

**HOUSEHOLD LIVELIHOOD AND COPING STRATEGIES OF
NOMADS IN NORTHEASTERN NIGERIA**

BY

TELLA, Modupeola Omowonuola

Matric No: 142713

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CERTIFICATION

I hereby certify that this research work was carried out by Modupeola Omowonuola **Tella** of the Department of Agricultural Extension and Rural Development, Faculty of Agriculture and Forestry, University of Ibadan, under my supervision.

.....

Professor A. E. Adekoya

Department of Agricultural Extension and Rural Development
Faculty of Agriculture and Forestry, University of Ibadan, Ibadan.

.....

Date

DEDICATION

This project is dedicated to Jehovah Elohim, The Creator of heaven and earth: for keeping me alive throughout the period of my PhD programme; in spite of frequent travels and challenges.

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ABSTRACT

The changing climate heightens drought situations especially in Northern Nigeria and induces multiple stresses on nomads and their animals. Resulting water and pasture insufficiency impose hardship on their livelihood. Little is known about coping strategies adopted for their stressed livelihood. Therefore, household livelihood and coping strategies of nomads in Northeastern Nigeria were investigated.

A four-stage sampling procedure was used to select respondents for the study. Three states (Adamawa, Taraba and Bauchi) were randomly selected from the six states in the study area. From these states, 15% of Local Government Areas (three, two, and three, respectively) were randomly selected, while five communities and 10 respondents were randomly selected from each, giving a total of 400 respondents. Interview schedule and Focus Group Discussion (FGD) were used to collect data on respondents' socioeconomic characteristics, coping strategies (low: 1.00-12.20; high: 12.21-38.00), perception of the effects of drought (unfavourable: 40.00-95.91; favourable: 95.92-118.00), challenges to livelihood and livelihood status: (low: 0.00-3.61; high: 3.62-11.65). Livelihood status was made up of access to capital assets, livelihood activities in the dry season (low: 0.00-26.16; high: 26.17-122.00) and rainy season (low: 0.00-23.90; high: 23.91-81.00) and household capabilities (low: 5.00-25.17; high: 25.18-83.00). Capital assets include: human/social (low: 0.00-5.61; high: 5.62-47.00), natural (low: 0.00-5.59; high: 5.60-8.00), physical (low: 0.00-6.89; high: 6.90-15.00) and financial (low: 0.00-1.32; high: 1.33-6.00). Data were analysed using descriptive statistics, Pearson's product moment correlation, multiple linear regression and ANOVA at $\alpha_{0.05}$.

Most respondents were married (91.1%), below 56 years (84.0%), male (90.8%) with one wife (62.6%), children (6.0 ± 3.99) and dependents (3.0 ± 1.60). Majority (81.3%) had no formal education and was primarily engaged in animal husbandry (77.7%) with monthly income of ₦15,000 (I.Q.R.: ₦37,000). Majority (65.6%) of the respondents had low access to human/social capital, 60.7% had high access to natural capital, 59.5% had high access to physical capital and 75.2% had low access to financial capital. Many (55.8%) had low use of livelihood activities in dry season, high use (23.91-81.00) in the rainy season (59.5%) and low household capability (62.3%). Many respondents had low coping strategies (63.5%) and favourable perception of the effects of drought on their livelihood (52.1%). Most (82.6%) noticed major alterations in rainfall patterns with hunger (58.6%) and poverty (57.6%) being consequent impacts. Other challenges to livelihood included migration for drought related problems (70%), lack of rainfall (45.0%) and

drying up of lakes and streams (35.9%). The FGD revealed that terrorist activities led to disruption of respondents' social and cultural activities and loss of livelihoods as well as death of many nomadic household members. Livelihood status significantly correlated with monthly income from primary occupation ($r=0.23$) and number of total coping strategies used ($r=0.631$). Significant difference existed in respondents' coping strategies and livelihood status across states. Respondents' age ($\beta=-0.29$), number of sources of income ($\beta=0.20$), number of secondary occupation ($\beta=-0.26$), perception ($\beta=0.18$) and number of coping strategies used ($\beta=0.33$) contributed significantly to livelihood status.

Livelihood status and use of coping strategies of nomads in Northeastern Nigeria were low.

Keywords: Livelihood capabilities, Capital assets, Coping strategies, Northeastern Nigeria, Nomads

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CHAPTER ONE

INTRODUCTION

1.1. Background to the Study

The background to the study considered household livelihood, pastoralists and their livelihoods, drought and its effects on livelihoods and coping strategies in challenging climatic conditions.

1.1.1. Household livelihood

In general terms, the concept of human livelihood encompasses the extent to which people are able to access the resources available to them in order to meet their needs. Several authors have shown the importance of sustainable livelihoods in the wellbeing of human populations in both rural and urban settings (Nzeh, 2015; Norhasmah, Zalilah, Mohd, Nasir, Kandiah and Asnarulkhadi, 2010). A landmark definition by Chambers and Conway (1991) portrays livelihood to comprise the capabilities, assets (including both material and social resources) and activities required for a means of living. They also assert that a livelihood is sustainable when it can cope with and recover from stress and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base.

Similarly, Carney (1998) defines livelihood as the capabilities, assets and activities required for a means of living. In this context: assets include the stores of resources, access and claims to natural, physical and financial capital; capabilities comprising of both human capital (education, skills, the ability to labor and good health to pursue different livelihood strategies) and social capital (membership of households, groups and relationships of trust), while activities include diversified activities (on-farm and off-farm). Ellis (2000) brought in a more explicit consideration of the claims and access issues, and in particular the impact of social relations and institutions that mediate an individual or family's capacity to secure a means of living. Most studies consider the household as the most appropriate social group for investigating livelihoods (Makoti, 2014; Berman, Quinn and Paavola, 2013; Okoro and Odebode, 2009). Household livelihoods however, are founded on the aggregation and dynamics

of its individual members, which suggests that to understand the pervasive features of rural households, some account of the intra-household dynamics (by gender, age or status) will be necessary. Definitions of households have emphasized co-residence, sharing the same meals - “cooking and feeding from one pot”- and understanding joint or co-ordinated decision making. Rural households have been regarded as the center of rural social systems (Morris, Butterworth, Lamboll, Lazaro, Maganza, and Marsland, 2001).

All the livelihood assets available to the household represent the basic platform upon which household livelihood is built. Livelihood focuses on the totality of means by which people secure a living, acquire in one way or another the requirement for survival and the satisfaction of the needs as defined by people themselves in all aspects of their lives (Olawoye, 2000). Household livelihood therefore comprises of all the means by which households obtain and maintain access to the resources necessary to ensure their immediate and long term survival and include all activities with the potential of increasing household income, reducing household expenditure and producing other benefits that support health and wellbeing and make peoples’ lives more satisfactory and secure. These means are used by households to increase their ability to withstand shocks and manage the risks that threaten their wellbeing, such as drought, aridity and seasonal climatic variations in Northeastern Nigeria.

1.1.2 Pastoralists and their livelihoods

Some authors (Hassan, 2002; Nicholls, 2004; Brooks, Brown and Grist, 2009a), assert that pastoralism arose in Africa 5000 years ago precisely as an adaptation to local climate variations that precipitated periodic droughts at that time. As rainfall declined and became temporally and spatially more variable, plant resources and wild animals became scarce, making cattle pastoralism the most sensible and viable option to cope with the reality that reliable supplies of large quantities of permanent water simply did not exist (Marshall and Hildebrand, 2002). Africa has an estimated 30 million pastoralists out of which about 10 million are found in Nigeria. The Nigerian pastoralists are made up of various ethnic groups with the largest group being the Fulani that constitute about 95 per cent of the nomadic herders in Nigeria. Bearing at least thirteen names in West Africa, and found in more than twenty countries, the Fulani make up the continent’s most diffuse ethno-cultural group (Islam, 2001).

According to Adebayo (1995), the Fulani pastoralists immigrated into Hausa land from the Senegambia valley in the western Sudan. The immigration spanned several centuries as they traversed the West African savanna in small groups of compound families, reflecting the patrilineal system. Droughts have resulted in immense losses in resources and affected the livelihoods of many who depend on the ecosystem for survival, particularly the pastoralists (Orindi, Nyong, and Herrero, 2007). The deteriorating environmental conditions, land degradation and recurrent drought that hit the Sahel region during the 1960-1970s largely account for the exodus of Fulani herdsmen from their homelands into the northern guinea savanna of West Africa (Tonah, 2002).

Pastoral and agro-pastoral communities differentiate from other rural groups by the specific relevance of livestock-based activities and mobility patterns for their livelihoods. In contrast to sedentary farmers and breeders, pastoral herders and their flocks (and often households) move through places and seasons. Their livestock forage is mainly natural as opposed to cultivated fodders and pastures. Pastoral resource management is based on a complex set of temporary or semi-permanent claims on pasture, water and other resources, as well as on the underlying principles of flexibility and reciprocity. Land, which is the resource base of pastoralists is not a fixed individually owned capital, but rather a flexible asset with specific use and access mechanisms (Sandford and Habtu, 2000; Thebaud and Batterbury, 2001; Nori, Switzer and Crawford, 2005).

By their culture, tradition and occupation, the Fulani tribesmen are itinerant people and do not own lands nor have permanent abodes. They are known for drawing their livelihood from rearing livestock which often involves mobile livestock rearing. They live with their cattle wherever there is abundance of fodder and absence of tsetse fly which threatens the existence of their cattle. The Fulani nomads in Nigeria used to embark on seasonal migrations from north to south but this has become an all seasons' migration due to the fact that overgrazing in the north has given way to desertification (Nzeh, 2015). Ofem and Inyang (2014) assert that in previous years, a symbiotic relationship existed between nomadic families and the farm settlements on which they stopped to rest. However, the presence of nomads and their cattle have

provoked many violent clashes in many farm communities in Nigeria, in recent years. The security of pastoral livelihoods depends mainly on the condition of the herd, which in turn relies on the availability and quality of rangeland for grazing. The herd must have access to dispersed, ecologically specialized and seasonally varied grazing lands and watering holes to provide for the distinct foraging needs of different livestock species and to afford a margin of safety against the normally erratic pattern of rainfall (Nori, *et.al.*, 2005).

The Fulanis' production system, pastoralism, is based on unrestricted grazing and movement of ruminant livestock (mainly cattle) in response to variation in the availability of water, grazing pasture and the limitation imposed on cattle production by flies and livestock diseases (Fabusoro and Oyegbami, 2009). Unrestricted grazing and various types of migration practiced by Fulani pastoralists provide the best strategy to manage the variations in their livestock grazing resources and unpredictability of rainfall and available water sources. The Fulani nomadic lifestyle makes it possible for them to cope with unpredictability and risks associated with their pastoral livelihood mean.

1.1.3. Drought and its effects on livelihoods

Drought is a prolonged lack of rainfall and/or absence of surface water in a geographical area. It is an injurious impact of climate change that decimates lives and hinders socio-economic development. The 2007/2008 Human Development Report warns that, in the next 50-80 years, an extra 600 million people are likely to be affected by malnutrition; an additional 1.8 billion people are likely to be living in water-stressed environments as a result of climate change (UNDP, 2007). The projections indicate that by 2060, extensive drought spells would threaten the cultivation of about 18.6 million hectares of traditional rain-fed lands in Sudano-Sahel regions of Africa. Many studies (Brooks, 2003; Balgis *et al.*, 2005; Pantuliano, 2005; Brooks, 2006; Mwangi and Desanker, 2006, 2007; IPCC, 2007a, IPCC, 2007b) have shown the adverse impacts of drought, climate variability and extremes on the livelihoods of rural communities in the dry regions of developing countries. In most of these cases, rainfall, rain-fed lakes and basins of seasonal rivers were the only reliable sources of fresh water for the people.

Furthermore, Ayouba (2009) shows average rainfall decreases by about 6 mm/month during the rainy season in the Lake Chad Basin. The livelihoods of the migrant pastoralists who live within these watersheds are therefore threatened. Recent studies confirm that the arid and semi-arid regions of Africa are the most vulnerable areas to climate variability because of multiple stresses and low adaptive capacity (Osman-Elasha, 2007; IPCC, 2007a). This vulnerability is due to several factors such as: seasonality of pastureland, drought, and over-exploitation of natural resources, widespread poverty, poor infrastructure, high illiteracy rates, conflicts, and dependence of a large share of its economies on climate-sensitive sectors (mainly rain-fed agriculture). These factors, coupled with limited institutional and technological capabilities have subsequently affected food production, water resources, biodiversity and human and livestock populations. Thus, livelihoods that arise from agriculture, forestry, fisheries and local commerce have been disrupted.

1.1.4. Coping strategies in changing climatic conditions

Livelihood diversification and coping strategies are recognized as separate activities (Ellis 1998), yet diversification can improve coping opportunities (McLeman and Smit, 2006). Unfortunately, with increasing population, poverty, illiteracy, coupled with various risks and the resulting patterns of loss, there seems to be a breakdown in the effectiveness of coping strategies (Ayouba, 2009). While households with diverse long-term livelihood strategies are known to be better positioned to offset climate risk than those who rely on non-farm work as short-term coping strategies (Cunguara, Langyintuo and Darnhofer, 2011), this success depends on existing customary livelihoods.

1.2. Statement of Problems

According to Jopson (2009), a few million nomadic pastoralists who have trekked across the arid lands of sub-Saharan Africa for thousands of years with their animals may be on the move outside traditional ranges due to environmental challenges. According to Salman and Momha (2009), an unprecedented array of crises ranging from food security to socio-political conflicts to disease epidemics have been reported at various locations proxy to the water basins in northeastern Nigeria, and they are expected to escalate if urgent measures are not taken. For instance, many pastoralists

that used to herd their animals within the northeastern parts have now expanded southwards to areas in the Upper Benue river basin (Ayouba, 2009).

Climate change is a global phenomenon whose impacts are felt locally and invariably the adaptation capacities and the strategies employed to cope are localized. Adaptation to climate change and variability has become an important response worthy of research in order to reduce the vulnerability of people to the impacts of climate change and hence minimize costs associated with the inevitable impacts (Maiti, Jha, Garai, Nag, Chakravarty, Kadian, Chandel, Datta, and Upadhyay, 2014). One of the inevitable consequences of climate change already manifested in northeastern Nigeria is prolonged drought.

Prolonged drought is a threat to human development and wellbeing of people. In many parts of Africa including the Northeastern part of Nigeria, the length of dry season has gradually increased, thus triggering the migration of many communities from their ancestral domains, with resultant new settlements, new livelihoods and consequently new adaptations and coping strategies (Ayouba, 2009; Salman and Momha, 2009). At present, many communities in northeastern Nigeria, consisting mostly of farmers, gatherers, hunters, pastoralists and their households, have migrated and can be described as climate refugees at various new locations. For many of these people, normal climate has been replaced with unpredictable patterns of dust storms, rainstorms, heat waves and an alternation between drought and floods, leading to a disruption of livelihoods that arise from agriculture, local commerce, forestry, fisheries and public health. Jopson (2009) asserts that these nomadic pastoralists and their families could be the last generation and among the first mass casualties of climate change because in the people's own opinion, their ancient way of life has no future.

Northeastern Nigeria is vulnerable to drought and the prevailing drought-induced problems faced by pastoralists in the area include: several rainy seasons fail in succession; water sources dry up; grazing lands dry up and cannot regenerate; animals become thin and sick and cannot be sold; animals stop calving and producing milk. Other problems include: increasing human and animal populations with reduced food

and pasture lands to live on; the available pasturelands have been over-grazed; water resources have been depleted and cattle raids by rival tribes are more frequent.

In order to mitigate losses of the Nigerian nomads' livelihoods, especially to drought, it is vital to study the status of livelihood among nomadic communities whose livelihood have been affected by drought stress, to obtain information on the multifaceted challenges they face from drought and how these affect their livelihood. Also, to investigate the strategies they adopt in order to cope with their challenges. Such additional information can help provide insight that could enhance the resilience of the nomads to drought.

In light of the foregoing, the study seeks to answer the following questions:

1. What are the personal characteristics of the nomads within the boundaries of the major water basins in Northeastern Nigeria?
2. What assets do the nomads in the study area have access to?
3. What livelihood activities do the nomads in the study area engage in?
4. What livelihood capabilities are possessed by nomads in the study area?
5. What is the perception of the nomads about drought?
6. What household coping strategies are used by the nomads in response to drought?
7. What are the various challenges facing the nomads in the study area?

1.3. Objectives of the Study

The general objective of this study is to examine the household livelihood and coping strategies of nomads in Northeastern Nigeria.

The specific objectives are to:

1. describe the personal characteristics of respondents in the study area.
2. identify the assets that the respondents in the study area have access to.
3. enumerate the livelihood activities which respondents in the study area engage in.
4. investigate the capabilities of the respondents' households in the study area.
5. examine the respondents' perception of the effect of drought on their livelihood.
6. investigate the coping strategies adopted by respondents in response to drought in the study area.
7. catalogue various drought-related challenges faced by nomads in the study area.

1.4. Research Hypotheses

1. There is no significant relationship between selected personal characteristics of nomads facing drought in the study area and their livelihood status.
2. There is no significant contribution by independent variables to livelihood status
3. There is no significant relationship between respondents' perception of the effect of drought and livelihood status.
4. There is no significant relationship between the respondents' coping strategies to drought and their livelihood status.
5. There is no significant difference in the coping strategies adopted by the nomads in response to drought across the three selected states in Northeastern Nigeria.
6. There is no significant difference in the livelihood status of the nomads across the three selected states in Northeastern Nigeria.
7. There is no significant relationship between respondents' income from primary and secondary occupation and livelihood status.
8. There is no significant relationship between the challenges faced by the respondents and their livelihood status

1.5. Significance of the study

The livestock sub-sector accounts for one-third of agricultural Gross Domestic Product (GDP) and 3.2% of the nation's GDP (C.B.N., 2013). The contribution of the Fulani pastoralists to the national food security in Nigeria is very vital as they engage in over 90 per cent of the nation's livestock production (Fabusoro and Oyegbami, 2009). Cattle are a major source of animal protein consumed by many Nigerians due to the availability and comparative price to other animal protein products.

According to Mwangi and Desanker (2006), drought is the most injurious impact of climate change that decimates lives and hinders socio-economic development in most rangelands in sub-Saharan Africa. At the various United Nations climate conferences held at Copenhagen in 2009, Mexico in 2010 and South Africa in 2011, it was widely recognized that developing countries stand to suffer disproportionately from the effects of climate change; particularly disrupted rainfall patterns. This is because developing countries are in the weakest position to mitigate the adverse effects of climate change,

and also stand to lose some of the current development gains that have been made as a result (Frankel-Reed *et al.*, 2009; Hayed and Brooks, 2009; Jopson, 2009).

The arid/semi-arid lands of sub-Saharan Africa are characterized by limited water supply, low and highly variable rainfall, and recurrent droughts (Shauri, 2011). The situation is grave for rural people in dry areas, such as northeastern Nigeria, because the current agricultural production system is already an adaptation to hostile environmental circumstances, especially drought (Brooks *et al.*, 2009). Brooks *et al.*, (2009b) indicate that the frequency and intensity of droughts will increase in many areas where dry-land farming is the chief source of livelihood, with heavy reliance on rainfall. Even where surface water accumulates, it is not easily retained due to high temperatures and intense precipitation that cause water to be lost to evaporation and run off, respectively (IIRR, 2002).

In northeastern Nigeria, the duration of dry seasons has gradually increased, triggering the migration of many communities from their ancestral domains (Ayoubu, 2009; Jopson, 2009). This has resulted into new settlements, new livelihoods and consequent coping strategies (Ayoubu, 2009; Salman and Momha, 2009). Many rural communities in the Northeastern Nigeria, consisting mostly of farmers, gatherers, hunters, and pastoralists have migrated from their ancestral domains and could now best be described as environmental refugees at various new locations. For many of these people the erstwhile reliability of water supply was hinged on predictable hydrological cycles and fairly stable ecological systems, particularly rainfall. As such, livelihoods of the rural dwellers that arise from agriculture, local commerce, forestry, fisheries and public health (herbalists) have been disrupted (Deschenes and Greenstone, 2007; Ayoubu, 2009). Normal rainfall cycles have now been replaced with unpredictable patterns of dust storms, rainstorms, heat waves and a persisting paradox of alternating drought and floods (IPCC, 2007; Jopson, 2009).

It then becomes very vital to study the status of livelihood among communities whose lives and livelihoods have been altered by drought and the ways they have fashioned to cope with the challenges. One of the ways to understand livelihood systems is to analyze the coping and adaptive strategies pursued by individuals and communities as

a response to external shocks and stresses, such as drought in this case. According to Ayouba (2009), humans have been adapting to changing climatic conditions and to the impact of extreme drought in around water basins for several centuries, but much of this adaptation occurred gradually. Unfortunately, with increasing population, poverty, illiteracy, coupled with various drought related risks in recent decades, there seems to be a breakdown in the effectiveness of coping strategies (Ayouba, 2009).

In northeastern Nigeria, the rangelands are fragile and degraded, and the inhabitants are mostly poverty-stricken. It is therefore important to investigate the household livelihood of the pastoralists facing drought related stress in the study area, to investigate their coping strategies and catalogue the challenges they face in order to inform better means of sustaining rural livelihoods and promote the formulation of helpful policies at the national levels.

1.6. Scope and limitations of Study

The study investigated the household livelihood of nomads in Northeastern Nigeria and how they are coping with drought related stresses. It investigated if there is any relationship between the livelihood status of the nomads and coping strategies to drought. In the course of the study, a socio-political conflict arose in Northeastern Nigeria by a terrorist organization known as *Jama'atu Ahlis Sunna Lidda'awati wal-Jihad*; code-named *Boko Haram*. The insecurity was worse in Borno State during the period of data collection, leading to its exclusion from the study.

1.7. Conceptual and theoretical definitions of terms

Conceptual and theoretical definitions of terms that are used in this study are outlined below. Definitions are put in context of the objectives of this study.

Rural areas: settlements where dwellers livelihood depend more on natural resources.

Household: all the members living in a family unit: parents, children and dependents.

Livelihood status: the capabilities, assets and livelihood activities required for living.

Assets: include natural, physical and financial capital.

Capabilities: human and social capital including household size, household educational level and skills.

Livelihood activities: activities with the potential of increasing income and reducing expenditure.

Coping strategies: short term activities carried out by people to target specific shocks in order to reduce exposure to or cushion the adverse effects of shocks or external threat.

Drought: an extended period of time when a region is significantly deficient in its natural water supply with hazardous impact on the people, ecosystem and agriculture of the affected region.

CHAPTER TWO

LITERATURE REVIEW

2.1. Introduction

Many factors contribute to household livelihood but this study focuses on how the livelihoods of the nomads in Northeastern Nigeria are affected by prolonged drought and on ascertaining the strategies used by the nomads to cope with the resulting challenges. This study is built on the concept of the strategic coping of nomads in a drought stressed environment. The study seeks to investigate the livelihoods of the nomads in relation to drought related stress.

2.2 . Vulnerability of Human and Natural systems to Climate Change

Vulnerability of human and natural systems to climate change and variability, and of their ability to adapt to changes in climate hazards, is a relatively new field of research that brings together experts from a wide range of fields, including climate science, development studies, disaster management, health, social science, policy development and economics, to name but a few areas. Researchers from different fields bring their own conceptual models to the study of vulnerability and adaptation models that often address similar problems and processes use different language. The growing body of literature on vulnerability and adaptation contains a sometimes bewildering array of terms: vulnerability, sensitivity, resilience, adaptation, adaptive capacity, risk, hazard, coping range, adaptation baseline and so on (IPCC, 2007; Adger, Khan and Brooks, 2003; Burton, Huq, Lim, Pilifosova and Schipper, 2002).

Researchers from the natural hazards field tend to focus on the concept of risk, while those from the social sciences and climate change field often prefer to talk in terms of vulnerability (Downing, Butterfield, Cohen, Huq, Moss, Rahman, Sokona, and Stephen, 2001; Allen, 2001). Social scientists tend to view vulnerability as representing the set of socio-economic factors that determine people's ability to cope with stress or change (Allen, 2003), climate scientists often view vulnerability in terms

of the likelihood of occurrence and impacts of weather and climate related events (Nicholls, Hoozemans and Marchand, 1999).

2.2.1. Biophysical and social vulnerability

There are many different definitions of vulnerability. The third assessment report of the IPCC (2001) describes vulnerability as the degree to which a system is susceptible to, or unable to cope with adverse effects of climatic change, including climate variability and extremes. It is essential to stress that one can only talk meaningfully about the vulnerability of a specified system to a specified hazard or range of hazards. The ability of people to survive a particular hazard depends on the type of coping mechanism(s) they employ. Climate hazards may be defined in terms of absolute values or departures from the mean of variables such as rainfall, temperature, wind speed, or water level, perhaps combined with factors such as speed of onset, duration and spatial extent. Hazards are also referred to as climate events or climatic problems. A disaster as measured in human terms (lives lost, people affected and economic loss) is therefore the outcome of a hazard, taking into cognizance the properties of the human system that is exposed to and affected by the hazard.

The term hazard is used throughout this study to refer specifically to physical manifestations of climatic variability or change, such as droughts, floods, storms, episodes of heavy rainfall, and long-term changes in the mean values of climatic variables. Of the phenomena listed above, floods are particularly problematic, as their magnitude is aggravated by factors such as river engineering and land use. Definitions of vulnerability in the climate change related literature tend to fall into two categories, viewing vulnerability:

- (i) in terms of the amount of (potential) damage caused to a system by a particular climate-related event or hazard (Jones and Boer, 2003), or
- (ii) As a state that exists within a system before it encounters a hazard event (Allen, 2003).

The former view has arisen from an approach based on assessments of hazards and their impacts where the role of human systems in mediating the outcomes of hazard events is downplayed or neglected. Climate change impact studies have typically examined factors such as increases in the number of people at risk of flooding based on

projections of sea level rise (Nicholls *et al.*, 1999), and have thus focused on human exposure to hazard rather than on the ability of people to cope with hazards once they occur. The hazard and impacts approach typically views the vulnerability of a human system as determined by the nature of the physical hazard(s) to which it is exposed, the likelihood or frequency of occurrence of the hazard(s), the extent of human exposure to hazard, and the system's sensitivity to the impacts of the hazard(s).

This combined vulnerability, a function of hazard, exposure and sensitivity, may be referred to as physical or biophysical vulnerability. The term "biophysical" suggests both a physical component associated with the nature of the hazard and its first-order physical impacts; and a biological or social component associated with the properties of the affected system that act to amplify or reduce the damage resulting from these first-order impacts. Jones and Boer (2003) refer to biophysical vulnerability when they state "vulnerability is measured by indicators such as monetary cost, human mortality, production costs, or ecosystem damage". These are indicators of outcome rather than indicators of the state of a system prior to the occurrence of a hazard event. Biophysical vulnerability is concerned with the ultimate impacts of a hazard event, and is often viewed in terms of the amount of damage experienced by a system as a result of an encounter with a hazard.

Conversely, the view of vulnerability as a variable describing the internal state of a system has arisen from studies of the structural factors that make human societies and communities susceptible to damage from external hazards (Allen, 2003). In this formulation, vulnerability is something that exists within systems independently of external hazards. For many human systems, vulnerability viewed as an inherent property of a system arising from its internal characteristics may be termed "social vulnerability" (Adger and Kelly, 1999). Social vulnerability is determined by factors such as poverty and inequality, marginalization lack of food entitlements, lack of access to insurance and poor housing quality (Blaikie, Cannon, Davis and Wisner, 1994; Cross, 2001). Existing social vulnerability is important, as it constitutes the "baseline" from which any reduction of vulnerability to "acceptable" levels via adaptation must take place (Nicholls *et al.*, 1999; Parry, Arnell, and McMichael, 2001).

Social vulnerability has been the primary focus of most field research and vulnerability mapping projects, which are generally concerned with identifying the most vulnerable members of society, and examining variations in vulnerability between or within geographical units that may experience similar hazards (Clark, *et al.*, 2000; Downing and Patwardhan, 2004). In this formulation, it is the interaction of hazard with social vulnerability that produces an outcome, generally measured in terms of physical or economic damage or human mortality (Brooks and Adger, 2003). Social vulnerability may therefore be viewed as one of the determinants of biophysical vulnerability. The nature of social vulnerability will depend on the nature of the hazard to which the human system in question is exposed. Social vulnerability is not a function of hazard but it is hazard specific. This is because due to the severity or probability of occurrence, certain properties of a system will make it more vulnerable to certain types of hazard than to others. For example, quality of housing will be an important determinant of a community's (social) vulnerability to a flood or windstorm, but is less likely to influence its vulnerability to drought.

Certain factors like poverty, inequality, health, access to resources and social status are likely to determine the vulnerability of communities and individuals to a range of different hazards (including non-climate hazards) and may be viewed as "generic" determinants of social vulnerability while factors such as the situation of dwellings in relation to river flood plains may be viewed as determinants which are "specific" to particular hazards such as flooding. In summary, biophysical vulnerability is a function of the frequency and severity (or probability of occurrence) of a given type of hazard, while social or inherent vulnerability is not. In this study the term "social vulnerability" is used in a broad sense to describe the factors that determine the outcome of a hazard event of a given nature and severity. Social vulnerability encompasses all those properties of a system independent of the hazard(s) to which it is exposed and which mediate the outcome of a hazard event, these may include environmental variables and measures of exposure. For example the vulnerability of a country to a given hazard occurring over its national territory will be a function of the percentage of the population living in the area which is affected by the hazard and also a function of the extent to which individuals and sub-national scale systems within this area are exposed to its first-order impacts.

The exposure and the state of the environment within a system will be socially determined to a large extent: exposure will depend on the areas populations choose to (or are forced to) live and how they construct their settlements and livelihoods while environmental variables will vary in response to human activity as populations exploit resources and manage the environment for their benefit in the short or long term. Social vulnerability as described here therefore encompasses elements of the physical environment as they relate to human systems, including factors such as groundwater reserves and topography. Groundwater reserves may reduce the harsh outcome of hazards such as drought by enabling people to compensate for lack of rain through irrigation while the topography and soil type of an area may affect the degree of erosion that takes place there.

2.2.2. Adaptive capacity, adaptation and vulnerability

The concepts of vulnerability and risk are based on the distinction between social and biophysical vulnerability, and on the equivalence of biophysical vulnerability and risk. This distinction clarifies the association of hazard with climate variation and vulnerability with biophysical vulnerability or risk. However, there is need to link the issue of adaptive capacity, and its relationship to social and biophysical vulnerability. Many definitions of adaptive capacity exist (IPCC, 2001; Burton *et al.*, 2002; Adger *et al.*, 2003); broadly speaking it may be described as the ability or capacity of a system to modify or change its characteristics or behavior in order to cope better with existing or anticipated external stresses. Reduction in social vulnerability may arise from the realization of adaptive capacity as adaptation (adjustments in a system's behavior and characteristics that enhance its ability to cope with external stresses). Given constant levels of hazard over time, adaptation will allow a system to reduce the risk associated with these hazards by reducing its social vulnerability.

Faced with increased hazard, a system may maintain current levels of risk through such adaptation; reductions in risk in the face of increased hazard will require a greater adaptation effort. If hazards increase dramatically in frequency or severity, a human system may face greater risk despite reduction in social vulnerability achieved through the implementation of adaptation strategies. The direct effect of adaptation is therefore to reduce social vulnerability. Whether or not this translates into a reduction in

biophysical vulnerability/risk will depend on the evolution of hazard. The term vulnerability will refer to social vulnerability except otherwise stated in the following discussion.

2.2.3. Types of environmental hazards and adaptive capacity

Three broad categories of hazard may be identified:

- **Category 1:** Discrete recurrent hazards, as in the case of transient phenomena such as storms, droughts and extreme rainfall events.
- **Category 2:** Continuous hazards, such as increases in mean temperatures or decreases in mean rainfall occurring over many years or decades (such as anthropogenic greenhouse warming or desiccation experienced in the Sahel over the final decades of the 20th century (Hulme, 1996; Adger, *et al.*, 2003).
- **Category 3:** Discrete singular hazards, for example shifts in climatic regimes associated with changes in ocean circulation; the palaeo-climatic record provides many examples of abrupt climate change events associated with the onset of new climatic conditions that prevailed for centuries or millennia (Cullen, de Menocal, Hemming, Hemming, Brown, Guilderson, and Sirocko, 2000; Adger and Brooks, 2003).

Adaptive capacity represents potential rather than actual adaptation. The definition of adaptive capacity must encompass all the processes that determine whether or not adaptation takes place and to what extent, including those associated with different systems, representing the environmental, economic and geopolitical contexts in which the system of interest is embedded (O'Brien and Leinchenko, 2000; Pelling and Uitto, 2001; Singh, 2002). A high level of adaptive capacity only reduces a system's vulnerability to hazards occurring in the future (allowing the system time to adapt in an anticipatory manner) or to hazards that involve slow change over relatively long periods, to which the system can adapt reactively. In other words, adaptive capacity is a determinant of vulnerability to Category 2 hazards and also of the future vulnerability to anticipated Category 1 and 3 hazards. The damage to a system resulting from a discrete hazard event such as a storm or flood occurring tomorrow would not be a function of the system's ability to pursue future adaptation strategies – it is existing adaptations resulting from the past realization of adaptive capacity that

determine current levels of vulnerability. The likelihood of a system adapting responsively to (as opposed to coping with) a sudden short-lived event such as a hurricane is negligible. Adaptive capacity may also be reduced by the impact of the hazard that a system must adapt to.

Since adaptation does not occur instantaneously and a system requires time to realize its adaptive capacity as adaptation, a system's vulnerability to more gradual, longer-term change will be a function of its ability to adapt incrementally and responsively. Also, a system's vulnerability to discrete hazards occurring in the future will be a function of its ability to anticipate and pre-empt those hazards via appropriate planned adaptation strategies. The rate at which risk (or biophysical vulnerability) associated with a particular type of hazard is reduced (or increased) will depend on the timescales associated with the implementation of adaptation measures, that is, the realization of adaptive capacity as adaptation, and also on the timescales associated with the evolution or occurrence of the hazard in question (in the case of global-scale anthropogenic climate change the latter will be influenced by global development pathways and the extent to which mitigation is pursued). In other words, one must ask whether a system is likely to implement the necessary adaptation measures in the time available to it in order to reduce risk to a subjectively defined acceptable level or not.

2.2.4. Adaptive capacity to current and potential vulnerability

Current vulnerability is determined by past adaptation and the availability of current coping options. Current vulnerability provides a baseline from which a system's future vulnerability will evolve. The evolution of future vulnerability will be determined by the system's current adaptive capacity. At any given time, a system may be viewed as exhibiting a certain degree of vulnerability to a specified hazard and as having a certain ability or potential to adapt so as to reduce its vulnerability to that hazard within any given time frame, constrained or modulated by a range of external factors. If the hazard in question is a particular type of discrete or transient, extreme climatic event, then the system's vulnerability can be viewed as current vulnerability, a "snapshot" which determines the extent to which it would be damaged if the event in question occurred immediately. A system's potential vulnerability describes the extent to which the system may be damaged at a specified point in the future when exposed to

a specific hazard after realizing all its current adaptive capacity. The potential vulnerability of a system to climate change that is associated with anticipated hazards in the medium-term to long-term will depend on that system's ability to adapt appropriately in anticipation of those anticipated hazards.

2.3. Challenges of sustaining livelihood in arid regions

Dry land areas, which include arid and semi-arid areas, receive annual rainfall of less than 1500mm. Around half a billion people live in such areas, where water is an unavoidable constraint on everything they do (IPCC, 2007). Global warming with its influence on climatic change is rendering the climates of some regions drier and more unpredictable (Parry *et al.*, 2001). The arid and semi-arid of sub-Saharan Africa (SSA) are characterized by limited water supply, low and highly variable rainfall, and recurrent droughts. Even where surface waters accumulate, they are not easily retained due to high temperatures and intense precipitation that cause water to be lost to evaporation and run off, respectively. Dry land communities are in greater need of external support because their crops are failing and their herd sizes are being reduced to less than the minimum required for subsistence. High herd mortality has mainly been due to severe and persistent droughts that have led to tremendous human suffering (IPCC, 2007). These communities have gained experience trying to adapt to the changes in climatic conditions. For example, in west and east Africa, dry land communities have developed traditional water harvesting systems in response to the increasingly frequent droughts (Jama *et.al.* 2009).

Techniques such as half-moon pits and contour stone bonds are popular among farmers. In Turkana area of Kenya for example, farmers who practice water harvesting are able to grow food crops like maize for household consumption and even for sale in local market (Nyangito *et.al.* 2008). Water harvesting in dry lands has resulted in more vegetation cover, due to increased infiltration rate resulting from slowed water movement on land. It has helped households to diversify into arable agriculture to cope in the absence of profits from cattle production and has also helped to provide grazing pasture in uncertain times as demonstrated in West Africa and East Africa (Musimba *et al.*, 2004).

2.4. Basic livelihood model

Several types of livelihood models have been put forward over the years. As noted by Morris *et al.*, (2001), the core of livelihoods models has been the relationship between assets (also capitals), activities (also strategies, production, exchange and so on) and outcomes (also entitlements, consumption bundles, well-being, utility, income) within a mediating environment. These core aspects are represented in Fig.2.1. The modifying and contextual factors represent the “external” mediating environment which directly influences the internal workings of the assets-activities-outcome relationship. The mediating environment provides the context within which household decision-making process unfold, it mediates the access to household assets and the use to which they can be put, and also influences the strategies which households adopt and their potential outcomes (Morris *et al.*, 2001). The influence of these “external” modifying factors may affect the quality and quantity of assets, the activities and the terms on which they transform assets (for instance, drought will lead to adopting some coping strategies that might involve selling some productive assets) and the relationship between activities and consumption outcomes.

Carney (1998) divides the “external” modifying factors into ‘transforming structures and processes’ or ‘policies, institutions and processes’ (for instance, levels of government, private sector, laws, policies, culture, institution) and ‘vulnerability context’ which is described in terms of shocks (for example, civil and climatic), trends (for instance, resource stocks, population, technology, policies and economics) and seasonality.

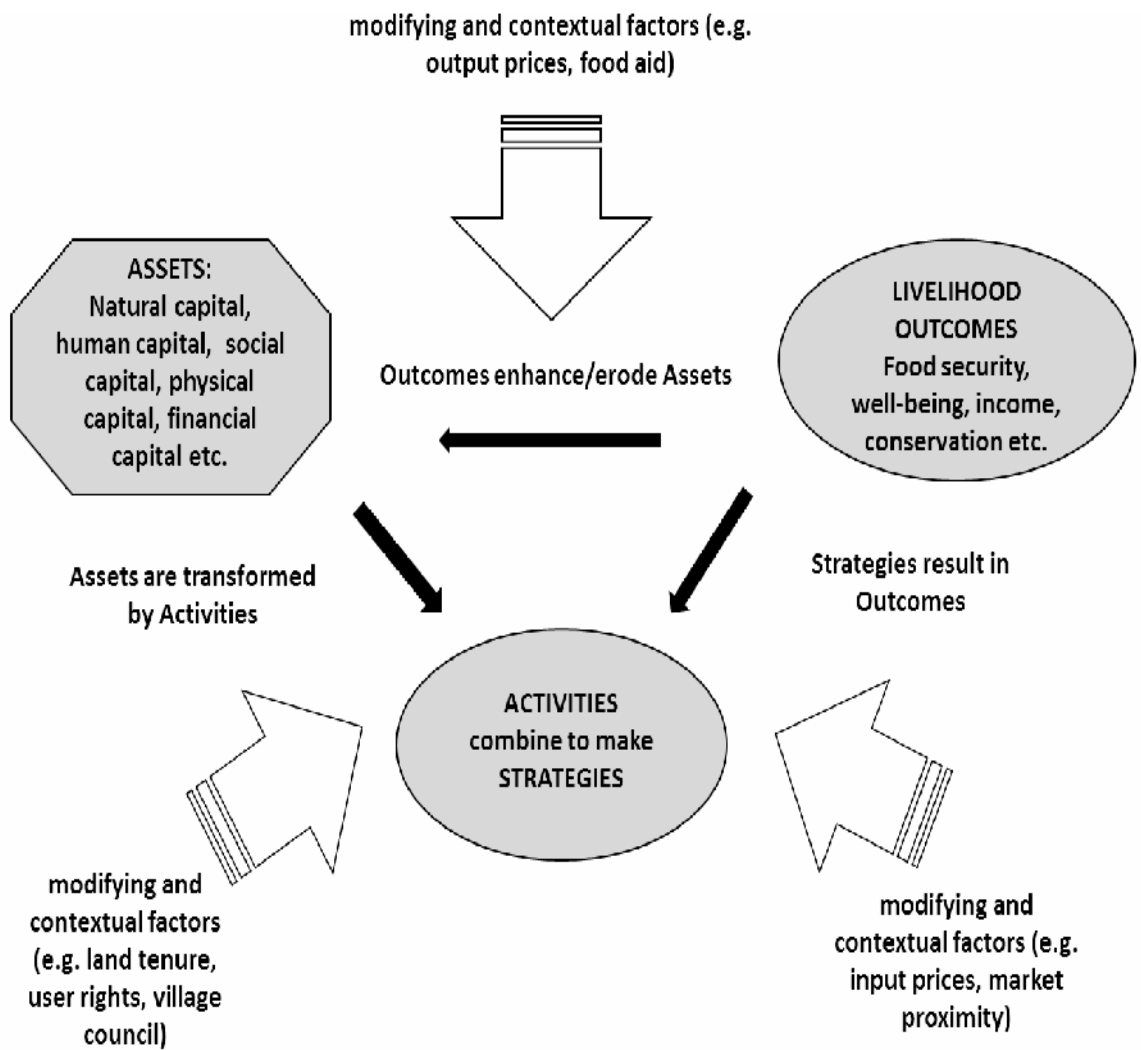


Fig. 2.1: A Generic Livelihood Model
 Source: Morris et al., 2001

2.4.1 Accessing livelihood capital/assets in a sustainable manner

Assets are considered to be stocks of different types of capital that can be used directly or indirectly to generate livelihood. They give rise to a flow of output, which may either be depleted or accumulated as surplus, to be invested in future productive activities. Assets are delineated in terms of six complementary kinds of capital, as follows:

- **Natural capital:** Constituted from oil, water, flora and fauna, minerals and other things not created by human design but rather representing a finite endowment from nature;
- **Human capital:** Represent the accumulated knowledge and ability to labour;
- **Financial capital:** Reserves of money or other assets that confer purchasing power to acquire other resources for funding productive activity that can earn additional income;
- **Physical capital:** Material assets that enhance productivity, such as equipment, tools, transportation or communication infrastructure, housing and other facilities;
- **Social capital,** relationships and norms that are conducive to cooperation and sharing that give persons opportunity and security for economic and other wellbeing.
- **Institutional capital:** These refer to institutional outfits with the capacity to buffer/mitigate factors that deprive people of their livelihoods. Institutional capital is important for sustainable livelihoods because people need to be protected from the vulnerability to disruption of their livelihoods; which is characteristic of the circumstances of the poor.

While possession of the other five forms of capital can help to insulate people from the crises that occur when hazards occur and deprive them of livelihood, institutional capital (especially at local levels) is important to mitigate the hazards themselves. Mishra (2007) emphasized the importance of access to institutional capital. For instance, roads and vehicles clearly influence access to markets and facilitate daily or longer-term travel/migration for alternative employment. The transforming structures and processes are the mediating influences external to the household and these can be classified as operating at different levels, such as macro (national government policy), meso (state policies and programmes) and micro (local land-use plans). Markets also

exert a major influence on livelihoods through changes in relative prices and trade terms which may cause change in food consumption pattern. In accessing livelihood assets, ecological integrity must be ensured so that livelihood activities do not degrade natural resources irreversibly. Social equity must also be ensured, so that promotion of livelihood opportunities for one group does not foreclose options for other groups, either now or in the future.

2.4.2 Objectives of livelihood and adjustment in behavior due to changing external environment

A hierarchy of three objectives/priorities exists for many rural farmers: survival (based on stable subsistence), security (based on assets and rights) and self-respect (based on independence and choice) and once the first level is achieved, people tend to pursue the second, and subsequently, the third. Gordon *et al.* (2000) opined that the objectives of livelihoods and coping strategies vary within and across situations which include: more income, increased wellbeing reduced vulnerability, improved food security and more sustainable use of natural resource base. Turton (2002) observed that rural dwellers' intensity of the pursuit of their priorities (i.e. survival, security and self-respect) is subject to changes in the external environment, thereby affecting assets, activities or outcomes.

The resultant adjustments in behavior due to changes in the external environment are known as coping strategies, which if repeatedly employed eventually become a survival strategy, leading to erosion of assets and destitution (Turton, 2002). These survival strategies include, intensification of existing income activities, diversification into new activities, migration, drawing upon social relationships and informal credit networks, drawing upon assets (stores or productive assets) and adjusting patterns of consumption of vital resources such as food. Coping strategies are the short term methods rural people have developed over the years to check the problems of poverty and food scarcity and to ensure that rural households have access to enough food. The type and number of coping strategies adopted is assumed to have direct impact on availability of food in the household. People's livelihoods are affected by their coping strategies as well as by the constraints to assessing livelihood assets.

Mishra (2007) reported that in some dry parts of India, subsistent farmers have been known to adopt coping strategies that include: reduction of food consumption and change of food consumption pattern; change of occupation; mortgage of land and other household assets; borrowing funds with the condition of repaying the loan in the form of labour and forthcoming agriculture produce, selling of non-agricultural goods; and both casual and permanent migration.

One of the most effective coping strategies that have been used by pastoralists in many parts of sub-Saharan Africa is known as water harvesting. According to Nyangito *et al.* (2008), farmers in Kenya who practice water harvesting are able to grow food crops like maize for household consumption and even for sale in local market. Water harvesting in dry lands has resulted in more vegetation cover, due to increased infiltration rate resulting from slowed water movement on land. It has helped households to diversify into arable agriculture to cope in the absence of profits from cattle production. It has also helped to provide grazing pasture in uncertain times as demonstrated in West Africa (e.g. Niger) and east Africa (Musimba *et al.*, 2004). Improved runoff farming techniques has enabled production from the land to meet household requirements and to provide surplus for sale to augment household incomes from cattle rearing (Nyariki *et al.*, 2005). Though water harvesting has contributed to land rehabilitation enabling communities to adapt to drought/highly variable climate, with the subsequent reduction of poverty (Orindi *et al.*, 2007), it still remains a research agenda whether water harvesting has reduced vulnerability of households and rural communities to drought, and to what extent (Musimba *et al.*, 2004).

2.4.3. Household livelihood activities

According to FAO (1997), food production comprises such factors as land use and tenure, soil management, crop breeding and selection, crop management, livestock breeding and management and harvesting while food distribution involves a series of post-harvest activities including the processing, transportation, storage, packaging and marketing of food as well as activities related to household purchasing power, traditions of food use (including child feeding practices), food exchange, gift giving and public food distribution. Household livelihood activities used by the nomads to meet the food needs of their households include the activities involved in food

production, food distribution and also activities related to food utilization and consumption such as the preparation, processing, and cooking of food at both home and community levels. Household livelihood activities also include activities used for harvesting of primary products such as fruits, tubers, cereals; rearing domestic animals for home consumption and for occasional sale; gathering of forest product for consumption and sale.

2.4.4. Diversification of livelihood activities

In studies with male and female residents in both rural and urban areas, as many as three to six income-generating activities may be practiced by the average person and the average number of activities that yield income or important products for the household was 3.2 per woman in studies specifically with rural women (Olawoye, 2001). For this reason, most rural households depend on a diverse portfolio of activities and income sources. Diversification appears to be enduring and pervasive in many low-income countries; especially in sub-Saharan Africa (Bryceson, 1996).

2.4.4.1. Diversification as a coping strategy

It is useful for policy purposes to distinguish income sources into categories. A basic division is between natural income resource-based activities and non-natural resource based activities or income sources. The former include collection or gathering of natural resource, food cultivation, non-food cultivation (e.g. export crops), livestock keeping, non-farm activities that depend on natural resources such as brick making, weaving, thatching. The latter include rural trade like the marketing of inputs and output, other rural services like the repair of bicycles and tires, rural manufacture, remittances like pensions from past formal sector employment (Ellis, 1998). A complementary way of categorizing income sources is to distinguish farm income sources from off-farm and non-farm income sources (Saith, 1992). Some definitions include:

- **Farm income:** This refers to income generated from own-account farming, whether on owner-occupied land or land accessed through cash or share tenancy.
- **Off-farm income:** This refers to wage or exchange of labour on other farms within agriculture and may include income obtained from local environmental resources like charcoal, firewood, wild plants, and so on.
- **Non-farm income:** This refers to non-agricultural income sources and some sub-

categories include: non-farm salary employment or rural wage, non-farm rural self-employment, income from leasing land or property, pension and remittances from family and friends. Some studies show that 30% to 50% of rural household income in sub-Saharan Africa is typically derived from non-farm sources (Sahn, 1994; Reardon, 1997).

2.4.4.2. Impacts of diversification on livelihood

Generally, diversification can be said to have a positive impact on livelihoods if it makes people more secure, reduces the adverse impacts of seasonality and helps to raise poor rural households out of poverty. In other words, diversification is positive if it reduces the vulnerability of individuals and households to deprivation and disaster (where vulnerability is taken to mean proneness to stress and shocks). Conversely, diversification has a negative effect on livelihoods if it increases the vulnerability of households. Positive impacts of diversification include consumption smoothing, risk reduction, more complete use of available household labour and skills, cash generation for investment in human or physical capital, more opportunities for women to exercise independent economic decision-making and in some circumstances improvement in natural environments or reduced pressure on environmental resources (Ellis, 1998).

Diversification of income sources can have the following impacts:

- **Seasonality:** Diversification of income sources can help to ameliorate the adverse effects of seasonality on the income security of the household. Seasonality causes peaks and troughs in labor utilization on the farm, and creates livelihood insecurity due to the mismatch between highly uneven farm income streams and continuous consumption requirements. The more diversification involves activities whose seasonal cycles are not synchronized with the farm's own seasons, the greater the potential for smoothing out uneven labor use and income flows.
- **Risk reduction:** Diversification can greatly reduce the risk of income failure confronted by the household. Reliance on income sources that are prone to annual fluctuations in outcomes, as is typical of rain fed farming systems, places the rural household at high risk of income failure. The key to risk reduction is to seek income sources that exhibit low covariate risks between them. This means that the factors that create risks for one income source (such as risk of drought for farm activities) should not be the same as the factors that create risk for another source of income (such as risk of job insecurity for salary earners).

- **Higher earnings:** Since one livelihood activity on its own rarely provides a sufficient means of survival in rural areas of low-income countries, diversification into various income sources may achieve higher income than is possible from a single livelihood activity. Livelihood diversification generates earnings that tend to significantly alter the options open to the household, providing it with cash resources that can be used to improve income earning potential in the future.
- **Asset improvement:** Poverty is strongly associated with a lack of assets, or the inability to put assets to productive use. Assets in this context include human capital, physical capital, social capital and natural capital. Cash resources obtained from diversification may be used to invest in, or improve the quality of any or all of these classes of assets for example; buying a bicycle that can be used to enhance income generating opportunities.

According to Brooks *et al.* (2005), income diversity is an important determinant of vulnerability to drought for rural communities in Africa. Also, certain factors such as developmental factors including poverty, health status, economic inequality, and elements of governance influence vulnerability to a wide variety of hazards in different geographical and socio-political contexts. These factors contribute to lessening vulnerability by ameliorating risk and reducing the adverse consumption effects of seasonality. They also result in increasing assets beyond human capital, thereby permitting poverty to be reduced.

2.4.4.3. Migration as a method of diversifying livelihoods

Migration means leaving the resident household for varying periods of time, and in so doing, being able to make new and different contributions to wellbeing. Mobility of pastoralists depends on tenure security on lands, knowledge of ecosystem productivity potentials and constraints, and capacity to negotiate with hosts or enforce access to key range resources, primarily pasture, water sources and migratory corridors (Fabusoro, 2006). Mobility can be vertical, with different seasonal altitudinal areas. The pastoralists in southwest Nigeria often move from their origin in the semi-arid regions of the north to the southwest during the dry season and then move back at the beginning of the raining season. Moving of animals at different times of the year avoids overgrazing and enables pastoralists to raise considerably more livestock than

they could if they chose not to migrate (Fabusoro, 2006). The horizontal movement of livestock entails movement within the same grazing belt on a more permanent basis which is determined mainly by the restriction imposed by property regimes, access rights and the need for rotatory grazing to allow restoration of grazing lands and also to prevent diseases (Fabusoro, 2006). A distinction can also be made between regular movements and emergency movements due to drought, conflict or other reasons. Patterns of mobility range from pure nomadism (opportunistic, no fixed base), through various forms of transhumance (set migratory routes on seasonal basis), to degrees of agro-pastoralism (with seasonal attachment to crop production); each demanding different involvement of household and herd members (Fabusoro and Oyegbami, 2009).

Migration is one of the most important methods of diversifying rural livelihoods, and it takes several forms (Stark, 1991). Some types of migration include:

- **Seasonal migration:** This refers to temporary migration according to agricultural season. It is associated with movement away in the slack season and the return of migrants for the peak periods of labour input (land preparation and harvesting) in the agricultural calendar.
- **Circular migration:** This refers to temporary migration that is not necessarily tied to seasonal factors in agriculture, implies that migrants routinely return to their resident households and regard these as their principal places of domicile. Thus they do not set up permanent living arrangement in the places they go for temporary work.
- **Permanent migration (rural-urban):** This implies a long-duration move to a different location, typically an urban area, and settings up domicile at the destination. In this instance, the contribution to the rural resident household takes the form of regular or intermittent remittances back home.
- **International migration:** The farmer and his family members move either temporarily or permanently abroad. Different variants occur, corresponding to the distance traveled, permanence of movement and the type of work abroad.

CHAPTER THREE

THEORETICAL AND CONCEPTUAL FRAMEWORK

3.1. Theoretical Framework

A theoretical framework is a structure that guides research by relying on a formal theory, constructed by using an established, coherent explanation of certain phenomena and relationships. Several livelihood models have been put forward over the years. Morris *et al.*, (2001) shows that the core of livelihood models has been the relationship between assets (also capitals), activities (also strategies, production, exchange and so on) and outcomes (also entitlements, consumption bundles, well-being, utility, income) within a mediating environment. The modifying and contextual factors represent the “external” mediating environment which directly influences the internal workings of the assets-activities-outcome relationship. The mediating environment provides the context within which household decision-making process unfold, it mediates the access to household assets and the use to which they can be put, and also influences the strategies which households adopt and their potential outcomes (Morris *et al.*, 2001). The influence of these “external” modifying factors may affect the quality and quantity of assets, the activities and the terms on which they transform assets (for instance, drought will lead to adopting some coping strategies that might involve selling some productive assets) and the relationship between activities and consumption outcomes. The theoretical framework for this study was drawn from the sustainable livelihood theory and the coping theory.

3.2 Coping Theory

One of the ways to understand livelihood systems is to analyze the coping strategies pursued by individuals and communities as a response to external shocks and stresses. Knowledge of coping strategies and adaptation to natural climate variability can reduce vulnerability in the short-term and provide insights and experience that could enhance resilience to long-term climate change (Gupta *et al.*, 2015; Salman and Momha, 2009). Humans have been adapting to changing climatic conditions and to the impact of extreme climate events for several centuries, but much of this adaptation occurred

gradually and the economies of many local communities still depend on sophisticated production and social systems that are adapted to manage climate risk and variability.

Coping strategies are often a short-term response to specific shocks such as drought, while adaptive strategies entail a long-term change in behavior patterns as a result of the shock or stress. Coping strategies include: non-food related and food-related varieties (Kempson *et al.*, 2003). Non-food related coping strategies include: adjusting lifestyles to avoid wasting money; reducing expenditure by buying less expensive products or shopping at cheaper places; reduction of money spent on children's education and clothes; delaying payment of bills and running from creditors; increasing cash earnings by begging and hiring out own labor; selling or pawning of possessions like gold, plates; selling own blood, and many more.

Food-related coping strategies include: food rationing, food stretching, food seeking and food anxiety. Food rationing is the coping strategy of food insecurity related to the quantity of food available for household consumption such as reducing the portion of food per meal and reducing the number of meals per day. Food stretching is a strategy of food insecurity that involves reducing the quality of diet. Food seeking is a strategy of acquiring food through socially unacceptable ways such as eating expired food and eating processed yam peels. Food anxiety is a strategy that indicates households allocating money to buying staples to prevent food insecurity (Norhasmah *et al.*, 2010). Other coping strategies include relying on less expensive foods like seasonal or locally available vegetables, borrowing food or money from friends or relatives, buying food on credit, relying on food aid in an attempt to increase access to food such as eating at parties and organizations that give food aid, withdrawing children from school to save spending money on school fees and sending children to work (Gupta *et al.*, 2015) and re-using palm oil used by friends or family to fry food; gathering foods such as snails, mushrooms and fruits from the wild.

3.3. Orientation of conceptual framework of the study

Many factors contribute to household livelihood. However, this study is focused on how the livelihoods of the nomads are affected by prolonged drought. It also ascertained the strategies used by the nomads to cope with the resultant challenges that

arise. The conceptual orientation represented in Fig. 3.1 attempts to describe the concept of the study and the relationships found among the variables affecting the attainment of the household livelihood.

In the framework, household livelihood is the dependent variable and it is assumed to be dependent on selected personal characteristics of the nomads, their perception of drought, their coping strategies, and the challenges they face in the course of their livelihoods. Furthermore, the conceptual orientation is based on the premise that the nomad's household livelihood is influenced by the personal characteristics of household members (age, sex, marital status, household size, educational attainment, membership of social groups). This in turn influences their perception of the effect of drought on their livelihood (whether favourable or unfavourable). Similarly, their perception of the effects of drought on their livelihoods in turn affects the portfolio of strategies they use to cope with the challenges that arise in the course of obtaining their livelihoods. The household livelihood therefore is a product of interactions between the various independent variables.

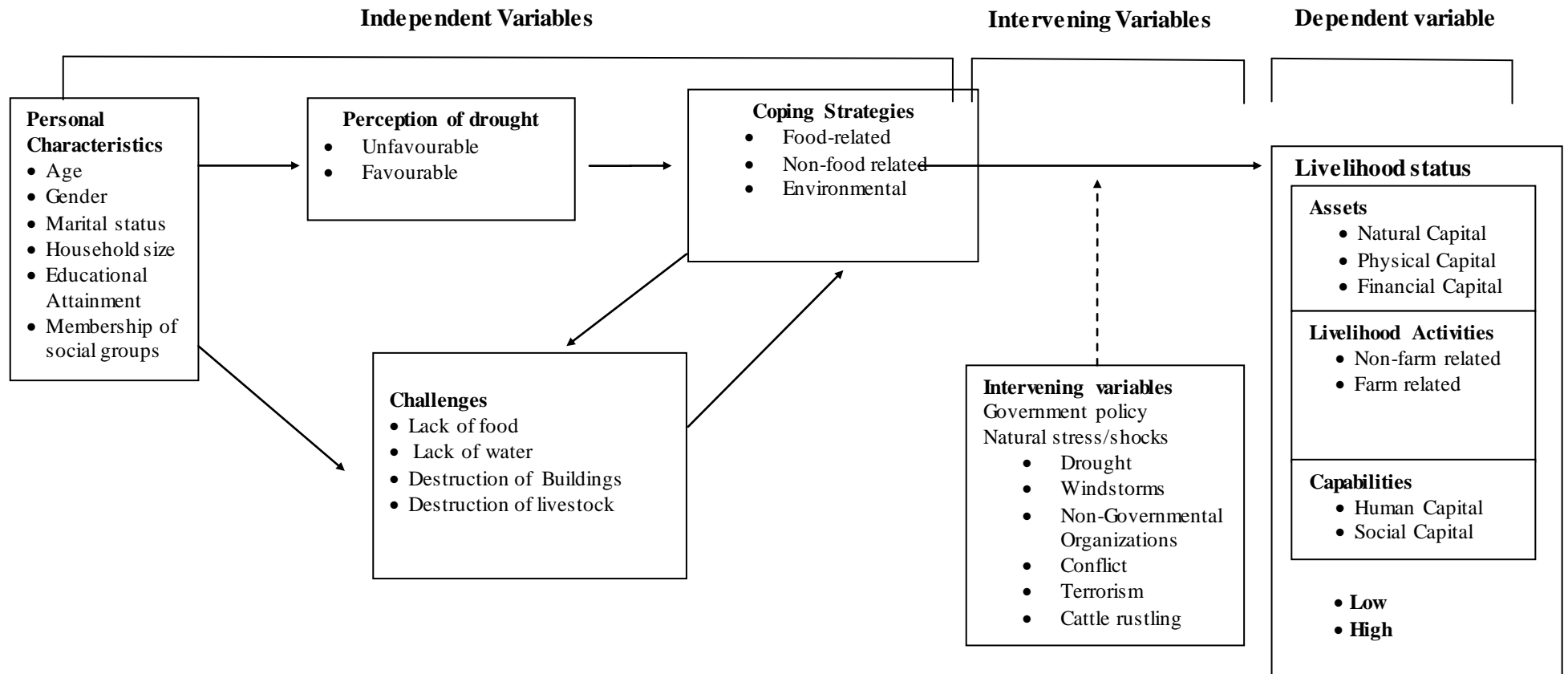


Fig. 3.1 Conceptual framework of household livelihood and coping strategies of nomads in Northeastern Nigeria

CHAPTER FOUR

METHODOLOGY

4.1. Study Area

The study was conducted in Northeastern Nigeria (Fig. 4.1). The area is internationally bounded by Niger, Chad and Cameroon. It also spans across a major part of the Lake Chad basin and River Benue basin, with many other crisscrossing water ways. The region consists of six states: Adamawa, Bauchi, Borno, Gombe, Taraba and Yobe states. Many ethnic groups make up its about 30 million population, including: Longuda, Kanuri, Mumuye, Higgi, Bachama, Mbula, Koma, Hausa, Fulani, Gwari, Borim and many other tribal groups. Economic activity in the study region is typically agrarian. Most of the inhabitants live in rural areas, earn most of their income through farming, fishing, hunting, pastoralism and artisanship. The region is also characterized by over-exploitation of natural resources, widespread poverty, poor infrastructure, high illiteracy and recurrent social conflicts about land-use, limited institutional and technological capabilities. There is also an overwhelming dependence on climate-sensitive sectors such as rain-fed agriculture, fisheries and animal grazing (Osman-Elasha, 2007).

The climatic condition in the Northeastern part of Nigeria is typically an alternation between a short wet season and a prolonged dry season. Temperatures during the day remain constantly high while humidity is relatively low throughout the year, with little or no cloud cover. There are, however, wide ranges in temperature (between nights and days) particularly in the very hot months. The mean monthly temperatures during the day exceed 36°C while the mean monthly temperatures at night fall to below 22°C. The region is semi-arid and already replete with all the visible and perceivable symptoms of desertification, such as: drought, siltation of water bodies, incessant floods, soil erosion, sand dune invasion, disappearance of plant species, migration of animal populations and massive loss of seeds cum top soil (Adebayo, 1999). There is a general increase in sunshine hours from the south to the northern parts of the state, ranging from 2500 hrs/annum to 3000 hrs/annum respectively (Adebayo, 1999). Between

December and January, the mean minimum temperature is 18.1°C, while the mean maximum temperature is 39.6°C. Relative humidity ranges from 27 to 79.

4.2. Study population

The population of the study consists of all nomadic households in Northeastern Nigeria. Northeastern Nigeria comprises of six states: Adamawa, Bauchi, Borno, Gombe, Taraba and Yobe states.

4.3. Sampling procedure and sample size

Multi-stage sampling technique was used to randomly select study areas among the six states (Adamawa, Bauchi, Borno, Gombe, Taraba and Yobe) in Northeastern Nigeria. Borno state was excluded from the study as a result of insecurity by *Boko Haram* terrorists at the time of the study. Three of the remaining states (Taraba, Adamawa and Bauchi) were randomly selected for the study (Fig. 4.1). A sampling intensity of 15% was used to estimate the total number of Local Government Areas (LGAs) per selected state to be included in the study giving a total of eight LGAs to be included in the study (Table 4.1). Five (5) communities were randomly selected in each of the eight chosen LGA, within each of which 10 respondents were randomly selected for interview. A total of 400 interview schedules were administered (through indigenous interpreters); from which 326 (81.5%) were useable (Table 4.1).

4.4 Instruments for data collection and validity test

Quantitative and Qualitative data were collected through survey with interview schedule and Focus Group Discussion (FGD). The interview schedule was subjected to face validity and expert validity tests. Face validation was based on the researcher's subjective evaluation, and it scrutinized: what the instrument appears to measure; the extent to which it measured; and the expected accuracy of the research instruments to provide information that will aid the realization of the study objectives. In addition, specialists within the Department of Agricultural Extension, University of Ibadan and Federal University of Technology, Yola, were consulted to validate the instrument.

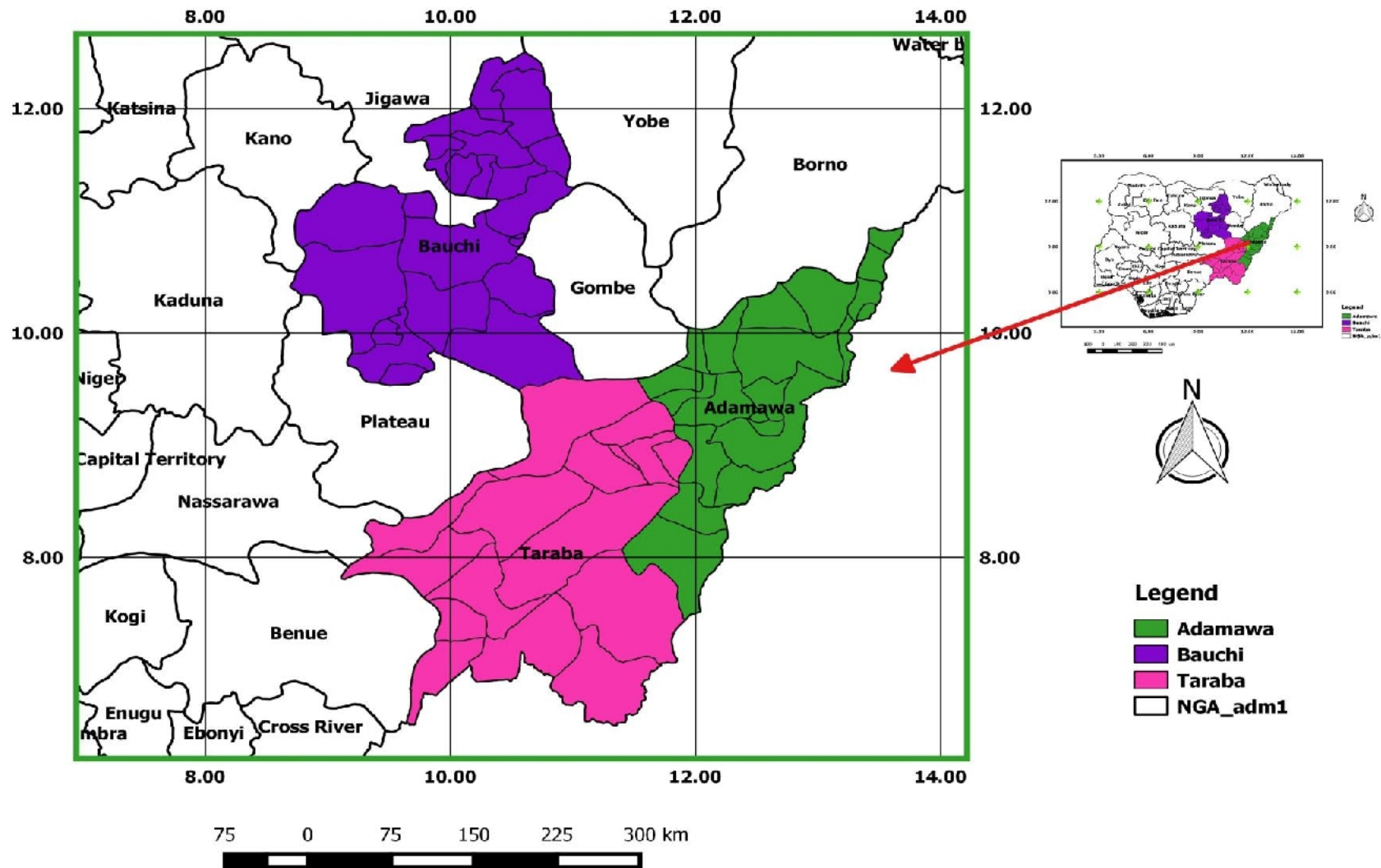


Fig. 4.1: Map of Northeastern Nigeria showing the Study locations (Adamawa, Bauchi and Taraba States)

Table 4.1: Sampling schedule, distribution and retrieval of questionnaires

Selected State	No of LGAs in selected States	No of LGAs selected for Study (at 15% sampling intensity)	No of communities sampled (5 per LGA)	Total No of questionnaires distributed *	Total No of questionnaires returned
Adamawa	21	03	15	150	100
Taraba	16	02	10	100	92
Bauchi	20	03	15	150	134
TOTAL	57	08	40	400	326

* 10 questionnaires were randomly distributed per selected community.

4.5 Pre-testing the Instrument

After an initial scoping exercise had been done to identify data categories that are relevant to the study objectives, the study instruments was pre-tested in one of the Fulani communities in Gombe State which was not in the actual sample for the study. The interview schedule was administered to 30 respondents before the actual study.

4.6 Measurement of Variables

Measurement of variables includes those of dependent and independent variables.

4.6.1 Dependent Variable

The dependent variable is livelihood status which is the sum of standardized scores of beneficiaries' access to capital assets (human/social, natural, physical and financial); livelihood activities in dry and rainy seasons; and household capabilities (level of skill and capability for each household member).

4.6.2 Independent Variables

The independent variables were the personal characteristics of the nomads, perception of the effect of drought on livelihood, coping strategies to drought and challenges.

A. Socioeconomic characteristics of the respondents

(A1) Age: Respondents were asked to state their actual age in years.

(A2) Sex: Respondents were asked to state their gender (a) Male [1] (b) Female [2]

(A3) Marital Status: Respondents indicated the option that best describes their marital status among those listed (a) Married [1] (b) Single [2] (c) Divorced [3] Widowed [4]

(A4) Married respondents were asked to indicate at what age they married in years.

(A5) The actual number of children each respondent has.

(A6) The number of wives each respondent/her husband has.

(A7) Respondent were asked to state total number of children of husband and wife

(A8) Respondents were asked to state type of household head: Male [1] Female [2] Dejure Female [3] Defactor Female [4]

(A9) Respondents were asked to tick the highest educational qualification attained:

Non-formal [1] Adult Education [2] Primary [3] Secondary [4] Post-secondary [5]

(A10) Respondents were asked the actual number of people who live in their household.

(A11) Respondents were asked the actual number of dependents apart from their children

- (A12) Primary occupation: Farming [1] Livestock [2] Pastoralism [3] Fish capture [4] Employed [5]
- (A13) Respondents were asked to state other means of livelihood
- (A14) Respondents were asked the number of years of involvement in their occupation
- (A15) Respondents were asked to state if they have any other occupation
- (A16) Respondents were asked their sources of income: Friends & relatives [1] Cooperative scheme [2] Inheritance [3] Personal savings [4] Money lenders [5]
- (A17) Respondents estimated monthly income from primary occupation in Naira (₦)
- (A18) Respondents estimated monthly income from other occupations in Naira (₦)
- (A19) Respondents estimated amount sourced externally for enterprise in Naira (₦)
- (A20) Respondents estimated outstanding credit they had to settle in Naira (₦)
- (A21) Respondents were asked to list their major assets
- (A22) Respondents were asked if they are indigenes of their settlement: Yes [1] No [2]
- (A23) Respondents were asked if resident in present settlement/village in the past 5 years: Yes [1] No [2]
- (A24) Respondents asked if they had access to drought warning systems: Yes [1] No [2]
- (A25) Did respondents move to settlement because of climatic problems? Yes [1] No [2]
- (A26) Which reasons made respondents move to their settlement? Lack of rainfall [1] Drying lake/streams [2] Water disputes [3] Land disputes [4] Livestock deaths [5] Animal disease [6] Lack of human food [7] Loss of assets [8] Drought [9] Crop failure [11] Human disease [12] Reduction of income [13]

B. Human/Social Capital

- The respondents were asked to indicate the capital assets they have access to/own. Yes [1] No [0], while their frequency of access to capital assets were determined using a three point scale with the following scores: Always [3] Sometimes [2] Rarely [1]
- (B1) Are you self-employed? Yes [1] No [0]
- (B2) Are you paid in cash for your labour? Yes [1] No [0]
- (B3) If yes, how often? Always [3] Sometimes [2] Rarely [1]
- (B4) Are your household members hired for work? Yes [1] No [0]
- (B5) If yes, how often? Always [3] Sometimes [2] Rarely [1]
- (B7) Do you belong to any social organization? Yes [1] No [0]
- (B8) If yes, which Social Group/Association do you belong to?

(a) Cooperative society [1], (b) ‘Adashe’ [2], (c) Cultural group [3], (d) Milk sellers group [4], (e) Cow rearers group [5]

(B9) Do you lead any group you belong to? Yes [1] No [0]

(B10) Respondents were asked to state actual number of years they belonged to groups?

(B11 – B22) Respondents were asked questions on frequency of access to Natural Capital, Physical Capital and Financial Capital: Always [3] Sometimes [2] Rarely [1]

C. Analysis of Household Capabilities

Respondents were asked to state the Age, and tick the appropriate options under the following:

Gender - Male [1], Female [0]

Highest level of education - Non-formal [1], Primary [2], Secondary [3], Tertiary [4]

Skills/Capabilities - Mat’Zana’ Weaving [1], Carpentry [1], Masonry [1], Sewing or Knitting [1], Barbing or Hair dressing [1], Farming [1], Fish capture [1], Carving or Handcrafts [1], Others (Specify) [1], Total [all skills added]

D. Analysis of Coping Strategies

Respondents were asked to state frequency of use of coping strategies, using a Likert-type scale of Always, Often, Rarely, and Not-at-all:

Food-related strategies: Always [3], Often [2], Rarely [1], Not at all [0]

Non-Food-related strategies: Always [3], Often [2], Rarely [1], Not at all [0]

Environmental strategies: Always [3], Often [2], Rarely [1], Not at all [0]

E. Respondents’ Perception about the Effects of Drought on Livelihood

Respondents replied perceptual statements using a five-point Likert scale: Strongly-disagree (SD), Disagree (D), Undecided (U), Agree (A), Strongly Agree (SA)

Scoring:	SD	D	U	A	SA
Positive statements	1	2	3	4	5
Negative statements	5	4	3	2	1

F. Analysis of Livelihood Activities

Respondents were asked to state the frequency of engagement in livelihood activities in both dry and rainy seasons:

Farm-related: Fully involved [3], Sometimes [2], Rarely [1], Not at all [0]

Non-Farm-related: Fully involved [3], Sometimes [2], Rarely [1], Not at all [0]

G. Analysis of Challenges to Livelihood

Respondents were asked about the challenges to their livelihood: Yes [1], No [0]

Respondents were asked to indicate the major impacts of alteration in rainfall pattern on their livelihood: Conflict [4], Poverty [3], Disease [2], Hunger [1], Others [stated impact].

4.7. Data Analytical Tools

Descriptive statistics were used to present data on personal and non-personal characteristics of the respondents as applicable. Applicable inferential statistical tools were used to test the stated hypotheses (Table 4.2).

Table 4.2. Hypotheses and Corresponding Applicable Statistical Analysis Tools

Null Hypothesis	Analytical Tool
Hypothesis 1: There is no significant relationship between selected personal characteristics of the nomads in the study area and their livelihood status.	Chi Square and Pearson's Product Moment Correlation (PPMC)
Hypothesis 2: Independent variables do not contribute significantly to livelihood status	Regression Analysis
Hypothesis 3: There is no significant relationship between respondents' perception and livelihood status	PPMC
Hypothesis 4: There is no significant relationship between the number of coping strategies used by respondents during drought and livelihood status	PPMC
Hypothesis 5: There is no significant difference in the coping strategies adopted by respondents across the three selected states in Northeastern Nigeria	Analysis of variance (ANOVA)
Hypothesis 6: There is no significant difference in the livelihood status of the nomads across the three selected states in Northeastern Nigeria.	Analysis of variance (ANOVA)
Hypothesis 7: There is no significant relationship between respondents' monthly incomes from primary and secondary occupation and livelihood status	PPMC
Hypothesis 8: There is no significant relationship between the challenges faced by respondents and livelihood status	PPMC

CHAPTER FIVE

RESULTS AND DISCUSSION

This chapter presents and discusses the findings of the study as highlighted in the objectives and hypotheses of the study. It comprises of two sections: the first section discusses the analysis of the results using descriptive statistics, namely: frequency counts, means, percentages and pie charts, while the second section highlights the relationships between certain variables and the dependent variable based on the stated specific objectives and hypotheses of the study.

5.1. Research objective 1: Selected personal characteristics of respondents

The personal characteristics of respondents examined are: age, gender and marital status, highest level of education attained, household size, monthly income and sources of capital, amount sourced for the enterprise and membership of social groups.

5.1.1 Distribution of the respondents according to age

Table 5.1 shows that young people (less than 26 years old) constituted 12.8% of the respondents, 59.1% were between 16 and 46 years while only 3.3% were old (above 65 years). The mean age was 42 years (Table 5.1) which is similar to the mean age (40.96 years) reported by Makoti (2014) for rural households in Kenya. This implies that majority of the respondents were mature adults who were within the labour force bracket who could both identify the challenges that drought poses to their livelihood and also employ various strategies to cope with them. In spite of the advantage of a large work force, providing for young dependents and many elderly people (above 65 years) is likely to strain the labour force and consequently cause them to tire out early, thus adding to the high number of dependents in the society.

Table 5.1: Age of Respondents (N=326)

Age group(years)	Frequency	Percentage	Mean	Standard Deviation
16 - 25	42	12.8	41.9479	13.1517
26 - 35	82	25.0		
36 - 45	70	21.3		
46 - 55	79	24.9		
56 - 65	42	12.7		
66 - 75	11	3.3		
Total	326	100		

Source: Field Survey, 2013

5.1.2. Distribution of Respondents by Gender and Marital Status

Table 5.2 shows that most (90.8%) of the nomads were male. The large number of male respondents was due to their availability for interview unlike their female counterparts who were mostly engaged in the sale of processed milk products at markets. The FGD revealed that culturally the Fulani womenfolk commute and trek long distances to village markets and markets of neighboring towns to sell the milk produced by the cattle while the menfolk concentrate on taking the herd out in search of pasture and water. Table 5.2 shows that majority (91.1%) of the respondents were married. This is probably indicative of a high value attached to the marriage relationship in the study area. It is logical to suppose that when the men are on nomadic trips, the women were needed to maintain the home fronts. In addition, married individuals are likely to be more responsible and use their income for feeding the family unlike single or divorced individuals who may consider only their individual wellbeing. This is similar to the finding of Yohanna (2013) who found that majority (69%) of the farmers in Adamawa state were married.

5.1.3 Distribution of respondents by household size

Respondents' number of children and number of dependents are shown in Table 5.3. The respondents' mean number of children was six while the mean number of dependents was three (Appendix 3). The FGD revealed that Fulani households have more female children than male children in the ratio of three females to one male child. The respondents' number of wives is presented in Table 5.3. Most (62.6%) of the pastoralists had only one wife, some (31.0%) had two wives each while a few (6.4%) had between three and five wives each. The mean household size of the respondents was eleven, comprising of one man, one wife, six children and three dependents. These are similar to the findings of Otufale (2010) with household size of 5-9 persons. The FGDs revealed that the Fulani nomads use migration to cope with increasing large households. Gbetibouo (2009) asserts that household size enhances farmers' adaptive capacity to respond to climate change.

The pastoralists in the study area are likely to intensify their involvement in livelihood activities in order to provide for their large family needs. There is an expected continued pressure on the stock of natural capital in the region as the household heads strive to provide for their households. Although large household size indicates high dependency on the working class, it may enhance the household's capacity to cope with frequent drought.

Table 5.2: Distribution of respondents by gender and marital status (N=326)

Category	Frequency	Percent
Gender		
Male	296	90.8
Female	30	9.2
Marital Status		
Married	297	91.1
Single	24	7.4
Widow	2	0.6
Divorced	3	0.9

Source: Field Survey, 2013

Table 5.3: Respondents' total number of children, dependents and wives (N=326)

Category	Frequency	Percent	Mean	Standard Deviation
Number of Children			6.3838	3.9874
1-5	149	45.7		
6-10	106	32.4		
11-15	32	9.8		
16-20	10	3.0		
No. of Dependents			2.7708	1.6030
1-2	82			
3-4	41			
5-6	17			
7-8	4			
No. of wives				
1	186	62.6	1.4684	0.6903
2	93	31.0		
3	16	5.1		
4	4	1.0		
5	1	0.3		

Source: Field Survey, 2013.

5.1.4 Respondents' highest level of education

The educational attainment of the respondents is presented in Table 5.4. Majority (81.3%) of the respondents did not have formal education. Only 4.3% of the respondents had undergone adult education, 7.1% had primary education and 6.1% had secondary education while 1.3% reported that they attained post-secondary education. These are at variance with the findings of some authors: Makoti (2014) found that only 38.3% of the sampled respondents had no formal education, 38.4% had up to primary education and 16.7% completed high school while Yanda and William (2010) found that 46% had no formal education while 48.5% had primary education; Okoro and Odebode (2009) found that about 49% of the respondents had no formal education, 34% had between 1 and 6 years of formal education while 13.5% had between 7 and 12 years of formal education. Barret *et al.*, (2001) assert that educational attainment provides one of the most important determinants of non-farm earnings especially in skilled employment in rural Africa. The low level of education of the nomads in the study area is likely to limit their diversification to more remunerative non-farm activities and this could encourage continued dependence on agriculture and environment-based activities, with more pressure on the land. Also, the nomads are not likely to be able to access improved coping strategies to drought which are formal education-oriented but may likely use local coping strategies which tend to be time consuming.

5.1.5 Distribution of respondents by occupation

Table 5.5 shows that majority (77.7%) of respondents were primarily engaged in animal husbandry (either as pastoralists or in livestock rearing), 20.8% in farming and 1.2% in civil service. The respondents had been involved in these primary means of livelihood for an average of 23.5 years (Appendix 3). The respondents engaged in a variety of secondary occupation: farming (62.4%); livestock rearing (20.8%); gathering firewood (20.8%); house help (28.8%), hair making (11.9%); butchering (10.2%); honey collection (10.2%), *Zana* weaving (8.5%) and selling *Nunu* (8.5%). These findings are similar to those of Makoti (2014) that respondents' primary occupation included livestock production (80%) and crop production (13.3%). These findings agree with various authors that the main strategy for reducing climate risks is to diversify production and livelihood system (Rudolf and Hermann, 2009; Molua, 2008; and Datta *et al.*, 2003). Ofuaku (2011) found that high financial responsibilities reflected in engaging in many farming activities.

Table 5.4: Respondents' educational attainment (N=326)

Educational Attainment	Frequency	Percent
Non formal	265	81.3
Adult education	14	4.3
Primary education	23	7.1
Secondary education	20	6.1
Post-secondary education	4	1.3

Source: Field Survey, 2013.

Table 5.5: Occupation of Respondents (N=326)

Occupation of Respondents	Frequency	Percent
Primary Occupation		
Pastoralists	127	39.0
Livestock rearing	126	38.7
Farming	68	20.8
Fishing	1	0.3
Civil service	4	1.2
Secondary Occupation*		
Farming	156	62.4
Livestock rearing	52	20.8
Gathering firewood	52	20.8
Trading	3	1.2
Civil service	14	5.6
Rope making	2	0.8
Other Secondary Occupation		
Butchering	6	10.2
Fishing	4	6.8
Hair making	7	11.9
Honey collection	6	10.2
Zana weaving	5	8.5
House help	17	28.8
Mechanic	3	5.0
Security officers	2	3.3
Selling <i>Nunu</i>	5	8.5
Sewing	4	6.8

*Multiple responses

Source: Field Survey, 2013

The FGDs also revealed that the primary occupation of the Fulani people is cattle rearing for milk production, milk sale and cattle marketing. Also, that sheep, goat and poultry rearing are secondary occupation engaged in to buffer the earnings from cattle rearing.

5.1.6 Distribution of respondents by monthly income

The mean monthly incomes from primary and secondary occupations were N32, 953.10 ± 48345 and N29, 978.86 ± 29965, respectively (Appendix 3). Majority (54.2%) earned below N20, 000; (20.9%) earned between N20, 001 and N40, 000; 19.1% earned between N40, 001 and N100, 000 while 5.8% earned above N100, 000 from their primary occupation. Most of the respondents (51.1%) earned below N20, 000; many (36.6%) earned between N20, 001 and N60, 000; 5.4% earned between N60, 001 and N100, 000 while 6.9% earned above N100, 000 from secondary occupations (Table 5.6). These findings are similar to those of Okoro and Odebode (2009) where 97% had monthly income below N20, 000.00. This implies that respondents' purchasing power is low especially during drought driven food insecurity where prices of foodstuff hike. Low occupational income implies low purchasing power and low savings which will increase the nomads' vulnerability and render them unable to cope with drought effectively. The findings suggest that most of the nomads may be living below poverty line and may consequently intensify environmental exploitation while trying to meet household livelihood needs.

5.1.7 Distribution of respondents by sources of capital for their enterprise

Fig. 5.1 shows that many (43.0%) of the respondents got capital for their enterprises through inheritance and 31.0% used personal savings which may be because both sources of income do not require paying back debts. Some (12.0%) sourced capital from friends and relatives which might be due to the ease of paying back loans to people they have cordial relationships with. Few respondents (8.0% and 6.0%) sourced funds through cooperative societies and money lenders, respectively. This might be due to bottlenecks involved with sourcing loans from corporate bodies, such as, collaterals and high interest rates. These are similar to findings of Makoti (2014) where the respondents sourced income through remittances/support from relatives (56.7%), Government subsidies or assistance (63.3%), from friends & relatives (35.8%) and waged labour (73.3%).

Table 5.6: Respondents' Monthly Income from Primary and Secondary Occupations (N=326)

Monthly Income	Primary Occupation		Secondary Occupation	
	Freq.	Percent	Freq.	Percent
Below N20,000	150	54.2	67	51.1
N20,001-N40,000	58	20.9	24	18.3
N40,001-N60,000	22	7.9	24	18.3
N60,001-N80,000	18	6.5	4	3.1
N80,001-N100,000	13	4.7	3	2.3
Above N100,000	16	5.8	9	6.9
Total	277	100.0	131	100.0

Source: Field survey, 2013

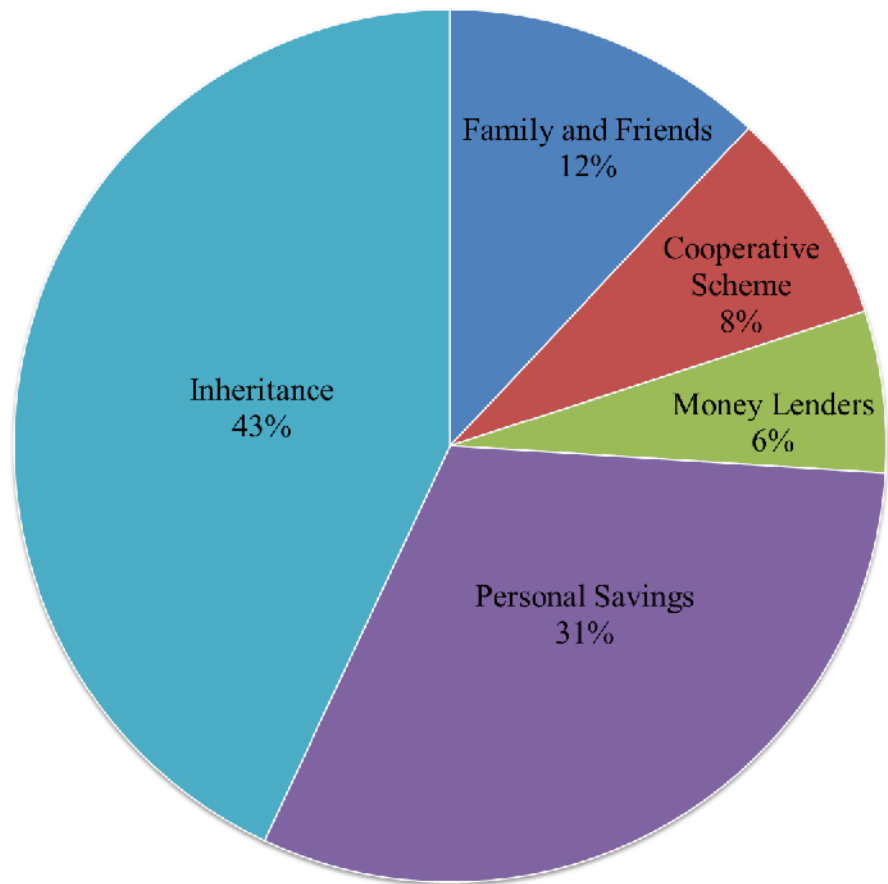


Fig. 5.1: Sources of Capital

5.1.8 Amount Sourced by Respondents for their enterprise

Table 5.7 shows that many (45.6%) of the respondents sourced for below N20, 000; many (46.9%) sourced for between N20, 001 and N60, 000; a few (3.7% and 3.8%) sourced for between N60, 001 and N100, 000 and over N100, 000 respectively, for their enterprise . The mean amount sourced by respondents for their enterprise was N39, 001.90 (Appendix 3). The low amount sourced by respondents may be due to their low level of income and invariably a low capacity to pay back loans. It may also be due to the bottlenecks involved in getting loans such as high interest rates. Low amounts of income sourced by the nomads imply that they might not be able to expand and develop their enterprises.

5.1.9. Demography and Population

The average Fulani settlement is a rural one with clusters of mud houses scattered around the settlement. The Fulani live in clusters of large extended households comprising of small nuclear families living together with uncles, aunties, cousins and grandparents. The number of huts in each cluster depends on the size of the extended family. The population of an average Fulani settlement is about 800 people, made up of an average of forty households. The Focus Group Discussion (FGD) revealed that an average household was made up of twenty members with more female members than male members in the ratio of three to one.

5.1.10. Land Ownership and Migration Patterns

The Focus Group Discussion (FGD) revealed that the Fulani people in the study area are semi-nomads that migrate in cycles. The land on which they settle is communally owned. The community in which they settle allows them to farm and rear their cattle and other livestock on the land until they migrate to another settlement. The FGD revealed that the Fulani settle in a place for an average of twenty years but within that period, nuclear family units from the extended family migrate with some cattle to other locations with better feeding conditions for the cattle. The smaller migrant nuclear family units that migrate settle in the new area for up to five years where their family size increase and they multiply their herds. After they have increased they return to the extended family settlement. They keep migrating in this cycle with the younger nuclear family units breaking out from the extended family again with some cattle.

Table 5.7: Amount sourced by respondents for enterprise (N=326)

Amount sourced	Frequency	Percentage
Below N20,000	36	45.6
N20,001-N40,000	24	30.4
N40,001-N60,000	13	16.5
N60,001-N80,000	1	1.2
N80,001-N100,000	2	2.5
Above N100,000	3	3.8
Total	79	100.0

Source: Field Survey, 2013



Plate 1: Focus Group Discussion with Fulani Milk sellers at an Adamawa Market (2015)

5.2 Objective 2: Access to capital assets

Many (56.7%) nomads had low level access to all capital assets as shown in Table 5.12. This confirms that the building blocks upon which the nomads fashion their livelihood is weak. This predicts that the livelihoods of the nomads in the study area are not sustainable.

5.2.1. Distribution of respondents by membership and leadership of social groups

Table 5.8 shows that many (52.0%) of the respondents were members of social groups: most (56.0%) of them belonged to the association of cow rearers while 25.0% and 10.0% belonged to cooperative societies and thrift groups respectively. These have a semblance with the findings of Akeweta, Oyesola, Ndaghu and Ademola (2014) that rural dwellers are more associated with religious groups than economic groups like cooperative society. Some (30.0%) of the members of social groups led their groups and most (80.0%) of these have led their groups for between two to five years (Table 5.8).

5.2.2. Distribution of respondents by human capital

Table 5.9a shows the respondents' forms of human capital. Many (57.4%) of the respondents were self-employed; 42.6% were paid in cash for their labour; 19.6% were employers of labour and 26.1% stated that their household members were hired for work. Table 5.9b shows the number of skills that respondents' households have. Out of the eight skills tested: 64.7% respondents' household members were engaged in 1-2 skills; 6.7% were engaged in 3-4 skills; 4.6% were engaged in 5-6 skills; 1.8% were engaged in 7-8 skills while 19.3% respondents' household members have none of the eight skills and 2.7% household members had other skills. Table 5.12 shows that majority (65.6%) of the nomads had low level of access to human capital. These corroborate the findings of the Oyesola and Ademola (2011) that majority (73%) of the respondents had a low level of human capital. The respondents' low level of human capital is largely due to their low level of educational attainment.

Table 5.8: Respondents' membership and leadership of social groups (N=326)

	Yes	
	Frequency	Percent
Do you belong to a social group?	169	52.0
If yes, which ones?		
Cooperative society	42	25.0
'Adashe' thrift group	16	10.0
Cultural group	26	15.0
Milk sellers' association	2	1.0
Association of cow rearers	95	56.0
Do you lead any groups you belong to?	50	30.0
If yes, for how many years?		
<2years	1	2.0
2-5 years	40	80.0
6-10 years	7	14.0
>10 years	2	4.0

Source: Field Survey, 2013

Table 5.9a: Distribution of respondents by forms of human capital (N=326)

	Yes	
	Frequency	Percent
Are you self-employed?	177	57.4
Are you paid in cash for your labour?	139	42.6
Are you an employer of labour?	64	19.6
Are your household members hired for work?	85	26.1
How often are your household members hired?		
Not at all	241	73.9
Rarely	12	3.7
Often	73	22.4

Source: Field Survey, 2013

Table 5.9b: Distribution of respondents by household members' number of skills (N=326)

Number of skills	Frequency	Percent
None	63	19.3
1-2	211	64.7
3-4	22	6.7
5-6	15	4.6
7-8	6	1.8
Above 8	9	2.7

Source: Field Survey, 2013

5.2.3 Access to and ownership of natural capital and frequency of access

The respondents' access to natural capital is shown in Table 5.10a. Majority (74%) of the respondents had access to water and majority (86%) had access to pasture lands. Table 5.10b shows the frequency of respondents' access to natural capital. Out of the respondents with access to water: 63% often had access while 11% rarely had access to water. Out of the respondents with access to pasturelands: majority (74%) of them often had access while 12% rarely had access. Table 5.11 shows that many (58%) of the respondents own farmlands, some (15%) own pasture lands while few (9%) own wells. Most of the respondents often had access to water and pasturelands but only few actually own wells and pastureland. This is most likely because the available wells, water sources and pasturelands dry out due to unstable rains and then they move around in search of these resources far away from their homesteads. Table 5.12 shows that majority (60.7%) of the respondents had high level of access to natural capital which is similar to the findings of Adi (2007) who observed that majority of people in rural and peri-urban areas had rich natural capital that shapes their livelihood activity choices in the direction of agriculture. The result contrasts the finding of Oyesola and Ademola (2011) and Iwachukwu, Nwankwo and Igbokwe (2014) that majority of the respondents had low access to natural capital.

5.2.4 Access to and ownership of physical capital and frequency of access

The respondents' access to physical capital is shown in Table 5.10a. Majority (61%) of the respondents had access to bicycles, majority (69%) had access to motorcycles and 27% had access to electricity while 23% had access to rented living quarters. The respondents' frequency of access to physical capital is shown in Table 5.10b. Out of the respondents with access to bicycles: 53% often had access while 8% rarely had access. Out of the respondents with access to motorcycles: 62% of them often had access while 7% rarely had access. Out of the respondents with access to electricity: 22% of them often had access while 5% rarely had access. Table 5.11 shows that majority (73%) of the respondents owned houses; 28% owned livestock; 21% owned equipment and 9% owned cars while 29% owned bicycles and 45% owned motorcycles.

The houses owned by the Fulani are made from mud bricks and thatch which are readily available in the study area and built for protection from the elements of weather and are

not evidence of wealth in the study area. Livestock on the other hand are considered as a source of wealth in the study area. During the FGD, some discussants stated that “*we Fulani people consider our cattle as a source of wealth*” and that “*ownership of cattle is a symbol of wealth*”, and “*Our cattle are our bank*”. The findings of the study showed that more than two thirds of the respondents did not own livestock implying that most of the Fulani are not wealthy judging by the peoples’ own standard.

Many of the respondents had access to and even owned motorcycles which have economic value because they are used as public transport to commute people between the villages in which they settle and the nearby towns in order to buy household goods which are not readily available in the villages. Many of the respondents had access to bicycles but only some of them actually owned bicycles which are used for transporting personal belongings like firewood between farmsteads and homesteads. Table 5.12 shows that most (59.5%) of the respondents had high level of access to physical capital while 40.5% had low level. The result is in contrast with the findings of Ebitigha (2008) that access to productive equipment is low in southwestern Nigeria.

5.2.5 Access to financial capital and frequency of access

The respondents’ access to financial capital is shown in Table 5.10a. Some (24%) of the respondents had access to loans/credit while few (10%) had access to allowances from family. Table 5.10b shows the respondents’ frequency of access to financial capital. Out of the respondents with access to loans/ credit: 19% often had access while 4% rarely had access. Table 5.12 shows that majority (75.2%) of respondents had low level of access to financial capital. The result is in contrast to the findings of Oyesola and Ademola (2011) who reported an appreciably high level of access (60.2%) to financial capital.

5.2.6 Access to drought warning systems

The respondents’ access to drought warning systems is shown in Table 5.10a. Many (50.3%) of the respondents had access to one form of drought warning system or the other. Majority (74.0%) had access to news media as a warning system about drought; 33.0% had access to extension agents to warn them about drought while 20.0% and 24.0% used their own personal experience and traditional institution respectively, as drought warning systems.

Table 5.10a: Access to various natural, physical and financial capital (N=326)

Do you have access to the following:	Yes	
	Frequency	Percent
Natural Capital		
Water	240	74.0
Pasture land	282	86.0
Physical Capital		
Bicycles	198	61.0
Motorcycles	225	69.0
Electricity	89	27.0
Rent living quarters	75	23.0
Financial Capital		
Loans/credit	78	24.0
Allowances from family	31	10.0
Drought warning system		
Do you have access to drought warning systems?	164	50.3
Which ones?*		
News media	121	74.0
Extension agents	55	33.0
Personal experience	33	20.0
Traditional institution	39	24.0

Table 5.10b: Frequency of access to natural, physical and financial capital (N=326)

Frequency of access to capital	Not at all		Rarely		Often	
	F	%	F	%	F	%
Natural Capital						
Water	86	26	35	11	205	63
Farm/Pasture land	44	14	39	12	243	74
Physical Capital						
Bicycles	128	39	25	8	173	53
Motorcycles	101	31	23	7	202	62
Electricity	237	73	16	5	73	22
Financial Capital						
Loans /credit	248	76	14	4	64	19

Source: Field Survey, 2013

Table 5.11: Ownership of some capital assets (N=326)

	Yes	
	Frequency	Percent
Do you own capital assets?	222	68.0
Which ones?*		
Natural Assets		
Farmland	128	58.0
Pasture land	33	15.0
Well	19	9.0
Physical Assets		
House	161	73.0
Store houses	3	1.0
Bicycle	65	29.0
Motorcycle	100	45.0
Livestock	62	28.0
Equipment	46	21.0
Motor cars	20	9.0
Handset	5	2.0
Radio	1	0.5
Generating set	1	0.5

*Multiple responses

Source: Field Survey, 2013.

Table 5.12: Distribution of respondents by level of capital assets (N=326)

Level of capital	Frequency	Percent	Mean	Standard Dev.
Human/Social capital			5.6166	7.44603
Low (0.00-5.61)	214	65.6		
High (5.62-47.00)	112	34.4		
Natural capital			5.6012	2.64294
Low (0.00-5.59)	128	39.3		
High (5.60-8.00)	198	60.7		
Physical capital			6.8988	4.19951
Low (0.00-6.89)	132	40.5		
High (6.90-15.00)	194	59.5		
Financial capital			1.3344	1.75636
Low (0.00-1.32)	245	75.2		
High (1.33-6.00)	81	24.8		
Total capital assets				
Low (1-19.44)	185	56.7	19.4509	9.99519
High (19.45-61.00)	141	43.3		

Source: Field Survey, 2013

5.3. Objective 3: To enumerate respondents' livelihood activities in dry and rainy seasons

The types of farm-related and non-farm-related livelihood activities used by the nomads in the study area, and the frequency of use during both dry and rainy seasons are shown in Tables 5.13, 5.14, 5.15 and 5.16a, while the overall level of use is shown in Table 5.16b. The FGDs revealed that the nomads' livelihood activities were gender specific. The male household members were involved in feeding and herding cattle while the females were involved in processing and selling of milk and milk products. Most of the nomads' livelihood activities hardly meet most of their immediate needs. Efforts to meet the immediate needs of the people result in further exploitation of the environment with no regards to its long-term effects. This pressure on the land and other natural resources reduces the sustainability of the environment and agriculture.

5.3.1. Farm-related livelihood activities during the dry season

Table 5.13 shows that majority (74%; 80%; 77%; 74%) of the respondents were mostly involved in rearing cattle, sheep, goats and local chicken, respectively; some (46% and 39%) were mostly involved in rearing guinea fowls and ducks, respectively in the dry season. Many of the respondents were also involved to various degrees in processing of dairy products: 61% in *Nunu* (milk), 56% in *kindirimu* (yoghurt) and 57% in *Mai n Sanu* (butter), respectively. Table 5.16b shows that many (53%) of the respondents had a high level of use. of the 18 farm related livelihood activities. The FGDs revealed that the Fulani engage in cattle rearing as their major occupation; the male members herd and feed the cattle while the female members process and sell the milk products from the cattle. The FGDs also revealed that the Fulani households rear sheep, goats, local chicken and guinea fowls as a secondary means of income. In the FGDs, some women said “*we sell our sheep, local chicken, guinea fowls and goats to get money to spend*” implying that raising and sale of sheep, local chicken, guinea fowls and goats is a means of coping with the raising of cattle that is time intensive and only yields dividends in the long run. Diversifying into raising and selling other livestock is largely a buffer for raising cattle and may be a form of risk coping mechanism. This is in line with the study of Sodiya *et al.*, (2008) that agro-pastoralist households engage in the rearing of cattle, sheep, poultry and crop production.

Table 5.13: Distribution of respondents by frequency of engagement in farm-related livelihood activities during the dry season (N=326)

SN	Farm-related livelihood activities	Not at all		Rarely		Mostly	
		F	%	F	%	F	%
1	Rearing Cattle	52	16	33	10	241	74
2	Rearing local chicken	21	6	65	20	240	74
3	Rearing guinea fowls	123	38	54	16	149	46
4	Rearing ducks	140	43	61	18	125	39
5	Rearing sheep	40	12	22	7	264	80
6	Rearing goats	45	14	30	9	251	77
7	Processing milk (<i>Nunu</i>)	126	39	43	13	157	48
8	Processing yoghurt (<i>Kindirimu</i>)	143	44	42	13	141	43
9	Processing butter (<i>Mai'nSanu</i>)	141	43	48	15	137	42
10	Processing cereal cakes (<i>Fura</i>)	193	59	35	11	98	30
11	Gathering firewood	71	22	39	12	216	66
12	Wildlife hunting	170	52	57	18	99	30
13	Gathering of wild plants	115	35	49	15	162	50
14	Fish capture	274	84	13	4	39	12
15	Selling of fish	277	85	11	3	38	12
16	Planting of cereals	218	67	13	4	95	29
17	Planting of vegetables	194	60	28	8	104	32
18	Bee farming/ honey production	282	86	8	3	36	11

Source: Field Survey, 2013

5.3.2 Farm-related livelihood activities during the rainy season

Table 5.14 shows the respondents' frequency of use of the farm-related livelihood activities engaged in during the rainy season. Majority (65%; 64%; 61%) of the respondents were mostly involved in rearing cattle, sheep and goats respectively; some of the respondents also kept various types of domestic birds during the rainy season: 50%, 43% and 37% were mostly involved in rearing local chicken, guinea fowls and ducks, respectively. Many of the respondents were also involved to varying degrees in processing of dairy products: 55% in *Nunu* (milk), 50% in *kindirimu* (yoghurt) and 49% in *Mai'nSanu* (butter) respectively. Table 5.16b shows the respondents' level of engagement in all the 18 farm related livelihood activities tested. Many (59%) of the respondents had a high level of use of the livelihood activities implying that most of the respondents used most of the tested livelihood activities during the rainy season. The findings are in tandem with Molua (2008) and Apata, Samuel and Adeola (2009) who found that the main strategy for reducing risks and shocks such as drought was to diversify livelihood system and production.

5.3.3 Non-farm related livelihood activities during the dry season

Table 5.15 shows the respondents' frequency of engagement in the non-farm related livelihood activities during the dry season. During the dry season: 48% of the respondents were mostly involved as domestic help (items 10-11), 41% were mostly involved in various handcrafts (items 5-9) while 14% were artisans (items 12-16). The FGDs revealed that male and female household members had distinct and different livelihood activities. The male household members were involved in handcrafts while the females were employed as domestic help. Table 5.16b shows that majority (71%) of the respondents had a low level of engagement in non-farm related activities implying that most of the respondents did not use many of the tested non-farm livelihood activities in the dry season. Mudzonga (2011) advanced that mitigating the adverse effects of climate change goes beyond diversification alone and that extension, credit service, market, technology and access to assets are critical for helping African farmers to adapt to climate change.

5.3.4 Non-farm-related livelihood activities during the rainy season

Table 5.16a shows the respondents' frequency of engagement in the non-farm related livelihood activities during the rainy season. During the rainy season: 38% of the

respondents were mostly involved as domestic help (items 10-11), some (21%) of the respondents were involved in various handicrafts (items 5-9) while few (14%) were involved in artisanship (items 12-16). Table 5.16b shows that many (55%) of the respondents had a low level of engagement in non-farm related activities implying that most of the respondents did not use many of the tested non-farm livelihood activities in the rainy season.

Table 5.14: Distribution of respondents by frequency of engagement in farm-related livelihood activities during the rainy season (N=326)

SN	Farm-related livelihood activities	Not at all		Rarely		Mostly	
		F	%	F	%	F	%
1	Rearing Cattle	98	30	16	5	212	65
2	Rearing local chicken	83	25	82	25	161	50
3	Rearing guinea fowls	129	40	56	17	141	43
4	Rearing ducks	147	45	58	18	121	37
5	Rearing sheep	94	29	22	7	210	64
6	Rearing goats	105	33	20	6	201	61
7	Processing milk (<i>Nunu</i>)	135	41	13	4	178	55
8	Processing yoghurt (<i>Kindirimu</i>)	152	47	10	3	164	50
9	Processing butter (<i>Mai'nSanu</i>)	154	47	13	4	159	49
10	Processing cereal cakes (<i>Fura</i>)	214	66	14	4	98	30
11	Gathering firewood	140	43	19	6	167	51
12	Wildlife hunting	218	67	29	9	79	24
13	Gathering of wild plants	175	53	31	10	120	37
14	Fish capture	278	85	9	3	39	12
15	Selling of fish	281	86	16	5	29	9
16	Planting of cereals	143	44	24	7	159	49
17	Planting of vegetables	175	54	25	7	126	39
18	Bee farming/ honey production	284	87	11	3	31	10

Source: Field Survey, 2013

Table 5.15: Distribution of respondents by frequency of engagement in non-farm related livelihood activities during the dry season (N=326)

SN	Non-farm related livelihood activities	Not Involved		Rarely		Mostly	
		F	%	F	%	F	%
1	Making of pots	301	92	8	3	17	5
2	Renting out pots	308	94	8	3	10	3
3	Selling of pots	300	92	12	4	14	4
4	Selling used plates and pans	309	95	7	2	10	3
5	Weaving mats (<i>Zana</i>)	252	78	11	3	63	19
6	Hair weaving/barbing	277	85	7	2	42	13
7	Tie-Dye	311	95	6	2	9	3
8	Knitting/ Sewing clothes	309	95	6	2	11	3
9	Drawing and art work	310	95	6	2	10	3
10	Night guard	287	88	7	2	32	10
11	House help	184	57	17	5	125	38
12	Manicuring nails	311	95	8	3	7	2
13	Shoe repairs (Cobbler)	311	95	6	2	9	3
14	Carpentry	312	96	4	1	10	3
15	Bricklaying	314	96	3	1	9	3
16	Blacksmithing	313	96	3	1	10	3

Source: Field survey, 2013

Table 5.16a: Distribution of respondents by frequency of engagement in non-farm-related livelihood activities during the rainy season (N=326)

SN	Non-farm related livelihood activities	Not at all		Rarely		Mostly	
		F	%	F	%	F	%
1	Making of pots	308	95	4	1	14	4
2	Renting out pots	315	97	7	2	4	1
3	Selling of pots	313	96	6	2	7	2
4	Selling used plates and pans	315	97	4	1	7	2
5	Weaving mats (<i>Zana</i>)	296	91	10	3	20	6
6	Hair weaving/barbing	299	92	7	2	20	6
7	Tie-Dye	308	95	4	1	14	4
8	Knitting/ Sewing clothes	310	95	10	3	6	2
9	Drawing and art work	313	96	3	1	10	3
10	Night guard	303	93	10	3	13	4
11	House help	211	65	4	1	111	34
12	Manicuring nails	311	95	3	1	12	4
13	Shoe repairs (Cobbler)	309	95	11	3	6	2
14	Carpentry	321	97	3	1	2	0
15	Bricklaying	310	95	9	3	7	2
16	Blacksmithing	318	98	4	1	4	1

Source: Field survey, 2013

Table 5.16b: Level of engagement in farm-related and non-farm-related livelihood activities in the study area during the dry and rainy seasons (N=326)

Livelihood activities	Season	Level of engagement	Freq.	%	Mean	Std. Dev.
Farm-related	Dry	Low (0.00-22.44)	152	47	22.45	9.29
	Dry	High (22.45-46.00)	174	53		
	Rainy	Low (0.00-21.48)	135	41	21.49	12.86
	Rainy	High (21.49-46.00)	191	59		
Non-farm-related	Dry	Low (0.00-3.70)	232	71	3.71	6.70
	Dry	High (3.71-81.00)	94	29		
	Rainy	Low (0.00-2.41)	180	55	2.42	4.39
	Rainy	High (2.42-35.00)	146	45		

Source: Field Survey, 2013.

5.4. Objective 4: Examine the livelihood capabilities of the nomadic households

The respondents' livelihood capability for this study comprises the household size, the age of household members, and highest educational level attained and skill level of household members. Table 5.17 shows the respondents' level of livelihood capabilities. Majority (62.3%) of the respondents had low household capability (5.00-25.17) while 37.7% had high household capability (25.18-83.00). The low household capability of the nomads is directly related to their low skill level. The result implies that most of the members of the nomadic households in the study will not be employed as skilled labour. This will reduce the nomads' opportunity for higher remunerations when they diversify into various livelihood activities. The results corroborate the findings of Oyesola and Ademola (2011) who reported that majority of the respondents had low levels of livelihood abilities but contradict Ewebiyi (2012) who stated that rural dwellers have a high level of livelihood ability.

5.5. Objective 5: Respondents' level of perception of effects of drought

Table 5.18 shows the respondents' level of perception of the effect of drought. Many (52.1%) of the respondents had favourable perception (95.92-118.00) of the effect of drought on their livelihood while 47.9% had unfavourable perception (40.00-95.91).

5.5.1 Perceived impact of alterations in rainfall patterns and water levels on livelihood

Table 5.19 shows that majority (82.6%) of the respondents noticed major alterations in rainfall pattern/water level over the years and they all (82.6%) stated that the alterations had negative impact on their livelihood. The impacts of fluctuating rainfall patterns observed in this study are similar to the findings of a study by Fasona, Fabusoro, Sodiya, Adedayo, Olorunfemi, Elias, Oyedepo, and Oloukoi (2016) on Nigerian savannah regions, stating that vulnerability of the Fulani pastoralists and their herds to climate change depend significantly on the seasonal fluctuations in rainfall. It in turn affects the growth of pasture and availability of water for animals and by extension, the grazing distance. On the other hand, Apata *et al.* (2009) observed the contrary among arable crop farmers in Southwestern Nigeria; many (82%) of who attributed low yields to soil infertility rather than to climate change.

The respondents' perceived impacts include: hunger (58.6%), poverty (57.6%), conflicts (24.2%), and disease (11.6%). The FGDs revealed that Fulani households depend to a large extent on the sale of milk products for their livelihood. Some women stated during the FGD that "too much sunshine reduces the milk produced by our cattle" and "the milk produced by our cattle has greatly reduced because of frequent lack of rainfall and has reduced what we earn from milk products". The FGDs revealed that drought has led to drying up of many water sources in the area, forcing them to walk long distances of over 10kms in search of water for both livestock and domestic use. This has resulted in wasted man hours that could have been put into productive activities for better livelihood prospects. Conflicts also occurred due to dwindling communal resources like pasture and water. The implications of reduced rainfall are dry and degraded pastures and farm lands which lead to loss of livelihoods which according to Norhasmah *et al.*, (2010) cause rural populace to become vulnerable to food insecurity, malnutrition, disease and food insecurity.

5.6. Objective 6: Examine the number of coping strategies used by nomads

Table 5.20a shows the number of coping strategies used by the respondents. Out of the 22 non-food related strategies tested: most (53.6%) of the respondents used 1-5; many (33.9%) used 6-10; while 10.3% used 11-20 strategies. Out of the thirteen food related strategies tested: most (54.6%) used 1-5 while many (30.6%) used 6-10. Out of the three environment related coping strategies tested: 25.5% used only one; 40.5% used two while 13.5% used the three. Out of the total (38) strategies tested: majority (51.8%) of the respondents used 1-10; many (36.9%) used 11-20 while few (11.3%) used over 20 strategies in order to handle the incidence of drought. Table 5.20b shows that most (63.5%) of the respondents had a low (1-12.20) level of use of the 38 coping strategies tested, indicating that they do not use many of the coping strategies. The results point to the fact that the respondents employed one form of coping strategy or the other in order to handle the incidence of drought.

Table 5.17: Distribution of respondents by household capability level (N=326)

Household capability	Frequency	Percent	Min.	Max.	Mean	Std. Dev.
Low (5.00-25.17)	203	62.3	5.00	83.00	25.18	17.22
High (25.18-83.00)	123	37.7				

Source: Field Survey, 2013.

Table 5.18: Respondents' level of perception of the effect of drought (N=326)

Perception level	Frequency	Percent	Min.	Max.	Mean	Std. Dev.
Unfavourable (40.00-95.91)	156	47.9	40.00	118.00	95.92	10.24
Favourable (95.92-118.00)	170	52.1				

Source: Field Survey, 2013

Table 5.19: Nomads' Perceived impacts of alterations in rainfall/water levels on livelihood (N=326)

	Yes	
	Freq.	%
Have you noticed major alterations in rainfall patterns/water levels?	219	67.2
Are these alterations having negative impacts on your livelihood?	219	67.2
In what ways?*		
Conflicts	48	22.0
Poverty	114	52.1
Disease	23	10.5
Hunger	116	53.0
Other negative impacts:		
No other negative impact	312	95.7
No/Less grazing land	6	1.9
Flood	4	1.2
Lack of water	4	1.2

Source: Field Survey, 2013

Table 5.20a: Number of coping strategies used by the respondents (N=326)

Number of coping strategies used	Frequency	Percent
Non Food related strategies		
None	3	0.9
1-5	175	53.6
6-10	110	33.9
11-15	21	6.4
16-20	13	3.9
Above 20	4	1.2
Food related strategies		
None	35	10.7
1-5	178	54.6
6-10	100	30.6
Above 10	13	3.9
Environmental Related Strategies		
None	67	20.6
1	83	25.5
2	132	40.5
3	44	13.5
Total number of strategies used		
1-10	169	51.8
11-20	120	36.9
21-30	27	8.2
Above 30	10	3.1

Source: Field Survey, 2013

Table 5.20b: Respondents' level of use of coping strategies (N=326)

Level of use	Frequency	Percent	Min.	Max.	Mean	Std. Dev.
Low (1.00-12.20)	207	63.5	1.00	38.00	12.21	6.74
High (12.21-38.00)	119	36.5				

Source: Field survey, 2013

Table 5.20c shows the types of coping strategies used by respondents' and frequency of use. Out of the non-food strategies: 49% often relocated to houses with less rent; 46% often reared ducks for sale; 44% and 41% often bought second hand clothes for children and for self, respectively while 18% and 14% rarely donate blood and pawn/sell jewelries, respectively. These observations have a semblance to those of Norhasmah *et al.* (2010) among women from food-insecure households in Malaysia. There, respondents' coping strategies included: adjusting of life style, being thrifty, planning for expenditure, buying less expensive products or shopping at cheaper places, not attending parties, not giving gifts during parties or festivals and requesting money from relatives or friends during financial difficulty.

Out of the food-related strategies: 32% often gathered fruits from the wild; 27% often sent children to eat at parties; 26% often re-used groundnut oil used by friends; 23% often reduced number of meals while 21% often reduced the quantity of food served to the family daily; while 32% and 32% rarely gathered fruit and hunted birds or animals, respectively. Similarly, Norhasmah *et al.* (2010) observed coping strategies such as food stretching, food rationing, food seeking and food anxiety among women in Malaysia.

Out of the environmental strategies: many (54%) often practiced multi-cropping while 29% rarely planted trees around farms/ houses. Households engaged in customary farm-based livelihoods sourced for food externally or through social support during drought while those households with market-orientated livelihoods relied on the same economic activities regardless of drought.

These are similar to the findings of Berman, Quinn and Paavola (2013) that different hazards demand different strategies: savings and selling assets were more important during droughts than floods; that conserving assets during the wet season enabled households to sell them off during a drought and that where customary livelihoods were supplemented with livestock keeping, petty trading or service-based activities, households undertook social support and economic activities as flood coping strategies and labour exchange and social support during droughts. Mudzonga (2011) states that beyond diversification: extension, credit and market, technology and access to assets are all critical to mitigating adverse climate change effects. Berman, Quinn and Paavola (2013) also assert that the ability to engage in market-based activities determine

whether households could draw on financial capital during times of stress, and particularly whether they had to substitute financial capital based coping strategies with more human or social capital based ones.

5.7. Objective 7: Catalogue of respondents' challenges

5.7.1 Some factors/activities in which respondents faced challenges in the last five years

In the past five years, many of the respondents had experienced the following challenges: availability /provision of food (86%), quantity of pasture available for cattle (83%), quantity/quality of water{rain/well/rivers}(80%), soil fertility and crop yield (78%), household comfort and daily activities (76%), availability of firewood (74%), gathering of wild fruits/herbs (69%), availability/hunting of wildlife (63%), peace of the inhabitants of communities (67%) (Table 5.21). These results are similar to the findings of Makoti (2014) who identified crop failure (79%) and water scarcity (74%) as the most devastating effects of drought experienced by nomads in Kenya and that these led to food shortages.

5.7.2 Change in some factors/activities due to change in rainfall

Table 5.21 shows the response to the question: Was the change in tested factors due to a change in rainfall? Most (86%) considered change in availability/provision of food to be due to change in rainfall; 83% considered change in the quantity of pasture available for cattle to be due to change in rainfall; 78% considered change in the quantity/quality of water {rain/well/rivers} to be due to change in rainfall. Similarly, many (77%) considered change in soil fertility and crop yield to be due to change in rainfall; also change in household comfort and daily activities (73%), change in the availability of firewood (74%), change in gathering of wild fruits/herbs (69%); change in the availability/ hunting of wildlife (63%), and change in the peace of the inhabitants of communities (64%). These agree with Lambrou and Laub (2004) that land and water degradation impact poor rural dwellers because they depend on these for food and livelihoods.

Table 5.20c: Distribution of respondents by types of coping strategies used and frequency of use (N=326)

S/N	Coping strategies Do you do the following:	Not at all		Rarely		Often		F1+F2 (F3)
		F	%	F1	%	F2	%	
A Non –food related strategies								
1	Relocate to houses with less rent?	111	34	57	17	158	49	215
2	Buy second hand clothes for yourself?	89	27	102	32	135	41	237
3	Buy second hand clothes for your children?	90	28	92	28	144	44	236
4	Buy second hand kitchen items: plates, pots?	221	68	42	13	63	19	105
5	Buy goods on credit?	231	71	38	12	57	17	95
6	Delay paying for goods bought on credit?	258	79	28	9	40	12	68
7	Hide away from those you owe money?	278	85	29	9	19	6	48
8	Increase cash by begging for money?	274	84	22	8	30	9	52
9	Increase cash by gambling?	308	95	13	4	5	1	18
10	Pawn/sell your used plates?	297	91	22	7	7	2	29
11	Pawn/sell your used pots?	300	92	18	6	8	2	26
12	Pawn/sell your used gold?	275	84	36	11	15	5	51
13	Pawn/sell your used jewelries?	276	85	45	14	5	1	50
14	Pawn/sell your household furniture?	284	87	27	8	15	5	42
15	Donate your blood?	222	68	56	18	48	14	104
16	Get paid for donating your blood?	277	85	30	9	19	6	49
17	Make clay pots for your use?	288	88	23	7	15	5	38
18	Rent out your clay pots for money?	314	96	7	2	5	1	12
19	Make clay pots for sale?	294	90	14	4	18	6	32
20	Rear ducks for sale?	147	45	30	9	149	46	179
21	Migrate to other areas for better livelihood?	120	36	100	31	106	33	206
22	Store water for future use?	221	68	45	14	60	18	105
B Food related strategies								
		F	%	F1	%	F2	%	F3
1	Reduce quantity of food served family/meal?	189	58	69	21	68	21	137
2	Reduce no. of meals served to family/day?	183	56	68	21	75	23	143
3	Do you cook yam peels?	243	74	49	15	34	11	83
4	Do you eat expired food?	263	81	30	9	33	10	63
5	Do you gather fruits from the bush?	119	36	103	32	104	32	207
6	Do you gather mushrooms?	287	88	27	8	12	4	39
7	Do you hunt birds and animals in the wild?	169	52	104	32	53	16	157
8	Do you buy food on credit?	256	79	46	14	24	7	70
9	Do you re-use groundnut oil used by friends?	178	55	64	19	84	26	148
10	Do you lease land to produce food for family	195	60	73	22	58	18	131
11	Do you lease land to produce food for sale?	219	67	67	20	40	12	107
12	Do you send your children to eat at parties?	211	65	25	8	90	27	115
13	Sending children to eat in neighbors houses?	222	68	53	16	51	16	104
C Environmental Related Strategies								
		F	%	F1	%	F2	%	F3
1	Practice multiple cropping?	94	29	58	17	174	54	232
2	Plant trees around your farms and houses?	127	39	83	26	116	35	199
3	Practice irrigation?	278	85	25	8	23	7	48

Source: Field Survey, 2013

Table 5.21: Respondent' perception about environmental changes due to change in rainfall (N=326)

SN	Factors/Activities in which respondents face challenges due to drought spells	Have you experienced changes in the last 5yrs?		Was this change due to change in rainfall pattern?	
		Yes		Yes	
		F	%	F	%
1	Availability/Provision of food	281	86	281	86
2	Quantity of pasture available for cattle	269	83	269	83
3	Quantity/Quality of water (rain, well, river)	261	80	255	78
4	Soil fertility and crop yield	257	78	251	77
5	Household comfort and daily activities	246	76	237	73
6	Availability of firewood	241	74	241	74
7	Availability/Gathering of wild fruits/herbs	226	69	226	69
8	Availability/Hunting of wildlife	204	63	204	63
9	Peace of community /inhabitants	218	67	207	64

Source: Field Survey, 2013

5.7.3 Respondents' challenges associated with windstorms

Table 5.22 shows that in the last one year: many (49.7%) respondent's buildings and some (31.2%) respondents' livestock were destroyed by windstorms in the dry season while many (56.0%) respondents' buildings and most (67.3%) respondents' livestock were destroyed by windstorms in the rainy season. In the last two to five years: many (45.1%) respondents' buildings and some (31.3%) respondents' livestock were destroyed by windstorms in the dry season while many (48.2%) respondents' buildings and most (62.1%) respondents' livestock were destroyed by windstorms in the rainy season. In the last six to ten years, some (27.0%) respondents' buildings and few (15.8%) respondents' livestock were destroyed by windstorms in the dry season while some (28.5%) respondents' buildings and many (40%) respondents livestock were destroyed by windstorms in the rainy season. This study showed that many of the Fulani nomads' homes and barns were destroyed by windstorms. These results are similar to results of studies carried out by Olabode and Ajibade (2010) and Fiki and Lee (2004) in the guinea Savannah area of Kwara State, which reported that out of about 150 households interviewed, 22 reported losses of livestock while eight household from both sides reported loss of human lives.

The FGDs revealed that Fulani nomads often engaged in bush burning and cutting of trees. Some women stated that *“our men cut down the trees around our farms and homes so that the cattle can get fresh vegetation to eat”*, *“we prepare for the planting season by burning the bush near our houses and burning grass on our farms”*. Bush burning and cutting trees expose the ground cover to windstorms may lead to destruction of buildings and barns and invariably loss of capital assets and livelihoods. In the FGDs some stated *“we hide during windstorms”* but *“many of our family members get blind from the windstorms and from eye infections after”* revealing that windstorms pose as a health hazard to the nomads. The grazing of animals on limited pasture also exposes the ground cover and increases the tendency of soil erosion which will lead to the reduction of soil fertility and invariably lead to loss of livelihoods from the land which is a natural asset.

Table 5.22: Respondents' challenges associated with windstorms (N=326)

	DRY SEASON						RAINY SEASON					
	Not at all		Rarely		Often		Not at all		Rarely		Often	
	F	%	F	%	F	%	F	%	F	%	F	%
Have windstorms												
Destroyed buildings?												
In the last one year	97	50	56	29	40	21	85	44	63	33	45	23
In the last 2-5 years	106	55	50	26	37	19	100	52	64	33	29	15
In the last 6-10 years	141	73	36	19	16	8	138	72	43	22	12	6
Have windstorms												
Destroyed livestock?												
In the last one year	187	69	44	16	41	15	89	33	121	44	62	23
In the last 2-5 years	187	69	50	18	35	13	103	38	127	47	42	15
In the last 6-10 years	229	84	30	11	13	5	163	60	98	36	11	4

Source: Field Survey, 2013

5.7.4 Respondents' challenges associated with migration

Table 5.23 shows the respondents' challenges associated with migration. Most (70%) of the respondents migrated to their present community because of drought related problems which include: lack of rainfall (45.0%); drying up of lakes and streams (30.9%); animal and human disease (10.4%); lack of human food (22.0%) and reduction of income (11.5%); land and water disputes (39.8%); crop failure and death of livestock (30.4%) and loss of assets (5.8%). Yanda and Williams (2010) show that 22% of the households reported that family members had migrated to other areas and that in-migration of pastoralists in Maasai plains was due to search for good grazing land free from animal diseases, availability of good arable land for crop cultivation, seeking both agriculture and grazing lands, joining relatives and spouses and mining/mineral business. Herren (1991) and Blaikie *et.al.*, (1994) confirm that households' migrate to urban centers in search for waged employment during drought crisis. Bratton (1987) and Mortimore (1989) opine that decimation of livestock herds is the most serious long-term effect of drought.

Most of the respondents (54.6%) intend to migrate from their present locations due to various challenges: majority (61.9%) due to lack of rainfall and drying up of lakes/streams; 49.7% due to drought; some (28.6%) due to crop failure and death of livestock (28.6%) and some (21.8%) due to reduction of income (Table 5.24). Fulani nomads living by riversides usually experience flooding of houses and loss of farm, some women confirmed this by saying "*we suffer loss when floods destroy our farm produce*". Mung'ong'o and Mwanfupe (2003), William (2003) and Christiansson (1988) found that ecological migrants move from degraded and unproductive areas where land scarcity compels residents to seek farmland in more productive areas. O'Meagher (2003) confirms that drought leads to the reduction in farm production and incomes.

Table 5.23: Respondents challenges associated with migration (N=326)

	Yes	
	Frequency	Percent
Did you move to this community for Drought-related problems?	191	70.0
Which problems made you move here?		
Lack of rainfall	86	45.0
Drying lakes and streams	59	30.9
Animal disease	18	9.4
Human disease	2	1.0
Lack of human food	23	22.0
Reduction of income	22	11.5
Land disputes	45	23.6
Water disputes	31	16.2
Crop failure	32	16.8
Death of livestock	26	13.6
Loss of assets	11	5.8

Source: Field Survey: 2013

Table 5.24: Respondents' reasons for wanting to migrate from present settlements (N=326)

	Yes	
	Frequency	Percent
Do you intend to migrate away from your present community?	147	54.6
For which reasons?		
Lack of rainfall	63	42.9
Drying of lakes and streams	28	19.0
Animal disease epidemic	12	8.2
Human disease	2	1.4
Lack of human food	21	14.3
Land disputes	36	24.5
Water disputes	12	8.2
Crop failure	31	21.1
Death of livestock	11	7.5
Loss of assets	3	2.0
Reduction of income	32	21.8
Drought	73	49.7

Source: Field Survey, 2013

5.7.5 Respondents' challenges associated with insurgence by terrorists.

5.7.5.1 The effect of insurgence on social and cultural activities

Insurgence in Northeastern Nigeria by *Boko Haram* terrorists has affected social activities and altered cultural activities of many settlers in this region. The FGDs with Fulani women revealed that their social life has been disrupted through the numerous bombings by the terrorist groups in public places, many families have been separated from loved one because they had to run for their lives, many families have lost loved ones who have either gone missing or been killed during terrorist raids and attacks, many families have lost parents and bread-winners, many family members have become homeless and even destitute. Some reported that wedding ceremonies that used to be elaborate and held outdoors are now performed indoors with just the very close family members to avoid gathering a crowd for fear of being attacked by the terrorists. Some reported that traditional dance festivals have stopped completely in villages because of insecurity and the fear of being attacked and killed. Similar impacts of conflict on livelihood of pastoralists were observed by Fasona *et al.* (2016) in the Nigerian Savanna.

5.7.5.2 The effect of insurgency on marketing activities

The insurgence and bombing of public places by *Boko Haram* terrorists have led to the destruction of many markets in Northeastern Nigeria. Many traders and passers-by have lost their lives. Some women in the FGDs reported that *“our market spaces were destroyed by bomb blasts”* and *“strategic market places have been moved to obscure areas”*. Some women said *“government officials have stopped us from displaying our goods in front of the market and on the roadside where more people bought our goods because they could easily see our produce displayed as they walked on the side of the road”*. Other women said *“we do not make much money like before because the new market place is too far from the main road and many people do not want to trek far distances to buy our goods”*. The FGDs revealed that the Fulani milk sellers' high patronage before the insurgence has reduced due to massive relocation of customers to safer locations, loss of many lives, insecurity and fear of being bombed at market places has caused most people to reduce patronage of markets minimally to procuring very essential commodities. These have led to reduction in the commerce of Fulani households.

5.8 Test of Hypotheses

This section discusses the test of relationship between the dependent variable and some independent variables. Chi square was used to test the significant relationship between the dependent variable and some selected personal characteristics of the respondents.

Pearson's Product of Moment Correlation (PPMC) and Analysis of variance (ANOVA) were used to test the relationship between the dependent variable and other variables.

5.8.1 The dependent variable

The dependent variable is the livelihood status of the respondents which comprises of the capital assets, the household capability and livelihood activities. Table 5.25 shows the categorization of respondents' livelihood status. Majority (61%) of the respondents had low livelihood status while 39% have high status.

5.8.2 Hypothesis 1: There is no significant relationship between selected personal characteristics of the nomads in the study area and their livelihood status.

5.8.2.1 Chi square analysis of selected personal characteristics of the respondents

Results of Chi square analysis of selected personal characteristics of the respondents are shown in Table 5.26. The table reveals a significant relationship between gender and livelihood status ($\chi^2=8.319$; $p<0.05$). This implies that gender influences livelihood status. The relationship between marital status and livelihood status was significant ($\chi^2=24.777$; $p<0.05$) implying that the marital status of the nomads influence livelihood status. The relationship between educational level and livelihood status is significant ($\chi^2=32.732$; $p<0.05$), implying that respondents with higher levels of education had higher livelihood status than the less educated ones. The relationship between employer of labour and livelihood status was significant ($\chi^2=47.193$; $p<0.05$) implying that respondents who employed of labour had higher livelihood status than those who are not. Table 5.26 also revealed that there was no significant relationship between the primary occupation and livelihood status of the respondents ($\chi^2=12.987$; $p<0.05$) implying that the livelihood status of the respondents is not affected by the types of primary occupation in which they are engaged. The relationship between secondary occupation and livelihood status was significant ($\chi^2=22.236$; $p<0.05$). This implies that the number of secondary occupation the respondents engage in, in addition to their primary occupation affects their livelihood status.

Table 5.25: Categorization of respondents by level of livelihood status (N=326)

Level of livelihood status (Z score livelihood status)	F	%	Min.	Max.	Mean	Standard Deviation
Low (0.00-3.61)	199	61.00	0.00	11.65	3.62	2.04
High (3.62-11.65)	127	39.00				

Source: Field survey, 2013.

Table 5.26: Chi square analysis of the relationship between the respondents' selected personal characteristics and their livelihood status

Variables	χ^2 Value (Calculated)	df	P-value	Decision
Gender	8.319	2	0.016	S
Marital status	24.777	6	0.000	S
Educational level	32.732	8	0.000	S
Employer of Labour	47.193	2	0.000	S
Primary occupation	12.987	8	0.112	NS
Secondary occupation	22.236	2	0.000	S

S = Significant at $P < 0.05$; NS = Not significant

Source: Field survey, 2013

5.8.2.2 Pearson's Product of Moment Correlation (PPMC) between livelihood status of respondents and selected personal characteristics

Pearson's Product of Moment Correlation (PPMC) results between livelihood status of respondents and selected personal characteristics are shown in Table 5.27. The correlation between the age of the respondents and livelihood status was significant ($r= 0.285$, $p<0.05$). This implies that as the respondents get older, livelihood status increases. This might be due to increase in knowledge and learning better ways of implementing livelihood means that save time and cost as they grow older. The correlation between livelihood status and the number of male children ($r=0.430$; $p<0.05$), the number of female children ($r=0.296$; $p<0.05$), the total number of children ($r=0.514$; $p<0.05$), number of wives ($r=0.437$; $p<0.05$); household size ($r=0.542$; $p<0.05$), number of years of engaging in primary occupation ($r=0.131$; $p<0.05$): number of sources of income ($r=0.259$; $p<0.05$) number of social groups ($r=0.158$; $p<0.05$) and assets score ($r=0.302$; $p<0.05$) were all significant, implying that as each of these variables increases the livelihood status would also increase. The correlation between livelihood status and number of dependents and number of years of leadership of social groups were not significant, implying that increase in each of these variables will not increase livelihood status.

5.8.3 Hypothesis 2: Independent variables do not contribute significantly to livelihood status

Independent variables were regressed with livelihood status to ascertain their contributions to respondents' livelihood status. Table 5.28 shows that: age of respondents, highest level of education attained, number of sources of income, number of secondary occupation, perception score and total number of coping strategies used were significant. The negative beta value for age implies that the younger nomads have higher livelihood status and vice versa. This might be due to the fact that older nomads may be averse to change while the younger nomads who constitute majority of the work force may be more flexible and receptive of improved innovations. The negative beta value of the number of secondary occupation implies that the more the number of secondary occupation the nomads engage in, the less the livelihood status. This may be due to reduction in respondents' capacity as they engage in more activities.

Table 5.27: Pearson’s Product Moment Correlation (PPMC) of livelihood status and selected personal characteristics of respondents in all the states

Selected personal characteristics of respondents	r-value	p-value	Decision
Age	0.285**	0.000	S
At what age did you get married	0.228**	0.000	S
Number of male children	0.430**	0.000	S
Number of female children	0.296**	0.000	S
Total number of children	0.514**	0.000	S
Number of wives	0.437**	0.000	S
Household size	0.542**	0.000	S
No of dependents living with you apart from children?	0.151 ^{NS}	0.071	NS
Years of engaging in primary occupation	0.131*	0.018	S
Number of social groups	0.158*	0.040	S
Number of years of leadership of social group	0.267 ^{NS}	0.061	NS
Number of sources of Income	0.259**	0.000	S
Assets Score	0.371**	0.000	S

* = Significant at 0.05, ** = Significant at 0.01, NS = Not significant

Source: Field survey, 2013

Table 5.28: Contribution of independent variables to respondents' livelihood status

	Unstandardized		Standardized		
	Coefficients		Coefficients		
	B	S. E.	Beta	t	Sig.
(Constant)	.557	6.364		.088	.930
Age	-.192	.074	-.287	-2.584	.012*
Number of male children	-.045	0.051	-.189	-.882	.381
Number of female children	.015	.049	.053	.316	.753
Total number of children	.058	.042	.381	1.374	.174
Total number of wives	.077	.101	.111	.762	.448
No of dependents apart from children	-.038	.034	-.106	-1.127	.263
Highest educational level attained	.049	.029	.146	1.689	.096
Number of sources of income	.157	.063	.201	2.507	.014*
Assets Score	.059	.037	.143	1.603	.113
Number of secondary occupation	-.186	.070	-.256	-2.640	.010*
Perception score	.009	.004	.179	2.139	.036*
Total number of coping strategies used	.023	.007	.328	3.094	.003*

R= 0.776; R²= 0.603; Adjusted R²=0.535; Std Error = 0.3886; * = Significant at <0.05

5.8.4 Hypothesis 3: There is no significant relationship between respondents' perception and livelihood status

The relationship between respondents' perception and livelihood status is shown in Table 5.29. The Table reveals that there is no significant relationship between respondents' perception and livelihood status in Adamawa State ($r=0.002$; $p<0.982$), Taraba State ($r=0.006$; $p<0.957$), Bauchi State ($r=0.036$; $p<0.684$) and across States ($r=0.063$; $p<0.258$). The non-significant results imply that the respondents' perception of the effect of drought on their livelihood have no effect on their livelihood status.

5.8.5 Hypothesis 4: There is no significant relationship between the number of coping strategies used by respondents during drought and livelihood status

The Pearson's Product Moment Correlation (PPMC) results between number of coping strategies used by respondents and livelihood status for all the states are shown in Table 5.30a. The result reveals that the relationships between livelihood status and the number of non-food related coping strategies used ($r=0.599$; $p<0.05$); number of food-related coping strategies used ($r=0.534$; $p<0.05$) and number of environmental coping strategies used ($r=0.310$; $p<0.05$) and number of total coping strategies used ($r=0.631$; $p<0.05$) were significant, respectively. These imply that the more of the coping strategies that respondents use in each respective category, the higher the livelihood status. Since drought leads to loss of respondents' livelihoods, it is imperative that respondents utilize coping strategies, regardless of their category, in order to bring about improvement in their livelihood status. This is in line with Ogbuene (2010) that adapting coping strategies safeguards and sustains production and that consequences of not adapting are severe reduction in annual yield.

The PPMC result between respondents' use of coping strategies and livelihood status in each of the three states is presented in Table 5.30b. In Adamawa state: the relationship between respondents' livelihood status and use of non-food related coping strategies ($r=0.143$; $p<0.05$) was not significant; the relationship between livelihood status and the use of food-related strategies was significant ($r=0.424$; $p<0.05$) while the relationship between livelihood status and environmental coping strategies ($r=0.215$; $p<0.05$) was significant. These imply that in Adamawa state, respondents' livelihood statuses do not

depend on the use of non-food related coping strategies but on the use of food-related and environmental coping strategies.

The Pearson's Product Moment Correlation (PPMC) results between respondents' coping strategies and livelihood status for Taraba state are shown in Table 5.30b. The result reveals that in Taraba state: the relationship between respondents' use of non-food related coping strategies and livelihood status was significant ($r=0.428$; $p<0.05$); the relationships between livelihood status and the use of food-related coping strategies ($r=0.324$; $p<0.05$) and environmental strategies ($r=0.306$; $p<0.05$) were also significant. These imply that livelihood statuses of respondents in Taraba state depend on the use of non-food related coping strategies, food related coping strategies and environmental coping strategies.

The Pearson's Product Moment Correlation (PPMC) results between respondents' use of coping strategies and livelihood status for Bauchi state are shown in Table 5.30b. The result reveals that the relationship between respondents' livelihood status and use of non-food related coping strategies ($r=0.659$; $p<0.05$), use of food-related strategies ($r=0.454$; $p<0.05$) and environmental strategies ($r=0.651$; $p<0.05$) were all significant in Bauchi state. These imply that livelihood statuses of respondents in Bauchi state depend on the use of non-food related coping strategies, food related coping strategies and environmental strategies.

5.8.6 Hypothesis 5: There is no significant difference in the coping strategies adopted by respondents across the three selected states in Northeastern Nigeria

The result of the analysis of variance (ANOVA) of coping strategies in the study area is presented in Table 5.31a while the result of a Post Hoc multiple tests showing difference in coping strategies employed by respondents across states is presented in Table 5.31b.

The ANOVA result indicates a significant difference in the coping strategies of the nomads across the states ($F=15.813$; $p<0.05$). This implies that the coping strategies employed by the nomads were significantly different across the three states. The Post Hoc multiple tests reveal that the difference between the coping strategies employed by nomads in Taraba and Adamawa states was significant ($MD=11.722$; $p<0.05$); the difference between the coping strategies employed by nomads in Bauchi and Adamawa

states was significantly different (MD=11.969; $p<0.05$) while the difference between coping strategies of nomads in Bauchi and Taraba states was not significantly different (MD=0.247, $p<0.05$). The non-significant difference existing in respondents' use of coping strategies between Bauchi and Taraba states could be because the use of the coping strategies require change in knowledge, attitudes and skills which are not location specific.

Table 5.29: Pearson’s Correlation between respondents’ perception and livelihood status

Category	PPMC between respondents’ perception of effect of drought and livelihood status	P value	Decision
Across States	0.063	0.258	NS
Adamawa	0.002	0.982	NS
Taraba	0.006	0.957	NS
Bauchi	0.036	0.684	NS

Source: Field Survey, 2013

Table 5.30a: PPMC of nomads' use of coping strategies and livelihood status across states (N=326)

Number of coping strategies		Z score Livelihood status
Use of non-food strategies	Pearson Correlation	0.599**
	Sig. (2-tailed)	0.000
	N	326
Use of food-related strategies	Pearson Correlation	0.534**
	Sig. (2-tailed)	0.000
	N	326
Use of environmental Coping strategies	Pearson Correlation	0.310**
	Sig. (2-tailed)	0.000
	N	326
All coping strategies	Pearson Correlation	0.631**
	Sig. (2-tailed)	0.000
	N	326

** Significant at the 0.01 level (2-tailed). Z scores of livelihood status are standardized scores

Table 5.30b: PPMC of respondents' use of coping strategies and livelihood status per State

Use of coping strategies		Z score of livelihood status per State		
		Adamawa	Taraba	Bauchi
Use of non-food related coping strategies	Pearson Correlation	0.143	0.428**	0.659**
	Sig. (2-tailed)	0.155	0.000	0.000
	N	100	92	134
Use of food related coping strategies	Pearson Correlation	0.424**	0.324**	0.454**
	Sig. (2-tailed)	0.000	0.002	0.000
	N	100	92	134
Use of environmental coping strategies	Pearson Correlation	0.215*	0.306**	0.651**
	Sig. (2-tailed)	0.032	0.003	0.000
	N	100	92	134
All coping strategies	Pearson Correlation	0.383**	0.507**	0.683**
	Sig. (2-tailed)	0.000	0.000	0.000
	N	100	92	134

** Significant at the 0.01 level (2-tailed); * Significant at the 0.05 level (2-tailed)

Source: Field survey: 2013

Table 5.31a: Analysis of variance (ANOVA) in coping strategies across States

SUM (Coping Strategies)	Sum of Squares	df	Mean Square	F	P value
Between Groups	9768.845	2	4884.422	15.813	.000
Within Groups	99770.394	323	308.887		
Total	109539.239	325			

Source: Field Survey, 2013

Table 5.31b: Post Hoc test showing differences in coping strategies employed by respondents across states in the study area

(I) State	(J) State	Mean Difference (I-J)	Standard Error	P value
Adamawa	Taraba	-11.722*	2.53896	.000
	Bauchi	-11.969*	2.32250	.000
Taraba	Adamawa	11.722*	2.53896	.000
	Bauchi	-0.247	2.37962	.917
Bauchi	Adamawa	11.969*	2.32250	.000
	Taraba	0.247	2.37962	.917

* The mean difference is significant at the 0.05 level.

Source: Field Survey, 2013

5.8.7 Hypothesis 6: There is no significant difference in the livelihood status of the nomads across the three selected states in Northeastern Nigeria.

The result of the analysis of variance (ANOVA) on livelihood status across the three states is presented in Table 5.32a while the result of a Post Hoc test is presented in Table 5.32b. The ANOVA result indicates a significant difference in the livelihood status of the nomads across the states ($F=14.628$; $p<0.05$). This implies that the livelihood statuses of the nomads were significantly different in the three states. The Post Hoc test multiple test reveals that the difference between the livelihood status of nomads in Adamawa and Bauchi states was significant ($MD=3.555^*$; $p<0.05$) and the difference between the livelihood status of nomads in Taraba and Bauchi states was significantly different ($MD=4.111^*$; $p<0.05$) while the difference between livelihood status of nomads in Taraba and Adamawa states was not significantly different ($M=0.578$, $p<0.05$). These imply that the nomads in Taraba and Adamawa states have similar livelihood statuses while the livelihood statuses of nomads in Bauchi are different from those of the nomads in Taraba and Adamawa states

Table 5.32a: Analysis of variance showing differences in livelihood status of respondents

Z score Livelihood Status	Sum of Squares	df	Mean Square	F	P value
Between Groups	1161.801	2	580.901	14.628	0.000
Within Groups	12827.114	323	39.712		
Total	13988.915	325			

Source: Field Survey, 2013

Table 5.32b: Post Hoc test showing differences in respondents' livelihood status across states

Z score Livelihood Status (LSD)		Mean Difference	Std. Error	P value
(I) State	(J) State	(I-J)		
Adamawa	Taraba	-0.578	0.910	0.526
	Bauchi	3.533*	0.833	0.000
Taraba	Adamawa	0.578	0.910	0.526
	Bauchi	4.111*	0.853	0.000
Bauchi	Adamawa	-3.533*	0.833	0.000
	Taraba	-4.111*	0.853	0.000

* The mean difference is significant at the 0.05 level.

Source: Field Survey, 2013

5.8.8 Hypothesis 7: There is no significant relationship between respondents' monthly incomes from primary and secondary occupation and livelihood status

The Pearson's Product Moment Correlation (PPMC) result between monthly income and livelihood status of respondents for each of the states and across states is shown in Table 5.33. In Adamawa state, the relationships between livelihood status and monthly income from primary occupation ($r=0.009$; $p>0.05$); and monthly income from secondary occupation and monthly occupational income were not significant ($r=-0.228$; $r=-0.001$; $p>0.05$), respectively. This implies that increase in respondents' monthly income from primary and secondary occupation will not increase livelihood status in Adamawa state. The negative value implies that as income from secondary occupation increases livelihood status decreases.

In Taraba state, the relationships between livelihood status and monthly income from primary occupation and monthly occupational income ($r=0.270$; $r=0.296$; $p<0.05$) were significant, respectively. The relationship between livelihood status and monthly income from secondary occupation ($r=0.231$; $p>0.05$) was not significant. These imply that monthly occupational income affects livelihood status of respondents in Taraba state. In Bauchi state, the relationships between livelihood status and monthly income from primary occupation, secondary occupation and monthly occupational income ($r=0.425$; $r=0.746$; $r=0.296$; $p<0.05$) were significant, respectively. These imply that monthly occupational income of respondents in Bauchi state affect livelihood status.

Across states, the relationships between monthly income from primary occupation and livelihood status ($r=0.225$; $p<0.05$) and between total monthly income and livelihood status ($r=0.263$; $p<0.05$) were significant, respectively. The relationship between livelihood status and monthly income from secondary occupation was not significant ($r=0.003$; $p>0.05$). This implies that monthly occupational income affects livelihood status of respondents across the states with major contribution from primary occupation. Although majority of the respondents diversified into various secondary livelihood activities, incomes from these sources did not affect livelihood status.

Table 5.33: PPMC of respondents' monthly income from primary and secondary occupation and livelihood status for each state and across States (N=326)

Monthly Income		<u>*Z scores livelihood status</u>			
		Adamawa (n=100)	Taraba (n=92)	Bauchi (n=134)	Across States (N=326)
A17 Monthly income from primary occupation	Pearson Correlation	.009	.270**	.425**	.225**
	Sig. (2-tailed)	.936	.009	.000	.000
	N	73	92	112	277
A18 Monthly income from secondary occupation	Pearson Correlation	-.228	.231	.746**	.003
	Sig. (2-tailed)	.108	.056	.008	.976
	N	51	69	11	131
Total occupational income (Pry and Sec. sources)	Pearson Correlation	-.001	.296**	.529**	.263**
	Sig. (2-tailed)	.995	.004	.000	.000
	N	73	92	112	277

Source: Field Survey, 2013.

*Z scores livelihood status are standardized

5.8.9 Hypothesis 8: There is no significant relationship between the challenges faced by respondents and livelihood status

Table 5.34 shows the relationship between the challenges faced by the respondents and their livelihood status. The table reveals a significant relationship between challenges and livelihood status of respondents in Adamawa state ($r=0.261$; $p<0.05$) and a significant but inverse relationship in Bauchi state ($r=-0.687$; $p<0.05$). These imply that challenges faced by respondents in these states affect their livelihood status but the more the challenges increase in Bauchi state the less their livelihood status. The relationship between livelihood status and challenges faced by the respondents in Taraba state was insignificant ($r=0.130$; $p<0.05$) implying that challenges faced by respondents in Taraba state do not affect livelihood status.

Table 5.34: Pearson's Correlation between respondents' challenges and livelihood status

Challenges faced by respondents	Pearson's Correlation between livelihood status and challenges	P value	Decision
Across States	-0.222**	0.000	S
Adamawa	0.261**	0.009	S
Taraba	0.130	0.216	NS
Bauchi	-0.687**	0.000	S

** Correlation is significant at the 0.01 level (2-tailed)

Source: Field Survey, 2013

CHAPTER SIX

SUMMARY, CONCLUSION AND RECOMMENDATIONS

6.1 Summary

The average Fulani settlement is a rural one with clusters of mud houses scattered around the settlement with an average population of 800 people. The nomadic households in the study area were dominated by married (91.1%) nomads most (83.9%) of who were below 56 years. The Focus Group Discussion revealed that the Fulani people in the study area are semi-nomads that migrate in cycles. The Fulani households usually have more female children than male children in the ratio of three females to one male child. The mean household size was eleven comprising of one man, one wife, six children and three dependents. Majority of the nomads did not have formal education and were primarily engaged in animal husbandry either as pastoralists or in livestock rearing for an average of 24 years. Majority of the nomads were engaged in various secondary occupations especially farming, livestock rearing, gathering firewood and as house helps. Many of the respondents were self-employed while a few were employers of labour. Most of the respondents earned below ₦40, 000 from their primary occupation and below ₦ 20, 000 from their secondary occupation.

Many of the respondents sourced capital for their enterprises through inheritance while some used personal savings. Most of the respondents sourced for ₦ 40, 000 and below for their enterprise. Majority of the nomads had access to natural assets (water and pasture land); physical assets (bicycles and motorcycles). Majority of the nomads did not have access to financial assets (loans/credit). Many of the nomads did not have regular access to supply of electricity but many had access to news media for drought warning information. Most of the nomads were members of the cow rearers' association and many of these were leaders who have led their group for between two to five years (social capital). Most of the respondents owned houses, many owned farmlands, and some owned motorcycles, while a few of them owned bicycles and livestock. Majority of the nomads had low household capability level and low skill level which implies that most of the

nomadic households will not have the opportunity of being employed as skilled labour which will reduce the opportunity for higher remunerations when they diversify into various livelihood activities. The study revealed that the nomads have gender specific livelihood activities with the male members involved in herding and feeding cattle while the females processed and sold milk products. The catalogue of farm-related livelihood activities engaged in by respondents shows that during the dry season: 74% of the respondents were actively involved in cattle rearing; 80% and 77% were actively involved in rearing sheep and goats, respectively; 74%, 46% and 39% were actively involved in rearing chicken, guinea fowls and ducks, respectively. Many of the respondents were involved in processing of dairy products: 61% in *Nunu* (milk), 56% in *kindirimu* (yoghurt) and 57% in *Mai'n Sanu* (butter) respectively while 66% were actively involved in gathering of firewood and 50% were actively involved in gathering wild plants.

The catalogue of farm-related livelihood activities engaged in by respondents shows that during the rainy season: 65% of the respondents were mostly involved in cattle rearing; 64% were mostly involved in rearing sheep while 61% were mostly involved in rearing goats; 50%, 43% and 37% were mostly involved in rearing chicken, guinea fowls and ducks, respectively. Many of the respondents were involved to varying degrees in processing of dairy products: 59% in *Nunu* (milk), 53% in *kindirimu* (yoghurt) and 53% in *Mai'n Sanu* (butter) respectively while 51% were involved in gathering of firewood, 49% in planting cereals and 39% in planting vegetables. The catalogue of non-farm-related livelihood activities engaged in by respondents showed that during the dry season: 48% of the respondents were mostly involved as domestic help, 41% in various handcrafts and 14% in artisanship. During the rainy season: 38% of the respondents were mostly involved as domestic help, (21%) in various handcrafts and 14% in artisanship.

The results further revealed that nomads in the study area have a high level of perception of the effects of drought on their livelihood but there is no significant relationship between respondents' perception and livelihood status in Adamawa state, Taraba state, Bauchi state and across states implying that the nomads' perception of the effect of drought on their livelihood have no effect on their livelihood status. The non-food coping strategies employed by the respondents to reduce the effect of drought on their livelihood

include relocating to houses with less rent, rearing ducks for sale, buying second hand clothes for children and self and migrating to other areas for better livelihoods, among others. The food related coping strategies often used by the respondent were: gathering fruits from the wild, sending children to eat at parties, re-using groundnut oil used by friends, reducing number of meals served to family daily and reducing quantity of food served to family daily, among others. The environmental coping strategies often used by the nomads were multi-cropping and planting of trees around farms and houses. The nomads in the study have a low level of use of tested coping strategies.

The catalogue of respondents' challenges in the past five years showed that many of the respondents had experienced a change in the following factors: availability/provision of food, availability of firewood, gathering of wild fruits/herbs, availability of wildlife, quantity of pasture available for cattle, soil fertility and crop yield, household comfort and daily activities, peace of the inhabitants of communities and quantity/quality of water and that these changes were due to change in rainfall. Majority of the respondents noticed major alterations in rainfall patterns/water level over the years and stated that the alterations had negative impact of hunger, poverty, conflicts and disease on their livelihood.

Windstorms have destroyed the buildings and livestock of many of the respondents: In the last one year: in the dry season, many (49.7% and 31.2%) of the nomads experienced destruction of their buildings and livestock, respectively while in the rainy season, 56.0% and 67.3% experienced destruction of their buildings and livestock, respectively. In the last two to five years: 45.1% and 31.3% of the respondents experienced destruction of their buildings and livestock respectively, in the dry season while 48.2% and 62.1% experienced destruction of their buildings and livestock respectively, in the rainy season. In the last six to ten years, 27.0% and 15.8% of the respondents experienced destruction of their buildings and livestock respectively, in the dry season while 28.5% and 40% experienced destruction of their buildings and livestock respectively, in the rainy season. The study revealed that Fulani nomads often engage in bush burning and cutting of trees which expose the ground cover to windstorms and may lead to destruction of buildings and barns and invariably loss of capital assets and livelihoods. Windstorms cause eye infections and even blind some nomads thus posing as a health hazard to the nomads.

Most of the nomads migrated to their present community because of drought related problems which include: lack of rainfall and drying up of lakes and streams, land and water disputes, death of livestock and crop failure, lack of human food and loss of assets. Many of the nomads intend to migrate from their present settlements due to various challenges which include: drought, lack of rainfall and drying up of lakes/streams, crop failure, death of livestock, and reduction of income.

The study revealed that insurgence and numerous bombings by a terrorist group tagged “Boko Haram” in public places in Northeastern Nigeria has disrupted the social life of the Fulani nomads and halted their cultural activities. The insurgence by ‘*Boko Haram*’ terrorists has led to the disruption of many Fulani households and killing of many household heads, young men and active youths which are the labour force of the Fulani households. Many Fulani households have lost capital assets including cattle which were raided and stolen by terrorists. Destruction of many markets in Northeastern Nigeria has led to death of many traders, passers-by and disruption of marketing activities. The Fulani milk sellers’ patronage before the insurgence has reduced due to less marketing activities due to fear of being bombed at market places and relocation of many customers to safer locations leading to reduction of Fulani households’ livelihoods.

Results of Chi square analysis of selected personal characteristics of the nomads show significant relationships between livelihood status and gender, marital status, highest educational level, employers of labour and secondary occupation. These imply that gender and marital status of the nomads influence livelihood status, those nomads with higher levels of education have higher livelihood status than the less educated ones and those who employ labour have higher livelihood status than those who do not. There was no significant relationship between the primary occupation and livelihood status implying that the livelihood status of the nomads is not affected by the types of primary occupation they engage in. The Pearson’s Product Moment Correlation between livelihood status and the age, household size (number of children and wives), years of engaging in primary occupation, number of social groups, and number of sources of income and assets score were significant, respectively. This implies that these variables affect livelihood status of the nomads, respectively. Nevertheless, the correlations between livelihood status and number of dependents and years of leadership of social groups were not significant,

implying that these variables do not affect the nomads' livelihood status. Regression analysis of independent variables with livelihood status revealed that: age of respondents, highest level of education attained, number of sources of income, number of secondary occupation, perception score and total number of coping strategies used were significant with R^2 value of 0.603 which implies that these independent variables can explain 60% of the respondents' livelihood status.

The Pearson's Product Moment Correlation (PPMC) results between coping strategies of respondents and livelihood status reveals that across states the relationships between livelihood status and the use of non-food related coping strategies, the use of food-related coping strategies and the use of environmental strategies were highly significant, respectively. PPMC results between coping strategies of respondents and livelihood status for Adamawa state reveals that the relationships between livelihood status and nomads' use of non-food related coping strategies and status was not significant; the relationships between livelihood status and the use of food-related strategies and environmental strategies were significant, respectively.

The Pearson's Product Moment Correlation (PPMC) results between respondents' coping strategies and livelihood status for Taraba state revealed that: the relationship between respondents' use of non-food related coping strategies and livelihood status was not significant; the relationships between livelihood status and the use of food-related coping strategies and environmental strategies were significant, respectively. The Pearson's Product Moment Correlation (PPMC) results between respondents' coping strategies of and livelihood status for Bauchi state revealed that: the relationship between respondents' livelihood status and use of non-food related coping strategies, use of food-related strategies and environmental strategies were significant, respectively.

The result of Analysis of Variance (ANOVA) showed a significant difference in the coping strategies of the nomads across the States. The Post Hoc multiple tests revealed a significant difference between the coping strategies employed by nomads in Taraba and Adamawa States and a significant difference between the coping strategies employed by nomads in Bauchi and Adamawa States while there was no significant difference between livelihood coping strategies of nomads in Bauchi and Taraba States. The result of

Analysis of Variance indicates a significant difference in the livelihood status of the nomads across the states. This implies that the livelihood status of the nomads in the three States was significantly different.

The Post Hoc test multiple test revealed that the difference between the livelihood status of nomads in Adamawa and Bauchi States was significant, the difference between the livelihood status of nomads in Taraba and Bauchi States was significant while the difference between livelihood status of nomads in Taraba and Adamawa states was not significant. This implies that the livelihood status of nomads in Taraba and Adamawa States are similar but are different from the livelihood status of nomads in Bauchi State. In Adamawa State, the relationships between livelihood status and monthly income from primary occupation, from secondary occupation and monthly occupational income were not significant, respectively. This implies that increase in respondents' monthly income from primary and secondary occupation will not increase livelihood status in Adamawa State.

In Taraba State, the relationships between livelihood status and monthly income from primary occupation and monthly occupational income were significant, respectively. The relationship between livelihood status and monthly income from secondary occupation was not significant. This implies that monthly occupational income affects livelihood status of respondents in Taraba State. In Bauchi State, the relationships between livelihood status and monthly income from primary occupation, secondary occupation and monthly occupational income were significant, respectively. These imply that monthly occupational income of respondents in Bauchi State affect livelihood status. The study revealed a significant relationship between livelihood status and challenges faced by nomads in Adamawa and Bauchi States but an insignificant relationship in Taraba State. These imply that challenges faced by respondents in Adamawa and Bauchi States affect their livelihood status while challenges faced by nomads in Taraba State do not affect their livelihood status.

6.2 Conclusion

Most of the respondents were married mature males who had one wife, large households and were within the labour-force age bracket. There was a significant relationship between the nomads' marital status, household size and livelihood status. Majority of the respondents did not have formal education and were primarily engaged in animal husbandry as pastoralists or livestock rearers for over twenty years. The relationship between educational level and livelihood status was significant implying that nomads with higher levels of education had higher livelihood status than the less educated ones.

The nomads have distinctively different livelihood activities based on gender. The major occupation of the nomads in the study area was cattle rearing: the male members herded and fed the cattle while the females processed and sold milk products. Many nomads were self-employed. The relationship between employer of labour and livelihood status was significant, implying that the employers of labour had higher livelihood status than those who did not. Majority of the respondents often had access to water, pasture land, bicycles, motorcycles and to drought warning systems especially through news media. Majority of the respondents owned farmlands and mud houses.

Major farm related livelihood activities in the dry season were rearing of cattle, sheep, goats and local chicken, processing of milk products and gathering of firewood and wild plants and in addition to these they planted cereals and vegetables in the rainy season. The major non-farm-related livelihood activities involved in during the dry and rainy seasons were various handcrafts by the men and employment of female members as domestic help. In Taraba state, the numbers of livelihood activities which the nomads engaged in were significantly different, in the dry and rainy seasons. In Bauchi and Adamawa states, there was no significant difference between the number of livelihood activities used by the nomads in the dry and rainy seasons. Most of the nomads had low household capability level and low skill level which implies that most of the nomadic households were not likely to be employed as skilled labour which will reduce the opportunity for higher remunerations when they diversify into various livelihood activities.

The major non-food coping strategies used were: relocating to houses with less rent; rearing ducks for sale; buying second hand clothes for children; buying second hand

clothes for self and migrating to other areas for better livelihoods. The major food-related coping strategies often used by the respondents were: gathering fruits from the wild; sending children to eat at parties; re-using groundnut oil used by friends; reducing number of meals served to family per day and reducing quantity of food served to family per day. The main environment related coping strategies used were multiple cropping and planting of trees around farms and houses. The nomads in the study had a low level of use of tested coping strategies.

The relationships between livelihood status and the use of non-food related coping strategies, food-related coping strategies and environmental strategies were significant across the states implying that the respondents made use of the listed coping strategies and these in turn impacted their livelihood status. In both Adamawa and Taraba states, nomads' livelihood status did not depend on the number of non-food related coping strategies used but only on the number of food-related and environmental strategies used. In Bauchi state, the livelihood status depended on the three categories of coping strategies, respectively. Although the nomads had a high level of perception of the effects of drought on their livelihood, there was no significant relationship between perception and livelihood status in Adamawa State, Taraba State, Bauchi State and across States implying that the nomads' perception of the effect of drought on their livelihood had no effect on livelihood status.

Across the States, the relationships between livelihood status and monthly income from primary occupation and total monthly occupational income were significant, respectively while the relationship between livelihood status and monthly income from secondary occupation was not significant implying that primary occupation was the major contributor to respondents' livelihood status across the States. Incomes from the various secondary livelihood activities that respondents engaged in did not affect their livelihood status. In the past five years, many of the respondents have experienced negative changes in their livelihood and they claim that the changes were due to change in rainfall. The negative impacts of alterations in rainfall patterns/water levels on respondents' livelihood include: hunger, poverty, conflicts, and disease in descending order. Majority of the respondents migrated to their present community for drought related problems which include: lack of rainfall and drying up of lakes and streams, land and water disputes; crop

failure and death of livestock and lack of human food. Insurgence by a terrorist group tagged “Boko Haram” in public places in Northeastern Nigeria has disrupted the social life of the Fulani nomads and halted their cultural activities. The insurgence led to the death of many household heads and many active young men and youths thus reducing the work force of the Fulani households and will invariably reduce their livelihoods.

Many Fulani households lost capital assets including cattle which were raided and stolen by terrorists. Destruction of many markets in Northeastern Nigeria led to death of many traders, passers-by and disruption of marketing activities. The Fulani milk sellers’ patronage before the insurgence reduced due to less marketing activities, insecure market places and relocation of many customers to safer locations leading to reduction of Fulani households’ livelihoods. Overall, the livelihood status of nomads in Taraba and Adamawa states are similar while the livelihood status of nomads in Bauchi is different from that of nomads in Taraba and Adamawa states.

6.3 Recommendations

In the light of the findings of this study,

1. Government should create communication channels to educate and warn pastoralists of impending climate-related hazards.
2. Ready access to electricity and loans should be provided for the nomads by relevant agencies.
3. Credit institutions should monitor the loans given out to the nomads since most of them default in paying back loans.
4. The nomads should be encouraged by Extension agents of Agricultural Development Projects (ADPs) to plant more trees around their farms and dwelling places in order to combat desertification and make their living environment more comfortable.
5. Government institutions tasked with implementing Sustainable Development Goals (SDGs) should reach out to the nomads in order to provide input aids that will help improve the fertility of degraded lands, increase productivity and hence increase availability of food for the nomadic households.
6. Efforts must be made by Government, Non-Government Organisations (NGOs) and relevant Stakeholders to ensure adequate water availability and access points in the

study area in order to reduce productive time wasted in search of water and thus help secure the livelihoods and overall wellbeing of farmers and pastoralists.

7. The human capital and human capability of the respondents due to low educational level should be addressed through the provision of adult education and skill acquisition centers; by the Government, Non-Government Organisations (NGOs) and relevant Stakeholders.

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APPENDICES

APPENDIX 1: Age distribution of the respondents

AGE	Frequency	Percent	Cumulative Percent
18.00	1	.3	.3
19.00	2	.6	.9
20.00	9	2.8	3.7
21.00	3	.9	4.6
22.00	5	1.5	6.1
23.00	3	.9	7.1
24.00	4	1.2	8.3
25.00	15	4.6	12.9
26.00	1	.3	13.2
27.00	5	1.5	14.7
28.00	4	1.2	16.0
29.00	4	1.2	17.2
30.00	25	7.7	24.8
31.00	6	1.8	26.7
32.00	10	3.1	29.8
33.00	4	1.2	31.0
34.00	2	.6	31.6
35.00	21	6.4	38.0
36.00	5	1.5	39.6
37.00	5	1.5	41.1
38.00	7	2.1	43.3
39.00	1	.3	43.6
40.00	19	5.8	49.4
41.00	3	.9	50.3
42.00	13	4.0	54.3
43.00	1	.3	54.6
44.00	3	.9	55.5
45.00	13	4.0	59.5
46.00	9	2.8	62.3

AGE	Frequency	Percent	Cumulative Percent
47.00	6	1.8	64.1
48.00	11	3.4	67.5
49.00	6	1.8	69.3
50.00	16	4.9	74.2
51.00	6	1.8	76.1
52.00	7	2.1	78.2
53.00	6	1.8	80.1
54.00	5	1.5	81.6
55.00	7	2.1	83.7
56.00	5	1.5	85.3
58.00	7	2.1	87.4
60.00	11	3.4	90.8
61.00	4	1.2	92.0
62.00	2	.6	92.6
64.00	6	1.8	94.5
65.00	7	2.1	96.6
67.00	3	.9	97.5
68.00	1	.3	97.9
69.00	2	.6	98.5
70.00	1	.3	98.8
72.00	1	.3	99.1
74.00	1	.3	99.4
75.00	2	.6	100.0
Total	326	100.0	

Appendix 2: Distribution of the respondents by age at marriage

AGE	Frequency	Percent	Valid Percent	Cumulative Percent
14.00	2	0.6	0.7	0.7
15.00	9	2.8	3.0	3.6
16.00	10	3.1	3.3	7.0
17.00	61	18.7	20.2	27.2
18.00	37	11.3	12.3	39.4
19.00	18	5.5	6.0	45.4
20.00	47	14.4	15.6	60.9
21.00	12	3.7	4.0	64.9
22.00	14	4.3	4.6	69.5
23.00	8	2.5	2.6	72.2
24.00	2	0.6	0.7	72.8
25.00	35	10.7	11.6	84.4
26.00	3	0.9	1.0	85.4
27.00	4	1.2	1.3	86.8
28.00	13	4.0	4.3	91.1
29.00	1	0.3	0.3	91.4
30.00	15	4.6	5.0	96.4
31.00	2	0.6	0.7	97.0
33.00	1	0.3	0.3	97.4
35.00	8	2.5	2.6	100.0
Total	302	92.6	100.0	
Missing System	24	7.4		
Total	326	100.0		

Appendix 3: Summary of Descriptive Statistics of Personal Characteristics

Personal Characteristics	N	Range	Minimum	Maximum	Mean	Std. Deviation
A1 Age	326	57.00	18.00	75.00	41.9479	13.15167
A4 At what age did you get married	302	21.00	14.00	35.00	21.1225	4.74130
A5 Number of male children	276	11.00	1.00	12.00	3.5362	2.29041
A5 Number of female children	269	9.00	1.00	10.00	3.1970	2.01168
A5 Total number of children	297	19.00	1.00	20.00	6.3838	3.98741
A6 Number of wives	301	4.00	1.00	5.00	1.4684	.69029
A10 How many people live and feed in your house	326	26.00	1.00	27.00	8.8528	5.44650
A11b How many dependents live with you apart from your children	144	8.00	1.00	9.00	2.7708	1.60296
A13 How long have you been engaged in your primary means of livelihood?	326	59.00	1.00	60.00	23.5890	12.72392
A17 Monthly income from primary occupation	277	499900	100.00	500000	32953.098	48345.44130
A18 Monthly income from secondary occupation	131	129980	20.00	130000	29978.855	29965.67136
A19 Amount externally sourced for your enterprise	79	999900	100.00	1000000	39001.899	1.13148E5
A20 Outstanding credit you have to settle	102	499000	1000.00	500000	39763.235	84967.38015

Appendix 4: Distribution of respondents by total number children and other dependents

Number of Children	Number of Respondents				Number of Dependents	Number of Respondents			
	Freq.	%	Valid %	Cum. %		Freq.	%	Valid %	Cum. %
1	13	4.0	4.4	4.4	1	30	9.2	20.8	20.8
2	36	11.0	12.1	16.5	2	52	16.0	36.1	56.9
3	34	10.4	11.4	27.9	3	20	6.1	13.9	70.8
4	28	8.6	9.4	37.4	4	21	6.4	14.6	85.4
5	38	11.7	12.8	50.2	5	11	3.4	7.6	93.1
6	29	8.9	9.7	59.9	6	6	1.8	4.2	97.2
7	21	6.4	7.1	67.0	7	3	.9	2.1	99.3
8	19	5.8	6.4	73.4	8	1	.3	.7	100.0
9	16	4.9	5.4	78.8					
10	21	6.4	7.1	85.9					
11	8	2.5	2.7	88.6					
12	9	2.8	3.0	91.6					
13	6	1.8	2.0	93.6					
14	4	1.2	1.3	94.9					
15	5	1.5	1.7	96.6					
16	3	.9	1.0	97.6					
17	1	.3	.3	98.0					
18	5	1.5	1.7	99.7					
20	1	.3	.3	100.0					

Appendix 5: Descriptive Statistics (Capital Assets)

Capital Assets	N	Range	Minimum	Maximum	Mean	Std. Deviation
Zscore B Human/Social capital	326	22.29094	-5.28669	17.00425	.0000077	4.33174793
B Natural Capital	326	8.00	.00	8.00	5.6012	2.64294
B Physical capital	326	15.00	.00	15.00	6.8988	4.19951
B Financial Capital	326	6.00	.00	6.00	1.3344	1.75636
Zscore total capital	326	24.78156	-6.82413	17.95743	.0000075	4.59037355
Valid N (listwise)	326					

Appendix 6: Descriptive Statistics (Human Capabiity)

	N	Range	Minimum	Maximum	Mean	Std. Deviation
Zscore: A10 How many people live and feed in your house	326	4.77370	-1.44180	3.33191	.0000000	1.00000000
Zscore: C HM Age	326	4.53596	-1.23319	3.30277	.0000000	1.00000000
Zscore: C HM Education	326	4.73984	-.82067	3.91917	.0000000	1.00000000
Zscore: C HM Skill	326	9.01848	-.79119	8.22729	.0000000	1.00000000
Zscore total capability	326	16.14947	-3.78285	12.36662	.0000000	3.02859961
Valid N (listwise)	326					

Appendix 7: Descriptive Statistics (Human/Social Capital)

Human/Social Capital	N	Range	Minimum	Maximum	Mean	Std. Dev.
B6 How many household members work for other people? Dry season: Male Adults (>18yrs)	46	5.00	1.00	6.00	2.3478	1.44864
B6 Dry season: Female adults (over 18 years)	19	7.00	1.00	8.00	1.6842	1.63478
B6 Dry season: Male youths (13 - 17 years)	27	4.00	1.00	5.00	2.1111	1.25064
B6 Dry season: Female youths (13 - 17years)	11	3.00	1.00	4.00	2.0909	1.22103
B6 Dry season: Male children (under 13 years)	14	5.00	1.00	6.00	2.5714	1.82775
B6 Dry season: Female children (under 13 years)	11	3.00	1.00	4.00	1.7273	1.00905
B6 Rainy season: Male Adults (over 18yrs)	53	13.00	1.00	14.00	2.4340	2.23184
B6 Rainy season: Female adults (over 18 years)	12	11.00	1.00	12.00	2.8333	3.32575
B6 Rainy season: Male youths (13 - 17 years)	38	4.00	1.00	5.00	1.8947	1.18069
B6 Rainy season: Female youths (13 - 17years)	13	4.00	1.00	5.00	1.4615	1.12660
B6 Rainy season: Male children (under 13 years)	14	2.00	1.00	3.00	1.5714	.64621
B6 Rainy season: Female children (under 13 years)	6	4.00	.00	4.00	1.6667	1.50555
B10 If yes, for how many years have you led your group?	50	29.00	1.00	30.00	4.7600	4.30263

Appendix 8: Descriptive Statistics (Livelihood Activities)

Livelihood Activities	N	Range	Minimum	Maximum	Mean	Std. Dev.
G total Dry season (Farm related activities)	326	46.00	.00	46.00	22.4540	9.29265
G total Dryseason (Non farm related activities)	326	81.00	.00	81.00	3.7117	6.69532
G Total DRYSEASON (LIVELIHOOD ACTIVITIES)	326	122.00	.00	122.00	26.1656	13.16885
G total Income dry season (Farm related activities)	124	862900.00	100.00	863000.00	51864.7581	1.11649E5
G total Income Dry season (Non farm related activities)	28	99875.00	125.00	100000.00	36373.3929	44874.126 30
G total Income Dry season	124	862000.00	1000.00	863000.00	60078.1048	1.25041E5
G total Rainy season (Farm related activities)	326	46.00	.00	46.00	21.4908	12.86420
G total Rainy season (Non farm related activities)	326	35.00	.00	35.00	2.4233	4.39145
G total RAINY SEASON (LIVELIHOOD ACTIVITIES)	326	81.00	.00	81.00	23.9141	15.03366
G total Income rainy season (Farm related activities)	154	731935.00	65.00	732000.00	66447.0455	1.50542E5
G total Income rainy season (Non farm related activities)	31	449875.00	125.00	450000.00	44358.8710	88393.288 43
G total Income rainy season	153	1046000.00	1000.00	1047000.00	75782.1569	1.84150E5
G SUM (Livelihood activities - Dry and Rainy Season)	326	153.00	.00	153.00	50.0798	23.70186
G INCOME SUM (Livelihood activities - Dry and Rainy Season)	190	1363000.00	1000.00	1364000.00	100233.4474	2.40808E5
Valid N (listwise)	18					

Appendix 9: Number of non-food related coping strategies

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
.00	3	.9	.9	.9
1.00	14	4.3	4.3	5.2
2.00	32	9.8	9.8	15.0
3.00	35	10.7	10.7	25.8
4.00	43	13.2	13.2	39.0
5.00	51	15.6	15.6	54.6
6.00	27	8.3	8.3	62.9
7.00	40	12.3	12.3	75.2
8.00	24	7.4	7.4	82.5
9.00	10	3.1	3.1	85.6
10.00	9	2.8	2.8	88.3
11.00	5	1.5	1.5	89.9
12.00	8	2.5	2.5	92.3
13.00	3	.9	.9	93.3
14.00	3	.9	.9	94.2
15.00	2	.6	.6	94.8
16.00	7	2.1	2.1	96.9
17.00	2	.6	.6	97.5
19.00	2	.6	.6	98.2
20.00	2	.6	.6	98.8
22.00	4	1.2	1.2	100.0
Total	326	100.0	100.0	

Appendix 10: Number of environmental related coping strategies (others)

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
.00	67	20.6	20.6	20.6
1.00	83	25.5	25.5	46.0
2.00	132	40.5	40.5	86.5
3.00	44	13.5	13.5	100.0
Total	326	100.0	100.0	

Appendix 11: Number of food related coping strategies

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
.00	35	10.7	10.7	10.7
1.00	16	4.9	4.9	15.6
2.00	38	11.7	11.7	27.3
3.00	44	13.5	13.5	40.8
4.00	33	10.1	10.1	50.9
5.00	47	14.4	14.4	65.3
6.00	29	8.9	8.9	74.2
7.00	19	5.8	5.8	80.1
8.00	29	8.9	8.9	89.0
9.00	16	4.9	4.9	93.9
10.00	7	2.1	2.1	96.0
11.00	3	.9	.9	96.9
12.00	3	.9	.9	97.9
13.00	7	2.1	2.1	100.0
Total	326	100.0	100.0	

Appendix 12: Descriptive Statistics (COPING STRATEGY and PERCEPTION)

	N	Range	Minimum	Maximum	Mean	Std. Deviation
E total (Coping strategies - 326 Non food related)	326	55.00	.00	55.00	14.3190	10.30203
E total (Coping strategies - 326 Food related)	326	44.00	.00	44.00	16.6350	9.26591
E total (Coping strategies - 326 Others)	326	20.00	.00	20.00	6.9540	4.10640
E SUM (Coping Strategies)	326	94.00	7.00	101.00	37.9080	18.35875
F SUM (Perceptions)	326	78.00	40.00	118.00	95.9172	10.23760

Appendix 13: Distribution of respondents according to perception of the effect of drought (N=326)

SN	Perception Statements	SD		D		U		A		SA	
		F	%	F	%	F	%	F	%	F	%
1	Drought has brought about an increase in temperature	4	1	9	3	6	2	164	50	143	44
2	There is insufficient water for household use due to drought	8	2	11	3	65	20	139	43	103	32
3	There has been a decrease in rainfall due to drought	3	1	54	17	35	11	161	49	73	22
4	There is a change in timing of rainfall as a result of drought	-	-	7	2	253	78	46	14	20	6
5	Households members trek very far from home to fetch water due to drought	5	1	38	12	55	17	136	42	92	28
6	Nomads have to go further from home to find water for cattle due to drought	2	0	54	17	29	9	128	39	113	35
7	There is unexpected cessation of rainy season	4	1	36	11	79	24	151	46	56	17
8	Drought has brought about an increase in rainfall	61	19	97	30	60	18	78	24	30	9
9	Cattle get sick due to insufficient water to drink	11	3	16	5	60	18	193	59	46	14
10	Temperature has neither increase nor decreased due to drought	37	11	81	25	95	29	84	26	29	9

SN	Perception Statements	SD		D		U		A		SA	
11	Water evaporation from the ground is so fast due to drought	33	10	17	5	35	11	185	57	56	17
12	Drought occurs as a result of curses from unhappy ancestors	156	48	59	18	42	13	52	16	17	5
S/N	Perception Statements	SD		D		U		A		SA	
		F	%	F	%	F	%	F	%	F	%
13	Rains sometimes arrive late or finish late giving way to dry spells	9	3	7	2	66	20	174	53	70	22
14	Windstorms lead to loss of houses and store houses and store houses	2	0	10	3	45	14	187	58	82	25
15	Reduction of existing water basins over the years has led to reduced rainfall	2	0	11	3	85	26	159	49	70	22
16	Reduction of pasture for animals leads to migration of more nomads	-	-	7	2	40	12	183	57	96	29
17	Reduction in rainfall has led to increased diversification	2	0	12	4	35	11	204	63	73	22
18	The rate of migration is higher over the years due to drought	2	0	12	4	29	9	204	63	79	24
19	There is more conflict over grazing land and water resources due to drought	5	1	16	5	43	13	194	60	68	21

SN	Perception Statements	SD		D		U		A		SA	
20	Irregular rainfall pattern has led to reduced harvest	6	2	34	10	43	13	158	49	85	26
21	Nomads get sick by feeding on animals sick due to drought	1	0	31	9	91	28	149	46	54	17
22	Drought has led to an increase in prices of milk products	2	0	4	1	30	9	235	73	55	17
23	Drought has led to an increase in poverty	1	0	8	3	31	9	214	66	72	22
24	Drought causes animals to die	1	0	8	3	46	14	206	63	65	20
25	Drought has led to food inadequacy over the years	3	1	9	3	27	8	213	65	74	23

Appendix 14: Regression model with Livelihood status as the dependent variable

Model	Unstandardized Coefficients		Std. Error	Standardized Coefficients	t	Sig.
	B			Beta		
(Constant)	-.397	.561		-.706		.482
A1 Age	.015	.006	.246	2.411		.018
A5 Number of male children	-.045	.051	-.189	-.882		.381
A5 Number of female children	.015	.049	.053	.316		.753
A5 Total number of children	.058	.042	.381	1.374		.174
A6 Number of wives	.077	.101	.111	.762		.448
A11b No. of dependents living with you apart from children	-.038	.034	-.106	-1.127		.263
SUM sources of income	.157	.063	.201	2.507		.014
Asset Score	.059	.037	.143	1.603		.113
No. Sec Occupation (SUM)	-.186	.070	-.256	-2.640		.010
A9 Educational attainment	.049	.029	.146	1.689		.096
F SUM (Perceptions)	.009	.004	.179	2.139		.036
SUM COPINGSstrategies used	.023	.007	.328	3.094		.003

Appendix 15: Descriptive Statistics (Livelihood Status)

	N	Range	Minimum	Maximum	Mean	Std. Deviation
Zscore Livelihood Status	326	35.22026	-9.20805	26.01221	.0000075	6.56070235
Valid N (listwise)	326					

Appendix 16: Descriptive Statistics (Challenges)

Challenges	N	Range	Minimum	Maximum	Mean	Std. Deviation
D total (Has ths been altered in the last 5 years?)	326	10.00	.00	10.00	6.9417	2.90034
D total (Is it due to changes in rainfall pattern?)	326	10.00	.00	10.00	6.9479	2.92791
D total (How has it affected your livelihood/wellbeing?)	326	10.00	.00	10.00	6.8681	3.05605
D SUM (Challenges faced by respondents)	326	30.00	.00	30.00	20.7577	8.24693
Valid N (listwise)	326					

Appendix 17: Interview Schedule

Dear Respondent,

Kindly answer all the questions in this **QUESTIONNAIRE** to the best of your knowledge. All information provided will be used solely for research purposes. Thank you very much for your time and kind cooperation.

Yours sincerely, Researcher.

HOUSEHOLD LIVELIHOOD AND COPING STRATEGIES OF FULANI NOMADS DURING DROUGHT WITHIN THE BOUNDARIES OF MAJOR WATER BASINS IN NORTHEASTERN NIGERIA

Date	Name of Village Group	Name of Community
Enumerator	Population of Community	Number of Homesteads

A1	Age (years)		<20		20-30		31-40		41-50		>50	
A2	Gender	Male		Female								
A3	Marital status	Married		Single		Widow		Divorced				
A4	What age did you marry?		<15		16-20		21-25		26-30		>30	
A5	How many children do you have?	Male		Female								
A6	How many wives do you have (does your husband have)?											
A7	How many children does your husband have?				How many children do you have?				Total			
A8	Type of household head	Male		Female		Dejure Female		Defacto Female		Others		
A9	Educational attainment	Non Formal		Adult		Primary		Secondary		Post Secondary		
A10	How many people live and feed in your house?											
A11	How many dependents live with you apart from your own children?											
A12	What is your primary occupation?	Farming		Livestock		Pastoralism		Fishing		Employed		
A13	What other things do you do?											
A14	How long has this been your means of livelihood?			< 1 yr		1-5yrs		6-10 yrs		> 10 yrs		
A15	Do you have any other occupation? (specify)											
A16	Source(s) of income for enterprise	Friends & relatives		Cooperative scheme		Inheritance		Personal savings		Money lenders		
A17	Give an estimate of the monthly income from your primary occupation (₦)											
A18	Give an estimate of the monthly income from your other occupation(s) (₦)											
A19	Give an estimate of the amount externally sourced for your enterprise (₦)											
A20	Give an estimate of the outstanding credit you have to settle (₦)											
A21	Give a list of your major assets (i.e. farmland, house, pasture, well, transportation, labour, financial credit, equipment/infrastructure)											
A22	Are you an indigene of this village/community/settlement?							Yes		No		
A23	Have you been resident around here in the last 5 years?							Yes		No		
A24	Do you have access to a drought warning system?							Yes		No		
A25	Which?	News media		Extension Agents		Personal Experience		Traditional Institution				
A26	Did you move here because of climatic problems?							Yes		No		
A27	What specific problems made you to move?											
	Lack of rainfall		Drying lake/streams		Water disputes		Land disputes		Livestock deaths			
	Animal disease		Lack of human food		Loss of Assets		Drought		Crop failure			
	Human disease		Reduction of income									
A28	How far did you travel?			<10km		10 – 50km		50-100km		>100km		
A29	Are you here with your entire household?							Yes		No		
A30	Have you noticed major alterations in rainfall patterns and water levels around here?							Yes		No		
A31	Are these alterations having negative impacts on you and/or your livelihood?							Yes		No		
A32	In what way(s)?	Conflicts		Poverty		Disease		Hunger		Others		
A33	Do you intend to move again?							Yes		No		
A34	If yes, why?											
	Lack of rainfall		Drying rivers/streams		Water disputes		Land disputes		Livestock death			
	Disease epidemic		Lack of human food		Loss of Assets		Drought		Crop failure			
	Human disease		Reduction of income									

A35 If not, how do you intend to cope/how have you been coping?

With reduced availability of water/food?

With changing weather patterns?

With socio-cultural challenges?

Effects of season on livelihood

(A36) Have you ever experienced windstorms? Yes [] No []

(A37) Have windstorms ever destroyed your buildings? Yes [] No []

(A38) If yes, how often?

	In the Last One Year			In the Last 2 - 5 years			In the Last 6 - 10 years		
	Often	Rarely	Not at All	Often	Rarely	Not at All	Often	Rarely	Not at All
Dry Season									
Rainy Season									

(A39) Have windstorms ever destroyed your livestock/crops? Yes [] No []

(A40) If yes, how often?

	In the Last One Year			In the Last 2 - 5 years			In the Last 6 - 10 years		
	Often	Rarely	Not at All	Often	Rarely	Not at All	Often	Rarely	Not at All
Dry Season									
Rainy Season									

B. Please tick the following questions as appropriate

Human/Social Capital

(B1) Are you self employed? Yes [] No []

(B2) Are you paid in cash for your labour? Yes [] No []

(B3) If yes, how often? Always [] Sometimes [] Rarely []

(B4) Are your household members hired for work? Yes [] No []

(B5) If yes, how often? Always [] Sometimes [] Rarely []

(B6) How many of your household members work for people?

	Adults (over 18 years)		Youth (13 – 17 years)		Children (under 13 years)	
	Male	Female	Male	Female	Male	Female
Dry Season						
Rainy Season						

(B7) Do you belong to any social organization? Yes [] No []

(B8) If yes, which Social Group/Association do you belong to?

(a) Cooperative society [] (b) 'Adashe'* + (c) Cultural group [] (d) Milk sellers group [] (e) Cow rearers group []

(B9) Do you lead any group you belong to? Yes [] No []

(B10) If yes, for how many years? _____

S/N	Capital	Access/Ownership Yes/No	Frequency of Access		
			Always	Sometimes	Rarely
Natural capital					
B11	Do you have access to land?				
B12	Do you have access to sufficient water?				
Physical Capital					
B13	Do you have access to bicycles?				
B14	Do you have access to motorcycles?				
B15	Do you own a bicycle?				
B16	Do you own a motorcycle?				
B17	Do you rent your living quarters?				
B18	Do you own your living quarters?				
B19	Do you have access to electricity?				
Financial Capital					
B20	Do you have personal savings?				
B21	Do you have access to loans/credit?				
B22	Do you collect allowances from family?				

C. Analysis of Human Capabilities

Please tick the following as appropriate

Household Member	Age (years)	Gender		Highest level of education				Skills/Capabilities								
		Male	Female	Non-formal	Primary	Secondary	Tertiary	Mat/'Zana' Weaving	Carpentry	Masonry	Sewing or Knitting	Barbing or Hair dressing	Farming	Fishing	Carving or Handcrafts	Others (Specify)
C1																
C2																
C3																
C4																
C5																
C6																
C7																
C8																
C9																
C10																
C11																
C12																
C13																
C14																
C15																

D. Analysis of coping strategies

Please state how often you use the following coping strategies by ticking as appropriate

S/N	Coping Strategies	Always	Often	Rarely	Not at All
Non-food related coping strategies					
D1	Do you relocate to less expensive houses to reduce expenses?				
D2	Do you buy second hand clothes for yourself?				
D3	Do you buy second hand clothes for your children?				
D4	Do you buy second hand kitchen items like pots, plates?				
D5	Do you buy goods on credit?				
D6	Do you delay paying for goods bought on credit?				
D7	Do you hide away from those you owe money?				
D8	Do you increase cash by begging for money?				
D9	Do you increase cash by gambling?				
D10	Do you pawn/sell your used plates?				
D11	Do you pawn/sell your used pots?				
D12	Do you pawn/sell your used gold?				
D13	Do you pawn/sell your used jewelries?				
D14	Do you pawn/sell your household furniture?				
D15	Do you sell your blood for money?				
D16	Do you make clay pots for your use?				
D17	Do you rent out your pots for money?				
D18	Do you make clay pots for sale?				
D19	Do you rear ducks for home use?				
D20	Do you sell the ducks you rear?				
Food related coping strategies					
D21	Do you reduce the portion of food served to members per meal?				
D22	Do you reduce the number of meals served members per day?				
D23	Do you eat three meals in a day?				
D24	Do your household members eat three meals in a day?				
D25	Do you cook yam peels?				
D26	Do you eat expired food?				
D27	Do you gather fruits from the bush?				
D28	Do you gather mushrooms?				
D29	Do you hunt birds and animals in the bush?				
D30	Do you buy food on credit?				
D31	Do you send your children to eat in relatives'/neighbors' homes?				
D32	Do you send your children to eat at parties?				
D33	Do you re-use groundnut oil used to fry food by family/friends?				
D34	Do you lease land to produce food for family consumption?				
D35	Do you lease land to produce food for sale?				

Other coping strategies					
D36	Do you plant trees around your farm and houses?				
D37	Do you practice multiple cropping?				
D38	Do you migrate to other areas to seek better livelihood?				
D39	Do you store water for future use?				
D40	Do you practice irrigation?				

E. Perception of the respondents about drought

Please tick the following as appropriate

S/No	Perceptual Statements	SD	D	U	A	SA
E1	Drought has brought about an increase in temperature					
E2	There is insufficient water for household use due to drought					
E3	There has been a decrease in rainfall due to drought					
E4	There is a change in the timing of rainfall as a result of drought					
E5	Household members have to trek very far from home to fetch water for use at home. due to drought					
E6	Pastoralists have to go further from home to find water for cattle due to drought					
E7	Unexpected cessation of rainy season is as a result of drought					
E8	Drought has brought about an increase in rainfall					
E9	Cattle get sick due to insufficient water to drink					
E10	Temperature has neither increased nor decreased because of drought					
E11	Water evaporation from the ground is so fast due to drought					
E12	Drought occurs as a result of curses from the ancestors who are unhappy that the gods are not appeased					
E13	Rains sometimes arrive late or finish early; giving way to dry spells during the rainy seasons					
E14	Windstorms lead to loss of houses and storehouses					
E15	Reduction in available water basins over the years has led to a reduction in animal production					
E16	Reduction of pasture for animals leads to migration of more pastoralists					
E17	Reduction in rainfall has led to increased desertification					
E18	The rate of migration over the years is higher due to drought					
E19	There is more conflict over grazing land and water resources as a result of drought					
E20	Irregular rainfall pattern has led to reduced harvest because people are not sure of when to plant					
E21	Nomads get sick by feeding on animals that are sick due to drought					
E22	Drought has led to an increase in prices of milk products					
E23	Drought has led to increased poverty					
E24	Drought causes animals to die					
E25	Drought has led to food inadequacy over the years					

F. Analysis of Livelihood Activities

S/N	Livelihood Activities	Dry Season				Rainy Season	
		Fully Involved	Sometimes Involved	Rarely Involved	Not Involved	Fully Involved	Sometimes Involved
	Farm related Activities						
1.	Rearing cattle						
2.	Rearing local chicken						
3.	Rearing guinea fowls						
4.	Rearing ducks						
5.	Rearing sheep						
6.	Rearing goats						
7.	Processing milk ('Nunu')						
8.	Processing yoghurt ('ki dirimu')						
9.	Processing butter ('Mai'n Saanu')						
10.	Processing cereal cakes ('Fura/Dekere')						
11.	Gathering firewood						
12.	Gathering mushrooms						
13.	Gathering fruits from the wild						
14.	Gathering snails/ bush animals in the bush						
15.	Gathering of wild plants						
16.	Fish farming						
17.	Processing of fish						
18.	Selling of fish						
19.	Planting cereals						
20.	Planting vegetables						
	Non- farm related activities						
1.	Making pots						
2.	Renting out pots						
3.	Selling pots						
4.	Weaving mats / 'Zana'						
5.	Hair weaving/barbing						
6.	Tie-Dye						
7.	Food hawking						
8.	Sewing clothes						
9.	Knitting						
10.	Night guard						
11.	House-help						
12.	Manicure of nails						
13.	Selling of used plates and pots						
14.	Shoe repairs(Cobbler)						
15.	Drawing and art work						
16.	Carpentry						
17.	Bricklaying						
18.	Blacksmithing						

	FACTOR/ACTIVITY/CHALLENGE OF THE INHABITANTS' LIVELIHOOD AND/OR WELLBEING	Has this been altered in the last 5 years?		Is it due to changes in Climate/ Weather?		How has it affected your Livelihood/ Wellbeing?		How have you been coping or how do you intend to cope with this challenge?
		No	Yes	No	Yes	+vely	-vely	
1	Availability/Access to enough water							
2	Availability/Provision of household food							
3	Availability/Access to pastureland							
4	Availability/Access to farmland							
5	Availability/Collection of firewood							
6	Availability/Gathering of wild fruits/herbs							
7	Availability/Hunting of wildlife							
8	Availability/Access to job/hired labour							
9	Availability/Access to healthcare/education							
10	Market/Trading/Cottage activities							
11	Qty of natural resources extracted/used							
12	Soil fertility and Crop yield							
13	Socio-cultural activities i.e. events							
14	Religious activities							
15	Household comfort and daily activities							
16	State of health (human/livestock)							
17	Peace of community/inhabitants							
18	Movement/migration (human/livestock)							
19	Quantity/quality of water (rain/well/river)							
20	HOPE for future provisions (sustainability)							

	FACTOR/ACTIVITY/CHALLENGE OF THE INHABITANTS' LIVELIHOOD AND/OR WELLBEING	How have you been coping or how do you intend to cope with this challenge?	Describe your most unique Indigenous approach (traditional knowledge) of handling this challenge
1	Availability/Access to enough water		
2	Availability/Provision of household food		
3	Availability/Access to pastureland		
4	Availability/Access to farmland		
5	Availability/Collection of firewood		
6	Availability/Gathering of wild fruits/herbs		
7	Availability/Hunting of wildlife		
8	Availability/Access to job/hired labour		
9	Availability/Access to healthcare/education		
10	Market/Trading/Cottage activities		
11	Qty of natural resources extracted/used		
12	Soil fertility and Crop yield		
13	Socio-cultural activities i.e. events		
14	Religious activities		
15	Household comfort and daily activities		
16	State of health (human/livestock)		
17	Peace of community/inhabitants		
18	Movement/migration (human/livestock)		
19	Quantity/quality of water (rain/well/river)		
20	HOPE for future provisions (sustainability)		

Appendix 18: Focus Group Discussion (FGD) Questions

HOUSEHOLD LIVELIHOOD AND COPING STRATEGIES OF NOMADS FACING INTERMITTENT DROUGHT IN NORTHEASTERN NIGERIA

Name of Community	
Name of Enumerator	
Name of Interpreter	
Community Contact	

No. of participants	
<i>Men</i>	
<i>Women</i>	
<i>Youths</i>	

Venue of FGD	
Date of FGD	

Time started	
Time ended	

A. Social Characteristics

1. What is the average household size in your community?.....
2. What is the number of males in an average household?.....
3. What is the number of females in an average household?.....

B. Social /Political organisation

1. Type of community/settlement.....i. Urban ii. Semi urban iii. Rural
2. Ward..... LGA:.....
3. Distance of community to LGA Headquarters.....Km
4. Distance of community to state capital.....Km
5. Head of community.....
6. What is the estimated population of the community?.....
7. What land ownership system do you have here? Communal, family, or individual?
.....

C. Ethnic composition

1. Major or dominant tribe.....
2. Other sub-group or tribes.....
3. Major language spoken.....

D. Markets

1. Do you have a market? i. YES, ii. NO
2. How far away is the market from the Chief's house?.....km
3. How regular is the market?.....

E. Please rank or indicate population by economic activities in the community

***Most common, ** least common**

S/N	Activity	Rank	Population involved
1.	Farming		
2.	Fishing		
3.	Civil service		
4.	Company work		
5.	Lumbering (wood cutting)		
6.	Petty trading		
7.	Hunting		
8.	Artisan		
9.	Hired labour		
10.	Politics		
11.	Others (specify)		

F. Environmental problems in the community

Environmental problem	Mitigation measure adopted (indicate provider where applicable)
Erosion	
Waste management	
Flooding	
Deforestation	
Poaching	
Landslides	
Bush burning	
Others (specify)	

Are you an indigene of this village/community/settlement?				Yes		No
Have you been resident around here in the last 5 years?				Yes		No
Are you aware of the phenomenon of climate change?				Yes		No
Do you have access to a weather warning system?				Yes		No
Which?	News media	Extension Agents	Personal Experience	Traditional Institution		
Did you move here because of climatic problems?				Yes		No
What specific problems made you to move?						
Lack of rainfall	Drying lake/streams	Water disputes	Land disputes	Livestock deaths		
Animal disease	Lack of human food	Loss of Assets	Drought	Crop failure		
Human disease	Reduction of income					
How far did you travel?						
<10km		10 – 50km		50-100km		>100km
Are you here with your entire household?				Yes		No
Have you noticed major alterations in climatic patterns and water levels around here?				Yes		No
Are these alterations having negative impacts on you and/or your livelihood?				Yes		No
In what way(s)?	Conflicts	Poverty	Disease	Hunger	Others	
Do you intend to move again?				Yes		No
If yes, why?						
Lack of rainfall	Drying rivers/streams	Water disputes	Land disputes	Livestock death		
Disease epidemic	Lack of human food	Loss of Assets	Drought	Crop failure		
Human disease	Reduction of income					
If not, how do you intend to cope/how have you been coping?						
With reduced availability of water/food?		With changing weather patterns?			With socio-cultural challenges?	