

**NETHERLANDS CLIMATE CHANGE ASSISTANCE PROGRAMME (NCAP) IN
TANZANIA**

**Analysis of Technical and Policy Options for Adaptation to
Consequences of Climate Change for Tanzania**

**Gender, Poverty and Food Security in Relation to Climate
Change Impact and Adaptation, a case of Kilimanjaro Region**

By
Hubert E. Meena
and
Samsam Zahra Sharif

**CEEST Foundation,
P.O. Box 5511,
Dar es Salaam, Tanzania.
Tel: +255 22 2667569,
E-mail: ceest@ceest.co.tz**

March 2008

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1 Introduction

Gender refers to the social constructed roles, behaviours and activities that a particular society considers suitable for men and women. Various roles and behaviours may give rise to **gender inequalities**, i.e. differences between men and women that systematically favour one group. In turn, such inequalities can lead to inequities between men and women in terms of wealth, leadership, health status, access to food, access to education, access to health care and other services.

In most societies, women have lower social status than men, producing unequal power relations. For example, women have lower status in families, communities and society: They have less access to and control over resources and they have less of a say in decision-making than men. These factors have led to a systematic devaluing and neglect of women's opportunities and ending up in unbalanced entitlement to women while they carry heavy load of work of their families.

1.1 Gender situation in Tanzania

The social roles in Tanzania differ from region to region and from one tribe to another. Gender division of labour also varies similarly, for example in some tribes it is a responsibility of men to fetch water, look for/find fire wood, head the livestock, milk the cows etc while in others it is women's responsibilities.

1.1.1 Gender situation in Kilimanjaro Region

The major factor that causes gender inequality in Kilimanjaro region is the ownership and access to land. The Chagga land tenure does not allow women to inherit land therefore land is entitled to men only. Recently, the government has passed a law that make couples own the land equally as soon as they get married. However, many families don't recognize it or are not aware of this law, while some knows but still difficult to act.

It is also known that in this region when a man dies there is a custom in many Chagga families that the widow is taken care by one of the husbands' brother, he is then responsible for all what is happening in the family. This is done without even thinking of diseases that killed the husband; as a result diseases like HIV/AIDS have been transmitted to innocent people without knowing.

In some cases when a husband dies, the relatives to the man especially brothers to the husband would take all the properties and leave the woman without any resources as a result the woman is left out suffering with the children. In Kilimanjaro region divorced women are forced out of their land so they go and live with her parents,

In general gender inequalities in Chagga tribe directs big burden of farm work as well as domestic work to women. But when it comes to selling the farm produce, men have gone to the extent of selling crops like maize, beans and bananas, which formerly were for women, and this is attributed to the prolonged dry spell caused by the climate change that affected coffee production as well as the falling world coffee prices.

1.2 Background of Kilimanjaro Region facts and figures

The Kilimanjaro region is located in the Northeast of the country sharing a border with Kenya. The administrative centre is the town of Moshi, where the study was based. It has an area of 13,209 km², making it the smallest region in Tanzania. The region is dominated by Mount Kilimanjaro also referred to as the peak of Africa with heights reaching 5,895 metres. Kilimanjaro region has a population of 2,097,166, giving a population density of 159 persons per square kilometre. The population density varies from 650 people per square kilometre in the highland Chagga gardens, to below 50 people per square kilometre in the lowland plains making the region one of the most densely populated areas in Tanzania (National Bureau of Statistics, 2002).

There are six districts in Kilimanjaro region; Rombo, Mwanga, Same, Hai, Moshi Rural and Moshi urban. Rombo, one of the study areas, is located in the East of Kilimanjaro region, covering 1,442 Km² with a population of 417,602; the population per square kilometre is 290. The other two study areas, Marangu and Old Moshi are both in Moshi Rural district. Moshi Rural land area covers 1,713 Km² and has a population of 504,287; giving a population density that is slightly higher at 294 people per square kilometre. The population growth rate is also slightly higher at 1.9 per cent but the average household size is lower at 5.4 persons (National Bureau of Statistics, 2002).

Table 3.1: Kilimanjaro Region demographics

Area	Population	Population density (per km ²)	Annual population growth	Average household size
Rombo	417,602	290	1.6%	5.6
Moshi Rural	504,827	294	1.9%	5.4

Agriculture accounts for 70 per cent of GDP for the region, where it is largely subsistence, 70 per cent use less than 25 per cent of their livelihood time budget for non-subsistence activities. Kilimanjaro region also has the highest per cent of literate rural population (86 per cent) and the difference between male and female literacy is the lowest in the country (3 per cent). Ninety per cent of the region's population have roofs of modern materials and ninety eight per cent have toilets. Lighting is largely by hurricane lamps but the regions also have the highest per cent of households in the country with electricity and rank the second highest with access to piped water at 50 per cent (National Bureau of Statistics, 2002).

The rains in Kilimanjaro region come from the Southwest; therefore those who have West-facing land receive greater rainfall, making this the best lands for Chagga gardens, or kihamba. Those further East have less rainfall and annual rainfall reaches a maximum of around 3,000 mm and is greater on the higher slopes (Thompson et al. 2002).

There are two distinct rainy seasons: the long rains from March to May forming the main rainy season; and the short, but heavy rains centered on the month of November of the small rainy season. The driest period falls into the months from July to October, while April and May are the wettest months (Soini, 2005)

The upper areas of Mt. Kilimanjaro that lie above the 2,700 metres fall within Kilimanjaro National Park. Towards the lower end of the park there is a forest belt between 1800 and 3100 m.a.sl. Below this is the study area, where three distinct ecological zones can be identified. These are a highland (where the Chagga home gardens, or Kihamba, are located) a midlands and a lowlands. Table 3.2 shows some of the main differences between these areas.

Table 3.2: Kilimanjaro inhabited ecological zones

Area	Altitude	Main crop	Rainfall/mm
Highlands/ Kihamba	1200-1800m	Coffee/bananas	1200-2000
Midlands	900-1200m	Maize/beans	1000-1200
Lowlands	<900m	Maize and livestock	400-900

1.3 Chagga livelihood systems

After the First World War coffee demand increased and consequently production increased. This was because the settlers on Mount Kilimanjaro took advantage of the railway system that ran to Tanga and Mombasa, in Kenya and turned the grazing area into coffee plots. By 1923, the British encouraged the farmers to increase production and by 1933 about one third of families on Mount Kilimanjaro were growing coffee.

Over the following years, profits from coffee were used not only to improve farming and irrigation system but also roads, schools, dispensaries and other infrastructure. This enabled the Chagga to educate their children, so they could send their children to university in other countries like Uganda and Kenya. This led to the Chagga becoming the most educated tribe by Independence (Coulson, 1982).

The homegarden, or kihamba usually consists of a wood and mud house, or stone house for the better off, and generally found on the upper part of the study area. The main crops on the Kihamba are coffee and bananas, with different varieties of other crops that are intercropped. Trees are also planted and used to provide shade for the coffee, or kept as fences for mulch and used for their anti-pest properties. More importantly trees are grown for firewood and timber. When a farmer gets wealthy, the first livestock usually owned would be hens. These can be kept in cages, however free range is usually more widely practised. If the farmer is wealthier livestock such as cows, goats and pigs are kept in stalls, where the fodder grasses are sometimes grown as the fence surrounding the compound and used as animal feed. Beekeeping is also widely practised and may be used as another source of income (Soini, 2005).

Traditionally the Chagga would also have a lowland farm (Soini, 2005) also known as a shamba. Since farmers would be pre-occupied with the Kihamba most of the year, crops that did not require much attention, such as maize and beans, would be planted as supplementary crops on the shamba. These would be planted before the long rains from March to August and if irrigation was possible again before the short rains. However, today crops such as sunflower used for oil, and millet used for the local brew, also known as Mbege, are also widely grown.

The homegarden is owned by a family and traditionally the sons would be allocated a piece of the garden. The system was viable for some time however the population has been increasing dramatically. Population density in the 1920's was 26 people per square kilometre (Soini, 2005), however this figure has more than tripled to 300 per square kilometre (Mboline et al, 2003).

This has led to several consequences. The size of kihamba has continuously decreased with every generation (Fernandes et al. 1984) and thus threatening the allocation system. Families began to allocate the Kihamba land to the last son, whilst the rest would be allocated part of the lowland shamba or alternatively seek work in the town. This new allocation system would work temporarily; however as more and more people took over the lowland shamba, it led to more demand for land. This led to the cultivation of more marginal land and the disappearance of the savanna grassland especially those used for grazing by the Maasai tribe, which was taken up as a shamba for production (Soini, 2005).

1.4 Food security in Tanzania today

There is no detailed information available on food security in Tanzania or Kilimanjaro region that is completely up to date. The most up to date information that is available is from regional famine early warning systems, so this will be looked at briefly.

USAID's Famine Early warning system (FEWS) reported in February 2007 that the food security outlook for Tanzania was generally good, and that Tanzania was "generally food secure" and that food security was "expected to improve through July" (FEWS, 2007:1). It did say that "localised areas of food insecurity exist" (FEWS, 2007: 2) and forecasted that in a worst case scenario some districts (including in Kilimanjaro region) could experience moderate food insecurity. The UNFAO's Global information Early warning system report for May 2007 repeated much the same information (GIEWS, 2007).

1.5 Vulnerability

There is much debate about the definition of vulnerability. Adger defines vulnerability as "the state of susceptibility to harm from exposure to stresses associated with environmental and social change and from the absence of capacity to adapt" (Adger, 2006: 268). This set of definitions is of greater use since social factors contribute to disaster risk. For example, one such factor is wealth. Wisner et al describe how, despite the fact that, although the

wealthy and poor may be exposed to the same hazard, wealthy groups are less vulnerable as their housing is likely to be more resistant, they have savings and insurance and are more mobile (Wisner et al, 2004). However, poor people exposed to the same hazard who lack such safeguards may suffer more severe consequences from the same hazard and are therefore more vulnerable.

1.6 Adaptive capacity

A key component of vulnerability is adaptive capacity. This is the flexibility and the ability of systems to learn in response to shocks and stress (Gunderson and Holling, 2002). Human adaptation, in natural science is how the species adapt reactively to environmental change. On the other hand, humans have the ability to plan ahead and to deal with these changes. Therefore humans can incorporate these risks and strategize in order to actively adapt to known future risks.

Communities have different levels of adaptive capacity that allow them to either respond to hazards or to prevent a potential hazard. Since vulnerability and resilience are related to adaptive capacity (vulnerability as lack of adaptive capacity, resilience as the positive ability to cope and adapt), communities with greater adaptive capacity face a lower risk of disaster. One approach aimed at reducing this risk is through diversification. This allows the community to have a wide range of coping options that seek to reduce hazards (Quarantelli, 1998).

Certain properties of climatic events such as floods can also potentially affect the way in which adaptation takes place. These are the duration, speed of onset and frequency (Crosson and Rosenberg, 1991). Firstly, the duration of such events can significantly affect peoples' adaptation. Disasters that inflict an area for a long period of time will cause more damage to both the people and the community as a whole. However such a disaster will create more opportunity for the people to adapt than a shorter disaster event. For example, longer lasting events such as drought allow people more time to make plans and adapt, for example by cutting down on meals when if a drought looks likely to lead to food shortage. Secondly, the speed at which the disaster event takes place will also affect adaptation. For example sea level rises take a longer period than flash floods. Therefore the community have the opportunity to adapt better to slower onset disasters, and will be able to plan better than for disasters that occur suddenly, as they are less predictable. Finally, the frequency of the disaster can also affect adaptation. The cumulative frequency of a disaster will command a different approach to adaptation than a single event of a disaster.

One particular factor that may affect coping capacity may be gender. Eriksen et al (2005) show how women in Kenya and Tanzania may be excluded from carrying out certain coping strategies. They show how many of the most profitable sources of off-farm income, such as stonemasonry or running a shop, require a sustained period of time to be committed regularly. Because women had to take care of household chores and look after children, they were unable to spare such continuous periods of time and were therefore

excluded from many favourable coping strategies. Gender has also been found to significantly affect available coping strategies in other studies (Campbell, 1999; Fratkin and Smith, 1995). For example, Campbell found that “the availability of these options differs according to a person’s age, gender and socio-economic status” (Campbell, 1999: 377).

Gender does not only affect available coping strategies, it may also affect the level of care and allocation of resources among a population. Gender and poverty therefore may place significant limitations on the availability of assistance and coping strategies, but this is not to say that it is the only limitation, as the cited studies indicate.

1.7 Resilience

Resilience can be defined as “The capacity of a system, community or society potentially exposed to hazards to adapt, by resisting or changing in order to reach and maintain an acceptable level of functioning and structure. This is determined by the degree to which the social system is capable of organizing itself to increase this capacity for learning from past disasters for better future protection and to improve risk reduction measures” (UNISDR, 2005: 4).

Resilience may be particularly important in the context of climate change since it emphasises the ability to build up resilience in order to cope with future events. Climate change may increase the frequency and intensity of natural climatic events that trigger disaster (Glantz, 1992). This means that in order to cope with more extreme events associated with climate change, building resilience is particularly important. This is because the focus of resilience is on more than just coping with current situation. It is about actually building adaptive capacity to help getting through unforeseen future events with no long-term adverse effects.

2 Methodology

The background above has discussed a range of issues, from vulnerability and resilience to adaptive capacity. One important theme is that of food security, gender and poverty, and the factors that lead to food insecurity. As the adaptation and coping in the above background shows, there are a complex range of factors at an individual or household level which affect the available coping mechanisms and in turn affect vulnerability and resilience to food insecurity. This study aims to explore such factors further, so a range of research questions concerning food security have arisen.

The main aim of this study under the NCAP is to examine factors that cause vulnerability, and affect resilience to food insecurity, both within and from outside the household level, in Kilimanjaro region, specifically in relation to gender and poverty issues and its hindrances in coping mechanism

The major objectives of the project were to find out how the following affect vulnerability and resilience to food insecurity by analysing the following:

Opportunities and constraints (outside community level):

- Market conditions
- Climate change play
- Local geography, rainfall, population
- Role of government institutions – e.g. healthcare

Strengths and weaknesses (factors within household/community level)

- Agriculture – access to land, farming methods and choice of crops.
- Social context of Chagga society – e.g. How do Chagga customs affect food security, how social institutions build resilience,
- Employment opportunities
- Access to water – drinking/irrigation
- The role of gender aspects

The methodology chosen was part quantitative and part qualitative. Having a methodology with two theoretical perspectives provides a fuller picture of reality than either one alone. It also recognises the limits of both, in that neither methodology can fully capture reality, allowing conclusions to be realistic as well as representative of reality.

2.1 Research methods, including sampling strategy and design

Questionnaires were used as the method of collecting the quantitative (and some qualitative) data. More than 1000 sample household survey carried out with the Kilimanjaro region (Rombo and Moshi Rural districts) under the supervision of CEEST Foundation (Centre for Environment, Energy and Technology), with assistance from the university students.

The CEEST questionnaire was quantitative and very structured, with a high level of standardisation. All the answers were numbered which made it easier to input the data using various data entry packages and to analyse it statistically.

2.1.1 Sampling strategy and design

The aim was to achieve a sample size of 1000 households in three areas making up the target population on the vertical axis of the mountain, middle (Old Moshi), East (Marangu) and further East (Rombo). The sample also covered three aspects of the mountain in each area, the top area to the national park boundary, middle and also the low land farms. This sample population was chosen as it is known that livelihoods in the area vary by altitude (affecting crop varieties in particular) and by area (some areas have better infrastructure than others), so this sample population would allow a fair representation of the area as a whole, and account for differences between areas.

Collecting the sample entailed going through several villages along the aspect. A team of local enumerators was hired, as they would know the area and be culturally sensitive, allowing better data to be obtained. The sampling strategy was to ask the questionnaire at every third house encountered. This was because no maps or information about the population exist, and houses are not situated in any particular pattern meaning that there is no known list of households to choose a random sample from in advance, and that in the circumstances this was the most random method possible. Enumerators were dropped far enough away from each other that they would not duplicate responses.

Once a household was selected, it was decided to read out the questions and answers to the respondents and they would select an answer. This would save time, as the enumerators were familiar with the questions, which avoided the respondents taking out a lot of their time out from farming. Also some of the respondents were not educated enough to read and write, so it also ensured consistency and accuracy in the way answers were recorded, as enumerators received training.

Each question addressed one issue only, chosen as being relevant to the research aims and objectives of the overall project, although only a proportion of the 1000 sample questionnaire were relevant to this study. The questions were formulated in Kiswahili and tested for relevance, simplicity, precision and regularity. Each question had four or five options, and respondent were expected to choose only one of these possible options to allow statistical analysis. Some questions had verbal scales, where the respondents chose the extent to which they agreed with a particular statement, although most had a set of options chosen as the most likely responses by the local CEEST staff.

A pilot study was done to ensure the questions were suitable and relevant and also to find out whether the set of answers for a particular question were comprehensive, or if more categories should be added. It was also to check that the questions ran in a structured manner and did not take too long to complete (more than one hour would be considered unfair to expect respondents to sit through). The pre-test was done in Uru, Old Moshi, an area which has similar characteristics, but very much away from the study area so as to avoid double sampling. The pilot study gave the enumerators the opportunity to see how the questionnaire was to be conducted, and allowed any issues they had to be ironed out so the recording of answers was consistent. It also highlighted any changes that should be done to the questionnaire, which was revised accordingly. The final draft was then done, for example spelling mistakes and so on.

Finally, as the survey was being carried out, informal interviews with respondents were carried out where respondents were keen to talk about a particular issue, again in Kiswahili. These allowed a good general understanding of the issues that were important to people in the area, which guided additional research to the CEEST questionnaire, which aimed to more fully understand what causes food insecurity in relation to gender and poverty in the area.

2.2 Additional questionnaire (Description, justification and limits of Method)

The second questionnaire was devised to provide additional information not covered by the main questionnaire. This is because several issues about food security in particular in the context of gender, were not addressed by the main questionnaire but arose as significant in the course of research. Therefore an additional, structured questionnaire was formulated to try to answer these issues. It was addressed specifically to women as questions concerned women's daily activities their role in subsistence production. Some questions were of a closed, quantitative nature whilst others of an open, qualitative nature. This is because the closed questions were needed to confirm the issues that the first questionnaire indicated were potentially significant but did not fully cover. The open ended questions were there to find out what other unforeseen issues were important, and to provide greater depth on issues that closed questions could not fully cover.

2.2.1 Sampling strategy and design

The additional questionnaire was added to the main survey, with a sample size of 150. The sampling strategy was therefore exactly the same as that described above. [The design of the questionnaire and a translation of the questions asked can be found in the Appendix.](#) The aim of these questions was to find out more about subsistence production, and the effects this might have on the quality of food people consumed.

2.3 Focus groups (Description, justification and limits of method)

Focus groups were chosen as a method as in depth knowledge about food security and gender needed to be collected. This was because, during the initial research period, it became obvious that gender and marital status were massive factors in food security. Therefore the focus group was chosen as a method to address this problem and bridge the gap. This is because focus groups can provide far more detailed qualitative information, and can give information on social issues that quantitative data cannot reveal.

2.3.1 Sampling strategy and design

The disadvantage of the main questionnaire was that it failed to specifically deal with the views of women, and also the views of women of different marital status. For example, although it could be analysed by marital status, questions were not formulated specifically with this in mind. Also, the main questionnaire is only asked to the female or male of the house. This means that a lot of the divorced widowed or separated women who may end up living with their parents were not represented fairly in the main sample.

The sampling method was therefore purposive, in order to make up for these deficiencies. Six women were brought together in each of the three research areas of Marangu, Old Moshi and Rombo. In each focus group, this included two married women, two widowed and two divorced or separated women. Help was sought from the village representative as

it was difficult and also a sensitive matter to ask them to carry out a focus group interview, and they would know people to approach for sampling. Although this had a danger of introducing bias into the survey as the respondents were chosen by a local representative, in the circumstances this was judged to be the only way to gather such a group, as public advertising etc, would have been insensitive and allowed people who had no interest to know that such women were being consulted, scaring away people who might have agreed had they been approached personally by someone they knew.

Questions were formulated to try and discuss mainly the issues the women faced in everyday life concerning how they try to achieve food security not only for themselves but also their children. The focus groups were semi-structured and carried out in Kiswahili; with topics chosen for discussion in advance but without any set of questions. This allowed the women to discuss matters freely and choose the issues for discussion that were most important to them, meaning the focus groups were carried out in a strongly participatory manner. The women chosen knew each other so that it can encourage discussion and also help the discussions run smoothly and also allow different views to be represented in the most honest way possible. It also allowed the women to interact and discuss with each other different viewpoints and evaluate them.

The focus group discussions needed careful recording to avoid bias in what was noted. Therefore two women researchers had to be at the discussions. One guided all the discussions whilst the other did the manual recording. This was by tape if the women agreed; otherwise it was noted as fully as possible.

2.4 Key Interviews (Description, justification and limits of method)

The final method of data collection was unstructured key interviews with local experts. It was decided to concentrate on information about nutrition and the factors involved in the three study areas. This was partly because the three study areas have very different environments, and also there was an obvious difference in wealth as well as crop output in the study areas. It was therefore necessary to interview the local health clinics in the three study areas to investigate how factors in food security differed. The main limit of this method is that such officials may not gain an accurate picture of food security because what they record at clinics may not be representative of the population. People often have to pay for health services, and malnutrition is a source of shame in Chagga culture, so it is likely that such officials may not know the full extent of any nutritional issues.

2.4.1 Sampling strategy and design

Interviewees were selected purposively, based on their job. Interviews were either recorded for those that were comfortable, if not it was written down. The documents received were photo copied and kept in a safe place for confidentiality. The interviews were unstructured, and the interviewees were free to express their views without any limitations. This again

was to allow for the interviewees to choose the most important issues, rather than bringing in pre-conceived ideas. The following people were interviewed.

The mother and child health (MCH) nurse has several duties related to nutritional status of children, including weighing the infants and toddlers then discuss with parents their children's health status. It was therefore necessary to interview them, as they were the first contact with the villagers in the health service, and dealt with nutritional issues.

The nutrition and health officer for Moshi Rural District covers health and nutrition for two of the study areas, Marangu and Old Moshi. It was therefore necessary to interview them and also to collect the nutritional data for the district.

The final interviewee was the head doctor of the local hospital. This was in order to get a general overview of health and nutrition in the region. This also allowed access to records for nutritional status of all the districts of the Kilimanjaro Region. It was therefore important to hold this interview in order to gain this data, as well as a regional viewpoint.

3 Opportunities and constraints in Kilimanjaro

3.1 Infrastructure and markets

The paved road that leads to the national park gate in Marangu has brought about easier access to both local markets and markets further afield. Informal interviews indicated that this allows them to get their produce to the markets much quicker and fresher. Therefore they are able to negotiate better prices and spend less time travelling.

Rombo on the other hand is less well connected having most of the tarmac road passing along the bottom of the District, where it is not accessible to most of the people, especially towards the top of the district. For example respondents from the informal interviews in Rombo said the problem is when its harvest time, there is too much of the same produce on local markets, causing prices to drop, they indicated that if they had access to further markets, they can receive higher prices.

One constraint faced by people in the area may be linked to the level of water infrastructure. Overall a high proportion of people in the area have access to piped water, with 90.1 percent having access either in their house or in their neighbours. However there is variation within the area, with 70.9 percent of people in Marangu having access to piped water at home compared to 47.7 percent in upper Rombo.

Similarly, transport infrastructure varies, with 103 kilometres of paved road in Moshi Rural District, and only 52 kilometres in Rombo District (national bureau of statistics 2002)¹

¹ Figure for Rombo amended from book figure (zero kilometres) by District officials

Finally, the survey indicated that out of a range of transport and infrastructure problems, people throughout the area consistently ranked low prices as the major problem in selling surplus food at 55 percent. This is followed by having no sale at all at 28 percent. This trend was repeated across the study area, with the exception of the data from the lowlands of Rombo, where 60.2 percent did not sell surplus food.

3.2 Population pressure

Figure 4.1 shows a significant rise in population size in the study areas. From 1967 to 2002 the population of the two districts almost doubled from 47,6225 to 921,889 people. In particular, from 1988 to 2002, the population increased sharply by 41 percent. This is a very fast rate of population growth, at 2.9 percent per year. This shows an increase in population pressure in both Rombo and Moshi rural districts, especially over recent years.

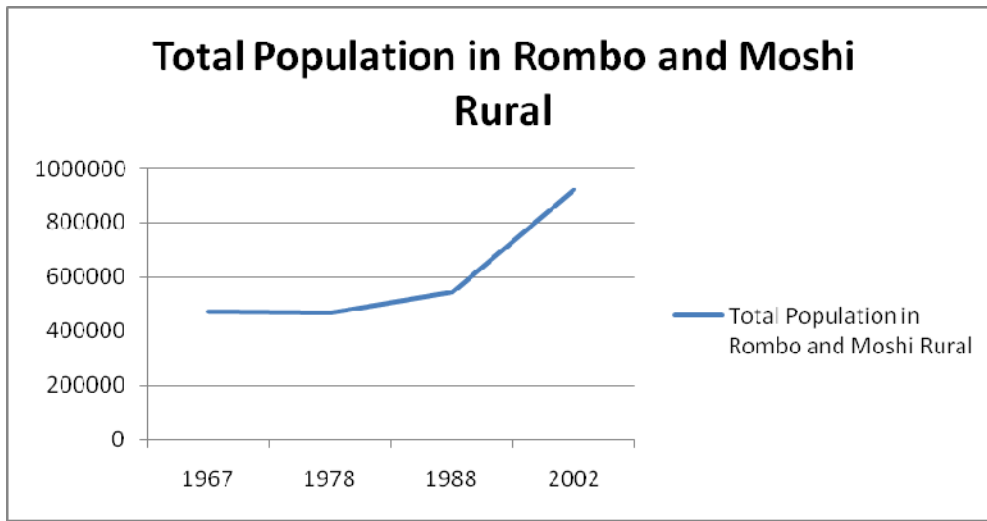


Figure 4.1: Total population in Rombo and Moshi Rural Districts

3.3 Effects of weather

Another constraint affecting people's livelihoods in the area identified is the variability in the weather. The amount of rainfall shows considerable inter-annual variability, which may have a considerable effect on farming activities by increasing the risk of poor harvests as seen in figure 4.2.

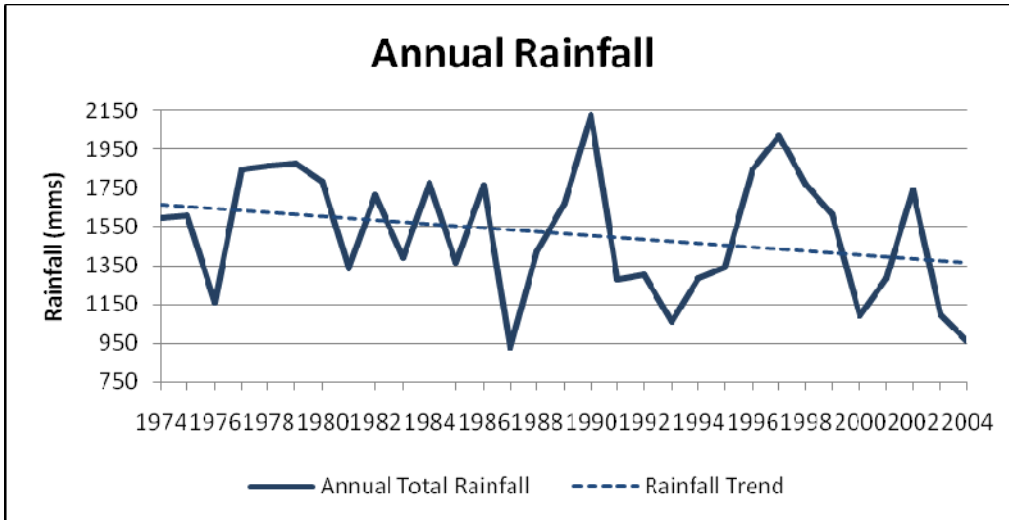


Figure 4.2: Annual rainfall, Kilimanjaro Region. Source: Kilimanjaro Meteorological Office (2007)

Drought is also a problem, with 43.3 percent of people perceiving drought since 2004. The problem seems to particularly affect the Old Moshi and Rombo study areas, with 62.4 and 58.9 percent of people perceiving drought in these areas respectively since 2004.

People also perceive a drought to be associated most with delayed or late onset seasonal rains more than with a failure of the rains, as follows: Warmer than usual (10%), No rain (22%), Delays of Seasonal rains (35%), Short seasonal rains (31%) and others (2%).

This may in fact be linked to climate change, with 96 percent of people having noticed changes in the climate, and average temperatures rising consistently from the beginning of available records, by about 0.6 degrees Celsius not noticing the changes since 1974. Figure 4.3 shows these temperature changes.

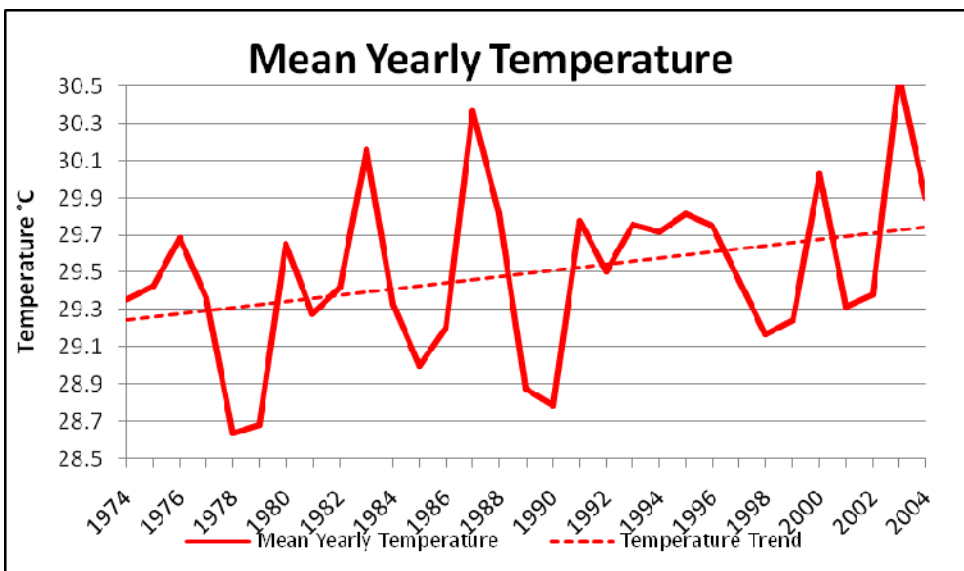


Figure 4.3: Mean yearly temperature, Kilimanjaro Region.
 Source: Kilimanjaro Meteorological Office (2007)

3.4 Changes in farming related to external constraints and opportunities

Many of the constraints faced by people in the study area have become more acute in recent years. This may have contributed to changes in farming, with 46 percent of respondents perceiving changes in farming over only the past five years. Of those who had noticed such recent changes, the majority (68.4 percent) perceived the cause to be changes in the climate, as seen in the survey report, while some perceived the cause to be soil exhaustion (19%), market situation (7%), changing altitude (4%) and population pressure (2%).

These perceptions of changes in farming may be explained as a shift from the more traditional reliance on cash crops such as coffee towards more subsistence-based production. For example, coffee prices have dropped considerably since the 1980's, which tallies with people's perceptions of prices being a major constraint. The variability in the amount and onset of the rains in the region would also affect coffee production, as a long dry period is needed in order for the trees to flower. Such external constraints may then help to explain the fall in coffee production that has occurred. The following Figure 4.5 shows coffee prices adjusted to take account of inflation, along with the amount of coffee produced in the region since 1982. This shows that real prices have fallen, and this has been followed by a fall in coffee production. It is unlikely that such a large fall in production was only down to falling productivity. It is almost certainly also due to a fall in the amount of land planted with coffee, as people no longer see coffee as a way to achieving food security.

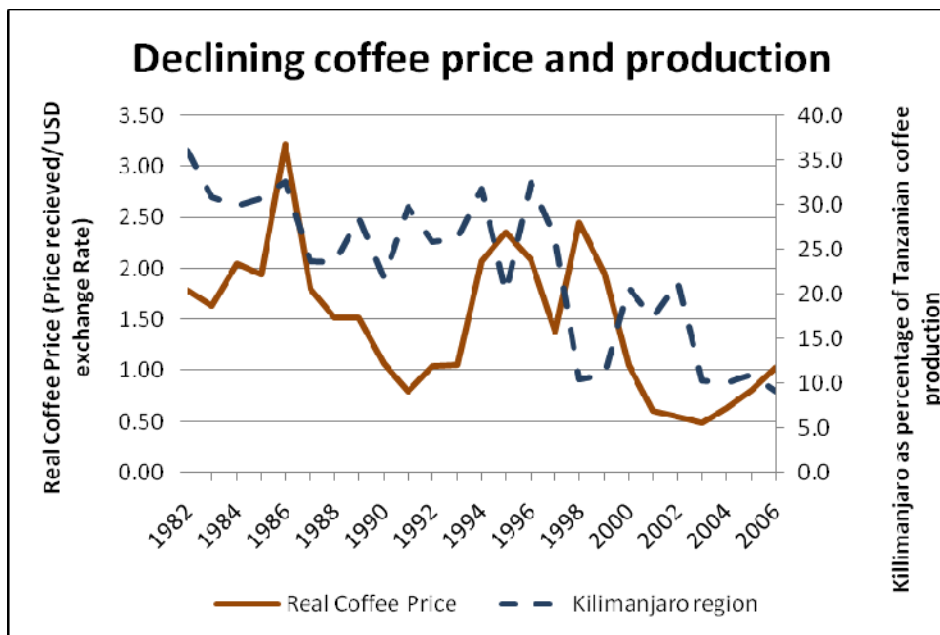


Figure 4.5: Coffee price and production figures. Source: Kahawa House, Moshi (2007)

Such external constraints may have also presented an opportunity, as cash crops have been replaced with subsistence crops like maize. The shift towards subsistence production, in particular of maize, is confirmed by the following explanation from data collected as part of the extra survey questions.

Data recorded shows that 65.6 percent of respondents grew maize on their Kihambas. This shows a shift towards maize production, as traditionally Kihambas were not planted with maize. Since this has coincided with a fall in coffee production, it is reasonable to conclude that maize has replaced coffee production on Kihambas.

The survey results show the length of time people have grown maize on their kihamba. It shows that the majority (82.7%) of respondents have grown maize on their kihamba for more than five years, showing that this shift towards maize production did not begin recently. This is because the external factors affecting coffee production (such as falling prices) have been a factor for a relatively long time.

The survey indicates that the main reason given by people for growing maize on their kihamba was to grow food. About a quarter of respondents also said that they grew maize on the kihamba as they had no lowland farm, which strongly indicates that coffee is no longer a reliable way to gain access to food. This shows that the shift towards maize production was due to people wanting to increase their food security. This backs up the hypothesis that the fall in the value of coffee led to a decrease in food security, which led to people reacting by planting maize in order to maintain food security.

Table 4.1: Primary reason for growing maize on kihamba

Reasons	To get food	No lowland farm	Insufficient rain on lowland	Easier to farm on kihamba	It is becoming traditional	Others
Percentage score (%)	54.0	24.1	10.3	6.9	1.1	3.4

4 Strengths and weaknesses of Chagga livelihoods

The external constraints and opportunities are not separate from strengths and weaknesses, as external factors may cause changes in people’s livelihoods. The analysis may be used to explain who is vulnerable to food insecurity, rather than just whether the area as a whole is vulnerable. The gender division of labour is also an important factor when considering food insecurity.

4.1 The gendered nature of subsistence production

There are strong indications that the shift towards maize production may have increased the amount of work women have to carry out. This is because coffee (especially selling) is more associated with men's work, whereas subsistence crops are more associated with women's work, so a shift towards subsistence crops would increase the amount of work women do. Since there has been a decrease of coffee production in the kihambas and a shift towards replacing it with maize, the work of women, especially in selling produce, has increased. Now they not only have to attend the lowland shamba and the kihamba, but they also have an increased role in selling produce, as shown in the survey data which also shows that subsistence crops such as maize and beans are planted, harvested and sold mainly by women. For example, 35 percent of kihamba cultivation was done by women alone, compared to 7 percent of men alone. Similarly, women alone did 34 percent of planting on the kihamba, compared to 7 percent by men alone. The data showed similar percentages in planting and cultivating on the lowland farm; although this has not been shown as it repeats this trend almost exactly.

A similar percentage of this work was done by both parents. For example 36 percent of respondents said kihamba planting was done by both parents together. However the survey does not indicate how equally the work was divided up between men and women. The hypothesis is that within this category, it is women that do most of the work, though this will need to be investigated further.

The marketing of farm produce was also strongly gendered. The only crop that showed an equal marketing between sexes was coffee. Livestock selling was also mainly a male activity, with 42 percent marketed by men, compared to 27 percent by women. However, subsistence crops from both the shamba and kihamba were mainly marketed by women. For example, 42 percent of shamba produce is marketed by women alone, compared to only 6 percent by men alone. Also, 67 percent of milk products are sold by women alone, compared to 6 percent by men alone. The survey showed that there are differences between the two products that are marketed more by men (coffee and livestock), and two selected products that are marketed by women for comparison (Milk and shamba produce).

So, with the exception of livestock and coffee, the survey clearly illustrates majority of planting, cultivating and marketing (with the exceptions of coffee and livestock) was carried out by women. The data clearly shows how the burden of farm work falls unevenly on women, and how a decline in coffee puts an even greater burden on women to ensure food security for their families.

4.2 Regular domestic activities and effects on food security

Further investigation was carried out to explore women's domestic activities in order to find out how their work was divided up between farming and household chores, and whether this affected their food security. The initial survey did not provide an indication of

the precise times taken by daily activities such as collecting firewood and water, and did not cover activities later found to be particularly time-consuming for women, such as cooking and fodder collection. The purpose of this data then is to fill in the gaps from the main household survey. It enables the effect of such activities on food security to be seen, as time spent on activities such as water collection reduces the amount of time available for farming activities which contribute more directly to food security. This, combined with further indicators of food security, allows an accurate picture to be drawn.

The first activity to be examined is fodder collection, as it is common for women to spend large amounts of time gathering and carrying fodder from long distances from their farm. Overall in the study area majority of the respondents spend 1-3 hours (51.2%) collecting fodder. The most common amount of time spent collecting is 1-2 hours at 27 percent. However a significant amount of respondents (24 percent) spent over 3 hours. Overall a large amount of time is spent on collecting fodder. In general there are no large amount of differences between the study areas however it seems in Old Moshi, a lot more time is spent collecting fodder. For example 34.2 percent in Old Moshi spent over 3 hours compared with 16.7 percent in Rombo and 18.6 percent in Marangu.

Collecting firewood was another predominantly female activity suspected to take large amounts of time and to vary by area. The survey showed overall in the study area, the largest single category was one hour or less to collect firewood, at 67.5 percent. The second largest category overall was 1-2 hours at 15.4 percent. The remaining categories (one hour or more) made up only 17 percent of responses. This shows that in the study area as a whole most people spend less than one hour collecting firewood.

Different study areas showed different results example, Rombo and Marangu showed similar results, both with large proportions spending one hour or less (about 82 percent in both), showing firewood is relatively easy to collect here. However, the survey showed respondents in Old Moshi took more time collecting firewood as the results were more spread out, with only 30.3 percent of the respondents spending less than one hour. On the other hand 69 percent of respondents in Old Moshi spent more than one hour collecting firewood whilst in Rombo and Marangu it was less at 18 percent in both areas. Overall, this shows that firewood collection generally takes an hour or less, but takes as much larger proportion of women's time in Old Moshi compared to Rombo and Marangu. This may be explained by the fact that in Rombo, drought was perceived more frequently, possibly meaning more dead wood, but the data does not indicate why it is so easy in Marangu, or difficult in Old Moshi, so further qualitative data is needed.

Water collection times were then examined as this was revealed to be female dominated in the initial survey. The survey show the overall 87.1 percent of the respondents spend less than thirty minutes collecting water and only 6.8 percent spend more than one hour collecting water.

Looking further into different study areas, in Old Moshi no respondents spent more than thirty minutes collecting water and in Marangu only 7.5 percent spent more than thirty minutes, showing that in these areas water collection is relatively easy. However in Rombo, 28 percent spent thirty minutes or more. Furthermore, 9.3 percent of respondents in Rombo spent more than 2 hours, showing that considerably more people spend longer periods of time on water collection in Rombo compared to the other two study areas.

Time spent cooking was also examined. The results show that most people in the study area (63 percent of respondents) spent less than two hours cooking, with the most common time spent on cooking being 1-2 hours, at 41.2 percent. 37 percent of respondents spent over 2 hours cooking. The survey did not show any significant differences between the three study areas. This indicates that cooking takes a fairly consistent and significant period of women's time each day across the study area.

The survey has shown a significant amount of time spent on all of the above activities by women each day. Fodder collection and cooking take the longest periods on average, but in some areas such as Old Moshi firewood collection takes a long time, and in other areas such as Rombo water collection takes a long time. Overall, the time spent on these activities may have an effect on food security as it reduces time available for farming activities (the main source of food for such families). This in turn may affect the number of meals mothers are able to provide for their families each day, which is an important indicator of food security (although other factors are also important). This will now be examined by comparing data on how many meals are provided per day in good and bad times, and further compared by area.

4.3 Meals provided, in good and bad times

The data has been analysed by area as before, except data from Rombo is from the lowland area only because it shows a significant difference between the lowland and upper areas (Table 4.2). It is taken as an example of the situation for a particularly food insecure group within the study area.

Women were asked to say the number of meals they were able to provide on bad days. Overall, the most common figure was 2 meals per day, at 47 percent. 2 meals was also easily the most common figure in Old Moshi (47 percent) and Marangu (55.9 percent). However, the vast majority of people in the lower part of Rombo (70.9 percent) said that they were only able to provide one meal on bad days. This again shows that food security varies a lot within the study area, with the lower areas being most vulnerable.

Table 4.2: Number of meals on bad and good days by area

Area	Number of meals	No. of meals on bad days	No. of meals on good days
		Percentages (%)	Percentages (%)
Old Moshi	1	17.9	0.9
	2	47.0	12.0
	≥ 3	35.1	87.1
Marangu	1	16.3	0.6
	2	55.9	11.2
	≥ 3	27.8	88.2
Rombo lowlands	1	70.9	5.9
	2	25.2	32.4
	≥ 3	3.9	61.8
Average all areas	1	35.8	2.09
	2	47.0	15.2
	≥ 3	27.2	82.8

The data on the number of meals on good days shows a similar trend in reverse (Table 4.3) People in Old Moshi and Marangu are more food secure, with less than 13 percent in each saying 2 meals or less on good days. However, in the lower part of Rombo just over 17.2 percent said that they had either one or two meals per day, even on good days, showing how much more food insecure people in this particular area are.

4.4 Gender, control of resources and coping mechanisms

In analysing the gender aspects of the control of resources it is important to look into the land tenure (which affects food security as access to food is directly linked to access to land to grow it on), and observe the gender aspects of land ownership. It is also important to analyse the availability of certain coping mechanisms and sources of help to cope with food insecurity. In order to analyse how gender affects food security further, data has been divided by marital status. This is because the women interviewed are not a homogenous group and one important difference among them is marital status. This was found to influence factors that affect food security, so will now be examined.

An important factor in food security is ownership of a lowland farm. The following data indicates that approximately half of respondents had access to a lowland farm (54.9% male and 51% female), with slightly more male respondents having such access. Of those who have access to a lowland farm, the majority of respondents own a lowland farm (57.8 percent), whereas 22.3 percent hire a lowland farm. Lastly, 19.9 percent have borrowed a lowland farm.

When ownership status of the lowland farm is further analysed by marital status, the data show some significant variations. For example, 77.8 percent of single women own the lowland farm, whereas married, divorced and widowed women all have lower percentages of ownership (54, 57.1 and 64.3 percent respectively). In terms of hired land, single women have the lowest percentage (5.6 percent) compared to the other categories (between 18 and 25 percent). The percentage of respondents with borrowed land showed small differences by marital status. However divorced women do show the lowest percentage of borrowed land at 14.3 percent.

In terms of sources of assistance in times of need (this covers all assistance, not just food as with the next set of data), overall the majority of female respondents (40.9 percent) said they receive assistance from relatives and neighbours. Men rely less on help from neighbours (32.3 percent), but get more assistance from the government than women, with 42.9 percent of men compared to 34 percent of women receiving assistance from the government.

When further analysed by marital status, single women receive the majority of help from relatives and neighbours at 47.2 percent, followed by widowed at 47.2 percent as seen in survey data. Divorced women receive the least help at 25 percent. However, the number of respondents was very low. There were too few responses for NGO/CBO (only 0.9 percent of married women, no responses in other categories) so it was not included in the table. From the government, married and widowed women received the most help, with 34.7 and 34.8 percent respectively. Single women follow this at 30 percent. Divorced women received the least help with 25 percent.

Data on people's sources of food in bad years was also examined. Overall, the majority (54.5 percent) of the women depend on food reserves as a bad year food source. This is followed by reliance on relatives and neighbours at 24.3 percent and thirdly the government food assistance at 10.1 percent respectively. The table shows that women depend more on these sources than men. Much higher proportion of men than women lists government food aid as a bad year food source (17 percent of men compared to 10 percent of women) indicating that access to food aid may be gender biased.

5. Gender aspects of adaptation

The main opportunities and constraints affecting food security was analysed based on the unstructured data collected from the focus groups, key interviews and informal interviews. In this regard, through the use of unstructured data, factors that cause vulnerability, and affect resilience to food insecurity both within and from outside the household level in Kilimanjaro region were analysed. The focus groups and informal interviews allowed a better understanding of the opportunities and constraints identified from unstructured data. The infrastructure and markets, population pressure and gender distribution of resources are the main factors affecting the opportunities and constraints.

5.1 Population pressure and climate change

The focus group discussions in all three study areas indicated that rising population pressure increased pressure on the land. They acknowledged it had an effect especially on the size of the Kihamba. In Chagga tradition, every male child receives a portion of the Kihamba. Therefore increase in population leads to increase in fragmentation of the Kihamba so each person has a smaller area to farm compared to the previous generation.

The qualitative data supported the quantitative results showing variability in term of quantity and timings of the rains. The informal interviews mentioned how climate has changed. Previously during Easter time, they recall having plenty of maize for the Easter celebrations. However at the moment the maize is not ready to harvest until May or June. Most of the respondents agree that is because of changes in rainfall pattern especially late onset rains. Variability of rainfall was also mentioned as an important factor. The farmers

mentioned predicting the rainfall pattern is not as easy as previously, therefore they feel that they are forced to try their luck when it comes to important farming decisions. When it comes to maize, they said that because they are trying their luck, some farmers might get it right and plant in time for the rains, while some may have chosen to plant too early. Others choose to wait and miss the rains, so either way seedling die because of lack of water, only the luckier farmers get good harvest.

The quantitative data indicated that the external constraints discussed above had contributed to a shift from cash cropping (coffee production) towards more subsistence based production. It also indicated that this shift was associated with an increasingly gendered division of labour with implications for nutrition status. The qualitative data aimed to provide a more detailed picture of whether and how such changes have occurred, and how they link to the external opportunities and constraints discussed above.

Qualitative data confirmed the shift away from coffee production, through informal interviews; most respondents agreed that less coffee is grown now, although the main external constraints they identified as contributing to this were different to those indicated by the quantitative results. One constraint identified was that, whereas before, the government gave the farmers subsidies on pesticides, it has now stopped and farmers can no longer afford to buy pesticides. This has led to a greatly increased risk of pest attacks leading to poor harvests. Interviewees confirmed that this factor, coupled with increasingly low prices, has led to decreased profits. Furthermore the coffee trees have aged and no longer enough beans produce. One particular farmer in his sixties, who was interviewed informally during the main survey, mentioned he has grown coffee for a very long time. He showed the trees, which were obviously old and had few leaves and new stems. He also showed how they were producing few beans where as in the past he made his living from coffee when the same trees were productive. He can no longer rely on coffee and now depends on his children, who have helped him grow subsistence crops.

5.2 The shift towards subsistence crops

The informal interviews also showed that the decreasing reliability of coffee as a source of food security has led to an opportunity as farmers have been able to replace it with subsistence crops, especially maize. Interviews confirmed the qualitative data, indicating the main reason for the shift towards subsistence crops was to ensure food security. Unlike coffee, subsistence production means that food security is not dependant on volatile coffee prices, so one source of food insecurity can be removed by growing crops such as maize. The shift to maize in particular was explained by the fact that in Chagga culture it is used in many different foods so is a particularly suitable subsistence crop for the people of the area (unlike crops such as sorghum that are not traditionally part of the Chagga diet).

Informal interviews and focus groups also confirmed that the external constraints identified previously have played a part in the increase in maize production, especially on the kihamba where traditionally it was not grown. Variability in weather was identified by

many interviewees as contributing to increasing maize production on the Kihamba as the climate has become increasingly dry. This has two effects. Firstly, maize production on the lowland shamba (where it was traditionally grown) has become increasingly unreliable, with many farmers identifying a sharp increase in the frequency of poor harvests on the lowland compared to previously. Secondly, the weather further up the mountain on the kihamba has also become drier, making it more suited to maize production than previously. So, as food security can no longer be guaranteed by maize production on the shamba, people have increasingly moved to grow it on kihambas thanks to the opportunity presented by the more favourable conditions there.

Population pressure was another external constraint that was related to the increase in subsistence production. Interviewees identified the need to feed large families as a motivation for planting more subsistence crops on Kihambas, especially since coffee can no longer be relied upon. For example, one elderly woman in Old Moshi stated that her family has grown, and her grandchildren are reliant on her to provide food. Because of this combined with the low yields she was getting from her coffee trees, she decided to uproot them and replace them with maize. It was also easier for her to tend subsistence crops at the kihamba as she lived there, rather than relying on her far away shamba, so the shift from coffee to subsistence aided her in providing for her growing family.

Another factor strongly identified was that maize is increasingly used as a source of income. This was especially the case with better off farmers, or those lucky enough to plant at the right time as they can sell surpluses. This may be especially profitable in years of generally bad harvests as they are able to take advantage of higher prices at this time.

5.3 Nutritional status as an indicator of vulnerability

This shift towards subsistence production (in particular of maize) may have implications for food security and nutritional status. Therefore, the supplementary questionnaire asked when people ate the best foods, in order to give an indication of the seasonality of food insecurity. In particular, this was to indicate the extent of time people depended on basic staples such as maize. Responses overwhelmingly indicated that they ate best after harvest periods and also after good rains. People ate best after harvest due to greater food availability. The responses also indicated people would eat stored maize after good rains, as they could be sure of a sufficient harvest later to replenish stores. The responses therefore showed food security has a strong seasonality.

The key interview with the MCH (Mother and Child Health) nurse confirmed such a seasonality of nutritional status, and indicated further reasons for this. She stated that the planting season was associated with a general drop in the weight of both children and mothers. This was because this season presents a good opportunity to earn extra income as labourers planting in far away fields, leading to weight loss from the physical labour, and greater time away from home and their children. This affects breastfeeding children more severely, as they are more directly dependant on their mothers for nutrition. Children who

are on solid foods may be left something to eat so suffer a smaller drop in nutritional status, but breastfeeding children cannot be left food in the same way so are worse affected.

Since the maize crop is likely to fail completely in poor rains (unlike coffee) there is greater dependence on the weather. This has led to an overall decrease in food security, as focus groups indicated that in previous years, they ate well all year round, as rains were earlier and more sufficient. However, the risk of the maize crop failing has meant that stores are likely to be lower, so must be used sparingly through the rest of the year up to harvest time so people eat less well. This has increased general food insecurity, but also means that such problems are increasingly likely to become acute prior to harvests as what little stores they have are used up.

5.4 Strengths and weaknesses affecting livelihoods in daily activities

The study shows that women spent a large amount of time on daily activities, specifically cooking, collecting firewood, fodder and water. It may be believed that such activities take time away from farming activities, thus reducing food security. However, through unstructured interview and focus group it was found that this was not necessarily the case. For example, in lower Rombo, focus groups revealed that women collected firewood for sale as well as domestic use as a coping strategy for food insecurity. This was because there is plenty of firewood in the lower area, whereas there is a shortage in the upper area. This is reflected by the quantitative data, showing women in Rombo had to spend less time collecting firewood than women in the other two study areas. Women in the lowlands therefore regularly take advantage of this opportunity by collecting extra firewood and carrying it to the upper area to sell, or exchange for food. So, although firewood collection may appear to reduce time for productive activities, in this area for many women it was itself a productive coping mechanism.

The focus groups also revealed that in general, women in the focus groups did not think that time spent on such activities themselves reduced their ability to tend their farms. This was because they had developed strategies to manage their time extremely efficiently so that vital production activities such as farming did not suffer. For example, the order of daily activities is often carefully planned so that no time is wasted in between activities. Children are also able to help with activities such as water collection and tending livestock, aiding women in their daily work. Another important factor is that maize requires very little regular care, so time spent on other activities does not have such an adverse effect on food security as if more labour intensive crops such as sorghum were grown. The payoff for this is that maize is less drought resistant, but it seems that many women would not have the time to tend such crops.

This shows that time spent on daily activities is not a major constraint on their ability to produce sufficient food, although since their days tend to be filled by such activities, it leaves little time to do more than just get by for many women. This means that there is

little margin for error, putting a lot of pressure on women to look after their families. This is made worse by the fact that coffee has lost its value, so there is less income to fall back on if the subsistence crops fail. Many women felt under increasing pressure because of this. Despite this pressure, many women interviewed were extremely determined to overcome such difficulties and work as hard as necessary to provide for their families.

Chapter four then went on to examine how many meals women had time to prepare for their families in good or bad times. This revealed that three meals a day was relatively uncommon in all areas, even in good times, and that it was fairly common for one meal a day to be prepared in bad times, especially in the Rombo study area. The focus groups revealed that in bad times the one main meal was usually the evening meal. It also revealed that the main constraint in this case was not preparation time, but shortage of food. In particular, women in Rombo said that it difficult times it was difficult to provide even one meal for their children. There were two main coping mechanisms for this. The first was to collect wild foods, in particular fruits such as mangoes and avocados. The second (also discussed above) was to go to the uplands and beg for food, or if any firewood or fodder was available, to carry it up for sale or exchange.

5.5 Gender aspects of vulnerability to food insecurity

In the survey it was found that gender was an important factor in food security, affecting control over resources such as land, sources of food in bad years and the availability of assistance in times of need. The focus groups shed light on all of these aspects, showing exactly how gender roles affected such issues, which in turn affect food security.

In terms of land ownership, higher proportion of single women own land compared to married women. The focus groups revealed that this was because when women get married, any former land ownership reverts to their male relatives. In Chagga society, women move to their husband's land after marriage, and are seen as having less need for their own land since they must depend on their husband, so land reverts to male relatives since ownership must stay in the family. However, a new land law states that women have a legal right to hold on to ownership of the land they held before marriage, although in practice this has been difficult to enforce, and women are still forced off their land after marriage in many cases.

A similar situation exists for divorced or separated women. When they are married, they have access to their husband's land, but when they get divorced or separated, they immediately lose access to this land and have to rely on their parents if they are alive. These women therefore have very little access to land, having to rely on others to provide for them. The only way they can regain access to land is through their children. If they have a child by their husband, that child has a right to farm their father's land when they come of age. The child will then return their mother to farm her former land. One woman in the focus groups advised that in this case the only option was to "get out of the place with your own peace of mind; he's not going to sell the land because your children are

entitled to it” (focus group discussion). However, this is made more difficult if the child is female, as male relatives are less likely to give up access to land to female children due to customary norms forbidding women to own land. Again, the new land laws have given such women a legal right to land ownership, but since it often clashes with customary laws, they often have to fight to uphold their right to land. Legally enforcing such rights through the courts is expensive and time consuming, reducing the chances of such women gaining access to their land. Focus groups also indicated that such disputes may turn violent. One woman said that “there is no point fighting about the land... for your own safety you might as well move” (focus group discussion).

The data in chapter four also indicated that gender was an important factor in the availability of coping mechanisms and assistance. The focus groups provided more information on what was actually happening. Divorced or separated women have less access to land, so do not have any food reserves for themselves and are completely dependant on their parents. They are less able to ask for assistance as they are seen as having already asked for help once, so are less likely to be given any further help. Asking for help is even more difficult for divorced or separated women as they have a very low status in Chagga society and are seen as having done something wrong in being divorced. This means that they are shunned by others to the extent that when they return to their parents they are usually put in a small house hidden behind the main house and are no longer part of the same family. For example, one divorced woman said that “every time I walk outside I feel like a second class citizen” (focus group discussion). Also, married women have an advantage in the sense that there are two people who may produce food or income together, and they are also able to seek further assistance since they are not seen as already being assisted, and there are two sides of the family to ask for help from.

However, focus groups revealed that marriage might not be such a great advantage to women as this suggests. In the case of women in Marangu, many men had jobs as porters climbing Kilimanjaro. A lot of women here complained that their husbands did not share their income, tending to drink it or spend it on other women, so the extra income source was of no benefit, since “they put pleasure before family” (focus group discussion). One woman summed this up by saying “drunkenness increases poverty” Since there are few economic opportunities to replace this income (with the exception of tourism in Marangu), men are unable to provide an extra income for their families.

The quantitative data also provided an indication of gender bias in government assistance. Informal interviews also indicated that there was a strong gender bias in food aid distributions. It is normally men who deal with the village government, so they would tend to collect and have control over any food aid. Women are also less likely to have the time to go and collect food aid, especially if they live a long way from the distribution point. Interviews also indicated that food aid was especially difficult for elderly women to get, since they were less able to walk to the collection point. These informal interviews also

indicated that divorced women also struggled to get food aid due to their low status making them uncomfortable going to the village government to seek help.

5.6 Women coping mechanisms and resilience building to food insecurity

One of the main ways women build their resilience to food insecurity, given the social constraints faced, is by forming a women's groups. For example in Marangu the women formed a group called Endeneza aiming to help women out of poverty and to provide help, advice and counselling to each other. They talked about how they help other members when they are sick by doing their farm and housework, saying that "You have problems, but there are others who have three times more so you have to help. You bring food, clothes and if she's weak and cannot farm you go and farm for her". This allows them time to recover, without their food security being negatively affected. This is important, as illness can stop women carrying out vital farm and house work which ensures food security. This shows how, despite a lack of financial resources, women are able to positively build resilience to food insecurity through pooling their labour and resources. In other areas where there were no formal women's groups, women still co-operated informally.

The focus groups also revealed a lot about how women plan to build resilience for themselves and their families in the long term. They have seen and experienced the increasing difficulty in gaining a livelihood through farming, and see it as unsustainable in the long term due to the kinds of external constraints examined above, particularly the increasing lack of rains and population pressure. They therefore valued education for their children very highly, as they did not see a secure future in farming for them, saying that "education is a better inheritance than land" (focus group discussion). They see this as an advantage for the children, as it is seen as the main path out of dependence on farming. It is also seen as an advantage for the women themselves, to invest in their children's education as a kind of pension fund. A further reason women gave for educating their children was to try and change attitudes among future generations. It is seen as a way of challenging the negative gender roles that they have to deal with. So, they "came to find out that the female children are the ones who take care of the family and the parents. For example you see that they [educated daughters] have built houses, bought cars...this has brought about changes, so parents are educating their girls because they see how other girls have advanced their families" (focus group discussion).

However, women face considerable difficulties in providing education. School fees, especially beyond secondary school, are difficult to afford for many women. Despite the cost, women in focus groups described the extraordinary lengths they go to in order to pay. If farm income was insufficient, women set up small businesses such as shops, even if they hardly had time to do so. If not, they would take extra jobs as farm labourers. If employment was unavailable, women would even sell their main personal assets, such as livestock and jewellery. This shows the value women place on their children's education as

a means of building resilience to food insecurity in the long term, both for their children and themselves.

Women in the focus groups also said that it was still important to teach their children how to farm even if they were in education. This is basically an insurance strategy in case the children did not find employment, so that they still had the means to a livelihood, even if it was uncertain. However, education was stressed as being more important. They also explained that it was especially good to educate their daughters. In Chagga society, educating women to a high level is traditionally frowned upon. Despite this, many women expressed a strong desire to educate their daughters since they see daughters as more likely to look after them in their old age.

6. Discussion and conclusions

Changes in the weather and population pressure definitely have an immense effect on food security. Seasonal rains have become more and more unpredictable; to the extent that farmers now plant seeds by guessing and hope the seasonal rains arrive at the right time. This has led to a greater number of people not having a secure food source. The situation has been exacerbated by population pressure that has over the years led to smaller landholdings.

Coffee production has fallen due to unfavourable prices, weather, the loss of pesticide subsidies and the age of the trees. A lot of farmers do not see the advantage of replanting younger trees as the profits are too low. Subsequently, this has shifted agricultural production towards subsistence farming to make up for the loss of cash crops. An indication of this can be seen as extra maize is grown on the Kihamba, where there is sufficient rainfall.

This has led to greater reliance on women to ensure food security. This is due to male activities on the farms being reduced dramatically due to the loss of coffee production and lack of other employment. The burden for providing sufficient income (particularly for school fees) and food for their families has therefore shifted more to the women. This has led to intensification of agriculture and women seeking extra income as extra help on the bigger farms in the planting season, affecting the nutritional status of their children in the seasons they are away doing these jobs. Women also employ coping strategies such as firewood collection for sale, and the collection of wild foods to maintain food security in difficult circumstances.

However, there are many gender related factors that limit the availability of such coping mechanisms and other sources of assistance. For example, women tend to have less secure land tenure than men, and this is particularly the case for divorced women, who are looked down upon in Chagga society. Community assistance is also biased against divorced women, and government food aid shows a strong gender bias in favour of men. The wide

range of gender factors identified shows that vulnerability and resilience to food insecurity are strongly gender biased and that marital status is also very important.

The structure of the findings can be summed up as follows:

1. External constraints have led to a shift from cash crop to subsistence production
2. Subsistence production is gendered, so there is a greater reliance on women to provide food security.
3. Many gender related factors limit what women can do to achieve food security
4. Despite these limits, they do a staggering amount of work in difficult circumstances, and actively co-operate to build resilience.
5. However, there is still food insecurity. These efforts alone will not be enough; the external constraints are too great, so many don't see a secure future in farming.
6. But are others doing all that they can to help the Chagga achieve food security?

Final comments

People in Kilimanjaro are doing the best they can to achieve food security, despite many external constraint and internal weaknesses. However with the drop in world coffee prices, variability in rainfall as well as population pressure and limited available land extension had increased their vulnerability to food insecurity. These external constraints are compounded by internal weaknesses such as gender roles, which put a heavy burden on women to provide food security and led marginalised groups such as divorcees to be particularly vulnerable. Many coping strategies are being employed to combat these and to build resilience, but it seems that they can only achieve so much in the extremely difficult circumstances. Questions remain over the sustainability of livelihoods in the area given the constraints faced, even if internal social inequalities change.

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