GENDER DIVISION OF LABOUR IN FOOD PRODUCTION AND DECISION MAKING POWER AND IMPACT ON HOUSEHOLD FOOD SECURITY AND CHILD NUTRITION IN RURAL RUKWA, TANZANIA.

Tiransia Arthur Shoo

Main Supervisor

Prof. Gerd Holmboe-Ottesen

Department of Community Medicine, Institute of Health and Society

University of Oslo, Norway

Co-supervisor

Prof. Joyce Kinabo

Sokoine University of Agriculture,Tanzania

Thesis submitted in partial fulfilment of Master of Philosophy degree in International Community Health

May, 2011

ABSTRACT

Background

Food insecurity which is the one of the causes of child malnutrition is still prevalent in Tanzania. One of the causes of food insecurity as it has been reported by other scholars is gender inequality. Women, especially in developing countries have been reported to have very high workload in food production compared to men and in decision making power they are often subordinate to men. Other studies have showed that gender roles are dynamic and they change over time with economic opportunities. In Tanzania, no current studies have looked at how gender division of labour affects food security and child nutrition. However, this is a follow up of a study which was done in the Rukwa Region in Tanzania in 1987/1988.

Objectives

The aim was to determine gender division of labour in agriculture and decision making power and their impacts on household food security and child nutrition

Methodology

A cross-sectional survey was conducted in 152 households in Msanzi village. The father and mother were interviewed separately. One random selected child below five years of age was included for assessment of weight, height and age in order to determine nutritional status

Results

Both men and women participated in agricultural activities but women worked more days in the field than men. All activities were done by men and women except ploughing which was a man's work. Women worked very heavily particularly in the work of weeding which is the longest and tiring activity. In addition women worked more in subsistence crops compared to men.

Food insecurity prevalence was high. As many as 47.7% reported food insufficiency in the last 12 months. 58.8% did not have maize stock for one month or longer time. Malnutrition rates found were also high, 63.8% stunted, 33.6% underweight and 2.6% wasted. Men's and women's workload put together in the field was observed to decrease the number of months without food stock and to increase energy availability per consumption unit though not significantly. Underweight in children was found to be significantly associated with food insecurity. It was also observed to associate with women's workload. The women who

worked with the highest input in the fields were found to more likely to have children being malnourished. Further dry season cultivation was observed to increase the prevalence of underweight in children despite the fact that it was found to significantly increase food security in the household. In decision making, most decisions were made by father and mother together or father alone. Women made seldom decision alone.

Comparing our results with the 1987/1988 study, it was obvious that not much has changed in the area. Women still spend more time in the field than men. Food insecurity was at the same high level and the rate of underweight was similar to what was found in the former study. In addition, women still had low decision making power compared to men.

Conclusion

Women are the ones who carry the major tasks of food production. Further in this study it was found that women high work in the field can impact child nutrition. Interventions should be targeted to women as there are observed to be the major producer of food. Intervention should target at empowering them in terms of education/capacity building to reduce gender inequity and also to provide them with nutritional education.

ACKNOWLEDGEMENT

I am indebted to extend my sincere notes of thanks to the following individuals for their tireless and long lasting efforts which at last culminated to the successful production of this dissertation work which is now ready for submission for my degree award. I will not be able to mention each and everybody but the following deserve a mention.

Gerd Holmboe-Ottesen (my main supervisor) for her supervisory work and constructive criticism during the whole period from proposal writing to dissertation writing. Your patience, support and encouragement have significantly contributed to this work.

My sincere thanks to Joyce Kinabo(my co-supervisor) for the inputs she brought into this thesis and for assistance in critical issues like ethical clearance. She was so instrumental in providing an enabling environment during field work. Margareta Wandel, for the advices, and her useful inputs she brought to this study in proposal and thesis writing up.

The Norwegian Quota programme for Masters Studies; for providing the funds for my studies here in Norway. I am also grateful to my fellow class mates, for the best stimulating environment, academically and socially and everybody else who we interacted on daily basis during the entire study program

'Asante kalesa' Sunniva Nordang (my fellow researcher) you have been a great and valuable friend throughout this whole period. I will always cherish the friendship we have made. 'Karibu tena Tanzania'.

Finally, I am especially grateful to my family and friends for always giving me the encouragement and support throughout the whole period of my master program. Special thanks to Erick Mlanga, my husband, your love, support and encouragement have helped me reach this far.

Contents

ABBREVIATIONS

1. SAP = Structural Adjustment Program
2. FAO= Food and Agriculture organization of the United Nations
3. UNICEF = United Nations Children Fund
4. WHO = World Health Organization
5. HIV = Human Immuno deficiency virus
6. AIDS = Acquired Immuno deficiency syndrome
7. TDHS= Tanzania Demographic Health survey
8. GDP= Gross Domestic product
9. CU=Consumption Unit
10. OR= Odds Ratio
11. NHANES= Third National and Nutrition Examination Survey
12. GDP=Gross Domestic Product

1. INTRODUCTION

1.1. Summary of the former study

This is a follow up of a study which was done in Tanzania from 1987 to 1988 in two villages in the Rukwa region. The present study has been carried out in one of the villages which was the one which produced most cash crop and had the highest rate of malnutrition among children. The 1987/1988 study looked at women's contribution to food production, household food security and child nutrition and as part of the exercise, gender division of labour in agricultural production, negotiation and decision making process which could influence the food security situation in the household was studied. It was shown that both men and women put a substantial effort into food production but that women worked longer hours than men. All activities were done by both men and women except ploughing which was exclusive a man's work. Weeding, the most time consuming activity, was considered women's work(1).

Malnutrition was found to be high in the village especially in the pre harvest season. On average the rate of malnutrition from three surveys was 26.5% using WHO(1983) reference with a cut off point of 75% of the median weight-for age(2).Nutritional status of children was found to be significantly better in households which were without maize stock for the shorter period of time compared to those with shortage for longer period. Men's and women's input together in the field was found to contribute significantly to maize stock availability. The group with highest input had the shortest time without maize stock(1).

It was found that malnutrition was also a problem in the household where there was enough food. In the analysis of time allocation data, it showed that women spent less time in cooking and children were fed less often in the seasons were women worked hard in the field. However no conclusive effect of mother's agricultural work on child nutritional was shown(3). In decision making, women were subordinate to men, and men tended to favour to sell food for cash, rather than keeping food for family consumption. However they observed that women had their way with men to insure that family food needs were met(4).

The present study investigated the present situation in regard to the same issues as described above and looked at possible changes since the time of the former study. The study was done by the two researchers, one from the master program in Nutrition and the other from the master program in International community health. It was two studies but yet separate. My fellow researcher looked at underlying factors which contributed to child malnutrition in the area while my study looked at how gender division of labour in agriculture and decision making power affects household food security and child nutrition.

1.1. Background

Food insecurity concept originated in 1970 in the World Food conference in the discussion of international problems at a time of global food crisis(5). Many definitions of the term have been used since then. Currently the most commonly used definition is that negotiated in the World Food Summit 1996, which defined food security as the state when "all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy lifestyle"(5).

According to FAO, food insecurity in the world still remains unacceptably high. It estimates that 925 million people are undernourished, and developing countries account for 98 percent of the world's undernourished people(6). Children under five are among the vulnerable group which are affected by food insecurity which lead to under nutrition. UNICEF defines under nutrition "as the outcome of insufficient food intake (hunger) and repeated infectious diseases. It includes being underweight for one's age, too short for one's age(stunted) dangerously thin(wasted) and deficient in vitamin and minerals"(7). According to UNICEF child under nutrition is still high in developing countries. About 150 million children are still malnourished in developing countries. Approximately 10.9 million children die each year and malnutrition and hunger related disease is estimated to cause 60 percent of the deaths(8).

Tanzania is among the most severely affected countries in food insecurity with more than 34% of its population estimated to be undernourished(9). The country ranks the 10^{th} in its contribution to the World's chronically under nutrition in children underfive(10).According to Tanzania Demographic Health Survey 2010, approximately 42% of children below five years

of age are stunted(too short for age), 16% are underweight (too thin for age) and 3% are wasted (too thin for height)(11).

There is a link between agriculture and food security. Agriculture is the only source of food both for consumption and as raw material to redefined foods. It plays a major role in providing food availability and also is an important source of income to purchase food(12). Therefore rising local productivity makes food more accessible not only to the rural poor but also to all the people.

Food accessibility for many in developing countries relies mostly on local food production. Agriculture is the major economic sector for developing countries and it accounts for 75 percent of the employment(13). In Tanzania it is the backbone of the economy and it accounts for about half of the national income, three quarters of merchandize export and it provide employment opportunity to about 80 percent of the people(14).

World development Report 2008, stresses the importance of agriculture growth to reduce poverty and food insecurity(12). It has also point the failure to realize women potential in agriculture as one of the contributing factor to low growth led agriculture and food security as it is observed that majority of the small holders farmers are women(12). FAO states that "Unless gender is addressed comprehensively the global community will not achieve the target set by 1996 World Food Summit and United Nation Millennium Development goals"(15).

Recently researches have put interest and action in the use of gender analysis as a tool for project designs assuming that development projects would result in efficient gain and more successful(16). However researches proved insufficient as they realized that women were not homogenous group their roles and responsibilities within agriculture were as variable as those of men and gender roles and relationships between men and women were dynamic and changeable(17;18). New economic opportunities were changing the agricultural roles of women and men, and often with men moving into women's activities when they proved profitable(18;19).

Therefore understanding the gender division of labour and its association to food security is crucial on many levels to shaping how development assistance should be structured and who should be targeted.

2. LITERATURE REVIEW

Gender Division of labour

Many studies have shown that women play a predominant role in household food security through participating in agricultural and food production (15;16;20-23). They account for between 60 and 80 of household food production in Sub-Saharan Africa(20). In South Asia they provide 90 percent of the labour for cultivating rice(24). They ensure household food security and nutrition through their roles as food producers, processors, and income earners but despite of their key role in food production they have less access to land, resources, credit, training, extension services, agricultural inputs and technology (16;18;24;25). They are also trapped in poverty by illiteracy and unwanted high fertility(24). And this affects production and food security

Women provide more labour in food production than men especially in Sub Saharan Africa. African women on average have their workdays may be 50 percent longer, and their work is closely integrated with household production systems(26). This may be contributed by due to the fact that in many places in Africa food production and security is reported to be a woman responsibility(25) In a study done in Kenya and Tanzania showed that all household, whether men contributed or not to the farming, women were the ones who are primarily responsible for farming the food that sustained their families (27)

In many places in Africa gender division of labour in agriculture is based on types of crop, types of task or both. Studies have shown that men are involved in most physical demanding activities such as ploughing, bush clearing, bush burning (land clearing) while other activities along the food chain are left to women. Women are involved in planting, harvesting, weeding, marketing of crops and in post harvest processing of food crops such as threshing, winnowing, milling and drying.(7;15;17;28-32). This is the pattern which is also called traditional farming system.

In regard to type of crops, women are reported to be more involved in food crops while men are involved in cash crops (whether food or non food crops) (18;31;33).An explanation for this is that women are responsible for feeding the family ,thus prefer to grow subsistence crops and men are responsible for providing cash income and thus prefer to grow cash or export crops(18). But more recent reports have shown that women are increasingly involved in cash crops despite their traditional role of feeding families (16;25;31;34)

Other studies have claimed that gender division of labour change over time. Boserup claimed that the roles of women in agriculture were related to population density and economic opportunities(35). Doss realized that gender relations are dynamic and respond to economic incentives and opportunities(18). In a study done in Indonesia in semi-urbanized and rural village, women in semi urbanized village did not participate in agricultural production because of other economic opportunities in the village, while men continued to be active in agricultural production. The traditional gender division of labour was observed to be more in rural while in semi urban village men performed more women tasks(29). Thus it varies from place to place and seems to be subject to local socio economic context.

On the other hand feminization in agriculture is reported to be increasing due to extensive male out-migration as they move to urban areas to search for better income opportunities. This has resulted in growth of female headed household and this increases female labour in agriculture (20;23;32;36). International trade agreements, Structural Adjustment programme(SAP) and loan repayment have also affected rural households. When government cut subsidies to support traditional crops many subsistence farmers fail to maintain their lives as a result many men leave their farm(37). Thus compounding the trend of feminization. In a study done in Tanzania found that not only do farmers responds to the effect of SAP by abandoning farming but also they may cope with situation by switching from growing some crops and/or reducing crop area under cultivation(38)

Other studies in Africa have shown that men contribution in crop production is higher compared to that of women. A multi country study in Africa showed that men contributed more in crop production than female in most places while women contributed their labour more in food processing(39). Similar findings were also observed in a study done in

Nigeria(40). The authors of both studies argue that it could be misleading to generalize women as main producers of food across Africa

Women work in agriculture and child nutrition

Association of women's economic activity and nutritional status has been observed in various studies. On one hand it increases the total amount of food procured while on the other hand makes women spent less time in cooking and caring for the children hence result in malnutrition(3). Holmboe-Ottesen and Wandel hypothesized women's workload cause child malnutrition but no conclusive support was given to the notion. However they observed that children were fed less than required during the season when the woman was working hard in the field (3). In a study from Iran, children with mothers with heavy workload on farm were malnourished compared to children with mothers with light workloads (mothers with light and heavy workloads-defined as being away from home less or more than 3 hours a day respectively (41)

Decision making power

The more the command woman has over the household resources the better the food supply and nutrition situation. This is because women were observed and reported to spend more of their time and income to secure food in the household and to invest in children education and health than men (4;25;42). Therefore if a woman has enough say they will not jeopardize food security

Several studies in developing countries have pointed out that men dominate the household decision making power in most places while women have subordinate position (4;27;29;32). For example in Nepal men culturally are accepted as being the decision makers in the household, however the decisions that they made are usually suggested by their wives. This is because the community is paternalistic thus the husband usually show supremacy especially in decision making (32). Similarly was observed in the former study done in the area(4)

In a qualitative study in Gambia the women reported lack of decision making as one factor that hinder their ability to practice what they know about child health and nutrition. They mentioned issues such as child spacing, child-bearing were out of their domain(43). In a Nigeria study it was found that the level of participation of woman in farm management decision making was quite low. In the farm operations less than 20% of the women were consulted. Decision making was found to be attributed to age and education but the majority of the women interviewed were however not formally educated(44)

3. COUNTRY PROFILE- TANZANIA

Geography

Tanzania is the largest country in East Africa, covering 940,000 square kilometres. It lies south of the equator and shares borders with eight countries: Kenya and Uganda to the north; Rwanda, Burundi, Democratic Republic of Congo, and Zambia to the west; and Malawi and Mozambique to the south (45). It has 29 regions and each region is composed of districts.

Agriculture

In Tanzania the main source of food to the majority is through agricultural production. It is the backbone of the economy and it accounts for about half of the national income. It provides employment opportunities to about 80 percent of Tanzanians(14)especially in rural areas where majority of the people lives. Agriculture in Tanzania is dominated by smallholder farmers (peasants) cultivating an average farm sizes of between 0.9 hectares and 3.0 hectares each. About 70 percent of Tanzania's crop area is cultivated by hand hoe, 20 percent by ox plough and 10 percent by tractor. It is rainfed agriculture. Food crop production dominates the agriculture economy 5.1 million hectares are cultivated annually, of which 85 percent is under food crops(14). Cash income accruing to Tanzanians is largely through agricultural product which provide main source of cash income for some 40% percent of households(46)

Overview of nutrition issues

According to TDHS 2010, 42% of the children are considered stunted, 16% underweight and 16% wasted. Stunting is observed to much more common among the rural than urban and

more prevalent in Mainland than Zanzibar. Exclusive breastfeeding for the first six months is not widely practiced in Tanzania. Half of infants below 6 months are exclusively breastfed. 82% under 2 months receive breast milk and 23% of infants 4-5months of age receive breast milk only. Complementary feedings starts early 22% of infants age 2-3 receive breast milk and complementary food(11)

Health indicators

According to WHO, the percentage of the Tanzanian population with sustainable access to drinking water sources is 55% and to improved sanitation is 33%. Under five mortality ratio per 1000 live birth is estimated to be 116 and measles immunization coverage is 90%. Approximately 15% of children under five years sleep under insecticide treated nets. Life expectancy at birth is estimated to be 52 years(47)

HIV/AIDS for the last two decades is reported to have spread relentlessly in Tanzania affecting most productive people in Tanzania particularly men and women of the age 20-49 years(48).According to the data from Tanzania HIV/AIDS and Malaria Indicator survey (THMIS) 2007-08, the national prevalence among the sexually active populations (between 15 and 49 years of age) is reported to be 5.7%.

Education

School attendance has increased since 2000/01 with 84% of seven to 13 years olds attending primary school in 2007 compared to 59% in 2000/01. Illiteracy among adults still remains high, a quarter of Tanzanian adults have no education at all. In rural areas about the third of adults have never had an education. The difference between men and women is large, 30% for adults women compare with 17 percent of men(46)

3.2. The study area.

The study was done in Msanzi village which is found in Rukwa Region. The region is located in the remote South-Western extreme of Tanzania between Lakes Tanganyika and Nyasa. The region has 4 districts which are Mpanda, Nkasi, Sumbawanga Urban and Sumbawanga rural. Msanzi village where this study was conducted is situated in Sumbawanga rural district in a ward called Msanzi-Rural ward. Msanzi ward by 2002 had a population of 12,464 where by

Msanzi village had population of 5156. The median age of the population in Msanzi ward was 14.8 (49).
The people are mostly Fipa, a bantu speaking tribe. The tribe is patrilinear and the majority are Christians. The common set up of the household is nuclear based families.

Msanzi village is situated in rural area reached by poor quality roads which were under construction by the time of data collection. Most of the villages in the region have no electricity and so is the case with Msanzi village. Many of the villagers of Msanzi survive solely by subsistence farming. This reflects the occupational patterns of Rukwa region, in which 76% of adults are in agriculture(50). Rukwa region is one of the five largest producers of maize in the country and is considered as 'breadbasket' region of the country.

The rainfall in this area varies from 800-1200 mm and they begin in November and continue until March or April and all famers cultivate during this period. In addition to the rainy season cultivation, dry season cultivation is possible for many farmers by cultivating along the river or springs and in the areas where there is residue of the moisture from the rainy season. In addition to their own farming, most of the women get additional income by beer brew and some of the men get some income by doing business.

Maize is by far the most prominent crop cultivated in the area. Beans, sunflower, groundnuts, fingermillet and wheat are crops which are also cultivated in the area. In addition sugarcane, potatoes, onions, tomatoes and various green vegetables are cultivated by the most farmers. About one third of the farmers also keep cattles. This also represents wealth in the community. Some also keep hens, goats, and pigs.

4. PROBLEM STATEMENT AND RATIONALE AND STUDY

4.1. Problem Statement

As many other country in Sub Saharan Africa, Tanzania economy depends heavily in agriculture in terms of output, employment and export earnings. In 2006, the agricultural sector account for 44.7% of the annual GDP(51). It also employs 80% of the workforce (14)

Food insecurity in Tanzania is high. Stunting among children under five which is one of food insecurity indicators, still remains high. According to Tanzania Demographic Health Survey (TDHS) 2010, 42% are stunted. In 2009,the country ranked the 4th in Africa after Nigeria, Ethiopia, and Democratic republic of Congo, with the largest number of children who are chronically malnourished (stunted)(10)

Furthermore, Rukwa region is one of the top five regions with high supply of food in Tanzania so called 'breadbasket' region in Tanzania. But still recent data from TDHS 2010 showed that under nutrition is high in this region. The region ranks the 4th out of 26 regions in Tanzania with the highest prevalence of chronic malnutrition (stunting) in Tanzania with 50.4% stunted. Therefore this calls for more researches to household level to look at associated factors.

Looking back from the time the former study was done, Tanzania has undergone major's changes. The World Bank Structural adjustment program and market liberalization have led to larger socio economic inequalities(52) and rural households are reported to be most affected. Also as mentioned above by other scholars, gender roles are dynamic and they tend to change over time according to population density and economic incentives(18;31;35).

In Africa few researches have looked at food security and associated factors at household level. This shows that there is still a need of researches on this aspect. Even fewer researchers have looked at the specific issue of gender division of labour and food security. In Tanzania there is no current research focusing on how gender division of labour can impact food security and child malnutrition. This means new studies on this field are needed so as to know how to combat food insecurity and malnutrition

The findings will hopefully give some useful insights on the relations between food security, child nutrition, and gender division of labour which will provide health personnel, governmental and non-governmental organization with valuable information on the problem in the local setting.

4.2. Rationale

The study will determine how gender division of labour, decision making power, is affecting food security and child nutrition. Assessment data from strong research is needed to plan appropriate programs. The findings will be of value to all individuals, groups, organization and government in Tanzania who work to combat food insecurity and child malnutrition. The result findings will be crucial to shaping how development assistance should be structured and who should be targeted.

When programmes are well planned using locally relevant, up to date data the implementation is more likely to be effective and hence we will be able to combat food insecurity and child under nutrition along the appropriate line.

4.3. Theoretical framework of food insecurity

Food insecurity in this study can be addressed using the framework presented (figure 1). The figure shows basic, underlying and immediate causes influencing food security and child nutrition where factors at one level influence the above level. The first row from top shows the immediate causes found at household level, the middle row show underlying causes and the last row show basic causes. The framework shows that the main outcome is food insecurity which in turns affects nutritional status. Gender division of labour, socio economic status, income generating activities, education level, Decision making power are characterized as immediate factors which cause food insecurity and are found at household level. These immediate factors are closely linked to underlying factors which are: economic and agricultural policies and inadequate policy to empower women but these causes are also determined by basic causes which are socio, political, economic and cultural factors within a country. This study focused on immediate causes which may lead to household food insecurity; of which food security indicators are nutritional status of children under five, food in stock, and self perception of food insufficiency

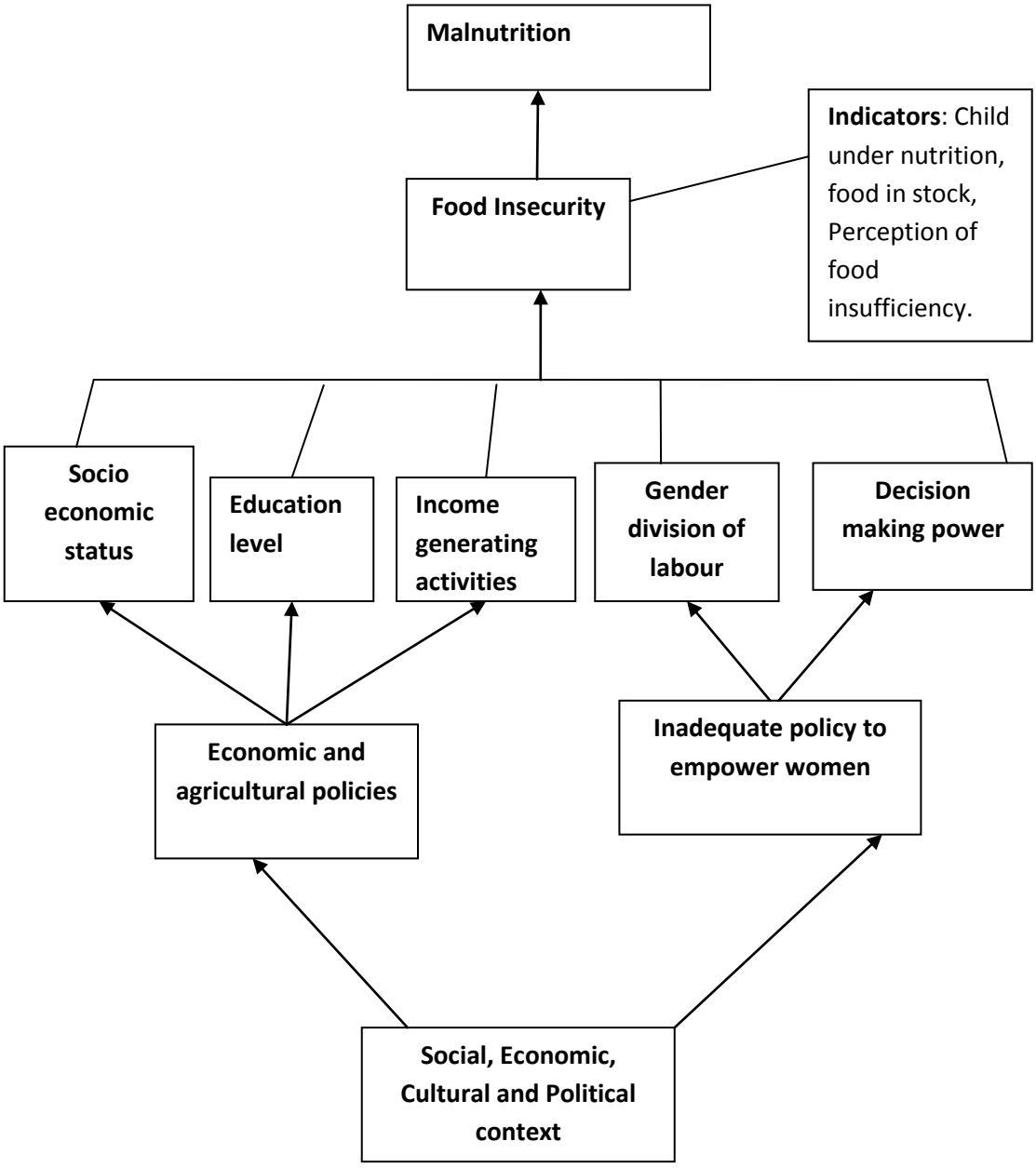

Figure 1.Framework of Food insecurity

4.4. Objectives of the study

4.4.1. General Objective:

To determine division of labor between genders in agriculture and decision making power and their impact on household food security and child nutrition.

4.4.2. Specific objectives:

- To estimate the prevalence of household food insecurity in Rural Rukwa
- To determine division of labour in agricultural tasks between genders and its association to household food security
- To determine which gender contribute more to food production (agriculture).
- To determine association between food security and child nutrition
- To determine decision making power between genders and association to household food security
- To determine association of women workload in agriculture and impact on child nutrition status

5. METHODOLOGY

5.1. Study area

The study was conducted in Msanzi village, in Rukwa region which is situated in the western part of Tanzania on the Ufipa plateau at an altitude of 1800 to 2000 above mean sea level. Since it is a follow up study, the same area of the former study was selected. The majority of people living in this area belong to the Fipa tribe. The village is in a rural setting where by agriculture is one of the main economic activities in the area.

5.2. Study design and population

5.2.1. Study design

The study used quantitative methodology and the design was cross sectional in nature. The study was carried out between September and November 2010, with individuals who had a permanent address in the village.

5.2.2. Study population

The study population was households with a child below 5 years of age. The study participants in each household were one child below five, the main care taker of the child and the household head.

A household was defined as a group of people who occupy a particular housing unit as their usual residence, and who lived there at the time of the interview and had no usual residence elsewhere.

Inclusion criteria:

- Household head (either male or female)
- Wife /main care taker of the child
- One child under five years of age
- Willing to participate in the study

Exclusion criteria

- Refused consent
- Household with no child below five years of age
- Not permanent resident of the village
- Children who are disabled

5.3. Sample size

To estimate the sample size, the prevalence of underweight children below 5 years of age in Rukwa region was used which was 24.5% according to Tanzania Demographic Health Survey 2004-2005(45).

The formula used: $n = \frac{t^2 \times p(1-p)}{m^2}$

n=required sample size, t=confidence level at 95% (standard value 1.96),

p=estimated prevalence malnutrition in the project area (24.5%), m= margin of error at 7%

From this formula, approximately the total number of 145 children was obtained. An additional 5% is included to account for attrition (the non-response) rate rendering minimum 152 children. Therefore that gives a total of 152.

Therefore the study included 152 households in which only one child was selected in each household.

5.3.1. Sampling procedure

The households included were selected based single stage proportion to size sampling. Msanzi village is divided into 3 sub divisions and further into 6 sub villages. No comprehensive list of all the households in Msanzi village existed, but in each of the sub villages a comprehensive list of households was present and obtained from the different sub-village leaders. According to the Ward/Village Executive Officer and the sub village leaders, the sub villages had approximately the same numbers of households, except for two, one which was larger and one which was smaller than the others. The sample size in the different sub villages included: 25 households in the 4 sub villages of equal size, 31 in the largest and 21 households in smallest sub-village. The sample of households was randomly drawn from the different sub villages through the following procedure: first a sampling interval was developed by dividing the total number of households in the sub village by the number required; household number one was randomly selected and thereafter the sampling interval was applied. If the selection criteria were not fulfilled in any of the selected households, the sampling procedure continued until the acquired number was obtained. In total 152 households were visited.

In the households where they had more than one eligible child, a coin toss or writing names on paper was used for random selection. If the mothers and fathers were not home at time of interview, they were visited later, at least once more.

5.4. Ethical Clearance

Ethical clearance for this study was obtained from the National Institute of Medical Research in Tanzania (NIMR) and from the Regional Committee for Medical Research Ethics in Norway.

The study was also introduced to Rukwa Regional Administrative Office, Rukwa Regional Health Office and to Sumbawanga Rural District Health Office by a letter and formal meeting. This was followed by meeting with village government officials. Informed consent was also sought from each of the participants prior to their involvement. Informed consent was obtained by a written or thumb print consent. Assurance was given to the participants that participation was voluntary and that there would be no negative consequences if they decide not to participate. They were also guaranteed full confidentiality.

5.5. Data collection procedures

There were two researchers in the field since the study was two in one. The collected data were based on face to face interview with a structured questionnaire and anthropometric measurements. The interview was conducted by the researcher herself within the household premises. The interview for the household head and the wife/main care taker were done separately and privately. All the interviews were conducted in Kiswahili.

5.5.1. Research assistant and sub village leaders

An assistant researcher, who knew both the people and the village, was employed during the whole period of data collection. The assistant researcher accompanied us to every household in the village and was trained to assist in measuring the children.

Our research assistant introduced us to the various sub village leaders prior to data collection in their sub village. The sub-village leaders informed their residents about our presence, provided us with the village inhabitants list, arranged appointments for our visits and accompanied us to the different households on the day of interview.

5.5.2. Pre-testing.

The data collection tool was pre-tested in 20 household. The aim was to test the questionnaire to find out if questions were understood and the questions were in a logical order. The questionnaire was then revised and adjusted based on the responses during the pretesting. Some questions were reformulated in order to make them easier to understand and some were completely changed. Questions on gender division of labour in agriculture were

completely changed as it was found not to catch the actual workload between men and women in different farm activities and instead recalls on last agricultural period and frequency was used.

Some of the questions on material possession were added such as possession of sofa, chairs and table and question on wall material was excluded as it was observed that all household in the village were made up of the same wall material.

5.5.3. Data collection tools

Structured questionnaire

A structured questionnaire with open and closed ended questions was used. The questionnaire was developed based on the questionnaire used in the similar former study done in 1987/88, a study done in rural Kilimanjaro on food insufficiency(53), a study performed in Malawi(54).The questionnaire was reviewed after pilot-testing and translated into Swahili by the researcher.

Most of the questions were asked to the wife/main caretaker of the child, except the questions on agricultural workload/division of labour and decision making power which were asked to both men and women separately.

The questionnaire collected information on the following:

Household characteristics: Household size, number of children under five in the household, household head relation to the selected child, number of wives

Socio-demographic characteristics: Education, Occupation and other income generating activities of the household head and wife/main caretaker.

*Socio-economic status***:** type of house roofing, size of dwelling, number of cattle, and number of assets owned, and amount of maize harvested.

*Prevention and control of disease***:** child disease, vaccination, vitamin A supplementation and deworming

*Agricultural characteristics***:** size of land cultivated last season, type of crops cultivated last season, main source of food in the household, dry season cultivation, amount of maize harvested

Food security: amount of food in stock, number of month without maize stock, dietary intake, and perception of food sufficiency.

Division of labour/Agricultural workload: length of different agricultural activities and frequency of each gender to all agricultural activities which are; land clearing, ploughing, hoeing, planting, weeding, and harvesting.

Decision making power: who decides what? To different selected activities

Anthropometric measurement tools

The anthropometric instruments (SECA) electronic scale and length board were provided by Sokoine University of Agriculture. The researchers were also trained on how to use both scales before field work.

Body weight, height and age were measured and recorded for all the children. Body weight was measured by weighing the child wearing minimum amount of clothing. The weight was recorded to the nearest 100 gram on an electronic scale (Seca) which was regularly checked. The youngest children and the children who refused to stand on the scale alone, were measured together with the mother. The mother stepped on the scale, the scale was tarred, the child was then given to the mother and the weight recorded. Two weight measurements were taken; if the measurements were different a third measurement was taken. The two similar measurements or the mean of the three was recorded.

Height was measured on a wooden measuring board. The measuring board had a fixed board at zero and a movable head piece. The children that could and were willing to stand by themselves were measured in an upright position, and chin-support method was used. The smallest children were measured in a lying position on the measuring board, with the face-up, the head placed firmly against the headboard and the body straight along the centre line of the

board. The knees were pressed down firmly and the foot piece placed to the heels. The length/height was recorded to the closest millimetre.

The age of the child was obtained from the mother and then verified in the clinic card. When no clinic card was available (n=3) the mothers recalls were used as they were found trustworthy after a lengthy discussion.

Weight for Age(WA), Height for Age(HA) and Weight for Height(WH) were calculated based on WHO 2006 child growth standards(55). The Z score were obtain from WHO Anthro version 3.1 software. The cut off point for malnutrition was set at -2SD (Standard Deviation).

5.6. Variables

This section outlines variables as they are understood in the analysis. Mainly they are dependent and independent variables:

5.6.1. Dependent variable

Food insecurity is the dependent variable which was assessed by using the following indicators:

Nutritional status of children under five years of age
Nutritional status indicators which are weight for age, height for age and weight for height were used. These indicators were grouped using a standard reference recommended by WHO,2006(55) which defined malnutrition as a median Z score (standard deviation) below minus 2 Standard Deviation, applied to any of the three indicators.
The categorization was as follows:
Over nourished: > +2SD for height/length for age, weight for age, weight for height/length
Normal: -2SD to +2SD for height/length for age, weight for age, weight for height/length
Undernourished: < -2SD for height/length for age, weight for age, weight for height/length
Moderately undernourished: < -2SD to -3SD for height/length for age, weight for age, weight for height/length

Severely undernourished: < -3SD for height/length for age, weight for age, weight for height/length

Food stock

The number of months without the main food crop (maize) in stock was used as the indicator of stability in food availability. The mothers were asked how many numbers of months they had stayed without maize in stock before the harvest. This method has been used by the former study (2). The present study was carried out between September and November representing the post-harvest season, a period usually characterized by sufficient food supplies since by November very few household start to experience food shortage. In order to signify the availability of food the whole year round, despite seasonal variation therefore months without maize stock before harvest was used. The household was considered to have a complete coverage of maize if they had stocks throughout the year from one harvest till the next harvest.

Consumption Units(CU)

Consumption units were calculated based on the FAO/WHO/UNU recommended intake of energy(56). Men aged 18-30 years has the highest recommended intake and were set to 1 CU. The other household members were added as fractions of a CU according to the recommended intake for their age group and were added up to get the total consumption unit of the households.

Sex of each household member was not collected except of the father and mother therefore average energy required between the two sexes was calculated and converted into consumption unit.

Consumption unit calculated from Recommended Energy intake by FAO/WHO/UNU (2004)

A man = 1 CU

A woman= 0.8 CU

Other adults members in the household, their sex unknown= 0.9 CU

Households members age 5-15 =0.6 CU

Children age 0-5years = 0.4 CU

Energy availability was calculated from the amount of maize stock which was available in the household at the time of survey. Mothers were asked how much maize stock they had in the household. The measures were taken according to the mothers' estimation. The measurements equipments used were the ones which they use for the storage of food. These were sacks of 100 kilograms, buckets of 20 kilograms and tins of 5 kilograms. The energy values of the maize was estimated from the Tanzania Food Composition Table(57)

Measurement of food insufficiency.

Food insufficiency status was determined by a single question: Which of the following best describes the amount of food eaten in your household in the past 12 months. a) Have enough food to eat; b)sometimes not enough food to eat; or c) often did not have enough food to eat." The latter question was drawn from the food sufficiency question developed for the Third National Health and Nutrition Examination Survey (NHANES III). In this study, households who responded sometimes or often did not have enough food to eat were categorized as food insufficiency and those who had enough food to eat were categorized as food sufficiency. This operational definition has been used in other research (53;58) and found to be valid and reliable (53;59;60)

Dietary intake:

Measures of dietary intake were collected by a food frequency questionnaire. Mothers were asked how often on average in the past month they had consumed each food. The responses were: everyday, several times a week, once a week, once a month, twice a month, and never. The list of food was developed based on the food consumed in the study area. The food items were then collapsed into eight food groups for analysis. A measure of frequent consumption was determined for each food group; for animal –source food consumption it was at least once a week and for green vegetables ≥ several times a week. This categorization has been used in other studies(61;62). An additional indicator of fat consumption was used. This additional indicator has also been used by another study in Rukwa(63). Several times a week for cooking oil consumption was used in this study for frequent consumption.

5.6.2. Independent variable

Gender division of labour

Men and women workload/gender division of labour were developed based on the length of the period and frequencies of days they went to field in various agricultural activities for various crops in the last agricultural season October/November 2009 to July/August 2010). The agricultural period selected for the study was the main agricultural period which everybody is involved. The agricultural activities includes: land clearing, ploughing, hoeing, planting, weeding, and harvesting, and the crops involved were maize, beans, finger millet, groundnuts, wheat and sunflower. The period was asked in a length of weeks/month/days, in each of the agricultural activity and for each crop. The frequency was asked in number of times she/he went to the field and was classified into everyday, several times a week, twice a week, once a week, and never. The number of days each gender went to the field was then calculated by adding period and frequency.

Everyday in a week was given a value of 6 days, since on Sundays usually people in this area do not work in the field, Several times a week was given a value of 4 days, which is a midpoint between 3 to 5 days a week. Twice a week was given a value of 2 days and once a week a value of 1 day.

Decision making power

It was determined by husband and wife responses about decision for specific activities which are assumed to influence directly or indirectly the food and nutritional situation in the household. The answers were either “it is husband”, “it is the wife” or “both decide” for the particular activity. The questions were asked to both husband and wife separately

Important independent variable

Socio economic status:

Socio economic status was determined from the assets which households had. The different assets were given an economic value based on an approximate monetary value (the value of money an asset costs in market), which the researchers came to know by their presence in Msanzi during the fieldwork.

The values given to the assets were as follows:

Economic Value	Asset
5'000 TSh	Wrist watch
10'000 TSh	Radio
30'000 TSh	Mobile phone
40'000 TSh	Chair/Table
100'000TSh	Sofa/Table
	Cupboard
120'000TSh	Plow
	Bicycle
	Sewing machine
200'000 TSh	TV
1'000'000 TSh	Milling machine
	Motorcycle

The cut off points were put into equal percentiles. People who possessed assets which costed:
≤40000 TSh were classified as Poor
41000- ≤ 160,000Tsh were classified as Middle
≥ 161,000Tsh were classified as well off
The majority of the households had none or 1 asset. In cases where the household had more than one asset, the economic value of the assets was added.

Other independent variables:

Demographic and Socio-economic variables:

The variables collected here are: occupation and education of the father and mother, size of the household, number of children under five in the household, gender of the household head, size of the dwelling, number of cattle, age of the child, sex of the child.

Diseases

Occurrence of disease to a child selected was also asked. The diseases which are included in the analysis are the ones which can affect child nutritious status which are diarrhea, fever and vomiting. Occurrence of diseases was asked for the past two weeks.

5.7. Data handling and analysis

Frequent reviewing of the questionnaires was done to detect any incorrect, illogical or missing data while in the field. In case of such occurring, the researcher went back to the respondent to seek clarity.

When in the field the data was entered in SPSS version 16. The data was checked and cleaned by going through each and every questionnaire by both researchers. Missing values were also checked by running frequencies on each variable.

Statistical Package for Social Science (SPSS) version 16 was used for analysis. For a description of the study population, frequency distribution with mean and standard deviation were used. Cross tabulation and chi square test were used to test for differences in proportions and significant difference between groups. Analysis of variance was employed to identify differences for continuous variable. Variables that failed to meet assumptions of normality were analysed using non parametric methods such as Mann-Whitney two sample test and chi-square test. Logistical regression models and Multiple Linear regression model were run to test independent associations for the main dependent variables and to adjust for potential confounders. In all stages of analysis, statistical significance was set at $p < 0.05$

6. RESULTS

6.1. Description of the sample

A total of 152 household fulfilling the inclusion criteria were interviewed and their children below 60 months of age were measured. In each household only one child was selected randomly.

6.1.1. Demographic and socio economic characteristics information

Table 1 shows households demographic characteristics. Out of 152 household, 142(92.1%) were male headed household while 12(7.9%) were female headed household. Female headed households in this study were the households in which they did not have men present at all. The households which the husband have migrated to other areas for work or employment and still send remittances home were not included in the category of female headed household.

The household median size was 6 persons ranging from 2 to 12 persons per household. The median number of children under five in the household was 2 (range1-3). About 87.9% of the household were monogamous, 12.0% were polygamous. Outmigration was very low, all mothers of the children were present and only 4 fathers(2.6%) were working/employed out of the village and the mothers reported to receive remittances from them(data not shown).

Table 1: Household demographic characteristics

	N	Percent(%)	Median(Range)
Number of households	152	100	
Household head			
Father	137	90.1	
Mother	12	7.9	
Stepfather	2	1.3	
Grandfather	1	0.7	
Size of household			6(2-12)
<5 people	59	38.8	
6-7 people	48	31.6	
>8 people	45	29.6	
Number of wives (n=141)			1(1-3)
1 wife	124	87.4	
2 wives	16	11.3	
3 wives	1	0.7	
Number of under fives living in the household			2(1-3)
1 child	66	43.4	
2 children	82	53.9	
3 children	4	2.6	

6.1.2. Socio-economic characteristics of the households

The study was done in a low socio economic area. About 55.9% of the households had thatch/grass roofed houses and 44.1% were iron sheets roofed (Table 2). Thatch/grass roofed houses are regarded as poor since thatch/grass can be easily obtained from the wild, unlike iron sheets which have to be bought. The distribution of types of houses was more or less the same between female headed and male headed household.

32.1% of the households were of low socio economic status. These households had only wrist watch and/or radio/and or mobile phone as the assets with high monetary value and some (18.4%) had no assets at all. There was statistical significant difference between the male and female headed households. Most of the female headed households (75%) fell into a lower socio economic status compared to male headed households (Table 2)

Not many households keep cattle. Only 39.5% of the households had at least one cow, the rest did not have any cattle. The number of cattle ranged from 0 to 30 with the median of 0. There was no significant difference between male headed household and female headed

household in this respect (Table 2). The possession of cattle was also analyzed according to socio economic status in cross tabulations to assess internal association between the two variables. The number of cattle was associated with socio economic status ($P<0.001$). In poor households 83.3% had no cattle at all, while in the middle and well off, 52.9% and 42.6% respectively had no cattle.

Most households (96.7%) had land for cultivation. Only 3.3%households did not have such land. Among the households which did not own land for cultivation (n=5) almost all were female headed households (n=4). The difference of ownership of the land between male headed and female headed households was significant (table 2).

The median amount of maize harvested in the household in the last agricultural period was 700 kilograms ranging from 0 to 20,000 kilograms. There was no significant difference between male and female headed household. Amount of maize produced (harvested) was also analysed according to socioeconomic status to assess internal association between the two variables. The amount of maize harvested (produced) was associated with socio economic status ($P<0.001$). In poor household 62.7% produced less than 500 kilograms, while in the middle and well off households, 21.6% and 15.7% respectively produced less than 500 kilograms.

Table 2: Distribution of socio economic characteristics of the households

	Male Headed household N=140 %	Female Headed Household N=12 %	P value
Socio economic status by assets owned**			
Low	32.1	75	0.011*
Middle	35.7	8.3	
High	32.1	16.7	
Type of house			0.468
Thatch	56.7	45.5	
Iron sheets	43.3	54.5	
Size of dwelling			0.002*
≤ 2 rooms	20	58.3	
>2rooms	80	41.7	
Number of cattles			0.285
≤0 cattle	59.3	75	
≥1 cattle	40.7	25	
Ownership of land for cultivation			0.000*
Have land	99.3	66.7	
Dont have land	0.7	33.3	
Amount of maize harvested(kgs)	**N=138**	**N=9**	
≤ 500	37.7	55.6	0.565
>500-1000	29.7	22.2	
>1000-20,000	32.6	22.2	

Chi-square, *significant at p< 0.01
Socio economic status by assets was determined by calculating monetary value of the assets. More details in methodology
Kgs=kilograms (unit measure for mass)

6.1.3. Characteristics of the respondents by gender

According to table 3, there was a highly significant difference between men and women in education. Illiteracy level was higher among the women than among the males. Also, there were a higher proportion of males who had completed primary school education than that of women. In terms of occupation, there was significantly more women who mentioned farming as their main economic activity (92.8%) compared to their male counterparts(78.6%).

In addition to their major economic activity, the majority of the women (71.1%) had other income generating activities compared to their male counter parts (42.4%). Local beer brewing was the most common other source of income among the women of whom 44.7% of the women were involved, followed by petty trading. Further, women were more involved in working as paid labour in other people's farm to earn some money compared to men. More than half (51.7%) of women had at least worked as paid labour in the last 12 month prior to the survey compared to men (33.3%) and the difference was found to be significant(Table 3).

Table 3: Characteristics of the respondents by gender

	Father(n=140) %	**Mother(n=152)** %	P value
Education [a]			0.000*
No formal education	12.9	36.8	
Primary education not finished	20.9	14.5	
Primary school, finished	59	46.1	
Secondary school	5	2.0	
Higher secondary	2.2	0.7	
Occupation [b]			0.002*
Farmer	78.6	92.8	
Paid professional	2.9	0.7	
Business	10.7	2.0	
Petty traders	1.4	2.6	
handcrafts	5.7	1.3	
None	0.7	0.7	
Other Income generating activities [c]			0.000*
Petty traders	11.5	27.7	
Beer brew	0.0	44.7	
Business	18.5	5.3	
Other	16.1	3.3	
None	57.6	28.9	
Work as Paid Labour in last 12 month			0.002*
Yes	33.3	51.7	
No	66.7	48.3	

*Significant $p < 0.001$, [a] For chi square test, primary education but didn't finish, primary school finished, secondary school and higher secondary were collapsed into one category and none into another category.

[b] For chi square test paid professional, business, petty traders handworker and other were collapsed into one category and farming into another category.

[c] For chi square test, with income generating activity were put in one category and none into another category

6.1.4. Characteristics of the children

The median age of the children included in the study was 30.8 months. The youngest child was 1.2 months and the oldest was 59.9 months. About 54.6% of the children in the sample were boys and 45.4% were girls. Table 4 shows the distribution of the children population included in the study by age and sex.

Table 4: Distribution of the child population in the study, by age and sex

	Total		Girls		Boys	
Age in months	N=152	%	N=69	%	N=83	%
0-≤12	27	17.8	11	15.9	16	19.3
>12- ≤24	31	20.4	15	21.7	16	19.3
>24-≤36	38	25.0	15	21.7	23	27.7
>36	56	36.8	28	40.6	28	33.7

6.2. Agriculture characteristics

Agriculture is the main economic activity in the area. 97.4% of the households cultivated at least maize in the last agricultural period. Further, the majority of the households (91.4%) rely on produce from harvest (farming) as their main/first source of food. Very few households (8.6%) relied on purchasing (Table 5).

Maize was the major food crop in the study area. Almost all households (99.3%) cultivated maize in the last agriculture period. Other important food crops were beans, groundnuts, sunflower and millet. Wheat is a minor crop in the area and was also cultivated by very small proportion of households (5.2%) in the last agricultural season. In addition potatoes, tomatoes, green vegetables and sugarcane were also cultivated by most farmers in the area (data not shown).

In this area wet season occurs from November to April/May, followed by the dry season from June to October. Various agricultural activities are organized according to these seasons. September/ October is the season for land preparation where by land clearing and ploughing/hoeing are performed, November/December is the season for planting, February/March is the season for weeding and July/August is the season for harvesting.

A high percentage (71.6%) of the households also practiced dry season cultivation. This type of farming is practiced in areas where there is residual moisture of wetlands, and in areas where there is stream, springs and rivers. The crops planted in this area include maize and beans and some also plant potatoes. The crops are planted in August/September and they are harvested and consumed during the wet season, when most households experience reduced food availability. The harvest here is usually small.

On average most households cultivate a median 1.2(range 0-16) hectares in a given season (table 5), but most of them possess a large piece of land which remains un-cultivated. The median total size of the land which households possess was 1.8 (range 0.2-80) hectares.

Table 5: Agriculture characteristics

	N	Percent(%)	Median(Range)
Number of households cultivated last season	148	97.4	
Crops grown last season			
Maize	147	99.3	
Beans	66	44.6	
Groundnuts	34	23.0	
Sunflower	29	19.6	
Millet	18	12.2	
Wheat	9	5.9	
Land area cultivated(Ha)last season			1.2(0-16.0)
≤0.80ha	56	36.8	
>0.80-1.20ha	28	18.4	
>1.20-2.20ha	28	18.4	
≥2.21ha	36	23.6	
Main source of food			
Direct from harvest	139	91.4	
Purchasing	13	8.6	
Dry season cultivation			
Yes	106	71.6	
No	46	28.4	
Amount of maize harvested(in kgs)			700(0-20,000)
≤ 500	57	37.5	
>500- ≤1000	43	28.3	
>1000-≤20000	47	30.9	

Ha= hectare (unit of measurement for plot sizes)

6.3. Agricultural activities

Agricultural activities which were considered in this study include; land clearing, ploughing, hoeing, planting, weeding, and harvesting (figure 1). From the field work days of woman and man, the figure shows that hoeing and weeding were the activities of longest duration taking many days i.e 17.5 days for hoeing and 15 days for weeding. However, it was observed that hoeing was not commonly practiced may be due to the ploughing technology which takes

much less time. Very few households 6.6% performed hoeing during last agricultural period. The majority(93.2%) used plough to prepare the land.

Ploughing, planting and land clearing were observed to be activities which were short and took less days. The median days were 6 for ploughing, 5 days for planting and 6 days for land clearing.

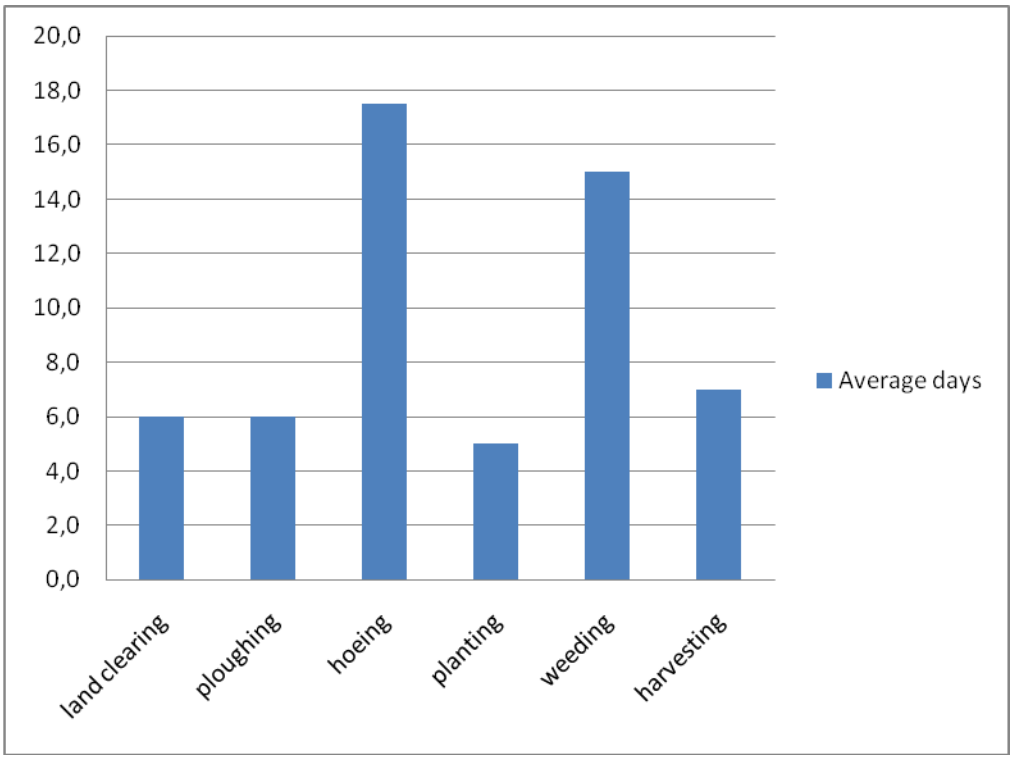

Figure 1: Agricultural activities performed in the area by average (median) days

6.4. Gender division of labour in Food production

6.4.1.Gender division of labour in Agriculture activities

Table 6 and 7 present results on gender division of labour in agricultural activities/tasks. Female headed household were excluded from the analysis and only households where both father and mother mentioned farming as their main economic activity (n=109) were included in this analysis so as to give indication of the pattern of work.

Table 6 shows the whole agricultural period which include all crops grown by the households in that season. The table shows that all the activities are done by both men and women except ploughing which is exclusively a man's job.

Though most of the activities are done by both men and women, data showed that women worked longer in most activities than their male counterparts. In land clearing women had a median days of 1.5 days more than men. In hoeing and planting men and women were contributing more or less the same and there was no significant difference between their contribution. In the work of weeding, which is very long and tiring activity women worked highly significant more days than men. Women worked for a median duration of 12 more days than men, which was twice more than that of men. In harvesting women also worked for significantly more days than the men amounting to 3 more days than the men, but the difference was small compared to the days spent in weeding (table 6).

Taking the whole agricultural period into account the table shows that women worked more days than men, women had a median of 53(0-196) while men went worked a median 39(0-164) days. Thus on average women worked 14 more days than men and the difference was significant at p=0.007.

Table 6: Gender division of labour in Agriculture activities (all crops workdays**)**

Activities	Men (days) Median(Range)	Women (days) Median (Range)	P value	N
Land clearing	6(0-30)	8.5 (0-36)	0.001*	102
Ploughing	6.50 (0-52)	0 (0)	0.000*	96
Hoeing	14.50(0-26)	17(4-26)	0.592	10
Planting	6 (0-32)	6 (0-36)	0.361	109
Weeding	12 (0-64)	24 (0-98)	0.000*	108
Harvesting	6 (0-50)	9 (0-55)	0.044**	109
Total days all activities	39 (0-164)	53 (0-196)	0.007**	109

For Mann whitney test
*Significant at p< 0.001, **Significant p< 0.05
Inluded only household where father and mother main economic activity is farming

Gender division of labour in Maize crop

Maize is the main subsistence crop and main source of cash. Table 7 shows men's and women's contribution to maize crop production. From total days, table 7 in contrast to table 6 shows how many days were devoted only in the maize field.

The total median number of days which the households worked in the maize field was 36 days as compared to 45 days in total for all crops (which is the whole agricultural period). The difference was 9 days. This indicates the importance of maize in this population.

Despite maize being the most important crop and cash crop too, men's contribution was still less than women's contribution to the cultivation of maize crop. Women worked for on average 11 days more than men and the difference was significant though not highly significant as compared to the total days for all crops. Men and women contributed the same amount of time in planting, hoeing, and harvesting.

Table 7: Gender division of Labour in Maize crop only (workdays maize)

Activities	Men (days) Median (Range)	Women(days) Median (Range)	P value	n
Land clearing	5.5 (0-26)	6 (0-26)	0.000*	100
Ploughing	6 (0-26)	0 (0)	0.000*	99
Hoeing	14.5(4-26)	14.5(4-26)	1.000	8
Planting	4 (0-26)	4 (0-26)	0.844	109
Weeding	9.5 (0-64)	22.5(0-64)	0.000*	108
Harvesting	6 (0-26)	6 (0-26)	0.255	108
Total days all activities	31 (0-114)	42 (0-134)	0.034**	109

Mann whitney test
*Significant at p<0.001, **Significant at p< 0.05
Inluded only household where main economic activity is farming

6.4.2.Gender division of labour by crop

Groundnuts, millet and beans were cultivated mainly for food consumption. Wheat and sunflower were cultivated mainly for cash (cash crops). Maize was cultivated for both purposes. Table 8 shows the time contribution of men and women to the production of these crops.

In sunflower and wheat crops men spent more days in the field than women. The median time spent (days) by men in sunflower production was 1.5 more days than women. The difference was small and not significant and results show that women also participated in the production of this crop. In wheat which was also called man's crop in the area, men spent 8 days more than women the difference was rather larger but it didn't reach statistical significant . It was also observed to be cultivated by very few people (n=7).

In millet production women spent 18 more days than men. The difference was quite large and was also significant. In most of the millet activities men were not involved at all especially weeding and harvesting millet were exclusively women's activities. Data also showed that women worked significantly more days in groundnuts fields than men. Men were less involved in this crop as it was considered women's crop in the area. Men do not participate at all in planting, and weeding, however, data shows that some of the men do participate in harvesting.

Though we could not estimate the days clearly for the beans, due to intercropping (planted together with maize) the data used here for beans were from the households which planted beans as a pure stand and on separate fields. The data showed that women worked more days in bean field (median 14 days) compared to men (median 9 days) but the difference was not significant.

Despite women participation in cash crops production, the data showed that they also participated more in subsistence crops production than men

Table 8: Gender Division of labour by crops

Crops	N	Men no.of days median(range)	Women no.of days median(range)	P-value
Maize	109	31 (0-114)	42 (0-134)	0.034**
Groundnuts	23	5 (0-18)	21 (3-47)	0.000*
Sunflower	20	16.5(2-48)	15.5 (2-42)	1.00
Millet	14	7 (1-25)	25 (1-65)	0.000*
Wheat	7	20 (10-63)	12 (5-41)	0.096
Beans	17	9(0-31)	14(2-36)	0.121

For Mann-Whitney test
*significant p< 0.001, **significant p<0.05

Includes only household where father and mother economic activity is farming

6.4.3. Relationship between men's and women's field work.

Table 9 shows the relationship between men's and women's field work. Female headed household were excluded from this analysis so as to get a clear relationship of field work pattern between the husband and the wife. The data shows that when men put substantial labour in the field women work even more days. The more the number of days the man was going to the field the more the woman number of days was increasing. This relationship was found to be highly significant $p<0.001$.

Table 9: Relationship between men's and women's field work

men's no. of work days	N=137	No. of days women work (median)
≤ 19	34	30
20-35	36	34
36-60	33	43
>61	34	84

Kruskal Wallis test, p =0.000.
Female headed household excluded

6.4.4.Distribution of women's workload in agricultural activities according to those who are alone(female headed household) and those in male headed households.

The analysis included only subsistence farmers. The difference in the number of work days between the women in the male headed household and the women who lives alone in female headed household was also analyzed. There was no statistical significance difference between them, P= 0.33. But when comparing the median days, women in the female headed household worked slightly less days (median days 47, range 10-159) than women in the male headed household (median days 53, range 0-196). However, this can not be generalized this is the case since the sample for female headed household was small (n=8**).**

6.5. Food security

6.5.1. Frequency distribution of food insufficiency in the household

Perceptions of food insufficiency were used as a proxy for food insecurity. 'Sometimes not enough to eat' and 'often do not have enough to eat' in the last 12 months were put into one category of food insufficiency. 47.7% of the households in the sample population were food insufficient (Table 10). Prevalence of food insufficiency was high in female headed households (91.7%) than in male headed households (43.9%) and the difference was significant at p=0.005. It was also high in subsistence farmers households (father and mother main/first economic activity is farming) than in non-subsistence farmers(father or mother whose first/ main economic activity is not farming), 55.6% in subsistence farmers and 20.6% in non subsistence. The difference was significant at p=0.000

Table 10: Frequency distribution of food sufficiency

	N=151	Percent(%)
Food sufficient		
Sufficient food to eat in the last 12 months	79	52.3
Food insufficient		
Sometimes not have enough food to eat	55	36.4
Often did not have enough food to eat	17	11.3

*Data for one case missing

6.5.2. Distribution of food(maize) stock in the households

Table 11, shows the number of months the households stayed without food stock before harvest. The sample here includes households which their main source of food is taken from their own harvest. The households which mentioned they relied on purchasing were excluded since they may not rely so much on food stock. 58.8% of the remaining households did not have maize stock from one month or longer time, while 41.2% had maize stock throughout the year. There was a statistically significant difference between male headed and female headed households p= 0.024 of which75% of the female headed household had no maize stock for more than 3 months compared to 30.6% in the male headed household.

Table 11: Number of months without maize in households relying on food from their own produce

No. of months without maize stock	N=136	Percent (%)
0	56	41.2
1-2	40	29.4
>3	40	29.4

*data for 3 cases missing

6.5.3. Children nutritional status

Results from the anthropometric measurements showed that 63.8% of the children were below -2SD height for age(stunted), 33.6% were below -2SD weight for age (underweight) and 2.6% were below -2SD weight for height (wasted). The data also showed that severe stunting was more prevalent (32.9%) than severe underweight which was 7.2% or severe wasting 0.7 % (Figure 1)

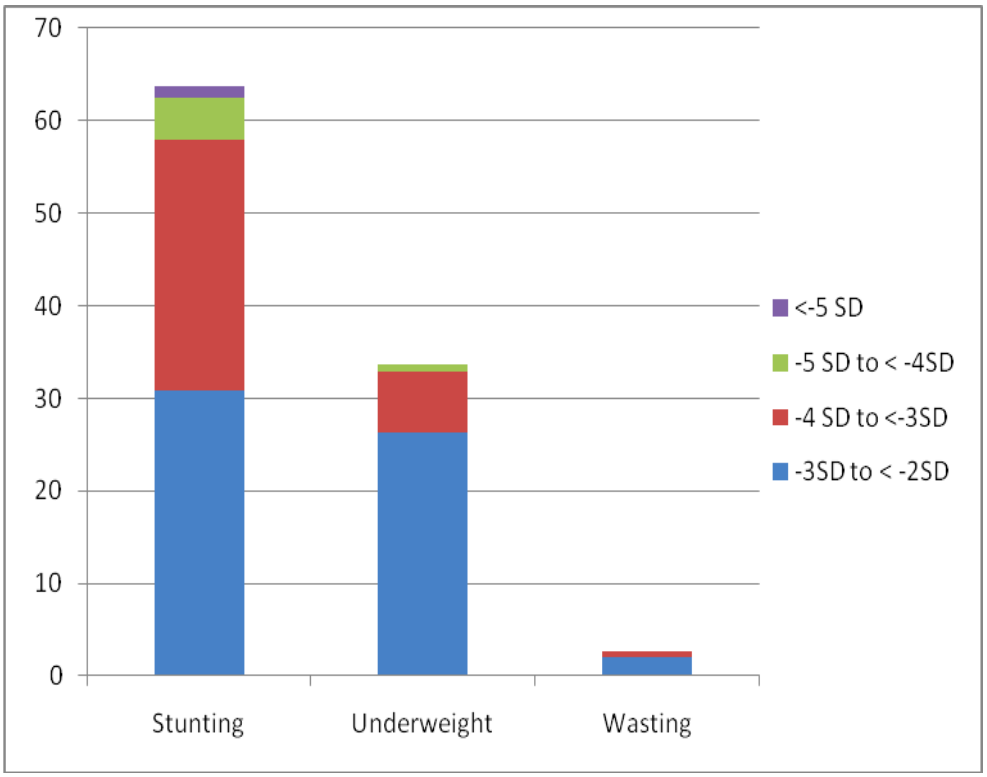

Figure 1: Rates of stunting, underweight and wasting among children in the sample

The relationship between malnutrition and age groups was analyzed (Table 12). Results show that the children in the youngest age group i.e. below 12 months of age were less malnourished than the older children who were above 12 months of age, both according to weight for age, height for age and weight for height. Comparison of the mean Z score of weight for age, height for age and weight for height, showed that the differences between age groups were all significant at P=0.001, P=0.000 and P=0.005 respectively.

Further, the relation between malnutrition and gender was analyzed. The difference in nutritional status between boys and girls in weight for age, height for age and in weight for height were almost the same and there was no statistical significance difference between boys and girls was observed in all three types of malnutrition.

Table 12: Children nutritional status according to age

		Stunting			Underweight			Wasting		
	n	<-2SD*	<-3SD	Mean Z score	<-2SD*	<-3SD	Mean Z score	<-2SD*	<-3SD	Mean Z score
Total	152	63.8	32.9	-2.5	33.6	7.2	-1.5	2.6	0.7	-0.16
Age(months)										
0- ≤12	14	25.9	11.1	-1.5	14.8	0	-0.8	0	0	0.3
>12-≤24	12	77.4	32.3	-2.6	41.9	6.5	-1.8	3.2	3.2	-0.6
>24-≤36	32	73.4	42.1	-2.8	39.5	10.5	-1.6	2.6	0	-0.03
>36	38	67.9	37.5	-2.6	33.9	8.9	-1.7	3.6	0	-0.2

* < -3SD included .
Data are in percent

6.6 Relationship between days allocated to field work and food security

6.6.1.Relationship between days allocated to maize fieldwork and number of months without maize stock

The analysis includes days which they work on maize field only. The sample here includes only subsistence farmers(where father and mother occupation is farming).When men's and women's input in the field work were added the data showed that the households with the

highest input had the shortest time of food insecurity i.e.without maize in stock than for those households that had invested less time on maize field. However the difference was small and did not reach statistical significant, p= 596 (Table 13)

Further analysis for trend was done by linear regression with robust variance estimation and it was found to be significant at p=0.032, β=0.012. That is, the numbers of months without maize stock decreases by 1% for every one day increase of fieldwork days by both father and mother.

Table 13: Relationship between days allocated to fieldwork work at Maize crop and months without maize stock

fieldwork father plus mother days in maize field	N=116	Average no. months without maize stocks	Median no.of months [a] without food stock
0- ≤ 51	34	2.59	2.0
52-85	38	2.13	2.0
>86	44	2.07	1.0

[a] Kruskal wallis test, P= 0.596
Includes only households with farming as main economic activity

6.6.2. Relation between days allocated to field work for all crops and food sufficiency

Total days of work by father plus mother in all crops grown by the households in the whole agricultural period was also analyzed in relation to food insufficiency. Only subsistence farmers were included in this analysis. There was a high percentage of households who experienced food insufficiency households in the group which had lower workload than in the household with higher workload. About 61.8% of the households were food insufficient in the group which worked for less number of days (0-64 days) compared to 47.7% in households which worked for more than 110 days in the field (table 14). The households which worked fewer days had higher odds of experiencing food insufficiency than the group which worked for many days, however the difference was not significant.

Table 14: Relationship between days in field work in all crops and food insufficiency

fieldwork father plus mother Number of days	N=116	food insufficiency (%)	OR(95%CI)
0- ≤ 64	34	61.8	1.77(0.71-4.39)
65-109	38	57.9	1.51(0.63-3.61)
>110	44	47.7	1

Chi square, p=0.428
Includes only subsistence farmers

6.6.3. Relationship between days allocated to maize field work and energy intake per consumption unit per day

The analysis include days working in the maize field for subsistence farmers. Energy intake was calculated from the amount of maize stock in the household at the time of survey. The households with lowest input in the field had the lowest energy intake compared to the households with high input in the field. But the difference did not reach statistical significance P=0.119.

Table 15: Relationship between days in field work and energy/Consumption Unit /day

father plus mother field work days	N= 115	Average Kcal/CU/day available from the stock	Median[a] kcal/CU/day from the stock
≤ 51	32	776.7	470
52-85	39	1303.2	866
>86	44	1642.6	685.3

[a]Kruskal wallis P=0.119

6.7. Relationship between household food availability and children's nutritional status

6.7.1. Relationship between number of months without food stock and child nutritional status

Includes the households who rely on their own harvest (produce) as the main source of food. Only children between 9 and 60 months of age were included since younger children were

mostly breastfed and thus less dependent on household food availability. The data showed that there was a relationship between food availability in the household and child nutritional status. The households which had food stock all the months, they had a lower proportion of children who were malnourished, compared to the households which lacked maize stock and the difference was found to be significant in underweight group 1-2 without maize stock and similarly in stunted, however not significant in neither.

Table 16: Tabulation of number of months without maize stock and child nutritional status

no of months without maize stock	N=117	<-2SD percent	OR[1](95%CI)	OR[2](95%CI)
Low weight for age(underweight)				
0	43	23.3	1	1
1-2	35	60.0	4.95(1.86-13.2)	6.18(1.99-19.2)*
>3	39	30.8	1.47 (0.55-3.9)	0.94(0.28-3.12)
Low height for age(stunted)				
0	43	67.4	1	1
1-2	35	80.0	1.9(0.68-5.5)	2.3(0.75-7.2)
>3	39	74.4	1.4(0.54-3.7)	1.5(0.47-4.8)

[1]Crude odd ratio. [2] for underweight adjusted for disease, socio economic status and age
*Significant after being adjusted for age, disease and socio economic status
Includes household which main source of food is from their own produce from harvest

6.7.2.Relationship between household food sufficiency and child nutritional status

Food sufficiency and child nutritional status was also analyzed (Table 17).The sample included children from 9 to 60 months of age. It was observed that the prevalence of malnutrition was higher in the households which were food insufficient than in households which were food sufficient. The prevalence of underweight among children from food insufficient households was high 47.5% compared to children from food sufficient household (25%). The odds ratio of being underweight was 2.75 higher in food insufficient households than in food sufficient households and the difference remained significant after being adjusted for disease, age and socioeconomic status.

Also the prevalence of stunting was higher in the households which were food insufficient than in the households which were food sufficient. The odds of being stunted in food

insufficient household were 2.1 higher than in food sufficient households, however this association was not significant.

Table 17: Tabulation of household food sufficiency status and child nutritional status

	N=119	<-2SD percent	OR[1](95%CI)	OR[2] (95%CI)
Low weight for age (underweight)				
food sufficient	60	25.0	1	1
food insufficient	59	47.5	2.7(1.23-5.89)	2.75(1.05-7.1)*
Low Height for Age (stunted)				
food sufficient	60	68.3	1	1
food insufficient	59	78.0	1.6(0.7-3.7)	1.64(0.7-3.97)

[1]crude odd ratio. [2] OR for adjusted for disease, age and socio economic status.
*significant after being adjusted for age, disease and socio economic status

6.8. Relationship between mother's field work and child nutritional status

The analysis included only the women whose first/main occupation is farming. When mother field work was analyzed according to child nutritional status (table 18), it was observed that there was association between these variables. Among the mothers who worked for more days in the field there was a higher proportion of children being malnourished than those who spent less days in the field. Among the mothers who worked in the field for less than 37 days the prevalence of underweight and stunting among children was 26.7% and 57.8% respectively compared to the mothers who worked more than 66 days where the corresponding prevalence of underweight and stunting among their children were 50% and 72.9% respectively. The odds ratio of a child being underweight having a mother with a high workload was 2.74 times that of the mothers who had lower workload. The prevalence of underweight was significantly high in the group of mothers who had the highest number of workdays in the field when adjusted for age, disease and socioeconomic status

The prevalence of stunting was also high in the group of mothers who had higher workload than in the group with lower workload in the field. The odds ratio of a child being stunted having a mother with a high workload (>66 days) was 2.0 times that of the mothers who had lower workload. The difference was small and did not reach statistical significance.

Table 18: Relationship between mother field work and child nutritional status

Field work days mother		(<-2SD)		
	N=140	(%)	OR[1]	OR[2]
low weight for age (underweight)				
≤37	45	26.7	1	1
38-65	47	25.0	0.9(0.37-2.39)	1.16(0.43-3.2)
>66	48	50.0	2.75(1.15-6.56)	2.74(1.06-7.1)*
low height for age (stunted)				
≤37	45	57.8	1	1
38-65	47	59.6	1.07(0.47-2.47)	1.18(0.49-2.83)
>66	48	72.9	1.96(0.82-4.69)	2.0(0.81-5.03)

[1] crude odd ratio [2]adjusted for age, disease and socio economic status,
*significant after adjusting for age, disease and socio economic status
Includes only women whose main occupation is farming

6.9. Food insecurity and dietary intake

Data obtained from the food frequency questionnaire showed that the households which were food insufficient had a lower intake of animal products, fruits and oil compared to food sufficient households. The difference in food consumption was larger for eggs, meat, milk, fruits and cooking oil than for other foods and the difference was significant for these foods (Table 19). There was no difference in consumption of green vegetables and fish between food sufficient and food insufficient household.

Animal food sources (eggs and milk), fruits and cooking oil were also observed to be significantly associated with number of months the households had limited food stock. Households which had maize stock throughout the year were more frequent consumer of animal food product, fruits and cooking oil than the households which had no maize stock for one month and above (table not shown)

Table19: Distribution of dietary intake of households by food insufficiency status

Food consumption pattern	Household food sufficiency status n	Food sufficienct %	Food insufficient %	P value
Whether eaten several times a week				
Green leafy vegetables	133	51.9	48.1	0.769
Fish	112	55.4	56.4	0.205
Cooking oil	109	62.4	37.4	0.000*
Whether eaten at least weekly				
Meat	66	63.4	36.4	0.014*
Eggs	26	76.9	23.1	0.009*
Milk	44	77.3	22.7	0.000*
fruits	66	68.2	31.8	0.001*

P value based on chi square test
*P value significant

6.10.Validation of food insecurity indicators

Associations among food insecurity indicators

The food insecurity indicators used were also analyzed to find if there is association between them. Table 21, shows the association between number of months without maize stock and energy available from the stock with reported food sufficiency.

There was an association between reported food sufficiency status of the household and months without maize stock and this relation was highly significant at $p< 0.001$. The data showed that 94.6% of the households which had maize stock throughout the year reported to be food sufficient. In the households which had no maize stock for 1-2 months 57.5% reported food insufficiency. Of the households which had no maize stock for 3 months or longer, 94.9% reported to food insufficient.

There was also a highly significant association $p< 0.001$ between energy per consumption unit available from maize stock and food insufficiency. Among the households with low energy availability a high proportion (75.5%) reported to be food insufficient and the

households with high energy availability only a small proportion (14.3%) reported to be food insufficient

Table 21: Food sufficiency according to number of month without maize stock and energy available from the stock per consumption unit (CU).

no. of months without stock[1]	N=135[a]	food insufficient Percent(%)
0	56	5.4
1-2	40	57.5
>3	39	94.9
Energy available from stock (Kcal /CU/Day)[2]	N=146[b]	
>1247.93	49	14.3
313.16-1247.92	48	47.9
≤ 313.15	49	75.5

[1]Chi square P= 0.000, [2]Chi square P=0.000
[a]Includes only households in which main source of food is direct from harvest
[b]Includes only households which cultivated maize last harvest

Relationship between number of months without maize stock and energy available from the stock per consumption unit per day

Table 22, shows that the households which had maize stock throughout the year before harvest had also high energy available from the stock per consumption unit than the households which lacked maize stock 1-2 or 3 months and above and the relationship was highly significant $p<0.001$. The results show that 70% of the households which had maize stock throughout the year had higher energy available from the stock (>1247.9). In the households which had no maize stock for more than 3 months, most of them 57.5% fell into the group which had low energy available from the stock (≤ 313.15).

Table 22: Relationship between number of month without maize stock and energy available from the stock per consumption unit per day

No.of months without maize stock	N	(median)[a] Kcal/CU/day	Energy intake kcal/CU/day[b] ≤ 313.15 %	313.16 -1247.92 %	>1247.93 %
0	56	1543	12.5	35.6	70.0
1-2	40	762	30.0	35.6	24.0
>3	39	251	57.5	28.9	6.0

[a]Kruskal wallis test P=0.000
[b]Chi-square, P =0.000
Includes households which cultivated maize and main source of food is direct from harvest

6.11. Factors affecting unavailability of maize stock

It was hypothesized that unavailability of maize stock in the households depended on the following factors: maize produced (wet and dry season maize), amount of maize sold, other income generating activities of mother and father used to secure food such as beer brew, petty trade and business, socio economic and demographic factors (household size, socio economic status, mothers and fathers school, occupation of both father and mother) and husband and wife contribution(working days)to fieldwork. The dependent variable was the number of months that the households did not have maize stock before the harvest. The household was considered to have a complete coverage of maize if they had stocks throughout the year from one harvest till the next harvest. The analysis done was Linear regression with robust variance estimation which does not take into account the normality of the data since the data was not normally distributed.

From the model it was observed that the amount of maize harvested had an association with number of months the households remained without maize stock. The finding shows that the higher the amount of maize the household produced the lesser the number of months without maize stock. In addition the amount of maize sold had a marginal significant positive effect of increasing the number of months the household remained without maize stock p=0.06

Dry season cultivation data used in the analysis was the size of land households cultivated during the dry season, since we did not collect data on how much was harvested in this season. The data indicated that dry season cultivation had a significant effect of decreasing the number of months without maize stock p=0.005.

It was also observed in the model that father other income generating activities which was mostly business decreased significantly the number of months the households remained without maize stock p=0.005 while that of a woman did not show any effect.

Women workload and men workload in the field did not have significant effect to the number of months without maize stock.
Household size, father education and mother education also did not show significant effect on number of months households remained without maize stock

Table 23: Model predicting number of months without maize stock

Dependent variable: number of months without maize stock (N=125)

Variable	Unstandardized coefficient (β)	P value
Household size	0.12	0.199
Socioeconomic Status	-0.37	0.108
Dry season cultivation	-0.94	0.005
Maize produced	-0.07	0.028
Maize sold	0.09	0.064
Occupation(subsistence vs non subsistence farmers)	0.32	0.482
Mother other income	0.26	0.524
Father other income	-0.09	0.005
Wife work in maize	0.00	0.978
Husband work in maize	0.01	0.367
Father education	-0.40	0.385
Mother education	0.19	0.600

Household relying on the produce (direct from the harvest) included.

List of variables used:

Household size = number of people in the household

Socio economic status = status of the household, 1=Poor, 2= middle, 3= well off

Dry season cultivation = hectares cultivated in dry season cultivation

Maize produced= amount of maize produced (main harvest) in kilograms

Maize sold = amount of maize sold in kilograms

Occupation= whether father and mother main occupation is farming (subsistence farmers) or not, 0=not subsistence farmers household, 1=subsistence farmers household

Mother income= Whether or not the mother has other income generating activities, 0= No, 1= Yes

Husband income= Whether or not the husband has other income generating activities,0=No, 1= Yes

Wife work in maize= Number of days the wife went to the maize field
Husband work in maize= Number of days the husband went to the maize field
Husband education = years in school, 0=didn't finish primary school (<7years)
1= finished primary school (≥7 years),
Mother education= years in school, 0=didn't finish primary school (<7years),
1= finished primary school (≥7 years),

6.12. Factors affecting child nutritional status

6.12.1. Low Weight for Age

It was hypothesized that factors which affect child nutritional status (low weight for age) includes: food availability (number of months without food stock/food insufficiency), diseases, age of the child, dry season cultivation, mother's workload in the field and socio economic and demographic characteristics such as education of the mother and father, occupation, father and mother other income generating activity, household size and socio economic status of the household.

(Beta negative sign here means increasing malnutrition since it decreases to negative Z score and positive sign means increasing to positive Z score).Only some of the results from the analysis in the model will be highlighted.

From the model it was observed that age contributed to child malnutrition. Underweight is increasing with the age of the child significantly, P=0.009. That is the older the child the more is likely to have low weight for age z-score. Disease is also observed to increase low weight for age Z-score. The association of the two variables was at marginally significant p=0.07. Disease included here were diarrhea, fever and vomiting in the past two weeks.

Food insufficiency was another contributor of underweight. Increased food insufficiency increased the probability of the child to have low weight for age Z score. The association was significant at P=0.015.

From the model it was also observed that the practice of dry season cultivation increased child malnutrition (low weight for age Z score) significantly P=0.034. The data used here is whether the household was practicing dry season cultivation or not.

Mother's workload in the field did not have a significant effect on child nutritional status but the data shows that it increased underweight in children but the increase was small p=0.375

Education of the mother and father, occupation (which was looked at whether their subsistence farmers or not), mother income, father income and household socio economic status did not have significant effects on child nutritional status.

Table 24: Model predicting low weight for Age (Underweight)

Dependent variable: Weight for Age Z score (Standard Deviation)

Variable	Standardized Coefficient(Beta)	P value
Disease	-0.16	0.074
Age	-0.24	0.009
Dry season cultivation	-0.28	0.034
Mother other income	0.02	0.821
Father other income	0.06	0.543
occupation	0.03	0.723
mother education	0.09	0.289
Father education	-0.11	0.225
Household size	0.03	0.726
food insufficiency	-0.28	0.015
no.month no maize stock	0.12	0.307
mother's workload	-0.08	0.375
socioeconomic status	0.08	0.418
$R^2 = 0.204$		
F=2.23, P=0.012		

List of variables:

Disease= Occurrence of disease (diarrhoea, fever and vomiting) in the past two weeks, 0= No, 1=Yes

Age = Age of a child in months

Dry season cultivation=	Households which cultivated in dry season, 0= No, 1= Yes
Mother other income=	Whether the mother has other income generating activities 0=No, 1=Yes
Father other income=	Whether the father has other income generating activites 0=No, 1=Yes
Occupation=	Whether father and mother main occupation is farming (substinence farmers), 0=not substinence farmers household, 1=substinence farmers household
Mother education=	Years in school, 0= didn't finish primary school (<7 years), 1=finished Primary school (≥7years)
Father education =	Years in school, 0=didn't finish primary school(<7 years), 1= Finished primary school(≥7years)
Household size =	number of people in the household
Food insufficiency=	Whether the household is food sufficient, 0= food sufficient, 1=food insufficient
No. months no maize stock=	Number of months the households did not have maize stock
Mother's workload=	Number of days the mother went to the field in all crops
Socio economic status =	Status of the household, 1=Poor, 2= middle, 3= well off

6.12.2. Predictors of low Height for age (stunting)

All the factors which were put in Weight for Age regression model were also put in the regression model for low Height for Age. Only age was found to associate significantly with height for age Z score at p=0.033. As the age of the child increased the probability of being low height for age increased, The model itself was not significant P = 0.359, R^2= 0.113 and F=1.1 (data not shown)

6.13. Decision making power

Husbands and wives were asked separately about decision making in relation to different activities which were assumed to influence directly or indirectly the food and nutritional situation in the household. Table 23 shows decision making power related to selected activities by gender.

The data showed that most decisions were taken jointly by father and mother or by the father alone. In the activities concerning cultivation especially the preparation of land, when to plant and when to harvest it was observed that most husbands seem to be deciding alone in these activities though in deciding what crops to grow 40% of women mentioned that it is the husband who decide while most husbands (81.3%) were of opinion that it is both of them.

In activities of food preparation (when to cook and what to eat) and beer brew the decision was observed to be mostly of the women alone. The money which a woman gets from beer brew was observed to be mostly kept by her. 90% of the woman who brew beer mentioned that the money they get from beer they keep by themselves but according to men's answer 31.8% of them mentioned that they also keep this money.

Decision to buy food was found to be rarely of the woman alone. As indicated in the table the decision was mostly taken by both husband and wife. Regarding the selling of food stock most decision were also taken by both husband and wife jointly together, though 21.8% of men mentioned that they decide alone while 32.4% of the women mentioned that they are the one who decide. There was a difference between father and mother answer on who keeps the money after selling stock. Most men (91.1%) were more likely to answer that it is their wives who keeps money from selling stock, while 48.5% of the wives reported that it's the husband.

Child medical treatment and schooling were observed to be mostly decided by both together. The data showed that there was correspondent answer between the husbands and the wives in regard to these two activities.

Table 24: Decision making power related to selected activities by gender

Who decides?	Decision taken by:					
	Wife's answer			Husband's answer		
Activity	h	w	b	h	w	b
	%	%	%	%	%	%
Preparation of land	35	5	60	52.6	1.5	45.9
what crops to grow	40	2.9	57.1	17.2	1.5	81.3
when to plant &harvest	31.4	5	63.6	46.7	1.5	51.9
when to sell stock	32.3	5.3	63.6	21.8	4.5	73.4
when to cook& what to eat	0.7	98.6	0.7	3.6	96.4	0
To buy food	19.7	19.7	52.0	33.6	18.3	48.1
To make beer	6.3	81	12.7	4.6	69.2	26.2
To buy clothes	15.5	19.7	64.8	18.7	6.7	74.6
To buy livestock	36.6	4.5	59	32.1	1.5	66.4
Children's schooling	17.1	6.0	76.9	13.3	3.7	83
Children's medical treatment	7.7	12.7	79.6	19.5	1.8	78.8
keep money after sell stock	48.5	40.8	10.8	6.7	91.1	2.2
keep money after sell beer	6.7	90	3.3	31.8	51.2	17.1

h = husband, w = wife, b = both husband and wife
Sample size n= 140, female headed household excluded.
Because of variation in the number of responses the figures are given in percentages to render comparable results

Drinking beer frequency between gender

Difference of alcohol consumption was analyzed between male and female to find if there was any difference between the genders. Men were found to be frequent consumer of beer than women. More than half (54.1%) of men mentioned that they go for beer drinking several times a week and more compared to women who only 9.7% go for beer several times a week and more. High proportion (75.2%) of women reported not to go for beer drinking compared to their male counterparts (40.6%). The difference was found to be highly significant at $p< 0.001$

7. DISCUSSION

This study was conducted in Msanzi village in Rukwa region, Tanzania. It is a rural area where the majorities are farmers. This was a follow up of a study which was done in1987/1988, and therefore the same area was selected so as to identify the changes which may have occurred.

In this chapter the results will be discussed, and compared with the previous study from 1987/1988. In addition, the results will also be discussed in relation to other current studies carried out both in Tanzania and in other countries. The strength and limitation of the study will also be considered.

One of the main results of the present study was that malnutrition and food insecurity was highly prevalent in the studied population. The prevalence of food insecurity by using food the insufficiency scale was 47.7%. The prevalence of food insecurity by using number of months without food stock was 58.8%, that is had no maize stock for one month or longer time. Prevalence of under nutrition was also high, chronic malnutrition (stunting) was more prevalent than underweight (global or general under nutrition) and wasting (acute malnutrition). The rate of malnutrition for children below five years of age was 63.8% for stunting, 33.6% for underweight and 2.6% for wasting. Another result was that women were observed to work significantly more days in the agricultural field than men. In addition, it was observed that food insecurity and high women workload were associated with children's nutritional status. This and other results will be discussed further in this chapter.

7.1. Methodological Discussion

7.1.1 Strength of the study

All the interviews were conducted by the researcher. This had positive bearing in regard to the aspects of validity and reliability since the researcher was well acquainted with the study objectives and hence efforts were made to ensure the questions were clear and understood by the respondents in the light of the objectives of the study. In addition the researcher speaks their language (Swahili) and was well acquainted with the culture of the people which had positive impact in interacting with a community and in understanding the respondents' answers better.

Information from sub-village heads and discussion with group of 6 men and group of 6 women has added strength to the study as it enriched and validated the information gathered. This also provided the researcher with some qualitative insights which was useful in interpreting the findings and discussing their validity. Further, the validity and the reliability of the survey was increased through the pre testing of the questionnaire in 20 households and some questions were adjusted and some changed so as to meet the objectives.

7.1.2. Limitations of the study

1) Study design

A cross sectional design was implemented in this study. One disadvantage of a cross sectional study design is that the exposure and the outcome are measured at the same time and therefore lead to difficulties in establishing what the cause is and what the effect is. A longitudinal study would have been a better design to establish the exposure and the outcome but a cross sectional study design makes it possible to indicate an association between the exposure and the outcome as it has been shown by researches(64).

2) Bias

Recall Bias

Recall bias may be present in the study since most of the questions asked relied on the respondent's memory. Most of the questions on food security and gender division of labor were asked for the span of up to one year prior to the investigation. The food security questions were dependent on the memory of the mothers. They had to recall the number of months they stayed without maize stock, the food situation in the household for the last 12 months and dietary intake of different foods for the last one month. Based on the fact that recalls were used mostly, this may introduce bias in the study findings. There is a possibility for bias in our estimates for food insecurity prevalence however from looking at internal associations of all the food security measures, it may be concluded that the bias was fairly minimal.

Further, each gender had to recall the frequency they went to the field in the last main agricultural period. It is possible that our estimates of total work days of both men and women may be overestimated or underestimated due to the recall bias. For example it is most likely for them not to remember some days when they just needed a rest, however efforts where done to ensure that the bias was reduced by probing.

3) Measurement of food insecurity

Calculation of Consumption units

The sex of each member in the household was not collected except of the father and the mother. Therefore the average energy required for both genders together was calculated and converted to consumption units. Also the actual age of the man and woman was not taken, and this means that some fathers and mothers who are old are given the consumption units of the middle age group. This may overestimate or underestimate the actual number of consumptions units in the household. However from the comparison of the energy available from the maize stock by consumptions unit per day with other food security measure showed that, this measure highly correlated/associated with other food insecurity measures used. This seems to reflect the actual food security status in the area and that the bias may be minimal.

Food insufficiency measure

The study also used NHANES-III single question of food insufficiency. In this study was asked in the span of last 12 months. The validity of this scale to assess food insufficiency in rural developing country is questionable as the scale was developed in a developed country (USA). However the scale has been used in another study done in rural Tanzania and indicated inter-informant reliability that (75%) of individuals in the same household agreed to be classified as food insufficient(62). In this study the measure was checked for internal consistency with other food insecurity measure by cross tabulation and found to be significantly associated with other food security measures. This may interpret the reliability of the measure, though reliability is not sufficient to prove validity.

Using child malnutrition as indicator of food security

Child malnutrition can be used as an indicator. This is because children under five are the most vulnerable and the first one to be affected when food security situation worsens. Therefore the prevalence of under nutrition is often used as an indicator of the general food situation in a population group. But on the other hand, malnutrition does not necessarily reflect the level of household food insecurity. As it has described by the UNICEF malnutrition is also determined by other factors than food security, for instance by health status of the child and the care it receives(65). They may all interact to influence nutritional status.

Further, studies have shown that intra household distribution of food may not be even. A study in Sri-lanka found a significant difference among calorie adequacy ratio of father, mother and children. Fathers had the highest and the children had the lowest mean calorie adequacy ratio(66). Another study in Nigeria found households to be nutritionally adequate but some members were undernourished. Adult male members were most favored in terms of food allocation compared to other members(67). This implies that the food in the households sometimes may be present but may not be distributed according to need which may result into malnutrition to some members in the household especially when the children who are vulnerable are not favored.

Nevertheless child malnutrition is considered to be a good proxy measure of food insecurity(68)

7.2. Discussion of the findings of the study.

7.2.1.Gender division of labour

The findings showed that there was great variation between the households in regard to men's and women's field work input. The number of days the women spent in the field was higher than that of men. This is in consistent with what has been reported by other studies. World Bank reported that the average number of workdays of African women may be 50 percent higher and their that work is more closely integrated with the production system(26). In South Asia women provide 90 percent of the labour for cultivating rice(24). They are addressed to

be the key to food security(25). In a qualitative study done in Tanzania and Kenya women were observed to be the primary responsible for farming and referred it to tightly controlled social norms around division of labour(27). Our findings corresponds with the former study done in the same area in 1988 in which they observed that women worked longer hours in the field than men(1).

Our findings contradict some studies done in Africa. In a multi-country study and in another study in Nigeria, it was shown that men contributed more in crop production than women, while women contributed more to food processing(39;40) .Although our study did not look at food processing but the result on crop production contradicts their findings. Women in our study area of Rukwa worked high also in crop production.

Our results show that all agricultural activities such as land clearing, hoeing, planting, weeding, and harvesting were performed by both men and women, except ploughing which was exclusively men's work. Similar observation were done in the former study(1) except for the land clearing which in 1988 was observed to be carried out only by men while in our findings also women were working more in this work than the males. Saito K. has reported that African rural household traditional farming system is changing with men searching for other income activities elsewhere and that women were taking on tasks (such as land clearing) which were traditionally performed by men(31). May be this could also explain why more women than men in this study mentioned farming as their main economic activity.

Our findings also showed that women worked in weeding twice the number of days compared to the men. Further, findings showed that men did not participate at all in weeding groundnuts, or in weeding and harvesting millet. Similar observation were done in 1988 study(1). In a qualitative part of the former survey, it was observed that traditionally weeding was woman's work (4) and that groundnuts and millet were also considered women's crop(1)

In regard to gender division of labour by crops, the findings showed that men worked more in crops which were used for obtaining cash (sunflower and wheat) than in subsistence crops such as millet, groundnuts, and beans. An explanation for this is that "women are responsible for feeding the family while men tend to favour cash"(18). However the number of household in the sample cultivating wheat was too small for us to draw this conclusion.

Further it was observed that higher percentage of women than men worked as paid laborers in other people's farm for money or food during last 12 months. This means that despite their workload in their own fields they also work more than men in other's people's fields when food stock was depleted. This also reflect the responsibility of a woman to feed the family as it has been observed by the former study that working as paid labour is one of the coping strategies which people in this area uses when they face food shortage to procure food(69).

Studies have reported that gender relations are dynamic and change over time in response to economic incentives and population density(18;31;35). Our findings which we got on gender division of labour by tasks and crop seem to be similar with the findings from the study of 1988 except for the land clearing activity.

7.2.2. Food insecurity

Food insecurity in the area was quite high. 58.8% experienced one month or more without maize stock. Maize stock was taken as indicator of food security since it was the dominant food in the area. From the discussions with some respondents and sub-village heads, it became evident that people in this area consider the food eaten to be a meal, only if it contains maize (i.e ugali) and usually when they talked about 'food' they refer to maize. All other meals such as those containing potatoes or rice were considered as 'snacks'. Similar observation were done by the former study(69) and by another study which was done in another area in the Rukwa region(70). The researcher of this study used also maize stock as an indicator of food security giving the same justification for using it(70).

Using the food insufficiency scale the prevalence was 47.7% which is twice higher compared to what was found in another study done in rural area in Tanzania(53). However the author of the study mentioned that the result might have been influenced by the season which was post harvest season, while in this study it was asked about the whole year round, in the last 12 months to minimize seasonal variation. Comparing our result with other studies must be done with caution since different scales and different definitions have been used and applied on people in different areas.

Using malnutrition as indicator of food insecurity the prevalence of malnutrition was high, for stunting and underweight but low for wasting. The rates are higher than compared to Tanzania Demographic Health Survey(TDHS)2010 for Rukwa region where by stunting was 50.4% and underweight 13.5%(11).The rates we found in our study were 63.8% for stunting and 33.8% for underweight. The rate for wasting (2.6%) did not differ so much with TDHS 2010 for Rukwa region which was 3.5%(11). However TDHS rate for Rukwa region involved both rural and urban parts of Rukwa which could probably explain why stunting and underweight was lower than our rate, taking into account the fact that malnutrition in Tanzania is reported to be higher in the rural area than urban area(71).

The prevalence rate of low weight for age(underweight) was compared with the former study by using the same scale WHO (1983) reference and cut off point of 75% of the median. In the former study the children were measured in three different season of the year (April-May, July-August and February-March) in two villages of the study(2). The rate used here were from the most market integrated village which was the same village in which present study was done(2). The average of the three rates was calculated and compared. The average of three rates of malnutrition was found to be similar to that of the former study which was 26.5% compared to 25% in this study. This means that there has been no improvement in the rate of malnutrition in this area since 1988.

Food insecurity (number of months without maize stock) and associated factors

As seen in the multivariate model the findings showed that food insecurity (number of months without stock) was associated with some demographic characteristics which were; socio economic status and father's income generating activities. From the multivariate model it was observed that the duration of maize stocks was different in the three socio economic groups. With the lower socio economic status in the household, the duration of months without maize stock was increasing. Also it was observed that father other income generating activities reduced the duration of months without maize stock. The association between income, socio economic status and food insecurity was also observed in other studies (72-77)

The effect of father's other income generating activities in reducing the number of months without maize stock, compared to the effect of mother's other income generating activities could be explained by the fact that most of the men's activities were larger businesses which generated much more money compared to those of the women, which were mostly beer brewing and petty trade. It was also noted that number of months without maize stock increased with woman's income generating activities but slightly and not significantly. An explanation for this is that beer brewing which is the most common activity among women was also one of the coping strategies the women used to get money in order to buy food when maize stock is depleted or about to be depleted. Therefore the households which lacked maize stock for longer time had more women doing beer brewing than the households which did not lack food stock or faced for shorter time.

Occupation of the father and mother was observed to significantly associate with number of months without maize stock in bivariate analysis that is the households whose father and mother main occupation was farming (subsistence farmers) were more likely to have longer months without maize stock than the households which either one or both main occupation was not farming (not subsistence farmers) however in multivariate analysis in the model this did not remain significant.

Education did not have significant association with number of months without maize stock (food insecurity). This is contrary to other studies in other areas which they have observed association between food insecurity and education (72;74;75;78-80). However our result is inconsistency with another study which has been done in rural Tanzania (62). Similar observation was done in the former study(69). Lack of significant relationship between education and food insecurity (months without maize stock) may be explained by that majority of population in the rural area have up to primary level education which means that there is little variation in education level. Further primary level education in Tanzania has been indicated to make very little difference to increase farm productivity and to reduce poverty in non modernizing environment such as rural areas of Tanzania(81).

It was observed that female headed households were more food insecure than male headed household in bivariate analysis. Similar findings have also been reported from studies in other areas(78;82;83). However we did not do multivariate analysis on this relationship due to smaller sample size of female headed households (n=12) which may limit the statistical power to detect association. The fact that female headed household were found to be food insecure may be due to lack of resources such as land as it was observed in this study. Out of the five households which did not have land for cultivation four of them were female head. This is due to lack of women land rights which have also been reported to be one of the major constraints which women farmers in Africa face(17;19;23;84).

It was also observed that household size had a positive effect of increasing the number of months without maize stock but the effect was so small and not significant which is contrary to other studies which have observed significant association between food insecurity and household size(74;79;82;83;85). Lack of effect of household size in this area may be due to a larger number of people who can work in the field including the children (teenagers).

From the multivariate model the finding showed that amount of maize produced decreased the number of months without maize stock while the amount of maize sold had a significant positive effect of increasing the number of months without maize stock. Similar result was observed by the former study(69). This may be due to overselling of the harvest in relation to household needs as was reported in the former study(69).

There was association between dry season cultivation and food security (number of months without maize stock). Production data for dry season cultivation was not collected and therefore land size cultivated for dry season cultivation was used in the analysis. However the former study reported that it was difficult to collect this data due to their practice of picking from the farm whenever needed for consumption before harvest and therefore people did not know how much they harvested(69). From the multivariate model it is observed that dry season cultivation decreases significantly the months without food stock even though this harvest is usually small. Similar observation was done by the former study(69).

Women's and men's workload and food security

The days spent into the maize field was used in the analysis given the importance of maize crop in this area. From the analysis it was observed that most of the respondents' effort(days) were devoted to maize compared to any other crop. When women's and men's labour input was added, those who worked more were seen to have shorter months without maize stock than those who worked less, however there was no statistical difference to support the finding. In the former study in this respect this difference was found to be statistical significant(1). This could probably be explained by different methodology used by the two studies to collect workload. Further it was also observed that the higher the workload of both men and women the higher the energy intake in kilocalories per consumption unit in the household. These relationships imply that both men's and women's work were important for household food availability.

Food insecurity and food consumption patterns

Food insufficiency and number of months without maize stock were related to the current indicators of dietary intake. The data showed that the participants who were food sufficient and also had maize stock throughout the year had high intake of animal products (except fish), fruit and cooking oil. The high intake of dietary intake of animal products, and fruits in food secure households is consistency with other studies(61;63;75;86-88) but for cooking oil was inconsistency with a study done in Rukwa(63). The difference in food consumption between food secure and food insecure can be explained by the fact that these foods are generally expensive and therefore unaffordable to the majority being less well off. There was no difference in consumption of green leafy vegetables between food secure and food insecure households since in this rural community they are less costly and hence available to the majority. The area is near the Lake Tanganyika and hence fish is abundant in the area and less costly and this could explain why there was no difference in consumption of fish between food secure and food insecure households.

7.3.3. Factors associated with malnutrition

Age of the child

Age of the child was found to be significantly associated with the child under nutrition both in regard to stunting and underweight. Children from 12 months and above had higher prevalence of underweight and stunting compared to the children from 0-12 months (table 12). In multivariate model the association was significant. This has also been observed by other studies(89;90) and in TDHS 2010(11). This is due to the fact that the younger ones mostly rely on breast milk. Therefore growth of children often declines as the child become less dependent on breast milk and start to get complementary or weaning foods. This can also imply that there is inadequacy in quantity or quality of weaning foods. Another reason is that (by observation) the younger ones were usually carried at the back with the mother everywhere they go even when they go to the field. The older ones are usually left with other older siblings or relatives at home thus receive less care. Also as the child grows older the immunity he/she acquire from the mother breast milk goes down and therefore become more susceptible to diseases which may compromise his/her health.

Sex of the child

There was no significant difference in child nutritional status in regard to sex of the child. This is in consistency with another study done in Tanzania(91).

Diseases

Diseases were found to have association with malnutrition. Diseases which were taken into consideration in this study were fever, diarrhea and vomiting for the past two weeks. 25% of the children had diarrhea in the past two weeks, 23.5% had fever and vomiting were 3.9%. The relationship was significant for underweight in bivariate analysis but in multivariate model the relationship was at borderline significant p=0.07. The relationship between disease and child nutritional status has also been observed by other studies(92;93) and also explained in UNICEF conceptual model of malnutrition(65) as it affects the uptake of nutrients and loss of appetite. Also it can be other way round that the children who are malnourished were more likely to get diseases since their immunity is low.

Food security

The odds ratio of being malnourished (underweight) in the household being food insufficient was significantly higher than in food sufficient households when controlling for age, disease and socio economic status. Also the households which had maize stock throughout the year had lesser odd of their children being malnourished than the household which had no maize stock from one month or longer time. This relationship between food insecurity and child under nutrition was also observed by the former study(1) and also by other study(94). From the findings on the number of months without food stock it was noted that the prevalence of under nutrition was higher in the household which had no maize stock from 1-2 months than those who were insufficient from 3 months and above. This implies that there might be a compensatory mechanism in the latter to grant them food without having food stocks. This could also be extra income earned in cash or foods given from other households. However this study did not provide further information to find a major cause.

Women workload

From our findings it was observed that there was an association between women's workload and child nutritional status. Women with highest workload on the farm had children who were significantly more malnourished than the women who worked less in the field. However in multivariate linear regression this association was not significant. The findings in study from Iran, showed that children with mothers with heavy workload on farm were significantly more malnourished compared to children with mothers with lighter workloads(41). In a qualitative study undertaken in rural Kenya on women's perception about reasons for under nutrition among their children, the mother's reported their heavy workload was among one of the reason (95). In the former study the negative relationship between women's workload and child nutrition was also hypothesized, but no conclusive evidence to the notion was observed. However their time allocation data showed that women spent less time in cooking and children were fed less often in the seasons when women worked harder in the field(3). That means the higher workload of women in the field may give women less time for child care and feeding.

Dry season cultivation

Another interesting finding is that dry season cultivation is found to contribute significantly to child malnutrition (low weight for age) despite the fact that it was found to significantly decrease the number of months without maize stock. From the data we could see that the households which practice dry season cultivation have children who were more likely to have low weight for age than the households which did not practice dry season cultivation at all. The implication of this could be explained by women workload as it was observed in this study, and the former study(3).

7.4.4. Decision making power

Women are known to provide care for their families, safeguard health of their children, to prepare and process food, and maintaining nutritional status of the household(96). Their command over the resources in the procurement of food will largely depend on their ability or power they have on decision making pertaining to the use of these resources. Several past studies have shown that when women's power is increased they use it directly in improving the health and nutritional status of the household (97-99). Therefore the assumption in this study was that the more command/power the woman has in the household the better the food supply and nutritional situation in the household. However we did not go further into deeper analysis to determine the association. Therefore we cannot confirm this assumption.

From the result it was noted that most decisions were taken jointly by husband and wife or by husband alone. Wives were observed to make decision alone only on preparation of food and beer brew. Similar observation was done in the former study(4). It was also noted that the decision to buy food was not taken by the woman alone rather it was done jointly by the husband and wife. From the qualitative part of the former survey it was indicated that the women usually had to obtain their husband's permission before anything was bought(4). They describe that it was placing women in difficult position since they were responsible to prepare food but not able to buy food unless they have consulted their husbands first(4).

In regard to cultivation most of the decisions were observed to be from both of them or from the father. About half of the respondents mentioned that they were taking decision together

while the other half came from the father alone. Similar observation was done in the former study(4). From their qualitative part of the former survey, they further observed that there was a variation in the households which decisions were stated to be taken jointly. It was observed that in those households where men were taking all the decisions, women were consulted first. Only in few households women were taking decision alone(4).

It was also noted that there was variation in the answers who keeps the money after selling crops between the husband and the wife however looking at the woman answer we see that can be either the woman alone or the man alone. 48.5% of the women reported it was the husband while 40.8% of the men reported it was the wife and 10% reported both. Looking at the qualitative part of the former survey they reported that even if the husband has the last word in the household women always had their way with men to ensure that foods need were met. This all depended on their smartness and ability to find arguments that the husbands could accept (4). This may be could explain why at least 40.8% of this women keep the money.

The results were inconsistency with other studies which were done in developing countries which showed that women are still not actively involved in decision making as their male counterparts. In a study done in Nepal they found that women were less involved in decision making process in rice production and microenterprise. They further observe that men culturally were accepted as being the decision makers in the household, however the decisions that they made were usually suggested by their wives (32). In a study done in Nigeria it was found that the level of participation of woman in farm management decision making was quite low(44)In a qualitative study in Gambia the women reported lack of decision making as one factor that hinder their ability to practice what they know about child health and nutrition (43).

8. CONCLUSION AND RECOMMENDATION

8.1. Conclusion

The findings of this study revealed that both men and women participate in agriculture however women work more days than men. Women were observed to spend more days in the

field especially in weeding which is one of the longest and tiring agricultural activities. Despite having a high workload in maize cultivation which is the main crop in the area women were also observed to participate more than men in subsistence crops.

Prevalence of food insecurity was high in the area. 47.7% reported food insufficiency in the last 12 months. 58.8% did not have maize in stock for one month or longer. Several factors were found to have significantly association with food insecurity (number of months without maize stock). Father's income generating activities, socio economic status, amount of maize produced, amount of maize sold and hectares cultivated during dry season cultivation. Women's and men's input together was also observed to decrease the number of months without maize stock and to increase energy availability per consumption unit in the household but not significantly.

Using child under nutrition as an indicator of food insecurity, the prevalence of stunting and underweight was quite high but low for wasting, indicating that it is the chronic under nutrition that prevailed. For stunting it was 63.8%, for underweight was 33.6%and for wasting was 2.6%. Food availability according to food stock and reported food insufficiency was found to be a significant factor contributing to children being underweight. Other factors which were found to contribute to underweight in children were diseases, age of the child, women workload and household practicing dry season cultivation. In stunting only age of the child was found to be a contributing factor.

Concerning decision making power, the findings reveals that there was gender inequity in decision making among the household. Most decisions were taken either jointly or by men. Women seldom make decision alone. This may have impact on food security and child nutritional status. However no further analysis was done to find if there was such an association.

Lastly, when we compare our result with the former study, it reveals that not much has changed in the area. Food insecurity is still high; malnutrition is still a major problem and the rate was found to be similar with the former study. There is still gender inequity in division of

labour in tasks and in decision making process as it was shown by the former study. Though women workload may increase food availability but also shown to contribute to child malnutrition.

8.2. Recommendations

Further research: There are few studies in Africa which looked on the association between gender division of labour, household food security and child nutrition. More studies should be conducted at the household level in these settings since the problem of food insecurity and child malnutrition still exists at the national level of many African countries. The studies should be more analytical to assist in confirming the suggested association of gender division of labour and decision making power to household food security and also to child malnutrition

Recommendation for policy: Knowing who does what work is essential in policy planning. Women were observed to be responsible for particular aspects of producing food for household consumptions than men. Therefore food policy needs to specifically target the women and empower them in terms of education/capacity building as this will increase their earning capacity and decision power and improve their security status

High prevalence of underweight and stunting indicates that there is a need for interventions which includes increasing food availability or income and nutrition education in the community.

Reference List

(1) Holmboe-Ottesen G, Wandel M. Men's contribution to the food and nutritional situation in the Tanzanian Household. Ecology of Food and Nutrition 1991;26(1):83-96.

(2) Holmboe-Ottesen G, Wandel M. Child malnutrition and development processes in two Tanzanians villages. Health Policy and Planning 1992;7(2):123-34.

(3) Wandel M, Holmboe-Ottesen G. Women's work in Agriculture and Child Nutrition in Tanzania. Journal of Tropical Pediatrics 1992;38(5):252-5.

(4) Holmboe-Ottesen G, Wandel M. Wife, Today i only had Money for Pombe, Gender and Food; Women Bargaining power and Agricultural change in a Tanzanian Community. Gender and Change in Developing Countries. Universitetsforlaget/Oxford University Press; 1991. p. 93-119.

(5) FAO. Rome Declaration on World Food Security,World Food Summit. Rome: Food and Agricultural Organization of the United Nations(FAO); 1996.

(6) FAO. The state of Food insecurity in the World: Addressing food insecurity in protracted crisis. Rome: Food and Agriculture Organization of the United Nations(FAO); 2010.

(7) UNICEF. Progress for Children: A report card on nutrition, number 4. United Nations Children's Fund; 2006.

(8) UNICEF. The state of the world's children 2007. United Nations Children's Fund; 2007.

(9) FAO. The state of food insecurity in the world 2009. Rome, Italy: Food and Agriculture Organization of the United Nations; 2009.

(10) UNICEF. Tracking progress on child and maternal Nutrition: A survival and development priority. New York,USA: United Nation Children's Fund; 2009.

(11) NBS. Tanzania Demographic Health Survey 2010-Preliminary report. Dar es Salaam, Tanzania: National Bereau of Statistics; 2010.

(12) World Bank. World Development Report; Agriculture for Development. Washington D.C: World Bank; 2008.

(13) FAO. Food Security and agricultural mitigation in Developing countries: Option for capturing Synergies. Rome: Food and Agricultural Organization of United Nations; 2009.

(14) Tanzania National Website. 2010.

(15) FAO. Gender Equity in Agriculture and rural development: A quick guide to gender mainstreaming in FAO's new strategic framework. Food and Agricultural organization of the United Nations; 2009.

(16) Mehra R, Rojas MH. Women, Food security and Agriculture in a global Market place: A significant shift. International Centre for Research in women (ICRW); 2008.

(17) Saito K, Weidemmann CJ. Agricultural extension for women farmers in Africa. World Bank; 1990.

(18) Doss CR. Designing Agricultural Technology for African Women farmers: Lessons from 25 years of experience. World Development 2001;29(12):2075-92.

(19) Quisumbing A, Pandolfelli L. Promising approaches to address the needs for Poor Female farmers, IFPRI Discussion Paper 00882. Washington DC: International Food Policy and Research Institute; 2008.

(20) FAO. FAO focus: women and food security. Food and Agriculture organization of the United Nations; 1997.

(21) UN-ESCWA. Gender and Food security. United Nations Economic and Social Commision for Western Asia; 2009.

(22) United Nations. Women Farmers: The invisible producers. Africa Recovery 1997;11(2).

(23) WB, IFAD, FAO. Gender in Agriculture sourcebook. The World Bank; 2009.

(24) UNFPA. World Food Summit on Food security. Reducing hunger and poverty: Women hold the key. United Nations Population Fund; 2002.

(25) Quisumbing AR, Brown LR, Feldstein HS, Haddad L, Pena C. Women:The Key to food security. Washington,DC: The International Food policy Research Institute; 1995.

(26) World Bank. Gender and Growth: Africa's Missed potential. World Bank; 2001.

(27) Hyder A.A, Maman Suzan, Nyoni J.E, Khasiani S, Teoh N, Premji Z, et al. The pervasive triad of food security, gender inequity and women's health: explaratory research from sub-Saharan Africa. African Health Science 2005;5(4):328-34.

(28) Ejembi EP, Ejembi SA, Abgulu ON. Food chain activities of women in an Agrarian Community in Central Nigeria: Implications for Rural Davelopment. Journal of Human Ecology 2006;19(1):63-7.

(29) Kusujiarti S, Tickamyer A. Gender Division of labour in two Javanese villages. Gender Technology and Development 2000;4:415.

(30) Lado C. Female Labor Participation in Agricultural Production and the Implications for Nutrition and Health in Rural Africa. Social Science & Medicine 1992 Apr;34(7):789-807.

(31) Saito KA. Raising productivity of women farmers in Subsaharan Africa: World Bank Discussion Papers No.230. Washington D.C: World Bank; 1994.

(32) Upadhyay B. Gender roles in rural communities of Nepal. Asian Women 2002;14(6):81-102.

(33) Gawaya R. Investing in women's farmers to eliminate food insecurity in southern Africa: Policy-related research from Mozambique. Gender and Development 2008;16(1):147-59.

(34) Doss CR. Men's crops?Women's crops?The gender patterns of cropping in Ghana. World Development 2002;30(11):1987-2000.

(35) Boserup E. Women's role in economic developmet. 1970.

(36) IFAD. Women as Agents of change: Discussion paper. International Fund for Agricultural Development; 2003.

(37) Sachs C, Alston M. Global shifts, Sedimentations and Imaginaries: An introduction to the special issue on Women & Agriculture. Signs: Journal of Women in Culture and Society 2010;35(2).

(38) Mwakalobo A, Kashuliza A. Small holder farming systems in a liberalized market environment in Tanzania: Some empirical anlysis in some areas of Mbeya Region. Agricultural Economists society of Tanzania conference proceedings series 1999;2.

(39) Enete A, Nweke F, Tollens E. Contributions of men and women to food crop production labour in Africa: information from COSCA. Outlook on Agriculture 2002 Dec;31(4):259-65.

(40) Chianu JN, Hiroshi T. Gender differences in Labor Allocation in West Africa : A case study of the Savannas of Northern Nigeria. Humanity and social science Journal 2007;2(2):93-103.

(41) Rabiee F, Geissler C. The impact of maternal workload on child nutrition in rural Iran. Food and Nutrition Bulletin 1992;14(43).

(42) HKI. Female decision-making power and nutritional status within Bangladesh's socio-economic context: Nutritional Surveillance Project Bulletin No.20. Hellen Keller International; 2006.

(43) Mwangome M, Prentice A, Plugge E, Nweneka C. Determinants of appropriate child health and nutrition practices among women in Rural Gambia. Journal of Health Population and Nutrition 2010;28(2):167-72.

(44) Damisa MA, Yohanna M. Role of rural women in Farm management Decision making process: Ordered probit analysis. World Journal of Agricultural Sciences 2007;3(4):543-6.

(45) Tanzania National Bureau of Statistics. Demographic and Health Surveys 2004-05. Dar es salaam,Tanzania: National Bureau of Statistics Dar es Salaam; 2005.

(46) NBS. Tanzania Household budget Survey 2007. Dar es Salaam, Tanzania: National Bureau of Statistics; 2007.

(47) WHO. World Health Statistics 2009. World Health Organization; 2009.

(48) Tanzania Commission for AIDS (TACAIDS). Tanzania HIV/AIDS Indicator Survey 2003-04. Dar es Salaam, Tanzania: National Bureau of Statistics; 2005.

(49) NBS. Statistics for Development. Tanzania- National Bureau of statistics; 2002.

(50) NBS. Tanzania Household Budget Survey. Tanzania- National Bureau of statistics; 2001.

(51) Tanzania National Website. The economy survey 2006. The Government of the United Republic of Tanzania; 2006.

(52) Wangwe SM. Economic reforms and poverty alleviation in Tanzania, Employment papers No.7. International Labour Organization (ILO); 1996.

(53) Lyena GH, Mnyika K, Mmbaga EJ, Hussain A, Klepp KI, Klouman E, et al. Food insufficiency in Rural Kilimanjaro, Tanzania. East African Medical Journal 2007;84(4).

(54) Kamudoni PR. Infant feeding practices and perceptions. Master Thesis, University of Oslo 2005.

(55) WHO. WHO child growth standards: Length/height-for -age, weight-for-age, weight-for-length,weight-for-height and body mass index-for-age, Methods and Development. World Health Organization; 2006.

(56) FAO, WHO, UNU. Human Energy Requirement, Report of a Joint FAO/ WHO/ UNU Expert consultation 17-21 october 2001. Rome: Food and Agricultural Organization of United Nations(FAO); 2004.

(57) Lukmanji Z, Hertzmark E, Mlingi N, Assey V, Ndossi G, Fawzi W. Tanzania Food Composition Tables. Dar es Salaam,Tanzania: MUHAS-TFNC,HSPH; 2008.

(58) Weiser S, Leiter K, Bangsberg DR, Butler LM, Percy-de Korte F, Hlanze Zeal. Food insufficiency is associated with higher-risk sexual behaviour among women in Botswana and Swaziland. PLoS Medicine 2007;4:1589-97.

(59) Briefel RR, Woteki CE. Development of the food sufficiency questions for the third National Health and Nutrition Examination Survey. Journal of Nutrition and Education 1992;24:24S-8S.

(60) Keenan DP, Olson C, Hersey JC, Parmer SM. Measures of food insecurity/security. Journal of Nutrition and Education 2001;33:S49-S58.

(61) Gulliford MC, Mahabir D, Rocke B. Food insecurity, food choices and body mass index in adults: nutrition transition in trinidad and Tobago. International Journal of Epidemiology 2003;32(4):508-16.

(62) Lyena GH. Food insecurity: associated factors, nutritional and health-related outcomes in Rural Kilimanjaro, Tanzania. Doctoral Dissertation 2009.

(63) Hadley C, Mulder MB, Fitzherbert E. Seasonal food insecurity and perceived social support in Rural Tanzania. Public Health Nutrition 2007;10(6):544-51.

(64) Caulfield LE, Bentley ME, Ahmed S. Is proplonged breastfeeding associated with malnutrition? Evidence from Nineteen demographic and health surveys. International Journal of Epidemiology 1996;25(4):693-703.

(65) UNICEF. The state of the World's Children 1998, Focus on Nutrition. United Nations Children Fund; 1998.

(66) Rathnayake R, Weerahewa J. An assessment of Intra household allocation of food: A case study of the Urban Poor in Kandy. Sri Lankan Journal of Agriculture Economics 2002;4:95-105.

(67) Akerele D. Intra household distribution patterns and calorie inadequacy in South-Western Nigeria. International Journal of Consumer Studies 2011.

(68) Ferris-Morris M, Dennis G. Proceedings of the USAID workshop on performance measurement of food security. United States Agency for International Development; 1997.

(69) Holmboe-Ottesen G, Wandel M. Food availability and nutrition in a seasonal perspective. Human Ecology 1992;20.

(70) Hadley C. Ethnic Expansions and Between-Group differences in Children's health:A case study from Rukwa Valley,Tanzania. American Journal of Physical Anthropolgy 2005;(128).

(71) MAFC. Follow up of implementation of the World food summit Plan for Action. Tanzania: Tanzania Ministry of agriculture and Food security; 2006.

(72) Furness BW, Simon PA, Wold CM, Asarian-Anderson J. Prevalence and predictors of food insecurity among low-income households in Los Angeles county. Public Health Nutrition 2004;7(6):791-4.

(73) Hakeem R, Asar F, Shaikh AH. Food insecurity in metropolis of the developing world-observations from the central district of Karachi,Pakistan. The Journal of the Pakistan Medical Medical Association 2003;53(11):556-63.

(74) Mohammadzadeh A, Dorosty A, Eshraghian M. Household food security status and associated factors among high-school students in Esfahan,Iran. Public Health Nutrition 2010;13(10):1609-13.

(75) Nnakwe N, Yegamia C. Prevalence of food insecurity among households with children in Coimbatore, India. Nutrition Research 2002;22(9):1009-16.

(76) Vozoris NT, Tarasuk VS. Household Food insufficiency is associated with poorer health. Journal of Nutrition 2003;133:120-6.

(77) Zalilah MS, Tham BL. Food security and child nutritional status among Orang Asli (Temuan) Household in Hulu Langat,Selangor. The Medical Journal of Malyasia 2002;57(1):36-50.

(78) Radimer KL, Allsopp R, Harvey PW, Firman DW, Watson EK. Food insufficiency in Queens land. Australian and New Zealand Journal of Public Health 1997;21(3):303-10.

(79) Mohd.Sharif Z, Merlin A. Assessment of food insecurity among low income households in Kuala Lumpur Using the Radimer/ Cornell Food insecurity instrument- A validation study. Malaysian Journal of Nutrition 2001;7(1&2):15-32.

(80) Sharif ZM, Khor GL. Obesity and household food insecurity: evidence from a sample of rural households in Malaysia. European Journal of clinical Nutrition 2005;59:1049-58.

(81) Wedgehood R. Education and poverty reduction in Tanzania. International Journal of Education Development 2007;27:383-96.

(82) Hackett M, Melgar-Quinonez H, Taylor CA, Alvarez Uribe MC. Factors associated with household food security of participants of MANA food suppliment program in Colombia. Archivos latinamericanos de nutricion 2010;60(1):42-7.

(83) Rose D, Charlon KE. Prevalence of household food poverty in south Africa: results from a large nationally representative survey. Public Health Nutrition 2002;5:383-9.

(84) Kevane M. Women and development in Africa: How Gender works. Boulder, USA; 2004.

(85) Rahim S, Saeed D, Rasool GA, Saeed G. Factors influencing household food security status. Food and Nutrition Sciences 2011;2(1):31-4.

(86) Chaput JP, Gilbert JA, Tremblay A. Relationship between food insecurity and body composition in Ugandans living in Urban Kampala. Journal of American Dietetic Associations 2007;107(11):1978-82.

(87) Tarasuk VS. Household food insecurity with hunger is associated with women's food intake, health and household circumstances. Journal of Nutrition 2001;131:2670-6.

(88) Lyena GH, Mmbaga EJ, Mnyika KS, Hussain A, Klepp KI. Food insecurity is associated with food consumption patterns and anthropometric measures but not serum micronutrient levels in adults in Rural Tanzania. Public Health Nutrition 2010;13(9):1438-44.

(89) Bloss E, Wainaina F, Bailey C. prevalence and predictors of underweight, stunting and wasting among children aged 5 and under in Western Kenya. Journal of Tropical Pediatrics 2004;50(5):260-70.

(90) Muhimbula HS, Issa-Zacharia A. Persistent child malnutrition inTanzania: Risks associated with traditional complementary foods(A review). African Journal of Food Science 2010;4(11):679-92.

(91) Nyaruhucha CNM, Mamiro PS, Kerengi AJ, Shayo NB. Nutritional status of underfive children in a pastoral community in Simanjiro District, Tanzania. Tanzania Health Research Bulletin 2006;8(1).

(92) Tumwike JK, Barugahare W. Nutritious status of children in Kasese district at the Uganda-Congo border. East African Medical Journal 2002;79(8):427-34.

(93) Madzingira N. Malnutrition in children underfive in Zimbabwe: effect of socioeconomic factors and disease. Social Biology 1995;42(3-4):239-46.

(94) Baiq-Ansari N, Rahbar MH, Bhutta ZA. Child's gender and household food security are associated with stunting among young Pakistan children residing in urban squatter settlements. Food and Nutrition Bulletin 2006;27(2):114-27.

(95) Abubakar A, Holding P, Mwangome M, Maitland K. Maternal perceptions of factors contributing to severe undernutrition among children in a rural African setting. Rural Remote Health 2011;11(1).

(96) Levin C, Daniel G, Maxwell MA, Ruel MT, Morris SS, Ahiadeke C. Working women in an Urban setting:Traders,Vendors, and Food security in Accra. Discussion paper No.66. Washington D.C,USA: Food Consumption and Nutrition Division, International Food and Policy Research Institute; 1999.

(97) Smith LC, Ramakrishna A, Haddad L, artorell R. The Importance of women's status for Child Nutrition in developing countries. Reserch Report 131. Washington D.C, USA: International Food Policy Research Institute(IFPRI); 2003.

(98) Smith LC, Byron ME. Is greater Decision making power of women associated with Reduced Gender discrimination in South Asia? FCND Discussion Paper 200. Washngton D.C, USA: IFPRI; 2005.

(99) Kishor S. Empowerment of women in Egypt and Links to survival and health of their infants. In Women's Empowerment and Demographic Processes,ed Presser.H and Sen.G. Oxford University Press 2000.

APPENDIX 1: CONSENT FORM

We are researchers currently studying at the University of Oslo in Norway. We invite you to participate in our study which look at gender division of labour in agriculture and decision making power in the household and their impact to household food security and child nutrition. We will also looking at other underlying factors which contribute to child malnutrition.

Specifically we are going to ask you on gender division of labour in food production and time allocation, decision making processes in different activities in the household, household food availability and perception of food sufficiency, child dietary intake and disease history. Also we will weigh one of the children under five years of age in the household to assess malnutrition

The information will be kept confidential. Only the research team will have access to the information. No information revealing the identity of any individual will be included in the final report.

Benefits of the study

By participating in this study, you will help to increase our understanding of gender relations to food security and child nutrition. We hope that the results of this study will help towards understanding at different levels how development assistance should be structured so as to combat food insecurity and child malnutrition

Your participation in this study is voluntary and you have the right to refuse to participate in the research or refuse to answer any questions that you feel uncomfortable with. If you change your mind about participating during the course of the study, you have the right to withdraw at any time. If there is anything that is not clear or you need further information, you are free to ask.

DECLARATION OF THE RESPONDENT

I have read the above information, or it has been read and explained to me. I have been given the chance to ask questions about the study and any question that I have asked have been answered to my satisfaction. Therefore, I consent voluntarily to participate as a respondent in this study. I also agree for my child to participate in the study

Signature/Thumb print of a respondent/ guardian of a child:

Date:

Signature of interviewer

Date:

APPENDIX 2: QUESTIONNAIRE

DETERMINANTS OF FOOD SECURITY AND CHILD NUTRITIONAL STATUS

Msanzi, Tanzania 2010

Date of interview:	Questionnaire No:
Name of the index child:	Index child's date of birth (verify clinic card):
Name of the mother:	Name of the household head:
Name of the father:	

Questionnaire mother/main caretaker

PERSONAL DETAILS: HOUSEHOLD

No	QUESTION	CODING CATEGORIES
1.	What is the relation of the household head to the index child?	1. □ Mother 2. □ Father 3. □ Grandmother 4. □ Grand father 5. □ Others……
2.	How many are currently living in the household?	Children under 5:..... Children 5-15: …..... Household size: .....
3.	How many wives does the husband have?	.....
4.	Is the mother of the index child living in the household every day?	1. □ Yes 2. □ No
5.	For how long during the last 12 months has the mother of the index child been away from this household?	…….
6.	Why is the mother not always present in the household?	1. □ Working/ employed in urban area or another country 2. □ Passed away 3. □ Other…….....
7.	Do you receive remittances from the mother?	1. □ Yes 2. □ No
8.	Is the father of the index child living in the household every day?	1. □ Yes 2. □ No
9.	For how long during the last 12 months has the father of the index child been away from this household?	…….

10.	Why is he not always present in the household?	1. □ Working/employed in urban area or another country 2. □ Passed away 3. □ Other…….....
11.	Do you receive remittances from him?	1. □ Yes 2. □ No
12.	Who is the main care giver of the child?	1. □ Mother 2. □ Father 3. □ Mother and father 4. □ Other…….....
13.	What is the mother's level of schooling?	1. □ None 2. □ Primary school, not fulfilled 3. □ Primary school 4. □ Secondary school 5. □ Higher secondary 6. □ Intermediate and above
14.	What is the mother's occupation?	1. □ Farmer 2. □ Petty trader 3. □ Paid labour 4. □ Commercial farmer 5. □ Paid professional 6. □ Other……
15.	Do you have any other income generating activities?	1 □ Yes 2 □ No
16.	What are the activities?	1. ..... 2. .....
17.	Is this an everyday activity?	1. Yes 2. No Comment: .....
ECONOMIC INFORMATION: HOUSEHOLD		
18.	What are the main materials of the roof? (observe)	1. □ Thatch/straw 2. □ Finished roof (iron, tin, cement, ceramic) 3. □ Earth/mud 4. □ Other……
19.	How many rooms are there in your household? (excluded toilet)	1. □ 1 room 2. □ 2 rooms 3. □ 3 rooms 4. □ 4 rooms 5. □ 5 rooms 6. □ more than 5 rooms
20.	Do you have animals (domestic)?	1. □ Yes 2. □ No
21.	If yes, how many? (multiple answers)	1 □ Cattles..... 2 □ Sheep.....

		3. □ Goats..... 4. □ Chicken, ducks ..... 5. □ Pigs..... 6. □ Donkey..... 7. □ Others….....
22.	What of the following does your household have? (multiple answers)	1.□ □ Radio 2. □□ Bicycle 3. □□ Motorcycle 4. □□ Wrist watches 5. □□ Buckets 6. □□ Plough 7. □□ Mobile phone 8. □□ Cupboards 9. □□ Sofa/table 10. □□ Chair/table 11. □□ Milling-machine 12. □ Sewing machine 13. □ TV
PREVENTION AND CONTROL OF DISEASE		
23.	Where do you get your main source of drinking water from?	1. □ Tap water 2. □ Borehole 3. □ River/stream 4. □ Spring water 5. □ Rain water 6. □ Other…….....
24.	Has the child been sick for last two weeks?	1. □ Yes 2. □ No
25.	If yes, what type of illness was it? (multiple answers)	1. □ Diarrhoea 2. □ Cough 3. □ Difficult breathing 4. □ Fever 5. □ Skin disease 6. □ Malaria 7. □ Vomiting 8. □ Other…… 9. Don't know
26.	Have the child received vaccination to prevent her/him from getting disease?	1. □ Yes 2. □ No 3. □ Don't know
27.	Do you have a child vaccination card? (observe in clinic card and fill in)	1. □ Yes 2. □ No DPT-HepB 1 2 3 | BCG | Polio B 1 2 3 | Measles

28.	Did your child receive vitamin A capsule (yellow capsules) within the last 6 months ? (children above 6 months)	1. □ Yes 2. □ No
29.	Did the child receive de worming tablet within the last 6 months? (children above 12 months)	1. □ Yes 2. □ No
	CHILD FEEDING / CARE	
	Breastfeeding:	
30.	Has the child ever been breastfed?	1. □ Yes 2. □ No
31.	What is the child fed now?	1. □ Exclusively breastfeed 2. □ Breastfeed plus food/liquid 3. □ Food only
32.	How long was the child breastfed?	……
33.	What was the first type of liquid introduced after birth? (except breast milk)	……
34.	When was it introduced?	
35.	For how long? And then?	…….
36.	What was the first type of food introduced after birth? (except breast milk)	……
37.	When was it introduced?	……
	Child feeding **(24 hour recall)**	
38.	What did the child eat and drink yesterday? (Ugali, maize/millet, uji, vegetables, meat, fish, fruit, milk, beans….)	Time: | Morning: | In between: |

		Mid day:	
		In between:	
		Evening:	
		In between:	
		Night	
		General	
39.	How many number(s) of feedings do the child receive pr day?	1. □ 1 2. □ 2 3. □ 3 4. □ 4 5. □ 5 6. □ > 5	
40.	Was the number of feedings/meals unusual in anyway?	1. □ Yes 2. □ No	
41.	Was the type of food/drink unusual in anyway?	1. □ Yes 2. □ No	
	If yes, comment.....		
	Responsibility of child:		
42.	When you go for fieldwork, what do you usually do with the child?	1. □ Child comes with me 2. □ Stays at home 3. □ Other…	

43.	Is the child usually fed when you are in the field? (if the child left home)	1. □ Yes 2. □ No 3. □ Other…….
44.	Who is feeding the child when you are in the field?	1. □ Mother in law/grandmother of the baby 2. □ Father 3. □ Grandfather 4. □ Siblings older than 15 years old 5. □ Siblings younger than 15 years old 6. □ Other women in the village 7. □ Other……
45.	During the day in the field, is the child fed? (if child comes with mother)	1. □ Yes 2. □ No 3. □ Occasionally
46.	How?	1. □ Bring food/cook in the field 2. □ Other .....
47.	What type of food do you bring to the field?	.....

HOUSEHOLD FOOD FREQUENCY:

48. How many times in the past month did the household consume the following food items:

Food/Drink item		Answer Code: 1. Everyday, 2 Several times a week, 3, Twice a week, 4. Once a week, 5.Twice a month, 6. Once a month, 7. Never
Porridge/Ugali		
Rice		
Beans, lentils		
Groundnuts		
Maandazi		
Potatoes(sweet potatoes/irish potatoes)		
Green vegetables		
Banana		
Oranges		
Tomatoes		
Onions		
Liver, Kidney, Heart		
Cow meat, Goat meat		
Chicken		
Pork		
Fish		
Dagaa		
Egg		
Milk		

	Cooking oil		
	Tea		
	Soda		
	Sugar/Sweets/Honey		
	Sugar Cane		
	Other..... ...		

	FOOD SECURITY	
49.	What is the main source of food in your household?	1. □ Direct from harvest/ garden 2. □ Purchasing 3. □ Exchange of food for work 4. □ Food aid 5. □ Other……..
50.	If more than one source has been chosen, rank them in order?	First main source…… Second main source……..
51.	What are the crops which you cultivated?	1. Maize 2. Beans 3. Groundnuts 4. Millet 5. Sunflower 6. Wheat 7. Other.....
52.	How many 100kg bags/ 20kgs tins did the household produce of each crop in the last harvest?	1…….. 2……. 3…… 4…….....
53.	How many bags/ tins did you sell of each crops?	1..... 2..... 3..... 4.....
54.	How many 100 kg bags/ 20 kg tins do the household have now in stock of each crop harvested	1…… 2…… 3……. 4……..
55.	Will the food stored be enough until the next harvest?	1. □ Yes 2. □ No
56.	For how long did you stay without maize stock before the last harvest?	.....
57.	For how long did you stay without beans stock before the last harvest?	.....
58.	In the past 12 months did the index child ever eat fewer	1. □ Yes 2. □ No

	meals than usual because there wasn't enough food?	
59.	Which of the following best describes the amount of food eaten in your household in the past 12 months?	1. Have enough to eat 2. Sometimes not have enough to eat 3. Often did not have enough to eat
60.	What do you usually do when facing food shortages? (ex. Doing paid labour, selling etc)	.....

	AGRICULTURE:	
61.	Do you have your own cultivated land?	1. □ Yes 2. □ No
62.	Where do you cultivate?	1. □ Shamba 2. □ Wetland 3. □ Both
63.	Who owns the land?	1. □ Mother 2. □ Father 3. □ Both
64.	What is the size of the shamba you cultivated last harvest?	……
65.	What is the size of the wetland you cultivated last harvest?	……..
66.	For how long did you cultivate wetland?	……

Time Allocation, Division of Labour and Decision Making Power

MOTHER

67. TIME ALLOCATION AND DIVISION OF LABOUR:

Activity/Crop:	**Frequency:** Answer code: 1. Everyday, 2. Several times a week, 3. Twice a week, 4. Once a week 5. Never	**Period:** Answer code: Day/week

Crop: Maize

Land preparation:		
Hoeing		
Ploughing:		
Planting:		
Weeding 1st		
Weeding 2nd		
Harvesting:		

Crop:

Land preparation:		
Hoeing		
Ploughing:		
Planting:		
Weeding:		
Harvesting:		

Crop:

Land preparation:		
Ploughing:		
Hoeing		
Planting:		
Weeding:		
Harvesting:		

Crop:

Land preparation:		
Ploughing:		
Hoeing		
Planting:		
Weeding:		
Harvesting:		

68. Did you do paid labour (last 12 months)?
    Yes, No
69. How often?
    …….
70. Who is responsible for:
    Collecting firewood……..
    Collecting water…….
71. Do you do drink pombe (beer, spirits etc)?
    a)Yes b) No
72. How often?
    a)Everyday b)Several times a week c)Once a week d)Occasionally e)Never

73. DECISION MAKING POWER:

	Activity:	Who decides? 1. Father, 2. Mother, 3. Both
	When to prepare land?	
	What crops to grow?	
	When to plant and when to harvest?	
	When to sell food crop?	
	When to sell vegetable?	
	When to cook and what to eat?	
	To make beer?	
	To buy clothes?	
	To buy food?	
	To buy livestock?	
	Child's medical treatment?	
	Child's schooling?	
	Keep money after selling crops?	
	Keeps money after selling vegetables?	

Questionnaire father

1.	What is the father's level of schooling?	1. □ None 2. □ Primary school, not fulfilled 3. □ Primary school 4. □ Secondary school 5. □ Higher secondary 6. □ Intermediate and above
2.	What is the father's occupation?	1. □ Farmer 2. □ Petty trader 3. □ Paid labour

		4. □ Business 5. □ Paid professional 6. □ hand craft 7. □ Other……
3.	Do you have any other income generating activities?	1. □ Yes 2. □ No
4.	What are the activities?	1..... 2.....
5.	Is this an everyday activity?	1. Yes 2. No Comment: .....

6. TIME ALLOCATION AND DIVISION OF LABOUR:

Activity/Crop:	**Frequency:** Answer code: 1. Everyday, 2. Several times a week, 3. Twice a week, 4.Once a week 5. Never,	**Period:** Answer code: Days/week

Crop: Maize

Land preparation:		
Ploughing:		
Hoeing		
Planting:		
Weeding 1st		
Weeding 2nd		
Harvesting:		

Crop:

Land preparation:		
Ploughing:		
hoeing		
Planting:		
Weeding:		
Harvesting:		

Crop:

Land		

preparation:		
Ploughing:		
Hoeing		
Planting:		
Weeding:		
Harvesting:		

Crop:

Land preparation:		
Ploughing:		
hoeing		
Planting:		
Weeding:		
Harvesting:		

7. Did you do paid labour the last 12 months?
   Yes, No
8. How often?
9. Do you do drink pombe (beer, spirits etc)?
   Yes, No
10. How often?
   Everyday, Several times a week, Once a week, Occasionally, Never

11. DECISION MAKING POWER:

	Activity:	Who decides? 1. Father, 2. Mother, 3. Both
	When to prepare land?	
	What crops to grow?	
	When to plant and when to harvest?	
	When to sell food crop?	
	When to sell vegetable?	
	When to cook and what to eat?	
	To make beer?	
	To buy clothes?	
	To buy food?	
	To buy livestock?	
	Child's medical treatment?	
	Child's schooling?	
	Keep money after selling crops?	
	Keeps money after selling vegetables?	

	ANTHROPOMETRY	
	Age of index child:	.....months
	Weight:	.....kg
	Length:	.....cm
	Length measured lying down or standing up?	1. □ Lying down 2. □ Standing up
	Sex:	1. □ Female 2. □ Male
	Oedema?	1. □ Yes 2. □ No