuttings do you use?
15. Have you ever used improved cuttings?
    a. If yes, why?
    b. If no, why not?
16. Do you have difficulties to get new cuttings?
        i. If yes, which problems?
17. From where do you get the cuttings?
18. How often do you use new cuttings/planting material? *(not your own cuttings)*
19. Would you invest money in improved planting material/cuttings, if this increases your yield?
        i. If no - Why not?
20. Are you using any inputs? (e.g. fertilizer)
    a. If yes – Which one? Why are you using it? From where do you get it?
    b. If no:

i. Why not?

ii. Would you invest money in fertilizer if this increases your yield?

a) If no, why not?

21. When (which year) did you start planting **sweet** cassava varieties?
22. If they started recently (after 2010) -->

    What has changed that you started to plant **sweet** cassava varieties?
23. Why do you plant **sweet** cassava varieties?

Food Crop Section:

24. How frequently do you consume **sweet** cassava varieties?
25. How do you eat it?
26. Which products made of **sweet** cassava varieties do you know?
27. If the farmer does not use cassava as cash crop: Why don't you sell **sweet** cassava varieties?

Cash Crop Section: (if not relevant, continue page 10)

28. In which form do you sell your **sweet** cassava?
29. Where are you selling your **sweet** cassava?
30. How far is this place from your land/plot? (distance or minutes (walking, cycling etc…))
31. How do you get there? (Means of transport)
32. When are you selling your sweet cassava?
33. How was the price for **sweet** cassava per kg in that month (32.)?
    a. This year 2017: _____
    b. 2016:_____
    c. 2015:_____
34. How do you set the price for your sweet cassava?
35. How much (kg) **sweet** cassava varieties did you sell in
    a. 2016:_____
    b. 2015:_____
36. To whom are you selling your **sweet** cassava?
37. How satisfied are you with the person (vendor/processor) who buys your cassava?

38. Why did you choose this state of satisfaction? What can be improved – what works good?
39. Do you know what happens to the **sweet** cassava which you have sold?
    a. If they answer: "Will be sold again" →
        ii. Where do they resell the sweet cassava?
        iii. To whom do they sell the sweet cassava?
        iv. Do you know the 'new' price?
        v. Why don't you sell it there?
40. What are the challenges/restrictions when selling the **sweet** cassava varieties?
41. How important are **sweet** cassava varieties for your income?
42. Are **sweet** cassava varieties a profitable product for you?
    a. If yes, why?
    b. If no, why not?

End questions 'Cash Crop'- section

43. Do you want to increase the size of **sweet** cassava varieties cultivated land?
    a. If yes, why?
    b. If no, why not?
44. What needs to change that you would grow more **sweet** cassava varieties?
45. What are your problems with **sweet** cassava varieties / as a cassava farmer?
46. Do you have solutions for your problems? What would help you?
47. Is there something else you would like to tell me about sweet cassava varieties?

Appendix B - Interview Guide

Interview Guide for Focus Group Discussion:

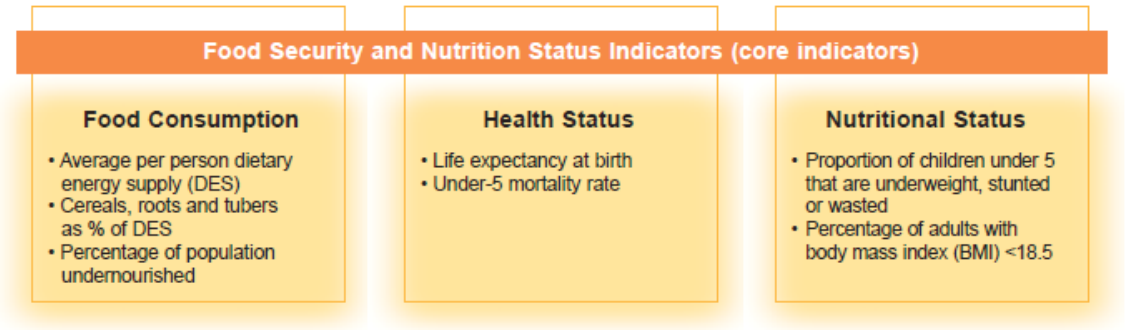
- What is food security for you? How would you describe it?
- Why do you prefer Nsima? Would you prefer to eat a more diversified diet?
- Why do you plant sweet cassava varieties?
- Is cassava an essential factor for your food security?
    - Why/Why not?
    - How does cassava influence your food security?
    - Do you use your income which was generated through cassava for purchasing maize and/or maize agricultural inputs?
- How important is cassava as food crop for you?
- How do you use it? (Famine?)
- How important is cassava in relation to maize for you?
- Are you sometimes hungry and has nothing to eat?
- Which other cash crops do you plant?
- How do you evaluate cassava in comparison with the other cash crops? What are the advantages and disadvantages of cassava?
- Do you use your income which was generated through cassava for purchasing maize and/or maize agricultural inputs

Interview Guide for Cassava Processors:

- Which cassava varieties do you buy?
- What is the difference between bitter and sweet varieties?
- What are the advantages of the sweet cassava comparing to the bitter varieties?
- What are the disadvantages of the sweet cassava comparing to the bitter varieties?
- Which do you prefer? Bitter or sweet? Why?
- Where and from whom do you buy the sweet cassava varieties?
- How was the price to buy sweet cassava varieties in
    - 2017:_____
    - 2016:_____
    - 2015:_____
- How much sweet cassava are your processing in one year? (kg)
- What are you processing - what is your end product?
- How much (kg) of your end product are you processing in one year? (kg)
- Why do you process this amount – and not more or less?
- Is sweet cassava a profitable product for you?
- What are your problems as a cassava processor?
- Do you know solutions for these problems?
- Do you have contact / business agreements with other actors of the Cassava Value Chain?
- Yes - with whom and how does it work?
- No - why not?
- Do you know other processors who use sweet cassava varieties?
- Do you think you will earn more money with sweet cassava varieties in the future?
- If yes, why?
- If no, why not?
- Is there something else you would like to tell me about sweet cassava varieties?

Appendix C - Monitoring Progress on Food Security

Seven core food security and nutrition indicators:



Fourteen additional indicators: