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Resilience of female headed farming households in times of drought

A case study of Enderta woreda, female headed households Tigray, Ethiopia in times of drought

A research project submitted to
Larenstein University of Applied Sciences
in Partial Fulfilment of the Requirements for
the Degree of Master of Management of Development
Specialization Rural Development and Communication

By
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September 2011

Wageningen
The Netherlands

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ACKNOWLEDGMENTS

Above all I thank God the Almighty. Thank you for making my dream comes true. I would also like to take this opportunity to thank all those who contributed directly or indirectly to the successful completion of this trajectory.
I would like to thank the Royal Dutch Government whose NUFFIC program granted me a fellowship to pursue this Master's course.
My sincere thanks to Dr.Ph.D.Loes Witteveen Rural Development and Communication (RDC) course coordinator and my supervisor. I am greatly indebted to Loes Witteveen, who inspired me to read more and to gain insight about resilience and guided me throughout the trajectory.

I would also like to thank Edith van Walsum, Director of ILEIA - Centre for Learning on Sustainable Agriculture who inspired me and made me curios with her powerful saying *''small farmers are incredibly resilient."*

Very special words of thanks go to all academic and administrative staff of Van Hall Larenstein University of Applied Sciences for their professional generosity and enormous professional support throughout the course. I have to thank all the international students for their support throughout my study and for providing me a home away from home.

I would like to extend my appreciation to Tigray Bureau of Agriculture and Rural Development for supporting my study. I thank you all friends and the regional bureau colleagues who continuously encouraged me, helped me in editing my first draft thesis and provided me the relevant documents and pieces of information during my research. I always appreciate your sincere words of encouragement.

Thanks to woreda Endeta office of agriculture and rural development colleagues Mr.Desta Feyisa vice head who helped me to select research site and linked me with relevant experts and tabia extension worker. Many thanks to woreda experts Mr.Berahne Kidanemariam, Mr.Berhane. Tadesseand Mr. Haile Kebede for providing me the relevant information.
Thanks to the extension worker of tabia mariamdehan Mr.Tisgabu Mehare and Mrs. Tisga who helped me in reaching respondents and organizing focus group discussion and shared me relevant information about the research site.

Thank you all the respondents from tabia mariamdehan who spared their time to respond to my questions during individual household interview and focus group discussion and shared me their views and opinions generously. I have to mention respondent Mrs.Tibebu Kahesaye for recognizing the relevance of coherent integration of indigenous and exogenous knowledge to enhance rural development by saying *"education matters, if I had better educational status I would be able to get better job than I have today."*

To my dearest husband Dr.Enquebaher Kassaye, thank you for keeping me up right and for reminding me there is no substitution for hard work and always assured me that you are my strong right arm. Finally I am deeply indebted to my far sighted sons Shewit Enquebaher, Abraham Enquebaher and Nahome Enquebaher, specially Abraham and Nahome who were my research assistance in the field work and thank you all for frequent words of encouragement.
I thank all family members, friends and neighbours who always visited, assisted and call my children while I was studying in the Netherlands.

DIDECATION

I dedicate this work to my husband Dr.Enquebaher Kassaye, my three sons Shewit Enquebaher, Abraham Enquebaher and Nahome Enquebaher whose love, words of encouragement, patience and understanding they showed during my time of absence gave me the inspiration to give my best to this study.

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LIST OF ACRONYMS AND ABBREVIATIONS

ADLI	Agricultural Development Led Industrialization
BoARD	Bureau of Agriculture and Rural Development
CHHs	Child Headed Households
CSA	Central Statistics Authority
DFID	Department For International Development
FDG	Focus Group Discussion
FAO	Food and Agriculture Organization
HH	Household
FHHs	Female Headed Households
HYV	High Yielding Verities
IDS	Institute of Development study
MHHs	Male Headed Households
PASDEP	Plan for Accelerated and Sustainable Development to End Poverty
SES	Social Ecological Systems
SNNP	Southern Nations Nationalities and People
SLA	Sustainable Livelihood Approaches
SLF	Sustainable Livelihood Framework
SL	Sustainable Livelihood
SCOPE	Scientific Committee on Problem of Environment
TBoARD	Tigray Bureau of Agriculture and Rural Development
WFP	World Food Programme

DEFINITION OF TERMS

- Keremet — is the heavy rain, which covers from June-September
- Bega — hot dry period or off-season, covers October to February
- Belg: — season of little rains, covers March-April

  Woreda: — it is a level of administration and has branch offices of all major regional bureaus. It is the most important administrative unit.

  Tabia — is basic administrative unit next to woreda. Tabia is also called peasant association.
- birr: — currency in Ethiopia birr (ETB)
- hedmo — traditional house made from mud and stone
- teff — type of grain widely grown and commonly used in Ethiopia
- jebena — is coffee pot made up of clay produced locally

ABSTRACT

In this study resilience is defined as a capability which people apply in order to cope with the recurrent drought situation or in times of hardship as form of indigenous or exogenous knowledge which can directly contribute to household's capabilities and sustainable livelihoods.
The indigenous knowledge which can potentially contribute to increase household's adaptive capacity is an important contributing factor in building households resilience even in the absence of external support. However, in building up the resilience of small-scale farming household's coherent integration of local knowledge (indigenous knowledge) with new sources of knowledge is an important entry point. To open up this entry point, protection and documentation indigenous knowledge of different household structure (Female, male and child headed households) and access to new knowledge through responsible organization is compulsory.

Drought affects agricultural (crop and livestock) production. Consequently, it increase vulnerability of small-scale farming households and enhance natural resource deterioration. Small-scale farming families have a range of strategies to cope with impact of drought.

Households which belong to different socio-economic groups have different strategies to earn their own means of living which, in turn, may achieve different levels of resilience to food security. Female headed households are the sub-set of these different socio-economic structure with different strategies and levels of resilience.

A female headed household is classified in most national and international data sources as a unit where an adult woman (usually with children) resides without a male partner. In other words, a head of household is female in the absences of a co-resident legal or common-law spouse or, in some cases, another adult male such as a father or brother (Chant, 1997).

Tigray Bureau of Agriculture and Rural Development (TBoARD) is one of the public sectors in the region, which is responsible to provide agricultural extension service to increase production and productivity of agricultural output. The prime objective of BoARD is to enhance rural development and improve quality of life of the farming households through capability building and reducing vulnerability in all the Woredas.

The objective of this study is to increase understanding of BoARD about the resilience capabilities and coping strategies of female headed households by further exploring the resilience and coping strategies of female headed farming households in Enderta, Tigray during 1984 drought season.

To meet its objective one main and two sub-research questions were formulated as follows: What is resilience capabilities of female headed farming households in times of drought? What were the coping strategies (endogenous knowledge) of female headed farming households in times of drought in Enderta, Tigray? And What organizational factors or actions (exogenous knowledge) influence resilience capabilities of female headed farming households?

To explore the resilience capability of female headed farming households in times of drought this study used a case study *of* Enderta woreda, tabia mariamdehan FHH Tigray, Ethiopia in times of drought. This strategy was employed in order to get in depth information about the livelihoods strategies of respondents and research area

In order to gain the necessary support and facilitation introduction of research proposal was conducted at different relevant levels.
To collect primary data purposive sampling technique was used. Twenty individual female FHHs were interviewed, two FGD and planned observation was conducted. Five key informants were interviewed to collect secondary data background information.

Based on the finding of this study the availability and access to natural resource initiate the resilient female headed household to look alternative source of income. This finding is in line with the idea of, capability approach and development and livelihood diversification and natural resource access studies of Clark and David (2009) and Ellis and Allison, (2004). Access by the poor to natural resources (land, forests, water, fisheries, pastures etc.), is essential for sustainable poverty reduction. The livelihoods of rural people without access, or with very limited access to natural resources are vulnerable because they have difficulty in obtaining food, accumulating other assets, and recovering after natural or market shock or misfortunes. Furthermore, Ellis and Allison stated, that diversification assist households to insulate themselves from environmental and economic shocks, trends and seasonality in effect, to be less vulnerable. Livelihoods diversification is complex, and strategies can include enterprise development.

Therefore, implication of the study is policy makers should tailor their food security strategies according to existing reality and variety needs of population. Comprehending the driving factors of each livelihood strategy is therefore crucial for improving the response mechanisms related to food insecurity and poverty.

Keywords: Female headed household, livelihood strategy, capabilities, resilience, drought**,** Enderta,Tigray Ethiopia

CHAPTER ONE INTRODUCTION

This introductory chapter presents the background of the study. The first section presents the general facts and figures at country and regional levels, Ethiopia, Tigray respectively. The second section presents the research problem which justifies the study, research objective and research questions.

1.1 Ethiopia and Tigray

Ethiopia is located in the tropics between 3 and 15 degree north latitude and 33 and 48 degree east longitude, landscape and variations in altitude which have resulted in a great diversity of climate, soil, and vegetation cover. Neighbouring countries Kenya, Sudan, Eritrea, Djibuti, and Somalia border Ethiopia in the south, west, north, east and southwest respectively. Ethiopia is a country of great geographical diversity high and rugged mountainous flat topped plateau, deep gorges, river valleys and plains formed erosion, volcanic activities and tectonic forces accentuate the unevenness of the surface. The altitude ranges from the highest peak at Ras Dashen (4620 masl) in the north west, to Danakil depression (125 mbsl) in the north east.
Ethiopia is the second largest country in Africa in terms of population size with total population of 73.9 million. Out of the total population 49.5% are female and 50.5% are male, in terms of age composition 45%, 51.9% and 3.1% are 0-14, 15-64 and plus 65 respectively, the total area coverage of the country is about 1.1 million km square. The country has diversified culture, linguistic composition and large ethnic composition; administratively it is sub-divided into nine (Tigray, Afar, Amhara, Oromia, Somali, Benishangulgumuz, SNNP, Gambela, and Harari) regional states and two (Addis Ababa and Diredawa) city administrations (CSA, 2007).

Agriculture is a corner stone of the national economy; it is a sector which provides a livelihood for about 85% of the labour force. It generates about 50 per cent of the GDP and it is a major source of raw material for agro-processing industries and foreign exchange earnings. Grain and coffee production together account 70 per cent of the agricultural GDP (Government of the Federal Democratic Republic of Ethiopia, 2005).

Ethiopia's agriculture is heavily dependent on rain fall. Although Ethiopia has got a large number of rivers and lake, irrigation has not been applied to grow food crops, vegetables and extend grazing areas at large scales. Rivers have not been used as coping mechanism for growing crops even in the acute shortage of rain season. It is estimated that only 2.2% of the cultivated crops are obtained from irrigation (Tigray food security coordination office, 2002).

Ethiopia's rainfall is seasonal and erratic in nature, varying in amount, distribution, and timing which directly affect agriculture. There is a long and heavy summer rain, called *Keremet* or the heavy rain, which covers from June-September. This followed by the *Bega* hot dry period from October-February. In some area there are short and moderate spring rains in March and April called *Belg* or little rains. These rainy periods correspond to Ethiopia's primary and secondary agricultural seasons.

Ethiopia has experienced many drought years and the most serious are: 1982, 1984, 1987, and 1997. Among these, the 1984 drought was so serious that people left their homes and were receiving food aid in different camps. The 1984-85 caused an estimated one million

death and made millions destitute and almost all livestock died. The other drought years although they were serious, were not as devastating as 1984 (Bio-physical team, 2010, The Library of Congress Country Study, 1991).

Table 1 Seasonal classification in terms of rainfall distribution in Ethiopia, Tigray

Months	Rain – Ethiopia	Tigray	Agricultural season
June-September	Kerematar the heavy rain	kerematar the heavy rain	Primary agricultural season throughout the country
October-February	Bega or hot dry period	Bega or hot dry period	Off season
March –April	Belg or little rains	In some parts of tiray	Secondary agricultural season in some parts of the country

Source: Bio-physical team, 2010

The Northern part of Ethiopia (Tigray, Afar and Amhara) is characterized by mono-modal rainfall with pronounced summer. Nevertheless, the climate type is often referred to as bi-modal, due to short rains in the spring in some areas (March-Jun, referred to as 'Belg') which increase in the summer to **'**Keremet' rains (July-September) without a pronounced dry period in between (Hausken, 2004).

Tigray, located in the northern part of Ethiopia, bordering Sudan to the west and Eritrea to the north, within Ethiopia Amhara to the south and Afar to the east, it has a cultivated area of about 1.3 million hectares farmed by 775,000 households and 400 investors located in the western lowlands (Strategic planning of BoARD,2011/15). Tigray is among the highly populated areas in Ethiopia with 4.3 million total population and 2.5 annual population growth (CSA, 2007). More than 80% of the population is dependent on subsistence rain fed agriculture, with an average land holding 1.3 ha. With a range from 0.22 ha, in the highlands and 2.6 ha in the low lands (Weldemichael, 2002). Agriculture is characterized by low productivity; usually the region is classified as food-deficit area due to its semi-arid climate and high population density (FAO, 2005). The region has 34 administrative and operational woredas.

Rural livelihood of Tigray is highly dependent on natural resources. Drought is a natural phenomenon that affects the livelihood of the rural poor who are highly dependent on natural resource. The basic climatic elements directly influence the spatial distribution of crop type and agricultural system, because different crops require different amount of rainfall, humidity, warmth and sunshine.

Drought affects agriculture (crop and livestock) production, consequently increase vulnerability of farming households and enhance natural resource deterioration. Drought not only affected rural households, it also erodes the purchasing power of urban households due to higher food prices. In a nut shell, drought has multiplier implications by lowering domestic production of agro processing input reduces non-agricultural production while forcing up input costs, meanwhile consumer's purchasing power is likely to decline owing to some combination of higher food prices, job losses in both agriculture and non-agricultural sectors. Moreover, the economic impact of drought is largely felt via its direct impact on agriculture.

There are tremendous efforts made by governmental and nongovernmental organization to improve quality of life of the small-scale farming families in Tigray, Ethiopia. The Ethiopian government considering the lion share of agriculture to the whole economy launched Agricultural Development Led Industrialization (ADLI) as the overarching policy response to food security and agricultural challenge since the early 1990's (World Bank, 2008). Basically ADLI was small scale farmer based.

Following this strategy, with some amendments Ethiopia has been adopting Plan for Accelerated and Sustainable Development to End Poverty (PASDEP) to enhance rural development and to ensure food security. PASDEP has covered 2005/6-2009/10.
During the PASEDP, different cross cutting issues were taken into consideration such as all agricultural extension will identify activities that will benefit both men and women. Currently Ethiopia has designed five year (2010/11-2014/15) growth and transformation plan. This plan seeks to double the total agricultural output from 18.08 million metric tons to 39.5 million metric tons.

The effort to reduce vulnerability is the central agenda to the five years strategic plan (2005/06-09/10): including reducing the variability in crop production and overall food availability through more irrigation and water control, diversification of crops and better integration of market and transport, and information link; maintenance of macroeconomic satiability: expansion of off-farm employment income-earning opportunity, and better functioning credit market: provision of improved health service and nutrition, and introduction of innovative measures.

Among all public sectors in Tigray, to reduce the deep rooted poverty in the region, TBoARD has significant role and responsibility. To translate the rural development policy into practice the bureau has designed strategic plan to reduce vulnerability and increase asset building capabilities of farming HHs. The bureau has legitimate organizational mandate to implement agriculture and rural development programmes and interventions. The bureau has a long standing experience in implementing rural development programmes and in providing agricultural extension service which is characterized by top-down and supply driven approach. Technological package prepared based on the available new or improved technologies and attempts are made to transfer them to farmers. Top-down and non-participatory nature of extension is pervasive thought out the country. This supply driven approach of extension has been a common feature of all the extension services programs in the country to date. Although socio-economic survey were made to develop the menu of household level package in Tigray and Amhara regions, it is not clear if farmers' needs and preferences were incorporated in the design of the package. There is a need to refocus the extension service to make it more demand driven and based on community resources. (Gebremdhin, Hoestra, and Tegene 2006).

More than in the past, extension organizations will have to anticipate diversity among farmers, which means that they have to be able to give different advice to different people, and treat diversity as resources rather than as a burden. (Leeuwis, 2004). Moreover, as stated by Shepher,(1998), the mission of rural development is to involve the rural poor in the processes. In line with this idea, considering farming household's asset holding capacity and agro-ecological zone of the area, BoARD has designed integrated household packages on (crop, livestock, bee keeping, poultry and agro-forestry) to introduce to farmers. The aim of these packages is to reduce the deep rooted poverty and to improve the quality of life of the rural farming households in Tigray. The intervention is mainly dominated by top-down approach, however, there are attempts by BoARD to develop interactive rural development strategies; for instance, after in depth discussion on the situation of environmental degradation rural households have decided to raise their free labour contribution from 20 day to 40 days in a year to work on soil and water conservation. But still the rhetoric and the practice is not yet the same for all rural development interventions. The planning processes, communication and innovation practices are initiated and guided by the attitude and interest of policy makers and experts.

Tigray Bureau of Agriculture and Rural Development (TBoARD) is one of the public sectors in the region, which is responsible to provide agricultural extension service to increase production and productivity of agricultural output. The prime objective BoARD is to

enhance rural development and improve quality of life of the farming households through capacity building and reducing vulnerability of the farming households in all the wored as. According to its legitimate mandate and mission, TBoARD is dedicated to provide services on agricultural extension; facilitate reliable supply of agricultural inputs and credit needed to increase food production and encourage economic development; development and management of natural resources; information on early warning response and food security to farmers to improve their quality of life.

Despite the fact that, there are tremendous efforts made by governmental and nongovernmental organization to improve the quality life of the small-scale farming families in Tigray woreda the quality of life is not yet well improved as expected. Moreover, at present, Tigray is experiencing persistent food shortages and the most affected are rural households whose livelihoods are heavily dependent on rain fed agriculture (Bio-physical team, 2010). Tigray*'s* recurrent drought and food insecurity problem has resulted due to combination of factors. These factors include environmental degradation, irregular rainfall, high population, lack of diversification in economic activities, and institutional factors such as poor infrastructures that threaten food security in the region. According to Chambers (1997) 'Effective action requires understanding of the physical and social world on which we seek to act. We have to know what works and what does not? The presumption has been strong among development professionals that we do know what we are doing. But, many beliefs, policies, projects and programmes which have been part of conventional wisdom at one time have proved later to have been false or flawed'. Moreover, attention has been paid in analysing the cause of food insecurity and dynamics of poverty, but studies on the impact of the government interventions on food security are limited (Van der Veen and Gebrehiwot, 2011).

Analysing and understanding the complexity and dynamism of households in terms of their structures, demographic and socio economic status would have significant role for designing and implementation of development interventions. However, this is not yet fully considered or practiced by rural development professionals. Farming households vary in their structure as female headed households (FHH),adult woman living with her children, male headed households (MHH) adult man living with his wife and children, child headed household (CHH), children who lost their parent and continue living together. These types of HHs vary the way they cope with and withstand impact of drought depend on the options available in terms of capabilities, assets (including both material and social resources) and activities.

1.2 The research problem

Based on the aforementioned situational description, drought affects agricultural (crop and livestock production). Consequently, it increase vulnerability of farming households and enhance natural resource deterioration. Small-scale farming families have a range of strategies to cope with impact of drought. For small-scale farming families the most important coping strategies include; borrowing money, reducing both quality and quantity of meals, relaying on wild fruits and vegetables, selling livestock and reducing expenditures on other household goods such as clothing, celebration of traditional festivities, replacing high yielding long cycle sorghum and teff with low yielding short season varieties, labour migration, increased production of cash crop and participation in daily labour (CHF, 2007). If the drought season stretched for prolonged period households are forced to sell their productive assets such as sale of small assets, exhaustively using contingent stock products and seeking support from relatives (Longhurst, 2009). Selling productive assets in one drought season would intensify poverty by eroding the buffering capacity of the household. Thus, Canali and Slaviero (2010) stated that households who have enough financial resources to escape extreme poverty rarely suffer from chronic hunger, while the

poorest households represent the population, who bear the highest risk during food shortage and drought. Incomes from off-farm activities and non-farm such as firewood selling and seasonal migration for temporary employment are also used as alternative buffering strategies against the seasonal stress. According to Canali and Slaviero (2010) by citing the work of Villagran de Leon (2006), when resilience is high, people are more able to adapt to variations in available resources and to use different environmental and economic possibilities to stabilize their conditions and sustain their livelihoods situation.

The researcher also understand resilience is a capabilities which people apply in order to cope with the recurrent drought situation or in times of hardship as form of indigenous or exogenous knowledge which can directly contribute to household's capabilities and sustainable livelihoods. The indigenous knowledge which can potentially contribute to increase household's adaptive capacity is an important contributing factor in building households resilience even in the absence of external support. Moreover, the researcher argue that, building up the resilience of small-scale farming households it relies on coherent integration of local knowledge (indigenous knowledge) with new sources of knowledge is paramount important. To apply this, protection and documentation indigenous knowledge of different household structure (Female, male and child headed households) and access to new knowledge through responsible organization is compulsory.

The central focus of Ethiopian government economic policy is to reduce vulnerability. To translate its policy into practice government designed top down approaches interventions which focused on poverty reduction and mitigation of impact of drought. Among the rural development interventions human resource development through provision of training on improved agricultural practices, enhancing households asset building, environmental rehabilitation are the major ones. Moreover, policy and strategies have been formulated to integrate and mainstream the gender dimension in economic, social and political decision. Integrated household extension package are planned to integrate female headed households. Continuous attempts are made to transfer technological package to farming households including FHHs. Method of transferring these technological packages is to persuade farmers as many as possible to adopt the available innovations as developed by researchers and planned by higher experts.

However**,** the resilience capabilities and coping strategies of female headed farming households of Enderta are not well recognized and documented. As stated by Tafur, et al.2007 it is rare that time and effort is put into organizing, analysing and documenting experiences, for various reasons. Consequently, rural development professionals are not yet able to build upon the resilient farmer's practice and use it as entry point for development intervention. Moreover, measures to minimize the impact of drought are usually done after the occurrence of the event that is a reactive process. Therefore, there is an urgent need of developing local knowledge system for relevant information involved in drought management to narrow the gap and to identify possibilities and act in advance to avoid calamities caused by recurrent drought (Bio-physical team, 2010). Therefore, organizing, documenting and using the resilient farmer's coping strategies as entry point is highly relevant and urgent agenda for development intervention to mitigate impact of drought. It is with this background problem that this research is aimed to further explore the resilience and livelihood strategies of Enderta woreda female headed farming households during 1984 drought.

Among different economic sectors in the region, agriculture is most vulnerable or highly susceptible to drought or climate change and BoARD is responsible to help farmers to cope with this challenge and mitigate the impact. Based on the organizational mandate, TBoARD is dedicated to provide extension service to increase food production and encourage economic development. In order to translate its mission into practice, there is a critical need to develop relevant information system to identify resilience strategies of

small-scale farmer (female and male headed households) during drought season. Due to the aforementioned reasons, Tigray bureau of agriculture and rural development would like to know more about the resilience and livelihood strategies of female headed farming households in Enderta woreda.

From the above background of the research area and research problem the following objective has been articulated:
to increase understanding of BoARD about the resilience capabilities and coping strategies of female headed households by further exploring the resilience capabilities and coping strategies of female headed farming households in Enderta, Tigray in times of drought season.
The main research question**:** is formulated as**:** what is the resilience capability of female headed farming households in times of drought?
The sub questions are formulated as what were the coping strategies (indigenous knowledge) of female headed farming households in times of drought in Enderta, Tigray? And what organizational factors or actions (exogenous knowledge) influence resilience capabilities of female headed farming households?

CHAPTER TWO LITERATURE REVIEW

This chapter discusses the main concepts of the research based on the available literature, namely household livelihood strategy, female headed household, resilience and sustainable livelihood strategy, adaptability and capability, sustainable livelihood framework, poverty and impact of drought. The chapter concluded with describing the contribution of indigenous and exogenous or new knowledge to resilience capabilities and adaptability.

2.1 Household livelihood strategy

Household's livelihood comprises four components these are: people, activities, assets and outputs. According to Ellis (2000) a livelihood strategy has two dimensions the assets (natural, physical, human, financing and social), the activities, and the access to these (mediated by institutions and social relations) that together employed by household or members of households to generate income and determine the living. A livelihood is sustainable which can cope with and recovers from stress and shocks, maintain or enhance its capabilities and assets, and provide suitable livelihood opportunities for now and the next generation; and which contributes net benefits to other livelihoods at the local and global levels and in the short and long term. Moreover, a livelihood strategy encompasses not only activities that generate income but also many other kinds of elements, including cultural and social choices (Susannah et al., 2010).

Livelihood is a complex concept incorporating many other concepts. According to Chambers and Conway (1991) sustainable households' livelihood strategy is a summation or conglomeration three different concepts that are: capabilities, equity and sustainability. These concepts are linked to each other as a means and an end. Capabilities are both end and means of livelihoods, a livelihood provides the support for enhancement and exercise of capabilities (an end); and capabilities a (a means) enable livelihood to be gained. Equity is both a means and an end: any minimum definition of equity must include adequate and decent livelihoods. Sustainability, too, is both a means and an end: sustainability stewardship of resources is a value (or end) in itself; and it provides condition (a means) for livelihood to be sustained for the future generation. Sustainability is thus a function of how assets and capabilities are utilized and enhanced so as to preserve livelihoods. Environmental sustainability concerns the external impact of livelihoods and other livelihoods; household and social sustainability concern their internal capacity to withstand outside pressures. According to DFID (1999) the livelihood approach puts people at the centre of development.

2.2 Female headed household

Households which belong to different socio-economic groups have different strategies to earn their own means of living which, in turn, may achieve different levels of resilience to food security. Female headed households are the sub-set of these different socio-economic structure with different strategies and levels of resilience.

A female headed household is classified in most national and international data sources as a unit where an adult woman (usually with children) resides without a male partner. In other words, a head of household is female in the absences of a co-resident legal or common-

law spouse (or, in some cases, another adult male such as a father or brother (Chant, 1997).

The high cost of inputs, especially of fertilizer, prevents resource poor female headed households from improving productivity and from engaging in high return agriculture. Female headed households are not homogeneous, there are marked disparities within the category of female headed households. Factors that enable some female headed households to achieve high income include the availability of high return non-farm income opportunities, use of social networks to obtain labour and income opportunities, land acquisition through flexible application of inheritance rules, and existence of formal and informal institutions. Livelihood diversification is adopted by both male and female headed households, but many of female headed households engage in low return and low entry barrier activities such as agricultural wage labour. On the other hand, the high off-farm income in the wealthier female headed households enables them to purchase fertilizer for own farm production, contributing to an improvement in productivity and increases their income (International Food Policy Research Institutes and State University of New York at Stony Brook, 2009).

Female headed households results from varieties of causes, widowhood (arising from war and natural death) divorce and de facto headship (temporarily absenteeism of male partner arising, for instance, from the sickness of spouse, or his migration to find job), No generalization are likely to be valid everywhere (Horell and Krishnan, 2006.and Chamber, 1997).
Understanding the variations and similarity among households on the basis of their structure (FHHs, MHHs CHHs), knowledge, experiences, practices, perception, priorities and capabilities, can underpin development interventions which aiming to bring sustainable rural development.
Female headed household's coping strategies can also vary from other households moreover, there are variations among themselves on the basis of knowledge, experiences, practices, perception, priorities and capabilities.
As said by Mrs.Tibebu Kahesaye the respondent of this research *"Education matters, if I had better educational status I would be able to get better job and salary than I have today."* This could be an indicator in learning process coherent integration of indigenous and exogenous knowledge is paramount important to increase resilience and reduce vulnerability achieve rural development.

The rural community in Tigray is organized in village, usually with scattered habitation, (see appendix 4) and with households of nuclear families as the smallest social and structural unit. Female headed households also share this characteristic. FHH is usually an adult woman living with her children. Resilience of female headed farming household, depend on the options available in terms of capabilities, endowment of human, material assets and availability, accessibility and proximity to natural resources. As a social unit, female headed farming households in Tigray, are mainly results of divorce and death of the spouse. Within the same HH type FFHs varies in their economic objective, strategies and priorities and socio-demographic status. Most female headed households are in a disadvantageous position relatively to their counterparts in terms of labour endowment, and agricultural productivity.

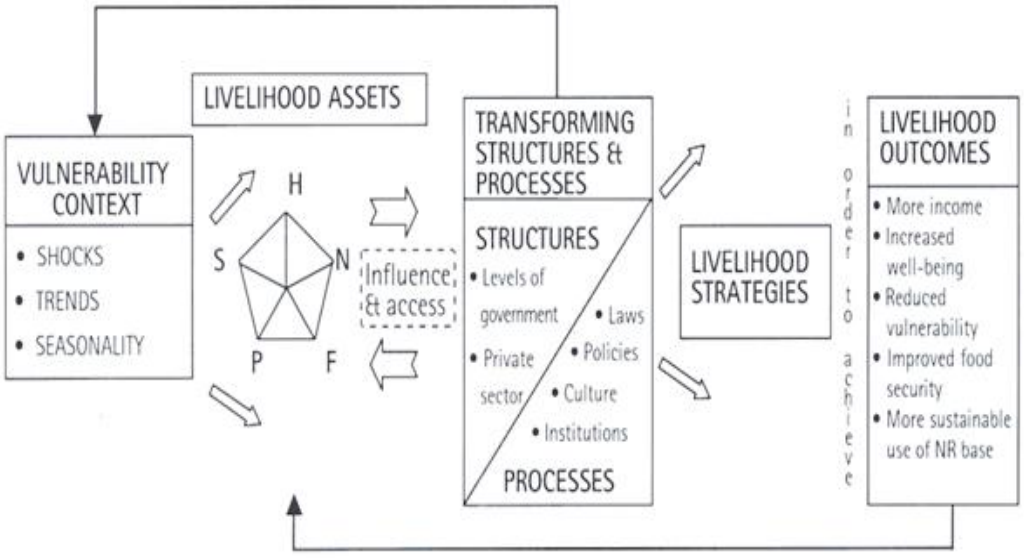
According the respondents of this study the decision to remain female headed is mainly depends on the number of children they have and their asset holding.

Therefore, policy makers should tailor their food security strategies according to existing reality and variety needs of population. Comprehending the driving factors of each livelihood strategy is therefore crucial for improving the response mechanisms related to food insecurity and poverty.

The sustainable rural livelihoods framework

DFID (1999)the livelihood approach is a way of thinking about the objectives, scope and priorities for development. The framework does not provide an exact representation of reality. It does, however, endeavour to provide a way of thinking about the livelihood of the poor people that will stimulate debate and reflection, thereby improving performance in poverty reduction. In its simplest form, the framework views people as operating in a context of vulnerability. Within this context, they have access to certain assets or poverty reducing factors. These gain their meaning and value through the prevailing social, institutional and organizational environment. This environment also influences the livelihood strategies and ways of combining and using assets that are open to people in pursuit of beneficial livelihood outcomes that meets their own livelihood objectives. The sustainable rural livelihoods (SRL) framework is a tool to analyse different ranges scales from individual, to household, to household cluster, to extended kin grouping, to village, region or even nation, with sustainable livelihood outcomes assessed at different levels.

Figure 1Sustainable livelihood framework



Source: Sustainable Livelihoods Framework, DFID's, 1999.

The framework which is presented above is used to analyse household sustainability and applying this Sustainable Livelihoods Framework (SLF) would help to gain a holistic understanding of the ways in which the vulnerability context affect the livelihood assets and the response of households against vulnerability. As stated by DFID (1999) the framework

is also useful in assessing the effectiveness of existing effort to reduce poverty. Like all frameworks it is simplification of the full diversity and richness of livelihoods can be understood only by qualitative and participatory analysis at a local level.
The conceptual understanding of poverty and its causes that underpins sustainable livelihood approach has influenced thinking and practice of throughout the development world. It has reached personnel in development agencies and government departments in the south and north as well as bureaucrats and politicians. For many of these people, whether engaged in field work, policy making, the word livelihood serves to anchor development thinking and practice in the day-to-day and aspiration of people.

Sustainable Livelihood Approaches (SLAs) are based on a multidimensional understanding of people's lives, which recognizes the different assets and entitlements that people hold in relation to the wider context of institutions, regulations and cultural norms. It is argued that an engagement with the complexity and integrated nature of people's livelihoods will provide an improved analysis of the vulnerability of the poor to external shocks and stresses, such as drought or market collapses. It is further claimed the SLAs potentially offer a solution to the failure of sect oral interventions to address the wider livelihood constraints that people face (Carney, 2002)
According to Scoones*, (1998)* the term sustainable livelihood relates to a wide set of issues which encompass much of the border debate about the relationships between poverty and environment. Yet in the existing literature, there is often little clarity about how contradictions are addressed and trade-offs are assessed. The "definitions of sustainable livelihoods are often unclear, inconsistent and relatively narrow. Without clarification, there is a risk of simply adding to a conceptual muddle" According to Chambers and Conway (1991) the Institute of Development study (IDS) team's definition of SL is:
A livelihood comprises the capabilities, assets (including both material and social resources) and activities for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks, maintain or enhance its capabilities and assets, while not undermining the natural resource base.
This, in turn, can be disaggregated to highlight different sub- components. Five key elements of the definition can be recognized:

1. Creation of working days- this relates to the ability of a particular combination of livelihood strategies to create gainful employment for a certain portion of the year. This may be on or off-farm, part of a wage labour system or subsistence production.
2. Poverty reduction- the poverty level is a key criterion in the assessment of livelihoods. Various measures can be used to develop an absolute poverty line measure on income or consumption levels. Alternatively, relative poverty and inequalities can be assessed using Gini coefficient measures. There are a range of pros and cons for each measure, as well as major measurement challenges. However, such quantitative assessments of poverty can be used in combination with more qualitative indicators of livelihoods.
3. Well-being and capabilities- the notion of well-being and capabilities provide a wider definitional scope for the livelihoods concept. Capability as what people can do or be with their entitlements', a concept which encompasses far more than the material concerns of food intake or income. Such an idea represents more than human capital which allow people to do things, but also the intrinsically valued elements of capability or well-of capability or well-being.
4. Livelihood adaption, vulnerability and resilience- the ability of livelihood to be able to cope with and recover from stresses and shocks is central to the definition of sustainable livelihoods Such resilience in the face of stresses and shocks is key to both livelihood and adaptation and coping. Those who are unable to cope (temporary adjustment in the face of change) or adapt (longer term shift in livelihood strategies) are inevitably vulnerable and unlikely to achieve sustainable livelihoods. Assessing resilience and the ability to positively adapt or successfully

cope requires an analysis of a range of factors, including an evaluation of historical experiences of responses to various shocks and stresses. Different types of shocks and stress, in turn, may result in different responses, including avoidance, repartitioning, resistance or tolerance mechanism.

5. Natural resource base sustainability- most rural livelihoods are result on the reliant on the natural resource base at least to some extent. Natural resource base sustainability refers to the ability of a system to maintain productivity when subject to disturbing forces, whether a stress (a small, regular, predictable disturbance with a cumulative effect) or a shock (a large infrequent, unpredictable disturbance with immediate impact). This implies avoiding depleting stocks natural resources to a level which results in an effectively permanent decline in the rate at which the natural resources base yields useful product or services for livelihoods.

The first three elements focus on livelihoods, linking concern over work and employment with poverty reduction with broader issues of adequacy, security, well-being and capacity. The last two elements add the sustainability dimension, looking, in turn, at the resilience of livelihoods and the natural resource base on which, in part, they depend (Scoones, 1998).

Development

For professionals committed to development, the world we wish to bring forth is linked to what we mean by development (Chambers, 2005). Development is a process of enlarging people's choice; of enhancing participatory democratic process and the ability of people to have a say in a decision to shape their live; of providing human beings with the opportunity to develop their fullest potential; of enabling the poor, women and to organize for themselves to work together (Cowen and Shenton,2005). As it is stated by Ashley and Maxwell (2001) in the vocabulary of sustainable livelihood approach, rural development has all various assets rural people access, and about the structures and process which mediate how those assets are transformed into income and other desired outcomes. Similarly, Ellis (2000) also states that rural development can therefore be defined as organizing principles for anti-poverty policies in rural areas of low income countries.

Poverty

There are many definitions of poverty by different scholars and organizations, among these the distinction between absolute poverty and relative poverty is pointed out as follows.

Absolute poverty: a condition characterized by sever deprivation of basic human needs, including food, safe drinking water, sanitation facilities, health, shelter, education and information. It depends not only on income but also on access to services

Relative poverty: people are living in poverty, if their income and resources (material, cultural, and social) are so inadequate as to preclude them from having a standard of living which is regarded as acceptable within their own society generally. As a result of inadequate income and resources people may be excluded and marginalized from participating in activities which are considered the norm for other people in society

Furthermore, Gordon (2005) defined poverty as absolute condition characterized by severe deprivation of basic human needs, including food, safe drinking water, sanitation facilities, health, shelter, education and information. It depends not only on income but also on access to services. Overall poverty takes various forms, including malnutrition; ill health; limited or lack of access to education and other services; increased morbidity and mortality from illness; homelessness and social discrimination and exclusion. It is also characterized by lack of participation in decision making and in civil, social and cultural life. It occurs in all countries: as mass poverty in many developing countries, pocket of poverty aimed wealth in developed, loss of livelihoods as a result of economic recession, sudden poverty as a result of disaster or conflict, the poverty of low-wage workers, and the utter destitution of people who fall outside family support system, social institutions and safety nets. Poverty is

a multi-dimensional phenomenon which includes: material deprivation, isolation, dependence, and subordination (over land ownership, sharecropping, and the poor bargaining position of asset less laborers in the labour-rich economies), absence from organizations, lack of asset, vulnerability to natural disaster, and insecurity (the later sometimes a result of development) (Shepherd, 1998).

Therefore although the conceptualization of poverty varies among different people, in general terms it is now universally associated with material deprivation, low level of health and education, inequality, vulnerability, powerlessness, and social exclusion. However, difficulties in measuring non-economic aspects of poverty result in material well-being/ consumption aspects of poverty being more widely used and focused on.

2.3 Drought

Drought can be defined as meteorological, hydrological, agricultural and social drought Meteorological drought can be defined as a reduction in rainfall supply compared to with a specified average condition over some specified period. Hydrological drought pertaining to the impact of reduction in precipitation on natural and artificial surface and sub-surface water storage system, thus possibly lagging behind period of agricultural or meteorological drought. Agricultural drought is defined as a reduction of moisture availability below the optimum level required by a crop during different stages of its growth cycle, resulting in impaired growth and reduced yield. Social drought relates to the impact of drought on human activities, including indirect as well as direct impact. Recurrent, predictable, seasonality low levels or low mean rainfall in arid area do not constitute drought. Such as events associated with well-established predictable, climatological patterns that occur with high degree of probability. For example 80% thus, there are phenomena to which local economies have adapted by selecting less water intensive type of agricultural and non-agricultural activities and by investing in water storage smooth seasonal variation in supply. The effects of drought are diffused more widely through the economy, reflecting greater overall integration and stronger intersect oral linkage than displayed in simple economics. Drought affect the larger manufacturing as well as agricultural and livestock sectors, as the lower domestic production of agro processing input reduces non-agricultural production while forcing up input costs, multiplier implications for domestic production. Meanwhile consumer's purchasing power is likely to decline owing to some combination of higher food prices, job losses in both agriculture and non-agricultural sectors; moreover, the economic impact of drought is largely felt via its direct impact on agriculture (Benson and Clay, 1998).

Impact of drought on agriculture

The economic impact of drought is largely felt via its direct impact on agricultural sector.
Agricultural drought is defined as a reduction of moisture availability below the optimum level required by a crop during different stages of its growth cycle, resulting in impaired growth and reduced yield. Social drought relates to the impact of drought on human activities, including indirect as well as direct impact ((Benson and Clay, 1998).
Drought can be manifestation and cause of poverty, the poor, particularly the rural poor, are at risk for climatic factors. Mortimore (1989) defined drought as meteorological drought which is defined by statistical term, hydrological drought occur when surface or ground water levels fall below average, agricultural drought is shortage of water for crop growth, and may be defined as a consistently high soil moisture deficiency over the growing season.
The basic climatic elements directly influence the spatial distribution of crop type and agricultural system, because different crops require different amount of rainfall, humidity, warmth and sunshine. In Sub-Saharan African countries' rain fed agriculture, climate is the main factor determining crop type and yield. Beyond certain climatic limits it is impossible to grow certain crop (Molua and Lambi, 2006).

In ecological terms, adaptation is the process of an organism becoming better suited to its habitat, and it is normally a slow inter-generational process, and therefore of particular concern given the current rate of climate change. However, in current climate change debates, adaptation does not only refer to the biological adaptation of species or the biophysical adaptation of ecosystems, but frequently refers to the behavioural and economic adaptation of people. This interpretation takes precedence in this section of the report (UNEP, 2010).

Vulnerability, stress and shock

Stress is a gradually or continuous increasing pressure, commonly within the range of normal variability. Stress frequently emanates within the system, and stressors often reside within it (Walker, et al., 2004). Vulnerability is a widely used and often arbitrarily applied term referring to the weakness or inability to cope with a specific situation or event. Furthermore, it is potential for negative consequence which can be defined at different scales, including yield, farm or farm sector, regional economic or hunger vulnerability and it is a product of a system and for assessing human welfare derived from aggregating environmental, social, economic exposure. The concept refers to the consequences of harmful perturbations and attempts to investigate the reasons and sources of this weakness. Resilience is the opposite of vulnerability increase, the capacity to cope with stress or perturbation (Hausken, 2004). But under significant stress, population displacement is often an indicator of the breakdown of social resilience (Adger, 2000).

2.4 Resilience and sustainable livelihood strategy

Resilience

Different authors stated that, the concept of resilience has come into recognition after Holling's (1973). Since then, resilience has been defined by different scholars on the basis of individual, group and systems capacity. According to Staudiger, et al., (1995) resilience is a concept that individuals can avoid negative outcomes despite the presence of significant risk factors in their environments. It also includes the idea that individuals can regain normal levels of functioning after developmental setbacks, both with and without the help of external interventions. According to Walker, et al., (2004), Adger, (2000) and Holling et al., (1995) resilience is the capacity of systems to absorb disturbance and recognize while undergoing change so as to still retain the same function, structure, identity and feedbacks and the ability of group or communities to cope with external stresses and disturbances a result of social, political and environmental changes. Moreover, it has been also defined as a buffer capacity or the ability of a system to absorb a perturbations, or the magnitude of disturbance that can be absorbed before a system changed its structure by changing the variables and processes that control behaviour. Similarly, Luthar (2003) also puts resilience that refers to the pattern of positive adaption in the context of significant risk or adversity.
Schulze and Mooney. 1993; Mooney Ehrlich, 1997, Tilman, 1997 cited in Adger (2000) also defines resilience from ecological perspective as the speed of recovery from a disturbance, emphasizing the difference between resilience and resistance, where the latter is the extent to which disturbance is actually translated into impact. Similarly, resilience refers to the ability of an ecological or livelihood system ‘'bounce back' from stress or shocks (Ellis, 2000).

Resilience has been defined in two different ways in the ecological literature, each reflecting aspects of stability. One definition focused on efficiency and depends on constancy and predictability of all attributes of engineers desire for fail-safe design and the other one depends on persistence, despite change and unpredictability (SCOPE, 2002).

Resilience has been defined in two different ways, first definition, and more traditional one, concentrate on stability near an equilibrium steady-state, where resistance to disturbance and speed of return the equilibrium measure. The second definition is far from equilibrium in which stabilities can turn over a system into another system of behaviour to another stability domain. Measurement of resilience is the magnitude of disturbance that can be absorbed before the system change its structure by changing its variables and processes that control systems behaviour called ecosystem resilience. Hence, its significance becomes obviously for large-scale systems over long periods. The first definition focuses on efficiency, constancy and predictability attributes at the core command and control desires for fail-safe design. The second focuses on persistence, change and unpredictability attributes embraced by an adaptive management philosophy (Alinovi, 2009 and Holling and Meffe, 1996).

Resilience, adaptability and capability

Based on the above definitions of resilience, and McCarthy (2001) the ability of human being to adopt and cope with climate change depends on factors such as wealth, technology, education, information, skill, access to resources and management capabilities contribute to resilience at different levels.

Levin (1998) cited in Walker, et al., (2004) define adaptability as the capacity of actors in a system to influence resilience. In a SES, the amount of the human capacity manages resilience. A feature of complex adaptive system is self-organization without intent and although the dynamics of SESs are dominated by individual human actors who do exhibit intent, the system as whole does not (as in the case of market). Nevertheless, because human actions dominate in SESs, adaptability of the system is mainly a function of the social components the individuals and groups are acting to manage the system. Their action influence resilience, either intentionally or unintentionally. Their collective capacity to manage resilience, intentionally, determines whether they can successfully avoid crossing into an undesirable system regime, or succeed in crossing back into a desirable one. Adaptability is the capacity of human being in the development process to influence resilience in a socio-ecological system essentially to manage it to use internal and external resources to positive adaptation. The capabilities and intent of human actors strongly influence the resilience and trajectory of the social ecological systems (SES).

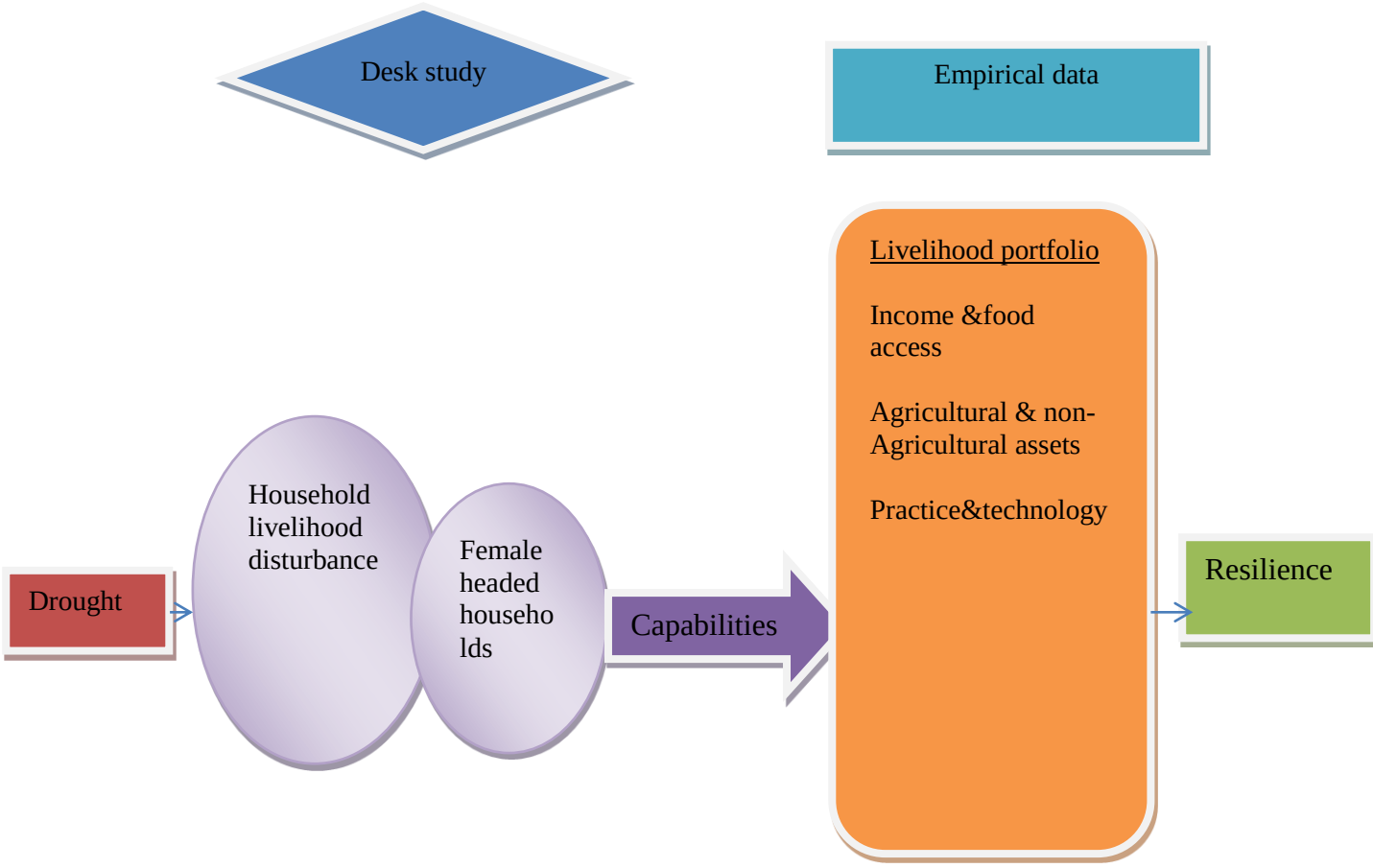
UNEP, (2010) also stated, traditional adaption mechanism have been used and transmitted over generations, they may not always be sufficient to address climate change. Therefore, there may be a need to design new adaptive mechanisms that are built on traditional practices and knowledge as well as appropriate technology transfer to strengthen the capacity of local people to address the issue of climate change through communicating new knowledge and blending of traditional and modern adaptation measures.

A research framework represents the internal logic of the research project (Verschuren and Doorewaard 2011) In line with this idea, for further communication and to show the travel map and the linkage among concepts this study used the following framework. This visualizes major concepts of the research. The main concepts are: drought, household livelihood strategy, female headed households, capabilities and resilience. The research has visualized the impact of drought on the on female headed households and their resilience capability to cope with.

Conclusion

Resilient female headed household is the core unit of discussion in this study. Other main concepts used in the study are female headed household, household livelihood strategy, capabilities, resilience and drought. The conceptual framework below follows the meaning of FHH and other concepts as developed from theoretical literature and defined throughout the study to give guidance to the research.

Figure 2 Research framework



Source: Own insight based on the literature reviewed

CHAPTER THREE RESEARCH METHODOLOGY

This chapter provides a description of how the research was structured and data collected to meet the research objective.
In the first part of the chapter discussed the research strategy with the specific reference to the benefit of case study to collect qualitative data. This is followed by research procedure and description of data collection tools The data collection section provides a description of research strategy and tools used to collect qualitative data and overview source of primary and secondary data. The last part of this chapter presents the project context

3.1 Research strategy

To explore the resilience capability of female headed farming households in times of drought this research used a case study *of* Enderta woreda,tabia mariamdehan FHH Tigray, Ethiopia in times of drought. A case study was employed to obtained qualitative data and in depth information about the livelihoods strategies of respondents and research area. This idea is in line with Baharein and Noor (2008) case studies as being concerned with how and why things happened, a case studies become particular useful where one needs to understand some particular problem or situation in great-depth and where one can identify cases rich in information.

This research employed case study as a research strategy to obtain in depth information from female headed households about their resilience and adaptive capabilities in times of drought. To collect primary and secondary data the following procedures were followed.

Based on the discussion with supervisor, after completion of the research proposal, introduction of research topic and proposal was conducted at different relevant levels to gain the necessary support and facilitation. Firstly, as resilience is a new concept the research proposal was presented to the researcher's organization to specific group of colleagues based on planned schedule. Secondly, brief introduction was given to the vice head of Enderta office of agriculture and rural development. Based on the briefing research site tabia mariamdehan was selected, This site is one of the 17 tabias in Enderta woreda, was selected for its convenient location and proximity to researcher's residence area. Thirdly, orientation about the topic and its relevance to the organization was given to colleagues at the research site to gain their facilitation assistance to reach to the respondents Colleagues of the researcher were given the opportunity to comment on the proposal. They all appreciated relevance of the topic but, they suggested on the specific time of 1984 drought. They were suggested as drought is recurrent phenomena in our region it is also possible to study the impact of drought in general and the resilience of FFHs in times of drought
The following pictures illustrate the activities carried out.by researcher to familiarize research topic and its relevance during the field work.

Figure 3 Introduction of research proposal

Source: Own field work

The researcher travelled for twenty days to and from the research area and site to collect primary and secondary data. To collect primary data twenty individual female FHHs were interviewed, two FGD was conducted. Each FDG had six participants and planned observation was employed to explore more about their resilience capabilities. Key informants were interviewed to collect background information about the research site. Interviewing key informants was helpful to select specific research site and to triangulate information.
As the research focus is on the resilience capability of female headed farming households in times of drought which is based on memories of informants, the researcher used purposive sampling technique for selection of respondents. With this understanding female headed households aged 40 and above were selected for interview and FDG.
As interview was the primary data gathering tool for this research, a semi-structured interview was used where questions were formulated from a topic list to meet the objective of the research. (see appendix 1 and 2)

The case study was focused on endogenous and intra household skill and knowledge for positive adaptation in times of drought. This research tried to describe/define the human and social assets that contributed to increase or reduce resilient.
It focuses on the coping strategies of resilient female headed farming households in Enderta woreda in 1984 drought.

It tried as well to explore the social capital and the contribution of exogenous knowledge to build up endogenous knowledge and practices.
Defining the presence and activities of local institutions and organizations and explore their Influence on the decision making of female headed households.

1.1.1 What were the immediate institutional coping strategies carried out during 1984 drought?

3.3 Source of data:

Secondary data: was obtained from 5 key informants, staffs of BoARD at different levels, regional, woreda, and extension office at tabia level. And documents of annual report, strategic planning of BoARD (researcher's organization) and internet sites were referred and consulted during desk study.
The researcher used desk study:

1. To get an overview of rural livelihood of FHH in the research area.

2. To get an overview of the drought in 1984

Primary data: fieldwork was carried out by the researcher and purposive sampling technique was employed in order to select resilient respondents who have been employing different coping strategies during and after the 1984 drought and ready to share their experiences. As it is stated by (Tongco, 2007) whenever information is held by only certain members of the community purposive sampling is relevant. Primary data was obtained from 30 female headed farming households

3.4 Data collection tools

Face to face interview and focus group discussion which was guided by open ended questionnaire and planned observation was carried out.
Interview: face to face interview was carried out with twenty respondents and with five key informants form (rural development professionals from BoARD regional bureau, woreda experts of and communication worker at tabia level using open ended questionnaire or semi-structured interview.
Focus group discussion: this research employed focus group discussion to further explores the resilience strategy and in order to get in depth insight why people are doing the way they are doing. The focus group discussion was carried out at research site at respondent's homes with twelve participants guided by open ended questionnaire or semi-structured. The focus group discussion (FDG) was organized by communication worker at tabia level and facilitated by researcher. The focus group discussion included female headed households aged 4o and above. The criteria for selection was based on their life experience and coping strategies. Communication worker at tabia level was instrumental in identifying respondents for focus group discussion. Gibbs (1997) states that the main purpose of focus group discussion research is to draw upon respondents' attitudes, feelings, beliefs, experiences and reactions in a way in which would not be feasible using other methods, for example observation, one-to one interviewing, or questionnaire surveys. The discussion was facilitated by the researcher guided by semi-structured or open-ended questionnaire to stimulate a free interaction among participants, and draw up their experiences and feeling about their coping strategy, impact of drought and resilience capability. The group discussion focused on topics that included human capabilities, the household's asset holding, and diversification of economic activities. The focus group discussion was very useful in completing the semi-structured interviews particularly in analyzing the access to natural resource and its contribution to resilience of the poor female headed households. However it has critical limitation. For instance, as participants are the bread winner of the household it was not easy to meet them in times of appointment. For one day failed appointment we had to fix another day which is not busy day.

Planned observation: planned observation iswhere the researcher can observe phenomena of interest in the environment studied to draw information which was not

obtained from other methods (Baharein and Noor 2008). In line with, when the researcher was visiting two to three times of the selected households during the twenty operational days in the research site, it was planned to observe health status of HH members and as time is one of the assets at disposal of the HH it has been tried to observe time utilization. As the operational time (field work) of this research was from mid-July up to first week of August and this period for the research area and site is supposed to be heavy rainy season, but actually there was no rain especially up to 30 July, 2011, the researcher planned to observe crop on the field at that specific time and respondent's emotional feeling as response to drought.

Data collection procedure: based on the discussion with supervisor, after completing the research proposal the research introduced and discussed with researcher's colleague. Colleagues of the researcher were given the opportunity to comment on the proposal. They all appreciated relevance of the topic but, they suggested on the specific time of 1984 drought. They were suggested as drought is recurrent phenomena in our region it is also possible to study the impact of drought in general and the resilience of FFHs in times of drought

Open ended questionnaire or semi-structured was formulated from the topic list to obtain qualitative data and in depth information. The open ended questionnaire or semi-structured was administered and pre-tested in order to make sure the questions are clear to all respondent and enable the researcher to get the answers for the questions. Based on the pre-test, after interviewing the first three informants the first day, the researcher made some modification on the questionnaire to cover the relevant topic list. The researcher travelled to and from the research site for twenty days going to the field in the morning and coming back home in the evening. Three days for focus group discussion, two days for planned observation and fifteen days to carry out the interview, within one day two informants were interviewed one hour each in total ten days to interview twenty informants, one key informant in one day two hours each.

3.5 Data analysis

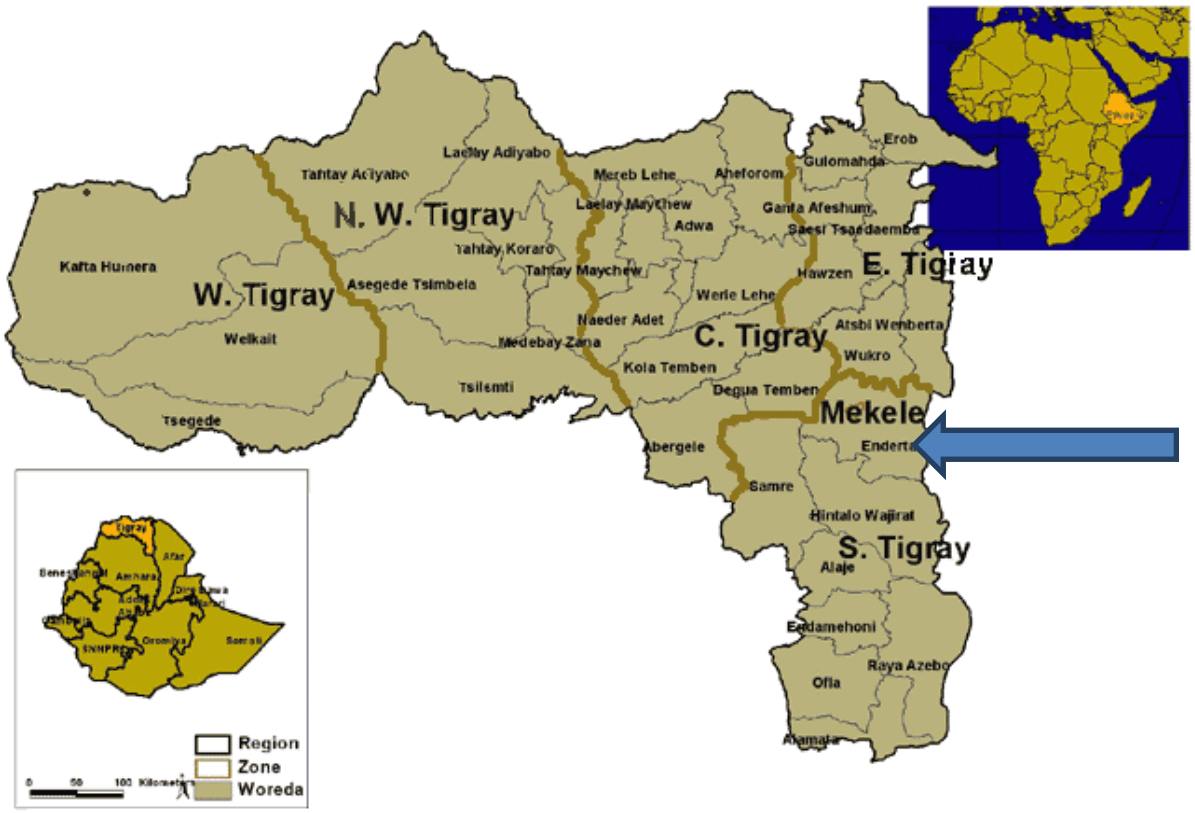
To analyse the resilience capability of female headed households, and to understand their coping strategies to withstand impact of drought sustainable livelihoods framework was used. Among the five assets defined by the framework this research mainly focused on the human and social capitals. Based on the finding of this research there is not easy to put rigid boundary among the five assets, it was hardly possible to analyses specific asset without touching the rest, for example for this study it was almost impossible to exclude natural asset from human and social assets for this study.

3.6 Research context

3.6.1 Enderta, the research area

Enderta is among the 34 woredas of Tigray regional state. It is located in southern part of the region which shares borders with Wukro to the north, Degue Temben to the west, Afar region to the east, and Alaje to the south. The Dry Midland Livelihood Zone spread across parts of Enderta, SehartiSamre, part of AtsbiWonberta and Hawzenworedas. It lies in the midland Agro-ecological zone, characterized by dry climatic conditions and erratic annual rain fall of 450-600 mm. The landscape is mostly plain and hills, with bush vegetation. The land is rocky with lime stone and marble resources that are currently being extracted by private investors (EndertaDry Midland Livelihood Zone, 2006).

Figure 4Map of research area EndertaTigray

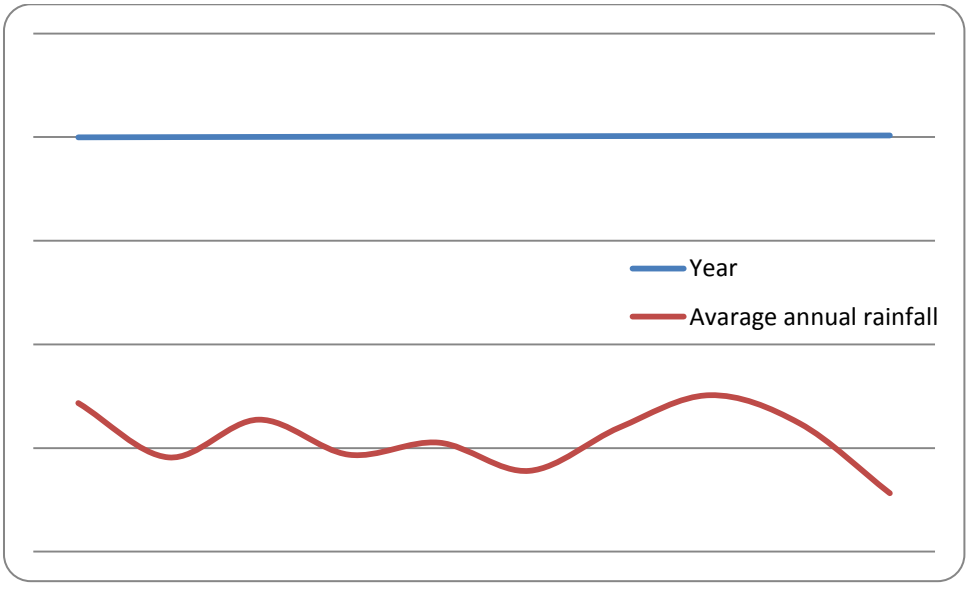


Source: Tigray online. 2011.

Enderta is the third populated woreda next to Hentalo Wajirat and Seharti Samre*woredas* with total population of 114,277 (57,472 male and 56,805 female) in the region (CSA, 2007). According to Enderta woreda office agriculture and rural development annual report , the woreda has seventeen tabias with 25,751 total households and out of the total number of households 7,750 are female headed, and the woreda has total area of 140,000 hectare and out of the total area 31,184 hectare is arable land.

Mixed farming which includes crop and livestock productions is the most dominant livelihood system undertaken by small-scale farming households in *Enderta*. Like other parts of the region livestock ownership and land holding are the important assets of the farming households of this area. The most commonly produced crops by small-scale farming households are wheat, barley, vetch, *teff***,** and lentils. Land preparation, particularly for *teff*field is labour intensive and is carried out by men. Both men and women share weeding, and harvesting is done by men. Recurrent drought and erratic nature of rainfall expose this woreda to chronic food insecurity. Rust, shoot flay and crickets are the common pests and diseases that affect crop production (BoARD cited by Enderta Dry Midland Livelihood Zone, 2006). The following figure illustrate erratic nature of rainfall in theEndertaworeda according the data attached on (Appendix 3).

Figure 5 Rainfall trend of woreda Enderta



Sources: Enderta office of agriculture and rural development.

Livestock serve as source of draught power, food, income, manure (fertilizer) and fuel. Cattle are the most productive asset, after land, mainly owned by better-off farming families. Milk production increase income and improve nutritional status of the households. Livestock are high value assets to reduce impact associated with drought. Outside the drought season, productive cattle are rarely sold. Households sell cattle after their productive lives, or when they encounter particular risks or important events that require

access to relatively large income. Poor households seek to purchase oxen during the farming season when they need draught power and sale after the farming season. Sheep and goats are sold more regularly to provide food and income to the households. The poor usually sell at age of twelve months, and the better-off sell bigger animals. The main source of animal feed is communal grazing land and purchasing crop residue. Anthrax, blackleg, and pasteurellosis are the main diseases affect livestock production.

Beehive is also another source of livelihood in the area but it is often practiced by better-off household due to the fact that bee keeping requires initial capital and management skill. Firewood sales and labour migration are important source of income for poor households. In the very poor households, firewood selling is carried out by both men and women. Agricultural labour opportunities are available in the areas. Water for human and animal consumption is collected from deep wells, shallow and hand dug wells, springs, pools, small rivers. And hand pump water In a nutshell, households that belong to different socio-economic groups have different strategies to cope with and withstand economic shocks which, in turn, may ensure different levels of resilience to drought.

Tabia mariamdehan: the research site is among the 17 tabias of *Enderta woreda*. It is located in East part of the woreda which shares borders with tabia felegmait to the north, tabia maialem to the west, tabia lachi to the east, and tabia adiha to the south. The tabia has 1366 total households and out of the total number of households 329 (24%) are female headed, with total area of 1153 hectare. Mixed farming which includes crop and livestock productions is the most dominant livelihood system undertaken by small-scale farming Tabia mariamdehan. The tabia has farmers training centre with three extension workers employed by the woreda office, human health clinic, four hand pump water and one junior school from grade one up to grade seven, four private flour mill machines and farmers who cannot afford to pay transport fee they have to walk around eight km on foot for weekly market to Mekelle. They use donkey to transport their produce and some of them carry at their back about 20 kg specially women.

CHAPTER FOUR RESULTS

This chapter presents a report of the fieldwork, the respondent's opinion obtained through interview of individual female headed household, FDG, planned observation and opinion of key informant on the organizational response to reduce the impact of drought and it also presents the information obtained from studying the organizational documents.

4.1 Results from interview individual female headed households

Demographic and social net work

The demographic situation of each HH varies from time to time and from HH to HH. Based on the sample taken, household size varies from the smallest HH with single woman aged 65 up to woman aged 45 and live with her five children.(see appendix 2) Out of the total sample only one household includes more than one household unit that is, a mother provides a house to her married daughter in her compound aiming to help her daughter in raising her baby and occurrence of the new household unit is not related to the old household unit, they are autonomous in their decision and resource utilization except sharing one compound. In other words out of the total sample 95% of the households are composed an adult woman with her children (nuclear family).

The major two reasons for being female headed are divorce 40% and the remaining 60% are due to the death of their spouse. Regarding social support from relative, neighbourhood and labour sharing arrangement 100% respondents are proud of the support they receive and give to each other. However, all respondents are not optimally using this opportunity. Out of the total respondents only 40% of them harvest their own plot of land using the existing reciprocal or give and take labour arrangement method in their area and the remaining 60% use share cropping method

Income and food access

Coping strategies carried out by resilient female headed households are: pottery production, petty trading, brewing local beer, employment, credit, remittance, begging, migration to neighbouring woreda and any piece of work, such as daily labour. Among these strategies, pottery production, migration to neighbouring woreda, hair dressing, begging and remittance are specifically employed to cope with impact of drought of 1984. These strategies cover 60%, 5%, 10%, and 5% respectively. (see appendix 2). All households face variation of food and income from. June to September is the most deficit of food to occur.

Regarding food access

Asset holding status

Out of the total sample 95% female headed owned plot of farm land, which vary in size from 0.5 ha to 1.5 ha, (40%) to 0.75 ha (25%),1 ha (20%) 1.25 ha (5%)1.5 ha (10%),.

However, the majority are use share cropping system to harvest their land due to labour shortage.

4.2 Results from focus group discussion

Case1

Mrs.TibebuKahesaye (45) live with her three children aged 21, 18 and 16. Tibebu had participated illiteracy elimination campaign of the country in the 1980's.
She has been head of her household for the last 15 years after the death of her husband. She only own a house with its backyard, she planted some perennial trees which could produce fire wood and shade during dry season.
Tibebu's husband was an employee of private organization called Guna and he was the bread winner for the family. Before the death of her husband they were living in Mekelle city. Due to the death of her husband living in the city became expensive and difficult to Tibebu because she could not cover the living expenses, such as paying house rent, and life became difficult to her in the city. By then, she decided to go back to the village (tabiamariamdehan) were her parents are living and where she was born and grown up. Her father allows her to live in one hedmo (traditional house made from stone and mud, surrounded by stone, roofed by mud and stone supported by big cut of wood) with her children for free.

Tibebu had some primary education. The private organization Guna, where her husband was working, employ her permanently as cleaner because of her basic skill of reading and writing. Currently she is earning a monthly salary 600 ETB or 37.5 USD.
Tibebu memorize different impact of drought since her childhood. She said, 1984 drought was so serious that we were not able to have normal diet. Instead I was preparing very thin soup and serve to my children and my husband which could not satisfy our dietary need. I remember once we received soya bean from aid organization, and I made flour of it and prepare a chapatti out of it. After we ate that chapatti all of us suffer from dysentery.

Tibebu, in total has five children, as she is aware of the advantage of schooling; she used to send her children to the nearby school. After school they were helping their mother in preparing local beer (sewa) and selling They were also generating some income from petty trade. She had also support from her brothers and after some time they built her a house with zinc roof.

Currently, her first born completed her diploma course and second born completed her 10^{th} grade and both of them are working at messebo cement factory close to their residence. Currently, her two daughters are married and started living on their own and still they are source of her income, occasionally they cover clothing and other holiday expenses of the family.

Tibebu memorize one successful coping strategy. She said "it was about thirteen years ago, on the top of my problem, one of my sister's daughter with her two young daughters came to me and asked for help if not she going to suicide. Because the father of her two daughters left her away without any promise and her poor mother rejected her because and she had other dependants and priorities at that moment."
Tibebu use the endogenous practice to help her sister's daughter. She asked some close friends and relative to contribute what they can afford and she was able to collect 300

birr(18.75 USD). Using this money, she prepared local drink and some snack from beans (locally called buqulti), and invite the neighbourhood at large to raise fund for her poor sister's daughter, by then she raised 1500 birr (93.75 USD) and 3 qt or 300 kg of cereal. Then she gave to her sister's daughter what she raised. Currently the daughter her sister, her name is called Embaynesh survived and rehabilitated. She has her own of source

income she is living in her own house with her two daughters. Her children are at school she live harmoniously with Tibebu's family and the community. Tibebu mentioned the social network in her locality helped her to rescue her sister's daughter.

Tibebu when she tries to bring back her memory about the different drought time, she said even though drought is still happening, nowadays its impact is not as severe as the old days. Because in old days, I remember we were borrowing one hundred kg of cereal from the better-off farming households during June-August and refund it 300 kg of cereal in December- January. This type of borrowing method was very exploitative. Even though, it helped us to survive, it contributed to our deep poverty. Unlike these days, there was no access to credit scheme. Thanks to our government these days we have access to micro credit to run different economic activities to generate income.

Case 2.

Mrs.NegestiZeferu (60) live with her 16 years old girl from relative. She has been head of her household for the last 10 years after divorce. After divorce, she remained with 0.5 ha of land because her ex-husband took his share. Since the last three years due to labour shortage, she gave her land for share cropping and consequently her income also reduced further. Negesti mentioned that after 1984 drought she learned how to make coffeepot and cooking pots with different size from clay (clay soil is a natural resource available in the area). Since then pottery production from clay is additional source of her household income. She produces 10 coffee pots and 2 cooking pots per week and sell it at Mekelle Monday market. Negesti that mentioned if she would able to produce more she could generate more income.
But nowadays, it is becoming difficult because clay work is labour intensive, collecting the clay by carrying at her back, grinding the clay manually all these activities are tire some for her because she is 60 years old

Case 3

Mrs.Tesihinesh Gessesew (43) living with her 5 children. She own 0.5 ha of land after divorce and she gave her land for share cropping due to labour shortage. The major crops she grows are wheat, sorghum and teff. Teihinesh has brothers abroad and she receives remittance in times of drought. From the income received from her brothers she saved part of it and built a house with zinc roof, and by now she has extra room which is ready for rent. But no one has asked to rent her extra room as everyone in the village (tabia mariamdehan) has her/his own building or not that much difficult to find a place or room to live for free, however, this is her long term strategy to reduce impact of drought.
After 1984 drought she started employing herself in brewing local beer (traditionally called sewa) and she has also trained herself from her neighbourhood how to make coffee pot from clay for sell.

Tesihineshs said among the economic activities she carried out (crop production, dairy production and brewing local beer), if it is good year crop and livestock production are the most important sources of her income and food.

Concerning the accessibility of the agricultural technologies which is provided by BoARD, Tesihinesh said it was accessible to her and her neighbours equally and they are free to

make choice on which type of agricultural activity would they like to take or run (poultry, dairy, or fattening of sheep and goat) and the amount of credit they would like to take mainly based on their decision. Consequently, based on her decision, she took credit to purchase a cow and run dairy farm to diversify her income. And she mentioned, she is returning her loan according the agreement made.

However, there is still seasonal variation in her income and access to food. From June to August the income and food access of HH is low and from September to May comparatively sufficient for survival. She uses the remittance to complement the household food deficit. Tesihinesh said there is labour market depending on the season.

Case 4

Mrs.Asefach Kahessay (51) living with her two children. Her two sons are not contributing much because the first born is 20 years old, he is busy with studying in his religious school full time, and the second one is 15 also a student in the nearby school. She own 0.75 ha of land, she has been the head of the household for the past 14 years since the death of her husband. Asefach said I never gave my land for share cropping, since the death of my husband so far. She harvested her land by renting oxen and asking some relative for labour, in return she also pays her labour during weeding for her relative. The following picture illustrate labour arrangement of female headed household.

Figure 6 Labour arrangement of female headed household

Source: Own field work

She had a bigger plot than what she has now, due to the proximity of her plot to messebo cement, factory; part of her plot was taken by the government and compensated 40,000 birr (2500 USD).
When she memorizes the situation in 1984, she said “I was undermining people who are engaged in making pottery, because traditionally we believe they are from low caste, but after 1984 drought the situation forced me to learn the skill from them and it prevented me from migrating elsewhere.”

Figure 7 Interviewing pottery producer at her back yard

Source: Own field work

The above picture illustrates how the researcher approached the respondents. Respondents feel free and comfortable to share their opinion, they can communicate easily if interviewer is not writing. However, it was also a challenge to avoid writing completely during the process. Unlike the above one the following figure 8 illustrate the challenge and how communication can be interrupted if interviewer is writing.

Figure 8 Individual household interview

Source: Own field work

Case5

Mrs.TwreseTafere (40) has five children in total. She is living with her four children; they are 13, 16, 19, and 22. Her first daughter is married and living with her husband. She has been head of her household for the past 12 years due to the death of her husband. She own 0.5 ha of land, and use share cropping method to harvest her land.

Case 6

Mrs.Fetsium Gessesew (45) is living with her five children, in total she has six children, and her first daughter is married and living with her husband. The rest are student and they are in grade 6, 7, 8, 10 and 12 according to their age. She has been head of her household for the past eight years due to the death of her husband. She owns 1.5 ha and she never give her land for share cropping. She use fertilizer and HYV (high yielding verities)in times of good year to improve her income. She mentioned that her children encourage her to use fertilizer and HYV. As a result of the inputs she used, she able to improve her harvests 2000 kg or 20 quintal of grain from 1.5 hectare of land. She practiced improved crop production managements (crop production package) and water harvesting technique. She

dug waterpond and irrigated her land during dry season and able to harvest 2-3 times in a year, however, currently her water pond has a problem in holding or collecting water as it is supposed to be.
Furthermore, to diversify her income she took credit to purchase a cow and currently she returned her loan from the income she generated from selling milk and milk products and own three cows. She also participated in fattening of sheep and goats.
Fetsium said, last year during wedding ceremony of her daughter gave a cow and a bull to her son in law as a dowry from the asset she accumulated.

Fetsium has been selected from her village to participate in training on improved agricultural practice. The training was prepared by woreda agriculture and rural development office to improve agricultural practices of farmers. After training, she has received a reward of 150 kg of grain for her successful performance. She appreciated the government response to reduce poverty in terms of integrating household packages with input supply in kind or credit in cash.

Case 7

Mrs.Kendehaft (40) living with her 3 children. She owns 0.75 ha of land. For the last ten years, after death of her husband she has been head of her household. She has support from her family to harvest her land. She received credit to purchase chicken and she has retuned her loan according to the agreement and she has a plan to take new loan to purchase sheep and goat for fattening to diversify her income and improve household food access.
She grows on her farm wheat, sorghum and teff. Her brothers lend labour during ploughing and sowing, in return she do the same thing during weeding.
After 1984 drought, she trained herself on hair dressing and since then she started employing herself on hair dressing. She said among the economic activities she carried out (crop production and poultry production) are significant sources of her household income if it is good year.
Concerning the accessibility of the agricultural technologies which is provided by BoARD, She said it is accessible to her and her neighbours equally and they are free to make choice on which type of agricultural activity would they like to take or run (poultry, dairy, or fattening of sheep and goat) and the amount of credit they would like to take. Based on her decision, she has received credit to purchase a chicken to run poultry production to diversify her income.
There is seasonal variation in her household income and access to food. From June to August the income and food access of HH is reduced and from September to May comparatively sufficient for survival.

Figure 9 Hair dressing and selling basketry products at open air market

Source: Own field work

Case 8

Mrs.Helefti Gebresselase(65) living with her adult daughter, she own 0.75 ha of farm land. For the last 30 years, after death of her husband she has been head of her household. Helefti said, on the top of agricultural activity which I run, using the locally available clay soil I used to produce pot for water container and local beer (its local name is called etro) and coffee pot (its local name of the coffee pot is called jebena) and sell them in Mekelle Monday market. During 1984, it was very dark time; on the top of drought there no peace due to the civil war and the situation was so serious. There was no day time market for my products, after some struggle together with my daughter we closed our house and migrated to the nearby woreda called SahartiSamre to look for better labour market.
Mrs.Helefti, by bringing back her memory, she mentioned the difficult time she had as follows; during the 1980's and prior to that time, we serve (weeding) the better off farming family in July and August with the agreement of future payment and they pay us during harvest time in December and January in kind. Or we borrowed money to purchase seed and we pay our labour during the pick agricultural season and the way of borrowing and labour market was very exploitative.
After we escape from sever 1984 drought time, we returned back to our home and thanks to our government I was beneficiary of the available credit scheme. The credit helped me to diversify my income by running petty trade and increase production of pottery business. But these days due to my old age I am tired and life becomes difficult to sustain my income. My only source of income is the output from share cropping and 12 kg of wheat per month from government support and support from my daughter.
Because the activities I already know require more energy and physical movement which is very difficult for 65 years old women.

Case 9

Mrs.HanesuMerutsi (45) living with her two children and one grandchild, she owns 0.5 ha of farm land. Hanesu gave her land for share cropping. For the last 25 years, after death of her husband she has been head of her household.
During 1984, It was very dark time, on the top of drought there no peace due to the civil war and the situation was so serious, for survival I went for begging. I really thanks my community they were sharing me from what they had and helped me to stand here today.
After we escape from the serious drought time of 1984, I train myself on hair dressing; I am gaining some amount of income to support the household income. And my daughter is working on productive sate net program and she gain certain amount of wheat.

Case 10

Mrs.TeheshBerhe (50) is living with her three children, aged 16, 18 and 23 and she has been head of her household for the past eight years due to the death of her husband. Tehesh said since the death of my husband I never use share cropping method.

She own 0.75 ha of land. Tehesh said, during the dark time 1984 I went for begging for survival and thanks to my poor community they were sharing me from what they had and we survived. After that time, I trained myself from my neighbourhoods how to produce coffee pot (local name of the coffee pot is called jebena) from clay (natural resource available in my area and since then it is my regular side line business.

Nowadays thanks to extension worker he is advising me concerning the available agricultural technologies which could help me to diversify my income. As result, I use to rent oxen and labour for ploughing, and to increase my output I apply fertilizer and HYV in times of good year I as a result of my hard work plus improved agricultural practices and inputs, I used to harvest 7 quintal of cereal in a year.
Nowadays I am using my son labour for ploughing and I have also an ox I only need for reciprocal share of another ox.

Furthermore, to diversify her income she took credit to purchase a cow and currently she returned her load from the income she generated and she own three cows. She also participated in fattening of sheep and goats, and chicken production.
Moreover, Tehesh used traditional way of saving money called Equb and uses the money for expansion of her fattening project. She had a chance to participate training to improve her practice.
Finally, she appreciated the government credit scheme, by witnessing it is in line with her interest and really helped her to escape from deep rooted poverty however, Tehesh said as the local governance (tabia mariamdehan administration) has a great role to sustaining the already initiated development, they need to be checked by their superiors for the service they are delivering day to day services. According to her they are not implementing government rules and regulation in a way it should be.

Case 11

Mrs.Afara Haile (65) is living alone, she own 1.25 ha of land, she use share cropping due to labour shortage, she has five children they are married and living on their own. She has been head of her household for the past fifteen years due to the death of her husband.
Afara use to produce tradition tread from cotton which is used as an input for traditional cloth making by traditional cloth producer. During the dark time 1984 she was producing one kilo of cotton tread per week for the better of family. This activity was a major source of her income next to crop production throughout her life. But these days due to old age she facing sight problem cannot produce any more. Her only sources of income are the output from my land and 12 kg of wheat from government support.

Case 12

Mrs.TeheshGermay(45)is living with her three children, aged 13, 16, and 21 She own 0.75 ha. Out of her total land holding, 0.25 ha is harvested by herself, using family labour and some reciprocal labour arrangement from the neighbourhood, the rest 0.5 ha. is harvested by share cropping arrangement. She has been head of her household for the past twelve years due to the death of her husband.
To diversify her income, she took credit and purchased a cow and currently the cow gave birth currently, calf she has three cows. She able to returned her loan according the agreement made from the income she generated by selling milk and butter. Currently she

own two cows and one bull. To further diversify her income sh produce coffee pot (local name of the coffee pot is called jebena)
Tehesh said, lost one cow from disease and she one bull to her son in law as a dowry out of her total stock.

4.3 Results from planned observation

Based on the planned observation during the field work of this research (mid-July up to first week of August, 2011)it is supposed to be heavy rainy season in the research in Tigray, because the season is 'Keremet' but actually there was no rain especially up to 25 July, 2011. However, farming households were emotional stable and women were fasting and praying aggressively they were spending longer time on praying than the usual practice as response to drought. Based on the individual interview a women can produce 10 to 20 coffee pot in a week and she can sell 16 ETH/birr that nearly one dollar. The following picture illustrates the coffee pot and cooking pot at market

Figure 10 Selling pottery products at Mekelle Monday market

Source: Own field work

4.4 Results from key informant interview and organizational documents

Organizational response to reduce impact of drought

There are different organizational responses to reduce impact of drought. In January 2005 the government has launched the Productive Safety net Programme (PSNP) as the main component and of food security programme. The PSNP represents a significant transformation of the government's food security policy, moving away from responding to chronic hunger through emergency appeals and food aid delivery towards the establishment of a productive safety net system. PSNS's objectives are reduction of household vulnerability, the improvement of household and community resilience to shocks, and breaking the cycle of dependence on food aid (FAO, 2005).

Moreover, to reduce the impact of drought and increase economic development, TBoARD has been aggressively working to implement government policy and strategy which emanate from national economic policy that is ADLI since 1993, basically ADLI was small scale farmer based. Following this strategy, with some amendments Ethiopia has been adopting Plan for Accelerated and Sustainable Development to End Poverty (PASDEP) to enhance rural development and to ensure food security. PASDEP is supposed to cover 2005/6-2009/10. Currently Ethiopia has designed five year (2010/11-2014/15) growth and transformation plan. This plan seeks to double the total agricultural output from 18.08 million metric tons to 39.5 million metric tons. Therefore, TBoARD is playing its part to translate the national policy and program through provision of integrated extension service to rural farming households. Table 2 illustrates number of HHs benefiting from household packages since 2004 up to 2008.

Historically the extension service in Ethiopia has been focused on improving productivity and production in line with focus of government agricultural development program on improving food security (Gebremedhin, Hoekstra and Tegene, 2006).

BoARD is dedicated and responsible to provide extension service to increase food production and encourage economic development. To translate its responsibility into practice it has designed integrated extension packages since 2004. The extension service is working aggressively to educate and persuade farming households as much as possible to promote the designed household packages. The packages are aimed at raising the annual household income. For instance an average household size of five was expected to reach Ethiopia Birr (ETB) 18 thousands by 2006. This income translates to daily per capita income of just, minimum level one dollar per day per head, which is defined as poverty line in the country. For instance a household with five an average family size five , is expected to reach the minimum level of income after three years of practicing or implementing some or all the designed HH packages. That is a household with five family sizes is expected to reach annual income of 1800 USD/HH after three years of practicing the packages or one dollar per day per head.
As stated by informants and supported by respondents, household packages are well integrated with credit supply service. The main component of the credit demands in the woreda are the inputs for all the designed packages of production improvement and capital for the purpose of introduced and improving cultural farm implements and practice in order to make agricultural productivity efficient.

An impact assessment had been carried out by extension department of BoARD (2010). According to the assessment, as a result of the extension service delivered by the bureau since 2003 up to 2009, 645598 farming households have practiced or implemented some (commonly a household practice or implement two to three packages) from the designed integrated packages. Out of those who implemented the packages only 233,386 (36%) households have reached the planned income (one dollar per day per head) that was the bench mark designed by the BoARD. On the other hand the assessment stated 148922 (23%) farming households reached at the expected bench mark through their traditional practice.

Table 2 Farming households practicing extension packages

Year	FHHs	MHHs
2004	30747	116408
2005	44370	130186
2006	11852	38009
2007	20503	69169
2008	18909	54143
Total	126375	407915

Source: Tigray bureau of agriculture and rural development, annual report

Based on the organizational mandate, TBoARD is dedicated to provide extension service to increase food production and encourage economic development. To translate its responsibility into practice BoARD has designed integrated extension package considering agro ecological and household's asset holding variations. These packages are designed

based on the available technology, professional knowledge and skill. Namely these agricultural extension packages include the following activities:
Crop production package
Dairy production (local and improved) package
Bee keeping package
Poultry production package
Sheep and goat production package
Fattening package and forestry package

According to the key informants MesseleKelkay (extension senior expert of BoARD), the bureau is responsible to help farmers to cope with the drought challenge and to mitigate its impact. Firstly, the organization is providing extension service and facilitating credit service for all the necessary inputs to increase income and asset building capacity of rural farming households. The key informant said “among all these packages, as the majority of farming households in rural Tigray own farm land, implementing crop production package is mandatory, but implementing the other packages is based on the available household resources, choice and decision of the household”. Therefore, according to the work done so far by the bureau out of the total farming households in Tigray 126,375 female headed and 407,915 male headed households are practicing or implementing the packages since 2004 up to 2008.

Secondly, in times of drought and other natural and manmade disasters the bureau is responsible to report about the damage and projected impact as soon as possible to responsible government body and humanitarian or aid organizations. Usually before reporting the impact, assessment is done in collaboration with community representatives and other relevant stockholders.

Most of the households in the research area, rely on mixed farming (crop and livestock farming system). Crop production mainly relies on rain fed and the major crops of this area are barley, wheat and teff and these are mainly crops grown on rain fed.

In line with the aforementioned national programmes and regional interventions, out of the total population of 114,277 of the Enderta 75,323 (41,357 female and 33, 966 male) or 66% of are beneficiaries of PSNP. On the other hand 6531 female and 3773 male in total 10,304 have received free aid (annual report of 2011 of woredaEnderta office of agriculture and rural development). Similarly according to the report 8,471 households took different credit in cash and in kind to improve their agricultural practice and ultimately improve their livelihoods.

4.5 Collective response to reduce impact of drought

It has been about twenty years since the community started to take strategic measure to reduce the impact of drought collectively in an organized way. To carry out the environmental rehabilitation programme effectively a top-down administrative arrangement is employed. This collective action has been guided and facilitated by BoARD and the community at large. The collective responses to reduce the impact of drought are activities such as, physical structure of soil and water conservation (filling gullies, stone check dams, gabion check dams, terracing construction of flood retention walls), and biological structure planting trees for agro-forestry purposes widely on cultivated and uncultivated lands to reduce runoff and soil erosion and maintain soil fertility. Soil and water conservation work is very common in the region at large and specifically at the research area and site that is collective measure against environmental degradation. Every economically active member in the community had to pay free labour in the environmental conservation and protection work for twenty days. Since the last two years, the community

realized that the environmental issue is demanding more protection work than before for its sustainability. Subsequently, after in depth discussion on the environmental situation to reduce environmental degradation rural households have decided to raise their free labour contribution from 20 day to 40 days in a year to work on soil and water conservation.

Productive Safety Net Programme (PSNP) is also one of the government strategies which could contribute to reduce impact of drought through implementation of environmental protection and rehabilitation. The main objective is to fill the food gap of the chronically food insecure farmers so that the farmers do not sell their assets to buy food and to develop community assets through the programme of public work activities. In the meantime, the PSNP beneficiaries participate in agricultural development packages so that they can ensure food security and increase resilience .
Respondents describe that it was possible to cope with drought by participating in the PSNP, that the safety net improves their range of livelihood strategies, and keeps them from having to migrate. Other positive benefits of PSNP included it is a long term strategy to reduce the impact of drought through environmental rehabilitation, being able to send their children to school.

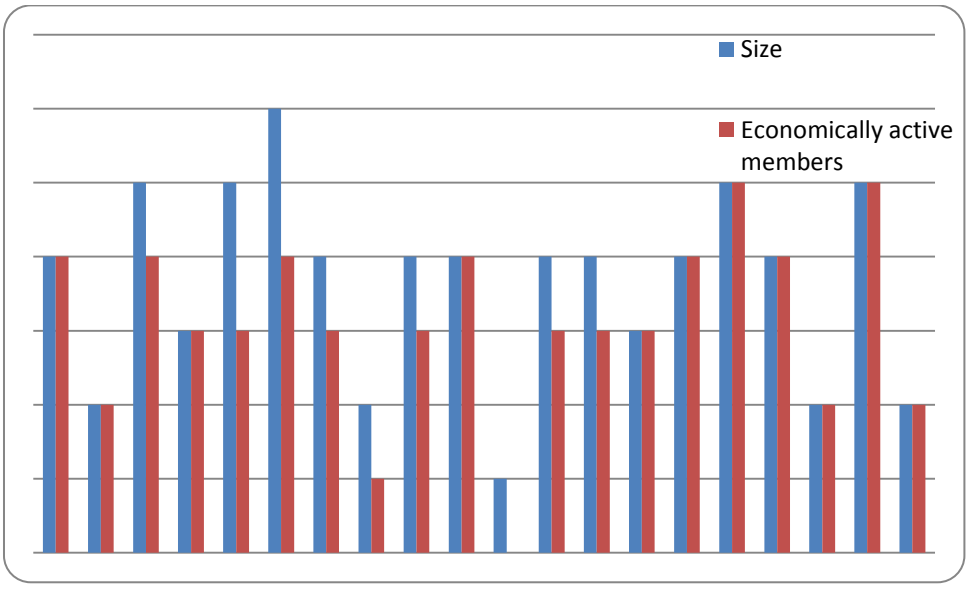
CHAPTER FIVE DISCUSSION

This chapter presents discussion based on research conducted on FHHs resilience, capabilities and coping strategies in times of drought and discuss the finding in relation to previous studies and theoretical literatures This chapter presents the discussion based on the principle of sustainable livelihood framework mainly focus on human and social capital.

5.1 Human capital

It is often that the chief asset possessed by the poor is their own labour (Ellis, 2000). In line with idea based on the individual HH interview, FGD and planned observation HH size and economically active members of the HH are almost proportional this is significant for resilience of the HH. The following figure 11 shows the available labour of the HHs. That is, 55% of the HHs are without dependent members. or HHs who are composed of 100% economically active members which is significant dimension for HHs resilience.
And only one HH comprise only with single woman over 65 years old that 5% which is dependent. Furthermore, based on the planned observation every member was physically active and healthy since, majorities were away from home to undertake different activities such as fetching water. **(**see appendix 4).

Figure 11 Household size versus economically active members



Source: Own field work

5.2 Social capital and social network

Respondents seemed proud to describe certain positive traditional practices in their locality that were helpful to their well-being. These included labour sharing arrangement in times of peak agricultural season at different levels of land preparation, weeding and communal efforts to harvest crops when they threatened natural calamities. All respondents (100%) reported that they have social support during difficult time either from relatives or neighbourhoods.

Moreover, as part of this research, other community responses were also assessed based on the livelihood framework. Hence, social capital and social network are important dimensions which contribute to reduce impact of drought and increase community resilience. These include their attitude in collaboration and change relationship between formal and informal institutions at the local level, the degree of collective decision making within the community, and the management of both local and external resources. As part of collective response to drought and environmental protection, it is compulsory for every physically active resident of the tabia to contribute free labour for 40 days in a year to work on soil and water conservation this is well endorsed by the community.

Relationships of mutual social support are critical components of tabial livelihood strategy. Such mechanism of social support help them to cope with impact of drought and enhance their capacity of assets accumulation , and include resource exchanges, labour, and draft power donations, grain and cash loan. These are based on social network and kinship and community relations. Community reinforce these networks through various social activities and association which take place the form of social obligations, religious and informal associations, although such activities decline in times of hardships like drought, however, everyone participate in different social event to help each other as it mentioned by case one above.

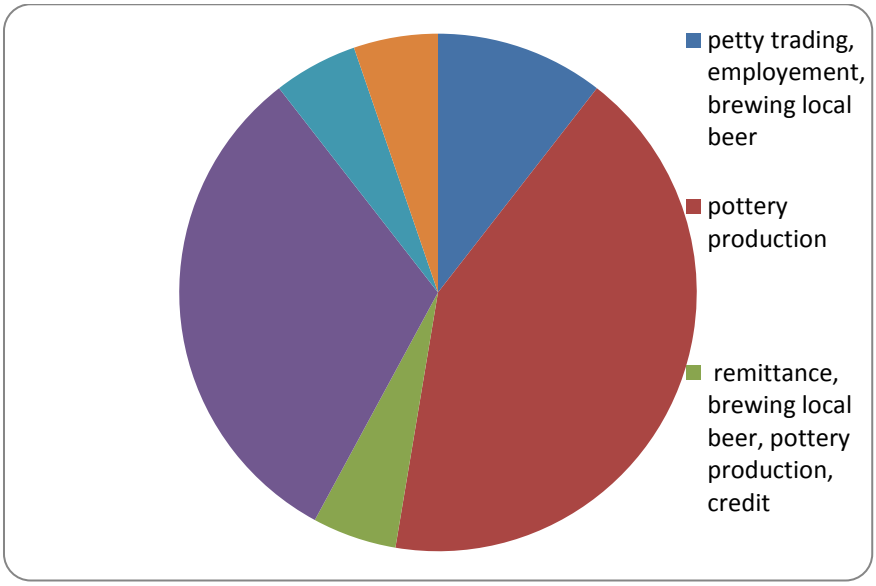
5.3 Livelihoods diversification and resilience

As income that households derived from agriculture was inadequate many of the family members in the farming households had to regularly supplement it with activities such as daily labour and sale of stone for house building. Specially, women in the research site coped with food shortage by selling coffee pot made from clay to cover their perpetual food deficits.
Based on the finding of this research the availability and access to natural resource initiate the poor female headed household to look alternative source of income. Availability and access to natural resource is a factor which contributes to increase resilience of female headed farming households in tabia mariamdehan which helped them to stay in their home in times of drought. Out of the total sample only one (5%) resilient woman migrate to neighbouring woreda to look for livelihood option during 1984 drought. This finding is in line with the idea of, Ellis and Allison, (2004) access by the poor to natural resources (land, forests, water, fisheries, pastures etc.), is essential for sustainable poverty reduction. The livelihoods of rural people without access, or with very limited access to natural resources are vulnerable because they have difficulty in obtaining food, accumulating other assets, and recovering after natural or market shock or misfortunes. Furthermore, Ellis and Allison stated, that diversification assist households to insulate themselves from environmental and economic shocks, trends and seasonality in effect, to be less vulnerable. Livelihoods diversification is complex, and strategies can include enterprise development.

On the other hand, some main determinants of diversification are, seasonality, differentiated labour market, risk strategies, coping behaviour, credit market imperfection, and personal saving and investment strategies (Ellis, 1998).

Out of the sample 40% of female headed households engaged on pottery production to cope with impact of drought. Within the given social context they trained themselves from skilled neighbours how to make coffee pot from clay and generate income for survival.

Figure 12 Coping strategies of resilient FHHs



Sources: Own field work

In the context of development it might be thought that the poor and deprived lack the necessary education, knowledge and experience to harbour grand desire or make rational choices. Such argument provide further grounds for doubting the reality of utility- inspired ethics as guides to ill-being. However, in an increasingly global and multinational world it is no longer realistic to suppose that the poor and deprived lack sufficient knowledge about alternative lifestyles to make informed decision. The poor and deprived are capable and arguably as capable as anyone else of making rational decisions and choices (Clark and David 2009

CHAPTER SIX CONCLUSION AND RECOMMENDATION

This chapter presents conclusion and recommendation based on the research conducted on livelihood strategy and resilience capabilities in the context of female headed household in times of drought in Enderta woreda, tabia marimdehan.

6.1 Conclusion

Based on the literature reviewed the researcher had developed the following questions to achieve the objective of this research.
The research questions were formulated as follows:

1. What is resilience capabilities of female headed farming households in times of drought
   - 1.1 What were the coping strategies (indigenous knowledge) of female headed farming households in times of drought in Enderta, Tigray?
   - 1.2 What organizational factors or actions (exogenous knowledge) influence resilience capabilities of female headed farming households?

To answer these questions, open ended interviews were conducted and data were collected at the level of the individual household. Results of the interview were triangulated and clarified by means of FDG and interview of key informants.
Smallholder farmers in general and female headed farming households specifically suffer from impact of recurrent drought in Tigray. Households vary in their asset holding and skills to combine the resources at their disposal and to look for opportunities. As a result the suffer or the hardships they face also vary. The variety of crop and livestock species produced by any one household and their interactions, and the importance of nonmarket relation in production and marketing will increase the complexity and the impacts and of subsequent adaptations. Small farm size, low technology, low physical capital and diverse economic stressors will tend to increase vulnerability, but the resilience factors family labour, existing pattern of diversification away from agriculture, and possession of a store of endogenous knowledge should not be undermined.

Based on the finding of this research, to cope with (reduce and manage) the impact of recurrent drought female headed farming households have developed different skills (pottery production, hair dressing, local beer selling) to fill food deficit of their family. According to the information during individual household interview and FGD, according to the culture of the research site these skills or livelihood options were valued as low caste job specially pottery making. The finding of this study proof culture is not static rather it is dynamic and important dimension for resilience and stability.
Traditional pottery production is type of non-farm economic activity which produces important traditional household equipment such as cooking pot, baking plate, boiling pot, water container and the like, in spite of its importance, culturally the job has been undermined and considered as low caste job. However, in times of drought women in the research site were forcefully trained themselves to produce household equipment from clay soil with specialization on coffee pot for selling and it becomes an opportunity for the poor women which increase their resilience. In other words, indigenous knowledge and availability and accessibility to natural resources lead the female headed households to stability and resilience.

Based on the aforementioned points it can be concluded that drought forced resilient female headed households to further explore their ability and utilize indigenous knowledge for survival. Furthermore, pottery making has gained recognition significant for as source of household income as a result of difficult time regardless of the traditional value and beliefs.
Once a woman has able to produce and sale clay product it continues as her regular non-farm economic activity to generate income to the household.

Therefore, this finding is in line with; capability approach and development studies of (Clark and David 2009) that is, people may develop various compensating abilities in the face of hardship. For example women who are relatively disadvantaged may work harder than men in order to achieve the same level of well-being. In cases where compensating abilities develop looking directly at human capability, behaviour and choice will provide unreliable guides to well-being. It is worth emphasizing that the direction of the adaptation process is reversed here: the disadvantaged and deprived adjust their abilities upwards (instead of their desires downwards) to compensate for their relative disadvantage.

In this research site (tabia mariamdehan, Tigray) female headed household are resulted from two major reasons that are death of husband and divorce. Female headed farming households are usually remaining widowed after the death of their husband based on their personal decision. As long as she has children and remained widowed, her land and other asset holding and remain the same. Asset holding are among the factors contribute to household resilience capabilities. On the other side divorced women also decided not to remarry again after having children from their ex-husband. But, unlike the widowed woman her asset holding reduced by 50% hence, her ex-husband took his share but according the individual household interview and FDG, children remain with their mother. The sample includes both types of female headed households (widowed and divorced).
In a nut shell, based on the study both types of female headed households are in a disadvantageous position relatively to their counterparts in terms of labour endowment, and agricultural productivity. There are disparities among them in their asset ownership. Out of the sample of the study, seven of them harvest their lands using family labour and using labour sharing arrangement from relatives and neighbourhoods and the rest use sharecropping system due to labour shortage. This implies, even though women have a right to own productive asset (land) they are not equally benefited as their counterparts.

6.2 Recommendations

BoARD needs to design specific intervention to help female headed farming households to optimally benefit out of the farm land they hold by increasing production and productivity. Moreover, to further explore about their resilience capabilities and to understand the priorities and development objectives of female headed farming households further study is necessary.

Livelihood framework is relevant tool which provide way of thinking to analyse household coping strategies. However, it is very difficult to make sharp distinction among the five assets. Based on the finding the availability of natural resource and endogenous knowledge are significant dimensions on stability and resilience of female headed households. Therefore, it is hardly possible to single out human and social capital without touching natural capital to analyse individual livelihood strategy.

Development of livelihood diversification outside farming and enhance livelihood option through micro and small enterprises and reduce vulnerability of the poor is among the focus area of Ethiopia economic policy. To contribute towards the application of this policy, bureau of agriculture and rural development need to create linkage with trade and industry

up to the grass root level. The linkage would help to develop the endogenous knowledge and create market linkage to pottery production at the research site. Thus economic policy requires rural urban linkage to further gain benefit out of endogenous knowledge and economically active population.

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APPENDIXES

Appendix 1 Check-list for individual interview, FGD and key informants

Check list for interview of female headed households and FGD

Bio-data of the respondent:
Location: Tabiamariamdehan
Date and Time:

1. Name of respondent:
2. Age of household head
3. Educational status of respondent: some primary education (writing and reading)
4. Reason/ cause for being Fhh death of husband
5. For how long have you been head of your family:
6. Sex composition of household members:

Female
Male

7. Age composition of household members:

≤14, 15-64 and >65

8. Size of land holding:

1. What are the major activities you carried out to generate income (in kind or cash)?
2. Do you receive remittance during drought time?
3. Which activity is the most important in terms income generation and outcome in times of drought?
4. Does the family income and food access vary from season to season?
5. Comparatively which months of the drought year are difficult to generate income and food access?
6. What coping strategy do you employ to improve income and food access during drought time?

Agricultural assets

1. What are the major crops harvested by the household?

1.1 Production per hectare during drought time----------

1.2 Production per hectare during good year time----------

2. What are the agricultural tools owned by the household? ----------
3. What are your agricultural practices used to reduce impact of drought?

3.1. Short term (use of natural fertilizer) ----------

3.2. Long term (use of fertilizer and HYV) ----------

3.3. Does your hh structure influenced on your farm size?

What do you think about the accessibility of the agricultural assets (land)

Non-agricultural assets (participation in reciprocal exchanges or social network and household relationship)

1. What are the immediate non-agricultural social support help to generate income in times of drought at household level?
2. What is the immediate action in times of drought at organizational level (TBoARD)?
3. What is your opinion about the accessibility of thenon-agricultural assets (labour market)?
4. To what extent the non-agricultural assets have potential to sustain household livelihood?

Agricultural practice and technology

1. What is your opinion about the technologies provided by TBoARD?
2. What do you think about the accessibility/sustainability of the technologies provided by BoARD?
3. What is your opinion about the agricultural technologies provided by BoARD do they in full fill your demand?
4. How does the technology influence your decision?

Recommendation

1. What are you recommending for better integrating endogenous and exogenous knowledge?
2. What alternative option is there to develop the endogenous knowledge?
3. What do you think about the relevance of the exogenous knowledge to reduce impact of drought?

Check list for interview of key informant

1 What are the organizational responses to reduce impact of drought?

1.1 Short term measures
1.2 Long term measure
1.3 What are the most important rural interventions carried in terms of reducing impact of drought?

2. How do you assist female headed household?

3. What are the achievements you reached so far?

Appendix 2 Data summery of individual HH interview

Table 3 Data summery on demographic and socio-economic status of 20 respondents

No	Variables		Respondents									
			1	2	3	4	5	6	7	8	9	10
1	HH size	Size (No)	4	2	5	3	5	6	4	2	4	4
2	Sex composition	F	3	2	3	2	4	3	4	2	2	3
		M	1		2	1	1	3			2	1
3	Age distribution	<14			2		1	2	1	1	1	
		15-64	4	2	4	3	3	4	3	1	3	4
		>65								1		
4	HH head age		45	60	43	51	40	45	40	65	45	50
5	HH head educational status	Primary education	grade 4									
		No education		No	No	No	No	No	No	No	No	No
6	Reason for being FHH	Divorce	Death	Divorce	Divorce							
		Death of husband				Death	Death	Death	Death	Death	Death	Death
7	Social network	Support from relative	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
		Support from neighbourhood	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
		Access to land	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
8	Organizational suppose	Access to agricultural extension package	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
		Access to credit	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
9	Socio-economic status of HHs	No. of hh members economically active	4	2	4	3	3	4	3	1	3	4
		Estimated amount of crop harvest		250 kg	300 kg	1000 kg	800 kg	2000 kg	400 kg	350 kg	50 kg	1000 kg
		Coping strategy (potter	petty trading,	pottery prod	remittance,	pottery prod	potteery prod			pottery prod	Begging	pottery prod

		production, hair dressing)	employment, brewing local beer	uction	brewing local beer, pottery production credit	uction	uction			uction and migration		uction &begging
		Sources of hh income(crop &livestock production, petty trade, pottery remittance, employment, piece of work from daily labour)	Employment &petty trade, selling local beer, financial support from daughters, payment from PSNP	Crop & pottery production, payment from PSNP	Crop & livestock production, payment from PSNP	Crop , livestock pottery production, payment from PSNP	Crop , livestock, pottery production& daily labour payment from PSNP	Crop , livestock, production& daily labour, payment from PSNP	Crop , livestock, production(poultry & Fattening of sheep &goats), payment from PSNP	Pottery & crop production, payment from PSNP	Support from two daughters, payment from PSNP	Crop , livestock, &pottery production, payment from PSNP
10	HH resource and assets	Build own house (with zinc roof, traditional house)	Own house	Own house	Own house	Own house	Own house	Own house	Own house	Own house	She is provided a room for free	Own house
		Own livestock(poultry, sheep & goats, cattle or both)	No	Poultry	Dairy	Dairy	Dairy	Dairy	Poultry			Dairy and poultry
11	Land holding status	Size of land holding in ha	Only back yard	0.5	0.5	0.75	0.5	1.5	0.75	0.75	0.5	0.75
		Share cropping		Yes	Yes		Yes			Yes	Yes	
		Harvest own land using family labour & using reciprocal exchange of labour				Yes	yes	Yes	Yes			Yes
12	Service and infrastructure	Main source of water	Common tap water	Common tap water	Common tap water	Common tap water	Common tap water	Common tap water	Common tap water	Common tap water	Common tap wat	Common tap water

											er	
		Main source of energy for light	Electric	Electric	Electric	Electric	Electric	Electric	Electric	Electric	Electric	Electric
		Main source of energy for cooking	Collect fire wood & dung	Collect fire wood & dung	Collect fire wood & dung	Collect fire wood & dung	Collect fire wood & dung	Collect fire wood & dung	Collect fire wood & dung	Collect fire wood & dung	Collect fire wood & dung	Collect fire wood & dung
		Training on improved agricultural practices	Yes	No	No	No	No	Yes	No	No		Yes

No	Variables		Respondents									
			11	12	13	14	15	16	17	18	19	20
1	HH size	Size (No)	1	4	4	3	4	5	4	2	5	2
2	Sex composition	F	1	2	1	1	3	3	2	1	4	2
		M		2	3	2	1	2	2	1	1	
3	Age distribution	<14		1	1							
		15-64		3	3	3	4	5	4	2	5	2
		>65										
4	HH head age		65	45	40	43	45	50	45	40	50	40
5	HH head educational status	Primary education										
		No education	No	No	No	No	No	No	No	No	No	No
6	Reason for being FHH	Divorce			Divorce	Divorce			Divorce	Divorce	Divorce	Divorce
		Death of husband	Death	Death			Death	Death				
7	Social network	Support from relative	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
		Support from neighbourhood	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
		Access to land	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
8	Organizational support	Access to agricultural extension package	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes
		Access to credit	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
9	Socio-economic status of hhs	No. of hh members economically active	0	3	3	3	4	5	4	2	5	2
		Estimated amount of crop harvest	550 kg	400 kg	250 kg	300 kg	250 kg	1500 kg	450 kg	900 kg	450 kg	250 kg
		Coping strategy (potter production, hair dressing)		pottery production	pottery production	pottery production	pottery production				pottery production	pottery production
		Sources of hh income(crop &livestock productio	Crop production, payment from	Crop, livestock, production	pottery production pay	pottery production payment	pottery production payment	payment from PSNP	payment from PSNP	payment from PSNP	pottery production payment	pottery production payment

		n, petty trade, pottery remittance, employment, piece of work from daily labour)	PSNP	pottery production, payment from PSNP	ment from PSNP	from PSNP	from PSNP				from PSNP	from PSNP
10	HH resource and assets	Build own house (with zinc roof, traditional house)	Own house	Own house	Own house	Own house	Own house	Own house	Own house	Own house	Own house	Own house
		Own livestock (poultry, sheep & goats, cattle or both)		Dairy								
11	Land holding status	Size of land holding in ha	1.25	0.75	0.5	0.5	1.5	1	1	1	0.5	0.5
		Share cropping	Yes	both	Yes	Yes	Yes		Yes		Yes	Yes
		Harvest own land using family labour & using reciprocal exchange of labour						Yes		Yes		
12	Service and infrastructure	Main source of water	Common tap water	Common tap water	Common tap water	Common tap water	Common tap water	Common tap water	Common tap water	Common tap water	Common tap water	Common tap water
		Main source of energy for light	Electric	Electric	Electric	Electric	Electric	Electric	Electric	Electric	Electric	Electric
		Main source of energy for cooking	Collect fire wood & dung	Collect fire wood & dung	Collect fire wood & dung	Collect fire wood & dung	Collect fire wood & dung	Collect fire wood & dung	Collect fire wood & dung	Collect fire wood & dung	Collect fire wood & dung	Collect fire wood & dung
		Training on improved agricultural practices	Yes	No	No	No	No	Yes	No	No		Yes

Source: Own field work

Appendix 3 Rainfall data of woredaEnderta and data summery HHs size Vs economically active members

Table 4 Rainfall distribution of woredaEnderta

Year	Months of the year in mm												
	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sep	Oct	Nov	Dec	Average
1999	22	0.3	11	0	0.02	7.5	294	359	23	0.9	0	0	717
2000	0	0	0	10	24.6	5.4	201	182	16	2.2	10.3	3.5	455
2001	0	0	38	18.7	9	65.5	268	226	9	2.9	0	0	637
2003	13	0	35	4	23	60.8	96	208	28	0	0	0.3	468
2004	0	26	18	8	35.2	87.5	126	201	23	0.7	0	0.1	526
2005	7	3.7	35	20	7	25	64	221	1.4	3.1	0.8	0	390
2006	0	1.4	15.6	49	55	18	111	314	34	0	1.3	0	599
2007	0	0	31	117.6	46	38	187	299	24	12	0	0.3	755
2008	1	2.3	11	35	22	57	272	140	78	0	0	0	619
2009	7.5	0	0	24	5.9	13	94	103	27	7.7	0	0	282

Source: Enderta office of agriculture and rural development strategic document

Table 5 Summery of households size versus economically active members

Respondents	Size	Economically active members
1	4	4
2	2	2
3	5	4
4	3	3
5	5	3
6	6	4
7	4	3
8	2	1
9	4	3
10	4	4
11	1	0
12	4	3
13	4	3
14	3	3
15	4	4
16	5	5
17	4	4
18	2	2
19	5	5
20	2	2

Source: Own field work

Appendix 4 Pictures from planned observation

Figure 13Children helping parents in fetching water

Source: Own field work

Figure 14 Sample of scattered habitation in tabia mariamdehan

Source: Own field work

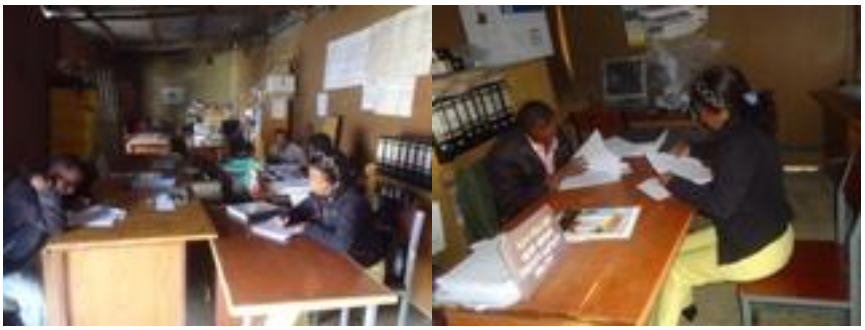
Appendix 5 Pictures from FGD

Figure 15 Focus group discussion

Source: Own field work

Appendix 5

Figure 16 Key informant interview



Source: Own field work

Appendix 6Informed consent form

Informed consent form

You are invited to participate in the study of resilience of female headed farming households in times of drought. I hope to learn from the information you shared me and to contribute for further understanding of BoARD about your coping strategies in times of drought and further research. You were selected as possible participant in this study because you are one of the female headed farming household who have been head of your household. If you decided to participate, we will discuss on issues about your coping strategies in times of drought and after drought by raising issues such as assets you own and activities carried out by household members to generate income ,in this regard your participation is paramount important in contributing for further knowledge and completion of the study. Tofinalize ourdiscussion we need three hours on three different days to and to minimize the in convenience I am planning to carry out these discussions based on your choice either at farm or at your home.

You will remain confidential and will be disclosed only with your permission. In case discloser of the information is inevitable it will happen with your recognition.

Your decision whether or not to participate will not prejudice your future relation with thebureau of agriculture and rural development. If you decideto participate, you are free to discontinue participation at any time without prejudice. If you have any question, please do not hesitate to contact me. If you have any additional questions later, please contact me with the following name HareguMohammedadem telephone number 251914747388Haregu will be happy to answer**.** You will be offered a copy this form to keep.

You are making a decision whether or not to participate. Your signature indicates that you have read the information provided above and have to participate. You may withdraw at any time with without penalty or loss of benefits to which you may be entitled after signing this form should you choose to discontinue participation in this study.

Signature Date----------

Signature of parent/Legal Guardian (if necessary) date

Signature of Witness (if appropriate) Signature of investigator

Appendix 7 Work plan

Table 6 Work schedule of the study

Schedule	Activities	Expected output	Resources required
April 1-June 7	Desk study Writing of first draft of thesis proposal	First draft of thesis proposal	PC/laptop Memory stick /external drive
June 7-24	Desk study understanding the research issue and refinement of thesis proposal	Second draft of proposal and literature review and methodology	Books/ Internet to access digital library
June 24- July 8	Desk study Consultations with Supervisor Continue with research design and preparing check list	Final draft of Literature Review, Conceptual Framework and Methodology Research questionnaire	Printing expenses
July 9-10	Reading relevant topics from the Ellis, F. 2000. book (Rural Livelihood and Diversity in Developing)	Gain in depth understanding on livelihoods framework	The book and continuous energy
July 11-15	Presentation of research proposal to family, organization and relevant friends Contact to research area	Understanding and assistance from family and organization Schedules of interview arranged	Transportation cost
July 18- Aug 5	Field work for collection of primary and secondary data interview with respondents (female headed households and key informants) Reporting and describing the data	Interviewed of 20 female farmers and 5 key informants Update background information of research area	Transportation cost Digital sound recorder, camera and stationary materials

		Preliminary analysis	
Aug. 6 -23	Data analysis and communicating with supervisor	Start writing the thesis	Good working environment and family assistance
Aug. 24-27	Trip to the Netherlands	Safe arrival	Traveling expense
Aug 27—28	Resettlement	Room arranged for work	Continuous energy
Aug.27– Sep. 8	Refinement of Thesis Report	Final Thesis Report prepared	Continuous energy
Sep. 9	Submission of Thesis Report	Thesis report submitted	