University of Reading

Graduate Institute of International Development and Applied Economics

Vulnerability to food insecurity among Maasai pastoralists in Kenya: Is there a future for pastoralism?

Verena Donislreiter

Dissertation prepared in partial fulfilment of the requirements for the Masters of Science in Applied Development Studies

29th September 2015

Acknowledgements

Firstly, I would like to thank the members of YISOG who allowed me to work with them in Kenya and shared their expert opinions with me. In particular, I would like to thank Father Tito David Parmuat and Peter Waweru for the precious time and great effort they have devoted. Also, I wish to acknowledge the genuine commitment of translators who facilitated the communication with interviewees. At this point, I would also like to thank all participants of this research again who opened up and shared their thoughts, problems and aspirations with me.

My special thanks are extended to my supervisor Dr Eleanor Fisher for her guidance and advice. I am deeply grateful for all her comments and suggestions which were invaluable during the process of this dissertation. Also, I would like to extend my deepest gratitude to the members of the Stanley Howard Hodgkin committee for nominating me for a scholarship.

Moreover, I wish to acknowledge all my lecturers at the University of Reading who have fundamentally changed my way of thinking and contributed to the outcome of this dissertation. I am deeply grateful to my fellow students who accompanied me during this journey and have become special friends.

I would also like to thank my friends at home in Germany who stood by me during the many ups and downs and of course, my parents and sister for their overwhelming understanding and wholehearted support throughout my study.

Content

List of boxes

List of figures

List of tables

Acronyms and abbreviations

= Number

DDS = Dietary Diversity Score

FAO = Food and Agricultural Organisation of the United Nations

GBP = Great Britain Pound

IPCC = Intergovernmental Panel on Climate Change

KSH = Kenyan Shilling

NGO = Non-governmental organisation

Summary

The aim of this dissertation is to explore food insecurity in terms of dietary diversity among Maasai pastoralists in Kenya and determine vulnerability to food insecurity by investigating the combined forces of stresses and risks, and the capacity to cope with them. Whether subsistence pastoralism will endure as a livelihood strategy to ensure future food security will be of particular interest.

Thus, this research recognises food insecurity as a dynamic and forward-looking concept influenced by changes, risks and stresses which are often neglected in food security studies. After a review of relevant academic literature, qualitative primary research was conducted in Kajiado County in the South of Kenya in order to capture the perceptions of pastoralists and anchor the research in a specific context.

The main findings of this dissertation are that food insecurity in terms of dietary diversity is high across wealth levels and positively correlated with wealth and engagement in farming, thus implying that access to food is the main obstacle to a diverse diet. When it comes to stresses and risks, prolonged drought, wildlife conflict, livestock diseases, market access, price volatility and increasing involvement in the cash economy are found to pose major challenges to pastoralists. At the same time, restricted income opportunities and limited access to resources are among the factors that impede the capacity to cope with these stresses and risks.

This interplay translates into high vulnerability to food insecurity which is manifested in decreasing numbers of livestock holdings. Coupled with the negative perception of pastoralists on the future viability of subsistence pastoralism, these findings paint dismal prospects for pastoralism as a sustainable livelihood strategy for food security.

Word count: 13,967 words

Chapter 1: Introduction

This dissertation will explore vulnerability to food insecurity among Maasai pastoralists in Kenya and seek to determine whether pastoralism can endure as a livelihood system and ensure food security in the future. This chapter provides background information on the topic area of the research before the specific research objectives and its approach are laid out.

1.1. Background

Hunger is one of the world's greatest challenges with an estimated 925 million people suffering from hunger (Foresight, 2011). The Millennium Development Goals established halving global hunger from 1990 to 2015 as their first target but only little progress has been made in many regions of the world (Foresight, 2011). In Kenya, for instance, the prevalence of underweight children under five years of age, which is one of the indicators used to measure the progress of this target, has only reduced from 22.3% in 1990 to 20.3% in 2009 (GoK, 2013).

The concept of food insecurity intersects with hunger but also captures other factors such as "hidden hunger" which refers to micronutrient deficiency (Kennedy et al, 2003). The FAO (2002) offers a comprehensive definition of food security which includes the importance of nutritional value and is widely used and accepted today:

> "Food security [is] 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, 2002:49)

This conceptualisation of food security has undergone a long evolution in the past decades which stands in contrast with the persistently high number of hungry people in the world. The following section will elaborate on the recent history of food security theory and scholarship.

1.1.1. Evolution of food security concepts

In the 1970s, food security entered the development jargon but mainly evolved around food availability at the national level (Young, 2012). Insufficient food supply was the primary concern at that time which was influenced by Malthus' theory (1798) on population pressure and food scarcity. After the Green Revolution brought about food supply spikes in the course of the decade but hunger persisted, Amartya Sen (1981) introduced the entitlement approach to food insecurity. His seminal work prompted a paradigm shift from the "food first" approach to food access and focused more closely on the household level. According to Sen (1981), people's entitlement to food depends on their endowments and how these can be used to acquire food.

This conceptualisation of food insecurity lead to a more comprehensive perspective on livelihoods but still missed important factors such as intra-household differences. Furthermore, food insecurity was primarily conceived in terms of food quantity instead of quality with calorie intake being the main measurement tool (Maxwell and Smith, 1992).

In the early 1990s, the issues of food utilisation and nutritional value entered the debate and with them, the use of new indicators such as micro-nutrient intake which are more concerned with individuals than aggregate households (Coates, 2013). It was realised that people can be food insecure without being hungry and consequently, the concept of "hidden hunger" which was referred to earlier in this chapter emerged (Kennedy et al, 2003).

At the same time, people's food preferences were acknowledged which recognises the importance of cultural food acceptability (Maxwell and Smith, 1992). How individuals experience and perceive food insecurity increasingly entered the debate in the 1990s, following the recommendations of Maxwell and Smith (1992). This conceptual expansion led to a shift from solely objective indicators to the inclusion of more subjective measures to increase the validity of food security assessments (Baro and Deubel, 2006).

However, it was only recently that the temporal component in the FAO's definition given above shifted to the foreground (Coates, 2013). After Chambers (1989) and Maxwell and Smith (1992) highlighted the dynamic nature of food insecurity, risks and people's perception on those risks emerged as important elements in the food security debate. Thus, in addition to the three pillars of food security – food availability, access and utilisation – most definitions of food security have now formally adopted a fourth element which is stability (Coates, 2013).

Webb and Rogers (2003) propose that this fourth pillar is crucial in all three other dimensions of food security and links vulnerability to the concept of food security. This adds to the complexity of food security but recognises it as dynamic concept which is often neglected in food security studies (Webb and Rogers, 2003).

1.2. Rationale of this research

This research will focus on vulnerability to food insecurity among pastoralists which are identified as a highly vulnerable group due to their location in risk-prone areas (Bohle et al, 1994). Pastoralist livelihoods are complex systems based on livestock management which depend on freedom of movement "to maintain an optimal balance between pastures, livestock and people in uncertain and variable environments" (Nori et al, 2008:3). Thus, pastoralism lives from flexibility and therefore, the dynamic concept of vulnerability seems to be an appropriate approach for studying food insecurity among pastoralists. To avoid generalisations and appreciate pastoralists as a heterogeneous group, Maasai pastoralists in the South of Kenya were chosen as the sub-group under study.

The study aims to capture changes within this sub-group, ranging from pastoralists' diets to the capacity to cope with stresses and shocks which fits into the debate of stability as mentioned above. The central question of this research is whether pastoralism is capable of enduring stresses and shocks to ensure future food security. The specific research objectives will be outlined below.

1.3. Research objectives and questions

The main objectives of this research are to analyse food insecurity in terms of dietary diversity and to determine vulnerability to food insecurity by looking at the combined forces of stresses and risks, and people's coping capacity. The specific research objectives and questions are listed in the table below.

Table 1. Research objectives and questions

Objectives	Questions
1. Analyse food insecurity among Maasai pastoralists	Has the traditional diet based on livestock products changed? What is the prevalence of food insecurity measured in terms of dietary diversity? Are wealth levels correlated with dietary diversity? Is low dietary diversity perceived as food insecurity by pastoralists?
2. Explore stresses and risks that affect pastoralists' ability to ensure food security	Which stresses and risks are experienced by pastoralists? Do different households experience these stresses and risks differently?
3. Assess the capacity to cope with stresses and risks	Which strategies are employed by pastoralists to cope with stresses and risks? Will pastoralism as a livelihood strategy be capable of enduring stresses and risks and ensure future food security?

1.4. Research approach

In order to answer the research questions stated above, relevant academic literature was reviewed and qualitative primary research was conducted in the South of Kenya. The specific area under study is within Loitokitok division in Kajiado County, Kenya. As part of a 3-week placement with the community-based organisation YISOG, data was collected on their behalf and used for this study.

This context-specific approach appreciates heterogeneity among pastoralists and avoids the danger of gross generalisation. Furthermore, the perceptions of pastoralists themselves are captured in this way. The following section will provide background information on the study area and highlight the diversity within the country.

1.5. Study area

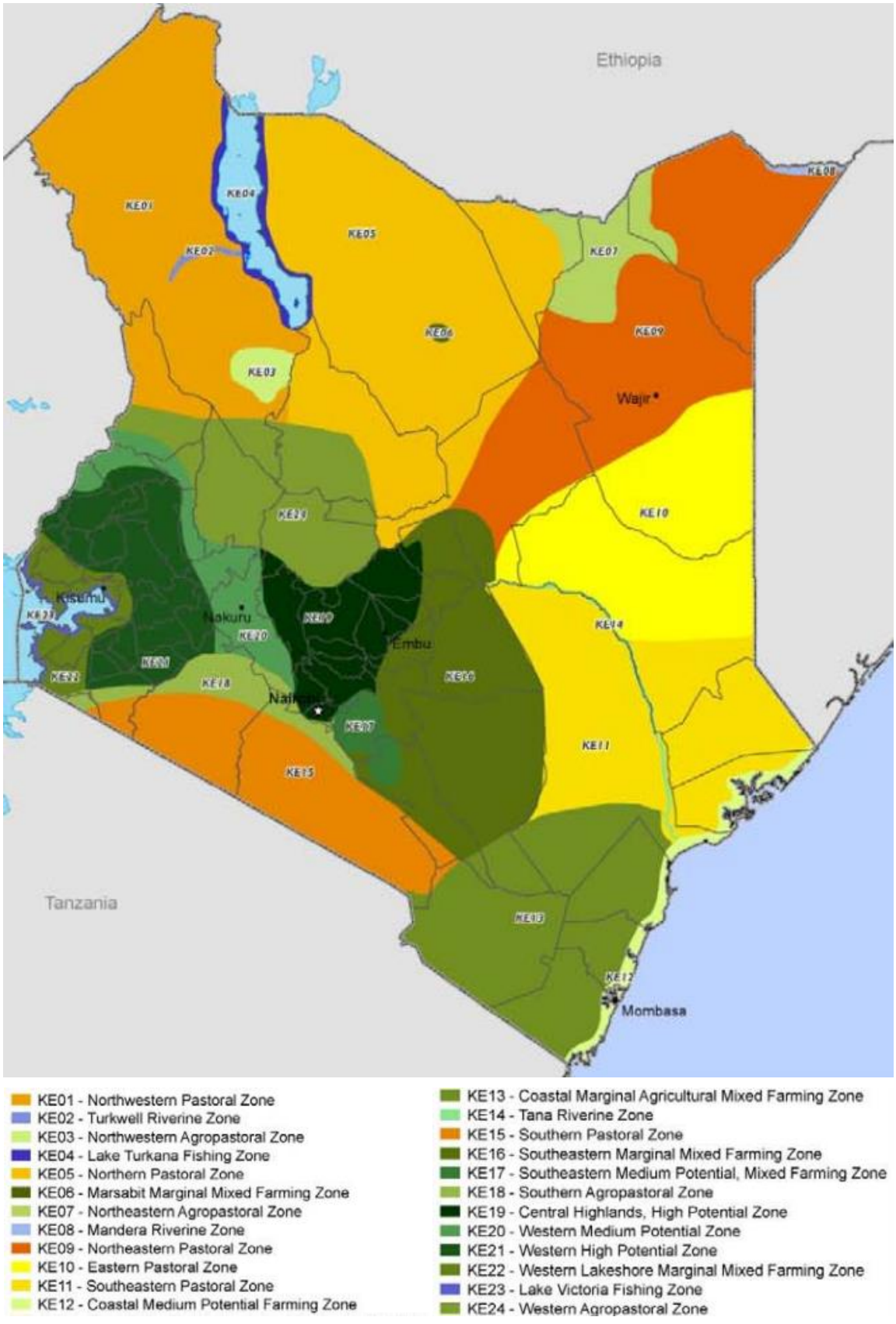
Kenya is located in East Africa and comprises a total population of approximately 44.9 million. This number has more than doubled in the past three decades and continues to grow (World Bank, 2015). The official languages are English and Swahili while numerous indigenous languages are spoken, such as Maa among the Maasai (CIA, 2015). After gaining independence from British colonial rule in 1963, the country became a republic which is currently headed by President Uhuru Kenyatta (CIA, 2015).

In recent years, Kenya has emerged as a lower middle income country and is considered to have high potential for economic growth and development (World Bank, 2015). However, as much as 45.2% of its total population live below the national poverty line[1] and income inequality as measured by the Gini coefficient is significant at 0.445 (Mwangi, 2013).

The diversity of the country is not only reflected in the different climates which range from tropical in the coastal region to arid in the interior of the country but also in the different livelihoods people pursue (CIA, 2015). As can be seen in the livelihood map of the Famine Early Warning System Network (FEWS NET, 2010), the Northern and Southern regions of Kenya are predominantly pastoral zones. In total, these zones are home to approximately four million pastoralists (Kirkbride and Grahn, 2008).

[1] The national poverty line for Kenya is at KSH 1,562 in rural areas and KSH 2,913 in urban areas per month per adult equivalent (Mwangi, 2013).

Figure 1. Livelihood Zones in Kenya

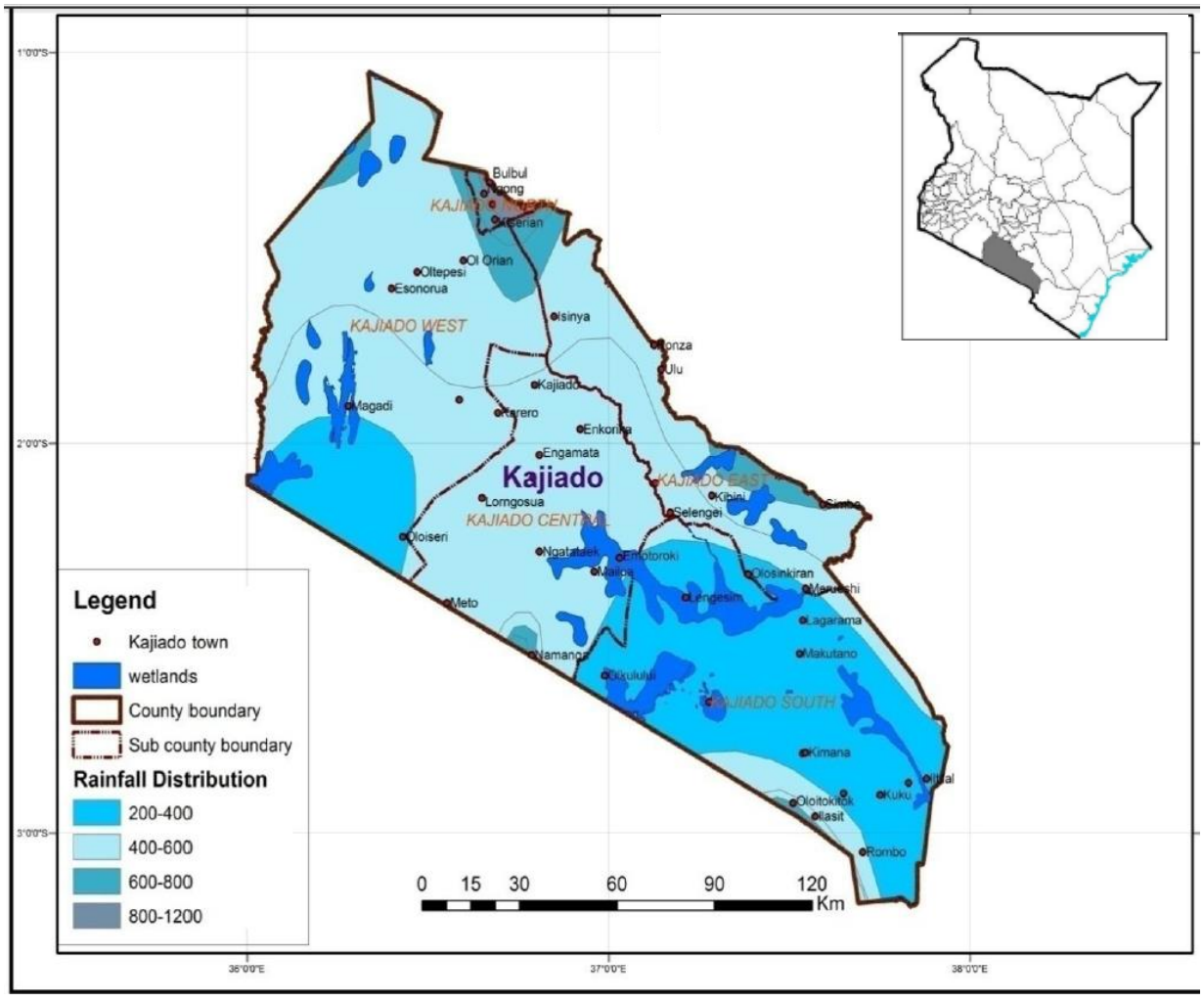


Source: FEWS NET (2010)

The area under study in this research is within the Southern pastoral zone, i.e. Kajiado County where 75% of the population practice semi-nomadic pastoralism while agro-pastoralism is increasing (GoK, 2014). However, only 16% of land in Kajiado County is currently arable according to a recent government report (GoK, 2014).

As can be seen in the figure below, rainfall varies widely within the county and ranges from 200 mm in the plain lands to 1200 mm at the slopes of Mount Kilimanjaro (GoK, 2014). As a result, land use strongly depends on rainfall patterns and cultivation is mostly practised on the more fertile soils at higher altitudes (GoK, 2014). The consequences of this on pastoralism will be discussed in chapter 2.

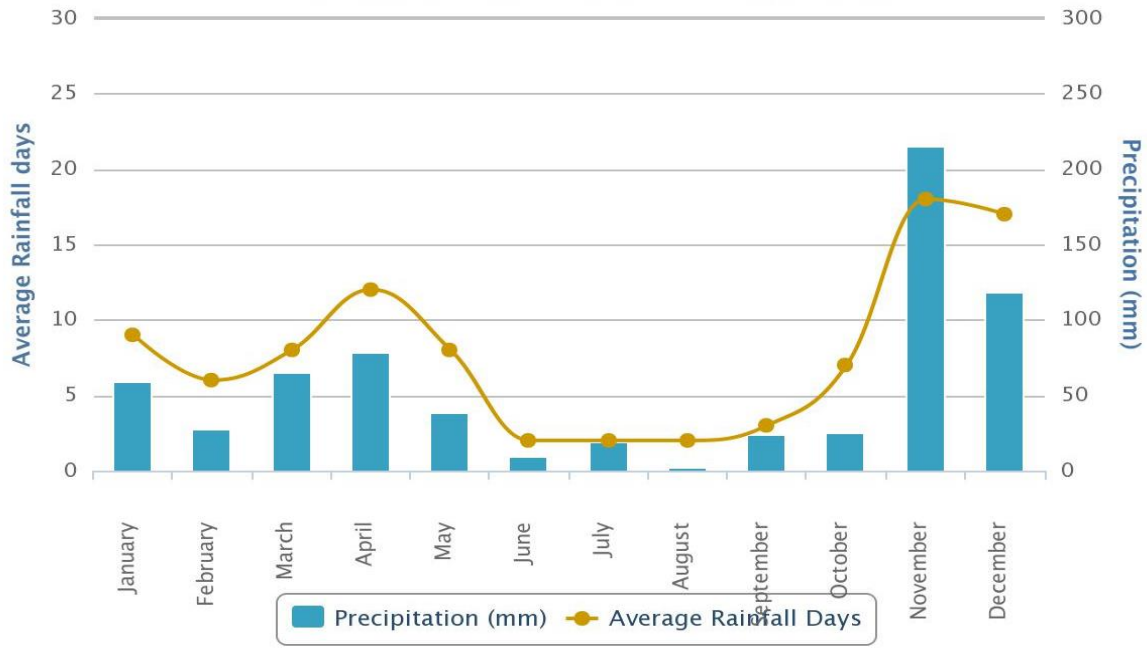
Figure 2. Rainfall distribution in Kajiado County, Kenya



Source: GoK (2014)

Rainfall does not only vary across areas but also between months. There are two rainy seasons with the short rains falling from November until December and the long rains starting in March and ending in May (FEWS NET, 2011). To illustrate rainfall patterns, the figure below shows the average rainfall from 2000 to 2012 in Kimana, Kajiado South.

Figure 3. Average rainfall in Kimana, Kajiado South, Kenya



Source: World Weather Online (2015)

The division of Loitokitok in Kajiado South is the particular area under study which is historically populated by Ilkisongo Maasai (Wangui, 2008). Overall, Maasai are a minority in Kenya and constitute approximately 2% of the total population in Kenya (KNBS, 2009).

The community-based organisation YISOG is operating in Loitokitok division and supports vulnerable children. Primary research was conducted on their behalf as part of a three-week placement in June and July 2015. The overall research approach and specific tools will be discussed in chapter 3.

1.6. Structure

The structure of the remaining chapters of this dissertation is as follows: Chapter 2 discusses key academic literature and previous studies on vulnerability and pastoralism in Kenya in particular. Subsequently, chapter 3 explains the methods of this research, including its limitations. Chapter 4 outlines the findings of data collection in Kenya and adds an initial analysis. Chapter 5 synthesises the analysis with the previously discussed academic literature and offers answers to the questions of this research. The dissertation concludes by pointing out the implications of this research and suggesting areas for further research in chapter 6.

Chapter 2: Literature review

2.1. Introduction

This chapter elaborates on academic literature on vulnerability to food insecurity and the overlapping concepts of poverty and sustainable livelihoods. Subsequently, vulnerability among pastoralists is examined with the use of relevant studies which centre on stresses and risks affecting pastoralists in Kenya.

2.2. Vulnerability to food insecurity

With the inclusion of stability in food security concepts as mentioned in chapter 1, the first three dimensions – food availability, access and utilisation – can be considered within a framework of risks. The exposure to risks and the capacity to cope with them consequently determine vulnerability to food insecurity (Chambers, 1989; Webb and Harinarayan, 1999). In this way, this conceptualisation is used to describe vulnerability to an outcome which follows a negative event, instead of vulnerability to the event itself such as vulnerability to drought (Yaro, 2004; Lovendal and Knowles, 2006).

Chambers (1989) describes this vulnerability as having two sides: an external one which comprises risk exposure and an internal side which refers to the capacity to cope with these risks. Thus, those who are most exposed to risks but least able to cope with them are most vulnerable to food insecurity (Chambers, 1989; Bohle et al, 1994). This is illustrated in the box below.

Box 1. External and internal sides of vulnerability

Risk Exposure – Coping Capacity = Vulnerability

Source: Adapted from Chambers (1989)

Measuring this vulnerability poses a major challenge because people's perception of risk has a crucial influence on their behaviour which can include ex-ante management or ex-post coping

strategies. This in turn impacts their capacity to cope with future shocks and is thus a crucial component in vulnerability analyses (Doss et al, 2008).

Another key dimension in analysing vulnerability to food insecurity is temporal since risks and people's coping capacity change over time (Bohle et al, 1994; Webb and Harinarayan, 1999). Therefore, encapsulating the dynamic concept of vulnerability in a static measure poses a particular challenge in assessing vulnerability.

Thus, the complexity of vulnerability has led to the formulation of various theories for analysis and approaches for measurement, overlapping with other fields in food security literature such as poverty and sustainable livelihoods as will be discussed below.

2.2.1. Vulnerability & poverty

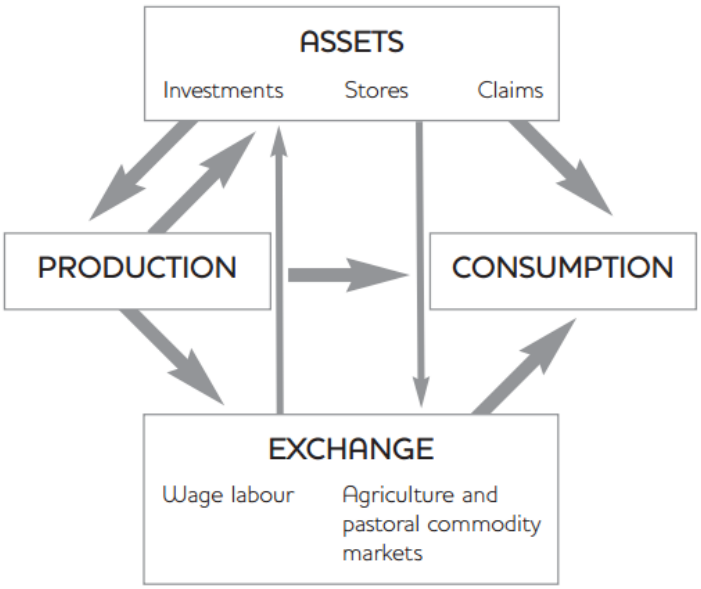
Poverty must not be equalled with vulnerability but the concepts are closely connected since poor people are more likely to be vulnerable to food insecurity due to lower asset holdings (Chambers, 1989; Swift, 1989; Moser, 1998).

Swift (1989), for instance, proposes the assessment of vulnerability in terms of assets which are comprised by 1) investments such as education, 2) stores, for example food stores, and 3) claims, such as community support. Building on Sen's (1981) entitlement approach, Swift (1989) offers a framework of vulnerability (see figure 4) where these assets intersect with production, consumption and exchange. For instance, surplus production can be converted into assets which can then be liquidated, exchanged or consumed directly in times of food crisis.

In this way, vulnerability is understood as a combined function of immediate entitlement failure and lack of buffer in the form of assets (Maxwell and Smith, 1992). Thus, poor people owning few assets are likely to be more vulnerable to food insecurity and caught in a vicious circle of steady asset depletion until their buffer to compensate current entitlement failures is exhausted completely (Swift, 1989).

This conceptualisation therefore offers a rather objective measure to assess vulnerability which is one of its strengths but might also be a limitation if people's subjective perceptions are neglected in the process.

Figure 4. Framework for vulnerability



Source: Swift (1989)

In his insightful analysis of the famine in Darfur in Sudan, De Waal (1989) was among the most influential scholars to document the importance of assets for people. Rather than depleting their assets, people were found to employ other coping strategies such as decreased consumption in order to preserve assets as a buffer (De Waal, 1989). This shows the trade-off people face when having to decide between their current subsistence and future sustainability (Frankenberger and Goldstein, 1990). At the same time, it contrasts the view of poor people as passive and without strategies for the future.

2.2.2. Vulnerability & sustainable livelihoods

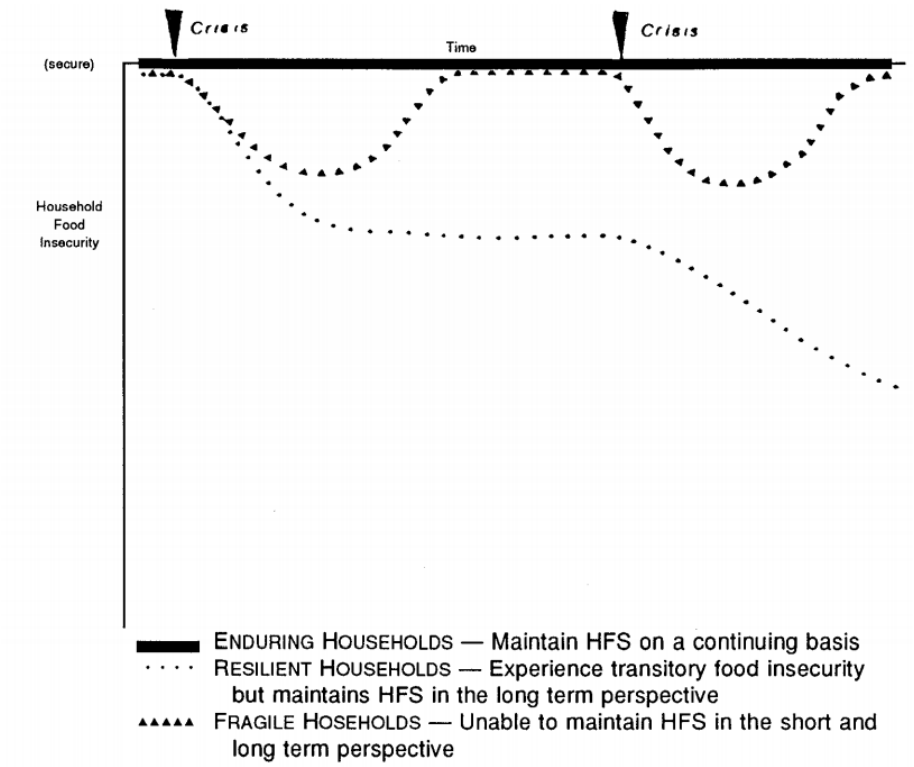
Being concerned with people's assets and capabilities, the concept of sustainable livelihoods is closely connected to vulnerability analysis and adopts an encompassing approach which is one of

its strengths but also limitations when it comes to concrete measurement (Alwang et al, 2001; Yaro, 2004).

Within the sustainable livelihoods debate, Scoones (1998) argues that people are vulnerable if their livelihoods are unable to cope in the short term or adapt in the longer term in the face of stresses and shocks. Thus, livelihoods are considered sustainable when they can cope with and recover from stresses and shocks while preserving or enhancing assets and capabilities for the future (Chambers and Conway, 1992; Scoones, 1998).

Oshaug (1985) identified three different households in their ability to recovery. As can be seen in figure 5 below, households are either 1) enduring, that is food secure despite stresses and shocks, 2) resilient, which means the household is able to recover from shocks and achieve food security again, or 3) fragile, that is unable to both cope and adapt. This differentiation is important since it appreciates heterogeneity and highlights the temporal dimension of food security.

Figure 5. Ability of a household to withstand stresses and shocks to ensure food security over time

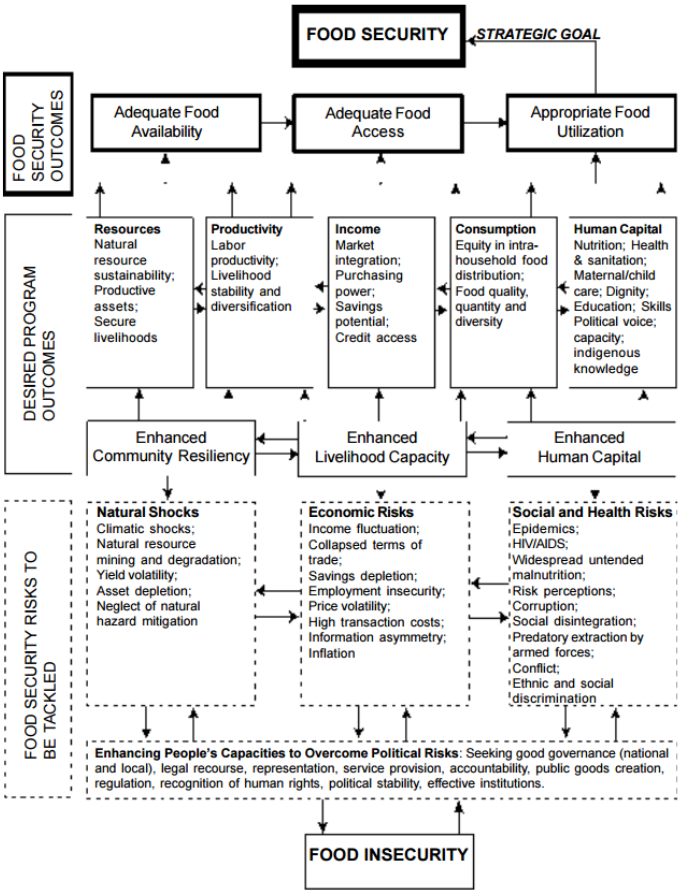


Source: Oshaug (1985) cited in Maxwell and Smith (1992)

However, differences may not only be found between households but also within. For instance, Maxwell and Smith (1992) note that shocks may affect individual household members differently due to their gender or age and criticise that this is often neglected in food security literature. Thus, certain individuals within a household may be vulnerable to food insecurity whereas the household as a whole is not (Lovendal and Knowles, 2006).

In order to capture the multidimensionality of food insecurity, Webb and Rogers (2003) propose a framework within a wider livelihood perspective which lays out a pathway to reduce vulnerability to food insecurity by increasing community resilience, coping capacity at the household level and human capital at the individual level. Risks to food security are grouped into four categories – political, natural, economic, and social and health risks as can be seen in figure 6. In this way, the political environment is regarded as an overarching issue which influences the constraints or opportunities at all other levels.

Figure 6. Conceptual framework of vulnerability to food insecurity



Source: Webb and Rogers (2003)

The importance of power and politics is also highlighted by Bohle et al (1994) in their causal analysis of vulnerability. They "emphasize particularly how capacity is an empowerment question, namely how political rights determine how and whether entitlements can be claimed, contested, defended and lost" (Bohle et al, 1994:41). Thus, it is argued that the political economy lies at the heart of vulnerability.

In this way, Bohle et al (1994) identify pastoralists as a vulnerable group due to their political marginalisation which is reflected in their location in geographically marginal areas. The next section will therefore investigate vulnerability to food insecurity among pastoralists more closely.

2.3. Vulnerability among Maasai pastoralists

This section will focus on changes, stresses and risks experienced by Maasai pastoralists in Kenya before discussing the effects on their ability to pursue their livelihood and ensure food security. Whether and how pastoralists diets have changed as a consequence will be investigated subsequently.

2.3.1. Politics, land & resources

As mentioned before, one of the underlying reasons for pastoralists' vulnerability is their political and consequent geographical and economic marginalisation (Bohle et al, 1994). In Kenya, pastoralists have suffered political disenfranchisement as early as in colonial times when almost two-thirds of traditional Maasailand was grabbed by the state and given to European settlers (Hedlund, 1979; Peluso, 1993). Pastoralism and nomadic pastoralism in particular, were regarded as backward. This led to government initiatives to sedentarise pastoralists which was also motivated by objectives of easier control and taxation (Peluso, 1993; Little et al, 2008).

At the same time, colonialists claimed land in the Central Highlands from agriculturalists who then migrated to the South where Maasai pastoralists had already been pushed (Southgate et al, 2000). The marked population increase led to high resource competition, in particular for land. The more

fertile land was occupied by in-coming agriculturalists, denying subsistence pastoralists access to former drought refuges (Western and Nightingale, 2003).

As a consequence, remaining grazing areas were overused and deteriorated in quality (Forstater, 2002). The Kenyan government blamed pastoralists for poor livestock management and consequently established group ranches on previously communal land in the late 1960s, with support from the World Bank, in order to modernise the pastoral system (Kimani et al, 1998). While this has helped pastoralists to protect their land in some instances, the overall failure of group ranches is now recognised, including by the Kenyan government (Kimani et al, 1998; Forstater, 2002; GoK, 2014).

After sub-division of group ranches started from the 1980s, much of the land has been sold to agriculturalists and fallen into the hands of more powerful pastoralists (Southgate et al 2000; Forstater, 2002). On the one hand, this translates into land fragmentation and alienation which restricts resource access and mobility of subsistence pastoralists but on the other creates opportunities for those obtaining official land titles to sell or rent land and take out loans (Hobbs et al, 2008; Western and Nightingale, 2003). These two sides to land privatisation are important to consider and suggest an increase in inequality as argued by Forstater (2002).

While land alienation and fragmentation have profound effects on pastoralists' ability to manage their livestock, wildlife have been similarly restricted in mobility and resource access (Kimani et al, 1998). However, in order to protect wildlife, national parks such as Amboseli were established and designated non-grazing zones (Peluso, 1993). This further restricts the mobility and resource access of pastoralists while at the same time, resource competition between livestock and wildlife on open pastures remains high and leads to conflicts and a high risk of disease transmission, according to studies by Boyd et al (1999) and Hobbs et al (2008).

2.3.2. Climate change & drought

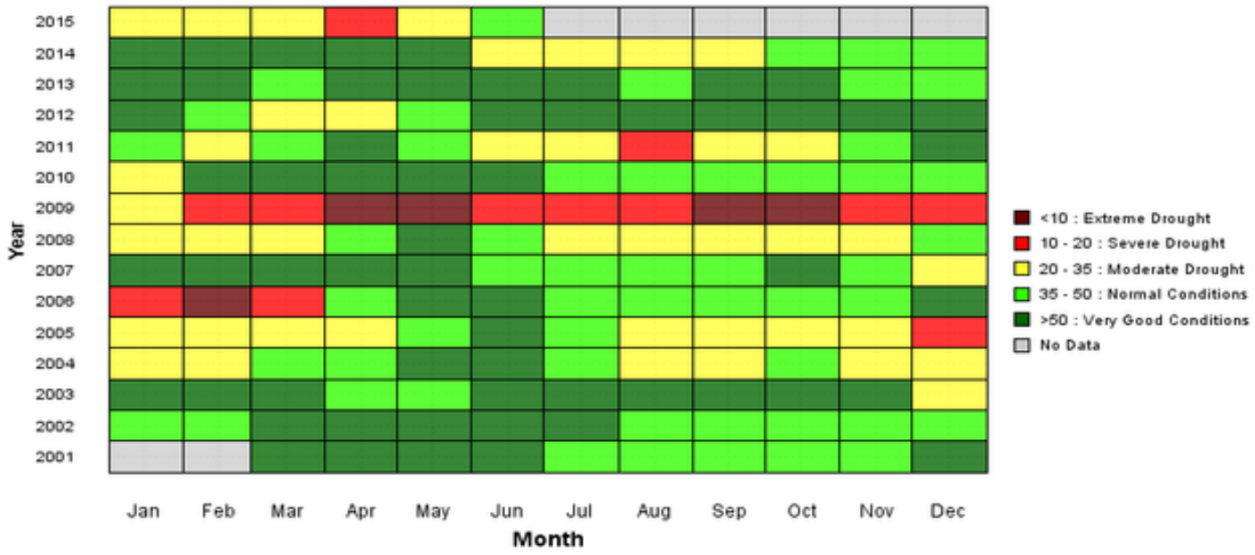
Another major risk factor for pastoralists is climate change with its impacts on water availability and range land quality. According to a recent climate trend analysis (FEWS NET, 2010), temperatures will increase by 0.7°C to 1.1°C in Kajiado County, leading to water and soil evaporation. Furthermore, the report projects a decline in rainfall by 50 to 100 mm in the region by 2025 (FEWS NET, 2010).

In contrast, however, the recent IPCC report (Niang et al, 2014) estimates that precipitation is likely to increase in East Africa. These contradictory projections illustrate the stark variability in climate which complicates estimating changes.

At the same time, there is wide consensus that extreme weather events are becoming more frequent and severe due to climate change (Kirkbride and Grahn, 2008; Blackwell, 2010; Niang et al, 2014). Alternating cycles of droughts and floods are already found to be shorter and hardly leave time for pastoralists to recover (Oiye et al, 2009; Huho and Kosonei, 2014).

As can be seen in figure 7, the last major drought experienced in Kajiado County was in 2009 which is regarded as the worst drought in the area since the beginning of satellite data use in the early 1980s (Zwaagstra et al, 2010). The impact was severe with 70% to 90% of livestock being lost (Huho and Kosonei, 2014). This event exemplifies the increased severity of weather events as projected in the IPCC report (Niang et al, 2014).

Figure 7. Vegetation condition in Kajiado County



Source: NDMA (2015)

In order to protect pastoralists from the adverse impacts of drought, a private insurance scheme has been piloted in Northern Kenya and Southern Ethiopia since 2010 (Mude, 2014). Insurance pay-outs are disbursed based on livestock mortality indices for geographical areas instead of actual livestock loss experienced by individuals and thus considered successful in reaching remote regions (Chantarat et al, 2013). The Kenyan government and World Bank now consider expanding the scheme but to date, no comparable programme is in operation in the South of Kenya (Mude, 2014).

2.3.3. Effects on livelihoods

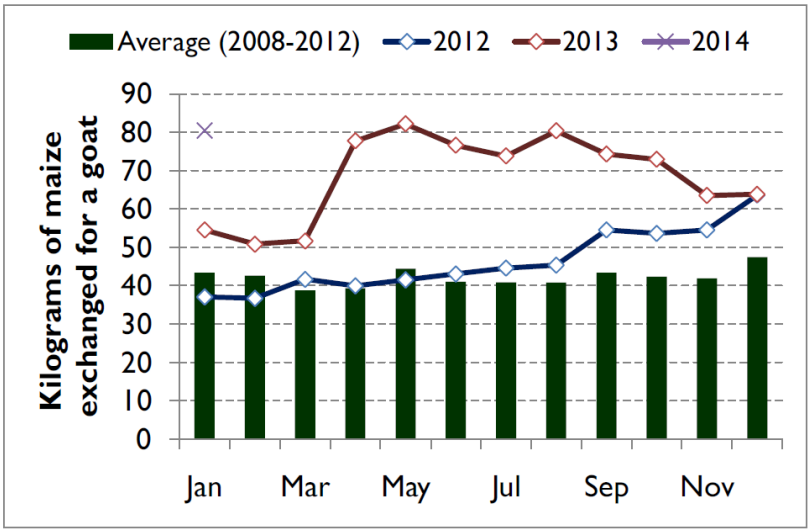
As discussed above, Maasai pastoralists have experienced a number of changes, such as in land use and climate. There is wide consensus among scholars such as Manger (2000), Southgate et al (2000), Forstater (2002), and Western and Nightingale (2003) that these have led to rising inequality among pastoralists as the majority of subsistence pastoralists are found to be adversely affected by the interplay of 1) limited migration because of land alienation and fragmentation and 2) increased risks due to factors such as climate change.

Several studies found that as a consequence, per-capita livestock holdings are in decline (Thornton et al, 2007; Little et al, 2008; BurnSilver, 2009; Ayantunde et al, 2011). This finding is important because decreasing livestock numbers implies an erosion of pastoralists' main food security strategy which is milk production from their own livestock (Rutten, 1998), falling income which is predominantly generated through livestock sales (McPeak and Little, 2005) and fewer possibilities to maintain and establish social ties which are based on reciprocity of giving animals (Grandin et al, 1991; Blackwell, 2010).

What is more, pastoralists with low livestock holdings are found to be particularly affected by price volatility at markets (Manger, 2000). The figure below shows the terms of trade in Kajiado County and illustrates a high volatility in both maize and goat prices which translates into fluctuating purchasing power.

However, it has to be noted that while low livestock prices are to the detriment for livestock sellers, better-off buyers benefit since they are in the position to make use of price changes and manage to increase their herds more easily (Manger, 2000). In this way, price volatility may be to the detriment of some but to the advantage of others.

Figure 8. Terms of trade in Kajiado County, Kenya



Source: NDMA (2014)

Way forward or way out?

In face of the declining livestock numbers as discussed above, different strands in literature on pastoralism about its future have emerged. Firstly, there are those who call for supporting mobile pastoralism, such as Levine (2010) in a study on pastoralists in Uganda who argues that pastoralism is still the most effective livelihood in variable environments. Secondly, the more moderate position argues that subsistence pastoralists are supposed to be supported while diversification options need to be facilitated for those who have already left subsistence pastoralism (Little et al, 2001).

However, recent studies show that diversification among pastoralists in Kenya has already increased tremendously in recent years. For instance, Coast (2002) found that as much as 51.8% of households in the western part of Kajiado County cultivate compared to only 20.1% ten years ago.

Similarly, Western and Nightingale (2003) note that "push" factors such as limited mobility and "pull" factors including increased opportunities in farming and wage labour have both contributed to the diversification of pastoralists. However, Little et al (2001) emphasise that the extent to which diversification is possible depends on the given opportunities, such as access to farming land.

Also, Reardon (1997) argues that in general, initial asset holdings and wealth determine whether people choose and are able to diversify. At the same time, diversification strategies are likely to be different between poorer households who opt for easy-entry options and wealthier households who are in the position to afford start-up costs, for instance for a small business (Reardon, 1997). Thus, distinctions need to be made between those that are pushed into low-return diversification strategies and those who chose to diversify to increase income and spread risks (Ayantunde et al, 2011).

In this way, diversification may not only reflect inequalities but also lead to them. For instance, in a case study on a pastoral group in Ethiopia, Tache and Sjaastad (2010) point out that increased up-take of cultivation is likely to further encroach on open grazing areas and impede the mobility of

those still in pastoralism. In this way, diversification into farming can be beneficial for some but to the disadvantage of others which exacerbates inequalities.

Education

Apart from farming, education has emerged as an important strategy for pastoralists to diversify their livelihoods and has been adopted as a new measure of family success according to Little et al (2009). Furthermore, studies show that even though educated pastoralists are not spared from livestock losses during droughts, they fare better in rebuilding their herds due to non-pastoral income (McPeak and Little, 2005; Little et al, 2008).

However, besides potential long-term benefits, short-term implications need to be considered as pointed out by Heffernan et al (2001) who highlight the need for increased livestock sales arising from the high cost of education. Additionally, less labour power is available for herding if children go to school (Heffernan et al, 2001; Little et al, 2009). Wangui (2008) notes that this increases the labour burden of women in particular.

Moreover, Krätli (2001) raises concerns about the quality of education while Little et al (2009) question the actual prospects of graduates at competitive job markets.

Overall, however, Heffernan et al (2001) find that pastoralists hold high educational aspirations for their children and express great hope for their consequent formal employment which contradicts the pastoralist way of life. Therefore, the authors argue that distinctions need to be made between pastoralism as a livelihood and livestock as a measure of wealth while the latter seems to shift into the foreground for pastoralists. This important differentiation is rarely covered in other studies and offers another outlook on the future of pastoralism.

2.3.4. Effects on food consumption

Considering the changes to and within the pastoral system as discussed above, the question arises whether and how food consumption has changed correspondingly. Therefore, this section will focus on changes in diets and their quality in terms of dietary diversity.

Dietary changes

Traditionally, the diet of pastoralists is mainly based on animal-products since their livelihood is centred on livestock. Milk and meat are key elements of this diet with milk being the most important staple food (Oiye et al, 2009). Therefore, the main food security strategy of pastoralists is the accumulation of livestock to ensure high milk production (Rutten, 1998). However, due to sedentarisation and increased availability of agricultural products, the reliance on animal products has reduced, according to Grandin et al (1991).

In particular, maize and beans have entered the diets of pastoralists through income from livestock trade and increasingly through diversification into farming (Grandin et al, 1991; Fratkin, 2001; Rufino et al, 2013). A recent study on the diet of Maasai pastoralists shows that animal products constitute as little as 7% of the energy intake while beans and maize are the main energy source (Oiye et al, 2009). The overall energy intake, however, is found to be insufficient in the study which confirms the ongoing validity of previous studies (Rutten, 1998; Grandin et al, 1991; Fratkin, 2001).

Similarly, in a comparison of nutritional data from 1930 to 2000, Galvin et al (2015) find that although diet composition is changing, nutritional status remains poor. However, even though the study considers differences across locations, variations between households are not considered. In turn, Sellen (2010) investigates heterogeneity between households but reports only weak correlations between household wealth and individual nutritional status in a study on Maasai in Tanzania.

Dietary diversity

When it comes to dietary quality, Fratkin (2001) found that while protein levels are high among Maasai pastoralists, deficiencies in Vitamin A and C are striking. In this way, the issue of hidden hunger mentioned in chapter 1 emerges as an additional challenge for pastoralists and illustrates the need for analyses on the individual level.

For instance, the study of Villa et al (2011) on intra-household differences in dietary diversity among pastoralists suggests that household heads and in particular men buffer household food insecurity. What is more, Holtzman (2002) argued in a study on pastoralists in Northern Kenya that women may actually be among the better-off when it comes to intra-household food allocation since cooking is within their domain, from which they could benefit.

On the aggregate household level, however, it is also important to consider seasonality since both dietary quality and quantity may vary throughout the year because of changes in food availability and prices (Oiye et al, 2009).

For instance, Fratkin (2001) notes that during the dry season, milk is increasingly scarce and pastoralists consequently resort to meat and cereals. However, due to the high unit value of livestock and their ceremonial significance, Sellen (2010) argues that meat is generally consumed infrequently.

On the other hand, Tache and Sjaastad (2010) find that during times of stress, pastoralists in Ethiopia with larger herds use their livestock to smooth consumption while poorer pastoralists are more likely to engage in asset-smoothing to the detriment of food quality and quantity. These findings exemplify the heterogeneity of households and the importance of asset preservation as mentioned earlier.

2.4. Conceptual framework of this research

In order to determine the current dietary composition of pastoralists and vulnerability to food security, primary research was carried out in Kajiado County, Kenya. Within the concept of

vulnerability, the overall aim of this research is to explore stresses and risks pastoralists experience and their capacity to cope with them. Building on the sustainable livelihoods literature discussed above, the question whether pastoralism can endure as a viable livelihood strategy to ensure future food security is of particular interest.

2.5. Conclusion

This chapter discussed concepts of vulnerability to food insecurity and examined changes and stresses experienced by pastoralists, followed by a discussion on effects on their livelihoods and diets. The next chapter will outline the specific methods of this research in detail.

Chapter 3: Research methods

This chapter discusses the methods of this research which was carried out in conjunction with YISOG. The research philosophy in which the research is situated will be explained first, before going into further detail with the specific research tools.

3.1. Research philosophy and approach

The overall research philosophy adopted in this study is interpretivism which seeks to comprehend socially constructed realities (Neuman, 2006). This interpretivist stance acknowledges people's different perceptions and aims to understand "culturally derived and historically situated interpretations of the social life-world" (Crotty, 1998:67).

Within this philosophy fall ontological and epistemological stances. The former refers to the theory of reality while the latter describes the theory of knowledge (Crotty, 1998). In this research, the ontological position is relativism which means that all perceptions on reality are subjective and therefore valid (Neuman, 2006). The epistemological stance is constructionism which acknowledges that people give meaning to things and phenomena since they are neither fully objective nor entirely subjective but bound up by both (Crotty, 1998). These approaches were chosen since this research aims to capture people's perceptions and recognise them as a heterogeneous group.

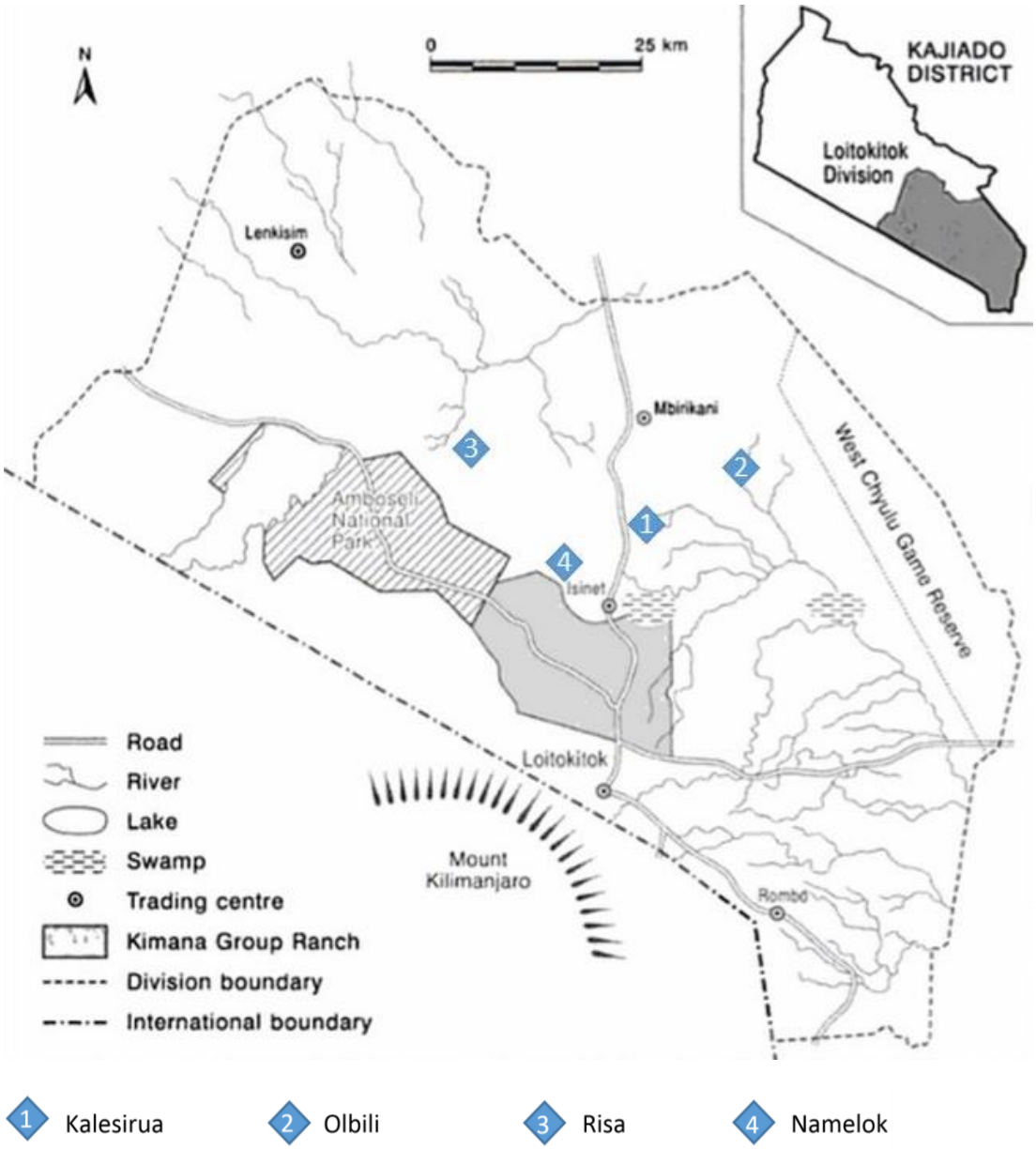
To be open to people's perceptions, an inductive approach was adopted in which observations are made first before drawing theories and assumptions (Neuman, 2006). This approach fits into the overall exploratory purpose of this research.

3.2. Research methods and data collection strategies

In order to appreciate the exploratory purpose of this research, qualitative research was conducted in four communities in Loitokitok division, Kajiado South. The communities under study are Kalesirua, Olbili, Risa and Namelok as shown on the map below.

The research team consisted of the researcher, the head of the YISOG committee, and a translator who was not affiliated with YISOG. This neutrality helped tremendously in the conversations, particularly in interviews with households receiving support from YISOG which was the case for two households in Kalesirua.

Figure 9. Map of the study area



Source: Adapted from Southgate et al (2000)

In each study site, one key informant interview was conducted first to gain an overview of the community, then focus group discussions were held and eventually female and male household decision-makers were interviewed. However, no focus group took place in Namelok due to time constraints. The table below presents a summary of research activities.

Table 2. Summary of research activities

Research tool	**Participants**
Observations	Conducted by the researcher in all four communities
Wealth ranking	4 key informants
Seasonal calendar	2 key informants
Historical timeline	3 key informants
Semi-structured interview (community specific)	4 key informants
Semi-structured interview (general)	5 key informants
Semi-structured interview (education specific)	6 staff members of different schools 1 government officer of the Ministry of Education
Discussion & problem matrix	6 focus groups
In-depth interview	36 household decision-makers
Individual dietary diversity score	36 household decision-makers

3.2.1. Observations

Observations were made in each of the four communities throughout the research process in order to provide context to the research findings. Distinguishing characteristics of the communities were noted and are presented in chapter 4 with all other findings.

3.2.2. Key informants

Semi-structured key informant interviews were held in order to gain a first overview of the main issues in the study area. Five key informants participated in general interviews which were non-specific to the four communities but tailored to the expertise of the interviewee who were chosen for exactly this reason. A sample interview outline is added in appendix A.

Furthermore, as can be seen in table 2 above, one key informant interview was held in each of the four communities to gain an understanding of the particularities in the study area. As part of this, community-specific wealth rankings were drawn which informed the sampling strategy as will be explained further in section 3.2.5.

Moreover, two key informants established seasonal calendars which were verified by a YISOG member afterwards. The calendars help in understanding seasonality and how this affects food security.

In addition, a historical timeline was drawn as a group exercise by three key informants to appreciate people's historically influenced interpretations which are integral in interpretivist research as argued by Crotty (1998) and pointed out earlier in this chapter.

When education emerged as theme in the course of the research, six informants in schools and one government officer of the Ministry of Education were interviewed. The exploratory, inductive nature of this research allowed expansion on this developing topic but limited time restricted the ability to do so in detail.

3.2.3. Focus groups

In focus groups, discussions were held in three of the four communities. As mentioned earlier, no focus group took place in Namelok but key informant and household-level interviews were used to capture the particularities of the community as much as possible.

As can be seen in table 3, focus groups comprise individuals from different age groups but a similar socio-economic background. All discussion were conducted in a gender-sensitive way with women and men separately and female translators in women's groups. This proved to be of tremendous importance for women to open up.

Table 3. Characteristics of focus group participants

Community	Gender	Wealth categories	Number of participants	Age groups			
				20 to 29	30 to 39	40 to 49	50 to 59
Kalesirua	Female	Very poor to poor	8	3	4	1	0
Kalesirua	Male	Very poor to poor	6	2	3	1	0
Olbili	Female	Middle	8	2	3	2	1
Olbili	Male	Middle	5	0	1	2	2
Risa	Female	Middle to better-off	5	2	0	2	0
Risa	Male	Middle to better-off	5	0	2	2	1

The focus groups started off with general discussions on food consumption and seasonality as can be seen in appendix B. Then, following the format of a problem matrix, participants identified problems in achieving food security throughout the year, their causes and effects and discussed actions to prevent or cope with these problems.

The first discussions in Kalesirua were conducted by community workers who were trained beforehand by the researcher but it turned out that participants aimed at engaging with the researcher directly. Therefore, subsequent discussions were facilitated by the researcher with the advantage of investigating issues in further depth as needed but the disadvantage of discussions adopting a more extractive format.

3.2.4. Household level

At the household level, 23 households were interviewed as can be seen in table 4. In-depth interviews were held with female and male decision-makers separately in order to capture different perceptions between women and men (see sample outline in appendix C). This was also important since women and men have different responsibilities within the household and consequently a different depth of knowledge on certain issues.

However, since men were away for wage labour or herding in several cases, more women than man could be interviewed as can be seen in table 5.

Table 4. Characteristics of households

Demographic characteristics of interviewed households		
Type of household	**#**	**% of total**
female-headed	6	26%
male-headed	17	74%
Total household size	**#**	**% of total**
1-5 members	4	17%
6-10 members	16	70%
11-15 members	2	9%
16 plus members	1	4%

Table 5. Characteristics of individual respondents at the household-level

Demographic characteristics of interviewed individuals				
	Female		**Male**	
	#	**%**	**#**	**%**
Total	23	64%	13	36%
Age				
- 20-29	8	22%	1	3%
- 30-39	10	28%	2	5%
- 40-49	5	14%	6	17%
- 50-60	0	0%	4	11%
Highest level of completed education				
- primary	1	3%	2	5%
- secondary	0	0%	1	3%
- tertiary	0	0%	0	0%
- adult basic education	2	5%	0	0%
- none	20	56%	10	28%

As part of the interviews, respondents were asked to rank their current ability to feed their families from 1 (= very easy) to 5 (= very difficult) with the use of wooden sticks as measurement tools. In this way, the perceived degree of current food insecurity could be captured.

In addition, an individual dietary diversity score (DDS) was established for the past two days from the time of the interview. The score indicates the nutritional quality of diets by counting the food groups consumed within the reference period (Devereux, 2002). Therefore, the score is a snapshot of that period but is considered to be an important food security measurement tool since an increase in dietary diversity by one percent is associated with an equal increase in food consumption (Hoddinott and Yohannes, 2002). Hence, the score does not only capture dietary quality but is also a robust indicator for dietary quantity. A template which was created based on guidelines from the FAO (2011) is attached in appendix D.

3.2.5. Sampling

The sampling strategy was based on the wealth rankings established with key informants. The tables below show the rankings for each of the four communities. However, as mentioned before, the rankings reflect the subjective opinions of key informants who assigned different characteristics to the four wealth categories and thus, the very poor in one community might be relatively better-off than the very poor in another community which needs to be considered when making comparisons.

Table 6. Wealth ranking for Kalesirua

Wealth category	%	# of cows	# of goats/sheep	Land holding
Better-off	5	50 plus	50 plus	50 acres plus (also for farming)
Middle	10	5-49	10-49	5 acres (for grazing only)
Poor	30	1-4	1-9	none
Very poor	55	none	none	none

Table 7. Wealth ranking for Olbili

Wealth category	%	# of cows	# of goats/sheep	Land holding
Better-off	5	50 plus	30 plus	not determining, land is communal
Middle	15	10-49	10-29	not determining, land is communal
Poor	40	5-9	7-9	not determining, land is communal
Very poor	40	0-4	0-6	not determining, land is communal

Table 8. Wealth ranking for Risa

Wealth category	%	# of cows	# of goats/sheep	Land holding
Better-off	10	30 plus	100 plus	not determining, land is communal
Middle	42	5-29	20-99	not determining, land is communal
Poor	40	1-4	10-19	not determining, land is communal
Very poor	8	none	0-9	not determining, land is communal

Table 9. Wealth ranking for Namelok

Wealth category	%	# of cows	# of goats/sheep	Land holding
Better-off	2	30 plus	40 plus	5 acres plus, cultivation also for sale
Middle	43	10-29	20-39	2-5 acres, cultivation also for sale
Poor	43	5-9	10-19	small plot, cultivation for home consumption
Very poor	2	0-4	0-9	none or not used for cultivation

The rankings were used to purposively choose households for interviews. Key informants in the communities identified the households to be interviewed and facilitated access to them. The aim was to interview an equal number of households in each wealth category and community. However, this turned out to be difficult due to time constraints and the relatively low number of better-off households. Tables 10 and 11 present the exact numbers of households and individuals interviewed in each community.

Table 10. Number of households interviewed per community and wealth category

Community	Total # of households	- very poor	- poor	- middle	- better-off
Kalesirua	6	2	2	2	0
Olbili	6	2	2	2	0
Risa	7	2	2	2	1
Namelok	4	1	1	1	1
Total:	**23**	**7**	**7**	**7**	**2**

Table 11. Number of individuals interviewed per community and wealth category

Community	Total # of individuals	- very poor	- poor	- middle	- better-off
Kalesirua	10	3	4	3	0
Olbili	9	3	3	3	0
Risa	10	3	2	3	2
Namelok	7	1	2	2	2
Total:	**36**	**10**	**11**	**11**	**4**

For focus groups, the same principal was applied and key informants were asked to invite men and women within a certain wealth range to the discussion.

The contact to key informants was established by YISOG who facilitated access to village elders, health workers and other NGO members who similarly arranged interviews. Therefore, snowballing was the main sampling strategy for key informants which enabled access to a wide range of expertise but might introduce a sampling bias (Neuman, 2006).

3.2.6. Ethical considerations

All research participants took part in the activities described above voluntarily and remuneration was neither offered nor made. Participants were informed on the purpose of the study and that notes taken would be used for the study only. Appendix E shows the consent and information form which was handed out to literate participants and reproduced orally for illiterate participants. Only after informed consent, the research activity was started.

3.3. Data verification and analysis

All research activities were discussed with YISOG prior to data collection and amended where applicable. Additionally, three pilot interviews were conducted at the household level in order to test the appropriateness of interview outlines. These pilots were not included in the eventual data set.

Throughout the data collection process, de-briefings with the research team took place in which initial findings were discussed and complemented. Through this constant analysis and verification of collected data, emerging themes were identified and investigated in further depth during the remaining data collection period. The strategy for the analysis of the final data set was description, analysis and interpretation as suggested by Wolcott (1994).

3.4. Research limitations

The first and foremost limitation of this research was constraints in time and resources for data collection which limited the scope of the study and impeded the ability to incorporate seasonality to a greater extent.

Another issue is the potential inaccuracy of responses, especially in the DDS since interviewees might have omitted foods they had eaten. However, through prompting of food groups, this risk was mitigated.

Furthermore, research participants might have been biased because access to them was facilitated by YISOG. In this way, hopes for support might have been raised and responses could have been altered. However, for all interviews, the head of YISOG who was part of the research team left the scene after the introduction was made. Yet, the researcher might have been similarly influenced through the cooperation with YISOG.

Another issue that has to be noted is the lack of generalisability of research findings due to the limited sample size. However, this limitation is inherent in interpretivist research which acknowledges subjective perceptions and recognises limited representativeness as a consequence.

Chapter 4: Research findings

4.1. Introduction

This chapter will lay out the findings of primary research in Kenya. An initial layer of analysis will be added to the description of results before the next chapter discusses them in synthesis with the academic literature reviewed in chapter 2.

4.2. General community characteristics

In order to provide context to the four communities where research was conducted, observations were made in each site. The observations are summarised in table 12 which shows marked differences between the communities which suggests consequently different opportunities for people.

Table 12. Community observations

Community	Market access	Income options (besides livestock)	Housing	Water source	Other
Kalesirua	Easy; close to towns	Many; high availability of casual wage labour	Individual houses or small enclosures	Nearby stream or distant river	High population pressure
Olbili	Difficult	Limited	Mostly in large enclosures	Seasonal stream	Strong community support
Risa	Very difficult	Very limited	Very large enclosures	Ponds	Women appear very shy; harsh living conditions
Namelok	Moderate; close to small towns	Many; most people own irrigated farming land; women have small businesses	Individual houses or very small enclosures	Protected spring	Women are very open and determined

Following these observations, water is a major issue in three of the four communities where water sources are not protected and are shared between people, livestock and wild animals (see photographs on the following pages). This suggests a high risk of water-borne diseases which has direct effects on health and nutritional outcomes.

Figure 10. Photograph of nearby stream in Kalesirua

Figure 11. Photograph of seasonal stream in Olbili

Figure 12. Photograph of a pond in Risa

Figure 13. Photograph of the protective wall around the spring in Namelok which prevents contamination through livestock and wild animals

Figure 14. Photograph of the spring in Namelok

4.2.1. Income sources

In focus groups, participants were asked about their sources of income in order to understand the household economies. Table 13 shows that in all but two focus groups, sale of livestock was mentioned as the main source of income. The female group in Kalesirua stated wage labour as the main source which could be attributed to the proximity to towns but also to the wealth level of participants which is very poor to poor. However, since the male group in the same wealth level mentioned livestock sales as the main income source, it is possible that the women's group may not have mentioned this, as according to key informants, livestock are usually owned and controlled by men.

Since focus groups did not take place in Namelok, it is worth noting that respondents of household-level interviews mentioned sale of animals and farming products as the main sources of income with the exception of the very poor household where wage labour constitutes the main source.

Compared to household-level interviews in the other communities, income sources in Namelok were by far the most diversified and women operated small businesses which enabled them to have independent control of income. This bears great potential for women's empowerment which could already be observed as follows from table 12 on page 36.

Table 13. Income sources according to focus groups

Community	Gender	Income sources	Comments
Kalesirua	female	1. wage labour 2. sale of milk and firewood	- high competition for wage labour - wage labour and milk sale mostly in rainy season when availability is high
Kalesirua	male	1. sale of animals 2. wage labour	- high dependence on animals as income source is problematic - income from wage labour very unstable
Olbili	female	1. sale of animals	- fear of asset depletion - milk sale not possible because no buyers - wage labour not available
Olbili	male	1. sale of animals	- price fluctuations are a problem
Risa	female	1. sale of animals	- returns are low in dry season
Risa	male	1. animal trade 2. sale of animals 3. tourism	- tourism very unstable source of income

4.2.2. Expenditure

Focus group participants across the three communities unanimously mentioned school fees as the highest household expenditure, as illustrated in table 14. This was verified by household interviews in which all but one interviewee (respondent #18) of the poor wealth category in Olbili mentioned school fees as the highest expenditure. However, this can be attributed to the fact that some of her children are exempt from school fees after her husband left the family this year.

Similarly, all participants of individual interviews in Namelok mentioned school fees as the highest household expenditure while food needs are predominantly met by their own agricultural

production. This stands in stark contrast to the other three communities where it was claimed that livestock needs to be sold to cover food needs, in particular during the dry season when milk production is low. In Namelok, however, livestock are mostly sold to cover extraordinary expenses such as health emergencies or post-primary school fees. This suggests that diversification into farming allows people to preserve productive assets.

Table 14. Household expenditure according to focus groups

Community	Gender	Expenditure
Kalesirua	female	1. school fees 2. food 3. depends, miscellaneous
Kalesirua	male	1. school fees 2. food 3. depends, miscellaneous
Olbili	female	1. school fees 2. food 3. clothing 4. miscellaneous, especially emergencies
Olbili	male	1. school fees 2. food
Risa	female	1. school fees 2. food
Risa	male	1. school fees 2. food

4.2.3. Food sources

During household-level interviews, those owning milk-producing animals stated that they use this milk for their own consumption and only sell surplus milk, depending on the availability of buyers which is a problem in the remotest communities under study, i.e. Risa and Olbili (see table 13).

All other food was said to be purchased at markets, except for those households that had their own farms. As with milk, farm produce is first and foremost used for own consumption and only surplus harvest is sold. In contrast, four households of the very poor category reported to receive food as

gifts from neighbours and family. Thus, it can be said that the sources of food mainly depend on livestock ownership and cultivation of agricultural products.

When it comes to seasonality, all interviewees highlighted that the reliance on food sources changes with season, except for those households depending on food gifts. Figure 15 shows a seasonal calendar established by key informants and depicts these changes. For instance, the calendar illustrates that milk production is low during the long dry season from June to mid-October when grazing land becomes increasingly scarce and animals are weak. Thus, dependence on food purchases from markets is highest during the end of the long dry season.

Key informants as well as household decision-makers claimed that therefore, the months of August, September and October bear the highest risk of food insecurity which probably also applies to those depending on food gifts because their well-wishers might be less able to give.

Figure 15. Seasonal Calendar

Months	January	February	March	April	May	June	July	August	September	October	November	December
Season	short dry season		long rains			long dry season					short rains	
Livestock sale for trading	high returns because cows are healthy											
Livestock sale out of necessity	for school fees					for food purchases						for school fees
Livestock purchase				high							high	
Livestock prices	high					low						high
Milk production	very high					very low					very high	
Food purchase						high						
Risk of food insecurity	very low							very high			very low	
Livestock disease outbreaks	FMD		Malignant Catarrhal Fever (MCF)			Lumpy Skin Disease (LSD)					FMD	
Food prices						high						
High risk of human diseases	Malaria		Malaria			Colds and Pneumonia					Malaria	
Floods				high								
Casual wage labour availability						high	very low				very high	
Livestock births			sheeps and goats								cows, sheeps and goats	
Migration with livestock							high					

4.3. Trends in food consumption

After discussing the general characteristics of the communities and respective household economies above, this section will look at food consumption more closely.

Bearing in mind the influence of seasonality, household decision-makers were asked about their food consumption in the last two days which consequently represents a snapshot of that time, i.e. June/July. The responses of interviewees are presented in the table below which illustrates the importance of milk across wealth levels. All individuals in the poor, middle and better-off wealth categories consumed milk in the last two days whereas only 70% of very poor individuals reported milk consumption which might be a result of fewer livestock holdings and consequently lower domestic milk production.

The table also illustrates the high significance of maize which interviewees explained by its relatively low price. However, after milk and maize, the percentage of individuals having eaten other foods reduces dramatically for the very poor, poor and middle categories. These findings suggest relatively low intakes of micronutrients which raises concerns about health outcomes. In contrast, the better-off category stands out with comparatively high percentages for all food items. The dietary diversity of different wealth levels will be further elucidated below.

Table 15. Percentage of individuals who ate the following food on one of the last two days

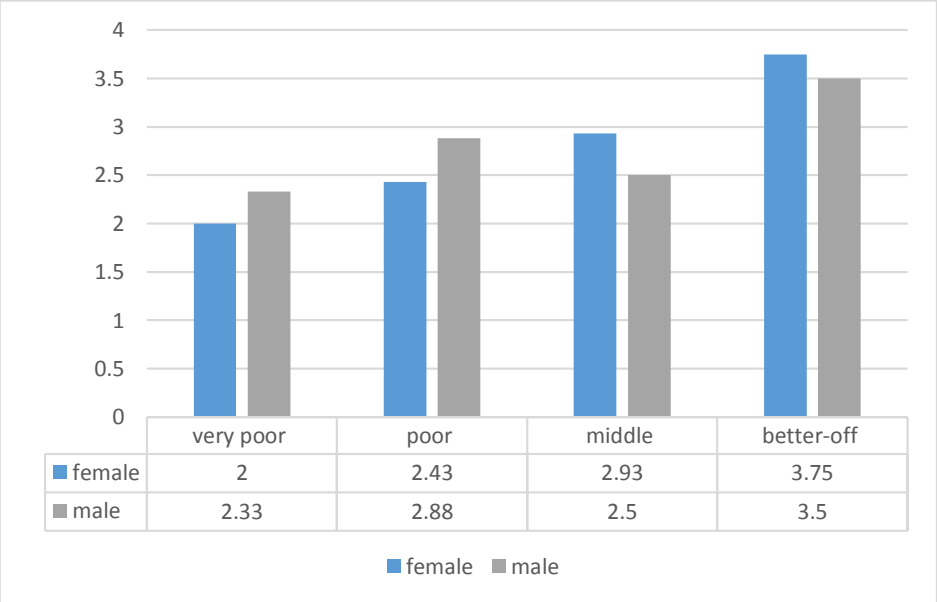
Food item	Percentage of individuals			
	very poor	poor	middle	better-off
Milk	70%	100%	100%	100%
Maize	80%	96%	80%	88%
Beans	0%	19%	25%	88%
Sukuma wiki[2]	35%	15%	30%	63%
Rice	5%	15%	25%	63%
Meat	5%	8%	15%	0%
Cabbage	0%	0%	0%	13%
Tomatoes	0%	0%	10%	0%

[2] Sukuma wiki is a green leafy vegetable popular in the Kenyan cuisine.

In order to create individual DDS, the above listed food items were categorised into food groups. The diagram below illustrates the average DDS per wealth category and shows that dietary diversity increases in line with wealth. Overall, however, dietary diversity is relatively low which raises concerns over the nutritional value of diets and micronutrient deficiencies in particular for individuals from the lower wealth categories as mentioned before.

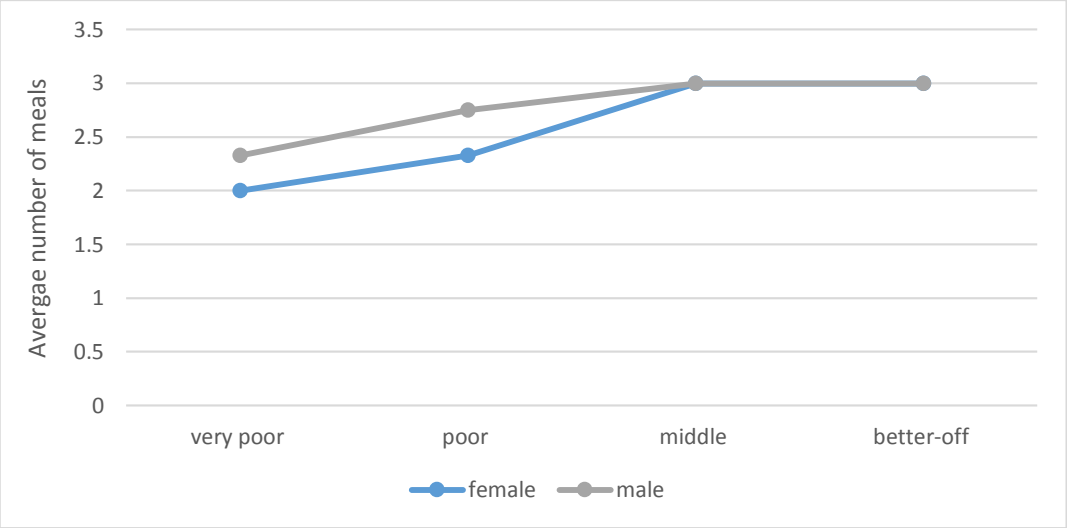
The scores also indicate that women have slightly less diverse diets at the lower wealth levels which suggests that women buffer household food stress. However, it is interesting to note that the pattern reverses in the middle and better-off categories where women have higher scores than men.

Figure 16. Average individual DDS per wealth level



As for dietary diversity, the average number of meals per day rises along with wealth as can be seen in the graph below. The figure also shows that females ate less meals per day than males in the very poor and poor category which lends further support to the foregoing indication that women of poorer households buffer food shortages.

Figure 17. Average number of meals eaten in the past two days per wealth category and gender



The following quote of a female respondent from the very poor wealth category illustrates the above made assumptions on women's disadvantage and depicts intra-household food allocation.

Box 2. Quote of participant #30 illustrating intra-household food allocation

> "My husband is the first person to eat, followed by our children and then myself. Of course, sometimes there is nothing left for me. That is how it is."

Apart from variations between individuals according to gender, the data shows marked differences between households in terms of diversification. Scrutinising DDS data, individuals whose households cultivate have substantially more diverse diets than those who do not (see figures 18-20).

This trend can be observed for both female and male individuals across wealth levels, except for females in the middle wealth category. However, this could be explained by the relatively diverse income sources of two households from this group which comprise salaried employment and the

operation of a small shop (participant #21 and #27). The male decision-makers of these households were not available for the interview and therefore, this trend is not reflected in the DDS for males.

Overall, the figures strongly suggest that if households cultivate, dietary diversity is considerably higher. However, the outlier cases of the middle wealth category indicate that diversification of income sources in general translates into more diverse diets. Thus, dietary diversity seems to be a matter of direct or indirect access to food.

Figure 18. Average individual DDS in the poor wealth category

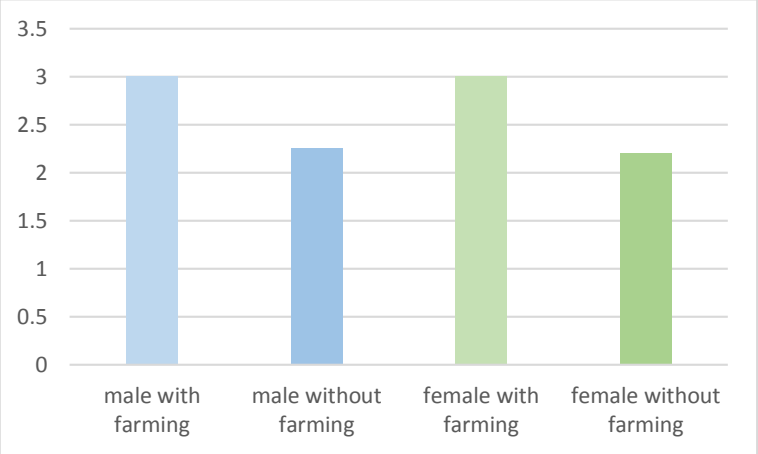


Figure 19. Average individual DDS in the middle wealth category

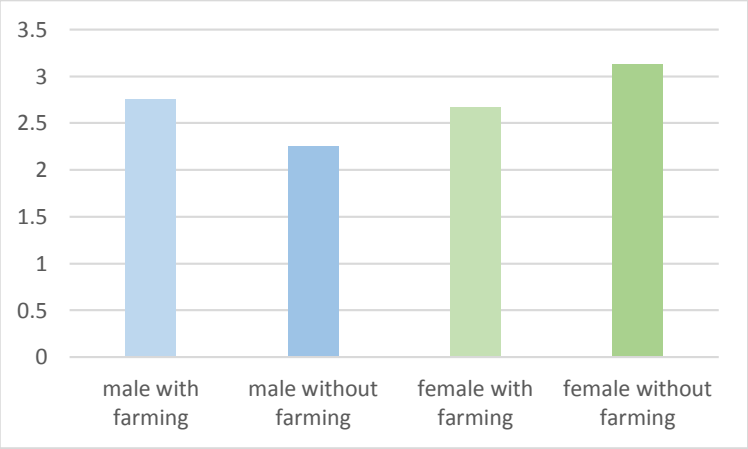
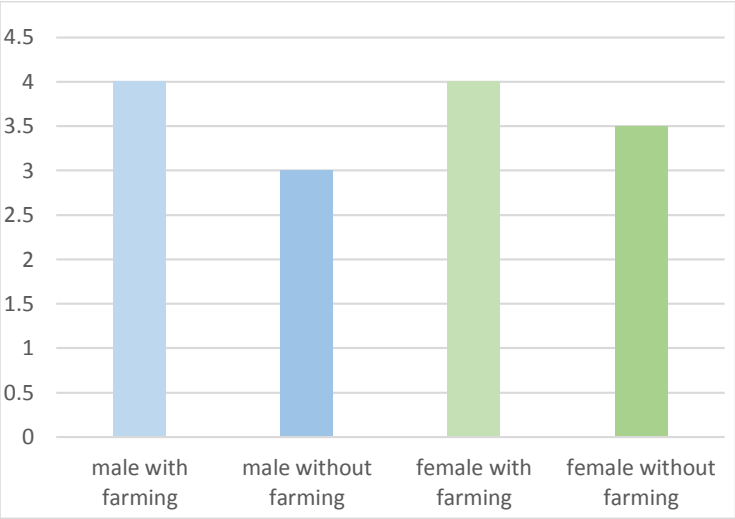


Figure 20. Average individual DDS in the better-off wealth category



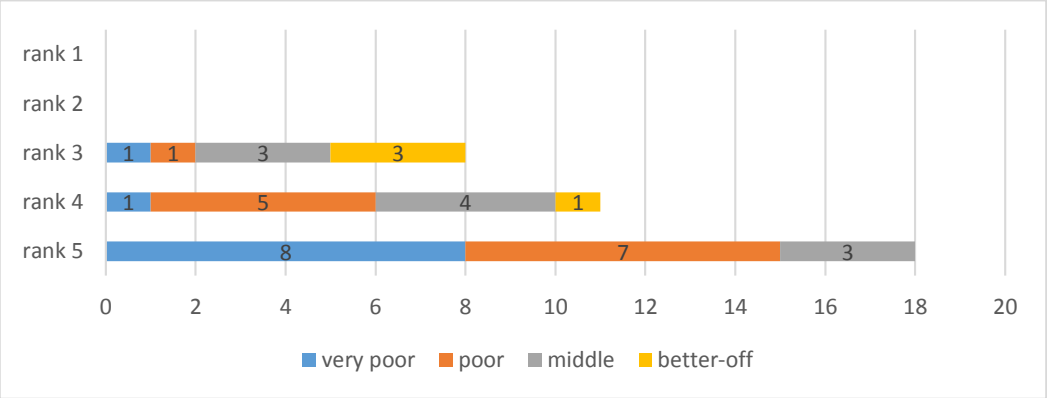
4.3.1. Perceptions on food security

As part of household-level interviews, respondents ranked their current ability to feed their families from 1 (= very easy) to 5 (= very difficult). The responses are used to explore perceptions on food insecurity and are presented in figure 21 below. The diagram shows that the majority of individuals from the very poor category claimed rank 5 and vice versa the majority from the better-off category stated rank 3, the lowest rank chosen by respondents.

However, three individuals from the middle wealth category also stated rank 5 which suggests that besides livestock holdings – which form the main basis of wealth categories – other factors influence the perceptions of respondents. For instance, one interviewee of the middle wealth category in Risa (participant #27) stated rank 5 and mentioned limited market access as main reason which shows that community-wide issues affect people's perception.

Thus, it can be argued that responses are affected by both objectively different circumstances, such as wealth and community characteristics, and people's subjective perceptions on them.

Figure 21. Number of individuals per wealth category stating rank 1-5 of perceived food insecurity

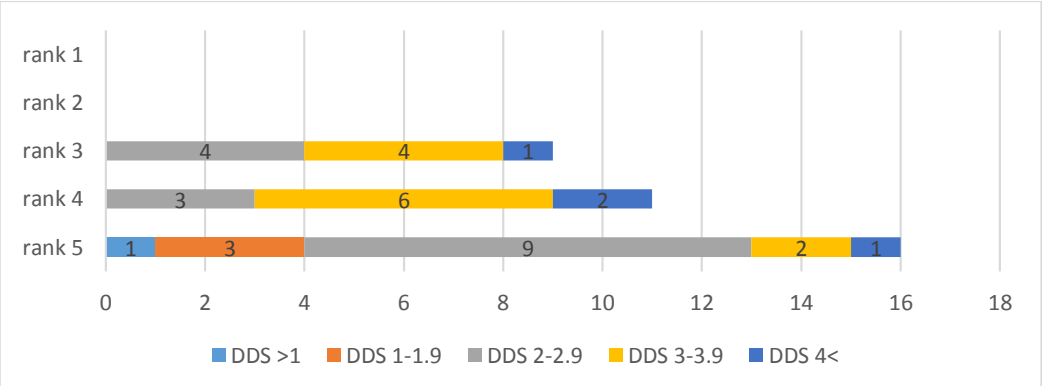


Comparing the subjective ranking of perceived food insecurity with the objective indicator of dietary diversity, only weak correlations emerge. Figure 22 below illustrates that although the majority of individuals with the lowest DDS stated the highest ranks of perceived food insecurity and vice versa, the overall picture is mixed.

For instance, four individuals (participants #6, #7, #8, #10) with DDS between 2-2.9 stated rank 3 which suggests that their relatively low dietary diversity is not perceived as food insecurity. Also, the before mentioned example of participant #27 from the middle wealth category has a relatively high DDS of 4 but perceived her household as severely food insecure with rank 5.

In this way, it appears that low dietary diversity as an end result is not strongly associated with people's perception on food insecurity.

Figure 22. Number of individuals per DDS stating rank 1-5 of perceived food insecurity



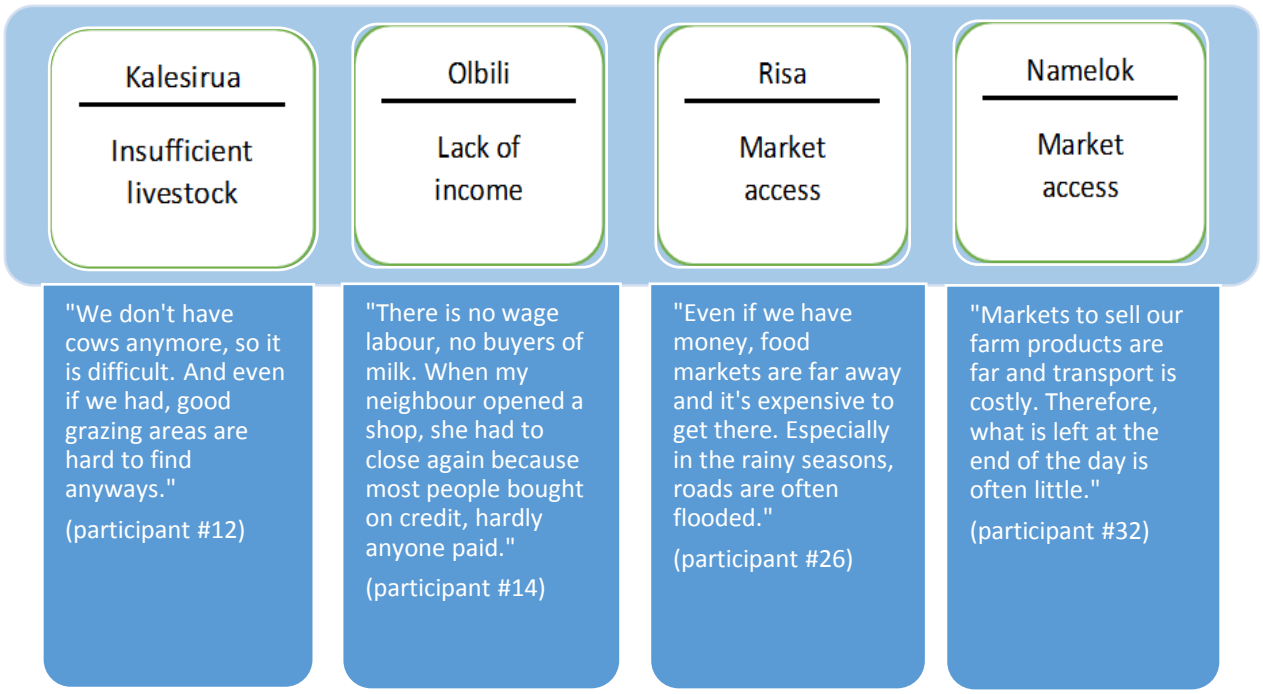
4.4. Stresses, risks and coping capacity

After trends in food consumption and perceptions on food insecurity were examined above, this section will present the findings on stresses and risks, and people's capacity to cope with them. The findings will be analysed in aggregate form at the end of this section.

When individuals were asked to rank their current food insecurity, the reasons for the chosen rank were subsequently questioned. The figure below presents the most frequently stated reason per community while the added quotes illustrate important nuances.

For instance, respondents in Risa referred to limited market access to buy food whereas in Namelok reference was made to markets to sell farm products. Thus, the figure demonstrates heterogeneity between communities but also indicates that community-wide instead of household-specific issues are in the foreground for the majority of respondents.

Figure 23. Most frequently stated reasons for perceived food insecurity per community



The above concerns were reiterated in the respective focus groups as illustrated in the problem matrices on pages 52-54. Focus group participants ranked the problems according to their severity and as can be seen, the main concerns are associated with the dry season and related to loss of livestock.

Both female and male participants mentioned livestock-related problems, although in more detail by male participants which is probably due to the ownership of livestock by men. Women, on the other hand, expressed worries over lack of clean water in Kalesirua and lack of income options in the remotest communities under study Olbili and Risa.

Table 16. Problem matrix for Kalesirua

Focus group	Problems	Causes	Effects	Actions
Kalesirua male	1.) Livestock diseases	- animals weak and susceptible to diseases - migration to places where livestock are not used to diseases - vaccination unavailable for some diseases	- livestock losses	- treatment of livestock with herbs
	1.) Attacks through wild animals	- high resource competition	- livestock losses - spread of diseases to livestock - threat to herders	- difficult
	2.) Low milk yields in dry season	- animals weak because quality of pastures is poor	- less milk consumption - more food purchases necessary	- longer migration to find better pastures - decrease food consumption
	2.) Low livestock prices in dry season	- many sellers because cash is needed for food purchases - animals are weak	- low returns from livestock sale - only little money to buy food	- children taken out of school
	3.) Long migration in dry season	- Limited grazing pastures because of land privatisation - only few water sources for livestock	- long migration periods - families left at home alone	- difficult - suggestion: boreholes
Kalesirua female	1.) storage of food not possible	- no storage facility - not enough money to buy food in bulk	- price changes cannot be taken advantage of	- borrowing from shops during dry season - suggestion: small businesses to generate income
	1.) food price volatility	- high food demand during dry season	- less food can be bought when prices are high	- borrowing from shops during dry season
	2.) contaminated water	- people, livestock and wild animals share water sources	- diseases	- getting water from more distant but cleaner water source - suggestion: protected boreholes

Table 17. Problem matrix for Olbili

Focus group	Problems	Causes	Effects	Actions
Olbili male	1.) prolonged drought	- increasingly unpredictable weather - less rain	- livestock weak - livestock generate low returns at markets - livestock produce little milk	- long migration - suggestion: boreholes
	2.) attacks through wild animals	- resource competition	- livestock die	- applying for compensation from Kenyan Wildlife Fund but payment is late and little (corruption is a problem)
	3.) livestock diseases	- vaccinations not available for all diseases - vaccinations expensive - transport of vaccinations difficult because of refrigeration	- livestock die	- only some animals receive vaccinations
	4.) food storage not possible	- no storage facilities	- price changes cannot be taken advantage of - dry season very difficult	- some people have built small storage mud houses recently
Olbili female	1.) decreasing livestock numbers	- drought - diseases	- less milk - less opportunities for sale	- restriction of livestock sale
	2.) lack of income options	- no water for farming - livestock ownership not allowed for women	- not enough money to cover food needs	- decreasing food consumption in dry season - suggestion: starting small businesses

Table 18. Problem matrix for Risa

Focus group	Problems	Causes	Effects	Actions
Risa male	1.) prolonged drought	- less rain	- coping is difficult because of pressure on grazing area - livestock weak and die	- long migration - suggestion: boreholes
	1.) livestock diseases	- vaccination unavailable for some diseases	- livestock die	- use of herbs - consultation of agroverts
	1.) frequent livestock sale necessary	- need to cover expenses, especially school fees	- number of livestock reduces	- searching for other income options, e.g. farming
	1.) attacks through wild animals	- Amboseli National Park is near - resource competition is high	- livestock die	- fencing (but not possible for the poor)
	2.) livestock and food market access	- markets are distant	- transport to markets is expensive - food cannot be purchased even if money is there	- suggestion: establishment of local markets
	3.) livestock and food market price volatility	- many livestock sellers in dry season - animal condition changes	- less food can be bought with available money	- trying to sell when animals are healthy
	4.) lack of income options	- no water for farming - no wage labour - tourism decreases	- not enough money to cover food needs	- sending children to school in hope for future employment
Risa female	1.) food market access	- food markets are distant	- food cannot be purchased even if money is there	- establishment of local shops but starting capital is a problem
	2.) decreasing livestock numbers	- sale necessary to cover household expenses	- less security for the future	- preventing sale of all animals to ensure future survival
	3.) lack of income options	- no water for farming	- insufficient food and income from livestock	- keep household expenses at a minimum

As well as at the household level and in focus groups, key informants were asked about the causes of food insecurity in the region. The word cloud below illustrates the opinions of key informants with the most frequently mentioned term printed in the largest font and the least frequently mentioned term printed in the smallest font. The word cloud was created with the tool Wordle and comprises all reasons given by key informants[3]. As can be seen, lack of diversification was mentioned most frequently, followed by lack of water.

Figure 24. Buzzwords on the causes of food insecurity mentioned in key informant interviews

After the above presentation, the gathered data on stresses and risks and people's capacity to cope with them will be discussed in aggregate form and divided into the main themes emerging from the data.

4.4.1. Drought

As can be seen in the problem matrices, prolonged drought is among the leading concern for focus group participants in Risa and Olbili where dependency on livestock is high. Rain was perceived to have decreased and become increasingly unpredictable. Hence, migratory movements are difficult to plan as weather forecasts are reported to be non-specific to the area and therefore not used.

[3] This includes all general and community-specific key informants, excluding interviews with informants specifically on education.

Similar to focus group participants, key informants pointed out that droughts are major stress events because grazing land becomes scarce and water sources dry up which requires long migration. In all focus groups, migration was perceived as highly undesirable and increasingly difficult because of land privatisation and high population pressure.

As solution, focus group participants proposed drilling boreholes in order to decrease the need to migrate. However, even though this might facilitate water access for livestock, the quality of pastures during times of drought is unlikely to improve in this way.

Besides migration, focus groups expressed worries over decreased milk availability during the yearly dry seasons. To compensate low milk production, food consumption is usually reduced while livestock are sold to purchase food at markets. However, low livestock holdings and the need to preserve a minimum number of animals for the future make dry seasons increasingly difficult according to focus groups. This contradicts the view of one key informant (see word cloud) that holding on to assets would contribute to food insecurity since this seems to be an important strategy for future sustainability.

4.4.2. Diseases

In all male groups and one female group livestock diseases was raised as a major concern. Participants reported that vaccinations are expensive and not available for some diseases. Furthermore, migration to distant places was reported to increase the risk of diseases which probably reinforces the before mentioned resentment towards migration.

However, what is striking is that key informants did not mention livestock diseases at all (see word cloud). This suggests that key informants are either not aware of the problem or underestimate its impact on food security.

4.4.3. Wildlife conflict

When it comes to wildlife conflict, in all three male focus groups the threat of wild animals to livestock and also herders was mentioned. Prolonged drought and limited access to land and water

were said to enhance resource competition which leads to conflicts and raids. Contact with wildlife would also increase the risk of disease transmission which shows the interconnectedness of factors raised by focus groups.

Another issue that was mentioned in male focus groups was the Wildlife Conservation and Management Act 2013 which governs fines for killing wildlife and compensation payments if a person was killed by a wild animal. The act was well known to focus group participants but attitudes towards it were vastly negative due to issues such as corruption.

For instance, in Kalesirua one participant mentioned that "the government is slow to compensate for human losses to wildlife but fast to fine you for killing wildlife". This statement also exemplifies the overall notion among participants that they are neither heard nor valued by the government since a fine of KSH 20,000,000 applies for killing a lion, whereas they receive only KSH 5,000,000 as compensation for a family member lost to a wild animal[4]. In this way, participants felt neglected by the government which would value wild animals over their own life.

As ex-ante mitigation strategy to wildlife conflict, the male group in Risa claimed that some households installed fences to protect their enclosures. This was considered very helpful in preventing livestock raids through wild animals but hardly feasible for poorer households.

4.4.4. Market access & price volatility

In household-level interviews and focus groups in Risa, access to food and livestock markets was mentioned as core problem. Surprisingly, however, market access was not mentioned by focus group participants in the second most remote community, Olbili.

[4] The numbers were given by participants of the male focus group in Kalesirua and subsequently verified in the Wildlife Conservation and Management Act 2013. KSH 20,000,000 is the equivalent of approximately GBP 119,850 and KSH 5,000,000 is the equivalent of about GBP 29,960.

In Namelok, the main issue raised at the household level was hampered market access for selling agricultural products rather than buying food. This can be explained by the lower dependence on food purchases in the first place as most households cultivate themselves.

When it comes to price volatility, focus groups in Risa and Kalesirua mentioned that both food and livestock prices fluctuate widely throughout the year. In the case of food purchases, the female group in Kalesirua with most participants from the very poor wealth category claimed that they could not afford to buy food in bulk and thus make use of lower prices. In Olbili, lack of storage facilities was highlighted as an obstacle to benefit from lower food prices. The photograph in figure 25 shows a recently built food store of a household in Olbili.

Figure 25. Photograph of a maize store in Olbili

It is interesting to note that key informants additionally mentioned increased food prices. This was not raised by focus group participants in problem matrices, only subsequently when changes in the past ten years were discussed as will be demonstrated in section 4.6.2.

4.4.5. High expenses & lack of income

In focus groups in Risa, increased need for cash to meet expenses such as school fees was mentioned as one of the most pressing problems. At the same time, lack of income options was noted by focus groups in Risa and Olbili and in particular by women which is probably due to their exclusion from decisions on livestock sales. In order to acquire cash for their own disposal, women mentioned small business and farming as desirable diversification strategies. However, insufficient starting capital for the former and lack of water for the latter were reported as the main obstacles.

In household-level interviews in Olbili, lack of income was also mentioned by the majority of individuals while in Kalesirua, this issue was not mentioned explicitly, probably because of higher availability of wage labour. However, although the benefits of wage labour were recognised by focus group participants in Kalesirua, it was pointed out that wages are low and labour availability fluctuates, thus making income highly volatile.

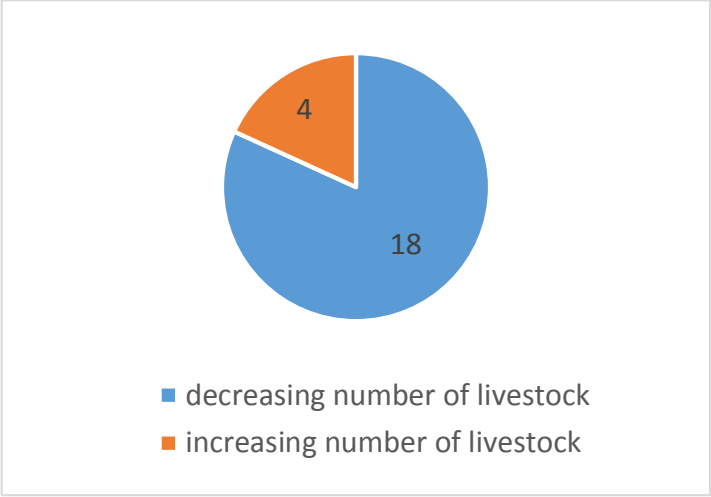
Overall, the perceptions of focus group participants and household-level interviewees corroborate the view of key informants on diversification as illustrated in Figure 24.

Interestingly, however, respondents of household interviews in the comparatively diversified community Namelok also mentioned income volatility because of varying farm yields which raises concerns over farming practices.

4.5. Effects on livestock ownership

In household-level interviews, respondents were asked whether their household had experienced a change in the number of livestock in the past 12 months. Figure 26 below illustrates that changes in livestock numbers were experienced by all of the 22 households having had livestock at the time of the interview or in the past 12 months. However, only four of them reported an increase which was achieved through animal purchase and reproduction by three households from the middle wealth level and through the receipt of animals as gifts by one poor household.

Figure 26. Number of households experiencing changes in livestock numbers in the past 12 months

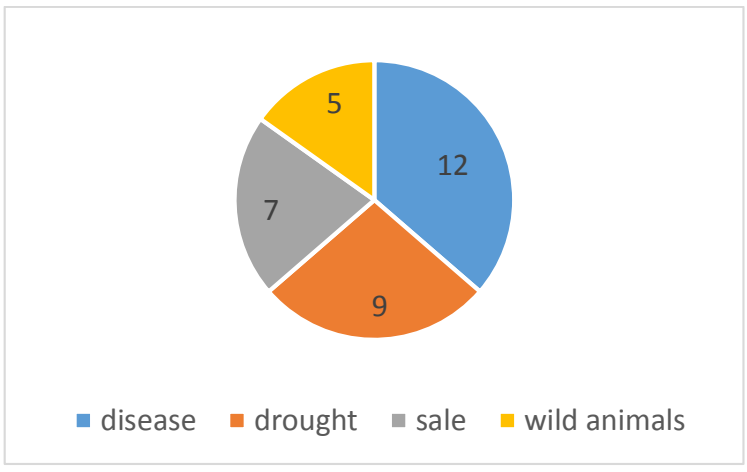


As illustrated in the chart below, the most frequently mentioned causes for decreasing livestock numbers are diseases, followed by drought, livestock sales and attacks through wild animals.

However, most of the stated causes are interrelated. For instance, animals are weaker during drought and therefore more susceptible to diseases. At the same time, attacks through wild animals increase during dry season due to high resource competition. These correlations are drawn from responses of household interviews.

In total, the stated causes mirror the stresses and risks discussed above and corroborate the notion that coping with them is difficult in view of the overall decreased livestock numbers.

Figure 27. Number of households stating the following causes for decreased livestock numbers



4.6. A retrospective

4.6.1. The impact of the 2009 drought

When household decision-makers were asked about the change of livestock numbers in the past 12 months, several respondents mentioned the 2009 drought in addition. In this way, the 2009 drought emerged as a topic and was incorporated in the interviews. 11 households were specifically asked about the effects of the drought on their household and without exception, all of them mentioned that almost all livestock was lost and none of them has managed to fully recover so far.

This is illustrated in table 19 which shows the changes in livestock numbers for one respondent from the middle wealth category (participant # 32). Similar figures were reported by other interviewees.

Table 19. Changes in livestock numbers of participant #32

Livestock	Before 2009	After 2009	Currently
Cows	100	2	10
Goats and sheep	150	2	50

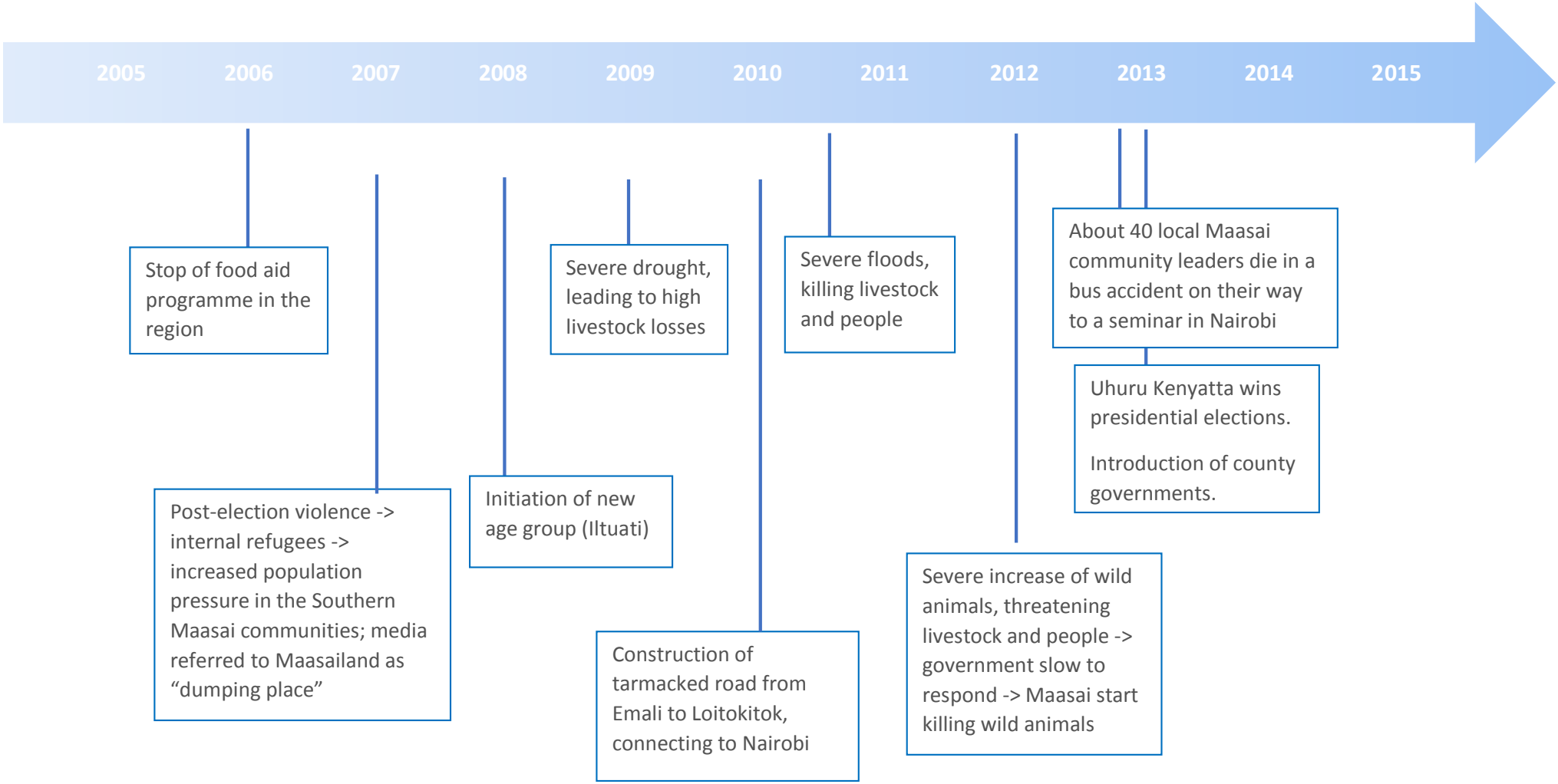
Strategies to recover livestock numbers after the drought included reproduction and trading, according to respondents. However, recovery was reported to be very difficult since cows give birth only once a year and animal trade produces low returns which was especially the case in the years after 2009 when livestock prices were very low. It was only richer pastoralists with other income sources who benefitted from these low prices and managed to restock their herds faster, according to interviewees.

Additionally, most of the households mentioned that the payment of school fees impeded their ability to rebuild herds because livestock have to be sold on a continuous basis. This claim was also made in two focus groups in Olbili and Risa.

Several key informants also mentioned the 2009 drought from which pastoralists struggle to recover. To capture other significant events of the recent past, three key informants established a historical timeline from 2005 to 2015 (see Figure 28 below).

The calendar reiterates several developments mentioned in focus groups, such as high population pressure, and thus provides important background information in order to understand the perceptions of people today.

Figure 28. Historical timeline of important events in the Southern Maasai communities from 2005 to 2015



4.6.2. Changes over time: Perceptions on the past ten years

To capture people's view about the changes of the past ten years, focus group participants were asked if they think that the overall situation has improved or deteriorated compared to ten years ago. Table 20 illustrates the consensus among participants that the situation today is more difficult which contrasts with the unanimous view of key informants[5] that the situation has improved. However, it has to be mentioned that two informants referred to the negative effects of price increases which was also mentioned in focus groups.

Moreover, it is important to note that most focus group participants regarded education as a positive development. However, participants claimed that ten years ago compulsory education for all children was less strict and therefore, the situation was easier because less school fees had to be paid. This illustrates an inner conflict of pastoralists who wish to benefit from education as it involves great promises for a better future but, at the same time, are burdened by its cost.

Table 20. Perceptions on the changes over the past 10 years

Respondent	Perception on changes	Reasons
Key informants	positive	- higher school enrolment now - more awareness on health and importance of education
Focus groups in Kalesirua	negative	- more unpredictable and less rainfall - more people in the area - life is more expensive - school is compulsory - more livestock diseases
Focus groups in Olbili	negative	- life is more expensive - droughts are longer - more livestock and human diseases - more people in the area - less livestock per person - migration more difficult because of privatisation of land
Focus groups in Risa	negative	- less livestock per person - school is compulsory - covering school fees is a burden

[5] This excludes education-specific informants

4.7. A prospective

After the retrospective on the past ten years, this section will look at people's hopes and aspirations for the future. At the household level, interviewees were asked what they would propose as the most successful strategy to combat household food insecurity. The table below shows that education was mentioned most frequently even though school fees were perceived as a burden in focus groups as outlined before. Diversification into farming was proposed as second most popular strategy but lack of water was mentioned as obstacle to do so and thus, the listed strategies are interdependent.

Interestingly, for both education and farming, respondents compared themselves to those who are educated or already cultivating which illustrates the significance of external influence. For instance, one interviewee in Kalesirua (participant #4) mentioned that "we send our children to school because we can see that those who are educated are better-off now." This also shows the great hope people place on education which will be investigated in more depth below.

Table 21. Proposed strategies for improving household food security

Proposed strategies	**# of individuals**
Education for children	10
Farming	9
Starting little business (e.g. vegetable trade)	7
Paid employment	2
Increase of livestock number	2
Better water access - for livestock - for people	 2 1
Better market access - for selling livestock products - for selling agricultural products	 1 1

4.7.1. Perceptions on education

In focus groups, views on education were further investigated and as pointed out earlier, education was perceived as a positive development but an expensive investment, especially when it comes to post-primary education (see table 22 below). For this reason, only very few would make it to the tertiary level, according to male and female groups in Risa. At the same time, the two groups considered tertiary level as absolutely essential for actual change since "secondary education has become almost meaningless" (statement of a female participant in Risa).

Table 22. Perceptions on education in focus groups

Community	Gender	View on education	Comments on education
Kalesirua	male	positive	- education is helpful but also very expensive - education has increased inequality; only the educated are well-off
Kalesirua	female	positive	- education brings freedom, especially for girls - secondary level absolutely necessary
Olbili	male	positive	- very positive - especially secondary education is expensive
Olbili	female	positive	- school meals important
Risa	male	positive	- hope is for paid jobs later on - distance to schools is a problem, especially for girls - tertiary level necessary but very expensive - only few proceed to tertiary education - increases inequalities
Risa	female	positive	- children might have negative influences at school (e.g. drug abuse) - especially secondary and tertiary education is expensive - highest level of education is mostly secondary - tertiary level necessary

In household-level interviews in Namelok, respondents also expressed essentially positive views on education but added that increasingly less herders are available because all children go to school nowadays. This suggests shifts in labour allocation which is illustrated in the following quote of a female respondent from the poor category. The statement additionally reflects far-reaching consequences on support networks.

Box 3. Quote of participant #35 illustrating the consequences of reduced herder availability

> "I used to be a member of a women's group where I saved the money that I earned from wage labour. But now, I am needed for herding our animals because all our children are at school. So I don't have my own income anymore and no reason to go the women's group."

Another respondent of the better-off wealth category in Namelok stated that these developments are inevitable as illustrated in box 4. This statement exemplifies the overall sentiment on the future of pastoralism in Namelok.

Box 4. Quote of participant #36 illustrating the perception on the future of pastoralism

> "Pastoralism will die eventually but that's okay. There are less people for herding because everyone is at school and less grazing pastures because of land privatisation – so how should it be possible in the future? And by the way, it is better to invest in education than in livestock because livestock can die during a drought, education does not."

However, in contrast to this statement is the expressed hope of several focus group participants that through salaried employment their children would invest into livestock of their family. This contradiction could be explained by the distinction people make between pastoralism as a way of life and livestock as wealth measure. In this case, it is likely that the quote in box 4 refers to the former and focus group participants spoke of the latter.

After education emerged as a theme, interviews specifically on education were held with key informants in order to further investigate this topic. Appendix F presents a short summary of the findings which provides additional background information, for instance on the cost of education, and raises concerns about post-primary prospects.

Chapter 5: Discussion

Having laid out the main results of the primary research above, this chapter synthesises these findings with the literature reviewed in chapter 2. The discussion will be structured according to the research objectives and aim at answering each of the research questions raised.

5.1. Research objective 1: Analyse food insecurity among Maasai pastoralists

Has the traditional diet based on livestock products changed?

The research findings demonstrate that milk is one of the most important staple foods while meat seems to be rarely eaten. This could be attributed to the relatively high cost of meat and its ceremonial value as noted by Sellen (2010) but also to the over-arching theme of seasonality.

When it comes to agricultural products, maize is an integral component of diets across wealth levels. However, other agricultural foods such as rice and beans are mostly found in the better-off wealth category which suggests that the consumption of these foods is determined by affordability rather than traditions.

Overall, the persisting importance of milk found in this research is consistent with the study results of Rutten (1998). The consumption of agricultural products, however, suggests that diets are not solely based on animal products which was also found by Fratkin (2001), Rufino et al (2013) and Galvin et al (2015). Yet, the lack of longitudinal data in this study limits the extent to which direct comparisons of diet compositions can be made.

What is the prevalence of food insecurity measured in terms of dietary diversity?

The individual DDS show low dietary diversity across wealth levels but in particular at the lower levels. Using the DDS to measure food insecurity as suggested by Hoddinott and Yohannes (2002), the high prevalence of food insecure individuals is alarming.

Compared to men, women in the lower wealth categories seem to buffer food stress since they eat less often and less diversely according to the research findings. This contradicts the study of Villa

et al (2011) which suggests that men are more likely than women to buffer household food insecurity. What is more, the findings of this research are in stark contrast with the claim of Holtzman (2002) that women could privilege themselves in food allocation.

Overall, the low dietary diversity found in this research raises concerns about the issue of "hidden hunger" as put forth by Fratkin (2001). Especially in the poorer wealth categories, the low consumption of vegetables implies respectively low vitamin levels. Thus, micronutrient deficiency is highly likely but further measurement is needed in order to determine exact deficiency levels.

Furthermore, this research found that food consumption varies considerably across seasons with the highest risk of food insecurity during the long dry season. Therefore, seasonality needs to be appreciated and requires longitudinal data to observe changes over time in more detail.

Are wealth levels correlated with dietary diversity?

As briefly indicated above, individuals in the lower wealth categories have significantly lower DDS than those in the better-off category. For instance, the score of females from the better-off category is almost double that from the very poor category. This suggests that the wealthier individuals are, the more diverse their diets become.

When comparing DDS of individuals whose households cultivate and those whose households do not, the latter group has significantly less diverse diets. Therefore, it can be argued that both wealth and farming are positively correlated with dietary diversity and suggest that the underlying obstacle for diverse diets is food access.

In contrast to these findings stands Sellen's (2010) study which finds that wealth is only weakly correlated with nutritional status.

Is low dietary diversity perceived as food insecurity by pastoralists?

Comparing DDS with the 1-5 ranking of perceived food insecurity, there seems to be weak associations only. Although most individuals with low DDS ranked their food insecurity to be high and vice versa, there are several outlier cases.

This weak correlation reflects the subjectivity of food security as pointed out by Maxwell and Smith (1992) but also suggests that low dietary diversity as an end result is not in the foreground for people when it comes to the ability to feed their families. This could be explained by the findings of Tache and Sjaastad (2010) that poorer households use consumption to smooth assets and therefore, low dietary diversity may not be perceived as a measure of current ability to feed one's family but rather as a coping strategy.

5.2. Research objective 2: Explore stresses and risks that affect pastoralists' ability to ensure food security

Which stresses and risks are experienced by pastoralists?

This research found that stresses and risks are high and include prolonged drought, wildlife conflict, livestock diseases, market access, price volatility, and increasing involvement in the cash economy because of high expenditure.

Especially in the communities with high dependency on pastoralism, Risa and Olbili, livestock-related issues such as prolonged drought and less rainfall were mentioned as core problems. The perception that rainfall has decreased mirrors the calculations of FEWS NET (2010) but contradicts the forecasts of the IPCC (Niang et al, 2014) of increased precipitation in East Africa.

Moreover, wildlife conflicts which are fuelled by increasing resource competition are widespread concerns according to the findings of this research and echo the study results of Hobbs et al (2008). Livestock diseases are another significant risk factor which are fostered by increased contact with wildlife according to focus groups and as argued by Boyd et al (1999).

Other sources of stress identified in this research include price volatility at food and livestock markets. Especially during the dry season, food purchases are necessary to compensate lower milk yields but during this time, purchasing power is low due to high food prices and low livestock prices, according to the seasonal calendar on page 43.

In comparison, the terms of trade in Kajiado County in Figure 8 suggest stark variations in purchasing power throughout the year rather than a fall in the dry season. However, this could be explained by the aggregation of market price data from the overall county of Kajiado which makes the figure non-specific to the markets of the study area in the division of Loitokitok, Kajiado South.

Furthermore, market access emerged as a core problem for the most remote community under study and for Namelok where people sought sale opportunities. At the same time, the increased need to participate in the cash economy, for instance to cover school fees, requires disposable income and appears as major stress factor for pastoralists.

Do different households experience these stresses and risks differently?

The research findings suggest that the stresses and risks summarised above do not affect all pastoralists equally because both risk exposure and the capacity to cope vary.

For instance, when it comes to price volatility, poorer pastoralists are more likely to be adversely affected by unfavourable terms of trade while others may be able to make use of price changes and benefit from them. As mentioned, this was particularly the case after the 2009 drought when better-off pastoralists were able to restock their herds more easily. With regard to food price volatility, lack of storage facilities and insufficient financial reserves are major obstacles for poorer households to make use of price fluctuations. These findings support the study of Manger (2000) who examined inequality within pastoralist societies.

Regarding wildlife conflict, this research found that some pastoralists installed fences to protect their livestock from attacks by wild animals. However, since this comes at a cost, poorer pastoralists are rarely able to afford them, according to focus groups.

Furthermore, inequalities can be observed between communities. For instance, pastoralists in Namelok benefited tremendously from the privatisation of land where irrigation has been set up and food can be grown. However, this is to the detriment of those dependent on communal land for livestock grazing which is also pointed out by Western and Nightingale (2003) and Hobbs et al (2008) who discuss both sides of land privatisation with winners and losers.

Overall, the variations between and within communities shown in this research highlight the need to recognise pastoralists as a heterogeneous group with different exposure to risks and stresses and coping capacity. At the same time, inequalities are likely to increase as a consequence which mirrors the concerns of Manger (2000) and Southgate et al (2000) among others.

5.3. Research objective 3: Assess the capacity to cope with stresses and risks

Which strategies are employed by pastoralists to cope with stresses and risks?

The primary strategies of pastoralists to cope with drought is migration with their livestock to find grazing pastures and water (see problem matrices on pages 52 to 54). However, this research finds that migration is becoming less successful since mobility is impeded due to land privatisation and decreased availability of herders due to schooling. Hence, pastoralists view migration as an undesirable and cumbersome activity.

A number of scholars such as Southgate et al (2000) and Forstater (2002) examined the constraint on mobility because of land use changes but only few point to the recent trend of decreased labour supply for herding resulting from education (Heffernan et al, 2001; Little et al, 2009). What is more, the negative perception on migration of pastoralists themselves is hardly considered in academic literature. Instead, Levine (2010) argues for promoting mobile pastoralism in a study on pastoralists in Uganda which runs contrary to the findings of this study. However, this could be explained by

the different characteristics of the areas under study which highlights again the danger of sweeping generalisations.

When it comes to wildlife conflict, fencing was considered as successful mitigation strategy but only few research participants were able to afford this as mentioned earlier. In the case of livestock or human losses to wildlife, the ability to claim compensation from the government is likely to depend on the empowerment of the individual or household which exemplifies the significance of making claims as one of the asset pillars in Swift's (1989) vulnerability framework. However, the underlying political will and ability to make rightful payments is of overall importance which mirrors the importance of the political environment in the framework of Webb and Rogers (2003) on page 14.

With regard to volatile prices, this research found that only a small minority were able to buy food in bulk when prices are low either because of limited storage facilities or savings as pointed out earlier. In this way, the majority of pastoralists are exposed to price fluctuations and consequently varying purchasing power.

Furthermore, this research finds that income sources other than livestock-related are in high demand among pastoralists which applies to women in particular since they are excluded from decisions over livestock. Especially in Olbili, lack of income opportunities was highlighted as a central problem in coping with high expenditures such as school fees and compensating low milk availability during the dry season. In Kalesirua, unstable and low income was perceived as major obstacle in planning ahead and covering expenses reliably.

In summary, this research finds that coping with stresses such as drought, wildlife conflict, volatile prices and increased involvement in the cash economy poses major challenges for pastoralists due to restricted mobility and resource access as well as limited income opportunities. As with exposure to stresses and risks, the capacity to cope varies and thus, stark heterogeneity but also inequalities can be suggested.

Thereby, will pastoralism as a livelihood strategy be capable of ensuring food security in the future?

The discussion above paints a compelling view that vulnerability to food insecurity is significant among subsistence pastoralists as stresses and risks are high but the capacity to cope is low. To put it in Chambers' (1989) words, the external side is on the rise, i.e. risk exposure for instance to drought due to climate change, while the internal side is restricted, i.e. the capacity to cope for example through migration due to impeded mobility.

One of the consequences therefore is a downward trend in livestock numbers as figure 26 and 27 indicate and argued by numerous scholars (Thornton et al, 2007; Little et al, 2008; BurnSilver, 2009; Ayantunde et al, 2011). Investigated within Swift's (1989) asset-based vulnerability framework, this corroborates the argument of high vulnerability to food insecurity due to decreasing immediate entitlement and buffer for future shocks.

In these terms, vulnerability is found to be lower among pastoralists with additional income sources because there is less reliance on livestock sales which confirms the findings of McPeak and Little (2005) and Little et al (2008). Yet, decreasing livestock numbers were reported across study sites, including the comparatively diversified community Namelok. This was explained by high education costs which head the list of expenditures in all four communities under study and mirror the findings of Heffernan et al (2001). Thus, it can be argued that education increases current vulnerability to food insecurity because covering its costs requires high numbers of livestock sale which consequently reduces herd sizes and restricts the capacity to recover from previous shocks, such as the 2009 drought.

Overall, the findings suggest that subsistence pastoralism as a livelihood strategy to ensure food security seems to be neither viable nor desirable for pastoralists themselves which is apparent in people's negative perception of migration and strong aspirations for non-pastoral strategies. These

included farming which is likely to further impede mobility and resource access of livestock, and education which limits labour supply for herding.

Hence, the interplay of "push" and "pull" factors as noted by Western and Nightingale (2003) seem to be in progress. On the other hand, livestock appears to remain an important measure of wealth which could be seen in the comparatively diversified community Namelok. These findings support the study of Heffernan et al (2001) who underline the significance of livestock rather than the pastoralist lifestyle which is a gap in most other literature on pastoralism.

Chapter 6: Conclusion

After the specific research questions were addressed above, this chapter will reflect on the overall research arguments and the implications of these in the wider debates on food insecurity. The chapter will conclude with suggestions for further research.

6.1. Reflection

While the prevalence of global hunger is persistently high, concepts and theories of food security have undergone radical development from a narrow focus on food supply to more encompassing approaches. With the recent advent of vulnerability concepts into food security studies, dynamics are increasingly appreciated and thus, this research focuses on vulnerability to food insecurity among pastoralists as they are considered as vulnerable group who practice their livelihood in variable environments. This approach is essential in order to capture the ongoing changes, stresses and risks in these environments and assess the prospects of pastoralism in enduring them.

The findings of this research are that food insecurity in terms of low dietary diversity is significant among the sampled population and positively correlated with wealth and engagement in farming. Similarly, vulnerability to food insecurity is illustrated by the downward trend in livestock numbers which follows from high exposure to risks and stresses and restricted capacity to cope with them.

This paints daunting prospects for the sustainability of pastoralist livelihoods which is underlined by the negative perceptions of pastoralists on the future of subsistence pastoralism. However, these perceptions most likely refer to pastoralism as a lifestyle since livestock seem to remain an important measure of wealth.

These findings are important as they contradict calls to support mobile pastoralism which appears neither viable nor desirable to pastoralists themselves. Also, these findings highlight the imperative to investigate food insecurity within forward-looking and dynamic vulnerability concepts as important trends might otherwise be missed. Thereby, the incorporation of people's perceptions is

absolutely essential and particularly important if efforts to address food insecurity are supposed to be successful in the long term.

For instance, because pastoralists greatly aspire to education while its costs constitute the highest share of expenditure which increases current vulnerability, interventions could be directed to 1) decrease stress exposure, i.e. the payment of school fees in this case, or 2) increase the capacity to cope with these expenditures, such as through the creation of income options, in particular for women. Based on the research findings, these strategies are promising in decreasing current vulnerability to food insecurity.

Overall, however, comprehensive approaches will be necessary to appreciate the complexity of people's livelihoods. Furthermore, the incorporation of people's perceptions is vital if the prevalence of hunger as well as hidden hunger is to decline.

6.2. Areas for further research

As pointed out earlier, areas for further research include education among pastoralists which lacks in-depth studies so far. As this research suggests that education with its high cost is likely to increase current vulnerability, the long-term impact merits further investigation. Thus, research is needed on the quality of education and eventual job opportunities in order to determine whether education can decrease vulnerability in the long run.

Appendices

Appendix A. Sample interview outline for key informants

Interview Outline

Key Informants Participant Number:

1. General

Gender: o Female o Male

Age:

Occupation:

2. Livelihoods

Are most of the pastoralists sedentary or nomadic?

Who usually owns land, men or women?

Who usually owns which kind of livestock?

Can both women and men inherit land and livestock?

Is cattle raiding an issue in this region?

3. Food Utilisation

What is the typical food eaten among Maasai pastoralists?

Do you think that the typical diet has changed? Why or why not?

4. Problems

During which months do Maasai pastoralists usually worry most about food? Why?

What do you think are the underlying reasons for this?

Which household members will be hit hardest by a lack of food in your opinion? Why?

5. Solutions

What is the strategy of your organization to tackle these problems?

What do you think would be the most effective strategy in your opinion?

6. Perception on changes over time

Do you think that the overall situation now has improved or deteriorated compared to 10 years ago? Why?

What is your view on the subdivision of land within group ranches?

Is there anything you would like to add?

Appendix B. Sample discussion outline for focus groups

Discussion Outline

Focus Groups

1. General Notes

Time and place of discussion:

Translator:

Number of participants:

Gender of participants:

Age groups of participants:

Ethnic groups:

Levels of education:

Main livelihoods:

Wealth levels:

2. Livelihoods

What are the main sources of income for your households?

Where do the biggest shares of this income go to? Can you rank them?

3. Discussion on Food Utilisation

What are the typical foods in this community?

Where do you get these foods from?

How does this change throughout the year?

What do you consider to be a good quality diet?

4. Problem Matrix (see sample table below)

Are there any problems in getting enough and the preferred food for your households?

Can you rank these problems according to their severity?

What were the causes for these problems?

Which effects do these problems have?

Which actions are taken to solve these problems?

What would be necessary to prevent these problems from happening again?

Problems	Causes	Effects	Actions

5. Perception on the changes over the past 10 years

Do you think that the overall situation now has improved or deteriorated compared to 10 years ago? Why?

Is there anything you would like to add?

Appendix C. Sample interview outline for household-level interviews

Interview Outline

Household Decision-Makers Participant Number:

1. General

Gender: o Female o Male

Age:

Ethnic group:

Marital status:

Level of education:

Type of household:

Number of total household members:

Thereof, number of children in the household:

2. Livelihood

What are the sources of income for your household? (Who contributes?)

Where do the biggest shares of the household income go to?

Does your household own land? If yes, how much?

Does your household own livestock? If yes, which ones and how many?

Which person in the household owns which livestock?

Which person in the household controls which livestock? Who decides when it is sold or bought?

Has the number of livestock changed over the past 12 months? If so, why?

3. Food Utilization

What is the main source of drinking water for your household? (Do you have to pay for it?)

What did you eat yesterday? (clarify number of meals, then move on to DDS)

What did you eat the day before yesterday? (clarify number of meals, then move on to DDS)

Who is the first person that eats in your household? Who is the last person?

4. Food Access

Where do you get your food from?

How does this differ throughout the year?

5. Perception on Food Security

From a scale of 1 to 5, how difficult or easy is it for you to feed your family with enough and the preferred food at the moment? (1 = very easy, 5 = very difficult)

Why is that?

6. Stability

Did you experience any unexpected negative events in the past 12 months? (e.g. diseases)

What effect did these events have on your ability to feed your family?

What did you do as a response?

7. Future Outlook

Have you taken any measures to make sure that your household has enough and the preferred food in the coming dry season? (e.g. savings, food storage)

What would you propose as most successful strategy to make sure that your household has enough and the preferred food in the future?

Is there anything you would like to add?

Appendix D. Sample template for individual dietary diversity scores

Food groups	**What foods have you eaten yesterday?**	**What foods have you eaten the day before yesterday?**
1) starchy staples		
- maize		
- rice		
2) dark green leafy vegetables		
- sukuma wiki		
3) other vitamin A rich fruits and vegetables		
- carrots		
4) other fruits and vegetables		
- cabbage		
- tomatoes		
5) organ meat		
6) meat		
7) eggs		
8) legumes, nuts, seeds		
- beans		
9) milk and milk products		
- milk		
Total dietary diversity score (sum of food groups 1-9)		

Source: adapted from FAO (2011)

Appendix E. Information and consent form

My name is Verena Donislreiter and I am currently studying for an MSc in Applied Development Studies at the University of Reading in the United Kingdom. As part of my postgraduate programme, I am carrying out research on food insecurity among pastoralists in Southern Kenya. The research is for my final dissertation and will contribute to my degree.

As part of this research, I invite you to participate in this interview. You have been selected because of your contact to the organisation YISOG. During the interview, notes will be taken. Any information received during this interview will be used for the purpose of this research only, and treated and stored confidentially. Your identity will not be revealed to anyone other than the interviewer and the translator. You are free to withdraw from the interview at any time you feel uncomfortable or unwilling to participate, and you do not have to specify reasons. Any contribution can be withdrawn at any stage and removed from the research if desired. If you wish to withdraw, please contact Verena Donislreiter (details below), quoting your participant number (see bottom of this page). The reference will only be used to identify the interview and will not reveal any other information about you.

If at any stage you wish to receive further information about the interview or research results, please do not hesitate to contact me:

Verena Donislreiter
Email: V. Donislreiter@student.reading.ac.uk
Mobile: 0711 972 493

By answering the interview questions you are acknowledging that you understand the terms of participation and that you consent to these terms. This application has been reviewed according to the procedures specified by the University Research Ethics Committee and has been given a favourable ethical opinion for conduct.

Participant Number: [ ]

Appendix F. Summary of research findings specifically on education

When education emerged as a theme during the course of the primary research, further investigation was carried out on the topic. In total, four primary schools and two secondary schools were visited and semi-structured interviews were held with staff members and a government officer of the Ministry of Education. The results of these interviews will be presented and discussed below and provide background information to the topic of education.

Obstacles to "free" primary education

Interviews with teachers and headmasters from four primary schools revealed that school fees are raised by the schools even though primary education is supposed to be free according to the 'Free Primary Education' government policy. It was claimed that the budget provided by the government would not be enough to cover school materials or hire enough teachers and therefore, levies ranging from KSH 500 per year to KSH 300 per month are imposed on parents, while additional activity or exam fees can apply.

In none of the primary schools visited were meals provided to the pupils even though classes run from morning until late afternoon. The headmasters were very concerned about this issue since pupils' performance would be adversely impacted by this. However, lack of government funding and the inability of parents to pay higher school fees prevented these schools from offering meals.

When asked about school meal provision, the officer of the Ministry of Education replied in his interview, only 22 out of 80 primary schools in his division would be part of a government school feeding programme due to lack of public funding. For the same reason, school fees were imposed on parents to cover costs such as additional teachers since "of course, government teachers are not enough".

When asked about the 'Free Primary Education' policy of the government, the officer stated "The word 'free', we don't pronounce it so much. It is cost-sharing." Thus, there seems to be clear

awareness of the issue of high costs for parents and lack of school meals for students but there were no signs of ability or intention to take action.

In this way, sending children to school is a costly venture for parents which explains why the interviewed pastoralists mentioned education costs as the highest expenditure (see chapter 4). At the same time, educational attainments might be impeded due to lack of school meals and inadequate teacher supply. Thus, the next section will look at transition to post-primary education more closely.

Further education

With regard to transition to secondary education, the headmaster of a primary school in Kalesirua estimated that 70% proceed to secondary education and 30% seek casual wage labour or get married. According to the interviewee, these percentages would be about equal for girls and boys.

In discussion with the headmaster of a secondary school in Namelok, however, gender differences emerged. The headmaster stated that in the first two years of secondary education, the girl-to-boy ratio is 2:3 and in the last two years 1:3. The reasons stated for lower enrolment and transition rates of girls were early marriages and pregnancies. When it comes to transition to tertiary education, the headmaster stated that only 4 out of 18 qualified graduates joined college because of high tertiary education costs.

According to a teacher interviewed at a girls' secondary school, out of 80 graduates last year, only one student proceeded to university and five to college. However, in contrast to the causes in the mixed-sex school, the reason given here were low grades which did not permit transition to tertiary education for the majority of students. Of course, this could have also been the case in the mixed-sex school but simply not stated by the headmaster who might have been concerned about the reputation of his school.

Overall, these interviews clearly indicate that there are severe barriers for students to proceed to secondary and tertiary education. The emerging issues include high cost and low marks. The latter

can probably be traced back to the low quality of primary education and consequently low performances, understaffed schools and overworked but underpaid teachers.

These findings are sobering in view of the high hopes focus group participants and interviewees at the household-level placed on education (see chapter 4). However, as pointed out in chapter 6, the topic merits further investigation, especially to determine whether and how investment into education pays off eventually and reduces vulnerability in the longer term.

References

Alwang, J., Siegel, P. B., & Jorgensen, S. L. (2001). Vulnerability: a view from different disciplines. Social protection discussion paper series. Vol. 115. World Bank. Washington DC.

Ayantunde, A. A., De Leeuw, J., Turner, M. D., & Said, M. (2011). Challenges of assessing the sustainability of (agro)-pastoral systems. *Livestock Science*, 139 (1), 30-43.

Baro, M., & Deubel, T. F. (2006). Persistent hunger: Perspectives on vulnerability, famine, and food security in sub-Saharan Africa. *Annual Review of Anthropology*, 35, 521-538.

Blackwell, P. J. (2010). East Africa's Pastoralist Emergency: is climate change the straw that breaks the camel's back?. *Third world quarterly*, 31 (8), 1321-1338.

Bohle, H. G., Downing, T. E., & Watts, M. J. (1994). Climate change and social vulnerability: toward a sociology and geography of food insecurity. *Global Environmental Change*, 4 (1), 37-48.

Boyd, C., Blench, R., Bourn, D., Drake, L., & Stevenson, P. (1999). Reconciling interests among wildlife, livestock and people in eastern Africa: a sustainable livelihoods approach. *Natural Resource Perspectives*, 45, ODI. London.

BurnSilver, S. B. (2009). Pathways of continuity and change: Maasai livelihoods in Amboseli, Kajiado District, Kenya. In Homewood, K., Kristjanson, P., Trench, P. (Eds.) *Staying Maasai?*. Springer New York, pp. 161-207.

Chambers, R. & Conway, G. R. (1992). Sustainable Rural Livelihoods: Practical Concepts for the 21st Century. *IDS Discussion Paper 296*. Institute of Development Studies (IDS). Brighton, UK.

Chambers, R. (1989). Editorial introduction: vulnerability, coping and policy. *IDS bulletin*, 20 (2), 1-7.

Chantarat, S., Mude, A., Barrett, C., Carter, M. (2013). Designing Index-Based Livestock Insurance for Managing Asset Risk in Northern Kenya. *Journal of Risk and Insurance*. 80 (1). 205-237.

CIA (2015). The World Factbook: Kenya. Central Intelligence Agency (CIA). Online at https://www.cia.gov/library/publications/the-world-factbook/geos/ke.html. Accessed on 29/08/2015.

Coast, E. (2002). Maasai socioeconomic conditions: a cross-border comparison. *Human ecology*, 30 (1), 79-105.

Coates, J. (2013). Build it back better: deconstructing food security for improved measurement and action. *Global Food Security*, 2 (3), 188-194.

Crotty, M. (1998). *The foundations of social research: Meaning and perspective in the research process*. Sage.

De Waal, A. (1989). *Famine that kills*. Oxford University Press.

Devereux, S. (2006). *Desk Review: Distinguishing between Chronic and Transitory Food Insecurity in Emergency Need Assessments*. SENAC/WFP. Rome.

Doss, C., McPeak, J., & Barrett, C. B. (2008). Interpersonal, intertemporal and spatial variation in risk perceptions: Evidence from East Africa. *World Development*, 36 (8), 1453-1468.

FAO (2002). *The State of Food Insecurity in the World 2001*. Food and Agriculture Organization of the United Nations. Rome.

FAO (2011). *Guidelines for measuring household and individual dietary diversity*. Food and Agriculture Organization of the United Nations. Rome.

FEWS NET (2010). A Climate Trend Analysis of Kenya—August 2010. Famine Early Warning System Network (FEWS NET). Online at http://www.fews.net/sites/default/files/documents/reports/fs2010-3074.pdf. Accessed on 29/08/2015.

FEWS NET (2011). Kenya Livelihood Zones Descriptions – March 2011. Famine Early Warning System Network (FEWS NET). Online at http://www.fews.net/sites/default/files/documents/reports/KE_livelihood_profiles.pdf. Accessed on 30/08/2015.

Foresight (2011). *The Future of Food and Farming. Final Project Report.* The Government Office for Science. London.

Forstater, M. (2002). Bones for Sale: 'development', environment and food security in East Africa. *Review of Political Economy*, 14 (1), 47-67.

Frankenberger, T. R., & Goldstein, D. M. (1990). Food security, coping strategies and environmental degradation. *Arid Lands Newsletter*, 30, 21-27.

Fratkin, E. (2001). East African pastoralism in transition: Maasai, Boran, and Rendille cases. *African Studies Review*, 44 (3), 1-25.

Galvin, K. A., Beeton, T. A., Boone, R. B., & BurnSilver, S. B. (2015). Nutritional Status of Maasai Pastoralists under Change. *Human Ecology*, 1-14.

GoK (2013). *Millennium Development Goals: Status Report 2013.* Ministry of Devolution and Planning. Government of Kenya. Nairobi.

GoK (2014). *State of the ASALs Report for the Medium Term ASAL Programme: Kajiado County*. Ministry of Devolution and Planning. Government of Kenya. Nairobi.

Grandin, B. E., Bekure, S., & Nestel, P. (1991). Livestock transactions, food consumption and household budgets. In Bekure, S. (Eds.) *Maasai Herding: An Analysis of the Livestock*

Production System of Maasai Pastoralists in Eastern Kajiado District, Kenya. ILCA (International Livestock Centre for Africa), Addis Ababa, Ethiopia, pp. 103-114.

Hedlund, H. (1979). Contradictions in the peripheralization of a pastoral society: the Maasai. *Review of African Political Economy*, 6 (15-16), 15-34.

Heffernan, C., Misturelli, F., & Nielsen, L. (2001). *Restocking and poverty alleviation: the perceptions and realities of livestock-keeping among poor pastoralists in Kenya*. Veterinary Epidemiology and Economics Unit, Department of Agriculture, University of Reading. UK.

Hobbs, N. T., Galvin, K. A., Stokes, C. J., Lackett, J. M., Ash, A. J., Boone, R. B., Reed, R.S. & Thornton, P. K. (2008). Fragmentation of rangelands: Implications for humans, animals, and landscapes. *Global Environmental Change*, 18 (4), 776-785.

Hoddinott, J., & Yohannes, Y. (2002). *Dietary diversity as a food security indicator.* Food and Nutrition Technical Assistance Project, Academy for Educational Development, Washington D.C.

Holtzman, J. (2002). Politics and gastropolitics: Gender and the power of food in two African pastoralist societies. *Journal of the Royal Anthropological Institute*, 8 (2), 259-278.

Huho, J. M., & Kosonei, R. C. (2014). Understanding Extreme Climatic Events for Economic Development in Kenya. *IOSR Journal of Environmental Science, Toxicology and Food Technology*, 8 (2), 14-24.

Kennedy, G., Nantel, G., & Shetty, P. (2003). The scourge of" hidden hunger": global dimensions of micronutrient deficiencies. *Food, Nutrition and Agriculture*, 32, 8-16.

Kimani, K., & Pickard, J. (1998). Recent trends and implications of group ranch sub-division and fragmentation in Kajiado District, Kenya. *Geographical Journal*, 202-213.

Kirkbride, M., & Grahn, R. (2008). Survival of the fittest: pastoralism and climate change in East Africa. *Oxfam Policy and Practice: Agriculture, Food and Land*, 8 (3), 174-220.

KNBS (2009). Kenya Population and Housing Census 2009. Kenya National Bureau of Statistics (KNBS). Nairobi. Kenya.

Krätli, S. (2001). Education provision to nomadic pastoralists. *IDS Working Paper 126.* Institute of Development Studies (IDS). Brighton, UK.

Levine, S. (2010). What to Do About Karamoja? Why Pastoralism is not the Problem but the Solution. Food Security Analysis of Karamoja. FAO/ECHO.

Little, P. D., Aboud, A. A., & Lenachuru, C. (2009). Can formal education reduce risks for drought-prone pastoralists? A case study from Baringo District, Kenya. *Human Organization*, 68 (2), 154-165.

Little, P. D., McPeak, J., Barrett, C. B., & Kristjanson, P. (2008). Challenging orthodoxies: understanding poverty in pastoral areas of East Africa. *Development and Change*, 39 (4), 587-611.

Little, P. D., Smith, K., Cellarius, B. A., Coppock, D. L., & Barrett, C. (2001). Avoiding disaster: diversification and risk management among East African herders. *Development and Change*, 32 (3), 401-433.

Lovendal, C. R., & Knowles, M. (2006). Tomorrow's hunger: A framework for analysing vulnerability to food security. *Research Paper No. 2006/119*, UNU-WIDER, United Nations University (UNU).

Malthus, T. (1798). An Essay on the Principle of Population, as it Affects the Future Improvement of Society, with Remarks on the Speculations of Mr. Godwin, M. Condorcet, and Other Writers. London.

Manger, L. (2000). East African pastoralism and underdevelopment: An introduction. In Manger, L. and Ahmed, A. (Eds.) *Pastoralists and environment: Experience from the Greater Horn*

of Africa. Organisation for Social Science Research in Eastern and Southern Africa (OSSREA). Addis Ababa. Ethiopia.

Maxwell, S., & Smith, M. (1992). Household food security: a conceptual review. In Maxwell, S. and Frankenberger, T. (Eds.) *Household Food Security: concepts, indicators, measurements.* IFAD and UNICEF. Rome and New York.

McPeak, J., & Little, P. D. (2005). Cursed if you do, cursed if you don't. In Fratkin, E. and Roth, E. (Eds.) *As Pastoralists Settle*. Springer US, pp. 87-104.

Moser, C. O. (1998). The asset vulnerability framework: reassessing urban poverty reduction strategies. *World development*, 26 (1), 1-19.

Mude, A. (2014). East African herders insure against drought: An impact narrative from Kenya and Ethiopia. *ILRI Research Brief 23*. ILRI (International Livestock Research Institute), Nairobi, Kenya.

Mwangi, T.W. (2013). *Exploring Kenya's Inequality.* National Report. Kenya National Bureau of Statistics (KNBS) and Society for International Development (SID). Nairobi. Kenya.

NDMA (2014). *Kajiado County. 2013 Short Rains Food Security Assessment Report*. National Drought Management Authority (NDMA). Nairobi. Kenya. Online at http://www.ndma.go.ke/images/assessments/kajiado_2013_sra.pdf. Accessed on 29/08/2015.

NDMA (2015). *Early Warning Bulletin for June 2015.* National Drought Management Authority (NDMA). Nairobi. Kenya. Online at http://reliefweb.int/sites/reliefweb.int/files/resources/Kajiado-June-2015.pdf. Accessed on 30/08/2015.

Neuman, W. L. (2006). *Social research methods: Qualitative and quantitative approaches.* Pearson. London. UK.

Niang, I., Ruppel, O.C., Abdrabo, M.A., Essel, A., Lennard, C., Padgham, J., & Urquhart, P. (2014). Africa. Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. In Barros, V.R., C.B. Field, D.J. Dokken, M.D. Mastrandrea, K.J. Mach, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, & L.L. White (Eds.) *Climate Change 2014: Impacts, Adaptation, and Vulnerability.* Cambridge University Press, UK and New York, USA, pp. 1199-1265.

Nori, M., Taylor, M., & Sensi, A. (2008). *Browsing on fences: pastoral land rights, livelihoods and adaptation to climate change*. Issue paper No. 148. International Institute for Environment and Development (IIED). UK.

Oiye, S., Simel, J. O., Oniang'o, R. & Johns, T. (2009). The Maasai food system and food and nutrition security. In *Indigenous Peoples' Food Systems: The many dimensions of culture, diversity and environment for nutrition and health*. FAO Food and Agriculture Organization of the United Nations. Centre for Indigenous Peoples' Nutrition and Environment, Rome, Italy, 231-249.

Oshaug, A. (1985). The composite concept of food security. *Introducing nutritional considerations into rural development programs with focus on agriculture: a theoretical contribution.* Institute for Nutrition Research, University of Oslo.

Peluso, N. L. (1993). Coercing conservation? The politics of state resource control. *Global environmental change*, 3 (2), 199-217.

Reardon, T. (1997). Using evidence of household income diversification to inform study of the rural nonfarm labor market in Africa. *World development*, 25 (5), 735-747.

Rufino, M. C., Thornton, P. K., Mutie, I., Jones, P. G., van Wijk, M. T., & Herrero, M. (2013). Transitions in agro-pastoralist systems of East Africa: Impacts on food security and poverty. *Agriculture, Ecosystems & Environment*, 179, 215-230.

Rutten, M. M. (1998). Land tenure frontiers and food security among Maasai pastoralists in Kenya. In Bruins, H. and Lithwick, H. (Eds.) *The Arid Frontier*. Springer Netherlands, pp. 185-208.

Scoones, I. (1998). Sustainable rural livelihoods: a framework for analysis. *IDS Working Paper 72.* Institute of Development Studies (IDS). Brighton, UK.

Sellen, D. W. (2010). Mobility, animal source foods and micronutrient needs among African pastoralists. *Social Biology and Human Affairs*, 75 (2), 27-49.

Sen, A. (1981). Ingredients of famine analysis: availability and entitlements. *The quarterly journal of economics*, 433-464.

Southgate, C., Hulme, D., Woodhouse, P., & Bernstein, H. (2000). Uncommon property the scramble for wetland in Southern Kenya. In Woodhouse, P., David, H., Bernstein, H. (Eds). *African enclosures? The social dynamics of wetlands in drylands*. James Currey, Oxford, pp. 73-118.

Swift, J. (1989). Why are rural people vulnerable to famine?. *IDS bulletin*, 20 (2), 8-15.

Tache, B., & Sjaastad, E. (2010). Pastoralists' Conceptions of poverty: an analysis of traditional and conventional indicators from Borana, Ethiopia. *World Development*, 38 (8), 1168-1178.

Thornton, P. K., Boone, R. B., Galvin, K. A., BurnSilver, S. B., Waithaka, M. M., Kuyiah, J., Karanja, S., Gonzáles-Estrada, E. & Herrero, M. (2007). Coping strategies in livestock-dependent households in east and southern Africa: a synthesis of four case studies. *Human Ecology*, 35 (4), 461-476.

Villa, K. M., Barrett, C. B., & Just, D. R. (2011). Whose fast and whose feast? Intrahousehold asymmetries in dietary diversity response among East African pastoralists. *American Journal of Agricultural Economics*. 1-20.

Wangui, E. E. (2008). Development interventions, changing livelihoods, and the making of female Maasai pastoralists. *Agriculture and Human Values*, 25 (3), 365-378.

Webb, P., & Harinarayan, A. (1999). A measure of uncertainty: The nature of vulnerability and its relationship to malnutrition. *Disasters*, 23 (4), 292-305.

Webb, P., & Rogers, B. L. (2003). *Addressing the" In" in food insecurity*. *Occasional Paper No. 1*. Office of Food for Peace. USAID, Washington D.C.

Western, D., & Nightingale, M. D. L. (2003). *Environmental Change and the Vulnerability of Pastoralists to Drought: A Case Study of the Maasai in Amboseli, Kenya*. United Nations Environmental Program (UNEP). London.

Wildlife Conservation and Management Act 2013. Part V & XI. Government of Kenya.

Wolcott, H. F. (1994). *Transforming qualitative data: Description, analysis, and interpretation*. Sage. USA.

World Bank (2015). Kenya: Overview. Online at http://www.worldbank.org/en/country/kenya/overview. Accessed on 20/08/2015.

World Weather Online (2015). Average Rainfall for Kimana, Kenya from 2000 to 2012. Online at http://www.worldweatheronline.com/Kimana-weather-averages/Rift-Valley/KE.aspx. Accessed on 20/08/2015.

Yaro, J. A. (2004). Theorizing food insecurity: building a livelihood vulnerability framework for researching food insecurity. *Norwegian Journal of Geography*, 58 (1), 23-37.

Young, E. M. (2012). *Food and Development*. Routledge. London/New York.

Zwaagstra, L., Sharif, Z., Wambile, A., de Leeuw, J., Said, M.Y., Johnson, N., Njuki, J., Ericksen, P. & Herrero, M. (2010). An assessment of the response to the 2008-2009 drought in Kenya. A report to the European Union Delegation to the Republic of Kenya. ILRI (International Livestock Research Institute), Nairobi, Kenya.