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Assessment of Agricultural Production Role on Poverty Alleviation in Wad Banda Locality, North Kordofan State - Sudan.

تـ قويم دور الإنتاج الزراعي في تخفيف الف قر في محلية ودبنده - ولاية شمال كردفان- السودان.

The thesis is submitted for the fulfillment of the requirement of the degree of Doctor of Philosophy in Agricultural Economics

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Abstract

Assessment of Agricultural Production Role on Poverty Alleviation in Wad Banda Locality, North Kordofan State, Sudan.

Mohammed Abdalla Teabin Ahmed

Agriculture is the main livelihood activity in North Kordofan State (NKS). Animal production, tapping of *Hahsab* trees *(Acacia Senegal)* and traditional gold mining recently are other livelihood activities in the state. Traditional farming and raising livestock are the major problems facing the livelihood. This study aimed to investigate poverty situation and analyzing root causes of poverty in Wad Banda Locality, NKS. The study used both quantitative and qualitative data. A field survey was conducted in June 2013 using a questionnaire. Group discussions, interviews and observations were also used in data collection. Foster, Greer, and Thorbecke index (FGT index) was used for measuring poverty. Descriptive statistics, correlation, Lorenz curve, regression analysis and Gini coefficient were also used. Results of the study revealed that 94% of studied household heads were males while only 6% were females. Age of household heads ranged between 22- 75 years with an average of 43 years old. About 21% of household heads were illiterate, 9% received Khalwa education and 70% of household heads received formal education. Family size ranged from 2-16 persons with an average of 7 persons per household. Males represent 50.9 % of the studied households; while female represent 49.1 %. Expenditure on food represented 84 % of total household's expenditure, clothes represented 5% and expenditure on education and health represented 7% and 4%, respectively. The study showed that about 94% of the household heads considered farming as their main livelihood activity, 5% considered it as secondary livelihood activity, and only 1% did not depend on agriculture as livelihood. The

people in the area raise sheep, goats, cattle and camels. About 17% of studied household heads practiced animal raising for cash as a secondary activity, while 83% said animal raising was only for home consumption. About 43% of studied households experienced food shortages during the last year. Rain variability is a major cause of livelihood vulnerability. Other problems facing household income generation include agricultural pests and diseases, traditional farming methods, marketing problems, low human capabilities, lack of finance, and low level of social services. People in the area adopted a number of coping strategies to alleviate poverty such as selling assets, borrowing, casual work, traditional gold mining, hiring their children to livestock breeders, and migration to Libya.

Results of the study showed that the incidence of income poverty between studied households was 100% regarding income from crop production only. The addition of livestock income reduced incidence of poverty from 100% to 94%. When total income was considered the incidence of poverty fell to 78%. Consumption expenditure was divided into two categories, consumption on food only, and total consumption which include food, education, clothes, and health. The incidence of food poverty was 74%. Regarding total consumption the incidence of poverty fell to 62%. The study recommended that provision of agricultural extension is highly needed to build capacities of rural people.

الخلاصة

تقييم دور الإنتاج الزراعي في تخفيف الفقر في محلية ودبنده، ولاية شمال كردفان، السودان.

محمد عبد الله تبن احمد

تعتبر الزراعة النشاط الرئيسي لسبل كسب العيش لغالبية السكان في محلية ود بنده، إلى جانب تربية الحيوان وطق اشجار الهشاب و التعدين التقليدي حديثاً. تعتبر الزراعة والرعي التقليديين المشاكل الرئيسة التي تواجه سبل كسب العيش.

تهدف هذه الدراسة إلى تحليل حالة الفقر في محلية ود بنده من خلال وصف حالة الفقر وتحليل الأسباب الرئيسية للفقر في المنطقة. استخدمت الدراسة كل من البيانات الكمية والنوعية. أجري المسح الميداني في يونيو 2013 باستخدام الإستبيان، بالإضافة إلي المناقشات الجماعية و المقابلات والملاحظات. تم اختيار مائة أسرة عن طريق العينة العشوائية البسيطة. تم إستخدام مؤشر Foster, Greer, and Thorbecke index (FGT index)) كمؤشر رئيسي لقياس الفقر، إلي جانب الإحصاء الوصفي، الارتباط منحنى لورنز، الإنحدار الخطي و معامل جيني. أظهرت نتائج الدراسة أن 94 ٪ من أرباب الأسر المبحوثين من الذكور في حين 6٪ فقط من الإناث. تراوحت أعمار أرباب الأسر بين 22-75 عاما بمتوسط بلغ 43 سنة. كشفت نتائج الدراسة أن حوالي 21 ٪ من أرباب الأسر من الأميين، 9٪ خلوة، بينما 70 ٪ منهم تلقوا تعليماً نظامياً. يتراوح حجم الأسرة من 2-16 شخص بمتوسط بلغ 7 شخص. أظهرت الدراسة أن الذكور يمثلون 50.9 ٪ من السكان، في حين أن الإناث تمثل 49.1 ٪. **يمثل الإنفاق على الغذاء** 84٪ من الاستهلاك الكلي للأسرة، والملابس 5 ٪، بينما الإنفاق علي التعليم والصحة تمثل 7٪ و 4٪ على التوالي. كما أظهرت الدراسة أن النشاط الرئيسي لسبل كسب العيش هو الزراعة حيث إعتبر حوالي 94 من أرباب الأسر الزراعة كنشاط رئيسي لسبل كسب العيش بالنسبة لهم، في حين اعتبر 5 ٪ منهم بأنها تمثل نشاط ثانوي لسبل كسب العيش، بينما اعتبر 1٪ فقط من الاسر أن الزراعة لا تمثل نشاط رئيسي او ثانوي للمعيشة بالنسبة لهم. تعتبر الثروة الحيوانية النشاط الرئيسي الثاني لسبل كسب العيش في المنطقة. يربي السكان في المنطقة أعداد مقدّره من الأغنام والماعز، و أعدد قليلة من البقر والإبل. يمارس حوالي 17% من أرباب الأسر تربية الحيوان كنشاط ثانوي، بينما أوضح 83٪ **من أرباب الأسر بأنهم يمارسون تربية الحيوان للإستهلاك المنزلي**. توصلت نتائج الدراسة إلي أن 43 ٪ من الأسر المبحوثة واجهت نقصا في المواد الغذائية في العام

الماضي. أظهرت الدراسة أن تذبذب الأمطار هو السبب الرئيسي لهشاشة سبل كسب العيش والف قر في منط قة الدراسة إلى جانب الآفات الزراعية، الأمراض، و أساليب الزراعة والرعي الت قليدية، مشاكل التسويق، تدني ال قدرات البشرية، ن قص التمويل، وإنخفاض مستوى الخدمات الاجتماعية. وكشفت الدراسة أن السكان في المنط قة تبنوا العديد من الإستراتيجيات لتخفيف الف قر مثل بيع الأصول، الإ قتراض، الأعمال الموسمية، العمل في مناجم الذهب الت قليدية، تأجير الأطفال لمربي الثروة الحيوانية والهجرة إلى ليبيا.

أظهرت نتائج الدراسة أن نسبة الف قر 100 ٪ فيما يتعلق بالدخل من إنتاج المحاصيل ف قط. وعند إضافة الدخل من الثروة الحيوانية إلي الدخل من إنتاج المحاصيل ينخفض معدل الف قر من 100 ٪ **إلى** 94 ٪. وعند إستخدام الدخل الكلي ينخفض معدل الف قر من 94 % إلي 78 ٪ . تم ت قسيم الإنفاق علي الاستهلاك إلى فئتين، الاستهلاك على المواد الغذائية و الإستهلاك الكلي الذي يشمل الإستهلاك علي الغذاء، التعليم، الملابس، الصحة وغيرها. بلغ معدل ف قر الغذاء 74 ٪. أما بخصوص الاستهلاك الكلي انخفضت **نسبة الفقر إلى** 62 ٪. أوصت الدراسة بضرورة توفير الإرشاد الزراعي لبناء قدرات السكان الريفيين.

Dedication

To the soul of my father Abdalla Teabin Ahmed

To my lovely mother Jada Ahmed AbuBakar

To my gorgeous wife Sabrin Hussein Bahar

To my daughter Sugood

To my brothers and sisters

To all poor and farmers

I dedicate this work with a great love and respect

Mohammed Abdalla Teabin

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List of Acronyms and Abbreviations

CBS	Central Bank of Sudan
CPA	Comprehensive Peace Agreement
DAD	Distributive Analysis / Analyze Distributive Software
DFID	Department for International Development, UK
FAO	Food and Agriculture Organization of the United Nations
FGT index	James Foster, Joel Greer, and Erik Thorbecke index
GDP	Gross domestic product
GNI	Gross National Income
IFAD	International Fund for Agricultural Development
MA&F	Minstry of Agriculture and Forestry
MDGs	United Nation Millennium Development Goals
MFG	Minimum Income Question
MICS	Multiple Indicators Culsters Survey
NKS	North Kordofan State
RSS	Republic of South Sudan
SCBS	Sudanse Cental Bureau of Statistics
SDG	Sudanese Pound
SH	Health Survey
SPLM	Sudanese People's Liberation Movement
SPSS	Statistical Package of Social Science Software
UNDP	Unit***ed Nations Development Program***
USD	United State Dolar
WB	World Bank

Chapter One: Introduction

1.1 Preface

Sudan is located in north east Africa. It lies roughly between latitudes 8.45◦ to 23.8◦ N and longitudes 21.49◦ to 38.24◦ E (www.sudan.gov.sd). Sudan is neighbor to six African countries. Its area is estimated at 1.87 million km^2. The latest population census in 2008 estimated the population of Republic of Sudan at 30.7 million (SCBS, 2009). Sudan used to be the largest country in Africa and ninth largest in the world area-wise, but in 2011 it split up in two countries, Republic of Sudan, and Republic of South Sudan. Sudan economy experienced a major economic shift for about two decades; the main driver was the oil discovery at the turn of the century. Agriculture which used to be the leading economic sector contributing typically over 40% of the GDP before oil; lost much ground and its share dropped to 31.1% in 2009 accompanied with the increase of oil share in GDP (CBS, 2009). The contribution of agriculture to the country's exports fell to 3% in 2007 down from an average of 74% during the period 1996–1998. Agriculture has almost consistently been disadvantaged in public allocations to various economic sectors. It can be concluded that agriculture, if not discriminatively treated, had not been given the attention parallel to its socioeconomic importance (Faki et al 2009).

The Comprehensive Peace Agreement (CPA), which was signed by the government of Sudan and the Sudanese People's Liberation Movement (SPLM) ended more than 20 years of civil war. In January 2011, the people in southern Sudan have voted for separation from the Sudan and in July 2011 the Republic of South Sudan (RSS) was officially declared.

Accordingly Sudan lost a major part of its oil revenue, which constituted a growing share in its trade, government revenue and GDP before the

secession of RSS during the last decade (Siddig, 2012). During the CPA period and until the secession of RSS, Sudan used to receive half of South Sudan's oil revenues (Thomas, 2012)

1.2 Problem Statement

Three out of every four poor people in developing countries live in rural areas, and most of them depend directly or indirectly on agriculture for their livelihoods. Climate change and rising food prices are reminders of the need to focus on food security and agriculture for development (IFAD, 2009). Agriculture is central to at least three of Millennium Development Goals, reducing poverty and hunger, fostering gender equality, and sustainable management of the environment **(**Byerlee et al, 2008). Agriculture can be an engine of growth which is necessary for reducing poverty and food insecurity, particularly in sub-Saharan Africa. Factors outside of the sector, such as widespread environmental change, are also altering agricultural potential throughout the world. Migration, arising mainly from poverty or prompted by natural disasters or violent conflicts form a dynamic force, changing the landscape of the rural population. Globalization and trade liberalization have opened more market opportunities internationally and have induced greater innovations and efficiencies in many cases. But at the same time, globalization has led to painful transition periods for some economies and has favored the producers who have more resources and the information, education, and capacity to cope with increasingly stringent market demands (WB, 2009).

Sudan is a low-income country, with average GNI per capita USD 1450 (WB, 2012). Sudan holds great economic potential with its vast geographic area and varied natural resources. So far, it has been a land of missed opportunities. Sudan is also a land of great diversity: ethnically, geographically and ecologically. The country faces the challenges of

utilizing, capitalizing on such diversity to achieve development and eradicate poverty. The relatively low level of per capita income masks wide regional disparities in economic and social development. Educational levels are low, health conditions are poor, and the burden of disease is heavy and widespread. Infrastructure is either non-existent or underdeveloped and inadequate in lager parts of the country (UNDP, 2006).

IFAD (2007) stated that about 19 million people, 85 % of the rural population in Sudan, are estimated to be living in extreme poverty. Most of them struggle to feed themselves and their families and have little or no access to safe drinking water and health services. The incidence of poverty varies considerably according to region. Inequalities in terms of access to education, sanitation and clean water, infrastructure and natural resources, income opportunities, justice and political protection exist between regions.

Sudan has suffered a number of long and devastating droughts in the past decades. All regions have been affected, but the worst impacts have been felt in the central and northern regions, particularly in North Kordofan, Northern state, Northern Darfur, Western Darfur, Red Sea and White Nile states. As a result, their population is highly vulnerable to effects of chronic and occasionally acute food shortages (Taha, 2007). During the last three decades North Kordofan State (NKS) has experienced catastrophic and frequent drought periods with far-reaching consequences on agricultural and pastoral system, regional economy, traditional family livelihood and environment. The droughts of the 1970s and 1980s triggered short cycles of famines in the State and these effect most vulnerable area farmers in traditional rainfed sector. The drought of 1984 was devastating. Severity of drought depends on the variability of rainfall both in amount and frequency (Khiry, 2007).

1.3 Objectives of the Study

The general intention of this study is to assess agricultural production role on poverty alleviation in Wad Banda Locality, North Kordofan State, Sudan. Specific objectives of the study are to:

1. Verify poverty situation in the study area.
2. Analyze causes of poverty in the study area.
3. Assess poverty safety nets, and coping strategies in facing poverty in the study area.
4. Assess role of agriculture in poverty alleviation and food security in the study area.
5. Derive some policy recommendations for poverty alleviation in the study area.

1.4 Hypotheses of the Study

1. The majority of people in the study area are under poverty line.
2. Illiteracy and conflicts are some of the causes of poverty in the area.
3. The role of agricultural production in livelihood and food security is decreasing.

1.5 Research Methodology

1.6.1 Study area

North Kordofan State (NKS) is located in central Sudan in arid and semi barren area between latitude 12^0 - 16^0 north and longitude 27^0 – 32^0 east. The total area of NKS is estimated at 244,700 km^2. It is bordered by Northern State to the north, Khartoum to the northeast, White Nile State to the east, North Darfur to the west, and southwest and South Kordofan to the south (Ministry of Agricultural and Forestry, 2007).

Wad Banda Locality is located in the western part of NKS. It is bordered by Elnhud locality to the east, North Darfur State to west, Gebeish

locality to the southern western part, and Soudrei locality to the north. It was created on the first of August 2005. At 13 of July 2013 West Kordofan State was established. Wad Banda Locality was added to the new established state. Population of Wad Banda Locality was estimated at 156,286 (SCBS, 2009). Its area is estimated at 13,000 km^2. It is composed of five administrative units, Wad Banda, Sough Al-Gamal, Dardoug, Armal, and Elzarnikh.

1.6.2 Data collection and analytical techniques

Both primary and secondary data were used in this study. Field survey was conducted during June 2013 using a questionnaire, group discussions, interviews and observations. Hundred households were chosen through simplified random sampling. Secondary data was collected from Published and unpublished reports, research papers, etc. Foster, Greer, and Thorbecke index (FGT index) was used as the main technique for measuring poverty. Descriptive statistics, correlation, Lorenz Curve, regression and Gini Coefficient were also used. See chapter 3 for more details on the methodology of the study.

Chapter Two: Literature Review

2.1 Definition of Poverty

Poverty is a multi-dimension concept. Experts and academics have suggested many definitions over time. Poverty can be due to lack of income, food or materials. It also could be the lack of capability to function in a given society. Poverty can be shaped in form of psychological aspects, such as powerlessness, voicelessness, dependency, shame, and humiliation. Furthermore poverty can be the lack of accessing basic infrastructure roads, transportation, and clean water. It also can be lack of services such as health and education (Nafziger, 2006, Chambers, 2006). All these definitions point to poverty as a status in which a reasonable standard of living is not achieved (FAO, 2005, WB, 2005). Ki and Anh (2009) wrote poverty consists in any form of inequity, which is a source of social exclusion in the distribution of the living conditions essential to human dignity. These living conditions correspond to the capabilities of individuals, households and communities to meet their basic needs in the following dimensions: income, education, health, food/nutrition, safe water/sanitation, labor/employment, housing (living environment), access to productive assets, access to markets.

Haughton and Khandker (2009) stated that poverty is deprivation in wellbeing. But the questions arises what is wellbeing and how we measure deprivation. One approach is to think of well-being as the command over commodities in general, so people are better off if they have enough resources to meet their needs. A second approach to wellbeing is to ask whether people are able to obtain a specific type of consumption good: Do they have enough food? Or shelter? Or health care? Or education? Perhaps the broadest approach to wellbeing is the one expressed by Sen (1987) who claimed that wellbeing comes from a

capability to function in society. Thus, poverty arises when people lack key competences; such have insufficient income or education, or weak health, or insecurity, or low self-confidence, or a sense of powerlessness, or the absence of rights such as freedom of speech.

The most important question which arises, why we measure poverty? For answering this question there are at least four reasons for measuring poverty. First, to keep the poor on the agenda; if poverty was not measured, it would be easy to forget the poor. Second, to be able to target interventions that aim to reduce or alleviate poverty. Third, to monitor and evaluate projects and policy interventions those are geared towards the poor. Fourth to evaluate the effectiveness of institutions whose goal is, to help the poor. And finally, to help countries think clearly and systematically about how the position of the poor may be improved (WB, 2005).

2.2 Choosing an Indicator of Welfare

Ravilion (1992) stated that the key questions to be answered by economists before measuring poverty should be:

1. How can we evaluate individual wellbeing or welfare?
2. At what level of measured wellbeing do we articulate that a person is not poor?
3. How do we combine individual indicators of wellbeing into a measure of poverty?

The assessment of wellbeing for poverty analysis is conventionally characterized according to two main approaches, welfarist and nonwelfarist (Duclos et al, 2006). Welfarist approach seeks to measure household utility, which in turn is usually assumed to be valued by household consumption expenditure or household income; these may be deemed as inputs into generating utility. Nonwelfarist approach might

concentrate on whether households have attained certain minimal levels of, say, nutrition or health (Haughton and Khandker, 2009).

2.2.1 Welfarist Approach

This approach tends to focus in practice mainly on comparisons of economic wellbeing, which also called standard of living or income (Duclos et al, 2006). Boccanfuso (2004) stated that welfarist approach refers to the numerous microeconomic principles that assume economic performers are rational and they behave in ways that lead to maximize their benefits.

A pure welfarist approach faces important practical problems. To be operational, pure welfarism requires the observation of sufficiently informative revealed preferences. A related problem to pure welfarist approach is the need to evaluate levels of utility or psychic happiness. How are we to measure the actual pleasure derived from experiencing economic wellbeing? Furthermore, it is highly problematic to attempt to compare that level of utility across individuals (Duclos et al, 2006). Since economic welfare is not measurable, the welfarist in fact have no choice other than to use the instrumental observable variable of wellbeing, often named a proxy, such as income or consumption, to attribute a value to economic welfare that is not directly measurable. Besides consumption and income proxies are rarely able to take full account of welfare contributed by public goods or non-traded goods that increase the benefit of individuals or households, such as freedom, peace, or health. This approach is called in the literature the monetary or unidimensional approach, as the concept of benefit is related to a monetary value (Boccanfuso, 2004).

2.2.2 *Nonwelfarist Approach*

Nonwelfarist approach has traditionally been supported mainly by social scientists other than economists. Recently and increasingly the approach was advocated by economists and non-economists alike as a multidimensional complement to the unidimensional standard of living approach (Duclos et al, 2006). Nonwelfarist approach include two schools, basic needs school and capabilities school.

2.2.2.1 Basic Needs Approach

The basic needs approach views poverty as a dilemma of unacceptable social inequality. Under this approach, the lost thing is a small subset of goods and services specifically identified and understood as basic needs by all individuals or households (Boccanfuso, 2004). Living may be seen as consisting of a set of interrelated functionings, consisting of beings and doings. A person's achievement in this respect can be seen as the vector of his or her functionings. The relevant functionings can vary from such elementary things as being adequately nourished, being in good health, avoiding escapable morbidity and premature mortality, etc., to more complex achievements such as being happy, having self-respect, taking part in the life of the community, and so on. The functioning approach is closely linked to the well-known basic needs approach, and the two are often difficult to distinguish in practice. Functionings, however, are not synonymous with basic needs (Duclos et al, 2006).

2.2.2.2 Sen's School of Capabilities

Sen's school of capabilities is defined by the capacity to accomplish the functions. In this approach, the missing thing is the human capabilities that will enable households or individuals to acquire the total complex of functions (Boccanfuso, 2004). This distinction between outcomes and the capability to achieve these outcomes also recognizes the importance

of preference diversity and individuality in determining functioning choices. It is, for instance, not everyone wish to be well clothed or to participate in society, even if the capability is present, so an individual will not be considered poor even if he selects not to achieve some functionings, because he would be able to achieve them if he so chose (Duclos et al, 2006).

2.3 Income versus Consumption

It is commonly argued that consumption is better suited than income as an indicator of living standards, at least in many developing countries. One reason is that consumption is believed to vary more smoothly than income, both within a given year and across the life cycle (Duclos et al, 2006). Most developed countries measure poverty using income, while most poor countries use expenditure. A reason for that; may be in rich countries, income is relatively easy to measure because much of it comes from wages and salaries, while expenditure is complex and difficult to quantify. On the other hand, in less-developed countries income is hard to measure, while expenditure is more sincere and therefore it is easier to estimate (Haughton and Khandker, 2009).

2.4 Other Measures of Household Welfare

Even if they were measured perfectly, neither income nor expenditure would be an ideal measure of household wellbeing. For instance, neither of the measures puts a value on leisure time enjoyed by the household; neither measures the value of publicly provided goods (such as education, or public health services); and neither values intangibles such as peace and security. Other possible measures of wellbeing include: Calories consumed per person per day. If one accepts the nonwelfarist notion that adequate nutrition is a prerequisite for a decent level of well-being, then we could just look at the quantity of calories consumed per person.

Anyone consuming less than a reasonable minimum, often set at 2,100 calories per person per day would be considered poor. However, at this point we just note that it is not always easy to measure calorie intake, particularly if one wants to distinguish between different members of a given household. Nor it is easy to establish the appropriate minimum number of calories per person, as this will depend on the age, gender, and working activities of the individual (Haughton and Khandker, 2009).

2.5 Cardinal versus Ordinal Comparisons

There are two types of poverty comparisons, cardinal and ordinal. Cardinal poverty comparisons simply involve differences in numerical poverty estimates. These estimates are valuable when a precise number must be attached to the extent of poverty in a distribution of wellbeing. Consider for instance numerical poverty estimates attach a single number to the extent of aggregate poverty in a population, e.g., the consumption expenditures of 30% of the individuals in a population lie underneath a poverty line, but that a proposed government program could decrease that proportion to 25%. But calculating cardinal poverty estimates requires making a number of very specific assumptions. These include assumptions on the form of the poverty index, the definition of the indicator of well-being, the choice of equivalence scales, the value of the poverty line, and how that poverty line varies precisely across space and time.

Ordinal comparisons, on the other hand, do not attempt to put a precise numerical value on the extent of poverty. They only try to rank poverty across two distributions, indicating whether it is higher or lower in the first than in the second, this can be useful when it suffices to know which of two policies will better alleviate poverty, or which of two distributions has more inequality, but not precisely by how much (Duclos, 2002).

The main advantage of cardinal estimates of poverty and equity is their ease of communication, their easiness to manipulate, and their apparent lack of ambiguity (Duclos et al, 2006). A focus on ordinal comparisons has two major advantages. First, it saves most of the considerable energy and time often spent on choosing poverty lines and poverty indices. This includes avoiding the difficult debate on the choice of appropriate theoretical and econometric methods for estimating poverty lines. It also enables the poverty analyst to escape arguing on the relative merits and properties of the many poverty indices that have been proposed in the scientific literature (Duclos, 2002).

2.6 Poverty Lines

Poverty line can be defined as the monetary cost to a given person, at a given place and time, of a reference level of welfare. People who do not attain that level of welfare are deemed poor (Ravallion, 1998). Haughton and Khandker (2009) stated that the choice of poverty line depends in large measure on the intended use of the poverty rates. Generally poverty line is obtained by specifying a consumption bundle considered adequate for basic consumption needs, then estimating the cost of these basic needs. The poverty line may be thought of as the minimum expenditure required by an individual to fulfill his or her basic food and nonfood needs.

2.6.1 Cost of Basic Needs versus Food Energy Intake Method

The cost of basic needs method specifies a consumption package deemed to be adequate for basic consumption needs, and then estimates its cost for each of the subgroups being compared in the poverty profile (Ravallion, 1998). When data on prices of goods are not available, a number of researchers have used an alternative method to construct the poverty line which is the food energy intake method. It is focusing on

determining the level of consumption that allows the household to obtain enough food to meet its energy requirements. Note that consumption will include nonfood as well as food items; even underfed households typically consume some clothing and shelter, which means that at the margin these basic needs must be as valuable as additional food (Haughton and Khandker, 2009).

2.6.2 Absolute versus Relative Poverty Line

A differentiation is sometimes made between an absolute poverty line and a relative poverty line, whereby the former has fixed real value over time and space, while a relative poverty line rises with average expenditure (Ravallion, 1998)**.** Relative poverty line is often helpful to target programs geared to helping the poor. An absolute poverty line is essential if one is trying to judge the effect of antipoverty policies over time, or to estimate the impact of a project on poverty (Haughton and Khandker, 2009).

2.6.3 Objective versus Subjective Poverty Lines

Objective approaches can be interpreted as attempts to anchor the reference utility level to attainment of certain basic capabilities, of which the most commonly identified relate to the adequacy of consumption for leading a healthy and active life, including participating fully in the society. Subjective poverty lines have been based on answers to the minimum income question (MIQ), such as the following, what income level do you personally consider to be absolutely minimal? That is to say that with less you could not make ends meet. One might define as poor everyone whose actual income is less than the amount they give as an answer to this question. However, this would almost certainly lead to inconsistencies in the resulting poverty measures, in that people with the

same income, or some other agreed measure of economic welfare, will be treated differently (Ravallion, 1998).

2.7 Causes of Poverty

Several complex factors contribute to poverty. They include low or negative economic growth, inappropriate macroeconomic policies, deficiencies in the labour market resulting in limited job growth, low productivity and low wages in the informal sector, and a lag in human resource development. Other factors which have contributed to a decline in living standards and are structural causes or determinants of poverty include increase in crime and violence, environmental degradation, retrenchment of workers, a fall in the real value of safety nets, and changes in family structures (Ajakaiye and Adeyeye, 2002).

Haughton and Khandker (2009) wrote that It very difficult to separate causal from correlation. Poverty may be due region level characteristics, community level characteristics, household and individual characteristics**.** Such characteristics include:

1. **Region level characteristics**: In general, however, poverty is high in areas characterized by geographical isolation, a low resource base, low rainfall, and other inhospitable climatic conditions. Other important regional and national characteristics that affect poverty include governance; environmental policy; economic, political, and market stability; mass participation; global and regional security; intellectual expression; and a fair, functional, and effective judiciary.
2. **Community level characteristics**, which are including the availability of infrastructure (roads, water, and electricity) and services (health, education), proximity to markets, and social relationships.

3. **Household and individual characteristics:** among the most important of them are: demographic characteristics, such as household size, age structure, dependency ratio, gender of head. Economic characteristics, such as employment status, hours worked, property owned. Social characteristics, such as health and nutritional status, education, shelter.

2.8 Vulnerability to Poverty

An attractive definition of vulnerability to poverty is the propensity to suffer a significant welfare shock, bringing the household below a socially defined minimum level (Haughton and Khandker, 2009). The shocks can affect individuals, e.g., through loss of employment, accident, or death. They can also strike whole communities, such as villages, regions, or particular socio-economic groups. Examples of this include natural disasters, changes in export prices, and climactic and environmental changes (Duclos, 2002).

2.8.1 Importance of Measuring Vulnerability

Measurement of vulnerability is particularly important for monitoring the wellbeing of the poor. Because the poor are already in difficult conditions, the effects of vulnerability are harsher to them. The poor are also more vulnerable because of their location and their characteristics, including a lower level of assets to protect them, less access to insurance and to input and output markets, less access to public protection, and a lower level of empowerment. Measuring vulnerability is also relevant for the design of poverty reduction policies (Duclos, 2002). Since vulnerability is the risk that face households to fall into poverty. This means that a household's vulnerability is measured as a probability; hence households have greater or lesser degrees of vulnerability, the magnitude of vulnerability rises with the time horizon, so vulnerability will increase

over time, over the next week will be quite low, over a year higher (Pritchett, et al, 2000).

2.9 Role of Agriculture in Poverty Alleviation

Theodore Schultz began his acceptance speech for the 1979 Nobel Prize in Economics observing:

"Most of the people in the world are poor, so if we knew the economics of being poor we would know much of the economics that really matters. Most of the world's poor people earn their living from agriculture, so if we knew the economics of agriculture we would know much of the economics of being poor" (Schultz, 1979).

People in developing countries who depend on agriculture for their living are typically much poorer than people who work in other sectors of the economy and that they represent a significant share, often the majority, of the total number of poor people in the countries where they live. Achieving the Millennium Development Goals (MDG) of halving poverty by 2015 requires finding ways to increase the incomes of those people (Cervantes-Godoy and Dewbre, 2010). A rich literature, both theoretical and empirical, has examined the process of structural transformation of economies, from the least developed in which economic activity is based largely on agriculture, to the high-income in which agriculture typically accounts for less than 5 percent of GDP (Byerlee et al, 2008). World attention has shifted back to agriculture out of concerns about how to feed its nine billion people by 2050, the precise role of agriculture in economic development remains very much debated. The dual economy models inspired by Lewis (1954) and popular in development economics in the 1960s and 1970s typically considered agriculture as a backward unproductive subsistence sector, from which labor and resources were to be moved to urge development of the

dynamic productive industrial sector. Much of the early development economics literature was thus understood as supporting an industrialization strategy. This led to an urban bias in development planning and fiscal and trade systems that systematically over-taxed agriculture (Christiaensen et al, 2010).

The view that agriculture plays only a passive role in development was swept aside by the dynamism of the green revolution in Asia during the late 1960s and early 1970s (Diao et al, 2007). The transformation of traditional agriculture into a modern sector revealed the potential of agriculture as a growth sector. Agricultural growth can therefore contribute to expanding agro processing and processed food marketing, which provide new engines of growth and opportunities to substitute for imports. Agriculture also creates backward production linkages through its demand for intermediate inputs such as fertilizers and marketing services. The consumption linkages generated by increased rural incomes is the strongest linkage of agriculture in the development process. A declining share of agriculture in national employment and GDP is an inevitable consequence of economic progress. This is largely due to higher income elasticities of demand for non-agricultural goods and services. As their incomes grow, consumers increase their consumption of manufactured goods and services faster than their consumption of food. The linkages between agriculture and poverty reduction can be seen through four transmission mechanisms: 1) direct impact of improved agricultural performance on rural incomes; 2) impact of cheaper food for both urban and rural poor; 3) agriculture's contribution to growth and the generation of economic opportunity in the non-farm sector; and 4) agriculture's fundamental role in stimulating and sustaining economic transition (Cervantes-Godoy and Dewbre, 2010). Agriculture relates to nearly all the eight Millennium Development Goals adopted in 2000 by

all 191 United Nations member states, and is central to at least three of them, reducing poverty and hunger, fostering gender equality, and sustainable management of the environment **(**Byerlee et al, 2008).

Evidence consistently shows that agricultural growth is highly effective in reducing poverty, every 1% increase in per capita agricultural output led to a 1.61% increase in the incomes of the poorest 20% of the population. On average, every 1% increase in agricultural yields reduced the number of people living on less than US$1 a day by 0.83%, (DFID, 2005). From a simple decomposition analysis, 81 percent of the worldwide reduction in rural poverty during the 1993–2002 periods can be ascribed to improved conditions in rural areas; migration accounted for only 19 percent of the reduction. Cross-country econometric evidence indicates that GDP growth generated in agriculture is particularly effective in benefiting the poor. Among 42 developing countries over 1981–2003, one percent GDP growth originating in agriculture increased the expenditures of the five poorest deciles on average by 3.7 percent, far more than the 0.9 percent induced by one percent GDP growth originating in the rest of the economy **(**Byerlee et al, 2008). The majority of Sub-Saharan Africa's population lives in rural areas, where poverty and deprivation are most severe. Since almost all rural households depend directly or indirectly on agriculture, and given the large contribution of the sector to the overall economy, one might expect agriculture to be a key component of growth and development. However, whereas agriculture-led growth played an important role in slashing poverty and transforming the economies of many Asian and Latin American countries, the same has not occurred in Africa. Most African countries have not yet met the criteria for a successful agricultural revolution, and factor productivity in African agriculture lags far behind the rest of the world (Diao et al, 2007).

2.10 Guiding Principles for Agricultural Development Strategies

To maximize their impact on poverty, agricultural development strategies should aim to realize the links between increasing agricultural productivity and growth in the wider economy. Achieving this requires policy and public investment decisions in agriculture. These decisions should reflect the stage of a country's development. Increasing agricultural productivity is most critical in the poorest countries in the earliest stages of development. Priority should be given to agricultural development in places where significant productivity gains are possible and the potential links to the wider economy are strongest. Policies should focus on demand and market opportunities. For large parts of Africa the domestic food market is the largest and most rapidly growing source of demand for agriculture. Elsewhere, where countries or regions are self-sufficient in basic goods, the focus will need to switch to higher value agricultural crops which have greater market potential. Social protection should be made complementary to agricultural growth. Social protection programs (such as cash benefits and welfare) are vital for ensuring a minimum level of well-being and social security for the chronically poor and vulnerable. The decisions should focus on sustainability of using the main productive resources such as land and water and minimise any adverse impact of increasing productivity on the environment (DFID, 2005).

2.11 The importance of the rural non-farm economy

Building livelihoods outside agriculture is vital to poverty reduction. This is particularly important in rural areas, where 70% of the world's poorest people live and the non-farm economy already plays a major part in people's livelihoods. Across the developing world, as much as 25% of the

rural population working fulltime is employed outside agriculture, and accounts for 35-40% of rural incomes. Case studies in the Indian states of Andhra Pradesh and Madhya Pradesh published in 2005 show that almost 40% of rural income in surveyed villages came from outside agriculture. The poorest 20% of the population, on average, earn 30% of their income from non-farm sources. In parts of Africa, up to 42% of total rural income comes from non-farm sources as reported in the study published 2000 and this trend appears to be increasing rapidly (DFID, 2005).

2.12 Bypassing Agricultural Development via Cheap Food Imports

Early development economists acknowledged that trade could expand sufficiently to provide a necessary growth stimulus, but argued that trade alone is insufficient to promote development. For example, based on neoclassical trade theory, it is plausible for resource-rich countries in Africa to export abundant nonagricultural natural resources, such as oil and minerals, and import agricultural goods to meet their domestic demand. This strategy might appear to eliminate the need to modernize agricultural sectors. Exports of natural resources can become an engine of growth only if the income generated from exports is channeled into productivity growth in other productive sectors and helps develop the broader economy. Economic theory predicts a possible “Dutch Disease” outcome in which growth in the oil and mineral export sector leads to an appreciation of the real exchange rate that penalizes other traded goods sectors, including agriculture. Income distribution is often another serious problem in such an economy, because rents are often captured by a small group of the population in the country or benefit an elite interest group through government intervention. Also the increase of food imports can places pressure on foreign exchange markets, leading to currency depreciation and higher food costs in local currencies (Diao et al, 2007).

2.13 Poverty in Sudan

Poverty in Sudan remains a rural phenomenon, and within rural areas it is closely associated with rain fed agriculture livelihood systems (FAO, 2004 and IFAD, 2009). Per capita income, US$340 in 2001, estimated at USD 800 2006. Moreover, rural per capita GDP increased at a slower pace than overall GDP per capita, thus widening the income gap between rural and urban areas (IFAD, 2009). Urban poverty is also growing, fueled by internal displacement resulting from a weak demand for labor, war, and natural disasters. In the rural areas, pastoralists and small farmers are most vulnerable to poverty. The poorest parts of Sudan are in the west and the war-tom areas mostly. Displacement of whole communities has ravaged traditional safety net systems and resulted in man-made famines. There is perennial vulnerability to insecurity of both persons and property. Basic human needs are often unmet. Even those areas that are relatively stable face isolation from markets and lack secure access to services for human development that can break the inter-generational poverty cycle; this can be ameliorated only by large volumes of humanitarian assistance (WB, 2003).

Faki et al (2009) concluded that there are three most important national surveys were achieved; namely, the 1990 Migration and Labour Force Survey conducted by the Ministry of Manpower, the 1993 Poverty Line Survey conducted by the Social Solidarity Fund, and the 1996 Migration and Labour Force Survey conducted by the Ministry of Manpower. Based on the 1993 Poverty Line Survey data, table (2.1) shows the numerical spatial view of food poverty in Sudan over the six regions forming the administrative divisions at that time. The results of national surveys include incidence of poverty (P_0), the depth of poverty

(P_1), and the severity of poverty (P_2) by region and the rural-urban residence of the poor.

Table 2.1: Spatial view of food poverty (1993)

Region	**Incidence of rural food poverty**	**Incidence of urban food poverty**
	P_0	**P_0**
Darfur	89	89
Kordofan	84	91
Central	83	89
Eastern	81	82
Northen	80	91
Khartoum	64	75
	Depth of rural food poverty	**Depth of urban food poverty**
Region	**P1**	**P1**
Darfur	75	73
Kordofan	69	63
Central	67	62
Eastern	62	59
Northen	60	60
Khartoum	43	42
	Severity of rural food poverty	**Severity of urban food poverty**
Region	**P2**	**P2**
Darfur	81	83
Kordofan	76	85
Central	75	82

Eastern	73	76
Northen	71	84
Khartoum	56	70

Source: Faki et al, 2009.

Using 1996 Migration and Labour Force survey data (Table 2.2) shows the incidence, the depth, and the severity of food poverty in each of the thirty two provinces.

Table 2.2: Spatial view of food poverty in Sudan (1996)

Region	Province	Poverty Measures %			
		P_0	P_1	P_2	G
Northern	Marawi	95	75	61	46
	Barbar	84	72	57	53
	Shendi	86	65	53	60
Eastern	Red Sea	98	74	59	40
	Sinkat	98	87	78	52
	Atbara River	92	77	66	67
	Elgadarif	92	73	61	77
Khartoum	Khartoum	75	44	31	73
	Jebel Awliya	82	52	37	76
	Khartoum Bahari	76	44	30	71
	Om-Durman	82	56	42	76
Central	Alkamlyn	87	62	46	45
	Alhasahisa	87	58	43	58
	Albutana	88	62	46	53

	Ajazira	95	74	61	59
	Almanagil	95	75	63	59
	Sinar	90	67	55	81
	Adindir	91	78	65	57
	Al-Gitaina	94	73	59	50
	Al-Diweim	98	83	71	41
	Kosty	89	75	63	63
Kordofan	Bara	98	91	83	53
	Shikan	92	69	55	61
	Om-Rwaba	93	75	62	71
	Al-Nohoud	96	83	73	57
	Kutum	96	74	62	68
Darfur	Al-Fashir	93	73	61	63
	Om-Kadada	97	85	77	64
	Al-Jineana	97	83	73	60
	Al-Da-Ein	96	90	84	82
	Niyala	94	80	70	66
	Id-Alforsan	99	83	72	49

Source: Faki et al, 2009.

P0: denote to incidence of food poverty, P1: denote to depth of food poverty, P2: denote to severity of food poverty, and G: Ginni coefficient.

2.14 Human poverty in Sudan

Tables (2.3) and (2.4) show numerical rural-urban profiles of human poverty in Sudan by State in 2000 and 2006 respectively, based on two

national surveys data; namely the 2000 Multiple Indicators Clusters Survey (MICS) and the 2006 Health Survey (SH).

Table 2.3: Spatial views of human poverty in Sudan (2000)

State	Rural	Rank	Urban	Rank
N.Kordufan	70.8	1	27.5	7
W.Darfur	67.5	2	39.1	1
B. Nile	65.9	3	36.6	2
Red Sea	62.9	4	23.4	12
W. Nile	57.5	5	23.7	11
N.Darfur	56.6	6	24.6	10
S.Darfur	55.9	7	31.1	6
Kassala	55.0	8	31.2	5
Al-Gadarif	54.9	9	33.4	3
W.Kordufan	53.4	10	26.5	8
S.Kordufan	50.0	11	33.0	4
Sinnar	43.6	12	25.1	9
Al-Gazira	39.6	13	14.3	16
Khartoum	37.1	14	16.1	15
R. Nile	34.8	15	16.7	14
Northern	29.8	16	21.4	13
ALL	51.3		24.9	

Source: Faki et al, 2009.

Table 2.4: Spatial views of human poverty in Sudan (2006)

State	**Human Poverty**	**Rank**
W. Darfur	57.7	9
S. Kordofan	52.0	11

S. Darfur	50.3	13
Blue Nile	49.4	14
N. Darfur	45.3	15
Kassala	44.7	16
Gadarif	44.4	17
N. Kordofan	42.7	18
Red Sea	40.9	19
White Nile	35.0	20
Sinnar	33.9	21
River Nile	25.6	22
Northern	23.2	23
Gezira	19.2	24
Khartoum	14.3	25

Source: Faki, et al, 2009.

Chapter Three: Research Methodology

This study is conducted in Wada Banda Locality, North Kordofan State. However this locality was recently in July 2013 attached to the new established West Kordofan State.

3.1 The Site of the Study Area

3.1.1 Location

North Kordofan State is located in central Sudan in arid and semi barren area between latitude 12^0 - 16^0 north and longitude 27^0 – 32^0 east. The area of the State is estimated at 244,700 km^2. The state is bordered by the Northern State from the north, Khartoum to the northeast, White Nile State to the east, North Darfur to the west, and southwest and South Kordofan to the south (Ministry of Agricultural and Forestry (MA&F), 2007).

3.1.2 Population

According to latest census in Sudan (2008) NKS ordered third state with respect to population after Khartoum State and Southern Darfur State. The total population of NKS was estimated at 2,920,992 persons (SCBS, 2009). NKS is divided into twelve localities which are: Skeikan, North Bara, UmRuwaba, Sodari Gebret el Skeikh, Abu-Zabad, Gebeishm, Wad Banda, West Bara (Umkreadim), AlKhwi, and AlRahad.

3.1.3 Wad Banda Locality

Wad Banda Locality is located in the western part of NKS; it is bordered by *Elnhud* locality to the east, North Darfur State to west, *Gebeish* locality to the southern western part, and *Soudrei* locality to the north. Wad Banda was created on the first of August 2005 as an administration locality. At 13 of July 2013 West Kordofan State was established, and Wad Banda Locality was added to the new established state. Population of Wad Banda Locality was estimated at 156,286 (SCBS, 2009). The total area of the locality is estimated at 13,000 km^2. It is composed of five administrative units (*Wad Banda*, *SugaAlgamal*, *Dardoug*, *Arma*l, and *Elzarnikh*). The majority of people in Wad Banda Locality from *Hamar* tribe besides many others tribes, all of them live together in harmony. It

comprises about 385 villages, 383 sheikh, and 178 people committees (Wad Banda locality, 2013). It is one of the localities that have been affected by the conflict in Darfur as it bordered by Darfur states from the west.

3.1.4 Climate in NKS

North Kordofan State lies within the dominantly prevailing arid and semi-arid desert climate (poor Savanna climate) with limited seasonal rains. The mean annual rainfall ranges from less than 100 mm in the north to about 350 mm in the south. Four periods are recognized by the locals, the rainy season (locally called *kharif)* from May to October with peak rains in August, harvest season (*Darat*) from October to December, a mild cold season (*shita*) from December to mid-February with moderate temperature and comfortable humidity and a hot dry season (*seif)* from March to mid-May. Rainfall precipitates in short high intensity storms of over six months from May through October, with concentration of 80 to 90% in July, August and September. Rainfall shows a great variability both in time and space. The mean annual temperature is 27° C with extreme temperatures ranging between 10°C to 46° C. Mean relative humidity ranges from 20% in winter to 75% during August, in the middle of the rainy season. The prevailing winds in the study area blow from north east during winter and from south west during summer. Winds have medium speed generally with less than 3 meters/second, but are quite capable of moving sands from sand dunes when soils are exposed (Khiry, 2007). Table 3.1 shows rain fall in some North Kordofan State stations in millimeter, 2005 - 2007.

Table 3.1: Rainfall in selected NKS stations 2005 – 2007 in millimeter

Years Stations	2005	2006	2007
Alobied	331.7	485.5	652.3

Wad Banda	352.2	186.7	Not available
Sough Algmal	405.3	415	Not available
Alnahud	205.1	252.5	Not available
Alkhaui	214.1	398.6	Not available
Abu Zabad	519.1	391.5	Not available
Gibesh	325.3	204.6	Not available
Bara	Not available	343.5	561.3
Tandalti	Not available	Not available	679.9
Alrahad	Not available	203.1	984.64
Umrawuaba	Not available	159.7	814.28
Soudrai	Not available	231.6	652.5
Alsemih	Not available	241	652.5

Source: Ministry of Agriculture and Forestry, 2007.

3.1.5 Natural Resource in NKS.

3.1.5.1 Land

Soils of NKS are various, with sand dominating. Mobile whitish sand is found in forms of sheets and dunes (*qoz*), while slightly brown sand is found in areas with sandstone. Basement clay depressions covered by clay soils are found between the dunes. There are also some rocky outcrops, mainly in the northern part of the state. Although sandy soils are deficient in organic matter, nitrogen, phosphorus and other elements they sustain more cropping pressure. This is because sandy soils are very easy to cultivate and it suits the production of many crops such as groundnuts, millet, sorghum and sesame. The problem with the sandy soils is that they lose their fertility in very short time and when stripped of their plant cover they became very easily eroded and desertified (Khiry, 2007). The most important kinds of soils are sandy dunes soil represent more than 55% of total area , then *Gardud* (clay) soil represents about 20%, sedimentary soil about 15% (Abu Habil ravine & valleys), beside other types of soil (MA&F, 2007).

3.1.5.2 Vegetation

North Kordofan state is sparsely vegetated as a result of the low amount of rainfall. The vegetation is exposed to extreme conditions and must survive drought, which can stretch over several years with little or no rain at all. The study area falls in the semi-desert or sand ecological zone with a single rainy season. There is usually a short growth period followed by dry season with a great reduction in the amount of green plant materials. Trees and shrubs are disturbed alternatively with open grassland (Khiry, 2007). Range land cover about 50% of total area; it ranges between poor, medium; and rich pasture. Where forest occupy about 10% of total State area, it forms from tress such as *Hashab*, *Sedir*, *Habeil*, *Marekh*, *Mokheid*, *Heglig* and *Seyal*. But unfair cutting of trees expose the most of the cover to disappearance. Desert represents about 24% of total are of the State. Desert lands are located in northern and western parts of the state (MA&F, 2007).

3.1.5.3 Sources of water

Sources of water in NKS can be itemized as rainfall, surface water and ground water. NKS suffers from an acute annual deficit in its water balance. Most of the rain water falls between July and September in form of heavy storms of short duration. Greater part of water deficit occurs during the dry season. Lower amount of rainfall increased the risks of crop cultivation and has obliged local inhabitants to increase their areas under rainfed cultivation. This in turn, has led to the successive deterioration of natural vegetation and subsequently induced desertification. Because of the torrential nature of the rainfall in NKS a good part of the rain water flow as surface runoff. There are no perennial streams in the study area. Runoff from rains forms a number of seasonal streams scattered within the state area with irregular, short duration flows in rainy season for a few days. Dependency of human and livestock

population of NKS on surface water resources was almost complete before the drilling of the first artesian tube well in 1912 at Um Ruwaba. This dependency drastically diminished with the establishment of Rural Water and Development Corporation Program of drilling tube wells in most of the populated areas in north Kordofan. Now ground water is an important source of domestic water in NKS. Most of the human and livestock population in NKS depend on ground water for their living and only a few agricultural schemes use ground water resources for supplementary irrigation purposes. The main physical constrains limiting development of water resources in the state are: low and erratic rainfall combined with high temperature and low humidity which implies high evaporation losses and high water requirements, short stream flow season comprising high sporadic, short duration floods, high rates of infiltration in sandy soils and evaporation. Despite many efforts to improve the rural water supply, the water shortages remain a chronic problem in NKS (Khiry, 2007).

3.1.6 Drought periods in the study area

During the last three decades NKS has experienced catastrophic and frequent drought periods with far-reaching consequences on agricultural and pastoral system, regional economy, traditional family livelihood and environment. The drought of 1984 was the most recent devastating one. The droughts of the 1970s and 1980s triggered short cycles of famines in the State and these effects most vulnerable area farmers in traditional rainfed sector. Severity of drought depends on the variability of rainfall both in amount and frequency. Soil moisture in the study area is only supplied through rainfall. The capacity of the soil to absorb and retain moisture determines how much rain water will be available for cropping. Therefore, the high seasonality of rainfalls in this region with long dry

seasons (6-8 months) results in drastic changes in land covers and thus contributes in desertification processes (Khiry, 2007).

3.1.7 Livelihood Systems in NKS.

Most of the population in rural areas of NKS either settlers or nomads keep some livestock. Their main occupations are livestock raising and traditional farming. Rainfall and its distribution are key determinants of practicing agriculture. In the northern part of NKS locals raise animals and grow crops in marginal land where rainfall is very erratic and the risk of agricultural failure is greatest. But in the southern part of NKS rainfed farming is carried out on *qoz* and clay soils, with preference for the high infiltration rates and ease of cultivation of the sandy soils which occupy about 16 percent from total area (Khiry, 2007). The most important crops in NKS are millet; sorghum (*Dura*); sesame; hibiscus (*Karkadeh*); melon; beans; and rain fed cotton, besides horticultural crops such as mango, potatoes, guava; lemon; and other fruits (MA&F, 2007).

Breeding of camels and sheep represents the main livestock economic activity in the north part of North Kordofan State in which rainfall range from 5 to 300 millimeter a year. Where herding of cattle; sheep; goats and camel prevails in south part of the State in which quantities of rain range from 300 to 500 millimeter a year. The natural pastures are regarded as the lonely main source of animal feeding in most of the time. As far as livestock production system is concerned in North Kordfofan State, the breeding system ranged between nomadic and semi nomadic system (MA&F, 2007). Animals are not only raised for food in the study area but also for marketing purposes. Livestock in the study area act like insurance against possible crop failure. Before the drought of 1984, cattle were much more common in the area. Farmers used to adapt themselves against adverseable conditions by raising drought tolerant livestock, such

as camels and goats. Due to increase of livestock pressure and human population, coupled with climatic element of low and erratic rainfall, the study area has been facing the clearance of trees in favour of annual cash cropping. The land use practices have changed significantly according to rotation systems length from short periods of cultivation (4-5 years) to more or less continuous cultivation over the last three to four decades. Whenever the yields of crops become low, the farmer responds by enlarging the area. This is especially the case when the type of farming is tied to cash economy. This situation left clear marks in the southern part of the study area. Crop yields have decreased mainly due to a marked decline of rainfall, but to some extent also due to the abandonment of fallow periods. In addition to cultivating crops, people also tap indigenous *Acacia Senegal (Hashab)* trees for Gum Arabic production. Gum tapping as an important source of income especially in the western part of the state starts in October every year (Khiry, 2007). Tables 3.2, 3.3, and 3.4 show land use, livestock, and crop production in the study area respectively.

Table 3.2: Land use in North Kordofan State in year 2007

The use	Area/million Fedden	Percentage%
Crops	9.5	16

Pastures	29.4	50
Forest	5.3	9.8
Desolate land	14.5	24
Total	58.83	100

Source: Ministry of Agriculture and Forestry, 2007.

Table 3.3: Livestock in North Kordofan State (000) head from 2002 to 2007

Year	Cattle	Sheep	Goats	Camels
2000/2001	544.2	378.22	216.7	605.04
2001/2002	560.6	387.01	224.01	531.3
2002/2003	563.7	389.5	226.10	661.7
2003/2004	564.6	393.2	227.8	703.5
2004/2005	404.7	497.9	425.3	390.5
2005/2006	225.30	358.1	168.1	152.05
2006/2007	137.48	844.85	425.094	219.289

Source: Ministry of Agriculture and Forestry, 2007.

Table: 3.4 Crop production and productivity in North Kordofan State Season 2004 /2005 -2007/2008

Year	2004/2005				2005/2006				2006/2007				2007/2008			
Crop	Area cultivated/ Faddans	Area harvested /Faddans	Production/ (000) tons	Productivity /Kg	Area cultivated/ Faddans	Area harvested /Faddans	Production/ (000) tons	Productivity /Kg	Area cultivated/ Faddans	Area harvested /Faddans	Production/ (000) tons	Productivity /Kg	Area cultivated/ Faddans	Area harvested /Faddans	Production/ (000) tons	Productivity /Kg
Millet	1669	912	18	20	2900	2230	140	60	2145	1652	181	109	2711	1968	180	92
Sorghum (*Dura*)	777	530	24	1362	979	735	111	863	652	551	118	1099	1198	860	131	381
Groundnuts	106	82	7	86	947	880	246	280	1274	892	205	230	1000	900	224	236
Sesame	1058	880	38	43	1300	1100	83	75	842	589	41	70	1300	945	65	69
Karkadeh	208	162	2	13	355	301	14	45	850	595	21	35	490	430	16	33
melon seeds	839	553	5	10	893	580	15	25	2500	1625	24	15	1390	1020	2	8

Source: Ministry of Agriculture and Forestry, 2007.

3.2 Methodology

3.2.1 Data collection

The study was conducted in Wada Banda Locality, North Kordofan State. Both primary and secondary data were used in this study. A field survey was conducted during June 2013. For the purpose of collecting data the study used observations and household questioners besides community based participatory approach. Participatory Rural Appraisal Techniques (PAR) are applied, include group discussions, interviews, problem analysis tools, etc. The households sample size for the questionnaire survey was 100 households' heads which has been chosen randomly from four villages and one town. Data collection through group discussions and interviews has covered almost all the areas of Wad Banda Locality.

3.2.4 Data analysis methods

The study used descriptive statistics besides many analytical techniques; however the main analysis technique was Foster, Greer, and Thorbecke index (FGT index) for poverty analysis. The stud used many analytical programs such as Excel, Statistical Package for the Social Sciences program (SPSS), and Distributive Analysis / Analyze Distributive software (DAD).

1. **Descriptive statistics**

Descriptive statistics has been used to deal with households demographic characteristics; socioeconomic factors and their effects on the population; services received; problems facing rural population in the study area.

2. **Pearson correlation coefficient**

Pearson correlation coefficient was used to study correlation relationship between socio characteristics of rural population in study area and income and consumption.

3. Foster, Greer, and Thorbecke index (FGT index)

The FGT index for poverty analysis include head count index, poverty gap, and poverty severity.

A. Head count index (P_0)

World Bank (2003) stated that Poverty Headcount (Incidence of poverty) is the share of the population that is poor, that is, the proportion of the population for which consumption or income *y* is less than the poverty line. Suppose we have a population of size *n* in which *q* people are poor.

$$P_0 = q/n$$

Where:-

P_0 = the head count index; q = the number of households under poverty line; n = the total number of population or sample size.

B. Poverty Gap (P_1)

The poverty gap, which is often considered as representing the depth of poverty, is the mean distance separating the population from the poverty line, with the nonpoor being given a distance of zero. The poverty gap is a measure of the poverty deficit of the entire population in which the notion of poverty deficit captures the resources that would be needed to lift all the poor out of poverty through perfectly targeted cash transfers. It is defined as follows:

P_1 $$P1 = \frac{1}{n} \sum_{i=1}^{q} \left[\frac{z - y_i}{z} \right]$$

Where: P1= poverty gap, n = total population; z= poverty line; q = poor people; y_i = income of individual i (yi is the income of individual i, and the sum is taken only on those individuals who are poor).

The poverty gap can be written as being equal to the product of the income gap ratio and the headcount index of poverty, where the income gap ratio is itself defined as Income gap index (I). It measure the amount of money needed to raise the income of all poor individual to the level of poverty line as a proportion of poverty line (World Bank, 2003).

$$\mathbf{I = 1 - U/Z}$$

Where: I = the income gap index; U = is average income per adult; Z = absolute poverty line.

It must be emphasized that the income gap ratio I in itself is not a good measure of poverty. Assume that some households or individuals who are poor but close to the poverty line are improving their standards of living over time and, thereby, become nonpoor. The poverty gap is a useful statistic to assess how many resources would be needed to eradicate poverty through cash transfers perfectly targeted to the poor (WB, 2003).

C. Severity index (P_2)

Squared Poverty Gap is often described as a measure of the severity of poverty. While the poverty gap takes into account the distance separating the poor from the poverty line, the squared poverty gap takes the square of that distance into account. When using the squared poverty gap, the poverty gap is weighted by itself, so as to give more weight to the very poor. In other words, the squared poverty gap takes into account the inequality among the poor. It measures the distribution of welfare of

those having income below poverty line. It can distinguish between poor and poorest (World Bank, 2003). It is obtained as follows"

$$P_2 = \frac{1}{n}\sum_{i=1}^{q}\left[\frac{z - y_i}{z}\right]^2$$

Where: P2= Severity index, n = total population; z= poverty line; q = poor people; y_i = income of individual i.

4. Lorenz curve

FAO (2005) stated that the Lorenz Curve is a tool used to represent income distributions as proposed by Lorenz 1905; it tells us which proportion of total income is in the hands of a given percentage of population. The Lorenz Curve relates the cumulative proportion of income to the cumulative proportion of individuals (Figure 3.1).

5. Gini Coefficient (G)

A Gini coefficient is a summary numerical measure of how unequally one variable is related to another. Gini coefficient is the best known and the most widely used measure of divergence based on the Lorenz curve. It is defined as an area between the diagonal and the Lorenz curve, divided by the whole area below the diagonal (equal to 1/2). The Gini coefficient is a number between 0 and 1, where perfect equality has a Gini coefficint of zero, and absolute inequality yields a Gini coefficint of 1. The Gini coefficient was developed by the Italian statistician Corrado Gini and published in his 1912. Gini index is the Gini coefficient expressed as a percentage, and is equal to the Gini coefficient multiplied by 100 (Shkolnikov, et al, 2003, FAO, 2006).

Figure 3.1: Gini Coefficient

Source: FAO, 2006.

$$G = 1 - 2Z$$

Where: G is Gini coefficient; and Z is area under the Lorenz Curve.

$$G = \frac{\sum_{i=1}^{n}\sum_{j=1}^{n}\left|x_i - x_j\right|}{2n^2\bar{x}}$$

Where *x* is an observed value, n is the number of values observed and x bar is the mean value. If the *x* values are first placed in ascending order, such that each x has rank i, the some of the comparisons above can be avoided and computation is quicker.

$$G = \frac{2}{n^2\bar{x}}\sum_{i=1}^{n} i(x_i - \bar{x})$$

$$G = \frac{\sum_{i=1}^{n}(2i - n - 1)x_i}{n\sum_{i=1}^{n} x_i}$$

Where x is an observed value, n is the number of values observed and i is the rank of values in ascending order.

3.2.5 Construction of a welfare distribution

Faki et al (2009) explained that in households budget surveys income and consumption expenditure can only be reported at the household level because of the difficulty involved in knowing the individualistic income or consumption expenditure as distinct from that of the household. However, since the poor should ideally be identified and targeted as individuals rather than households, it is the distribution of

per capita household consumption expenditure (income) that serves the purpose and not the distribution of household consumption expenditure (income). But in the distribution of per capita consumption expenditure, neither households nor individuals are comparable unless per capita consumption expenditure is adjusted for variations in household's characteristics (e.g. age and sex). The adjustment can easily be done by converting the head count size of the household into adult equivalent using an adult equivalent index that reduces adolescents, children, and females into adult males.

A(Ch) = Σ aimi over i[1.2.3.4….n]

A(Ch) denotes the adult male equivalent size of household h that has the characteristics (Ch) which is finally the deflated sum of the headcount members of household h; mi is the headcount member i in household h who has characteristic (Ci), ai is the factor that converts the headcount household member (mi) into adult male equivalent (ie ai converts children and females into fractions of an adult male), and (Ch) is the vector of the demographic characteristics of household (h)These characteristics include the following:

C1 = Adult male. (20 –over)

C2 = Adult female (20 – over)

C3 = Adolescent male (10 -19)

C4 = Adolescent female (10 -19)

C5 = Child male (0 – 9)

C6 = Child female (0 – 9)

The adjustment of these characteristics results are as flow:

Ci h Mi h ai h

C1 h M1 h 1.00

C2 h M2 h 0.75

C3 h M3 h 0.95

C4 h M4 h 0.79

C5 h M5 h 0.55

C6 h M6 h 0.48

While the elements of vector (Ci h) the demographic characteristics of the headcount members of household (h), the elements of vectors (Mih) and (aih) are the corresponding headcount members of household (h) and the adult equivalent factors respectively.

Chapter Four: Livelihood and Socio Economic Characteristics

4.1 Households Demographic Characteristics

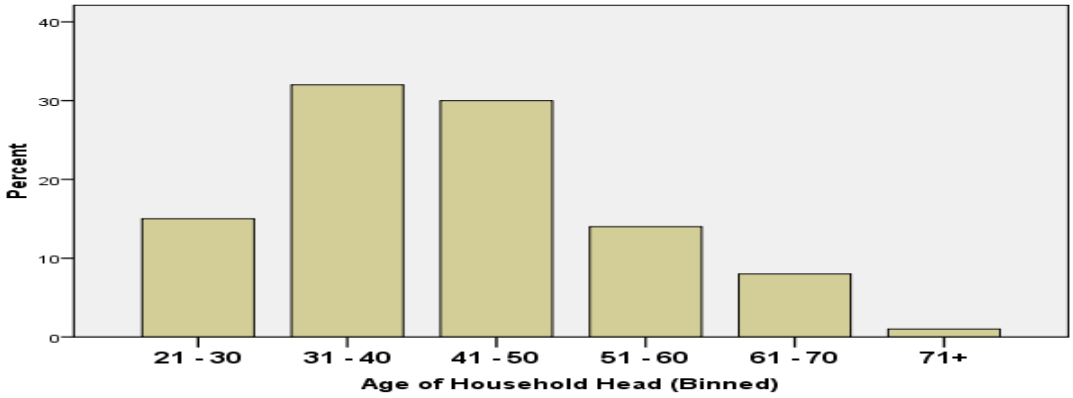
4.1.1 Gender of Household Heads

The results showed that about 94% of household heads studied were male while only 6% of them were female. This may attribute to customs and traditions in the area, which do not allow divorced and widower women to live in separate households especially if they were young or not have grown up children. Therefore they return to live with their families.

4.1.2 Age of Household Heads

Age of household heads ranged between 22- 75 years with average 43 years old. Age of household heads grouped into six categories (20-30, 31-40, 41-50, 51-60, 61-70, 71+) (Figure 4.1). The study revealed that, age category (31-40 years) was the highest one among age groups of household heads which represented 32% of household heads, followed by age category (41-50 years) which constituted 30% of household heads. Whereas age group (21-30 years) represented 15% of household heads, (51-60 years) represented 14%, (61-70 years) 8%, and finally age group (71+) represented only 1% of household heads (Figure 4.1). The majority of households were young because many of the youth in the area dropped out from school and got married and established new families.

Figure 4.1: Age of household heads in Wad Banda Locality, NKS.

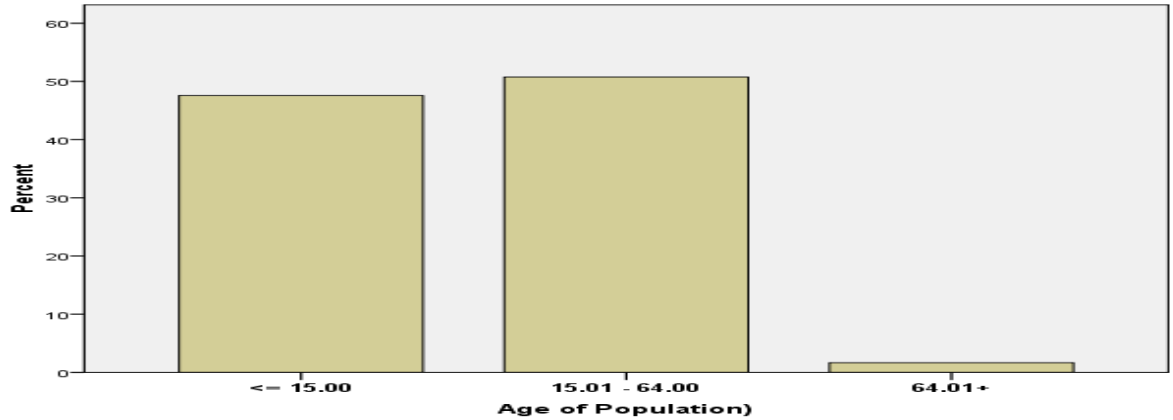


Source: Field survey, 2013.

4.1.3 Dependency Ratio

For the purpose of calculating dependency and labor force ratios, age of population grouped into three main categories, <=14 years, 15-64, 65+ years. The study showed that the age category <=14 years represented 47.6 %, and age group 65+ represented 1.7 %, while age group 15-64 years which considered as work force group represented 50.8%. Dependency percentage was 49.2 % which include children under 15 years and elderly people above 65 years old (Figure 4.2). The dependency ratio is almost equal to work force ratio.

Figure 4.2: Dependency and labor force ratios in Wad Banda Locality, NKS.



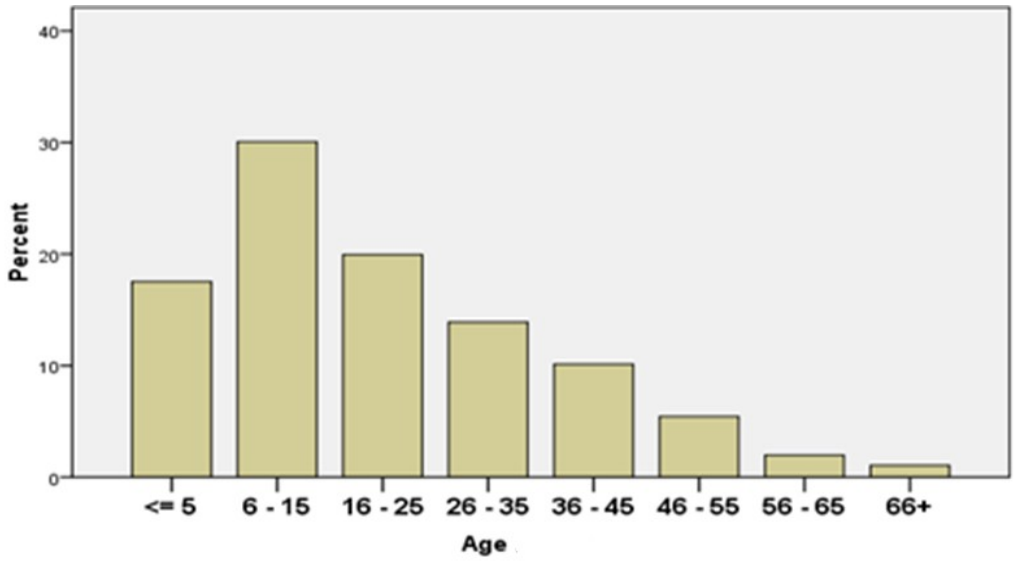
Source: Field survey, 2013.

In addition to that age of studied population grouped into 8 categories, (<=5 years), (6-15 years), (16-25 years), (26-35 years), (36-45 years), (46-55), (56-65) and (66+).

The study showed that the children under 5 years represented 18% of studied population, 6-15 years represented 30%, whereas age group 16-25 constituted about 20%, age group 26-35 was 14% of studied population, age group 36-45 was 10%, age group 46-55 represented 5%, age category 56-65 was 2%, and over 66 years represented only 1% (Figure 4.3). As indicated by the figures (4.2 and 4.3) the children less than 15 years constituted 38% of population studied, and this may be as result of young families.

The results showed that people under 18 years represented the highest age group among the studied community (44%). Married represent 34% of studied population, while single 20%, widower 1% and divorced less than 1%.

Figure 4.3: Age groups of studied households in Wad Banda Locality, NKS.



Source: Field survey, 2013.

4.1.4 Family Size and Type

The study revealed that family size ranged between 2-16 persons with an average of 7 persons and standard deviation 3.2. To calculate poverty indicators, family size was converted into adult equivalent using adult equivalent scales. The family size of studied households in adult equivalent ranged between 1.8 to 12.5 with an average of 5.5 and

standard deviation 2.4. The study revealed that the majority of households were nuclear families (80%); however there were some extended families (17%) and a few compound families (3%) as indicated by the relations of family members.

The study revealed that total studied population or the number of household members for the hundred selected households was 662 persons, male represent 50.9 % (337 person); while female represent 49.1 % (325 person) of total population. This results is near to the results of Sudanese latest census in 2008, which estimated male percentage at 51% and female at 49%.

4.2 Land Ownership and Land Tenure

The findings of the study revealed that (Figure 4.4), the majority of households in the area owned land, about 81% of responded household heads mentioned that they owned land through inheritance, and 3% asserted they purchased their land. 16% of respondents said they rent land from others. Those who rent land either they have no owned land in the village, or the size of their land is very small as a result of disintegration of inherited land to small sizes. The size of owned land ranged from 3 to 200 Mukhams, with an average of 20 Mukhams[1]. Generally inherited land divided between male, however female can take their shares from inherited land if they are single or divorced. Married females use their husbands land, therefore they rarely ask for their share in inherited land.

There are two types of production relations concerning land. In the first type, land owner and tenants agree on rent as percentage of production, and the rent is paid immediately after the crop harvest. While in the second type the tenant pay in advanced the rent regardless of the success of production season.

[1] *Moukhmas = 7,350 m^2*

Figure 4.4: Land ownership and land tenure in Wad Banda Locality, NKS.

Source: Field survey, 2013.

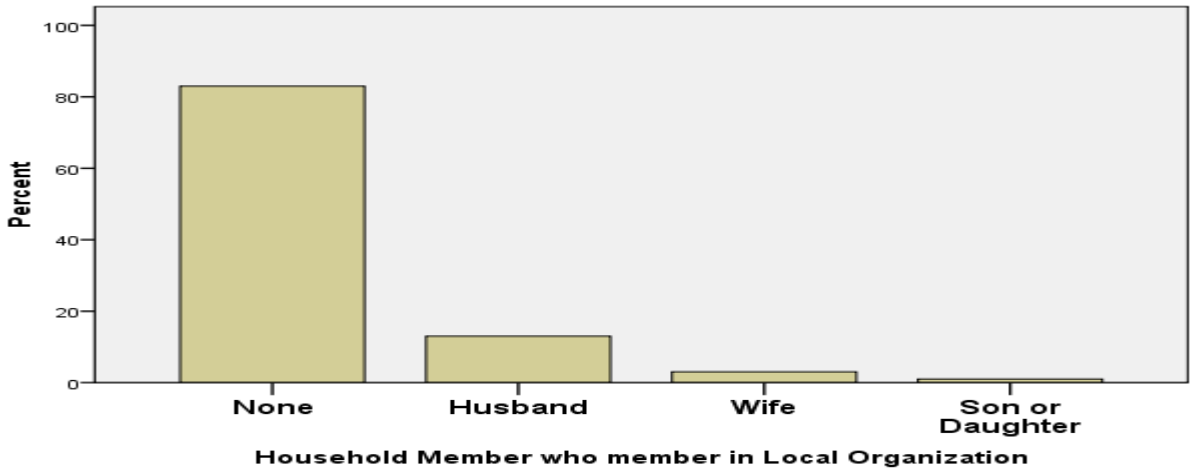
4.3 Local Social Organization in Wad Banda Locality

Local social organizations are found in almost all villages in the area, such as villages or quarters committees, development committees, school committees, women unions, etc. In some villages, school and development committees play remarkable role in delivering services such as provision of water services, health services education services, etc. However some of these social organizations are not effective as claimed by some in group discussions.

The study showed that about 16% of responded household heads asserted that one or more of their family members was involved in running a local organization. Whereas 84% of responded household heads confirmed that no one of their families' members was a member in local organization (Figure 4.5).

Regarding the family member involved in local organization, in most cases the household heads who participated in local organization. About 13% of respondents (81% of households involved in local organizations) asserted that husbands who were involved in local organization, while only 3% of studied households (19% of households involved in local organizations) said that their wives who participated in local organization (Figure 4.5). In addition to that a few of sons and daughters participated in local organization besides their parents.

Figure 4.5: Membership in Local Organization in studied households



Source: Field survey, 2013.

4.4 Livelihood Activities in Wad Banda Locality

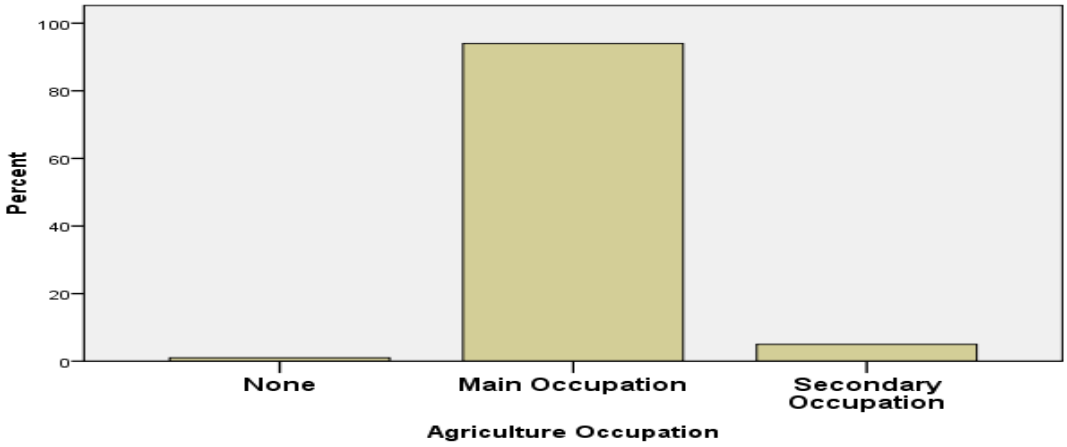
The natural resources in the study area are poor agricultural sandy soil, pasture, animal resources, and *Hashab (Acacia Senegal*) forest. Agriculture is considered as the main livelihood activity in the area, besides animal raising, traditional gold mining recently, and gum Arabic collection from *Hahsab* trees *(Acacia Senegal*). In addition part of adult males specially youth, migrate abroad mainly to Libya and lesser numbers to the Gulf countries. Provision of food is the most important role played by agriculture in the study area. People in the study area depend mainly on millet as food crop. Also agriculture regarded as main source of income generation in the area. Farmers grow cash crops such as

groundnuts, hibiscus, sesame, etc. to get incomes. In addition to that the area is famous with livestock production particularly Hamar sheep.

4.4.1 Farming System

The study showed that the main livelihood activity is farming (Figure 4.6). About 94% of household heads interviewed considered farming as their main livelihood activity, while 5% considered farming as secondary livelihood activity. Only 1% of the household heads interviewed did not depend on agriculture as livelihood activity.

Figure 4.6: Agricultural activity in Wad Banda Locality, NKS.



Source: Field survey, 2013.

People in the area grow mainly millet as food crop and groundnut as cash crop besides minor areas of sorghum, okra, hibiscus, sesame, beans and watermelon. According to the survey results a number of problems facing agriculture as livelihood activity. Rain variability is the main problem facing agricultural activities. In recent years droughts become more frequent in the area. Some refer to the global climate change and or damaging local practices such as removing vegetation cover for agricultural expansion, building materials, charcoal, and firewood as causes of desertification. Overgrazing is also mentioned as one of the causes of desertification.

Low agricultural productivity is another problem facing agricultural production (Table 4.1). Some of the reasons mentioned for low

productivity are the fertility of poor sandy soil, traditional farming practices, and low quality seeds. In addition to that pests attack agricultural crops from time to time destroying them. In the early stage of plant growth pests are locusts, grasshoppers, rats, bugs, *(Abualaid)* etc. In the pre-harvest season birds, locusts, *Maseh* (Pris rape) may also cause considerable damage to the crops. Plant pathogens and parasite weeds attacks may lead to a decrease in crop productivity. Such diseases may include smut diseases, and *striga sp*.

Table 4.1: Productivity of the main cultivated crops in Wad Banda Locality, NKS.

crops	**Average of area cultivated / Mukhmas***	**Average of area harvested / Mukhmas**	**productivity/ Kg**
Millet	5.72	4.55	57.6
Dura	0.08	0.06	105.6
Groundnut	4.63	4.31	270
Habiscus	0.16	0.16	33.75
Okra	0.11	0.11	50
**Moukhmas = 7,350 m^2*			

Source: Field survey, 2013.

The survey revealed that farmers depend on traditional tools in cultivating their lands; they use *Toria* for seeds sowing and *Hashasha* (*Maloud*) for cleaning grasses and preparing suitable plant bed. Knives, *Hashasha* (Maloud) without stick, and pare hands for crop harvesting.

The most difficult task in cultivation is the weeding process (cleaning grasses and preparing plant beds). *Hashasha (Maloud)* with long stick is used as weeding tool. Farmers push *Hashasha* forward manually to clean up grasses and to break down soil. This practice may take a day long.

People who cultivate large area (more than 10 Mukhams) may depend mainly on causal labor. Recently specially after emergence of traditional gold mining, casual labor become rare and sometimes not available at all.

Nowadays people in the study area tend to think on how to solve the problem of unavailability of causal laborers. Some of the farmers think about using tractors, and they ask about the feasibility of such practices in poor sandy soil.

4.4.2 Improved Seeds

Many reasons were cited for not using certified seeds in the study area:

First: farmers do not pay much attention for acquiring new seed varieties and testing them in their local condition to compare the results with productivity of local varieties.

Secondly: the role of agricultural research corporation was absent in the area. Therefore there are no certified seeds available in the area tested by research institutions, or if they are available no one know about them.

Third: Ministry of Agriculture which supposed to play leading role in adoption of improved seeds, is completely absent may be due to unavailability of funds. The researcher interviewed some agricultural officers who work in ministry of agriculture in the area, and they said that Ministry of Agriculture offices in the area lack basic facilities for work such as transportation facilities, work tools, and even they lack office supplies like computers, electricity, etc. Regarding the distribution of improved seeds, offices of the Ministry of Agriculture rarely distribute limited amounts of improved seeds to the farmers, the seeds sometimes provided by NGOs.

Fourth: Some seeds distributed or purchased as improved seeds e.g. groundnut seed, are in fact not true. Some of seeds are originally improved seeds but were grown many times before they delivered to the farmers. Therefore they lost some characteristics of improved seeds. Some of these seeds are grown nearby with local varieties; therefore the output may be cross breed with local varieties.

The group discussion with farmers revealed that few people brought an improved variety of groundnut called *(Gibeish)*; its productivity is slightly higher than the local varieties. In fact it can be regarded as improved seeds but it is not certified seeds.

The field survey showed that few farmers in the study area used improved watermelon seeds, and cultivate relatively small parcel of land with them. But the pest is challenging for them especially bugs and *Abu-Alaid*s, however the people who able to control the pest can gain considerable returns from watermelon production.

4.4.3 Marketing

Low prices of crops were also another problem facing the farmers in the area according to the interviewees. The farmers in the study area are not satisfied with the prices of cash crops such as groundnut, hibiscus, and gum Arabic. They mentioned that in spite of continuous increase in the prices of goods in the markets, as a result of inflation, the prices of groundnut which is considered as the main cash crop in the study area were very low during the agricultural season 2012-2013. The price of 1 quintal of groundnut (45 kg) was only SDG 80. The prices of gum Arabic are not stable from year to year; so many gum Arabic producers were discouraged to continue gum Arabic production.

4.4.4 Livestock Production

Livestock is the second main livelihood activity in the area besides farming. People in the study area raise considerable numbers of sheep, goats, and fewer numbers of cattle and camels. About 17% of household heads studied confirmed that they practice animal raising as secondary activity, while 83% of household heads confirmed that they do not involve in significant animal raising activity. However almost all households practice some kind of house animal raising like goats, cattle,

and chickens. Poor pastures and shortage of water are the main problems confronting livestock in the study area as mentioned by respondents. Pastures are poor in some seasons due to the rain variability and the increase in livestock numbers. In addition to that agriculture expansion leads to a decrease in lands available for grazing.

4.4.5 Livestock Production System

Traditional open system of livestock production is a dominant in all the area of Wad Banda Locality, North Kordofan State.

The researcher asked the participants in group discussions about the possibility of modernizing traditional open livestock production system to closed or semi-closed livestock production system such as farms and ranches in USA, Australia, Europe, and other countries. They confirmed that it is very difficult to change this traditional open system to modernized livestock system at least in the near future, because it needs relatively very high investments in ranches infrastructure like fences, and sources of water, etc. But it can be achieved by government intervention by making legislation of livestock production systems, and providing facilities like establishing water resources, providing finance for breeders and technical assistances. Also some breeders do not own lands to establish farms for their animals in case of modernization, therefore agrarian reforms may be needed to solve this problem by redistribution of agricultural lands. However the implementation of land redistribution policies is very difficult because of expected land owners' objection.

In case of Wad Banda locality the majority of animal breeders owned land. Also the researcher raised another question about possibility of collecting small numbers of animals in groups to establish cooperatives and companies. The participants said that the success of establishing companies and cooperatives for farmers in the area is questionable.

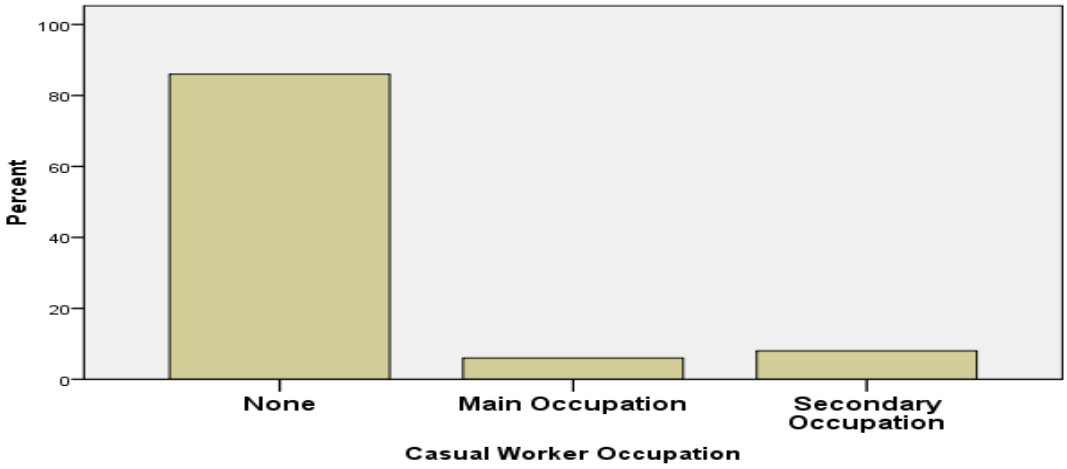
Because of problem of poor administration and the lack of needed awareness and culture to run like this suggested collective work.

As far as improved breeds are concerned, the area lack improved breeds of livestock. The breeders in the area do not pay any concern for provision of new improved breeds to test them in their local condition. And they do not see any problems in their local breeds especially sheep breeds (*Hamari Sheep)* and cattle. However research is needed in the field of improving local breeds of livestock in the area especially for main livestock types, sheep, cattle, goats, chickens. The findings of the study revealed that in spite of existence of some veterinary offices in the study area, veterinary services were very poor or not available at all.

4.4.6 Off-farm Activities

The findings of the study showed about 2% of household heads interviewed considered trade as main livelihood activity, while 3% of studied household considered it as their secondary occupation, whereas 95% of studied household heads asserted that they did not involve in any trade activities. The study revealed that about 6% of studied household heads emphasized that they engage in casual working activities, and considered it as their main livelihood activity, whereas 8% of studied household heads practice causal working activities but they consider it as secondary livelihood activity. However the majority of household heads studied 86% mentioned that they did not engage in causal working activities (Figure 4.7). The findings of the study showed that about 6% of respondents considered formal employment as their main occupation, whereas the majority of them 94% affirmed that they did not involve in any formal employment activity. These formal employment activities such as teachers and local government administration workers like tax & fees collectors.

Figure 4.7: Occupation of Casual working in in studied households



Source: Field survey, 2013.

4.5 Social Services in Wad Banda Locality

Social services were very poor in the study area. The researcher interviewed people individually and as groups, and asked them about the major three problems facing the community; the majority of them mentioned: shortage of drinking water, lack of health services, and poor education services. However the orders of these three main problems differ from village to another according to the most pressing problems.

4.5.1 Health services in Wad Banda Locality

There are only two hospitals in Wad Banda locality; rural hospital in Suga Algamal, and medical insurance hospital in Wad Banda, besides some clinics and health units in the main towns, (Wad Banda Locality, 2013). Hospitals and medical clinics in the study area suffer from lack of skillful medical cadres, medicine, equipments and medical tools. Therefore some people in the area suffer from chronic diseases like rheumatism, renal failure, psychological problems, high blood pressure, etc.

The findings of the study showed that about 11% of studied households has one or more of members of their family suffer from chronic disease, while 89% of studied households mentioned that no one of members of their families suffer from chronic disease.

The study revealed that total death cases during the past 10 years were 24 persons for the hundred studied households. About 63% of total death cases were male, while 37% were female. Regarding children under 5 years, the result showed that about 4 cases (16%) were children under 5 years. 4% of them were male children, while 12% were female children (Table 4.2).

Table 4.2: Death cases in studied households

gender	**no. of cases**	**percentage**	**children (5 years and less)**	**percentage of total cases**
male	15	63	1	4
female	9	37	3	12
total	**24**	**100**	**4**	16
82% of households did not experience date cases during past 10 years				

Source: Field survey, 2013.

4.5.2 Schooling services in Wad Banda Locality

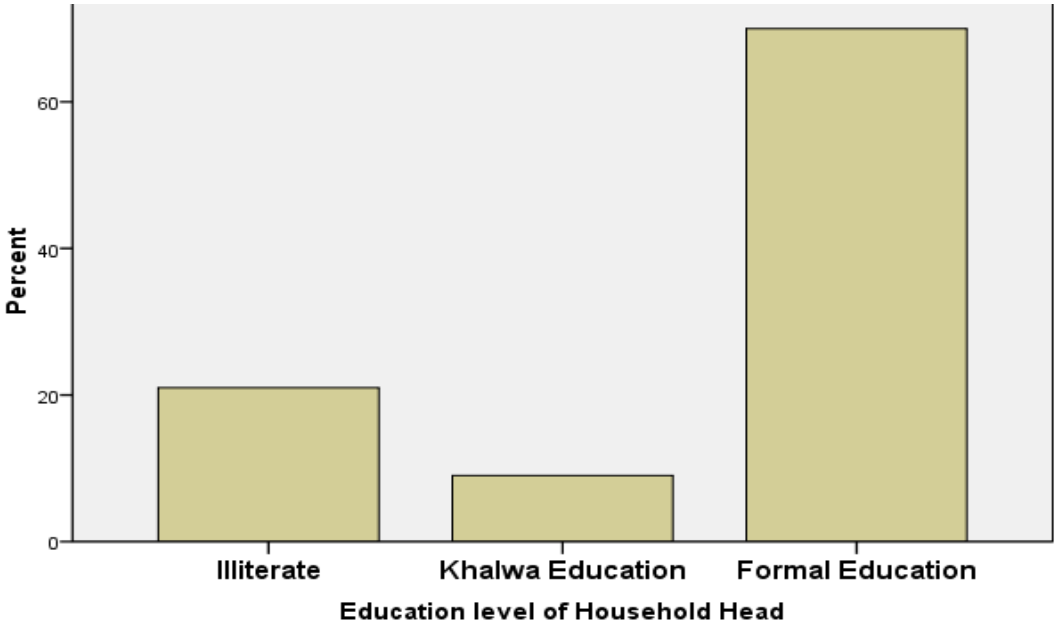
The results of Group discussions and interviews showed that schools in the area face many serious problems such as shortage of qualified teachers, shortage of schoolbooks, shortage of setting seats, and shortage of teacher facilities. In addition to that the majority of schools in the area were built with local material (millet straw). Education quality in the area is very low, some pupils who study in six or seven class, and they face difficulties in reading and writing. The majority of secondary school students enroll in arts classes as a result of lack of qualified science teachers. Furthermore there are many villages in the area without schools.

4.5.2.1 Education of Household Heads

The study revealed that about 21% of household heads were illiterate, 9% received Khalwa education, while 70% of households head received formal education (Figure 4.8).

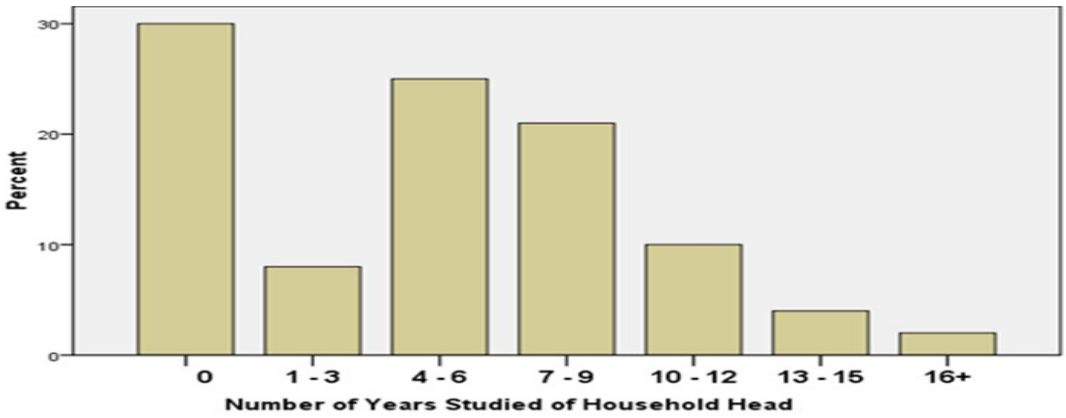
Number of years studied by household heads grouped into seven categories, zero years of education, 1-3 years, 4-6 years, 7-9 years, 10-12 years, 13-15 years, and 16+ (Figure 4.9). The study revealed that the majority of household heads 30% either illiterate or received non-formal education. Whereas 25% of household heads received 4-6 years of formal education, 21% of them received 7-9 years of formal education, 10% received 10-12 years, and 8% received 1-3 years. Number of years studied range between 0-16 years with an average of 5 years.

Figure 4.8: Education level of household heads in Wad Banda Locality, NKS.



Source: Field survey, 2013.

Figure 4.9: Number of years studied by household heads in Wad Banda Locality, NKS.

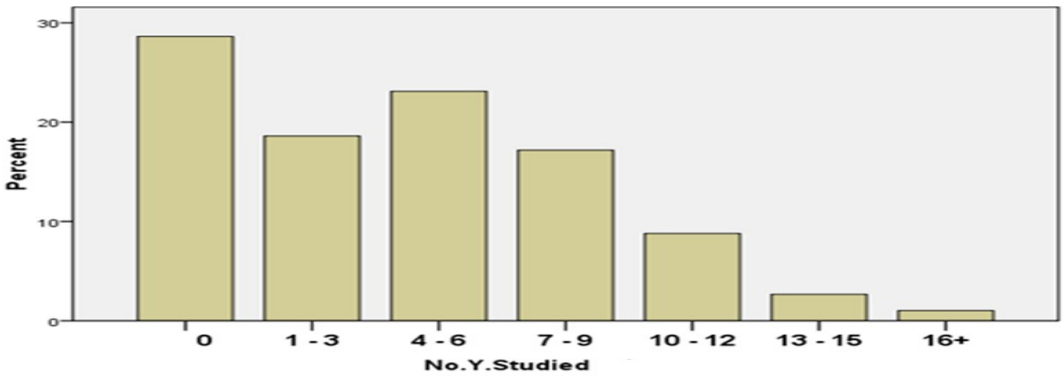


Source: Field survey, 2013.

4.5.2.2 Education of Households in Wad Banda Locality

Number of years studied by population categorized into seven groups Zero years of formal education, 1-3 years, 4-6 years, 7-9 years, 10-12 years, 13-15 years, and 16+. The study revealed that the group zero years of formal education represented the highest percentage 29% among population studied. 19% of studied population received 1-3 years of formal education, 23% received 4-6 years, 17% received 9-7 years, 9% received 10-12 years, 3% received 13-15 years, and 1% received 16 + years (Figure 4.10). While, 26% of studied population were children under the age of school.

Figure 4.10: Education of studied households in Wad Banda Locality, NKS.

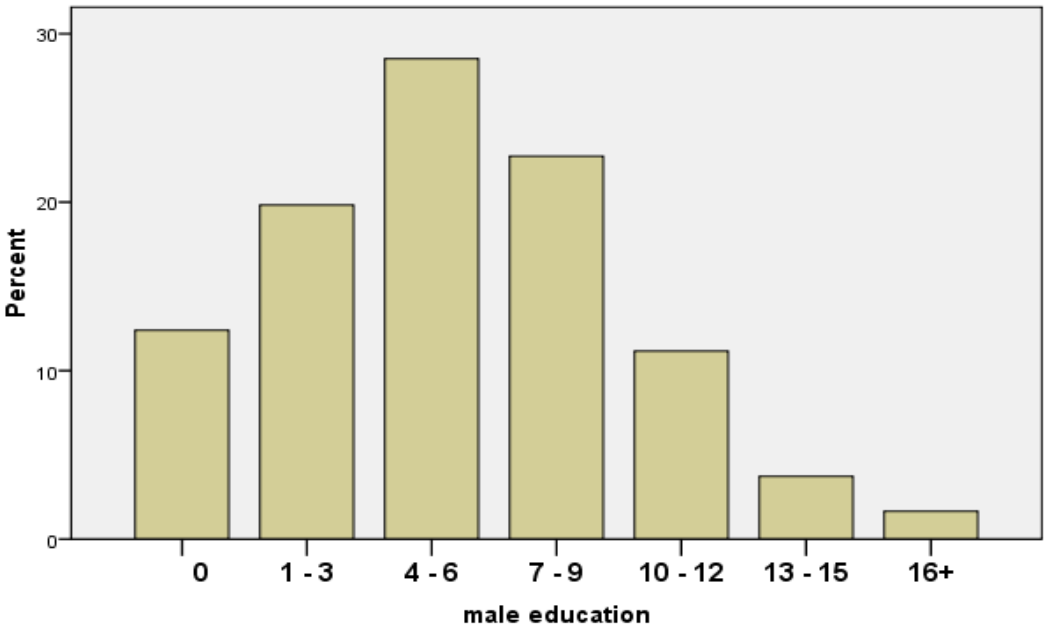


Source: Field survey, 2013.

Concerning gender education, about 12% of male and 45% of female were illiterate or not attend formal education, 20% of male and 17% of female attend 1-3 years of formal education, 29% of male and 18% of female received 4-6 years, 23% of male 12% of female attend 7-9 years, 11% of male and 7% of female attend 10-12 years, 4% of male and 2% of female received 12-15 years, and 2% of male and less than 1% of female received 16+ years of formal education, whereas about 28% of males and 24% of females were children under the age of school (Figures 4.11 and 4.12).

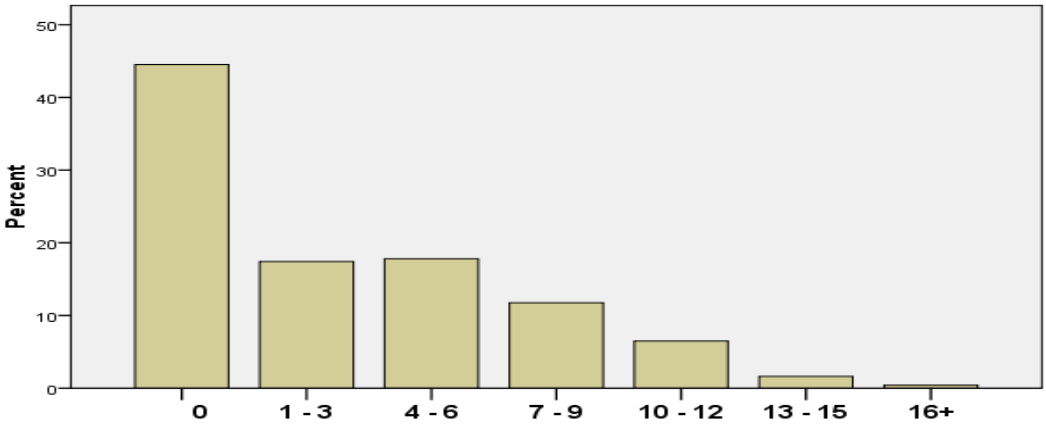
Regarding children who at the age of school and did not enroll in school, the study showed that about 5% of children above 5 years and under 16 years did not attend school, about 60% of them were female and 40% were male.

Figure 4.11: Male education of studied households in Wad Banda Locality, NKS.



Source: Field survey, 2013.

Figure 4.12: Female education of studied households in Wad Banda Locality, NKS.



Source: Field survey, 2013.

4.5.3 Water Sources in Wad Banda Locality

The field survey revealed that water resources are one of the serious problems facing the community in the area. There are two types of motorized water pumps in the study area for the supply of domestic

water. One type called Donkey water pump and other called sunken water pump.

Some villages have motorized water pumps and others have not, therefore some villages bring drinking water from other villages, however some of the existed water pumps confronting several problems like lack of skillful technician, unavailability of spare parts, and mismanagement. Therefore many of them do not working continuously. Most of these water pumps in the area were established by the government and controlled by collaboration between the government and the local community, however some water pumps owned by private sector especially in places where government fail in establishing water pumps. The researcher raise question in group discussions in Sallam village concerning the three main problems facing the community, one of the participants answered: (First problem is shortage of water, second is shortage of water, and third is shortage of water). He repeated the water problem to confirm that shortage water is the most pressing problem in the village.

In north eastern part of Wad Banda locality the area does not suit for establishing water pumps because of underground rock layer *(umgreyat villages)*. Therefore the people depend mainly on establishing paved water holes (4*4m or 6*6m), the holes paved with reinforced concrete and used for water storage. The people in that area harvest rainfall water and store it in storage holes. People and animals obtain water from the water storage holes. At time when water storage holes are near to be empty, the people bring water tankers mostly from Elnhud city to refill water storage holes.

In past people in the area would store water in *Tabldi trees (Adansonia Digitata)*. The trees were hollowed out and used for water storage. The researcher interviewed a number of people in the area and asked them about the history of storing water in *Tabldi trees (Adansonia Digitata)*,

they mentioned that the ancestors of *Hammar Tribe* when they arrived to the area in about seventeen or eighteen century, they found many *Tabldi trees* had already been caved, but no one know who caved them.

4.5.4 Electricity Services in Wad Banda Locality

The findings showed that there is new established rural electricity station in Wad Banda town. The station works for only four hours. All other areas in Wad Banda locality lack electricity services. Some people in the study area brought generators, and they deliver electricity for themselves and for some of their neighbors. Therefore in some villages people can enjoy watching television in public places, and a few of them in their houses.

4.5.5 Transportation Services in Wad Banda Locality

The main mean of transportation are animals specially donkeys, and camels. However, recently car transportation became available between villages particularly on market days. Land cruiser pick-up cars are used as means of transportation for carrying people and goods. Western Salvation Road passes across the area; it planned to pass through *Elnhud city* (North Kordofan), *Wad Banda* (North Kordofan), *Umkdada* (North Darfur), *Elfasher* (North Darfur), *Nyala* (South Darfur), *Zalingei* (Central Darfur), and it end at *Elgenina* in west Darfur. Until now the road is under construction. The road divided into many parts for the purpose of construction, the part of *Elnhud*, *Wadbanda* and *Umkadada* paved until western part of Wad Banda locality. Some parts in the study area benefit from this road specially those which located near the road. However the larger part of the study area suffer from lack of paved roads.

4.6 Housing in Wad Banda Locality

People in the study area live in houses built mainly from millet straws. Wooden poles are shaped in conical shapes, and then put on the top of wooden pillars. After that the structure is covered with millet straws and fixed with trees bark, plastic ropes or metallic wires. The houses usually surrounded by fences built from wooden sticks and straws. These houses are cool in summer and warm in winter. However people in main towns use both traditional houses and modernized houses.

The researcher asked villagers who participating in group discussions about the chances of changing traditional way of housing to modernized types using baked bricks or cement bricks (block). Respondents mentioned that they are willing to change the way of housing because recently getting local materials for building traditional houses become very difficult. But modernized houses need a higher financial ability. Villages' planning is needed to change traditional way of housing. Some villagers are not enthusiastic for villages planning because authorities impose high land fees for villages planning. In addition to that the majority of villagers have small farms called *(Gubraka)* extended at the back of their houses inside the villages.

The traditional houses (*Guteia*) can be improved by using wooden pillars which have resistance to termites and woodworm. Also it can be improved by changing it into *Drdur* by building a constant house foundation using mud or baked breaks instead of using wooden pillars.

The study showed that the majority of household depends mainly on normal houses without significant improvement. About 95% of studied households confirmed that they have normal houses while 34% possess improved houses, about 8% have Drdur houses, and only 5% possess mud or baked break rooms besides normal houses (Table 4.3).

Table 4.3: Housing of studied households in Wad Banda Locality, NKS.

Types of houses	possess	not possess	average of room owned by household
normal houses	95%	5%	2.36
improved houses	34%	66%	0.5
Drdur	8%	92%	0.08
Mud or baked break room	5%	95%	0.06

Source: Field survey, 2013.

4.6.1 Water Closet (Latrines)

They study showed that almost all households have some kinds of water closet. About 99% of household heads confirmed existence of some kinds of water closet or latrines in their houses. Generally water closets or latrines in the area build from local materials. Hole is dug in the ground, and covered with wooden poles which is covered with plastic or others materials leaving narrow opening in the center of the hole, and then covered with sand.

4.6.2 Kitchens

The findings of the study showed that 50% of studied households have a separated building as a kitchen in their houses, whereas the others 50% do not possess a separated kitchen in their houses. However some of what is called a separated kitchen only small shelter (*Rakuba*) that do not protect from rain falls. People who have no separate kitchen use a building where children can sleep for cooking.

4.7 Finance Services in Wad Banda Locality

Formal finance is not available in the study area; however villages' traders deliver some kind of short term traditional finance especially for foodstuffs and other consumption necessities. Also people in the area borrow from relatives in emergency cases.

The study revealed that about 34% of the interviewed households said that they borrowed some amount during last year either from village traders or relatives. While about 66% of studied household heads affirmed that, they did not borrow any amount in the last year. The purpose of borrowing amount was mostly for consumption or other necessities like medicine, education, etc. The borrowed amount ranged between SDG 200-9500 with an average of SDG 1,180 and standard deviation SDG 1,725. Regarding to paying back of the borrowed amount, the findings showed that 38% of borrowed household heads asserted that they paid back their debt. Whereas 53% of borrowed household heads emphasized that they did not pay back their debt. About 6% of borrowed household heads said that they paid back only part of their debt.

Regarding to traditional types of finance there is a traditional type of finance called (*Sheall*). *Sheall* is a traditional type of finance in which villages traders buy crops especially groundnut from farmers before harvesting season. Trader pays the cost now and receives the crop after harvest. *Sheall* starts in September because in this month the people can predict the success of agricultural season. *Sheall* prices usually are lower than harvesting season prices. However during the harvest season in 2012, the prices of *sheall* and harvesting season prices were almost the same.

Regarding micro finance the head of *Eltabldi* cooperative and representative of cooperatives in Wad Banda Locality was interviewed. He explained that the attempt of application of experiment of microfinance in the locality starts recently in 2013. The bank of savings and social development delivered little micro finance fund with 10% interest rate for animal raising for cooperatives. The number of cooperatives according to the head of *Eltabldi* cooperative was 110 cooperatives, most of them in main towns but almost all of them newly

established, and the majority of them were not effective, however the experiment of microfinance is so narrow in its extent and did not evaluated yet.

4.8 Savings

They study showed that 95% of responded household heads said that they did not save any amount during last year. Whereas only 5% of responded household heads emphasized that they save some amount of money. In fact getting information about some issues like saving is very difficult because almost all people in the area consider it as secret, therefore the majority of people not expected to give accurate figures about their savings. Households annual savings ranged between SDG 300 to SDG 3000, while the average was SDG 1660 (USD 277) and standard deviation was SDG 1256 ($ 209).

Chapter Five: Poverty and Food Security

5.1 Poverty Situation in Wad Banda Locality

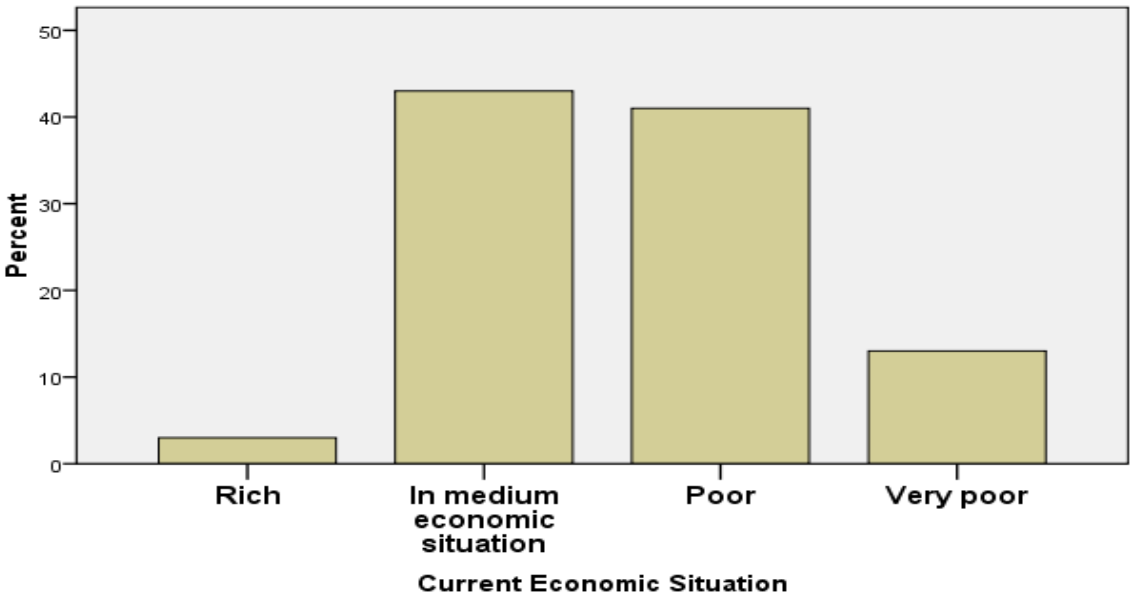
Poverty is highly prevalence in the study area as revealed in group discussions. The researcher asked the participants in group discussions about the prevalence of poverty within the past ten years and its expected prevalence for next ten years. The majority of the group discussions attendance mentioned that the situation was becoming worse and worse and it will continue to be worse if no action taken. Few members of the group dissuasion thought that the situation improved during the past ten years and expected it to be better in the next ten years.

The household heads were asked about their families' current and previous economic status. Only 3% of respondents considered themselves rich according to their current economic status, whereas 43% of the respondents considered themselves in medium economic situation, 41%

considered themselves as poor, and 13% of respondents mentioned that they are very poor (Figure 5.1).

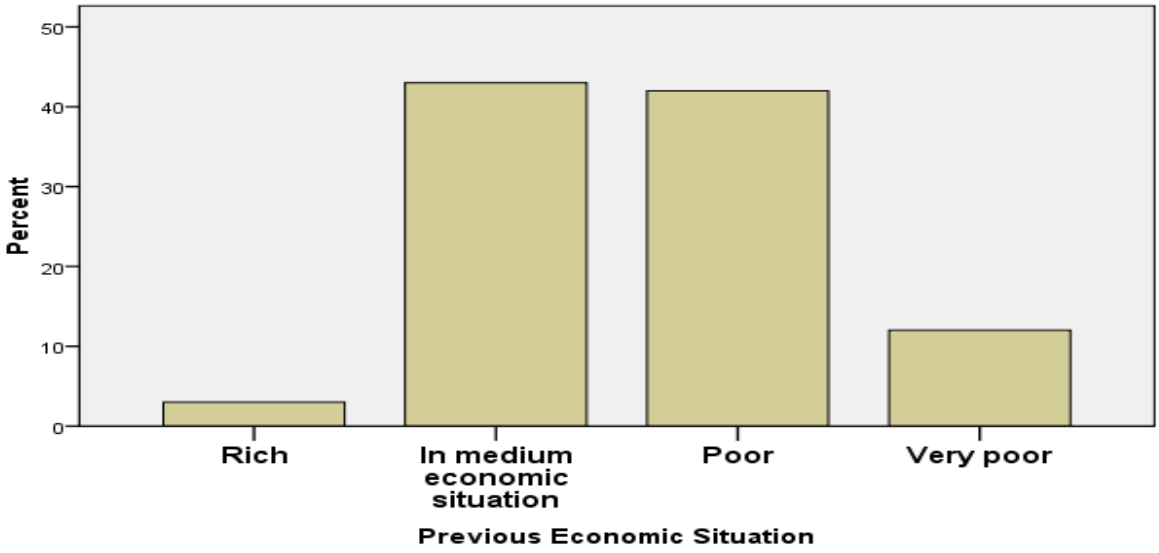
Regarding their previous economic status over the last 10 years, the result was almost the same, about 3% said they were rich, 43% said they were in medium economic situation, 42% said they were poor, and 12% said they were very poor (Figure 5.2).

Figure 5.1: Current Economic Situation as Seen by Households Heads in Wad Banda Locality, NKS.



Source: Field survey, 2013.

Figure 5.2: Previous Economic Situation as Seen by Households Heads in Wad Banda Locality, NKS.



Source: Field survey, 2013.

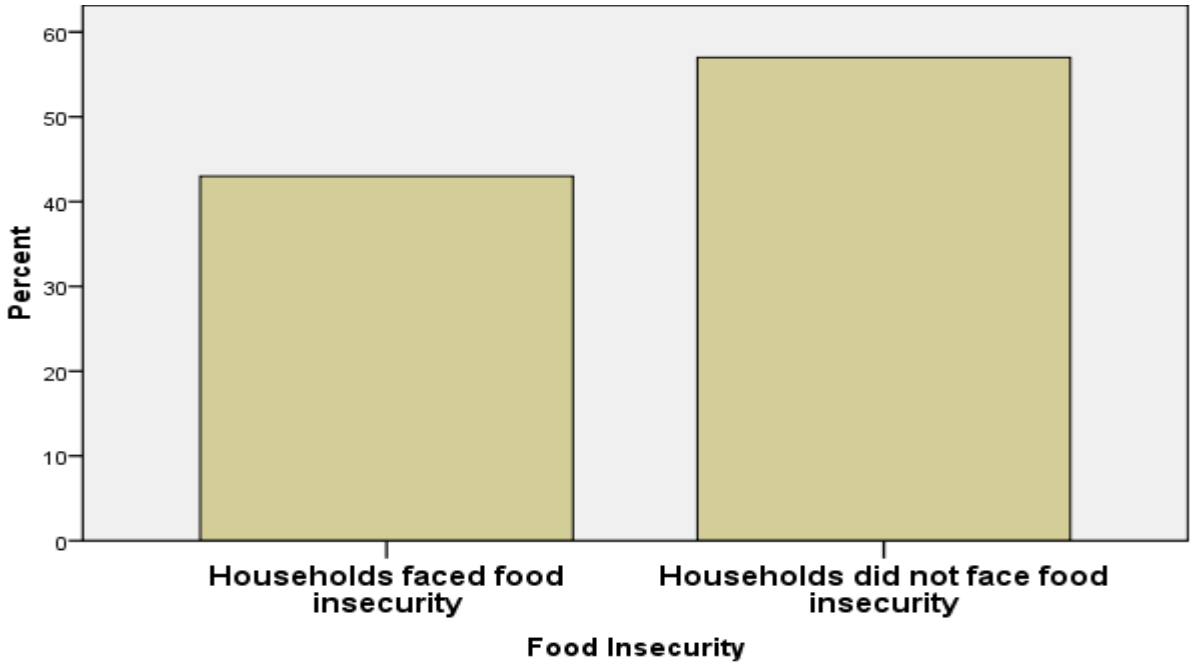
5.2 Food Shortages

To see the situation of food supplies in the study area, household heads were asked if their families faced any food shortage during last year. According to the group discussions participants, food sustainability is a serious problem facing people in the area because of rain variability. They mentioned that food security situation within the past twenty years is highly variable. Many household heads interviewed said that they confronted food insecurity, because of rain variability and lack of off farm income generating opportunities. 43% of the household heads interviewed said their families faced food shortage during last year, while 57% of the household heads said their families did not face any food shortage (Figure 5.3). The responded household heads said failure of agricultural season from year to year is common. Households in the study area experienced acute food insecurity many times.

Household heads were asked about the time of the year when they are most likely face food shortages. About 44% out of the households which faced food shortage during last year said they mostly face food insecurity

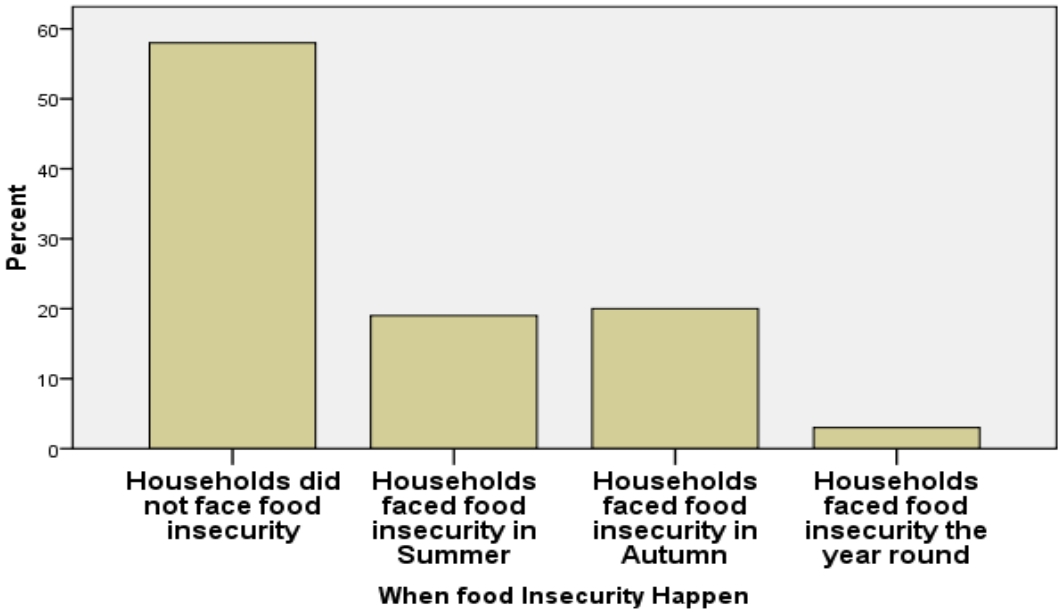
during summer. 47% of food insecure households said they usually face food shortage in autumn, while 9% of food insecure they mostly experience food insecurity all the year round (Figure 5.4).

Figure 5.3: Households Food Insecurity in Wad Banda Locality, NKS.



Source: Field survey, 2013.

Figure 5.4: Time of the year food insecure households mostly faced food insecurity, Wad Banda Locality, NKS.



Source: Field survey, 2013.

5.3 Food Shortage Coping Strategies

The study revealed that the households in the study area adopted coping strategies for food insecurity and lack of income. They tend to sell their accumulated assets like goats, sheep, cow, camels, etc. as first strategy. This leads sometimes in depleting their assets as a result of long periods of dependency on accumulated assets. Borrowing strategy is adopted as a short run strategy to overcome food shortage, while causal work is taken as long run strategy. Work in traditional gold mining, migrating to cities to work as casual labors are some of the choices household members may choose to support their families. Households may tend to hire their children even some of them before the age of school, to livestock breeders to work as shepherd as means to support the families. Children who work as shepherd are more likely lose the chance for enrolling in schools.

Migration to Libya is another strategy adopted by household members in the area to cope with lack of income. This strategy helped some of them to escape poverty, however many did not benefit much from migration to

Libya. Migration momentum pulled many students from their schools to travel to Libya with hope to change their economic situation and to help their families. It was revealed during group discussions few of the migrants succeeded but the majority failed to attain their ambition, and almost all of them lost the chances for returning back to their schools. The unrest in Libya during Arab Spring Revolution 2011 affected the study area because many of migrants lost their work there, after improvement of security situation in Libya, many migrants returned back to Libya.

According to the survey, limited number of households migrated from rural area to urban areas either to main towns in the locality or other cities and towns in the country. Although the area was affected by Darfur conflict as a result of the movement of Darfur rebels across the area, but there was no internal displacement took place. The studies showed that only 4% of studied households migrated from village to anther or from village to town as result of tribal disputes.

5.4 Social Safety Nets

They study revealed that social insurance services were not available in the study area. However some people in the area specially formal employees receive medical insurance. Only about 7% of studied households have one or more of their family members, has a medical insurance, while the majority of studied households 93% did not receive any medical insurance services.

Some charities like Zakat Chamber provide aid to a limited number of the poor households in the area. Only 2% of studied households receive a little in kind transfer from charity. About 2% of the studied households received aid from relatives.

5.5 Household Assets

Household assets considered as the main livelihood insurance for people in the study area. The study showed that 79% of households owned goats. Goats are one of the very important animals in the area. Households raise goats for milk, meat and income. Almost all households owned donkeys because they use them as the main mean of transport and carrying loads. They study revealed that about 38% of households owned sheep, 15% owned cow and 7% owned camel (Table 5.1).

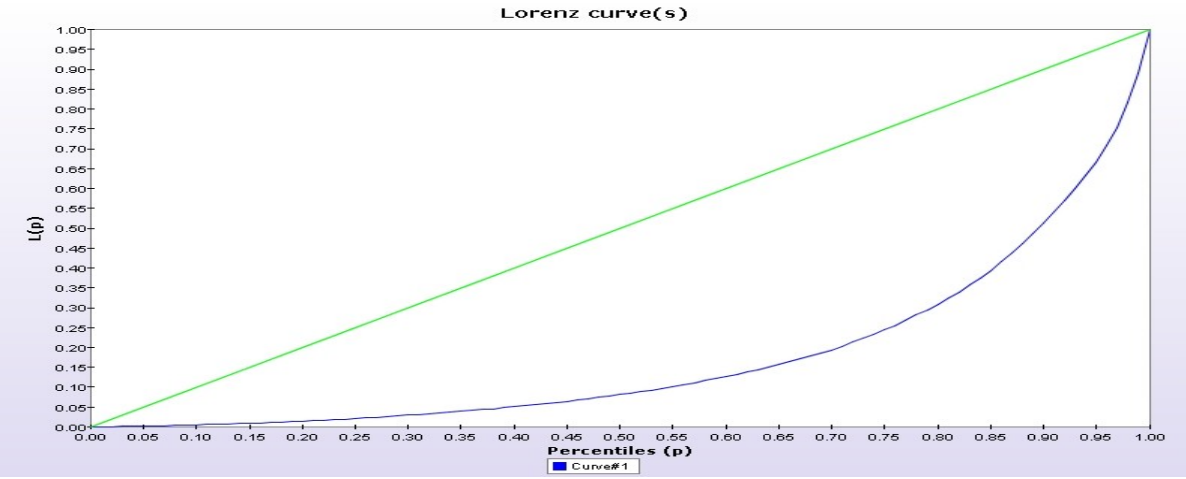
The results revealed that the inequality in owned assets distribution was very high as indicated by Lorenz Curve and Gini coefficient. The Gini coefficient of owned assets distribution was 0.65, (Figure 5.5 and Table 5.1).

Table 5.1: Assets of households studied in Wad Banda Locality, NKS.

Assets type	% of households who owned the assets	% of households who do not owned the assets	Number of animals per household	Value of assets per adult/ SDG
Cattle	15	85	0.57	1,590
Goat	79	21	3.49	1,141
Sheep	38	62	8.53	4,429
Camel	7	93	0.21	920
Donkey	98	2	1.94	1,463
Horses	2	98	0.02	100
Hens	62	38	3.01	71
Donkey car	9	91	0.09	113
Car	2	98	0.02	1,300
Mills	2	98	0.02	100
Generator	4	96	0.04	130
Shop	8	92	0.08	350
TV	8	92	0.08	57
Mobile Phone	81	19	1.44	248
Radio	67	33	0.38	42
Potgas	3	97	0.03	9
Mean value of household assets				**12,062**
Value owned assets per adult equivalent				**2,284**
Gini Coefficient				**0.65**

Source: Field survey, 2013.

Figure 5.5: Lorenz Curve of owned assets in Wad Banda Locality, NKS.



Source: dreived by resaercher using field survey data, 2013.

5.7 Causes of Poverty in Wad Banda Locality

High poverty rates exited in the area as result of many interrelated natural and social factors. The researcher asked the participants of the group discussions about the root causes of poverty in the area, they mentioned many factors. Rain variability considered as the main cause of livelihood vulnerability besides agricultural pest and disease, traditional farming methods, marketing problems, low income, low capabilities, lack of finance, shortages of formal jobs, low level of social services (Education, health, water) and many other social factors. Ajakaiye and Adeyeye (2002) stated that there is no one cause or determinant of poverty. On the contrary, combinations of several complex factors contribute to poverty. These include low or negative economic growth, inappropriate macroeconomic policies, deficiencies in the labor market resulting in limited job growth, low productivity and low wages in the informal sector, and a lag in human resource development. Other factors which have contributed to a decline in living standards are structural causes or determinants of poverty include increase in crime and violence, environmental degradation, public retrenchment, a fall in the real value of safety nets, and changes in family structures. All or some of these factors came up in group discussions in the study area.

5.8 Poverty Measurements in Wad Banda Locality

Poverty indicators for both income and consumption have been derived namely incidence of poverty (Headcount Index), poverty gap (depth of poverty), and severity of poverty using USD 1 (SDG 6) as poverty line. Household heads were asked about the minimum level of monthly income which enough for attaining basic needs for their families. These data used to calculate subjective poverty line. Subjective poverty line was SDG 8 (USD1.3), but it is not used in calculating poverty indicators.

Haughton and Khandker (2009) stated that income tends to be understated for several reasons. People forget, particularly when they were asked in a single interview, about items they may have sold, or money they may have received, up to a year before. People may be unwilling to disclose the full extent of their income, lest the tax collector or a neighbor get wind of the details. People may be reluctant to report income earned illegally, for instance, from smuggling, corruption, poppy cultivation, or prostitution. Some parts of income are difficult to calculate, for example, the extent to which the family buffalo has risen in value.

5.8.1 Income Poverty Indicators

Using income for measuring poverty, the study revealed that poverty was highly prevalence among people in study area (Table 5.2). Income was decomposed into three categories, income from crops as denoted by (Y1), income from crops plus livestock as denoted by (Y2), and total income which includes income from crops, livestock and other sources of income as denoted by (Y3).

The study showed that the incidence of poverty was100% regarding income from crop production only (Y1). The addition of livestock income to income from crop production (Y2) reduced incidence of poverty from 100% to 94%. Using total income (Y3) or when other sources of income were added to income from (Y2), the incidence of poverty fell to 78%. These results were closer to Teabin (2010) results for income incidence of poverty in Wad Banda locality which was 100%, 99%, and 90% for (Y1), (Y2), and (Y3) respectively. Faki et al (2009) study for incidence of poverty in North Kordofan revealed that the incidences of poverty were 99.5%, 98.1%, and 81.3% for (Y1), (Y2), and (Y3) respectively.

The current study revealed that poverty gap and severity were 66% and 49% respectively for (Y1), 58% and 42% for (Y2), 46% and 32% for (Y3). Teabin (2010) found that poverty gap and severity were 83% and 71% respectively with regards to (Y_1), 72% and 58% respectively for (Y_2), and 61% and 46% respectively for total income (Y_3). Faki et al (2009) results showed that poverty gap (depth of poverty) for North Kordofan State was 83.9%, 78.7%, and 45.4% for (Y_1), (Y_2), and (Y_3) respectively, while poverty severity was 84.0%, 78.8%, 51.7% and 45.5% for (Y_1), (Y_2) and (Y_3)) respectively.

Table 5.2: Income Poverty indicators in Wad Banda Locality, NKS.

Poverty indicator	Daily income per adult equivalent		
	Crop Production (Y1)	Crop plus livestock (Y2)	Total income (crop, livestock and other income) (Y3)
Head count	100	94	78
Poverty Gap	66	58	46
Poverty Severity	49	42	32
Gini coefficient	0.37	0.40	0.43

Source: Field survey, 2013.

The study revealed that the average of monthly household income from crop production was SDG 294 equivalent to USD 49 represented 52% of monthly total income which was SDG 94 (USD 16). For livestock production represented 17% of total monthly household income SDG 173 (USD 29). Other sources of income represented about 31% of monthly total household income, whereas the average of total household income was SDG 562 (USD 94) (Table 5.3).

Regarding daily income per adult equivalent, the average of daily income per adult equivalent from crop was SDG 2.06 (USD 0.34) representing 52% of total daily income per adult equivalent, while livestock income was SDG 0.56 (USD .09) represented 14%, and income from other

sources was SDG 1.31 (USD 0.22) represented 33% of total daily income per adult equivalent. The average of total daily income per adult equivalent was SDG 3.94 equivalent to (USD 0.66) (Table 5.4).

Table 5.3: Household monthly income in Wad Banda Locality, NKS.

monthly household income	Average SDG	Percentage
crop	294	52
livestock	94	17
other income	173	31
Total	562	100

Source: Field survey, 2013.

Table 5.4: Income per adult equivalent in Wad Banda Locality, NKS.

Income type per adult equivalent	Average SDG	Percentage
crop production	2.06	52
Livestock	0.56	14
Other sources	1.31	33
Total	3.94	100

Source: Field survey, 2013.

5.8.2 Consumption poverty indicators

In developed countries consumption is a better indicator for measuring wellbeing than income (Duclos et al, 2006). Income typically rises and then falls in the course of one's lifetime, in addition to fluctuating from year to year, whereas consumption remains relatively stable. Thus, information on consumption over a relatively short period, such as one a month is more likely to be representative of a household's general level of welfare than equivalent information on income, which is more volatile. However consumption also can be understated for many reasons. For instance Households tend to underdeclare what they spend on luxuries or illicit items (Haughton and Khandker 2009).

The study revealed that consumption poverty is less prevalent than income poverty in the study area (Table 5.5). Consumption was divided into two categories, consumption on food only as denoted by (C_1) and

total consumption which include food, education, clothes, health and others as denoted by (C_2). The incidence of poverty was 74% regarding consumption on food only (C1), which is higher than Teabin (2010) results for Wad Banda locality which estimated the incidence of poverty using food consumption at 63%. Regarding total consumption (C2) the incidence of poverty fell to 62% which also higher than Teabin (2010) results which mentioned that the incidence of poverty in Wad Banda locality for total income was 35%.

Poverty gap and poverty severity were 26% and 11% respectively regarding consumption on food only (C1) (Table 5.5). Teabin (2010) mentioned that poverty gap and poverty severity for Wad Banda locality were 20% and 8% respectively with regards to (C_1). Regarding poverty gap and severity for total consumption (C2), the study showed that poverty gap and severity were 18% and 7% respectively for total consumption which regarded relatively higher than Teabin (2010) results for Wad Banda locality which estimated them at 9% and 3% respectively.

Table 5.5: Consumption poverty indicators in Wad Banda Locality, NKS.

Poverty indicator	food consumption per adult equivalent (C1)	total consumption (food, clothes and education) (C2)
Head count	74	62
Poverty Gap	26	18
Poverty Severity	11	7
Geni	0.25	0.25

Source: Field survey, 2013.

The study revealed that income poverty rates are higher than consumption poverty rates in the study area (Tables 5.2 and 5.5). Income data seemed to be understated while consumption data seemed to be overstated. People for many reasons may understate their income; some of them do not desire to declare their real fortunes, while others understate their income because they expect that relief organizations may behind data

collection. Regarding consumption data, people tend to give supposed basic need consumption, however their actual consumption expected to be less than mentioned figures as a result of austerity adopted by households. Therefore the actual poverty indicators expected to be between income poverty indicators and consumption indicators.

The study showed that expenditure on food represented 84 % of total consumption which also relatively higher than Teabin (2010) results which estimated the percentage of consumption on food at 76% of total consumption of households studied, while clothes represented 5% of total consumption which is identical with Teabin (2010) results of Wad Banda locality which estimated cloth consumption also at 5%. Furthermore the study estimated the percentages of consumption on education and health at 7% and 4% respectively.

The study revealed that the average of monthly total household consumption estimated at SDG 849 equivalent to USD 142, decomposed to SDG 715 (USD 119) for food, 40 SDG (USD 7) for clothing, SDG 64 (USD 11) for education, and SDG 30 (USD 5) for health (Table 5.6). Regarding daily consumption per adult equivalent, the study showed that, the average of total daily income per adult equivalent estimated at SDG 6.04 (USD 1) which typically equal to poverty line. Whereas the average of daily consumption on food per adult equivalent estimated at SDG 5.10 equivalent to USD 0.85 which represented 84% of total consumption. The average of daily consumption on clothes was SDG 0.31 equivalent to USD 0.05 which represented 5%, consumption on education was SDG 0.40 (USD 0.07) (7%), and consumption on health was SDG 0.22 (USD 0.04) represented 4% of total consumption (Table 5.7).

Table 5.6: Household monthly consumption in Wad Banda Locality, NKS.

Items	Average of monthly household consumption (SDG)	Percentage of monthly household consumption (SDG)
Food	715.20	84
Cloth	40.02	5
Education	63.52	7
Health	29.83	4
Total	**848.57**	**100**

Source: Field survey, 2013.

Table 5.7: Daily consumption per adult equivalent in Wad Banda Locality, NKS.

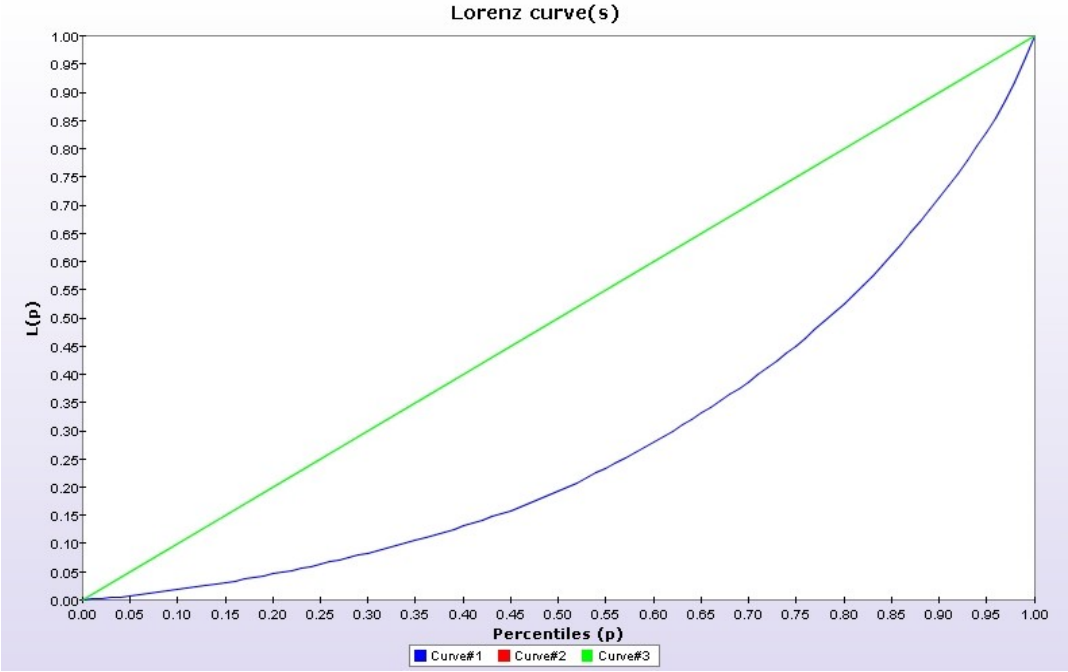
Items	Average of daily consumption per adult equivalent (SDG)	Percentage of daily consumption per adult equivalent (SDG)
Food	5.10	84
Cloth	0.31	5
Education	0.40	7
Health	0.22	4
total	6.04	100

Source: Field survey, 2013.

5.8.3 Gini Coefficient and Inequality

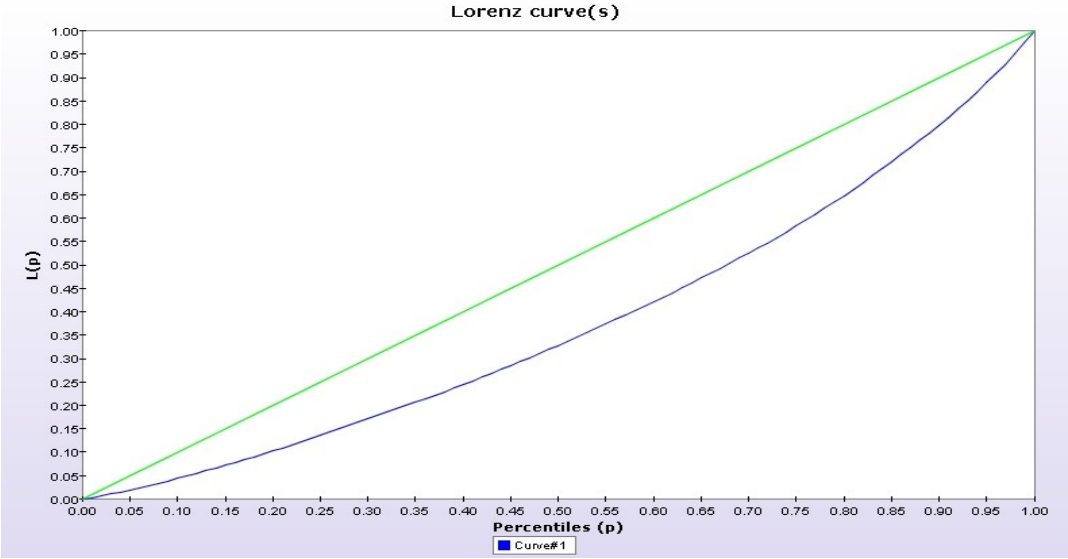
The Gini coefficient is usually defined mathematically based on the Lorenz Curve. It is the ratio of the area that lies between the line of equality and the Lorenz curve. Results of the study revealed that inequality was higher in income distribution than consumption distribution as indicated by Lorenz curve and Gini coefficient (Figures 5.6 and 5.7). Consumption Gini coefficient was 0.25 while income Gini coefficient was 0.43. Teabin (2010) resulted that consumption Gini coefficient was 0.22 which less than Income Gini coefficient 0.47. Since 0 for Gini coefficient corresponding to complete equality, and 1 corresponding to complete inequality, the households consumption distribution come near to the equality, while households income distribution come near to the middle which indicate high income inequality.

Figure 5.6: Income Lorenz Curve in Wad Banda Locality, NKS.



Source: dreived by resaercher using field survey data, 2013.

Figure 5.7: Consumption Lorenz Curve in Wad Banda Locality, NKS.



Source: dreived by resaercher using field survey data, 2013.

5.9 Poverty Profile

Poverty profiling for both income and consumption was undertaken for household heads according to numbers of years studied, age, and gender.

5.9.1 Numbers of Years Studied by Household Heads Poverty Profile

Numbers of years studied by household heads were grouped into seven groups, zero years of formal education, 1-3 years, 4-6, 7-9, 10-12, 13-15, and 16+. Poverty indicators for all categories were derived using SDG 6 equivalent to USD 1 as poverty line (Tables 5.8 and 5.9).

The household heads with 7-9 years of study represented the highest incidence of poverty (86%) for consumption poverty. This may be as result of young age household heads, whereas the group of zero years of formal education which include illiterate household heads and household heads who did not attend formal class represented the second highest incidence of poverty (67%) for consumption poverty. Regarding income poverty the study revealed that household heads who did not receive any formal education represented the highest incidence of poverty (90%) among the groups, followed by the groups 7-9 (81%) and 4-6 years of education (80%).

Poverty gap and severity were higher in income poverty than consumption poverty. Poverty gap and severity ranged between (11% - 25%) and (4% - 9%) respectively for consumption poverty. For income poverty profile, the poverty gap and severity ranged between (14 % - 59%) and (4% - 43%) respectively. Household heads with 7 - 9 years of study represented the highest poverty gap (25%) for consumption poverty profile, while household heads with zero years of study represented the highest poverty gap for income poverty profile. With regards to poverty severity, household heads with zero years of study, 1-3 years, 7-9 years and (16+) shared the same highest severity of poverty (9%) for consumption poverty profile. Whereas household heads with zero years of study represented the highest severity of poverty (43%) for the income poverty profile.

Table 5.8: Income poverty profile of numbers of years studied by household heads in Wad Banda Locality, NKS.

Number of years studied	N	Headcount	Poverty gap	Severity	Gini
0	30	90	59	43	0.40
1- 3	8	63	42	32	0.43
4- 6	25	80	46	32	0.42
7- 9	21	81	37	22	0.31
10- 12	10	60	43	31	0.47
13- 15	4	50	18	6	0.33
16.00+	2	50	14	4	0.15

Source: Field survey, 2013.

Table 5.9: Consumption poverty profile of numbers of years studied by household heads in Wad Banda Locality, NKS.

Numbers of years studied	N	Headcount	Poverty gap	Severity	Gini
0	30	67	21	9	0.22
1- 3	8	50	19	9	0.32
4- 6	25	48	11	4	0.24
7- 9	21	86	25	9	0.17
10- 12	10	50	11	4	0.21
13- 15	4	50	11	4	0.13
16.00+	2	50	22	9	0.09

Source: Field survey, 2013.

5.9.2 Age of Household Heads Poverty Profile

Age of household heads was grouped into six categories, <=30 years, 31-40, 41-50, 51-60, 61-70, and 71+. Poverty indicators for all age groups were derived using 6 SDG (USD 1) as poverty line. The study revealed that the household heads in the age group (41-50 years) represented the highest incidence of poverty among the age groups for both consumption (73%) and income (83%) profiles. Whereas the household heads in the age group (<=30) represented the second highest head count index for both consumption (67%) and income (80%) poverty profiles. Poverty gap and severity ranged between (7%-20%) and (2 % - 12%) respectively

regarding consumption poverty profile, while they ranged between (32% - 48) and (21% - 38%) respectively for income poverty profiles (Tables 5.10 and 5.11).

Table 5.10: Age of household heads income poverty profile in Wad Banda Locality, NKS.

age	N	Headcount	Poverty gap	Severity	Gini
<= 30	15	80	48	31	0.36
31- 40	32	78	43	29	0.40
41- 50	30	83	48	34	0.45
51- 60	14	79	50	38	0.53
61- 70	8	50	32	21	0.33
71+	1				

Source: Field survey, 2013.

Table 5.11: Age of household heads consumption poverty profile in Wad Banda Locality, NKS.

age	N	Headcount	Poverty gap	Severity	Gini
<= 30	15	67	20	7	0.20
31- 40	32	53	11	3	0.23
41- 50	30	73	26	12	0.29
51- 60	14	64	18	6	0.20
61- 70	8	38	7	2	0.21
71+	1				

Source: Field survey, 2013.

5.9.3 Gender of Household Heads Poverty Profile

Poverty indicators for both male and female headed households were derived using SDG 6 (USD 1) as poverty line; however the majority of household heads were male. Female represented only 6% of the studied household heads. The findings of the study revealed that for male headed households, incidence, gap and severity of poverty were 63%, 18% and 7% respectively which were higher than female headed households incidence, gap and severity of poverty which were (50%), (11%) and (4%) respectively for consumption poverty profile. Considering income

poverty profile, the incidence of and gap of poverty for male headed households were (79%), (46%) respectively, also were higher than female headed households incidence and gap of poverty, (67%) and (43%) respectively, while severity of poverty was equal for both male and female regarding income poverty profiles (Tables 5.12 and 5.13).

Table 5.12: Gender of household heads income poverty profile in Wad Banda Locality, NKS.

Gender	N	Headcount	Poverty gap	Severity	Gini
male	94	79	46	31	0.43
female	6	67	43	31	0.46

Source: Field survey, 2013.

Table 5.13: Gender of household heads consumption poverty profile in Wad Banda Locality, NKS.

Gender	N	Headcount	Poverty gap	Severity	Gini
male	94	63	18	7	0.25
female	6	50	11	4	0.19

Source: Field survey, 2013.

5.9.4 Villages' Poverty Profile

Poverty indicators for both income and consumption were derived for five villages in the study area which were Dawin, Hemdi, Sallam, Shigila and Suga Algamal town using 6 SDG (1 USD) as poverty line (Tables 5.14 and 5.15). The study revealed that Suga Algamal town was better off than the four villages with only 25% incidence of poverty for both income and consumption. Suga Algamal as a town offer more opportunities for formal employment or trading activities, this may be why there is less poverty in Suga Algamal than in other villages. Also the results of observations and group discussions supported these findings. However there were only four households studied in Suga Algamal,

therefore in spite of community homogeneity rigorous comparison may not achieve with a few number of household studied.

Shigila village represented the highest incidence of poverty among the other three villages for both income (100%) and consumption (63%). However though observation and group discussions Shigila village seems share the same characteristics with other villages and it distinguished with weekly market which bigger than the markets of other villages. Dawin, Hemdi, and Sallam have close figures for poverty indicators for both income and consumption.

Table 5.14: Villages income poverty profile in Wad Banda Locality, NKS.

village	**N**	**headcount**	**poverty gap**	**severity**	**Gini**
Dawin	19	74	45	31	0.45
Hemdi	16	75	57	46	0.48
Sallam	42	76	40	26	0.40
Shigila	19	100	56	38	0.31
SougAlgamal	4	25	7	2	0.17

Source: Field survey, 2013.

Table 5.15: Villages consumption poverty profile in Wad Banda Locality, NKS.

village	N	headcount	poverty gap	severity	Gini
Dawin	19	63	17	6	0.26
Hemdi	16	44	12	5	0.26
Sallam	42	62	17	6	0.21
Shigila	19	84	27	12	0.19
SougAlgamal	4	25	11	5	0.19

Source: Field survey, 2013.

5.10 Correlation Analysis

The study showed that the value of owned assets for the studied households was correlated with daily consumption, daily income and the number of years studies by households' heads at the sig. (0.05), (0.01), (0.05) respectively. Daily consumption per adult equivalent was highly correlated with daily income at sig. (0.00), family size sig. (0.00) and value of owned assets sig. (0.05). While daily consumption per adult equivalent, was not correlated with age of household heads, and number of years studied by household heads (Table 5.16).

The study revealed that daily income was highly correlated with value of owned assets at sig. (0.00), daily consumption sig. (0.00) and number of years studied by household heads sig. (0.00), whereas it was not correlated with age of household heads and family size (Table 5.16).

Table 5.16: Correlation analysis of owned assets, daily income and daily consumption in Wad Banda Locality, NKS.

		Value of owned household assets	Daily consumption per adult equivalent	Daily income per adult equivalent	Age of household head	Number of years studied by household head	Family Size
Value of owned household assets	Pearson Correlation	1	.211*	.580**	.063	.198*	.003
	Sig. (2-tailed)		.035	.000	.532	.048	.975
Daily consumption per Adult Equivalent	Pearson Correlation	.211*	1	.401**	.000	.056	-.351**
	Sig. (2-tailed)	.035		.000	.992	.581	.000
Daily income per adult equivalent	Pearson Correlation	.580**	.401**	1	.051	.355**	-.175-
	Sig. (2-tailed)	.000	.000		.613	.000	.081
	N	100	100	100	100	100	100
*. Correlation is significant at the 0.05 level (2-tailed).							

		Value of owned household assets	Daily consumption per adult equivalent	Daily income per adult equivalent	Age of household head	Number of years studied by household head	Family Size
Value of owned household	Pearson Correlation	1	.211*	.580**	.063	.198*	.003
	Sig. (2-tailed)		.035	.000	.532	.048	.975
Daily consumption per Adult	Pearson Correlation	.211*	1	.401**	.000	.056	-.351**
	Sig. (2-tailed)	.035		.000	.992	.581	.000
Daily income per adult equivalent	Pearson Correlation	.580**	.401**	1	.051	.355**	-.175-
	Sig. (2-tailed)	.000	.000		.613	.000	.081
	N	100	100	100	100	100	100
**. Correlation is significant at the 0.01 level (2-tailed).							

Source: Derived by reseracher using field survey data, 2013.

5.11 Regression Analysis

Regression analysis was conducted for both consumption and income (Tables 5.17 and 5.18). Simple regression was conducted for prediction of consumption per adult equivalent using income as explanatory variable.

Simple linear regression equation

$Y = A + bx$

Where, Y= dependent variable, A = constant, b = coefficient of explanatory variable, and x = explanatory variable.

Consumption linear regression equation:

$C = 4.7 + 0.32\ I$

Where, C denoted for daily consumption per adult equivalent, and I denote for daily income per adult equivalent.

The analysis showed that, consumption of households per adult equivalent in the study area can be calculated through regression model using income data. The formulae of simple linear regression showed that the constant is SDG 4.7 and the income coefficient which considered as explanatory variable is SDG 0.32.

Multiple regressions was conducted for predication of daily income per adult equivalent by using number of years studied by household heads and Value of household's owned assets as explanatory variables.

Multiple linear regression equation

$Y = A + b_1x1 + b_2x2$

Where, Y= dependent variable, A = constant, b_1 = coefficient of explanatory variable (x1), b_2 = coefficient of explanatory variable (x2) and x1, x2 = explanatory variables.

Income linear regression equation

I = 1.9 + 0.18N + 0.00 V

Where: I used for income per adult equivalent, N denoted for number of years studied by household heads, and V denoted for value of owned assets by households.

The multiple regression module for income predication showed that the constant is SDG 1.9, and the coefficient of number of years studied by household heads is SDG 0.18. While the value of owned assets has no role in determination of income as indicated by V coefficient which is 0.00, therefore income linear regression equation will be:

I = 1.9 + 0.18N

Table 5.17: Consumption regression analysis in Wad Banda Locality, NKS.

Coefficients [a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.708	.401		11.740	.000
	Daily income per adult equivalent	.338	.078	.401	4.332	.000
a. Dependent Variable: Daily consumption per Adult Equivalent						

Source: dreived by resaercher using field survey data, 2013.

Table 5.18: Income regression analysis in Wad Banda Locality, NKS.

Coefficients [a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.908	.411		4.638	.000
	Number of Years Studied of Household Head	.184	.059	.250	3.103	.003
	Value of household owned assets	.000	.000	.530	6.590	.000
a. Dependent Variable: Daily income per adult equivalent						

Source: dreived by resaercher using field survey data, 2013.

Chapter Six: Summary and Recommendations

6.1 Summary

Agriculture considered as the main livelihood activities for the majority of people in the study area. Animal raising, traditional gold mining recently and tapping of *Hahsab* trees (*Acacia Senegal*) are other livelihood activities. This study aimed to investigate poverty situation in in Wad Banda Locality through verifying poverty situation and analyzing root causes of poverty in the area.

A field survey was conducted in June 2013 using questionnaire, group discussions, interview and observations. Hundred households were chosen using simplified random sampling techniques. Foster, Greer, and Thorbecke index (FGT index) were used as main technique for measuring poverty. Descriptive statistics, correlation, Lorenz Curve, regression and Gini Coefficient were also used.

The result showed that that 94% of studied household heads were male while only 6% were female. Age of household heads ranged between 22-75 years with an average of 43 years old. The majority of household heads were young because many of youth in the area dropped out from

school and established new families. Also, the findings of study revealed that 21% of household heads were illiterate, about 9% received Khalwa education, while 70% of households head received formal education.

The study revealed that family size ranged from 2-16 persons with an average of 7 persons and standard deviation 3.2. For purpose of calculating poverty indicators, family size converted into adult equivalent using adult equivalent scales. The family size in adult equivalent ranged between 1.8 to 12.5 with average of 5.5 and standard deviation 2.4.

The findings of the study showed that the majority of households were nuclear families (80%); however there were some extended families and a few compound families. The total population of the hundred selected households was 662 persons. Male represent 50.9 % (337 persons); while female represent 49.1 % (325) of total population.

For the purpose of calculation dependency and labor force ratios, Age of households studied grouped into three main categories, <=14 years, 15-64, 65+ years. The study showed that the age category <=14 years represented 47.6 %, and age group 65+ represented 1.7 %, while age group 15-64 years which considered as work force group represented 50.8%. Dependency percentage is 49.2 % which include children under 15 years old and elderly people above 65 years old. The dependency ratio was almost equal to work force ratio.

The study revealed that the people who did not received formal education represented the highest percentage (29%) among studied population, whereas 19% received 1-3 years of formal education, 23% received 4-6 years, 17% received 9-7 years, 9% received 10-12 years, 3% received 13-15 years, and 1% received 16 + years, while 26% of studied population were children less than age of school.

Concerning gender education, about 12% of male and 45% of female were illiterate or did not attend formal education. About 20% of male and

17% of female attended 1-3 years of formal education, 29% of male and 18% female received 4-6 years, 23% of male 12% of female attended 7-9 years, 11% of male and 7% of female attended 10-12 years, 4% of male and 2% of female received 12-15 years, and 2% of male and less than 1% of female received 16+ years of formal education. While, about 28% of males and 24% of female were children under the age of school.

The study showed that the main livelihood activity is farming, about 94 of household heads considered farming as main livelihood activity for them, while 5% considered it as secondary livelihood activity, and only 1% did not depend on agriculture as livelihood activity either as main or secondary activity.

People in the area grow mainly millet as food crop and groundnut as cash crop besides narrow areas of Dura, okra, hibiscus, sesame, beans and watermelon. Rain variability is the main problem facing agricultural activities. Low agricultural productivity is another problem facing agricultural activities because of low fertility of poor sandy soil, traditional farming practices and lack of improved seeds. In addition to that pest from time to time attacks farms and destroy them in the early stage of cultivation like locusts, grasshoppers, rats, bugs, Abualaid etc. or in pre-harvest season like birds, locusts, Maseh (Pris rape). Plant pathogens and parasite weeds also contributed in a decrease of crop productivity of poor sandy soil like smut diseases, and striga sp.

Livestock is second main livelihood activities in the area. The people in the area raise considerable numbers of sheep, goats, and few numbers of cattle and camels. About 17 of household heads studied said that they practiced animal raising for cash as secondary activity, while 83% of household heads said that practiced animal raising for home consumption. Traditional open system of livestock production is dominant in all the area of Wad Banda Locality, North Kordofan State.

Poor pastures and shortage of water are the main problems confronting livestock production in the study area. Because of rain variability pastures become poor in some seasons, in addition to that agriculture expansion contributed in reduction of available lands for grazing.

Social services were very poor in the area. The researcher interviewed some people individually and as groups, and asked them about the main three problems facing the community; the majority of them mentioned: shortage of drinking water, lack of health services, and poor education services. However the orders of these three main problems differ from village to another according to the most pressing problems.

The findings of the study disclosed that about 43% of studied households faced food shortages in the last year, whereas 57 of studied households did not face food insecurity. However the failure of agricultural season from year to year is common. Therefore people in the area experienced acute food insecurity many times.

The study revealed that the people in the area adopted many strategies to cope with food insecurity and lack of income. The first solution is selling of accumulated assets like goats, sheep, cow, camels, etc. This leads in depleting their assets as a result of long period of dependency on them. Borrowing is adopted as second short run coping strategy, and causal working as long run strategy. Working in traditional gold mines and travelling to cities to work as casual labors, also other coping strategies households may choose. Some of household hire their children to livestock breeders to work as shepherd. Shepherd children more likely loss the chance for enrolling in school. Migration abroad is another strategy adopted by many people in the area to cope with lack of income. This strategy helped some people to escape poverty, however many people did not benefit much from migration.

They study revealed that social insurance services were not available in the area. However some people in the areas especially formal employees receive medical insurance. Only about 7% of studied households one or more of their family members has medical insurance, while the majority of studied households 93% have no medical insurance services.

High poverty rates exited in the area as result of many interrelated natural and social factors. Rain variability considered as the main cause of livelihood vulnerability besides agricultural pest and disease, traditional farming methods, marketing problems, low income, low capabilities, lack of finance, shortages of formal jobs, low level of social services (Education, health, water) and many other social and economic factors.

The poverty indicators for both income and consumption have been derived namely incidence of poverty (Headcount Index), poverty gap (depth of poverty), and severity of poverty using USD 1 (SDG 6) as poverty line. Results of the study showed that the incidence of poverty was 100% regarding income from crop production only (Y1). The addition of livestock income to income from crop production (Y2) reduced incidence of poverty from 100% to 94%. Using total income (Y3) or when we added other sources of income to income from (Y3), the incidence of poverty fell to 78%. Poverty gap and severity were 66% and 49% respectively for (Y1), 58% and 42% for (Y2), 46% and 32% for (Y3).

The study revealed that the average of monthly household income from crop production was SDG 294 (USD 49) represented 52% of monthly total income, SDG 94 (USD 16) for livestock production represented 17% of total monthly household income, SDG 173 (USD 29) from other sources of income represented about 31% of monthly total household income, whereas the average of total household income was 562 SDG (USD 94).

The study revealed that consumption poverty is less prevalent than income poverty. The incidence of poverty was 74% regarding consumption on food only (C1). Regarding total consumption (C2) the incidence of poverty fell to 62%. Poverty gap and poverty severity were 26% and 11% respectively regarding consumption on food only (C1). As far as poverty gap and severity for total consumption (C2) are concerned, the study showed that poverty gap and severity were 18% and 7% respectively for total consumption.

The findings of the study showed that expenditure on food represented 84 % of total consumption, while clothes represented 5% of total consumption. Furthermore the study estimated the percentages of consumption on education and health at 7% and 4% respectively.

The study revealed that the average of monthly total household consumption estimated at SDG 849 (USD 142), decomposed to SDG 715 (USD 119) for food, SDG 40 (USD 7) for clothing, SDG 64 (USD 11) for education, and 30 SDG (5 USD) for health.

Regarding daily consumption per adult equivalent, the study declared that, the average of total daily income per adult equivalent estimated at 6.04 SDG (USD 1) which typically equal to poverty line, where the average of daily consumption on food only per adult equivalent estimated at SDG 5.10 (USD 0.85) (84%), while SDG 0.31 (USD 0.05) (5%) for clothes, 0.40 (0.07 $) (7%) for education, and 0.22 SDG (USD 0.04) (4%) for health.

Results of the study revealed that inequality was higher in income distribution than consumption distribution as indicated by Lorenz curve and Gini coefficient. Consumption Gini coefficient was 0.25 while income Gini coefficient was 0.43.

Poverty profiling for both income and consumption was undertaken according to numbers of years studied, age of household heads, and gender of household heads.

The study showed that there is correlation between the value of owned assets and consumption at sig. (0.05), daily income sig. (0.01), and number of years studied by household heads (0.05), while there is no correlation between the value of owned assets and age of household heads and family size. Daily consumption per adult equivalent was highly correlated with daily income (0.00) and family size (0.00) and value of owned assets (0.05), while did not correlate with age of household heads and number of years studied. The study revealed that daily income was highly correlated with value of owned assets (0.00), daily consumption (0.00) and number of years studied by household heads (0.00), while it has no correlation with age of household heads and family size.

6.2 Recommendations

Based on the study findings the following recommendation can be suggested:

1. More studies are needed in agronomic practices, improved seeds, improved livestock breeds, soil, forestry, socioeconomics, etc. to find where the chances for modernizing traditional rain fed agriculture and traditional livestock system.
2. Provision of capacity building and agricultural extension is highly needed to the people in the area.
3. Provision of social services such as water, education, health is very important for the development of the area.
4. Establishing of rural infrastructure such as roads, electricity, improved markets are some of the essential investment for the development of the area.

5. Environmental programs that help to compact desertification phenomena need to be implemented to sustain agricultural production in the area.
6. Attention should be given to women development programs that enable them to contribute efficiently in improving living standards of their households.

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Appendixes

Appendixes (1) Households Questionnaire

جامعة السودان للعلوم و التكنلوجيا
كلية الدراسات العليا

دراسة تقييم دور القطاع الزراعي في تخفيف الفقر في محلية ودبنده، ولاية شمال كردفان، السودان

دراسة لنيل درجة الدكتوراه في الاقتصاد الزراعي

رقم الإستمارة: ..... التاريخ: .....

القرية: .....

1. معلومات عن رب الاسرة

اسم رب الأسرة: .....

1. العمر: .....النوع: (1) ذكر (2) أنثى

2. مستوي التعليم: أمي (1) خلوه (2) (تعليم نظامي) عدد سنوات الدراسة: .....

3. عدد أفراد الاسرة : ..... ذكور: ..... أناث: .....

2. مهنة رب الاسرة

المهنة	(1) أساسية	(2) ثانوية	نوعها: (تاجر خضار، ملابس، عامل يومية، موظف،.....الخ)	الدخل السنوي
زراعة				

رعي				
تجارة				
عامل				
موظف				
(اخري (حدد				

3. معلومات عن العائلة افراد العائلة: **(**تشمل الزوج، الزوجة، الابناء، الاخ، الاخت، اب، ام، اخري**)**

م	الاسم	النوع (1) ذكر، (2) أنثي	العمر	القرابة	الحالة الاجتماعية	عدد سنوات الدراسة النظامية	المهنة	الإقامة
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								

الحالة الإجتماعية: **(1)** متزوج، **(2)** أعزب، **(3)** مطلق، **(4)** أرمل، **(5)** مهجور
المهنة: **(1)** مزارع، **(2)** موظف، **(3)** تاجر، **(4)** طالب، **(5)** اخري، **(6)** صغار سن
الإقامة: **(1)** في القرية، **(2)** مؤقته في المدينة، **(3)** دائمة في المدينة

4. معلومات عن أفراد الأسرة المتوفين **(**اطفال + بالغين**)** خلال **10** سنوات الماضية

م	النوع : (1) ذكر، (2) انثي	العمر	سنة الوفاة
1			
2			
3			
4			
5			
6			
7			
8			

5. ممتلكات الاسرة **(**لكل افراد الاسرة**)** في هذا العام

نوع الاصول	العدد	القيمة
ابقار		
ماعز		
ضان		

جمال		
حمير		
حصين		
دجاج		
كارو		
عربة		
طاحونة		
مولد كهرباء		
دكان + بضاعة		
تلفزيون		
تلفون		
راديو		
بوتجاز		

6. العضوية في التنظيمات المحلية:

هل أي من أعضاء الأسرة عضو فى أي من التنظيمات المحلية مثل: جمعية تعاونية، لجان شعبية، اتحادات، لجان تنمي (1) نعم (2) لا

اذا كانت الاجابة نعم ماهو عضو الاسرة .....وماهي التنظيمات الإجتماعية التي هو عضو فيها: 1) ..... 2).....

.....(3). 4

عضو الأسرة: **(1)** زوج، **(2)** زوجة، **(3)** ابن أو ابنه، **(4)** أخ أو أخت، **(5)** أب أو أم **(6)** اخري(حدد)

التنظيمات الإجتماعية: **(1)** اللجنة الشعبية، **(2)** المجلس التربوي، **(3)** أتحاد شباب، **(4)** إتحاد مرأة، **(5)** لجنة تنمية وخدمات، **(6)** أخري حدد

7. الارض

1. المساحة ( ) مخمس ( ) فدان

2. كيف تم الحصول عليها (1) ورثة (2) شراء (3) اخري حدد .....

8. دخل الاسرة لهذا العام من المحاصيل المنتجة من المزرعة ومخلفات المحاصيل ومنتجات الغابات

م	المحصول	المساحة المزروعة	المساحة المحصودة	وحدة الانتاج	الكمية المنتجة	السعر/ جنيه و قت الحصاد
1	دخن					
2	فول سوداني					
3	ذره					
4	كركدي					

5	ويكة					
6	صمغ عربي					
7	بطيخ					
8	سمسم					
9						
10						
11						
12						
13						
14						

9. الدخل من الحيوانات المباعة في هذا العام

م	نوع المنتج	الفترة الزمنية	العدد	المبلغ	الغرض من البيع
1	حيوانات حية ((ابقار				
2	حيوانات حية ((ضان				
3	حيوانات حية ((ماعز				
4	حيوانات حية ((ابل				
5	حيوانات حية ((دواجن				
6	منتجات البان ((رطل				
7	منتجات بيض ((دستة				
8	اخري				
9					
10					

الفترة الزمنية **(1)** في الصيف، **(2)** في الخريف **(3)** في الشتاء

10. دخل الاسرة في هذا العام من اعمال اخري غير مزرعة الاسرة **(**لكل افراد الاسرة بما فيهم رب الاسرة**)**

م	عضو الاسرة	نوع العمل	مكان العمل				فترة الدخل	الدخل
			(1) في القرية	(2) داخل الولاية	(3) خارج الولاية	(4) خارج السودان		
1								
2								
3								
4								
5								
6								
7								

عضو الأسرة: **(1)** زوج، **(2)** زوجة، **(3)** ابن أو ابنه، **(4)** أخ أو أخت، **(5)** أب أو أم **(6)) ((**اخري(حدد

فترة الدخل: **(1)** في الصيف، **(2)** في الخريف **(3)** في الشتاء

11. دخل الاسرة في هذا العام من التحويلات الداخلية والخارجية (من الاقارب وغيرهم)

م	المصدر: **(1)** داخل السودان، **(2)** خارج السودان	المحول	صلة القرابة	فترة التحويل	القيمة المحولة في الفترة المذكورة

(صلة القرابة: **(1)** زوج، **(2)** زوجة، **(3)** ابن أو ابنه، **(4)** أخ أو أخت، **(5)** اب أو ام **(6)** اخري(حدد

فترة التحويل **(1)** في الصيف، **(2)** في الخريف **(3)** في الشتاء

12.المبالغ المقترضة خلال العام المنصرم

هل اقترضت اي مبلغ خلال العام المنصرم: **(1)** نعم **(2)** لا

إذا كانت الاجابة بنعم ماهو مصدر القرض ....

وماهو الغرض من الاقتراض: (أ) مبالغ لمتطلبات تمويل الزراعة ..... جنيه

(2) مبالغ لمتطلبات الاسرة (استهلاك الاسرة)..... جنيه (ج) اخري حدد .....

وهل قمت بتسديد المبلغ: (1) نعم (2) لا

13. هل ادخرت اي مبلغ خلال العام المنصرم: نعم **(1)** لا **(2)**

إذا كانت الاجابة بنعم كم تقدر المبلغ المدخر: ( ) جنيه

14.ماهو المصدر الرئيسي للطاقة للطبخ **((1)** حطب، **(2)** فحم،**(3)** كيروسين، **(4)** غاز، اخري **.....)**

15.مواصفات منزل الاسرة

1. نوع السكن

نوع السكن	قطاطي **(1)** عادية	قطاطي **(2)** محسنة (شعاب) (كداد	**(3)** درادر	اوضة **(4)** من الطوب الاخضر او الطين	اوضة **(5)** من الطوب العمر
عدد الغرف					

2. هل يوجد مرحاض (دبلوسية) في المنزل: (1) يوجد (2) لا يوجد
4. هل يوجد مطبخ منفصل بالمنزل: (1) يو (2) لا د

16. مصروفات الاسرة

نوع الغذاء	الكمية المستهلكة في الاسبوع	الوحدة (رطل، ملوة، كيلو، او قية، اخري (حدد	سعر الوحدة	ال قيمة
ذرة (كسرة (عصيدة				
دخن ((كسرة عصيدة				
خبز قمح				
مواد غذائية اخري				
مياه شرب				
كساء				
تعليم				
صحة				
اخري				

17. خدمات الضمان الإجتماعي:

هل تتل قي الاسرة اي مساعدة (خدمة او دعم) من اي ة: **(1** م **(2)**

(إذا كانت الاجابة بنعم (انظر الجدول

الخدمات	عضو الأسرة الذي يتل قي الخدمة	الجهة التي ت قدم الخدمات	نوع الخدمة الم قدمة	الكمية أو الم قدار	ال قيمة
دعم ن قدي					
دعم عيني					
تأمين صحي					
دعم رسوم دراسة					
معاش					
دعم معا قين					
مساعدة من الاهل					

عضو الأسرة: **(1)** زوج، **(2)** زوجة، **(3)** ابن أو ابنه، **(4)** أخ أو أخت، **(5)** أب أو أم **(6)** ((اخري(حدد

18. هل عانت الأسرة فترة نزوح؟

نعم **(2**)(**1)**

1. اذا كانت الاجابة بنعم متي كان ذلك: .....

2. ماهي

الاسباب: ....

19. هل عانت اسرتك من ن قص في الغذاء

نعم **(2** **1)**

3. اذا كانت الاجابة بنعم متي كان ذلك: **(1)** في صل الصيا **(2)**الخر **(3)** الشتاء

4. ماهي

الاسباب: ....

كيف يتم التغلب علي مشكلة ن قص في الغذاء: ....

....

20. كم من المبلغ تعت قد أنه كافي لتلبية إحتياجات الأسره الأساسية في الشهر: .....

21. في وجهة نظرك كيف ت قيم الوضع الإ قتصادى الحالي لأسرتك:

غني **(2)** وسط **(3)** ف ق **(4)** ف جداً**(1)**

22. كيف ت قيم وضعك الإ قتصادي قبل **10** سنوات

غني **(2)** وسط **(3)** ف قير **(4)** ف جداً**(1)**

23. ماهي أهم ثلاثة مشاكل تواجهكم؟ (أ).....

(ب). ..... ج. .....

24. هل من افراد الاسرة يعاني من مرض مزم **1)** نعم **(2**)(

إذا كانت الإجابة بنعم مانوع المرض: .....

Appendix 2: Group discussion checklist

جامعة السودان للعلوم و التكنلوجيا
كلية الدراسات العليا
دراسة ت قييم دور الإنتاج الزراعي في تخفيق الف قر في محلية ودبنده، ولاية شمال كردفان، السودان
دراسة لنيل درجة الدكتوراه في الا قتصاد الزراعي

دليل الأسئلة للمجموعات المختارة بالمجتمع

1. كم عدد الأسر بال قرية
2. كم يبلغ عدد سكان ال قرية/ المدينة
3. ماهي الموارد الطبيعية الموجوده بالمنط قة؟
4. ماهي سبل كسب العيش بالمنط قة؟
5. ماهي المشاكل التي تواجه سبل كسب العيش بالمنط قة وماهي اسبابها؟
6. ماهي أحوال الأمن الغذائي بالمنط قة (خلال العشرين سنة الماضية) وماأثر ذلك علي سكان المنط قة وخاصة في مايتعلق بالنزوح والهجرة؟
7. مامدي توفر خدمات التمويل بالمنط قة وماهي انواعها؟
8. هل يوجد تمويل بالشيل بالمنط قة؟

9. كم تبلغ كلفة الـ قرض (سعر الفائدة) في مصادر التمويل بالمنط قة الرسمية والتـ قليدية؟
10. مامدي توفر الخدمات الإجتماعية بالمنط قة (صحة، تعليم، مياه) ؟
11. هل يوجد هجرة او نزوح من الـ قري الي المدن ؟ وماهو السبب في ذلـ ك؟
12. ما مدي تفشي ظاهرة الفـ قر بالـ قرية؟
13. ماهي اسباب تفشي ظاهرة الفـ قر بالمنط قة؟
14. كيف يمكن التخفيف من حدة الفـ قر بالمنط قة؟
15. هل تعتـ قدوا أن مستوي الفـ قر في ازدياد أو نـ قصان خلال العشر سنين الماضية ؟
16. ماهي تو قعاتكم لمستوي الفـ قر خلال العشر اعوام الـ قادمه؟
17. ماهي أهم المشاكل التي تواجهكم وكيف يمكن حلها ؟
18. ماهي التنظيمات الإجتماعية الموجودة بالـ قرية؟
19. مامدي فاعلية التنظيمات الإجتماعية في حل مشاكل الـ قرية؟

Appendix *3: The area of the study*

Source: *wikipedia.org*

Appendix *4: The researcher trying weeding process in the study area*

Appendix *5: Housing and transportation in the study area*

Appendix *6: Improved House (Drdur)*

Appendix *7: Dawin village basic school*

Appendix *8: water sources in the study area*

Appendix *9: Teenagers bringing water from water source*

Appendix *10: the researcher at water source*

Appendix *11: livestock in the study area (Hamari Sheep)*