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ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES



DETERMINANTS OF RURAL POVERTY IN
AN AGRO-PASTORAL SYSTEM IN
GAMBELLA WITH SPECIAL
REFERENCE TO JIOKOW DISTRICT

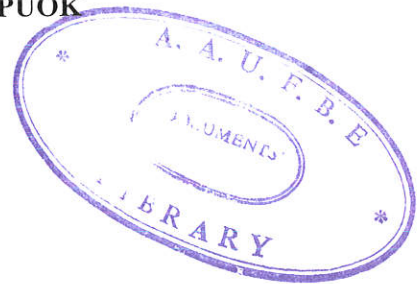
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JUNE, 2001



DETERMINANTS OF RURAL POVERTY IN AN AGRO PASTORAL SYSTEM IN GAMBELLA WITH SPECIAL REFERENCE TO JIOKOW DISTRICT

CHUOL RUEY KOMPUEK



A Thesis Submitted to the School of Graduate Studies of Addis Ababa University in Partial Fulfillment of the Requirements for the Degree of Master of Science in Economics (Economic Policy Analysis)

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School of Graduate Studies

**DETERMINANTS OF RURAL POVERTY IN AN AGRO-PASTORAL
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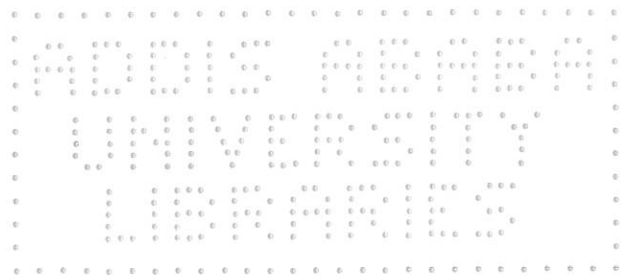
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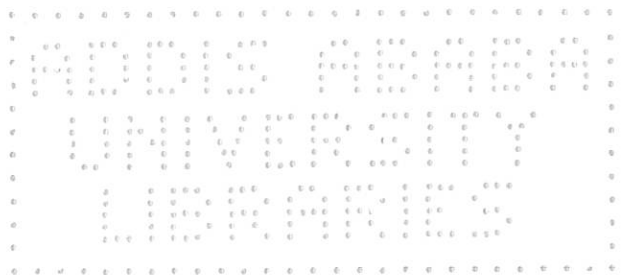
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ABSTRACT

Addressing the issue of rural poverty in agro-pastoral areas of Nuer should be at the heart of any development strategy for Gambella region. The main objectives are: (1) to measure the level of poverty, (2) to single out major determinants of poverty in an agro-pastoralists areas and (3) to point out some possible measures that need to be taken in order to alleviate poverty in the areas. The empirical findings also show that land size, total livestock owned (TLU), income ratio (IRATO), sex, number of women married to a man, hunting and fishing practices significantly explain household poverty. The major policy recommendations in alleviating poverty in rural Jiokow are to improve the quality of land through micro-irrigation schemes and promote management of conflict related to land issues, upgrade the productivity of local cows through crossbreeding schemes and veterinary campaign, and making a policy for gender equality by increasing the economic value of women's work through skill training for productive, profitable employment and through increased women's access to credit and technology.



INTRODUCTION

If the intended end of a development program is to alleviate poverty or reduce inequality, then periodic assessments of the level of poverty or the degree of inequality may help to determine the degree of success or failure of a development program. The inadequate progress on poverty reduction in Ethiopia, and in addition its growth during 1980s indicate that one of the chief primary goals of development has not been achieved. For most of the developing countries, the main task particularly in the 1980s was that of the existing adjustment imbalances, resulting in policies that in most cases did not give much attention on the poor.

Development specialists have come to recognize that the poor are not a homogeneous group of people who can all be aided by the same policies. Rather, the poor households have a variety of characteristics, and it is necessary to tailor assistance to their specific needs and problems. For policy purposes, it is therefore important to learn in what ways households that are poor differ from households that have a more adequate income, recognizing that those differences may be cause or consequence of low economic status.

The vulnerability of the poor draws attention of the government, local and international development agencies to focus on poverty reduction. In order for the advantages from restructuring and more market-oriented economic policies to have a trickle-down effect on to the majority of the society, there appears to be a renewed effort for a grassroots development that will reduce poverty.

Because of the insufficient attention previous government gave toward agriculture and its backwardness is one of the very roots of poverty in Ethiopia and Gambella in particular. Eventhough Gambella is endowed with abundant natural resources it is still poor. The present govemment rightly launched its Agricultural Development Led Industrialization (ADLI). Development efforts are now rule-focussed. But developing effective policies geared toward combating poverty requires specific knowledge about factors affecting poverty.

The present study is organized into five chapters. The first section focuses on the concepts of poverty and its measurement. The third section reviews the major studies on the determinants of poverty, particularly in Sub-Saharan Africa. The fourth section presents the empirical findings. The last section draws summary and gives some recommendations for policy and future studies to alleviate poverty in rural Jiokow district.

I. GENERAL BACKGROUND

The view that economic development is feasible, that it can reduce poverty, and that such reduction is the main theme of economics, is quite recent. However, there is no theoretical framework, which defines and analyzes poverty in all its aspects. For a few decades, the issue of poverty was associated solely with economic growth. The classical economists believed that economic growth would lead to a reduction of poverty. They have supported the idea that public and/or subsidized "mass" basic education would reduce total fertility rates, enhance the labour productivity and hence improve the living standards of the poor.

Regarding determinants of poverty reduction, the South and East Asian experience indicated that promoting a broad based economic growth and heavy investment on education are the crucial factors for reducing poverty on sustained basis. The development strategy can be summarized as promoting a dynamic agricultural sector and a labour demanding export-oriented growth.

During the 1980s, the overall progress in improving living standards slowed down (WB, 1993). There was also a marked divergence in progress among regions. The overall incidence of poverty is probably still falling, but not in a sufficient degree to prevent an increase in the number of the poor. Progress in improving social indicators, such as health facilities, education, potable water, and rural infrastructures also slowed down. This means that developing countries need to redouble their efforts to reduce poverty and the donors will have to improve the effectiveness of their external assistance to enhance country efforts (WB, 1993).

The economic development ideology was controlled by a paradigm in which the growth of the overall economy was believed to reduce poverty as wealth is "trickling down" to the poor.

Despite recorded economic growth in many parts of the world, there are still about 1.1 billion people living in absolute poverty (WB, 1990). Economists and policy makers do not raise fundamental questions about the causes of poverty and the techniques and strategies, which need to be pursued in order to tangibly, improve the quality of life of the poor.

Responding to income centred approach to poverty, the "basic needs" approach (ILO) and the "capabilities" approach (Sen 1987) redefined poverty. The "basic needs" approach stresses human needs in terms of health, food, education, water, shelters and transport rather than income. Within the framework of GNP, it was suggested that appropriate measures should be taken to ensure the basic needs of the poor are met. It emphasized the consumption needs of the poor, rather than their productivity and their capacity to generate a surplus. The "capabilities" approach lies in the rejection of the welfarism paradigm in which individual utility is taken to be the sole metric of welfare. In the "capabilities" approach, commodities matter as one determinant of people's capabilities to function, that is, commodities are considered not as ends but as means to desired activities.

1.1 The Ethiopian Condition and its Agriculture

Poverty reduction is one of the major challenges facing policy makers. The poverty situation in the country is worsening as manifested in the high incidence of malnutrition and food insecurity (Mulat, 1999). It is estimated that 64 percent of children under the age of 5 are

stunted, with little chance of "catch up" growth, as they become older. Therefore, the circumstance in which the country is found is very difficult and most rural community in Ethiopia cannot afford to meet the basic minimum requirements.

A few attempts have been made to determine the magnitude of poverty in Ethiopia. Based on the 1992 household expenditure survey of Addis Ababa and Mekele and other sources of data, a World Bank Mission concluded that about half of the population in Ethiopia was poor in terms of any reasonable criterion in 1992.

A study by the Transitional Government of Ethiopia in 1992 also estimated that 51.7% of the rural population were poor (Getahun, 1998). A recent estimate of poverty based on the construction of poverty lines following the cost of basic needs approach, showed that approximately, 41.5% of the total population in 1994 lived below the poverty line (Mekonnen, et al, 1998).

Agriculture is the mainstay of Ethiopian economy. Ethiopia is endowed with abundant natural resources for agriculture. It has diverse physical features in climate, terrain, etc and comprises of 18 major agro-ecological zones and 62 sub-zones having their own physical and biological potential (MEDaC, 1997).

The performance of the agricultural sector in Ethiopia has remained weak and is heavily influenced by weather conditions. Annual growth rates averaged a mere 1.9% between 1980/81 and 1997/98. In the mean time, population grew by nearly 3% leading to a sharp decline in per capita agricultural productions and a rise in incidence of poverty. Another distinctive feature of agricultural production is extreme variability due to fluctuation in the

rains. Annual growth rates dropped by 13% and 21% during the drought years of 1983/84 and 1984/85, respectively. Favourable rains in 1982/83, 1986/87 and 1995/96, on the other hand, resulted in growth rates exceeding 14% per annum.

Table 1: Contribution of Eth. Agriculture to its GDP (1980/81-90/91)

Year	Growth rate of Real GDP	Agriculture		Growth rate of Per Capita GDP
		As % of GDP	Growth rate	
1980/81		58.1		
1981/82	0.51	55.7	-3.6	-2.4
1982/83	10.1	57.5	13.6	6.9
1983/84	-6.3	53.7	-12.5	-9
1984/85	-9.7	47.0	-20.9	-12.4
1985/86	9.9	49.6	16.0	6.4
1986/87	14.0	51.7	18.8	10.4
1987/88	-0.1	50.3	-2.8	-3.0
1988/89	0.3	50.6	1.0	-2.7
1989/90	4.1	51.2	5.3	0.9
1990/91	-4.2	56.3	5.2	-7.2
Average	1.9	52.9	2.0	-1.2
1991/92	-3.7	56.8	-2.7	-6.7
1992/93	12.0	53.8	6.1	9.0
1993/94	1.6	51.0	-3.7	-1.6
1994/95	6.2	49.7	3.4	2.9
1995/96	10.7	51.5	14.7	7.4
1996/97	5.6	50.5	3.4	2.4
1997/98	0.5	46.4	-7.6	-2.6
Average	4.7*	51.4	1.9	1.6

* The Average Growth rate of GDP for the Years 1992/93-97/98 (i.e.excluding the year 1991/92 which was a year of political instability) is 6.1% and the corresponding per capita GDP growth rate is about 3%.

Source: MEDaC, National Income Accounts, Revised series, 1998.

The country has the highest livestock population in Africa with the current estimate of 30 million Tropical Livestock Units (TLU), comprising about 27-30 million cattle, 23-24 million sheep, 17-18 million goats, 7 million equines and 1 million camels (MEDaC, 1997).

There are also about 56 million poultry in the country and 2.5 animals per capita. Despite the fact that the country has the largest livestock population in Africa, productivity per animal is very low with milk production per local cow per lactation ranging from 200-300 kg, local mature ox weighing about 250 kg and egg production of local bird per year ranging from 40-60 eggs. This low level of productivity is mainly ascribed to poor nutrition, poor health and poor genetic potential of local animals.

Two main livestock production systems exist in the country namely, the highland and the lowland production system. In the highland production system livestock are part of the mixed farming complex (input oriented) providing integrated inputs for crop production (i.e., traction, threshing, transport and manure), followed by output supply (output oriented), providing milk, meat, eggs, wool, hides and skins. In the lowland production system, livestock are generally the sole sources of livelihood, providing milk, meat, and transports at large, while hide and skins provide additional income. Lowland cattle provide about 20% of the draft animals for the highlands. In both systems livestock provide a living insurance, a store of value for financing modest level of investment against calamities (MEDaC, 1997).

In Ethiopia, four agricultural systems can be distinguished: the seed farming complex, the ensat-planting complex, shifting cultivation, and the pastoral complex (see Westphal, 1975). Due to many transitions and a great diversity within each of those systems, their borderlines are not always clear. According to Westphal, E., the Ethiopian highland is the region of highly developed mixed agriculture where a simple plough and rotations including fallow and annual legumes are applied, often with contoured or even terraced fields. Broad valleys are used for dry season cropping and grazing. The general backwardness of agricultural system in Ethiopia and its poor performance contribute to the incidence of poverty. The

Ethiopian highland farming practice is different from what is practised in Gambella lowland areas. Gambella farming practices involve low level technologies, which increase poverty.

1.2 Gambella Region

The Gambella region lies between 7°-8° north latitude and 30°-35° east longitude. The capital of the region, Gambella town is connected by dry weather road to other parts of the country and its distance from Addis Ababa is 777 kms. The distance of Jiokow district from Addis Ababa is 865 kms. The region is bordered on the north by Oromia region, to the east by Southern National Regional State, and on the west separated from the Southern Sudan by the International Sudan-Ethiopia boundary.

The total area of the region is 25,275 km², population estimated in 1994 is about 181,862 and the density is about 7.6 persons/km². The altitude is about 400-500m above sea level. Eventhough temperature varies and may not be representative to all, it is around 30°C for most parts of the year. Annual average rainfall and more specifically the effective rainfall in the region is estimated at about 750 mm. The topography of the land is nearly flat. The major rivers found in the region are Baro, Alwero, Pivor (Gilo) and Akobo; and the major lakes are lake Tata and Bishan Waka in Godere.

1.2.1 Agriculture

The total area covered under crop agriculture does not exceed 2% of the total land cover of the region. However, the area under crop agriculture does not include the proposed 10,000-11,000 ha of irrigated agriculture using the Alwero dam. Major crops grown in the region include sorghum, maize, soyabean, rice, sesame and groundnuts. Plantation of cotton though

in small scale, is also practised. Generally speaking, the land type of Jiokow district is considered to be woodland/grassland and the dominant farming system is pastoral livestock dependent. However, agriculture in this district is dependent on rain-fed in the uplands and alluvial soil along the flood plains of the Baro river. Average crop area per family along the riverbank and uplands is estimated at 0.5 ha. In addition, the use of improved seeds, fertilizer and oxen is not practised in the area. Similarly, for tilling the ground, weeding and harvesting, family labour is contributed using hand tools.

1.2.2 Livestock

Livestock in the region are mainly raised by the Nuer who are agro-pastoralists. With regards to breeds of livestock, cattle are purely of the local zebu type referred to as the Abigar (currently Nuer) breed raised by the Nuer. Cattle are small sized, horned, brown and dull white in colour with an average body size of about 250kg. The breed has a potential daily milk production of about 5 lt. Though it's not proven, the breed is considered to be trypanotolerant (BARB, 1997).

The sheep breeds in the region are also indigenous, non-woollen fat type, generally brown in colour and weighing about 25-40 kgs. Goats are normally of the small East African type having brown white and black coat colour weigh about 25-30 kgs. The local poultry breeds are small in size and weighing about 1 kg with an estimated egg production between 60-80 eggs/year.

Table 2 Livestock Population of Gambella Region

Type	Ethiopia	Gambella	Percentage (%)
Cattle	30,000	315.6	1.05
Sheep	23,000	74.5	0.32
Goats	17,000	57.1	0.34
Equines	7,000	0.1	0.00
Poultry	56,000	173.0	0.001

Source: Baro-Akobo river Basin Integrated Development Master Plan Study. Final Report Annex 2 Pt. 2, May 1997

As shown in table 2, the region contributes 1.05% of the cattle 0.32% of the sheep 0.34 of the goats and 0.001% of the poultry population to the overall livestock population of the country. In general, in comparison with other regions the contribution of the region to the overall livestock of the country as a whole is insignificant. More specifically, livestock production is considered to be an important activity in the districts of Jiokow and Akobo accounting for over 85% of the livestock population of Tropical livestock units. However, the negligible contribution of the region's livestock population to that of the country could be mainly attributed to the prevalence of animal disease, that of trypanosomiasis, for some part of the year in particular, compounded by flooding of the rangelands, absence of communication, underdeveloped markets, poor extension and animal production and health services as well as shortage of skilled manpower.

1.2.3 Fish Resource

At country level, next to the rift valley lakes, the rivers in Gambella and that of, mainly, Baro river are known for fishery activity. According to the fisheries catch data for Ethiopia (1995) the rivers around Gambella have the production potential of 5000 tonnes/year and yearly production is estimated at 1200 tonnes/year. Similarly, according to the Russian team study, there are about 75 identified fish species in the lower basin of the region. Among the different fish species Nile perch (*Lates Niloticus*), Nile tilapia (*Oreochromis Niloticus*), Barbus and Lobe Spp. are the most important both from adaptability and commercial perspective.

Eventhough the national per capita fish consumption is estimated at 100gm, the people in the lower basin of Gambella are estimated to consume about 10kg/capita per year, which is about 100 times greater than that of the national per capita consumption. This figure can be further substantiated with the number of fishermen employed in fishing activity to be around 12,400.

The fishermen are mainly Anyuak and Nuer and fishing activity takes place during the drier month of October and April when the water level of the rivers fall. By and large traditional fishing gears, hooks and lines as well as dug canoes are used by subsistence fishermen. Based on the fish market survey undertaken by fisheries development project, Nile perch is preferred by 72% of the households and 94% of the hotels in Gambella for its test followed by cat fish.

With the decreasing amount of the river water, the fish and maize source is gradually declining. During this time the men and especially the young boys, as one of their coping mechanism, start to hunt for lungfish and turtles in the burned open range. At the end of the dry period when the tall hypherna grass stalks are matured and unpalatable the people start burning the range for different purposes. When the burning is over the young people using their spear start to hunt for lungfish and turtles, which are both high in protein and mineral source. After hunting for a day, one can get an average of 3-5kgs of both kinds. Usually, the hunting activities are conducted in the afternoon.

1.3 Statement of the Problem

In reality, pastoralists are the most marginalized and morally neglected social groups in Ethiopia despite the fact that they constitute 10% of the population, occupy 59% of the land

area and contribute 40% of the GNP and 80% of the livestock export (MEDaC, 1997). Pastoral areas are often regarded as "no-man's land," hence the so-called government development interventions and the activities of private capital have endangered local livelihood strategies.

The Nuer (agro-pastoralists) are even more marginalized because they are not included in the general discussion of pastoral communities in Ethiopia since they do not fit into the geo-climatic classifications of dry/arid zones where other pastoralists communities in Ethiopia are located. Currently, little is known about the very presence of Nuer in Ethiopia who are often considered as Southern Sudanese in geographical and cultural terms.

The incidence of poverty in an agro-pastoral system in Gambella region and Jiokow district in particular is very high. A case in point is the situation in most parts of Gambella region and agro-pastoralists area of Jiokow district, which have been facing food crises.

The causes of poverty in the region are the state neglect and lack of invited NGOs to participate in poverty reduction programs. The following could be also cited as the major causes of poverty in the district.

- i. Improper farming practices
- ii. Inadequate and variable rainfall
- iii. Lack of access to productive resources.
- iv. Underdeveloped transportation and infrastructure
- v. Low productivity of livestock
- vi. Heavy work load on women
- vii. Poor development of human resources

- viii. Ethnic conflicts and protracted civil war in the border
- ix. Poor health status and
- x. Socio cultural barriers (e.g., food habits)

Therefore, it is necessary to have a closer look at different factors that exacerbate the incidence of poverty in an agro-pastoral system.

1.4 Objective and Significance of the Study

As a matter of fact, Ethiopia is categorised as one of the poorest countries in the world. Previous estimates indicate that about 51 per cent of the population is living in absolute poverty and the social indicators, such as health facilities, education, potable water and infrastructures of the country are the worst in Africa. In effect, there is a need to address the issue of poverty and to incorporate poverty alleviation programs into the development strategy of the country.

In fact, Gambella region is one of the most marginalized areas in the country. Therefore, addressing the issue of rural poverty in agro-pastoral areas of Nuer should be at the heart of any development strategy for Ethiopia and Gambella region in particular. Unless rural poverty is addressed immediately and on sustainable basis, there is a danger that there will be far fewer physical and human resources available in the region in the future than required to generate and sustain positive economic development and social progress. A few analytical works have already been done in the highland areas of Ethiopia using household survey. The major focus of this paper is, then, to add to the works on rural poverty analysis on agro-pastoralists areas which were not touched before.

The main objectives are: (1) to measure the level of poverty, (2) to single out major determinants of poverty in an agro-pastoral areas and (3) to point out some possible measures that need to be taken in order to alleviate poverty in the areas.

It is not enough to state that the region is poor and poverty alleviation programs should be given due emphasis. Then, this study is hoped to furnish vital information on the study area. In fact, the area selected is inhabited by agro-pastoralists with different resources endowments. The outcome of the study may also be informative for other locations with similar environment.

2. LITERATURE REVIEW

2.1 Concepts of Poverty

2.1.1 Defining Poverty

Any study of poverty must begin first with a definition of poverty. Different criteria have been used to define poverty. For instance, many researchers have defined the poor, as that portion of the population that is unable to meet basic nutritional needs (Ojha, 1970, Reutlinger and Selowsky, 1976). Others view poverty in part, as a function of education and/or health: life expectancy, child mortality, etc (Singer, 1975). Levels of expenditures and consumption are other criteria used to identify the poor (Musgrove and Ferber, 1976).

For some researchers, poverty is defined in very broad terms, such as being unable to meet "basic needs". Basic needs refer to the physical (food, health care, education, shelter, etc) and non-physical (participation, identity, etc) requirements of a "meaningful life" (Streeten, 1979). Sen (1983) has related the concept of poverty to "entitlements". According to Sen, "entitlements" refer to the various bundles of goods and services over which one has command, taking into consideration the means by which such goods are acquired e.g., money, coupons, etc) and the availability of the needed goods. As these examples suggest, because poverty affects many aspects of the human condition, including physical, moral, and psychological, a concise and universally accepted definition of poverty is elusive.

The problems of defining poverty is aggravated when one considers the non-economic connotations such as "education, health, availability or unwillingness to participate in society, high rates of disruptive or disorderly behaviour, and improvidence" (Ibid). Making the obscure concept, even more complex and indistinct. Thus, poverty is not a function of

income per se but it is a function of a myriad of variables like life expectancy, literacy, accesses to safe water, malnutrition and so forth, (Ibid; Dasgupta, 1993; Lal and Myint, 1996). However, new forms of poverty have been included in the definition of poverty some of which are victims of AIDS, people living in conflict zones and refugees (Halvorson, 1996). Further letting the definition of poverty to be too wide to grasp.

It was suggested in the Copenhagen Conference of the OECD countries on poverty in 1996, that poverty would be more graspable if it is defined as a cumulative process involving a combinations of educational and material deficits that combines a series of immiserating traps. Poor people often face a vicious circle of poverty low income, low education, low productivity, low life expectancy, early marriage, ...all of which lock them into the same trend (Ibid11).

2.1.2 Poverty Lines

Based on the above conceptual exposition on poverty, the vital question to be answered is how to determine whether the individual is poor or not. We need to qualify the various indicators of well being into a single index-called poverty lines. It is undeniable that there exist level consumption of various goods (food, clothing, shelter,...) below which survival, beyond short period, is threatened. But it is less clear what these levels exactly are for any given individual (Chen, Datt ad Ravallion, 1994; Mekonnen, et al, 1998). And, in most societies (including some of the poorest) the notion of what constitutes poverty goes beyond the attainment of the absolute minimum needed for survival. Thus, views always differ on the location of poverty lines. Consequently, different approaches have been developed in the past. But, the main alternatives found in practice could be listed as follows.

a. Absolute Poverty Line

Many policy issues in less developed countries in relation to poverty have in the past focused on absolute poverty. Absolute poverty is defined as lack of command over basic consumption needs.

An absolute poverty level is one which is fixed in terms of the living standard indicator being used, and fixed over the entire domains of the poverty comparison (Ravallion, 1992). The absolute poverty measure would then deem two individuals at the same real consumption level to be either "poor" or "non-poor" irrespective of the time or place of being considered with or without policy changes within the relevant domain.

The most common practice in defining an absolute poverty level involves estimation of the cost of a bundle of goods (both food and non-food) deemed to assure that basic needs are met in the specific domain of the poverty comparison. Cost of basic need approach, therefore, is deemed to be a socially determined normative wage rate. Then, whose income fall below this threshold are simply categorised under the bondage of (absolute) poor.

b. Relative Poverty Line

Relative poverty measures define the segment of the population that is poor in relationship to the income of the general population. Hence, a society may have relative poverty, i.e., some members may receive incomes less than others by some degree, and at the same time have no absolute poverty, i.e., all members receive incomes greater than the designated poverty

line. One way of setting relative poverty measures is, for instance, to choose the poverty measures as a fraction of average income in society or as a specific percentile of the income distribution. First and foremost, of all the methods, this technique is entirely dependent upon the value judgement of the researcher.

While absolute poverty may be reduced through economic growth, relative poverty will only decrease when income inequality in the society decreases. That is, even a well-advanced society may have some people in relative poverty, because poverty measure simply vary with overall living standard. But, for less developed regions where most people live below the subsistence level, the emphasis on relative position of the poor is not very appealing. The main concern... at least in "measuring" poverty...should be with absolute, rather than relative, deprivation (Kakwani, 1993).

c. Subjective Poverty Line

The third variation is to define poverty based on responses to an attitudinal question such as what income level do you "personally" consider to be absolutely minimal? This indicates that, the higher the income level of the individual for whom such questions are addressed, the higher will be the "minimal" income necessary for survival. This approach explicitly recognises that poverty lines are inherently subjective judgements people make about what constitutes a socially acceptable minimum standard of living in their own societies.

Despite the conceptual complexities in perceiving poverty lines, the tradition of fixing a certain basic needs as minimum to avoid poverty (say minimum wage legislations) or defining a basket of consumption goods as representing basic goods is not a recent

phenomenon. The basic question remains that it is possible to have a poverty line that can offer a poverty profile which is consistent, that is the relative position of households remain unchanged whichever sub-group they belong to. In the current literature the most popular methods of estimating poverty lines are the Food-Energy Intake and the Cost of Basic Needs method.

d. The Food Energy Intake Method

This method of setting the poverty line stipulates the cost of attaining a predetermined level of food energy intake (Greer and Thorbecke, 1986).

The first problem is choosing the food energy requirement; this can vary across individuals and over time for a given individual. An assumption must be made about activity levels, which determine energy requirements beyond those needed to maintain the human body's metabolic rate at rest. The general practice in developing equivalence scales is to undertake a comprehensive and intensive household consumption survey to monitor and measure actual quantities consumed by each household member of various commodities produced or purchased by the household.

The second problem is making an allowance for non-food consumption. Under the FEI method first one proceeds to fix a food energy intake cut-off in calories, and then finds the consumption expenditure or income level at which a person typically attains that food energy intake. This can be estimated from a regression of calorie intake against consumption expenditures or income. The method automatically provides a poverty line that include an allowance for non-food consumption and a line, which is consistent with local tastes, as well

as prices.

A variation of this method is to first find the minimum cost of a food bundle which achieves the stipulated energy intake level, and then divide this by the share of food in total expenditure of the same group of households deemed likely to be poor. The FEI method is fine for setting a single poverty line, but one should be careful in applying it separately to each region, sector or date in the poverty comparisons being made. Ravallion and Bidani (1994) argued that the FEI is weak in terms of offering a consistent and robust poverty profile. There is no provision in the method for differences in relative prices, tastes and preference across sub-groups

e. The Cost of Basic Needs Approach

This method is based on taking poverty to mean a lack of command over basic consumption needs, and the poverty line to be the cost of those needs. The CBN method can be interpreted in two quite distinct ways. It can be interpreted as the cost of utility or as a socially determined normative minimum for avoiding poverty, analogous to the idea of a minimum wage rate. The problem that arises, here, is that a degree of arbitrariness in defining basic needs is inevitable. Another problem is that cross-sectional and some times even intertemporal price data are incomplete or unreliable. Achieving consistency, even in terms of the most basic consumption needs may then be difficult.

The approach developed by Ravallion and Bidani (1994) is to estimate the Engle function for food expenditure by regressing food share on the logarithm of total expenditure, taking care of differences in household size and composition and other exogenous variables. Ravallion

and Bidani (1994) have compared and contrasted this method with the FEI method in constructing poverty lines using the Indonesian data and concluded that the CBN methods offer a consistent and robust poverty profile.

Under the refined CBN method, not only the food component is anchored to the stipulated food energy requirement but also adjustment is made on its composition to accord with observed diets of the poor

2.2 The Magnitude of Poverty

Ethiopia and most nations of Sub-Saharan Africa have been experiencing a decline in per capita income and food production, which has led to rising poverty over the last three decades. The incidence of poverty for Africa, which was about 47 percent in 1985, was the highest in the developing regions of the world. Although the incidence of poverty is expected to decline to 43 percent in the year 2000, the number of people below the poverty line is expected to increase from 180 million to 265 million over this period (WB, 1990).

The shift in world poverty from growing Asia to stagnating or declining economies of Africa during the 1980's is an indication that economic growth based on agriculture reduces the incidence of poverty and food insecurity (WB, 1990). Specifically, Africa is losing the poverty battle relative to Asia due to the fact that Africa has been experiencing a negative economic growth during the 1980's. Real GDP per capita in Africa has been declining at a rate of 2.2 percent compared to that of Asia's, which has been rising by about 5.5 percent on the average. Also, Sub-Saharan Africa's population driven growth in food demand which

averaged slightly over 3 percent relative to food production increase of only 2 percent per annum, resulted in a decrease per capita food production and consumption during the 1980s (Teklu, 1995).

Recent empirical evidence suggests that the reduction of poverty has been achieved by pursuing a dual strategy of: first, promoting the productive use of unskilled labour primarily located in rural/ agricultural sector and upgrading the quality of that labour through investments on health, education, nutrition, and mobility; and second, providing basic social indicators/ services in the areas of primary education, health, nutrition and family planning along with targeted transfers to the poorest and most food insecure group (Teklu, 1995).

The economic decline and the associated rise in poverty and food insecurity in Africa is primarily a problem of policy failure. A combination of misguided domestic agricultural policies, including the global macro-economic environment of the 1980s characterised by falling terms of trade and debt crisis, have led to the declining economics and rising food insecurity and poverty. There is a crucial need for African states to adopt agricultural policies along democratic and decentralised market framework in order to promote rural and agrarian-based private economic enterprises. Such a strategy will empower the majority of the agrarian-based population and enable African economies to have a chance of participating in the emerging international economic order of the post cold war era. Valuable lessons can be drawn from Botswana, a Southern Africa nation that has been successful in achieving economic growth, challenging poverty and food insecurity on democratic and market-driven strategy of economic development.

The potential for generating rural employment by designing targeted labour intensive public

works projects to combat rural poverty and food insecurity has not been fully exploited. A recent paper by Teklu and Asefa (1995) deals with the question of whether the rural poor and food insecure can be targeted through labour intensive public works (LIPW).

This study, which is based on a survey data from the villages of Botswana and Kenya, presents some evidence on whether labour intensive road projects have reached the poor by providing short-term employment. The author aim is to provide some evidence on whether labour intensive employment is targeted to the poor, and whether demographic and other indicators of poverty can be identified and related to (1) the decision of households to participate in LIPW schemes such as road works, (2) the extent of participation and gender differentiation among participating households, and (3) whether participation has any impact on food access of poor households.

NGOs are acting more and more as intermediaries between governments and the poor as the role of the state changes. Governments are increasingly aware of the important role of NGOs in poverty reduction and are beginning to trust NGOs to undertake collaborative activities. NGOs are also working with the Bank and other donors to promote the well-being of the poor, a recent position paper prepared by OXFAM international, which supported the eleventh replenishment of IDA, reinforced many themes in this report, such as the focus of lending on poverty reduction and critical role of CASS (OXFAM, 1995).

NGOs are a significant potential force for promoting poverty reduction in Africa. They have, for example, pioneered participatory methods in project design and implementation and are strong advocates of strategies that view the poor as economic and social actors rather than passive recipients of welfare. NGOs have also been involved in most relief programs dealing

with the effects of sudden shocks, such as drought and civil conflicts.

The poverty analysis made by the International Fund for Agricultural Development (1989) indicated that nearly 19 million people (about 43% of the total population) are below poverty line based on an intake of 500gm of grain equivalent across different income groups. Further, Maxwell (1991), based on the 1983 nutrition survey and 1991 population estimate, projected the number of food insecure people to be about 38 million. These people, according to the Ethiopia: Food Security Strategy document, comprise the resource poor (landless or land scarce, ox-less, poor pastoralists, newly established settlers, female headed households, the elderly and disabled) living in marginal areas, the war affected, refugees and the urban poor. Andrew Mason (1996) also takes up the case of "districts" in Java (Rural Indonesia). He examined the extent to which it is possible to target the consumption of poor in rural Java by analyzing the regional and socio-economic characteristics of poor households. His analysis of official household sample survey data shows that there are important geographical and spatial features to rural poverty in Java. The proportion of households with expenditures below the official poverty line is, for example, substantially higher in upland and dry-land regions and rises as distance from economic and administrative centres increases.

However, geographical and spatial descriptions of poverty tell only part of the story. Forty three percent of the Javanese rural poor live in relatively prosperous wetland and mixed farming regions. Consumption poverty in these regions is characterised by, as expected, lack of access to land, credit and formal education.

Interestingly however, this anatomy of rural poverty indicates that regional targeting "alone" will be insufficient to eradicate rural poverty in Java. An effective anti-poverty strategy for

rural Java should combine continued, broad-based growth with judicious uses of geographic targeting and special efforts to enhance the "poor's" access to productive assets regardless of where they live.

Different traditional strategies are employed by the agro-pastoralists and pastoralists to mitigate famine during droughts. The Borana pastoralists use the following tactics during droughts /famine: (1) hunting, (2) sending the elderly or other volunteers to famine relief camps, (3) consume boiled cattle hides, (4) prioritising young children to consume milk, (5) shift diet composition for other age groups to include more cereals, meat and blood to accommodate the needs of children, and reduce size and frequency of meats for adults and older youth (Musa, 1995).

There is a global trend that because of population pressure and land limitation, pastoralists are gradually disappearing and that they shift into the cultivation of crop and other economic activities. In Ethiopia pastoral areas, there is a similar tendency where conditions are favourable to grow crops. However, food security of the Borana population still depends on the purchase of grain through sales of animals. Moreover, as far as output is concerned, the Borana pastoralism are better off compared with a highland farmers (Cossins and Upton, 1987).

2.3 Determinants of Poverty

As explained elsewhere in this paper, factors associated with the incidence of poverty in many countries were identified and analyzed in a large number of studies. Yet, there is a large body of literature on the determinants of poverty (for programs and projects) even in

many developing countries including south and south-east Asian countries, very few attempts have been made in their African counterparts.

In the following exposition of relevant studies on the correlates of poverty, focus is made on studies in developing countries, particularly on Africa. Many are at national level while some studies at regional or even district level within a country.

For example, Kakwani (1993) used per capita adjusted consumption for Cote d'Ivoire constructed by Glewwe (1988) as a measure of household's economic **welfare**. His major objective was to test whether the observed differences in poverty level between the regions or between socio-economic groups within the same region are statistically significant.

The empirical results show that poverty varies widely among the (five) regions that he developed for analytical purpose, and particularly between urban and rural. For example, only 5.25% of the population in Abidjan (urban) is poor whereas in the Savannah (rural) regions as much as 61.62% of the population is poor. Such differences in poverty between regions, however, are statistically significant even within rural and urban sub-regions, showing that geographical location of a household has a sizeable effect on its poverty level.

He also found that large households have significantly higher poverty than small and medium-size households do. The incidence of poverty is highest amongst households in which the head is over 65 and the age group 46-65 also has fairly high incidence of poverty-- leading to the conclusion that the age of household head, when it exceeds 45 years becomes an important determinant of poverty.

The study by Grootaert et al (1997), on the other hand, aimed to see factors, which play

important role to welfare "changes" in Cote d'Ivoire using the living standard survey (CLISS) which was conducted from 1985-1988. For them, particularly in rural areas, physical capital, especially the amount of land and farm equipment is most important endowments to explain welfare changes. Small holders were more prone to suffer welfare losses. Households with diversified sources of income managed better, especially if they had an important source of non-farm income. Again, the size and composition of households were key factors in affecting welfare changes -- larger households suffered larger welfare losses.

Another study on an African nation, by Coulombe and McKay (1996) focussed on the socio-economic determinants of living standards, in Mauritania; were not withstanding its per capita GNP of around USD 510 (1993) (higher than many African countries), a significant proportion of the people find itself below the lower of the two poverty lines proposed by the World Bank (1990) in its World Development Report.

In accordance with Wodon's (1997a) expectation study provided that within the rural and urban sectors, not only were large variations in poverty rates observed by geographical area but also land ownership as well as education and occupation appear to be the main determinants of poverty. Particularly in the rural sector, lack of land ownership appears to be the chief determinant of poverty.

Whether such regional targeting can ever be effective in reducing poverty in a country requires regional (or even lower) level analysis as did Mason (1996) for rural Java.

Such efforts are lacking in Ethiopia. For example, Dercon & Krishnan (1998), attempting to

see the contribution of household endowments and characteristics to the decline in rural poverty in Ethiopia between 1989-1994/95, did their "decomposition" analysis only at national level. The impact of the chosen "few" factors (education, sex, ownership of land/ox, distance to main road/town) has been reported to be as expected, taken at national level. In fact, the authors themselves warned that such indicators are reliable only for lower administrative levels such as "district" or "villages" (Dercon & Krishnan, 1996).

Finally, a study focussing on determinants of poverty in Ethiopia is that of Mekonnen (1997). He focussed on the determinants of poverty dynamics in urban Ethiopia. According to him, between 1994 and 1997, 14.8% of his sample households slipped into poverty while 15.2% moved out of poverty giving rise to a 0.4% decline in the incidence of poverty. Given such a decline, urban poverty incidence in the Ethiopia still lingers at a considerably high level of 46% with Addis Ababa -- the capital -- taking the lion's share of urban poverty concentration. He pointed out that the key determinants that accounted for going out of poverty are education, the existence of few numbers of children and elderly in the household.

This concludes the major works undertaken on poverty determinants in developing countries, particularly in Africa. The next section is on data source and method of analysis.

3. DATA SOURCE AND METHODOLOGY

3.1 Data Collection

The data type used in this study was mainly primary, which is cross sectional data collected during the year 1999/2000. The main data source was based on the household survey of the incidence of poverty in an agro-pastoralists area. Of course, other relevant documents from the concerned organisations were also used as a source of secondary data. The household survey was conducted by means of questionnaire. The data collection was a face-to-face interview with household respondents.

The sample design procedure involves selection of the Jiokow district, and 2 stages random selection of camps/villages, and random selection of households for an interview. The sampling frame was based on fresh listing of the households. The survey questionnaires were administered to a sample size of 250. Simple random sampling technique was employed in sample selection. Households were the primary sampling units in this survey.

3.2 Method of Analysis

Two different methodologies are adopted in the study: statistical and econometric methods. The statistical analysis is based on simple ratios, percentages, etc. The econometric method uses the logistic regression and generalised quadratic (GQ) Lorenz curve models. The models are expressed fully below.

3.2.1 Poverty Index

The pioneering work by Sen (1976) in the measurement of poverty was the formulation of axioms that are deemed to hold as in the literature on the measurement of income inequality.

Sen began his treatise by offering a critique of poverty indices that were commonly used at that time, known better as the Head count ratio and the poverty gap ratio. More formally, given that the structure of income distribution in a population is ranked in ascending order such that:

$$y_1 \leq y_2 \leq \dots \leq y_q \leq z \leq y_{q+1} \dots < y_n$$

where

Z is exogenously given poverty line, a level of income below which an individual is classified to be poor, then, the head count ratio, H , is defined as:

$$H = q/n \dots \dots \dots (1)$$

where q is the number of people earning an income level below z and n is the total number of people in the population. Similarly, the poverty gap or the income gap ratio, I , is defined as:

$$I = \frac{1}{zq} \sum_{i=1}^q (z - y_i) \dots \dots \dots (2)$$

H and I , measure respectively, the percentage of people falling below the poverty line income level, or prevalence of poverty and the average level of deprivation among the poor. In short, I measures the aggregate deficit of income experienced by the poor population relative to the poverty line.

Sen (1976) has shown that these two popular measures of poverty violate one or both of the following appealing axioms: (a) the monotonicity axiom all other things being equal, a reduction in the income of a person below the poverty line must increase the poverty index and (b) the transfer axioms all other things being equal, a pure transfer from a person below the poverty line to some one who is richer, but may still be poor, must increase the poverty index.

It can be seen quite easily that H violates both monotonicity and transfer axioms while I violates the transfer axiom. In the words of Sen (1976,1983) any poverty index worthy of consideration should be able to provide three basic information on poverty: it should be able

to identify who the poor are, capture their average deprivation and thirdly, their relative deprivation among themselves. As a result, H captures only who the poor are, or measures the prevalence of poverty, I measures the average deprivation.

Instead, Sen (1976) formulated a poverty index by departing from what he called a general expression of a poverty index defined as

$$Q(x) = A(Z, Y) \sum_{i \in S(x)}^q (Z - Y_i) V_i(Z, Y), \dots (3)$$

where, $S(x)$ is the set of people with income no higher than a designated X , $Q(x)$ is the aggregate income gap, $V_i(Z, y)$ is the non-negative weight to the income gap of the i^{th} person; and (z, y) is a normalising factor. Note that y enters as a vector. Sen defines a poverty measure, $P = \max Q(X)$, that is P is the maximum weighted income gap of the poor in a given group or community where the income shortfall of the i^{th} person and the j^{th} person must receive different weights. In doing so, Sen incorporated the ordered rank weight to capture relative deprivation.

If the income of the poor in a population is equal, Sen argued that complete information on poverty can be obtained from an index $P = H \cdot I$, which according to Sen represents both the identity of the poor and their average deprivation. However, if the level of income of the poor is different, as it is the case in reality then, the axioms of monotonicity, normalisation and ordinal rank order weights are sufficient to generate a poverty index accepted by a certain social welfare function, Thus, he suggested,

$$S = H [I + (1 - I)G_p], \dots \dots \dots [4]$$

Where, G_p is the Gini-coefficient among the poor population. It can be shown that if we allow the index given in [4] to embrace the entire income distribution, it evolves into a

measure of relative income inequality in a population. We note that the distinction in the type of poverty being measured rests on the way the poverty line is defined.

The literature following Sen focused on the refinement of poverty indices by introducing a number of other desirable properties that can fully represent a range of ethical considerations by offering rooms for flexibility. Thon (1979,1981) argued that Sen's index violates certain kinds of transfer and lead to ambiguity. For instance, it can be shown that a transfer of income from a poor person to someone who was poor and has become richer because of the transfer decreases poverty as measured by Sen's index. Thon's extension, and later a number of others (Takayama 1979, Kakwani, 1980a, 1980b) made an attempt at constructing indexes that meet a number of desirable properties. Another strand of research also pursued the construction of poverty indices on the basis of social welfare functions employing the underlying ethical properties. Notable among these are the works of Blackbory and Donaldson (1980), Clark, etal (1981) and Chakarvarty (1983) who truncated the underlying income distribution of a population to the relevant segment and defined poverty as a deviation from an "equally distributed income" among the poor.

The issue of whether the poverty indices suggested in the literature meet all these requirements has been a subject of inquiry. Kundu (1983) demonstrated that if the fixed population axiom is violated, no single poverty index could meet all the properties. Haggens (1987) showed succinctly that no poverty index can meet all the desirable properties simultaneously and that a choice of poverty index always implies the preference of some normative judgement over another. It is important for policy makers to draw their selection of a poverty index based on properties consistent with their policy objectives since

the same scenario is judged differently by different poverty indices.

In the current literature, poverty indices are summary measures defined over mean income, the relevant poverty line, and the parameters characterising the underlying income distribution.

The general form is given by:

$$P = P(\mu/Z, L), \dots \dots \dots (5)$$

Where μ is mean income of the population, Z is the poverty line determined exogenously and L is the parameter characterising the income distribution as measured by the Lorenz function.

The specification of P as in (5) has enormous advantages from practical considerations. It is possible to construct tests of statistical significance (Kakwani, 1991) of a poverty estimate for a given poverty line, it is simpler to decompose change in poverty into those related with changes in mean income of society and underlying distribution. In addition, one can also compute elasticity values with respect to mean income and inequality, parameters easily if the poverty index is specified as in above.

Finally, the Foster, Greer and Thorbecke (1984) (hereafter the FGT-index) class of poverty measure can be expressed as:

$$P_{\alpha} = \left(\frac{z - y_i}{z} \right)^{\alpha} f(y) dy \dots \dots \dots (6)$$

where y_i is the income or consumption of the i th household or individual, z is the poverty line, and α is a non-negative parameter. It is observed that for $\alpha=0$ and 1, the FGT- index reduces to H and I , which are interpreted respectively as poverty indices measuring the prevalence and intensity of poverty (Ravallion, 1992). For $\alpha=2$ the FGT-index has been interpreted to offer the severity of poverty. As the value given to α

increases, then the underlying poverty index offers more weight to the distribution of income found at the lower end.

The FGT-index is the most popular index estimated in the recent literature. Its attraction lies in the fact that while capturing the most desirable properties of a poverty index, it is also decomposable and sub-group consistent. That means, if there are n mutually exclusive sub-groups of households, classified either a long regions of residence, sector of employment or some other means of classification, then, the FGT allows that the overall poverty can be expressed in terms of poverty within each sub-group. That is, if P_s represents poverty estimated within each sub-group, than overall poverty is given by:

$$P = \sum_{s=1}^n W_s P_{s1} \dots \dots \dots (7)$$

Where, w_s represents the population share of the s sub-group to total population.

The task of measuring poverty is complete once the appropriate poverty line is determined and the poverty index is chosen. The latter part of the task is treated at some length, which in various studies has been identified to be "causes" of poverty.

3.2.2 Generalized Quadratic Lorenz Curve Model

From a valid parameterised Lorenz curve $L(P)$, H is calculatable using the well-known fact that $\mu L'(H) = z$. [Noting that $L'(p)$ is invertible-either explicitly or numerically-for a valid Lorenz curve]. The poverty gap index is then calculated as $PG = (1-\mu^p/z)H$, where $\mu^p = \mu L$

$(H)/H$ denotes the mean income or consumption of the poor. P_2 is obtained as the integral of $[1-(\mu/z)L'(p)]^2$ over the interval $(0,H)$.

Formulae have been derived for the FGT poverty measures for the parametric specifications of the Lorenz curve, i.e., the general quadratic (GQ) model of Villasenor and Arnold (1989). Equation below gives the functional forms of these Lorenz curves, and the implied poverty measures. The derivations of P_2 use standard methods of integration. The GQ models give somewhat easier computational formulae (generating explicit forms for all poverty measure. Subject to consistency with the theoretical conditions for a valid Lorenz curve, the choice of Lorenz curve specification was made according to goodness of fit.

GQ Lorenz Curve

$$\text{Equation of the Lorenz curve}(L(p)) \quad L(1-L) = a(p^2 - L) + bL(p-L) + c(p-L)$$

or,

$$L(p) = - \left[bp + e + (mp^2 + np + e^2)^{1/2} \right] / 2$$

$$\text{Headcount index}(H) \quad H = - \left[n + r(b + 2z/\mu) \left\{ (b + 2z/\mu)^2 - m \right\}^{-1/2} \right] / (2m)$$

$$\text{Poverty gap index}(PG) \quad PG = H - (\mu/z)L(H)$$

$$\text{Foster - Greer - Thorbecke}(P_2) \quad P_2 = 2PG - H - (\mu^2/z^2) \left[aH + bL(H) - (r/16) \ln \left\{ (1-H/s_1)/(1-H/s_2) \right\} \right]$$

3.2.3 Econometric Model

In order to identify the key determinants of poverty in general, one can take principally two models: (1) Use of real household (consumption) expenditure per capita as dependent variable in a regression with exogenous household endowments and characteristics as explanatory variable ("levels" regression), and (2) Use of a "binary" response model (poor/non poor as the dependent variable) which can be estimated by a logit.

The "levels regression" is a reduced form equation of the various structural equations which

express consumption (and income earnings) behaviour of the household (see Glewwe, 1991; Appleton, 1995; Alwang, Siegel and Jorgenson, 1996). The obvious advantage of the levels regression is that it utilises the information on the distribution of (consumption) expenditure in its entirety, while the binary model collapses this information to just two values (Grootaert, 1974). There is thus a loss of efficiency in using logit because one does not use all the information in the sample. They are also more sensitive to specification errors than levels regression. They can yield biased estimates if the error terms are not normally distributed (Wodon, 1997).

On the other hand, however, there is a gain in using logit rather than consumption (level) regression. First, while levels regression yields unbiased estimates of (usually) "log" mean "consumption", it does not necessarily yield unbiased estimates of "poverty" because of the non-linearity involved in using the cumulative normal (Φ) distribution for estimating poverty.

Second, logits relax the assumption of first order dominance embedded in levels regression. The linearity in levels regression constrain the impact of household characteristics to remain the "same" at various levels of per capita consumption (of poor or non-poor) (Wodon, 1997a). That is, it imposes "constant parameters" over the entire distribution and thus assumes that the impact of, say, education, physical capital ownership and other household characteristics on welfare is constant over the whole sample. It assumes that the poor are not fundamentally different from the rich other than just being "people with less money" (Grootaert, 1997).

But, in reality, the average returns to assets differ for the poor and non-poor because the poor face different constraints to the households' maximisation process to borrow, to ensure

against risks, etc. For example, education, occupation, or land ownership may have less impact at low levels of consumption if poor households are not able to take advantage of them (Rodriguez and Smith, 1974). With logit, the estimation of β parameters by maximum likelihood does not impose such first order dominance (similar parameter). Thus, if one is interested in the impact of variables on "poverty" rather than "consumption" in general, logit make sense (Wodon, 1997)

The logit models are thus increasingly used in the analysis of poverty determinants (see Grootaert, 1997). Similar steps are followed here. The logistic distribution is similar to the normal except in the tails, which are considerably heavier. There are practical reasons for choosing one or the other; but it is difficult to justify the choice of one distribution or the other on theoretical grounds. In most applications, however, the choice of the distribution does not make much of difference (Green, 1993; Gaiha, 1996). Assuming a normal distribution of the error terms, the logit model is used.

To specify the relationship between household (consumption) expenditure and household characteristics, one can consider a household with per capita consumption "y" and characteristics x, where X is an m x 1 vector. Denote the poverty line by "Z" define $Y^* = Z - y$, and assume that consumption is determined by the model.

$$y^* = \beta x + \varepsilon$$

Where β is a 1xm vector of returns to characteristics and ε is an error term with zero mean.

With a representative sample of the population, x can be used to predict poverty.

When one runs a logit of y^* on x, one pretends not to observe the Y^* s. One acts as if one only observed a dummy variable λ which takes the value 1 if $y > 0$ and 0 if $Y^* < 0$ (Wodon, 1977b). The probability that a household is poor is

$$\begin{aligned} \text{Prob} [\lambda = 1] &= \text{Prob} [y^* > 0] \\ &= \text{Prob} [\beta x + \varepsilon > 0] \end{aligned}$$

$$\begin{aligned}
&= \text{Prob} [\varepsilon > -\beta x] \\
&= 1 - F(-\beta x)
\end{aligned}$$

But if the distribution is symmetric, as are the normal and the logistic (Green, 1993), one can write:

$$\begin{aligned}
\text{Prob} [\varepsilon > -\beta x] &= \text{Prob} [\varepsilon < \beta x] \\
&= F(\beta x)
\end{aligned}$$

Where F is the cumulative distribution. The parameter vector β can be estimated by maximum likelihood.

For Logistic:

$$\begin{aligned}
\text{Prob} [\lambda = 1] &= L_{\alpha} \beta x \phi(t) dt \\
&= \phi(\beta x)
\end{aligned}$$

Where ϕ is the cumulative normal density. In estimating such a binary choice model by a maximum likelihood, each observation is treated as a single draw from a Bernoulli distribution (Green, 1993).

Thus, the model with success probability $[F(\beta x)]$ and independent observation leads to the joint probability or likelihood function.

$$L = \pi [F(\beta x_i)]^{\lambda_i} [1 - F(\beta x_i)]^{1 - \lambda_i}$$

(Green, 1993, Maddala, 1983, Kmenta, 1972). The parameters (β coefficients) of the model (like those of any non-linear model) are not necessarily the marginal effects. It's denoting as:

$$E(y_j^*) = F(\beta x_i)$$

The marginal effects of a one unit change (Wodon, 1997b) in the explanatory variables (X 's) on the probability of being poor are given by:

$$\frac{\delta E(y_i^*)}{\delta x} = \frac{[dF(\beta x_i)] \beta x_i}{d(\beta x_i)} \beta = f(\beta x_i) \beta$$

Where $f(\cdot)$ is the density function that correspond to the cumulative distribution, $F(\cdot)$ (Gaiha, 1996, Green, 1993). For the normal distribution, this is

$$\frac{\delta E(y_i^*)}{\delta x} = \phi(\beta x_i) \beta$$

Where ϕ is standard normal density

4. RESULTS OF THE STUDY

4.1 Socio-economic Characteristics of Sampled Households

The survey result about the basic characteristics of the households in rural Jiokow reveals the fact that, on the average, a household owns 10.12 total livestock unit (TLU)¹. Livestock ownership is relatively high in Gambella as the rural people save a large portion of their wealth in non-monetary forms. Much of it they keep in the form of livestock. Rural households in Jiokow district prefer to save in the form of cattle, sheep and goats for the family and sometimes donkey for a member of the family who is a handicap partly because they breed. For the Jiokow rural people time is livestock, perhaps more than it is money.

Marriage entails some of the largest savings and debts that rural Nuer in Gambella accumulates in their lives. Bridewealth payments from the groom's to the bride's family are commonly made on the instalment plan taking two or more years to complete. The culture allows more than one wife and it is an indication for wealth. The survey result shows that, on the average, a man is married to two wives with the standard deviation of 0.61. The Bridewealth paid to the bride's family by the groom's, on the average, is 33 cattle.

Land is also another important issue in the present study. For many people land is not a problem in Gambella since there is a vast uncultivated land. But here, the emphasis is on the productive land. The area of land a household owns in rural Jiokow, on the average is 1.17 hectare. The respondents also said that the crop yield, on average, is 15 quintal per hectare. The main crops in Gambella are maize and sorghum. These crops are also considered as

¹ TLU is defined as Tropical Livestock units using the conversion factors found in annex 2.

means of saving because they can be exchanged with the livestock.

The survey result shows that the average age of a household head is 43 with the standard deviation of 13. The average family size of a household in the rural Jiokow is about 6 persons with the standard deviation of 2. Table 4.1 also shows the percentage of female household heads in the survey area. About 12.4 percent of the total households considered in this survey were found to have female household heads.

Table 4.1 Basic characteristic of the households in Jiokow

Descriptive	
Average age of head	N = 250 43.0 (13.0)
Average family size	N = 250 6.0 (2.0)
Area of land (ha)	N = 250 1.17 (0.72)
Production (qt/ha)	N = 250 15.0 (8.0)
Total livestock owned (TLU)	N = 250 10.12 (10.0)
Average number of Wives	N = 222 2.0 (0.61)
Bride wealth	N = 222 33.0 (15.0)
Female-head household (%)	12.4

Source: Own Computation

Note: Figures in the parenthesis are standard deviation

N= Number of the respondents

Credit in the past has not been practised in the Gambella region. If you lend one, you don't actually expect any thing in return. Giving and taking for free has been a custom, but now because of modernisation things changed beginning about mid 20th century. The organisation, which has been giving loan in the Jiokow district formally for the last two years, is ACORD Ethiopia.

Table 4.2 shows that, only 25 percent of the sample household have so far received the loan. Borrowers have proven very efficient in loan repayment with only 5% failing to meet the schedule. Previously, people wouldn't charge any interest, if any one found charging an interest, he/she would be considered as greedy and socially sanctioned. This has not been a case for rural Jiokow district alone. For instance, (Parker Shipton, 1991), took the case of Gambian Muslims, like other Muslims from West Africa to Indonesia, Gambians refer to usury by the Arabic term "riba", meaning unjustified enrichment, or consumption at the expense of others for no good reason. Many Gambians will say that even 1 percent profit earned by interest on loan is more sinful than 100 percent earned by trade.

Village money lenders/relatives or friends lend to farmers only on the basis of personal acquaintance, on request of trusted go-between, or on the strength of kinship and friendship ties that will be invokable for recovery, as ties some times are between residents of neighbouring village. Collateral or loan guarantees are not normally taken. From table 4.2, one can see that it's very insignificant proportion, 20 percent and 13 percent respectively. It is also true that outstanding loan is insignificant, only 14 percent. Because of the credit worthiness of borrowers, lenders usually do not ask for collateral and heavily rely on informal ways to get their money back. This includes dishonouring credit defaulters and damaging their credibility in the community.

Table 4.2 Credit practice

	Frequency (%)
Used loan	25.0
Loan has fixed repayment time	95.0
Interest involved	58.0
Collateral involved	20.0
Guarantor involved	13.0
Outstanding loan	14.0

Source: Own computation

Table 4.3 shows the overall credit practice of the households. The rural households seek loan mainly to buy livestock and start business. Sources of loans are friends and/or relatives at local level and these accounted for 71 percent followed by NGOs, which is about 24 percent. Micro-finance institutions, which may help in changing the livelihood of the rural poor and get them involved in the world of financial business, are not found in rural Jiokow. It is only one NGO, ACORD-Ethiopia, which has introduced the practice of formal loan to local women, but the coverage is very minimal.

The most prevalent problems in obtaining non-input credit in rural Jiokow are like lack of creditor, high interest rates charged by local people and collateral requirement. Interests are charged base on the agreement between the lender and the borrower. It is up to the lender to charge more or less.

Table 4.3 Reasons in obtaining loan and problems of credit

	Frequency %
1. Reasons	
Buy farm or other tools/ implement	7.0
Buy livestock	37.0
Pay rent/tax	19.0
Start business	37.0
2. Source of loan	
Money lender	5.0
Friend/ relative	71.0
NGO	24.0
3. Problem in obtaining loan	
Lack of creditor	50.0
High interest rate	40.0
Collateral requirement	10.0

Source: Own computation

Table 4.4 shows the degree of rural household involvement in off-farm activities. Only the minority of the total populations has been involved in off-farm. Since the market in the rural

area is not well developed, the chance for off-farm activities is very much limited. The main off-farm activities are handicraft (pottery), grain trade /general trade, trade in livestock, and traditional healers account for 36, 54, 8 and 2 percents, respectively. Since off-farm activities are basically of traditional mode and due to lack of exposure to other areas, the local people spend their income which they earn from the off-farm business on their own consumption and investment in the same business, about 28 and 60 percent, respectively. The other two income spending areas are the least, accounting for about 7 and 5 percent.

Table 4.4 Households involved in non-farm activities

	Frequency (%)
1. Non-farm participants	28.0
2. Type of activity	
Handicraft(pottery)	36.0
Grain trade/general trade	54.0
Livestock trade	8.0
Traditional healers	2.0
3. Non-farm income spending (most important)	
Own consumption	28.0
Investment in business	60.0
Marriage	7.0
Investment in farm	5.0

Source: Own computation

Table 4.5 explains how different variables affect production due to variation in timing of land preparation and weeding. As a result, normal time spent on land preparation and weeding account for more than 55% of the total plots in rural Jiokow, while early preparation of land and weeding time account for about 42 and 38 percent, respectively. In most parts of the highland areas of Ethiopia, land preparation is conducted using draft animals while in most lowland areas, particularly, Gambella region land preparation is conducted by human labour. This method of farming practice contributes a lot to the incidence of poverty.

Table 4.5 Timing of farming practice (%)

	Normal	Too early	Too late
Land preparation	56.0	42.0	2.0
Weeding	60.0	38.0	2.0

Source: Own computation

Gambella is one of the most neglected regions in adopting new technology in domestic sphere. Accordingly, by having a glance at the figures in table 4.6, one can see that land preparation, harvesting, and threshing are performed with backward implements such as hoes and hand tools. Row planting and broadcasting account for 98 and 2 percent, respectively. Lack of adoption of new technology in rural Jiokow, which the highland communities used, results into low productivity and poor harvest, hence poverty.

Table 4.6 Main methods of farming practices in Jiokow (%)

Land Preparation	Harvesting	Planting		Threshing
Hoe	Hand tool	Row	Broadcasting	Human + stick
100	100	98.0	2.0	100

Source: Own computation

Crop damage, total rainfall, and land quality results are clearly seen in table 4.7. Crop damage in time of growing, harvesting or any other activity results in a very poor production. Plant disease, wind/storm, flooding/water logging, and rain near harvest time are among the major causes of crop damage in rural Jiokow. According to the responses of the rural households the most common factors affecting crops are plant diseases followed by rain near harvest time, and flooding/water logging, and all these account for 97, 52, and 51 percent, respectively.

Most of the rural households about 86 percent reported that there was enough rain and 83 percent households reported that the rain has stopped on time. Based on the quality of land,

about 78 percent reported that their land is fertile. Most of their farms are located at the bank of the Baro river, which is almost alluvial soil in that particular vicinity.

Land plays a vital role in improving the livelihood of the local communities in Jiokow district. It would also be advisable to know how households in those localities acquire land. The statistical results clearly indicate that about 57% of the households acquire land through inheritance. The rest about 33% and 10% of the households acquire land through purchase from their income derived from cattle ownership and allocation by the kinship's and/or lineage's, respectively.

Table 4.7 Factors affecting crops, rainfall and land quality

	Frequency %
1. Plant Disease	97.0
2. Wind/Storm	44.0
3. Flooding/water logging	51.0
4. Rain near harvest	52.0
5. Was there enough rain?	
Enough	86.0
Too much	5.0
Too little	9.0
6. When did the rain stop?	
On time	83.0
Too late	12.0
Too early	5.0
7. Quality of land	
Fertile	78.0
Semi-fertile	18.0
Not fertile	4.0

Source: Own computation

Table 4.8 shows reasons related to sale and financing of purchase of livestock. The Nuer (Agro-pastoralists) previously would keep cattle for years without exchange i.e., buying and selling were not common in Nuer custom. The only means of exchange was a system of bartering in which one would exchange one big bull in a given year with a female calf, which

would give birth the following year. If it happen that the born calf is a male, the person has to wait for the following years. But recently, due to modernisation purchase and sale began to grow very fast. We can clearly see that all sources of funds for the purchase of livestock income from sale of livestock, and farm income account for 44 and 31 percent, respectively. The major reason for an individual to sale the livestock is to buy livestock and followed by educational expenses, which is also a recent demand of the local community. Based on the responses of the households surveyed, the average value of livestock purchased is Birr 407 with standard deviation of 450, and average value of livestock sold is Birr 505 with standard deviation of 434. This could be a huge sum if the market is well developed

Table 4.8 Source of cash for cattle purchases and major reasons for sale

Sources of Financing of Purchase	Frequency (%)
Income from farm	31.0
Income from sale of livestock	44.0
Income from sale of other assets	12.0
Loan/gift from relatives	13.0
Reasons for sale	
To buy seeds	7.0
To buy livestock	72.0
To pay for educational expenses	21.0
Value of animals purchased(Birr)	407.0(450.0)
Value of animals sold (Birr)	505.0(434.0)

Source: Own computation

Note: Figures in the parenthesis are standard deviation

Table 4.9 shows different factors that affect livestock production in Gambella, and Jiokow district in particular. The region's contribution to the country's total livestock population has been insignificant due to mainly the prevalence of animal disease known as trypanosomiasis in some part of the year, in particular. Flooding of the rangelands, absence of communication, under developed markets, poor extension and poor animal production and inadequate health services as well as shortage of skilled manpower are the major problems of

livestock development in the region. Trypanosomiasis severely affects the livestock and accounts for about 68 percent of the loss in the region. The rest are insignificant in comparison.

Table 4.9 Factors affecting livestock (%)

	Moderately	Severely	Not at all
Lack of drinking water	46.0	4.0	50.0
Lack of grazing land and straw	46.0	5.0	49.0
Trypanosomiasis	30.0	68.0	2.0

Source: Own computation

Table 4.10 illustrates fishing and hunting activities in rural areas. Fishing and hunting activities are the other sources of income in Gambella, in general, and rural Jiokow, in particular. Both add to the smoothing of consumption and help the poor rural communities to alleviate the problem of food shortage mainly during slack seasons. From the survey results, 52 percent are involved in fishing. Among those who participate in fishing, 85 percent keep the fish dry for future consumption. With respect to hunting, only 18 percent participate in hunting and the rest, about 82 percent do not. Sharing is very common and 70 percent share the fish/animal they hunt. The hunting activity in local villages has been low because of the heavy loss of animals incurred by the rebel groups that have been operating in the surrounding areas. This led to a loss of a large number of animal herds and also resulted in a cost in terms of time for the people to participate in hunting. Fishing activity has been also affected by the rebel move in 1980s.

During those days, the practice was carried out using hand grenade/bombs instead of fishing net, which didn't only affect fish species, but also aquatic animals found in the Baro-river and at the sametime polluted the running water which the local communities used for drinking.

Table 4.10 Fishing and hunting activity

	Frequency (%)
Individuals involved in fishing	52.0
Dry fish kept for consumption	85.0
Animals hunt	18.0
Animals kill	20.0
Fish/animals shared	70.0
Are fish caught for consumption/sale?	
Consumption	41.0
Sale	4.0
Both	55.0

Source: Own computation

Several problems are clearly seen in this region and in Jiokow district, in particular, as to primary health care services. Some of them include lack of quality services, low level of income for those who seek health care services, high opportunity cost of travelling and waiting time etc. Table 4.11 shows that from the surveyed households, 27 percent reported that they are sick and 86 percent reported that, they bought medicines (including traditional) for the sick person. The individuals found still suffering from sickness account for 29 percent. According to the households' responses, the time that takes for an individual to get cure in a month is about 65 percent followed by 22 percent for days and 13 percent for years, respectively. This indicates lack of health facilities in and around the rural villages. Most of the households seek treatment in government hospitals because of the low fee charged as compared to private clinics. The hospital accounts for 87 percent of households seeking care and private clinic only 13 percent.

Table 4.11 Illness and visit

	Frequency (%)
Head reported sick	27.0
Medicines (traditional) bought	86.0
Individuals still suffering	29.0
How long?	
Days	22.0
Months	65.0
Years	13.0
Treatment Place	
Hospital	87.0
Private clinic	13.0

Source: Own computation

The SPLA rebel groups during the Dergue regime turned/ pointed their guns toward the local villagers instead of fighting their real enemies i.e., Arabs from North Sudan. Table 4.12 clearly shows that, 100 percent of the total population surveyed were affected by the war of 1980s with the SPLA rebel groups. Due to this war, family members were lost i.e., in death, permanent displacement etc., about 58 percent. Among the surveyed households, 92 percent lost their livestock. In case of crops lost, 98 percent lost their crops. Because of the war, 96 percent were displaced and only 4 percent were not. But by now all those who have been displaced have returned home. The table also shows that, wildlife is affected, 100 percent and hunting activity also.

Table 4.12 The effect of the 1980s war with SPLA

	Frequency (%)
Households affected by war	100.0
Family lost (death, permanent displacement) etc.	58.0
Livestock lost	92.0
Crops lost	98.0
Displaced households	96.0
Still displaced	0.0
Wildlife affected by war	100.0
Hunting affected by war	100.0

Source: Own computation

Table 4.13 shows some features about war casualties. It is very true that, on average, 3 people are lost with in the family member with the standard deviation of 2. Livestock lost, on average, is 9 per family and crops lost in quintal, on average, is 12 per family. The displacement period due to the war reported by the villagers, on average, was 2 years. Because the area was meant to be war zones, this war resulted in a huge number of people registered as refugees in the refugee camps and some left for U.S.A as settlers. As a result, the SPLA war with the rural people of Jiokow district instead of real enemies, i.e., Arabs north trapped in many households into poverty.

Table 4.13 War of 1980s Casualties

	Percentage (%)
Average family member lost	N= 152 3.0 (2.0)
Average livestock lost	N= 23 9.0 (10.0)
Average crops lost in quintal	N= 245 12.0 (12.0)
Average displacement period	N= 247 2.0 (1.0)

Source: Own computation

Note: Figures in the parenthesis are standard deviation
N= number of the respondents

4.2 Measurement of Poverty

According to the elaboration in the previous section, absolute poverty is considered as the appropriate measure for this kind of analysis. Hence, households whose per capita expenditure fall below a certain cut off point, Z, called "poverty line", are considered to be in absolute poverty.

Establishing the poverty line is a vital issue in poverty measurement and comparisons. Rural

poverty lines are typically associated with a similar nutritional cut-off point around 2100-2200 calories per person per day in developing regions (FAO, 1979). In addition, to construct the poverty line generating such calorie requirements, the Cost of Basic Need (CBN) approach, discussed previously has been adopted.

The choice of this approach over and above what is known as the Food Energy Intake (FEI) method is also discussed in detail by Ravallion and Bidani (1994), Wodon (1997) and Ravallion and Sen (1996).

The poverty line used in this study for the poverty measure is adopted from CSA urban and rural household consumption expenditure survey (1995/96). It was up-dated by the MEDaC (1999) as the national poverty line of Birr 89.60 per capita monthly expenditure. The Ethiopian national poverty line is similar to that of Planning Commission (Sixth Plan) poverty line up-dated by Minhas et al (1987) to a per capita monthly expenditure of Rs 89 all- India rural price.

The procedure used in estimating poverty measures is by classifying grouped data into decile group, then the estimation of poverty indices is made using parameterised Lorenz curve. The Generalised Quadratic (GQ) suggested by Villasenor and Arnold (1989) is found to be the valid Lorenz curve and fits the data better. This estimate is done using econometric software known as Povcal. Households are grouped into decile with corresponding mean expenditure for each decile (see annex 1)

The computation using per capita consumption expenditures provides the head count index, P_0 (when $\alpha = 0$) the poverty gap index, P_1 (when $\alpha=1$), and the Foster, Greer and Thorbecke measure, P_2 (when $\alpha=2$) in the district. Friedman [1957:21-30] suggests that the permanent

income, which may be represented more accurately by total expenditure, may reflect the purchasing power of a household better than measured current income. This is because recorded income during a survey may be distorted by transitory components such as windfall income, leading to an incorrect measurement of true income. The results and their illustrations are presented below.

Table 4.14 Poverty Measure of Rural Jiokow (1999/2000)

Poverty Index (P_0)	Poverty Gap (P_1)	FGT ₂ (P_2)	Gini Index
47.94%	18.94%	9.65%	43.22%

Source: Own computation

Table 4.15 Poverty Measure of Gambella Region (1995/96)

Poverty Index (P_0)	Poverty Gap (P_1)	FGT ₂
41.8%	12.0%	5.0%

Source: MEDaC (1999)

Poverty Index (P_0) measures the size of population living below the poverty line, i.e., the proportion of population falling below the poverty line. It can be seen from the above table 4.14 that about 48% of the population in Jiokow district are absolutely poor people, meaning they are unable to meet their basic needs.

Poverty Gap (P_1) measures the extent to which the incomes of the poor lie below the poverty line (i.e., about 19%). In other words, it measures the intensity of poverty by averaging the gap between the expenditure of the poor person and the poverty line.

FGT₂ (P_2) is an index that shows the severity of poverty by squaring the gap between the expenditure of the poor individual and the poverty line. Because the index gives more weight to the poverty of the poorest, it measures the degree of inequality among the poor implying

that transferring income to the poorest from the better-off poor should lower the poverty index. The implied Gini-index is 43% indicating income inequality among the rural communities in Jiokow.

The expenditure on consumption data shown on tables 4.14 and 4.15 is a striking evidence for the very low attention that the rural poor in Jiokow have been given to by government and non-governmental organisations. . For example, head count index is high by 6.14%, poverty Gap by 6.94% and FGT_2 by 4.65% as compared to Gambella region.

4.3 The Hypothesis

The variables listed below will have different impact on the household's likelihood of falling in to or out of poverty. Their level of impact varies from household to household, village to village, and most importantly their direction of influence may also be different. Thus, from the model specified above, the discussion below presents what impact each variable is expected to have on the likelihood of a household's well-being:

- DUMSEX: dummy for sex of the household head: 1 if the head is male, 0 otherwise.
Male-headed households are expected to have a better chance to escape poverty/food insecurity than female headed ones because of better access to information.
- AGEHHH: age of the household head. Age is supposed to represent accumulated work experience, either in farming or other occupations. More experience is therefore expected to help the household get out of poverty.
- DUMAGE: dummy for the age of household head: 1 if over year 64, and 0 otherwise.

Elderly household head may not be able to work longer hours and thus the likelihood of poverty in the household would increase.

- HHSIZE: household size is the total number of individuals in the household. The expectation is that with large household size the dependency burden would rise, and where there is limited possibility for utilisation of productive age, the chance of poverty would increase.
- DEHHH: dummy for the education level of the household head; 1, if head has completed primary school or above. Education increases the ability to understand and better make use of modern agricultural technologies, and help to escape poverty/food insecurity.
- IRATIO: the ratio of farm income to total household income represents the level of income diversification. Lower income ratio would mean more diversified income source, less dependence on “risky” farm income and better chance to escape poverty.
- TLU: total livestock owned which includes: cattle, sheep, goats, chicken, etc, which in rural areas are considered as means of savings, the sale of which would be sources of income during economic hardship. It serves the function of income smoothing over time and avoids poverty.
- FISHDMY: dummy for the number of fish catch: 1 if an individual happens to catch fish and 0 if no fish catch. Fish are considered as an important source of income. More fish are expected to reduce probability of poverty.
- DHHH: dummy for the health status of the household head: 1, if head has a good health status, and 0 otherwise. Physical health of the household head increases the chance of escaping poverty.

HUNTDMY: dummy for the number of animals killed. 1 if a person kills animal and 0 otherwise. Hunting activity is considered as one source of income. Hunting in rural Gambella is expected to add to consumption smoothing and help rural community escapes poverty.

DWMM: dummy for number of women married to a man:1 if the man has two or more wives and 0 otherwise. The role of polygamy in rural Jiokow indicates how an individual is wealthier and able to escape poverty.

4.4 Econometric Results

Many researchers have used total calorie gap (G) as the dependent variable in logistic regression model estimates. Based on this assumption two major crops maize and sorghum, which are mostly consumed in that district were taken into account. The calorie intake was set at 2100 k cal. The total calorie gap (G) as the dependent variable was dichotomized to identify the poor from non-poor. This dependent variable was thought to be more robust, but the significance of the results was not impressing (see table 4.16).

The robust dependent variable in this study is the mean frequency of meals per day per adult. This mean frequency of meals is taken as the coping mechanism to resist the hunger in the rural areas of Jiokow district. It will take 1 if the person eats more than two times a day and 0 otherwise. Taking into consideration the above variables, the econometric results obtained are presented below in table 4.18. The values of each explanatory variables used in the regression are given at their mean. The results are quite indicative of possible policy directives needed to raise well being in the rural Jiokow.

The fitness of this model was assessed by the Likelihood Ratio (or model Chi-Square) test which is an analogue to the F-test in an OLS regression that all the slope coefficients in the logistic regression model are zero (Green, 1993). From this test (comparing Chi-Square with critical table value), it has been confirmed that the joint hypothesis that the coefficients on all explanatory variables are zero is rejected for regression (statistically significant at 5% and 1% for rural Jiokow).

Table 4.16 Logistic Regression Models Estimates of Poverty Determinants

❖ Dependent variable is the total calorie gap (G)

Variables	B	S.E	Wald	Sign
CONSTANT	8.1333	38.7609	0.0490	0.8249
DUMSEX	-0.0317	0.0402	0.0001	0.9914
AGEHHH	-0.0317	0.0402	0.6226	0.4301
DEHHH	0.1410	0.7627	0.0342	0.8534
DHHH	-1.1577	0.9935	1.3578	0.2439
LANDSIZE	0.1924	0.4206	0.2092	0.6474
IRATIO	0.5327	0.8795	0.3669	0.5447
TLU	0.0756	0.0479	2.4959	0.1141
DWMM	0.7812	1.3990	0.3118	0.5766
DUMAGE	2.2270	1.8728	1.4140	0.2344
HUNTDMY	0.7890	0.8089	0.9516	0.3293
FISHDMY	-1.5652**	0.8066	3.7659	0.0523
HHSIZE	-1.9439***	0.5268	13.6182	0.0002
Model Chi.Square	66.829			
Sign.level	0.0000			
Goodness of Fit	91.56%			

Source: Own computation

Note: *** Significant at 0.01 level

** Significant at 0.05 level

❖ Number of observations 250

From the above table 4.16, the signs of most of the explanatory variables, particularly the key ones, are not as expected. Only two variables are significant.

To begin with, household size appears to be one of the most important determinants of poverty in this table taking total calorie gap (G) as the dependent variable. As expected, households with larger family size have a higher chance of being trapped into poverty (significant at 1% level). This is consistent with previous findings, among others, of Dercon and Krishnan (1998) at national level for Ethiopia, and also Kyereme and Thorbecke (1991) for Ghana, Coloumbe and Mckay (1996) for Mauritania, Kakwani (1993) for Cote d'Ivoire.

The second one is the dummy for the number of fish catch. Fishing activity is one of the important determinant of poverty in rural Jiokow and strongly significant at 5% level. It serves the purpose of smoothing consumption during food crisis.

Table 4.17 shows the mean frequency of meals per day per adult. The frequency table clearly indicates how rural households in Jiokow district are affected by the poverty. According to the responses of rural households, the most dominant number of meals in this survey is eating twice a day, which accounts for about 47 percent. It is followed by eating three times a day, and once a day account for about 24 percent and 21 percent, respectively. The group eating four times a day is the smallest about 18%; this may seem to be unusual for most of the rural communities.

The main reasons for most households to eat twice a day is to give some allowance for future consumption and to encounter food shortage. The consumption habit is restricted to two times a day and at worse one times a day when there exist food shortage. This is done to keep the consumption smoothing over the range until the next harvest. If it happen that there is a good harvest, the frequency of meals slightly increases. This eating habit of restricting number of meals to twice a day has been so far considered as a custom. But in reality, it is

the circumstance that force the rural communities to eat only twice a day and at worse once a day.

Table 4.17 Mean frequency of meals per day per adult

Number of meals	N	Percentage
1.00	53	21.00
2.00	118	47.00
3.00	59	24.00
4.00	20	8.00

Source: Own computation

Table 4.18 Logistic Regression Model Estimates of Poverty Determinants

❖ Dependent variable is the mean frequency of meals per day per adult

Variables	B	S.E	Wald	Sing.
Constant	-0.7083	1.0020	0.4996	0.4797
DUMSEX	-1.6091	0.6732	5.7134	0.0168**
AGEHHH	0.0052	0.0204	0.0657	0.7978
HHSIZE	0.0592	0.1064	0.3094	0.5780
DEHHH	-0.0219	0.4261	0.0026	0.9590
LANDSIZE	0.6219	0.2429	6.5545	0.0105**
DHHH	-0.4202	0.4260	0.9730	0.3239
IRATIO	-1.5570	0.5394	8.3333	0.0039***
TLU	0.0324	0.0195	2.7589	0.0967**
DUMAGE	-0.5936	0.9102	0.4253	0.5143
HUNTDMY	-1.2168	0.5819	4.3725	0.0365**
FISHDMY	1.4192	0.4085	12.0680	0.0005***
DWMM	1.3115	0.6006	4.7677	0.0290**
Model Chi-Square	45.328			
Sign.level	0.0000			
Goodness of Fit	75.00%			

Source: Own computation

Note: ** Significant at 0.05 level

***Significant at 0.01 level

❖ Number of observations 250

Physical Capital:

a) Land

Land is one of the important assets in rural areas. It is highly significant and positive

in the regression analysis. The econometric result confirms that the greater the size of productive land, the greater the chance of escaping poverty. As it is emphasised in the descriptive part, land for an outsider may not seem very crucial variable in explaining rural poverty in Gambella. For him/her, land is abundant. But here, the emphasis is on productive land out of which many intra-ethnic disputes arise from especially riverine land. This result serves to underscore the findings of table 4.14 and 4.15, which showed that physical asset-land size is important to the poor. The reasons for some households to own enough land as compared to other families may be due to the fact that most families in rural Jiokow get farmland through inheritance/parents' gift and at the sametime through purchase. The statistical results in table 4.7 indicate that inheritance and purchase of land account for about 57 and 33 percent, respectively.

b) Total livestock

Apart from land size, total livestock owned (TLU) has a big role to play in rural Jiokow mainly as an income source. Livestock are means of saving for rural households and are often sold in slack season and/or when households are in economic crisis. This is not the only purpose, they are also accumulated for many years such that they could be given to the bride's family by the groom as the bridewealth/dowry. According to the statistical results presented in table 4.1, a groom pays, on average 33 percent cattle excluding unweaned calf. The larger the total livestock owned (TLU), the larger the chance of escaping poverty (significant at 5% level). Returns to cattle rearing are generally believed to be high in Nuer land; hence cattle ownership is the dominant form of wealth holding and may therefore be used

as a proxy for total wealth. If a household's endowment of animals is increased, this will raise income in two ways: first, it will raise income directly through higher total returns from animals; and second, it will raise total income by increasing income from other sources. Having large herd of cattle definitely increases the number of plots or land size a household owns in the village.

Another important indicator of wealth in rural Jiokow is the number of wives married to a man. It is clear that a rich man can marry as many wives as he can. He is considered as a respectful person. Having more wives means having more children. The marriage conduct is not a male privilege, but under certain circumstance female happened to marry one another. This may be a case in which a female fails to produce an offspring or else if she only gave birth to female only. This can be done by delegating a male from the kins for the reproduction purpose, but the children will be named after her father or brother. They are considered as a work force, defence force and they fully participate in generating income for the family consumption. The chance for such a person to escape poverty is very high and the result is significant at 5% level.

One important mechanism or technique in rural areas to reduce vulnerability is by diversifying rural income into other vital off-farm employment such as trade in grain/general trade (livestock trade) and handicraft (including pottery). It is so visible that as the share of farm income in the overall household income declines (implying more diversification), the likelihood of being trapped into poverty declines. Moreover, the sign is as expected and the result is strongly significant at 1% level.

Demographic Variables:

a) Age

Age of a household head is supposed to represent accumulated work experience, either in farming or other occupations. More experience is therefore expected to help the household get out of poverty. Even though the regression results does not show any significance, the sign is as expected. The reason for the insignificance of the results may be due to the fact that the farming practice in rural Jiokow mostly depends on traditional method. It may not need much experience, whatever age groups you belong to, it may not cost much to learn because they take it as a culture. Age of the household head is another demographic variable, which has the bigger chance of pushing the family into poverty. The coefficients on the age dummy indicate that aged individuals are less likely to escape poverty. This implies that as age increases the demand for work declines. The sign of the age dummy is as expected, but not significant. The reason for the insignificance of the result may be due to the fact that family member, especially, productive age groups care more for the aged parents in rural Jiokow district. These communities have the tradition of supporting the aged parents because in the past, their parents supported them. When the youngsters are in their productive ages, it is their turn to take care for the old parents since they were taken care before. For Nuer, it is a rule of thumb to support parents in their old ages, eventhough, they are capable of doing things. Usually, children do not want their parents to get involved in the fields or other activities, which seem to have negative impact on their health status. This circumstance of supporting parents in their old ages has contributed a lot to the motive of having

more wives to produce more children.

b) Sex

Sex of the household head in rural Jiokow is one of most demographic variable in explaining poverty. The study area is also characterised by pronounced gender inequality. The Nuer society is patriarchal in which women are socially, economically, and politically marginalized. This conceals the crucial contribution women make not only in the domestic sphere but also for the very reproduction of the society per se. The workload of women has increased in recent times because of various factors. Women now are involved more in cultivation, which is steadily increasing because of sedentarisation. The various conflicts which cost the lives of many men as well as male out-migration to the towns have also increased the number of female-headed households who are bearing the additional burden of covering tasks formerly undertaken by men. Gender inequality is even more visible in access to and control over resources. While women do have access to productive resources they do not control any one of them. Control is exclusively a male privilege. The result is statistically significant at 5% level.

c) Household size

Another important demographic variable is household size considered as the basic determinant of poverty. The finding is inconsistent with the other researchers findings such as that of Dercon and Krishnan (1998) on Ethiopia, Kyerem and Thorbecke (1991) for Ghana and Kakwani (1993) for Cote de Ivoire. The reason for

the insignificance of the results may be due to the fact that children of the large families are always taken care of in their relatives' home in the time of food shortage. Therefore, as a way of life, rural communities do not let their kins suffer from the hunger. They always share what they have and eat together based on age category. This kind of eating habit reduces the household incidence of poverty. According to rural household response in Jiokow district, large family size is the best fuel or working force for the family to produce more output and involve in other income generating activities for the family consumption gap filling. But in most cases, household size and consumption or income per person is inversely related over the range (Lipton 1983a, World Bank 1991 b, d, and van de Walle and Ravallion, 1992).

Human Capital:

a) Education

It is surprising to note that education in rural Jiokow seem to have no importance in escaping from poverty. This analysis contradict the expectation that education helps households to better appreciate, adopt and effectively manage the use of modern agricultural technology and lead better life as hypothesised by Theodore Shultz. In other words, Glewwe (1991) has observed a similar weak relationship between education and rural poverty for Cote d'Ivoire. This may be because of the primary education's being poorly designed in such away not to target the agricultural problem or adoption of new inputs at local level.

b) Health status

The health status of the household head or family head has a great contribution in explaining rural poverty. This can be clearly seen by reducing the productivity of the household and how this affects the decision to produce more output or diversify their source of income. As it is expected, bad health condition of the household head is negatively related to the poverty. But, the result is not significant. This may be due to other households who are the relatives of the sick person who will take care of the farm land or else, a wife of the sick person would prepare local alcohol or food/porridge and invite a group of ten people in the village to participate in farming for one or two days.

Hunting and Fishing

a) Hunting

Hunting is another variable in explaining rural poverty in Jiokow district. In most cases, poor individuals practice hunting and smooth their consumption. The sign is as expected (significant at 5% level).

b) Fishing

Fishing activity in Gambella in general entails a lot even though it is carried out locally. Gambella is also known for fish stocks with different species among which Nile perch is one weighing about 250 kg. Fishing practice is not seasonal in Gambella and in Jiokow district, in particular. It is a year- long practice both in Baro-

river and other tributaries. Dry fish are kept for consumption during slack season and for sale when households are in need of cash. The econometric results show expected sign and significance.

5. SUMMARY AND RECOMMENDATIONS

5.1 Summary

In effect, Gambella region is one of the most marginalized areas in the country. Therefore, addressing the issue of rural poverty in agro-pastoral areas of Nuer should be at the heart of any development strategy for Gambella region. Unless rural poverty is addressed immediately and on sustainable basis, there is a danger that there will be far fewer physical and human resources available in the region in the future than required to generate and sustain positive economic development and social progress. The main objectives are (1) to measure the level of poverty, (2) to single out major determinants of poverty in agro-pastoralist areas and (3) to point out some possible measures that need to be taken in order to alleviate poverty in the areas.

The data type used in this study was mainly primary, which is cross sectional data collected during the year 1999/2000. The main data source was based on the household survey on the incidence of poverty in an agro-pastoralists area, which was conducted for this purpose on a sample of households. Of course, other relevant documents from the concerned organisations were also used as a source of secondary data. The household survey was conducted by means of questionnaire. The data collection was a face-to-face interview with household respondents.

The survey results revealed the fact that, on average, a household owns 10.12 total livestock unit (TLU). Livestock ownership is relatively high in Gambella as the rural people save a large portion of their wealth in non-monetary forms. Marriage results in some of the largest savings and debts that rural Nuer accumulates in their lives. The survey result shows that, on

average, a man is married to two wives. The bridewealth paid to the bride's family by the groom, on the average, is 33 cattle. Land is also another important issue in the present study. The area of land a household owns in rural Jiokow, on the average, is 1.17 hectare.

The empirical findings show that land is one of the important assets in rural areas. It is highly significant and positive in the regression analysis. The reason for some households to own enough land as compared to other families may be due to the fact that most families in rural Jiokow get farmland through inheritance/parents' gift and at the sametime through purchase. Apart from land size, total livestock owned (TLU) has a role in rural Jiokow. It is also positively significant. Livestock are means of saving for rural households and are often sold in slack season and/or when households are in economic crisis. This is not the only purpose, they are also accumulated for many years such that they could be given to the bride's family by the groom as the bridewealth/dowry.

Another important mechanisms or technique in rural areas to reduce vulnerability is diversifying rural income into off-farm employment. It is also visible that as the share of farm income in the overall household income declines (implying more diversification), the likelihood of being trapped into poverty declines.

Age of the household head that is supposed to represent work experience, either in farming or other occupations, does not indicate any significance. The reason for the insignificance of the results may be due to the fact that farming practices in rural Jiokow mostly depends on traditional method. Age variable also shows no significance. Moreover, old families are often supported by their children.

Sex of the household head in rural areas is one of the most important variables in explaining poverty. The study area is also characterised by pronounced gender inequality. The Nuer society is patriarchal in which women are socially, economically and politically marginalized. This conceals the crucial contribution women make not only in the domestic sphere but also in the very reproduction of the society, per se. The workload of women has increased in recent times because of various factors. Women now are involved more in cultivation, which is steadily increasing because of sedentarisation. The various conflicts which cost the life of many men as well as male out-migration to the towns have also increased the number of female-headed households who are bearing the additional burden of covering tasks formerly undertaken by men. Gender inequality is even more visible in access to and control over resources. Although, women do have access to productive resources they do not control any one of them.

Household size seems to have no importance in explaining poverty. Since there is high degree of sharing among local communities, household size is very much considered as a work force not as a burden, which traps households into poverty. This result is different from the situation in the highlands where family size is often a major factor inducing poverty.

It is surprising to note that education in rural areas seems to have no importance in the escape from poverty. This may be due to the primary education's being poorly designed in such a way not to target the agricultural problem or adoption of new inputs at local level. Health status also shows no importance in explaining poverty. This may be due to other households who are the relatives of the sick person who will take care of the farmland or else, a wife of the sick person would prepare local alcohol or food/porridge and invite a group of ten people

in the village to participate in farming for one or two days.

Hunting and fishing practices are important variables in explaining rural poverty. They both play vital roles in smoothing consumption. Gambella is also known for its fish stocks of different species among which Nile perch is one weighing about 250kg. The econometric results show expected sign and significant.

5.2 Recommendations

The results of the study underscore the fact that poverty is complex and multifaceted and that several-pronged approach is needed. Based on the basic idea of reducing poverty, there are two important major policy options.

The first policy option, which is the direct transfer of income or food to the poor faces problems of screening the beneficiary and leakage of benefits to the non-poor because people have a strong incentive to provide unrealistic information and present themselves as poor. Glewwe and van der gaag (1988) provide serious problems faced by Srilank's "food rationing" and "food stamp" schemes in early 1980. Such a programme should not be recommended because in the long run it would make people not to work and only depend on food aid or food-for-work. Yet, this policy would be of immediate effect, and would only be a short-term policy option.

The second policy option has a long-term impact, and has many advantages. For instance, policies which succeed in changing the characteristics of the poor can in large part remove the "causes" of poverty, not just reversing its effect, and many of these policies are less costly in the long-run, since they aim to raise the productivity of the poor. Furthermore,

although such policies benefit both the poor and non-poor, Glewwe and van der Gaag (1988) argue that raising the productivity of the non-poor is not necessarily a waste of government revenue. Thus, efforts need to be directed toward them.

From the standpoint of poverty reduction, policymakers would be well advised to pay more attention to livestock, especially, female animals in the study area. It is true that income from livestock ownership has a positive effect on poverty alleviation. The poor prefer cows because they can use the cows to pay bridewealth and to produce milk and offspring. To improve the livelihood of the poor in rural Jiokow and to combat poverty, policymakers should take steps to upgrade the productivity of local cows through crossbreeding schemes in meat, milk and other products and veterinary programs, especially through campaign against animal diseases, such as trypanosomiasis. Regional government should be well advised to develop livestock market in the district by establishing one centre in favour of local communities. This will play a role as an incentive for local people and also reduce the cost of travel from Jiokow to Gambella town and other expenses. Therefore, local communities will gain power and confidence in the market. With regard to human capital, the econometric results show that "formal education" does not seem to have contributed in the escape from poverty in rural Jiokow. This may raise the issue of appropriateness of formal education as a way to enhance "current well-being". Yet low returns to rural areas do not imply low returns to education, since educated people in rural areas can reap returns by moving to the cities.

Land plays a vital role in avoiding poverty. Local communities should be encouraged to better manage the existing productive land. The government is well advised to decentralise and retrain the bureaucracy in order to ensure that local people can participate in land use planning and raising land productivity. It is also necessary for poor farmers to be organised

into politically active associations at the local level so that they can articulate and transmit their needs to government based on land use. Improvement in poor farmer incomes increases the demand for locally produced goods and services and therefore strengthens the links between agricultural households and non-farm economies, particularly in rural areas. It is true that rapid development of local farmers on land can accelerate growth, enhance efficiency and promote equity. Both NGOs and government bodies should set sustainable institutions that deal with conflict related to land issues by involving local communities in the decision-making process.

There are two seasons for farming practice in the district (wet and dry), the productivity of farmers could be raised by encouraging government and other development agencies to carryout micro-irrigation schemes in the dry season at the bank of the Baro-river. This kind of strategy wouldn't be more costly since the land is almost flat and would have a direct impact on increasing the productivity of rural communities and reduce the incidence of rural poverty.

Gender inequalities that perpetuate and exacerbate poverty in rural Jiokow can be weakened by increasing the economic value of women's work through skill training for productive, profitable employment and through increased women's access to credit and technology. Development interventions aiming at alleviating rural poverty will be more successful if they:

- a. eliminate gender stereotypes (e.g., women are not involved in agriculture, do not require credit, etc) and target women and men equally;
- b. recognize that the most efficient method for reaching and involving large numbers of rural women is to organise them into groups;

- b. recognize the specific skills which NGOs have developed in motivating, organising and training the rural poor and promote co-operation, between government and non government organisations in order to incorporate NGO expertise into project designs.

Eventhough hunting and fishing activities are carried out locally, they need to be handled with care. Federal government in collaboration with the regional government should take the initiative to rehabilitate the animal herds, which escape into the neighbouring countries due to protracted civil war in the border area. This can be done by creating a safe zone and creating awareness among local communities not to kill any animal for no good reasons. Local communities need to be well informed of existing and future use value of animals. The government should also make fishing practice more profitable by providing sustainable market for the rural poor. It should create awareness among localities that harvesting rate of fish shouldn't exceed yield/production rate.

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Annex: 1

Grouped data for Jiokow rural households (1999/2000)

Decile group	Mean expenditure
10	28.90
10	47.39
10	54.27
10	65.80
10	81.66
10	96.97
10	112.11
10	190.09
10	240.06
10	411.19

Source: Own computation

Annex: 2

Livestock Units

Peasant households own different types of livestock (e.g., large and small ruminants, equines, and chicken) with different age groups. A standardised measure of such a variety of animals would involve the use of LU in which the weights are assigned to the standardised units in the following table:

Animals	LU
Calf	0.25
Weaned calf	0.34
Heifer	0.75
Cows and oxen	1.00
Bull	1.00
Horse	1.10
Donkey (adult)	0.70
Donkey (young)	0.35
Camel	1.25
Sheep and goat (adult)	0.13
Sheep and goat (young)	0.06
Chicken	0.013

Source: Development Strategy and the Ethiopian Peasantry: Supply Response and Rural Differentiation (Abebe H/Gebriel, 1999).

DECLARATION

This thesis is my original work, has not been presented for a degree in any other university and that all sources of material used for the thesis have been duly acknowledged.

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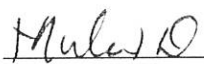
Signature: 

Date: 13 July 2001

Place: Addis Ababa University, Addis Ababa

This thesis has been submitted for examination with my approval as a thesis supervisor.

Name of supervisor: Dr. Mulat Demeke

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Date: 13 July 2001