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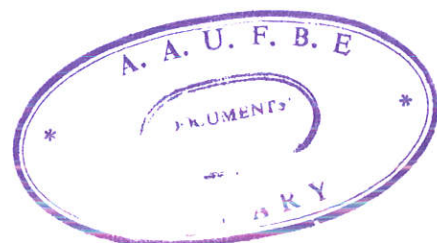
ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES

INQUIRY INTO THE
ROBUSTNESS OF
POVERTY INDICES

By

Elizabeth Woldemariam Kibroum

June 1997
Addis Ababa



INQUIRY INTO THE ROBUSTNESS OF POVERTY INDICES

**A Thesis Presented to the
School of Graduate Studies
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the Requirements for the Degree of
Master of Science in Economics (Economic Policy Analysis)**

**By
Elizabeth Woldemariam Kibrom**



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Inquiry into the Robustness of Poverty Indices

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DEDICATION

This thesis is dedicated to Adhanet Adgoi, my mother, Emiru Woldeyes my husband, and our children Malefia, Bilen, Selam and Rebecca and all my loving brothers and sisters.

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ABSTRACT

The objective of the thesis is to inquire into the robustness of poverty lines and poverty indices. This research was undertaken to contribute to the work on poverty analysis by using the household survey data, to investigate to an area not researched before. The conclusion of the paper leads to policy recommendations.

The data used is drawn from the Ethiopian Household Survey conducted for 15 rural sites and seven urban sites in 1994. The methodologies used include the calculation of four types of poverty indices by using two types of poverty lines constructed by the following methods i.e Cost of Basic Needs (CBN) and the Food Energy Intake (FEI), the FGT measures (i.e the Head-count index, the Poverty-gap Index and P2), SEN's index, Thons' index and CHU's index. The results obtained for both the rural and urban sites were further analyzed to see their robustness by cross tabulation method; by Persons rank correlation; regression method and by calculation of correlation coefficients.

It was found that generally the CBN and FEI do not identify exactly the same households as poor. In the case of the head-count index, CBN and FEI are not robust for urban sites, they do not give the same number of poor, but for rural sites they are robust. The results of the various indices tested by different methods lead to the conclusion that poverty indices are sensitive to the type of poverty line used, especially SEN's index. Even using the same poverty line, all the indices do not give the same ranking in the majority of the sites. In the analysis of the correlates of poverty, both poverty lines give very close results thus they are robust in this case.

The policy recommendations from this thesis are that the choice of a particular poverty line is important for targeting the poor.

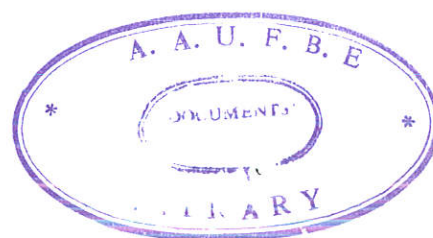


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CHAPTER I

INTRODUCTION

1.1 Introduction

The purpose of this study is to examine and compare the different measures of poverty and discuss their application in the Ethiopian context. It is widely accepted that there is severe poverty in Ethiopia and if policies are to be introduced to improve living standards then decision makers need reliable and relevant information on the scope and severity of the problem. The wide definitions of poverty and the different measures that have been devised to determine the nature of the poor can show considerable variation in outcome. Poverty studies using different measures are not easily comparable because of variations in data and other variables. The objective of this study is therefore to apply four different measures to the same data to compare how the different poverty indices relate to each other. In this way it is hoped (that it will be possible) to identify the peculiarities and commonalities that exist among the indices under consideration. Such assessment of the robustness of poverty indices will enable more informed choices to be made regarding the measurement of a particular aspect of poverty.

1.2 Background

The alleviation of poverty has been a great cause for concern, not just in Ethiopia but in the global context. It was initially believed that economic growth was the way to reduce the

incidence of poverty and economists therefore focused their attention on the modalities of economic growth. However economic growth in the majority of developing countries has not brought about a substantial reduction of poverty. Although poverty has fallen in most regions of the world since 1945, over 600 million people in the developing world in 1985, including at least one in four Africans and Asians, were too poor to afford enough food on a reliable basis (Lipton and van der Gaag (1993)).

Realizing that new measures were needed to alleviate widespread poverty across the globe, this decade has witnessed both renewed endeavours to find the best measures to reduce and eventually eradicate poverty. The World Bank, in its World Development Report (1990) made a timely summary of the situation, stating that:

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"In the 1950s and 1960s many saw growth as the primary means of reducing poverty and improving the quality of life..... In the 1970s attention shifted to the direct provision of health, nutritional, and educational services. This was seen as matter of public policy.

In the 1980s there was a shift in emphasis. Countries especially in Latin America and sub-Sahara Africa, struggled to adjust after the global recession. The constraints on public spending tightened. At the same time, many began to question the effectiveness of public policy, and especially policy toward the poor. "(World Bank (1990)).

Although some developing countries have followed strategies which improved the health and education of the poor and reduced child mortality, improved nutrition and increased primary enrolment, many countries have witnessed deteriorating conditions. This has been due to



war, civil strife, drought and famine and the macroeconomic crises experienced by developing countries in the 1980s, which led to a period of structural adjustment which, in the short term, increased poverty. The World Development Report (1990) indicates a depressing picture for millions of the worlds' poor during the 1980's noting that:

Many developing countries have not merely failed to keep pace with the industrial countries; they have seen their incomes fall in absolute terms..... In most of sub-Saharan Africa living standards have fallen to levels last seen in the 1960s. Such facts, extraordinary as they are, fail to capture the plight of the very poorest, whose lives have remained blighted even as incomes elsewhere in the developing world have risen. For many of the world's poor, the 1980s was a "lost decade" - a disaster indeed."

Rather than suffer another "disaster decade" in the 1990's, it is now recognized that specific anti-poverty policies are crucial for any developing country to reverse the alarming trend in the increase of poverty. For this purpose various international organizations and donor agencies have made several attempts to conduct studies on the status of poverty in different African countries. However using appropriate methods to measure poverty, to analyze the situation and target the poor, has proved challenging. The measurement dimension has to go further than merely counting the poor. If it is to provide meaningful input to policy formulation, such methods must also be able to assess the incidence, depth, severity and intensity of poverty as well as its distribution.

The capacity to measure poverty has considerable significance in leading to sustainable development. However in order to assess progress towards poverty alleviation, reduction or elimination, it is first necessary to have a reliable poverty profile. This shows how the poverty measure can be broken down, classified and analyzed according to sub-groups, sex, employment sector, ethnic group etc. A good poverty profile can therefore provide a major input to facilitate various aspects of poverty-reduction policies.

While a poverty measure is a summary statistic on the economic welfare of the poor in a society, there is no universally accepted single measure of poverty (United Nations (1996)). Despite substantial literature on the measurement of poverty, no single methodology is satisfactory in all situations. The multidimensional nature of poverty means that no single measure can portray all aspects of poverty. Depending on the reasons for measuring poverty and the data and measurement tools available, one can arrive at general conclusions. These methodologies can differ conceptually between developed and developing countries depending on the degree of sophistication of the methods of analysis. Having stressed the need for reliable measurement and profiling of poverty, an examination of the Ethiopian context is made in the next section.

1.3 Poverty in Ethiopia

With a per capita income of US\$ 130 per annum, Ethiopia ranks as one of the five poorest countries in the world. In 1992, out of a total population of approximately 52 million, the



number of poor in Ethiopia was estimated at 27 million people, of whom 13 million lived in chronic poverty while the remaining 14 million lived in transitory poverty. The distribution of poverty showed that 20 million poor lived in the rural areas, 4 million in the urban areas, while the remaining 2 - 3 million people were either refugees, displaced people, demobilized soldiers or redundant civil servants (World Bank 1992).

1.3.1 Indicators of Poverty in Ethiopia

Poverty in Ethiopia is manifested by very low school enrolment, very high rates of infant, child and maternal mortality, deteriorating conditions of child nutrition, limited access to safe drinking water and crowded housing conditions.

Access to education in Ethiopia is one of the lowest in Africa, with primary, secondary and tertiary education enrolment rates of 22 per cent, 13 per cent and 7 per cent respectively. (MOPED, (1994)). In addition, deterioration in the physical facilities of education establishments, the lack of instructional materials and the poor quality of teachers means that the standard of education offered is very low.

In the area of health, the record is equally disturbing. Life expectancy at birth is 53 years and potential health service coverage is only 38 per cent (World Bank, Country Report (1995)). The poor nutritional status of children under five is also very well documented. In the 1990s, the proportion of wasted, stunted and underweight children under five stood at 8

per cent, 64.2 per cent and 47.7 per cent respectively. The very limited access of the people to safe drinking water exacerbates the poor health status in both rural and urban areas. In the rural areas, only 20 per cent have access to safe drinking water while in the urban areas, this figure stands at 83 per cent.

The problem of shelter in the urban areas indicates that only an estimated 900,000 housing units are available for more than 5 million people. Of these units, about 80 per cent have no private water facilities, about 92 per cent have no bath or shower, 90 per cent have no flush toilets and only 41 per cent have dry pit latrines.

The fact that the population of the country is projected to double by the year 2,015 confounds the development problem with immense implication on poverty.

1.3.2 Characteristics of the Poor

According to poverty estimates made by the World Bank (1992), the rural poor are estimated to make up about 75 per cent of total number of poor in the country. In terms of absolute numbers, poverty is more concentrated in rural areas than in the urban areas. However urban poverty is no less severe than rural poverty.

In the rural areas, most poor households own not more than half a hectare of farm land and have either only one ox or none (MOPED (1992)). Lack of income to buy tools, agricultural

implements and other inputs such as fertilizer and improved seeds, means agricultural productivity is very low. In addition, opportunities for gainful non-farm employment are very limited. Since most farmers are fully dependent on rain-fed agriculture, they are the first to be affected by recurrent drought and famine. The limited utilization of existing irrigation potential has made the impact of drought on the poor even more severe. Ministry of Agriculture estimates show that of the potentially irrigable land of 3 million hectares, only a fraction (about 65,000 hectares) has been irrigated by small holders.

The plight of the rural and urban poor has been exacerbated by the large size of the households. The problem is not only the size of households but also the many dependents to support, both old and young. Sharing of meals with non-family members is a frequent practice which puts pressure on the over-stretched household budget.

Lack of human capital is another characteristic of rural and urban poverty. Often, educational achievement is low and women and children in particular frequently suffer from hunger and malnutrition. Thus the major asset of the poor, their labour, is debilitated. It is therefore important to formulate social policies that address these fundamental issues.

1.4 Statement of the Problem

The prevalence of poverty has been a common phenomenon in Ethiopia. The living conditions of the rural and urban poor, their meagre food intake and poor living conditions indicate the

severity of poverty. The magnitude of poverty in Ethiopia is summarized in Table 1.1 which classifies the number of poor in different sub-groups.

Table 1.1 Estimated Number of the Poor by Status in Ethiopia, 1993

No	Status	Population	As % Of Total Population
1	Total Poor	27306.8	51.1
	Chronically Poor	13472.2	25.3
	Very Poor	5255.1	9.9
	Vulnerable	8558.0	16.1
	New poor	20.0	16.1
2	Rural Poor	20036.8	37.4
	Chronically Poor	8822.7	
	Very Poor	4055.1	
	Vulnerable	7159.0	
	*Vulnerable to Drought and Famine	7159.0	
	*Vulnerable to General Incidence		
3	Urban Poor	4600	8.6
	Chronically Poor	2000.0	
	* Unemployed	600.0	
	* Own Account Workers	1400.0	
	Very poor	1200.0	
	* Government Employees	1200.0	
	Vulnerable	1400.0	
	* Pensioned		
4	Unidentified Location	2670.0	4.8
	Chronically Poor	2650.0	
	* Returnees/Refugees	550.0	
	* Returnees Ex-Soldiers and displaced	2100.0	
	New Poor	20.0	

Source: Ethiopia, Toward Poverty Alleviation and a Social Action Program, AEOD 1992.

However, the estimates of the numbers of poor made by different agencies, shown in Table 2 indicates a wide range in the affected population from 21 per cent to 67 percent.

Table 1.2: Recent Estimates of the Magnitude of Poverty in Ethiopia (1987-1992) by Selected Agencies

Name of Agency	Year	Size of population at risk (in millions)	Percent affected out of total population
RRC	1987	8.7	21
World Bank	1988	20.0	46
National Nutrition Survey	1990	31.0	64
IFAD	1989	-	50
IGADD	1989/90	31.1	60
IFPRI	1991	-	67
World Bank	1992	-	50

Source: MOPED: The Social Dimension of Adjustment in Ethiopia: A Study of Poverty Alleviation, Addis Ababa, May 1992, pp. 34-35.

These tables highlight the magnitude of poverty in Ethiopia and show the fluctuations and variations in the assessment of poverty. This indicates the need to have good poverty measures in order to formulate sound policies and to target the right population. Reliable measures of poverty are therefore essential. For the government to develop any effective program it must first be able to identify the 'poor', estimate their numbers and gauge the



intensity and depth of poverty. This is not easy for Ethiopia as the above tables show, due to variations in data and analysis.

In addition to being able to measure poverty, the government needs to have the appropriate macroeconomic policies to promote economic growth which must be supported by specific policies to alleviate poverty targeted to the poor. On the basis of the available data, the Ethiopian Government has taken some action towards meeting the goal of poverty eradication, both through policy formulation and addressing the urgent needs of specific sectors of the population.

In the area of policy formulation the government is developing an Action Programme for Social Development in line with the commitment it made at the World Summit for Social Development for the eradication of poverty. Sectoral policies and strategies that have been developed to address poverty alleviation and social development include the following: (UNDP, (1996).

- a) National Policy on Disaster Prevention and Management,
- b) National Population Policy,
- c) National Policy on Women,
- d) Education Policy,
- e) Health Policy.

Most of the poverty eradication focused development projects in Ethiopia are being undertaken through the Ethiopian Social Rehabilitation and Development Fund (ESRDF).

The targeted populations have included retrenched workers, ex-soldiers, the disabled and disadvantaged, displaced people, and refugees. Most of the efforts of the government have been in providing temporary relief, but for a lasting and effective impact the poor themselves have to be able to help themselves.

1.5 Objective and Significance of the study.

All the available social and economic indicators show that the poverty in Ethiopia is among the worst in the world. A major challenge for policy makers is to formulate and implement strategies to reduce and eventually eradicate poverty. However a limiting factor in poverty measurement is the type of data available. In Ethiopia the analysis of poverty has, in the past, been hampered by lack of data on the living conditions of households. This situation has now improved with the completion of two recent surveys.

The recent Household Income and Expenditure Surveys conducted by the Economics Department of Addis Ababa University in collaboration with Goteberg University and University of Oxford provide a good basis for analysis and subsequent policy formulation. The value of the data collected from these surveys has already impacted on the research in this area and analytical work has begun to be carried out.

Research based on the Household Survey has led to some valuable studies on "Measuring Wealth and Poverty in Rural Ethiopia: A data Based Discussion" by Bevan and Kebede



(1995) and "The Consumption Based Measure of Poverty in Rural Ethiopia in 1989 and 1994" Stephan and Dercon (1985)¹. Additional research on "Poverty in Ethiopia 1994-1995" by Bekele (1996), and a study by Tadesse Mekonen (1995) on "Food Consumption and Poverty In Urban Ethiopia" have shown the importance of having reliable data to work from. The aim of this research is to add to the work on poverty analysis by examining in more depth areas not previously covered.

Even though poverty is widespread in developing countries and has been a cause for much concern, basic research and empirical evidence of measurement has been lacking. This is not surprising as most developing countries, especially sub-Saharan Africa, lack the necessary data on consumption patterns and expenditure of households in urban and rural areas. It has therefore been difficult to compare the robustness of poverty measures used by different developing countries.

Generalizations regarding the extent of poverty are not helpful for those who formulate policies. In a situation where the problem is so vast, care must be taken to maximize the utilization of resources otherwise no one is effectively helped. To target programs and to direct government policy, it is essential that the different measures of poverty used are empirically tested to assess their robustness.

1. Dercon, Stefan and Krishnan, Pramila (1995), " A Consumption-based measure of poverty in rural Ethiopia in 1989 and 1994" ., Centre for the Study of African Economies Oxford University. Paper presented at the annual Conference of Ethiopian Economic Association, Nazareth, November 1995.

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The main objective of this study is to examine the robustness of different measures of poverty. Two methods of estimating poverty lines, namely the Food Energy Intake (FEI) and Cost of Basic Needs (CBN), will be compared to see if the same households are identified as poor. The indices will also measure the depth, intensity and severity of poverty.

The second objective of the research is to test the robustness of various poverty measures introduced in the literature. This is useful for targeting and other related issues in the policy formulation process, because the different measures show the depth, intensity and severity of poverty.

1.6 Data Source and Methodology

1.6.a URBAN SITES**

The data used in this study is drawn from the (Ethiopian) Urban Socio-Economic Survey undertaken jointly by the Department of Economics, Addis Ababa University and the Department of Economics of Goteberg University.

The Data used is the Ethiopia Socio-Economic Household Survey of 1994 of both the urban and rural areas made available by the department of Economics of the Addis Ababa University.

** Mekonen Taddesse, "An Assessment of Poverty in Urban Ethiopia", February 1996. (unpublished)

The survey covered a total of 1500 households, which were selected to represent the various socio-economic conditions of the country. The urban centres covered in the survey are Addis Ababa, Awassa, Bahr Dar, Dessie, Dire Dawa, Jimma, and Mekele. The capital city Addis Ababa is a metropolitan area where people of all socio-economic and ethnic background live. The main coffee producing areas were represented by Awassa and Jimma, to capture the socio-economic characteristics of the predominantly Enset culture and the diverse socio-economic groups of southern Ethiopia. Bahr Dar represents one of the richer cereal-producing areas. Dessie and Mekele were intended to represent one of the poorer cereal producing areas as well as one of the drought prone, which are often affected by famine. Dire-Dawa, which is located in the eastern part of the country, is mainly a commercial centre and is located in "chat" and coffee producing areas, both important export crops in Ethiopia.

1.6.b RURAL SITES ³

The Ethiopian Rural Household Survey 1994-95 ⁴ was undertaken by the Department of economics, of the Addis Ababa University in collaboration with the Centre for the Study of African Economies, Oxford university (CSAE). The survey has generated data on a sample of rural households belonging to various agricultural systems of the country.

-
2. A table which provides background information on the rural sites is annexed.
 3. Most of the background material is extensively taken from the study by Stefan Dercon and Pramila Krishnan, " A Consumption-Based Measure of Poverty in Rural Ethiopia in 1989 and 1994 ",Addis Ababa, 1995.
Background notes prepared by Kebede, Bereket, 1996



The sample was undertaken for 15 rural villages selected to represent the major farming systems within the country. This does not imply that the sample of the survey is representative of the entire rural population of Ethiopia. What was done was to have a sample of clusters to represent the main agro-ecological zones. Nevertheless, since the sample was spread over a large geographical area, the sample is believed to provide a relevant and representative picture of the state of rural Ethiopia.

Rural Ethiopia is characterised by substantial diversity in its farming systems. There are four main groups that have been identified. These are the plough-cereal farming systems in which teff is the main crop in most areas, while wheat and barley are the main alternatives. The enset-based farming, is the second farming system, which is characterised by mainly permanent crops which are found mainly in Gurage and Wolayta. The hoe-farming system is the third type, in which sorghum dominates, but it is sometimes complemented with permanent crops such as coffee, or tubers and maize, mainly found in drier highland areas, such as Hararghe or in some southern areas. The fourth is the pastoralist farming system which is a characteristic of the lowlands.

This study uses the household as a unit of measurement. This point is stressed because "The individual, which is the unit of analysis assumed in poverty indices cannot be seen in isolation from the family he belongs to in budget surveys. Thus variations across household characteristics severely affect the estimation of poverty indices." (Shimeles and Bereket (1995)).

I would like to acknowledge that the data on consumption expenditure used was taken from work done by Ato Mekonen Taddesse, Chairman the Department of Economics.

The following measures will be used:

1. FGT Index (Foster-Greer-Thorbecke Index, class of measures).
2. Sen's Index
3. Thon's Index
4. CHU's Index (Clark, Hemming, Ulph's Index)

Each measure has its own merits and demerits and also serves different purposes. By construction these poverty indices will tend to give different results and explain the different characteristics of poverty even by using the same data base. As measurement of poverty is crucial for any alleviation program, identifying the best measure or index that fits (identifies) the problem will help in formulating realistic policy options in the quest for poverty alleviation measures.

The analysis will be carried out at the disaggregated level in the following manner:

- Female/Male headed households, to see where poverty is mostly prevalent.
- Occupational groups, for example salaried, self-employed etc.. to see where poverty is more prevalent.

The justification for this thesis is that no research to date has used all the above measures to analyze poverty. The outcome of this study will be useful in exploring how the different indices relate to each other and to other variables. The results will also help policy makers to choose the most appropriate measurement relevant for a particular assessment of poverty.

1.7 Organization of the Study

This paper is organized in four main parts, Chapter 1 introduces the general background and assesses the Ethiopian economic and social situation. Chapter 2 is the literature review and scope of study which deals with the conceptualization, measurement and definition of poverty. Chapter 3 gives the empirical analysis and results of robustness of poverty measures, as well as the disaggregated analysis of poverty. The final chapter presents the conclusion and recommendations.

CHAPTER II

LITERATURE REVIEW

2.1 Introduction

This section reviews the literature on the development of aggregate poverty indices that meet certain desirable criterion to capture the characteristics of the poor.

The development record of the past 50 years has been mixed. While some countries have surged ahead, attaining levels of prosperity which were unthinkable half a century ago, many are still mired in poverty and underdevelopment. Even though there have been spectacular achievements and development in some countries, there are still billions who are in a dire situation of deprivation and hopelessness (UNDP (1995)).⁵

The pre-dominant view in the 1950's and 1960's was that poverty could be reduced or eliminated, as long as there was economic growth. This view could not be supported empirically since the "trickle-down " effect did not always work in alleviating poverty. In the 1970's a paradigm called redistribution for growth became popular as it addressed poverty in a different context.

2. UNDP,(1995), **Poverty Eradication:A Policy Framework for Country Strategies.** prepared by the Social Development and Poverty Elimination Division, Bureau for Policy and Programme Support (SEPED/BPPS).p.1

Reduction of poverty has thus eluded economists for centuries and has led to a reassessment of poverty which culminated in the World Summit for Social Development, held in Copenhagen, Denmark from 6-12 March 1995. For the first time in history, Heads of State and Government adopted a declaration and Programme of Action which placed the needs and aspirations of people at the centre of the development process. This summit was a landmark in the history of poverty alleviation. It heralded the concept that development should be people centred.

This concept has been defined by the UNDP as **sustainable human development**, and as a result of this conference, the year 1996 was pledged "**International Year for the Eradication of Poverty**". Each participating country at the World Summit committed itself to formulate national policies and strategies to substantially reduce, in the shortest time possible, the existing inequalities and to eradicate absolute poverty by a target date. Countries agreed to ensure that national budgets and policies are oriented to meeting basic needs, reducing inequalities and targeting poverty, as a strategic objective, UNDP (1995). Thus it is of paramount importance that in order to formulate policies on the eradication of poverty, there should exist a clear knowledge of defining and measuring poverty.

2.2 The conceptualization and definition of poverty

There appears to be no general agreement on a definition of poverty. Poverty is a multidimensional concept because it comprises of economic, social and cultural conditions.



The following are some of the attempts made in defining poverty. Sen (1987) defines poverty as lacking the ability to function. Sen's idea of well being is defined by living long, having enough to eat, being healthy and being educated. "Poverty" can be said to exist in a given society when one or more persons do not attain a level of material well-being deemed to constitute a reasonable minimum by the standards of that society, (Ravallion (1992))⁶. According to UNESCO, poverty is perceived as the relative absence of income, assets, basic services, self respect, opportunities for education and social mobility and participation in decision-making.

The 'capability concept' according to Sen and also applied by the World Bank and UNDP (1992)⁷ shifts the study of poverty and its causes, to freedoms and the capability of individuals to transform available resources into a higher quality of life. Those affected by poverty are interpreted more as actors who, with a given input of resources, according to their individual capabilities - can take advantage of various benefits or various degrees of scope for manoeuvre. The poor population is therefore not seen as passive, and belonging to a specific income or consumer group (Economics:FOCUS(1994)).⁸

⁶ Ravallion, M. (1992) World Bank, LSMS Working Paper No.88, " **Poverty Comparisons A Guide to Concepts and Methods**". WB, Washington, D.C., p.4

⁷ UNDP, **Human Development Report 1992**.

⁸ **Economics**, Focus: Poverty-oriented Development Policy, A Biannual Collection of recent German Studies, ed, Institute for Scientific Co-operation Tubingen, V 49/50. FRG. Printed by Georg Hauser, Metzingen, 1994 p.50

In practice, various definitions have been used, depending on the purpose of the study, to identify different population groups as poor. A study by Glewwe and Gaag (1990) showed that "different definitions of poverty can lead to the design of very different policy measures to reduce poverty."⁹

Defining poverty consists of classifying the population into the poor and the non-poor. Any definition of poverty embodies judgement of welfare. This welfare can be restricted to economic or material well-being in order to be able to measure it. In this way other non-material utilities are abstracted from this concept.

Although it is recognized that there are a number different conceptual approaches to the measurement of well-being at the individual level, according to Sen (1979) an important distinction is between "welfarist" and "non-welfarist" approaches. The "welfarists" base their comparisons of well-being solely on "utility" levels, while the "non-welfarists" attach little importance to utility (Ravallion 1992 p5). There are different opinions regarding this distinct view, but a detailed analysis does not further this study. It is more pertinent to examine the definitions of the types of poverty that have been defined.

⁹ Paul Glewwe and Jaques Van der Gaag,(1990), **World Development**, Vol.18, No.6,p 803-4, Identifying the Poor in Developing Countries: Do Different Definitions Matter?

a) **Absolute poverty**

Absolute poverty is the inability to meet that level of expenditure essential to purchase a basket of goods that enable households or individuals to meet a minimally acceptable level of basic human needs.¹⁰ The Absolute poverty line denotes a standard of living that is barely sufficient to sustain a livelihood and is mere physical existence. The focus of this paper is on absolute poverty which features in many developing countries.

b) **Relative poverty**

Relative poverty is a comparative measure of deprivation between households based on the distribution of income within a given country.¹¹ The relative poverty line varies according to the living standard in a particular society. Relative poverty measures the poor sector of the population in relation to the income of the general population. Thus a society may have relative poverty but not absolute poverty. According to Blackwood and Lynch (1993)¹² a commonly used relative poverty measure is the average income of a specific percentage of the population at the lowest end of the income spectrum.

¹⁰ UNECA "Progress made in the Implementation of the Programmes on Alleviation of Poverty in Africa". E/ECA/CAMSDE/CE/6 Addis Ababa, 21 November 1995.p.5.

¹¹ Op.Cit.

¹² Blackwood, D.L. and Lynch, R.G.(1993) "The Measurement of Inequality and Poverty: A Policy Maker's Guide to the Literature."World Development.



c) **Mass poverty**

Mass poverty exists in communities and states where nearly all of the people are poor. In such situations half and more of real income is required to acquire food. "Mass" poverty in Africa can be seen as a process whereby the bulk of the population is surviving at the daily subsistence rate of local dietary requirement; housed in squatter-type shelters; with a bare minimum of protective clothing; without the means to acquire productive assets; and with very low organizational capabilities and participatory role; as well as inadequate endowments of energy supplies for productive and other uses.¹³

d) **Chronic Poverty**

Chronic poverty or persistent poverty is a situation characterised by the inability to move out of poverty from one generation to the next. This is usually the 'poverty trap' that many developing countries find themselves in especially in Africa. Chronic poverty, is a situation in which one is poor and finds it difficult to move out of poverty. This situation is manifested when poverty is inherited from the family, especially in rural areas where the family has inadequate or no land or any productive assets. Thus the next generation will find it difficult

¹³ Foday, I.J., (1996) Poverty Monitoring in Africa: A Critical Review of Methodological Issues and a Proposed Framework for Analysis. Research Publication No. 61. RM.96.2.E46; Centre for Economic Research on Africa, Montclair State University, Upper Montclair, New Jersey. August 1996. (p.12).

to escape poverty. In urban areas, children of poor families do not have access to education or they have to work at an early age thus they also find it difficult to escape poverty. ¹⁴

2.3 Measurements of Poverty

An attempt has been made to define the types of poverty which categorizes the population into the poor and non-poor. In this section the focus is on **measuring** poverty which seeks to aggregate the "amount" of poverty into a single statistic (Ravallion 1992).

In order to develop meaningful policies it is necessary to find out who the poor are and measure the severity and intensity of poverty and to assess the needs of the indigent.

"The most important purpose of a poverty measure is to enable poverty comparisons. These are required for an overall assessment of a country's progress in poverty alleviation and/or the evaluation of specific policies or projects." ¹⁵ (United Nations, 1996 p.9)

Over the years many types of poverty measures have evolved with varying degrees of use and popularity. In measuring individual welfare the different approaches depend on the definition of well-being that an individual deems important, while there is the assessment which is

¹⁴ Trufat Bekele, (1996) M.Sc. Thesis "Poverty in Ethiopia (1994/95)" Addis Ababa, Ethiopia.

¹⁵ United Nations, Indicators of Sustainable Development Framework and Methodologies, New York, August 1996.

decided upon by somebody else. The former would focus on the consumption of a bundle of goods, while the latter would typically define welfare on the calorie intake of the individual.

For developing countries the poverty measure of calorie intake or nutritional attainment is a typical poverty measure which is consistent with the demeanour of poor people and is used for purposes of comparison. One reason for the widespread use of this measure could be the lack of available data for other measures.

When using household data for developing countries it is preferred to use current consumption to income as the indicator of living standards.

2.3.1 'Objective' versus the 'subjective' measures of poverty

There are various arguments centred around the issue of the appropriate measures of poverty. The conventional approach is to use income or consumption in constructing poverty measures in a sample population. Others, like Greely (1994), argue that the most appropriate means of measuring poverty is an absolute and objectively determined poverty line. But Ravallion (1992) maintains that the characteristics of poverty (poor nutritional status, lack of physical assets, inability to work) are well correlated with income and consumption.

Those who form the participatory school (Chambers 1995):

"reject the income/consumption approach on the grounds that it furnishes a narrow and reductionist view that fails to understand the complex, diverse, local realities in which the poor live."

The participatory approach endeavors to get the perceptions of the local people on poverty. The new interest in measuring subjective perceptions of poverty has resulted in the development of assessments such as the participatory poverty appraisals. For comparison purposes the following are some examples of Subjective poverty Indicators.

Criteria used by local people in Asia and sub-Saharan Africa for "well-being" (expressed in negative form)

- Disabled (e.g blind and crippled, mentally impaired, chronically sick)
- Widowed
- Lacking land, livestock, farm equipment, grinding mill...
- Cannot decently bury their dead
- Cannot send their children to school
- Having more mouths-to-feed, fewer hands to help
- Lacking able-bodied members who can fend for their families in the event of crisis
- With bad housing
- Having vices (e.g.alcoholism)
- Being 'poor in people', lacking social supports

- Having to put children in employment
- Single parents
- Having to accept demeaning or low status work
- Having food security for only a few months each year
- Being dependent on common property resources

Source: Chambers, (1995), 'Poverty and Livelihoods: whose reality counts?' IDS Discussion Paper No 347.(p.38).

The above collection from various participatory studies gives more detail about the local condition and can be used to supplement some aspects of poverty analysis done from household surveys. Otherwise it is very difficult to work on large samples and to aggregate the responses.

While poverty has been measured in many of the developed countries it is a recent phenomenon in many developing countries especially in Sub-Sahara Africa. The problem has been due to lack of data and the fact that research in this area has not been given much priority by countries. However, in the context of the World Bank Poverty Assessments undertaken, common poverty measures have been completed for 22 Sub-Saharan African countries.

2.4 The evolution of aggregate poverty indices

According to available sources, the earliest attempts to measure poverty were made by Booth (1889,1891) and Rowntree (1901). Their studies were directed towards urban poverty in London and New York. In 1901 Naoroji attempted to estimate the poverty in the whole of India.

In 1976 Sen introduced the first axiomatically based measure of poverty.¹⁵ He stipulated that a poverty index should be able to identify who the poor are and measure how much average and relative deprivation exists.

Other early works on poverty indicators are the "Physical Quality of Life Index" (PQLI) by M.D.Morris (1979) and the more recent version APQLI (Augmented Physical Quality of Life Index in Simonis 1991). The PQLI is calculated by means of a simple mathematical average of the values of the, life expectancy at 1 year of age, infant mortality and literacy rate.¹⁶

The 1990's have witnessed a surge in the concern for poverty. The UNDP introduced the Human Development Indicator (HDI) which measures the average achievement of a country in basic human capabilities. This measure examines the average condition of the whole population. The HDI indicates whether people lead a long and healthy life, are educated and

¹⁵ Ibid, ECONOMICS: P.19

¹⁶ Ibid, P.21

knowledgeable and enjoy a decent standard of living. Comparison of countries is possible using this measure. The HDI measures socio-economic achievement more directly than does an exclusively-income-based indicator. Another strength of the HDI is that it allows for cross country comparisons because it uses purchasing power parity. It also has limitations.¹⁷

2.4.1 The derivation of Poverty lines.

Various methods have evolved to set the poverty line which is a divide between the 'poor' and 'non-poor'. The drawing up of the Poverty line is not limited to a single approach, there are a number of ways of estimating this line.

Absolute poverty lines: An absolute poverty line is one which is fixed in terms of the living standard indicator being used (consumption, nutrition). It is fixed over the entire domain of comparison, that is, a poverty line which assures the same level of economic welfare would be used to measure and compare poverty across provinces or different situations. The poverty line may still vary, but only so as to measure the differences in the cost of a given level of welfare. Absolute poverty lines are more common in the literature of developing countries. (UN, 1996).p.11.

In developing countries the main focus had been on how to specify a set of 'basic needs', and measure the extent to which these needs are satisfied. That is, for particular consumption

¹⁷ Alternative Survey Methodologies for Monitoring and Analyzing Poverty in Sub-Saharan Africa. (A Study Done for the SPA Working Group on Poverty and Social Policy, funded by the U.S.AID) David S.Kingsbury, Ellen Patterson Brown, Prospere Poukouta January 1995. (p16)

items or sets of items such as food, clothing, shelter- etc.. a minimum level on each commodity or commodity groups may be considered necessary to avoid being in poverty. This multidimensional approach allows for the possibility that someone may be 'clothing-poor' but not 'food-poor', and requires direct observation of the consumption patterns of individuals/ households.¹⁸

The measurement of well-being can be measured or proxied quantitatively by either ~~or~~ income or consumption expenditure levels. It is argued that consumer expenditure is the best single proxy for poverty because it is stable over time. In the case of developing countries it is difficult to estimate income due to lack of reliable data and in the case of the rural areas due to seasonal income fluctuations.

2.4.1.a Income method

Sen (1979)¹⁹ refers to another method termed the 'income' method which relies on target levels of consumption of a set of basic commodities. This basket is obtained by simply costing the target set of basic commodities and deriving the minimum expenditure (or income) level/poverty line. This minimum cost budget leaves no provision for waste or inefficient expenditure and no expenditure on other items. Sen emphasizes a conceptual distinction

¹⁸ Callan, T. and Nolan, B. (1991) " Concepts of Poverty and the Poverty Line". Journal of Economic Surveys. Vol. 5, No.3. p.244

¹⁹ Sen, Amartya K.(1979). "Issues in the Measurement of Poverty" Scandinavian Journal of Economics. Vol.91.

between 'direct' and 'income' methods. The 'direct' methods identifies those whose actual consumption levels across a range of commodities fail to meet minimum accepted levels, while the 'income' method identifies those who do not have the ability to do so.

2.4.1.b Cost of Basic Needs (CBN)

The Cost of Basic needs (CBN) approach was first used by Rowntree in 1901. He stipulated a consumption bundle considered adequate for basic consumption needs and then estimated its cost for each of the subgroups being compared in the poverty profile. (M.Ravallion and B. Bidani 1994).²⁰ In using the CBN method, a number of obvious problems arise due to the interpretation of basic needs and unreliable or incomplete price data, which leads to inconsistency.

2.4.1.c Food-energy-intake (FEI)

Another popular method which still uses the most basic consumption need is the food energy requirement. This method finds the consumption expenditure or income level at which a person's typical food energy intake is just sufficient to meet predetermined food energy requirements. It has been used in numerous countries (Ravallion and Bidani 1994,p.78).

²⁰ Ravallion, M. and Bidani, B. (1994) "How Robust Is a Poverty Profile". The World Bank Economic Review, Vol. 8, No.1.p.77

Even though a detailed analysis of the problems of these methods are beyond the scope of this paper, mention must be made of the problem of setting food energy requirements, which depend upon activity levels and vary across individuals and over time for a given individual.

The concept of the poverty-line is treated with caution among researchers, because the divide between the poor and non-poor is so thin that a person just above the poverty-line cannot be considered well-off. Thus to circumvent these conceptual caveats, an alternative approach to the measurement of poverty has been suggested. First Degree and Third Degree Stochastic Dominance rules introduced by Shorrocks (1984) and later developed by Atkinson (1987) guide the direction of poverty index under alternative poverty lines.²¹

2.5 Poverty indices to be used in this study.

Comparative analysis of the indices

There are a number of ways of measuring the poverty-line depending on the available data of the country in question. In many developing countries, apart from the theoretical limitations, the paucity of data and the estimation problems render the estimation of the poverty-line difficult. However, once the poverty-line is determined then the estimation of the other measures of poverty can be undertaken.

²¹ **Ravallion (1994)**, as quoted by Abebe Shimelles and Bereket Kebede. "Issues in the Measurement and Dynamics of Poverty: A Survey". Paper prepared for the Fifth Annual Conference on the Ethiopian Economy. Organized by the Department of Economics, Addis Ababa University and the Ethiopia Economic Association. Nov 30-Dec 2, 1995. p 8. ²¹



In discussing poverty measure indices it is also important to take note of some important axioms.

AXIOMS (Kakwani 1980)²³ and (Haggenars 1987)²⁴.

Sen has suggested the following two axioms in order to arrive at a suitable measure of poverty.

Axiom 1 Monotonicity: Given other things, a reduction in income of a person below the poverty line must increase the poverty measure.

Axiom 2 Transfer: Given other things, a pure transfer of income from a person below the poverty line to anyone who is richer must increase the poverty measure.

Axiom 2.1 Monotonicity-Sensitivity: If P_i represents the increase in the poverty measure due to a small reduction in the income of the i th poor, then $(P)_i > (P)_j$ for $j > i$.

What this axiom implies is that the poorer an individual, the larger should be the increase in poverty measure due to a reduction in his income.

If the income of a poor person is reduced, the overall deprivation increases (monotonicity axiom); but according to this axiom, the increase in the overall deprivation should be higher if the same amount of income is taken away from a still poorer individual

²³ Kakwani, N., "On A Class of Poverty Measures", Econometrica, Vol.48, 1980.

²⁴ Hagenaars, A.,(1987), " A Class of Poverty Indices", International Economic Review Vol.28, No.3. p.584-5.



Axiom 2.2 (Transfer - Sensitivity I): This axiom implies that the sensitivity of the poverty measure depends on the position of the transferrer in the ordering of poor people when the number of positions between the transferee and the transfer recipient is fixed. The poorer the transferee, the greater should be the increase in the poverty measure.

Axiom 2.3 (Transfer - Sensitivity II) : If a transfer of income takes place from the i th poor with income x_i to a poor with income $(x_i + h)$, then for a given $h > 0$, the magnitude of increase in poverty measure decreases as i increases.

Population Symmetry Axiom: If two or more identical populations are pooled, the poverty index should change.

Proportion of Poor Axiom: An increase in the relative number of poor should increase the poverty index.

Focus Axiom: The poverty index should be independent of the income levels of people above the poverty line.

Decomposability Axiom: The poverty index should increase when poverty in a subgroup increases, other things being equal, and vice versa.

2.5.1 FGT Class of Measures

a) The Head Count Index - P_0

" The Head Count Index of poverty captures the prevalence of poverty by measuring the proportion of population for whom consumption (or any other suitable measure of living standard) is below the poverty line. An increase in this indicator implies a worsening of the poverty situation with a greater proportion of the population falling below the poverty line." (UN 1996, p9).

The "**Head Count Ratio**" is the most commonly used poverty index and is defined as the fraction of the income-receiving unit below the poverty-line and it measures how widespread poverty is.

Where Z is defined as the poverty-line income level and if we rank households in ascending order as follows : (Blackwood & Lynch 1993).

$$Y_1 < Y_2 < \dots < Y_q < Z < Y_{q+1} < \dots < Y_n$$

H is defined as the number of poor q divided by the total number of people in the population n .

$$H = q/n$$

H is the ratio of the population below the poverty-line and is helpful in giving a general idea about the incidence and prevalence of poverty in the given society. This simple measure of poverty has a number of drawbacks and lacks some desirable poverty index properties. H

takes no account of the extent of the short-fall of incomes of the poor from the "poverty-line". It does not matter at all whether someone is just below the line or very far from it, in acute misery and hunger (Sen (1981))²⁵. For example **H** is insensitive to transfer of income among the poor and violates the axiom of monotonicity.

b) The Poverty-Gap - P_1

The poverty-gap ratio is the average of the difference or gap of each poor household's or person's income from the poverty-line income. The poverty-Gap measures how poor the poor are. It is the aggregate short-fall of income of all the poor from the specified poverty-line (Sen (1981)).

The poverty Gap index is a better measure than the Head-Count ratio in that it shows or indicates the depth of poverty. It depends on the distances of the poor below the poverty-line (Ravallion 1992).

The Poverty-Gap Index formally defined:

$$PG = \frac{1}{n} \sum_{i=1}^q \frac{(z - y_i)}{Z}$$

²⁵ Sen, Amartya K. (1981) Poverty and Famines. "An Essay on Entitlement and Deprivation", Oxford University Press. 1981.

It can also be expressed in the following way.

$$PG = I.H.$$

It captures two aspects of poverty: who the poor are and the average deprivation.

Where **I** is referred to as the income-gap ratio and is defined by:

$$I = \frac{(z - y_p)}{z}$$

and y_p denotes the mean consumption of the poor **PG** changes when there are income inequalities among the poor. The criticism to this measure is that it is insensitive to redistribution of income among the poor since it depends only on their mean income. Thus it does not capture a transfer from a poor person to one who is less poor. It also does not capture the differences in the severity of poverty (Ravallion (1992)). Although it satisfies the monotonicity axiom it violates the transfer axiom.

c) FGT INDEX - P_2

Foster-Greer-Thorbecke (1984)²⁶ or commonly known as FGT measure of poverty is a famous and popular index. This measure is defined as follows:

$$P_\alpha(y, z) = \frac{1}{n} \sum_{i=1}^q \left(\frac{z - y_i}{z} \right)^\alpha$$

²⁶ Foster, J.E., J. Greer, and E. Thorbecke: "A Class of Decomposable Poverty Measures". Econometrica, Vol.52, No.3, 1984.

n = total number of household in population

q = the number of poor households

y = household income

z = the poverty line for the household

This index changes when different values are given to α that is when $\alpha = 0$, $P(y,z)$ reduces to Head count, and when $\alpha = 1$, it reduces to Poverty gap. As α increases more and more weight is given to the poorest.

In the FGT index, deprivation depends on the distance between a poor household's actual income and the poverty line rather than the number of households that lie between a given household and the poverty line.

As α takes different values P^α measures different features of poverty. When $\alpha=0$, it measures the fraction of the poor in total population. When $\alpha=1$, $P^\alpha = PG = HI$ which measures the intensity of poverty. The higher α , the higher will be the weight attached to the poorest poor.

The FGT index satisfies the monotonicity axiom for $\alpha > 0$, the transfer axiom for $\alpha > 1$, and the transfer sensitivity axiom for $\alpha > 2$. It is subgroup decomposable. This is useful in analyzing the effect of changes in subgroup poverty on total poverty.

2.5.2 SEN'S POVERTY INDEX

Sen (1976) developed a measure of poverty that satisfied monotonicity and transfer axioms:

Sen's Index is defined where,

S is Sen's poverty index $S = H[I + (1 - I) G_p]$

H is the head count ratio,

I is the average income shortfall as a percentage of the poverty line

G_p is the Gini coefficient for the poor population.

Sen's index is larger, the higher the H , for any given average income shortfall and Gini coefficient among the poor; the higher I for any given H and G_p ; and the higher G_p for any given H and I . Generally Sen's poverty index is a "distribution sensitive" measure of aggregate poverty and has more explanatory properties and satisfies following important axioms: a) monotonicity; b) transfer; c) relative equity; d) ordinal rank weights; e) monotonic welfare; and, f) normalized poverty value.

The basic assumption underlying Sen's index is: a) that the weights on successive income short-fall are equal to the rank orders of the poor. If there are 100 poor persons below the poverty line, arranged in ascending order, the weights given to the 100th person is 100, to the 99th person 99, etc, and b), that under the extreme case when all poor have equal income

level, $y^* < z$, then $P = H.(I)$, which is certainly arbitrary. These assumptions and the axioms are the critical links between Sen's poverty index and that of relative inequality measures. (Foday 1996)²⁶ Sen followed an axiomatic approach of measurement of poverty in the manner of measurements of income inequality. Sen tried to capture the aspects of poverty such as: who the poor are, their relative deprivation compared to one another and the average deprivation, which are reflected by the use of H , G_p and I .

The implication of Sen's index is that it implies that the most efficient way to reduce poverty is to help the least needy first and the most needy last. (Blackwood and Lynch 1994). That is, it is sensitive to the choice of the poverty line as is captured by the Gini-coefficient among the poor.

2.5.3 THON'S INDEX

Thon (1979)²⁷ pointed out that this generalized equation violated the monotonicity and transfer axioms by assuming u and $F(z)$ to be constant when G_p changes as a result of a transfer from one poor to another, or from a poor to a non-poor.

²⁶ Foday, I.J., (1996) Poverty Monitoring in Africa: A Critical Review of Methodological Issues and a Proposed Framework for Analysis. Research Publication No. 61. RM.96.2.E46; Centre for Economic Research on Africa, Montclair State University, Upper Montclair, New Jersey, August 1996.

²⁷ Thon, D. "On Measuring Poverty" The Review of Income and Wealth. Series 25, 1979.

After pointing out the weaknesses of Sen's Index he proposed the following:

$$P^* = \frac{2}{n(n+1)} \sum_{i=1}^q g_i (n+1-i)$$

where, g_i is a rank order weight to the i th individual.

The difference between Thon's and Sen's Index is that the former takes the entire population for normalization while the latter considers only the poor population.

Thon argued that the use of Sen's Index is misleading because it assumes transfers which preserve the relative rank order of the population. It also violates requirements related with transfers and pure income changes.

Thon's index, after pointing out Sen's work against the poorest, satisfies all the necessary requirements but is insensitive to the number of the poor.

2.5.4 CHU Index

(Hagenaars 1987)²⁸ Clark, Hemming and Ulph (CHU) in (1981) developed a poverty measure based on Social Welfare Function.

²⁸ Hagenaars, A.(1987) p.589-90.

CHU's Poverty Index defined

$$1 - \left[\frac{q}{n} \left[\frac{Y_{EDEP}^A}{z} \right]^{\beta} + \left(1 - \frac{q}{n} \right) \right]^{\frac{1}{\beta}}$$

where q = number of poor

n = number of persons in the population

z = poverty line

Y_{EDEP}^A = equally distributed equivalent income of the poor, according to an Atkinson social evaluation function, defined over the poor only.

CHU's Index is based on a Social welfare function defined over the truncated population, such that the addition of a poor person to the population increases the poverty index if the income of the additional poor person is lower than the equally distributed equivalent of the censored income distribution Y_{EDE}^* defined as $U^{-1}(SW(Y^*))$. The poverty index decreases if the income of the additional poor has an income higher than Y_{EDE}^* .

The choice of a specific social welfare function may depend on the nature of the poverty line; if one wants to maintain the proportion of poor axiom, no matter what income the additional poor has got, one may choose a social welfare function such that $Y_{EDE}^* = z$.

CHU developed a poverty measure based on a group of social welfare function (SWF) which reflects Sen's notion of relative deprivation. The difference between Sen's notion of relative deprivation and CHU's is that while the former is represented by deprivation functions which

are social evaluation functions for individual incomes, the latter is represented by deprivation functions which are social evaluation functions for individual poverty gaps. In CHU, the social evaluation function is used to incorporate inequality in poverty gaps which reflect relative deprivation in aggregate.

Comparison of Poverty Indices Used

The measurement of poverty has been a subject of extensive discussion in recent literature. The nature of poverty indices is such that no one measure is able to capture all the characteristics of the poor. Following is a brief discussion of the merits and demerits of the poverty indices.³⁰

Haggens (1987) has shown that no poverty index is capable of meeting all the [axioms].. and thus a choice of a given poverty index must perforce imply the desirability of a specific aspect of poverty over another.

The subsequent developments in the measurement of poverty in the wake of Sen's index followed three approaches:

³⁰ Abebe Shimeles, and Bereket Kebede, (1995), "Issues in the Measurement and Dynamics of Poverty: A Survey". Paper prepared for the Fifth Annual Conference on the Ethiopian Economy: Organized by the Department of Economics, Addis Ababa, University and the Ethiopian Economic Association. Nazareth, November 30-December 2, 1995.

see also, Trufat Bekele, (1996) M.Sc. Thesis "Poverty in Ethiopia (1994/95)"

- The first strand is to pursue Sen's axiomatic approach as in Thon (1979,1983), Kakwani (1980), Takayama (1979), Foster, et al (1984), Foster and Shorrocks (1991) in order to derive a poverty measure that satisfies certain desirable properties.
- The second approach is to use the notion of social-welfare functions (SWF) to define a poverty measure that carry properties easily discernable in their construction in the manner of Blackbory and Donaldson (1980), Clark, et al (1982) and Chakravarty (1983).
- The third is one that tried to disentangle poverty from inequality in the strict sense, using the social-welfare function framework as in Vaughan (1986), Pyatt (1987) and Lewis and Ulph (1988), who went a step further to endogenize the determination of the poverty line within the context of utility maximization. (A.Shimeles and B.Kebede,p 2-3,(1995))

It has also been shown that the poverty indices suggested by Sen (1976) and Thon (1979) could be reduced from the social-welfare function of the Gini type, while the FGT and CHU indices can be reduced from a utilitarian type of social-welfare functions. (A.Shimeles and B.Kebede,p 4,(1995)).

It must be noted that each poverty measure has its own merits and drawbacks. Due to the complex nature of poverty there is no one measure that can capture all the dimensions of poverty. This study aims to see the robustness of the different measures and to analyse the results obtained in the following chapter.

"An increasingly common practice is to recalculate the poverty measures using various poverty lines, and to test whether the qualitative poverty comparisons are robust to the choice." (UN, 1996, p 12)

The research focuses on the results of the different poverty indices used and the interpretations these different measures present. Thus the main scope of the study is to see if using two measures of the poverty line namely one constructed using the Food Energy Intake (FEI) and the Cost of Basic Needs (CBN) identify the same households as poor. The results obtained will also be disaggregated by gender, occupational groups, educational level, land size and other endowments etc. It is hoped that the results will enrich our knowledge of poverty indices keeping in mind the limitations of the data.

CHAPTER III

EMPIRICAL ANALYSIS AND RESULTS

3.1 EMPIRICAL ANALYSIS

3.1.1 Robustness of Poverty Line Measurements

This section attempts to examine the robustness of poverty line measurements using two alternative methods of estimating poverty lines.

As discussed in the previous chapter there are various types of poverty line derivation methods based on absolute poverty, relative poverty etc.. (for a full discussion on the concepts of poverty and poverty line see Callan and Nolan (1991)). For the case of a developing country like Ethiopia absolute poverty lines are proper, while for developed countries relative poverty lines are more appropriate. Thus the consumption based poverty lines namely the Food Energy Intake (FEI) and the Cost of Basic Needs poverty lines (CBN) for both the urban and rural areas of Ethiopia³¹, are considered to be appropriate for our analysis.

³¹ **Note:**Rural Poverty lines estimates made by Stefan Dercon and Mekonen Tadesse, " A Comparison of Poverty in Rural and Urban Ethiopia." (1997) unpublished (memo).

Urban Poverty lines estimates done by Mekonen Tadesse "An Assessment of Poverty in Urban Ethiopia" unpublished (1996).

✓
Table 3.1 Rural Site: Poverty lines (birr/per month) 1994/95 and Mean Expenditure

Survey Site	Household Number	CBN/ poverty line	FEI/ poverty line	Mean exp. of the poor ¹	Mean exp. of the poor ²
8 Haresaw	84	47.30	33.21	31.32	20.91
9 Geblen	66	45.00	38.14	28.91	24.64
10 Dinki	87	38.90	31.86	26.43	21.34
11 Debre Berhan	183	40.80	33.23	32.04	25.77
12 Yetmen	59	43.80	33.68	38.55	19.77
13 Shumsha	147	42.10	34.31	34.14	25.14
14 Sirbana Godeti	96	43.5	30.73	35.08	21.81
15 Adele Keke	97	53.7	39.56	29.16	23.41
16 Korodegaga	109	50.0	37.08	28.76	22.12
17 Turfe Kechemane	101	40.6	30.90	27.93	17.86
18 Imdibir	67	38.3	30.18	27.72	23.68
19 Aze Deboa	75	43.5	31.04	34.07	21.57
20 Adado	130	42.9	34.87	31.26	24.61
21 Gara Godo	96	59.5	43.32	29.02	20.44
22 Doma	72	48.8	40.44	30.13	23.51

1. Food and Non-Food Expenditure
2. Food Expenditure

Food & non food
Food Cost only?

Table 3.2 Urban Sites: Poverty Lines (Birr per month) 1994/95 and Mean Expenditures

Survey site	HH No.	CBN	FEI	Mean Exp. among the poor ¹	Mean Exp. among the poor ²	Mean Exp. of the population ¹	Mean Exp. of population ²
1. Addis Ababa	895	81.20	60.04	48.98	36.05	129.50	90.11
2. Awassa	71	64.70	52.77	39.67	31.01	116.31	84.74
3. Bahir Dar	100	62.70	64.40 ¹	39.82	40.56	148.04	106.78
4. Dessie	91	67.00	64.71	43.31	40.43	167.19	96.22
5. Dire Dawa	126	81.30	99.24 ¹	57.71	73.20	173.23	136.15
6. Jimma	99	62.80	57.85	41.93	35.53	120.93	94.49
7. Mekele	98	78.90	64.69	52.40	43.29	123.13	91.51

1. Food and Non-Food Expenditure

2. Food Expenditure

The thesis will use the household as a unit of measurement. This point is stressed because the survey data collected is based on the household and secondly .." the individual, which is the unit of analysis assumed in poverty indices cannot be seen in isolation from the family he belongs to in budget surveys, thus variations across households characteristics severely affect the estimation of poverty indices."³³

³³ Ibid, Shimeles, A., et al p.14.

Tables 3.3 and 3.4 are results obtained from the calculations that identified the poor in each urban and rural sites.

Table 3.3 Rural Sites number of poor using the CBN and FEI Poverty lines

Survey Site	Household Number	CBN No. of Poor	FEI No. of Poor
8. Haresaw	84	24	16
9. Geblen	66	38	35
10. Dinki	87	34	35
11. Debre Berhan	183	22	26
12. Yetmen	59	7	8
13. Shumsha	147	20	17
14. Sirban Godeti	96	10	7
15. Adele Keke	97	7	9
16. Korodegaga	109	70	62
17. Turfe Ketchemane	101	17	17
18. Imdibir	67	27	16
19. Aze Deboa	75	12	18
20. Adado	130	40	43
21. Gara Godo	96	75	79
22. Doma	72	35	37

Table 3.4. Urban Sites number of poor using the CBN and FEI Poverty lines

Survey Site	Household Number	CBN Number of poor	FEI Number of Poor
1. Addis Ababa	895	392	408
2. Awassa	71	31	28
3. Bahir Dar	100	35	21
4. Dessie	91	37	27
5. Dire Dawa	126	54	16
6. Jimma	99	33	26
7. Mekele	98	40	31

3.1.2 Rural and Urban Sites: Cross Tabulation Results and Pearson's Rank Correlation

In order to assess the robustness of poverty lines CBN and FEI Cross Tabulation and Pearsons's rank correlation was done and the results are presented in Tables 3.5 and 3.6. In the case of rural sites according to Pearsons rank correlation in most of the sites (9 out of 15 sites) CBN and FEI rank in almost the same way. On the other hand in urban sites except for Dire Dawa CBN and FEI have high Pearsons correlation coefficient.

Table.3.5 Cross Tabulation Results and Pearson's Rank Correlation/Rural Sites

Rural sites	No of HHs	CBN poor	FEI poor	CBN/EFI poor	Rural CBN poor FEI has identified as nonpoor	Rural FEI poor CBN has identified as nonpoor	Pearsons Rank Correlation
8. Haresaw	84	24	16	13	11	3	.56564
9. Geblen	66	38	35	33	5	2	.7892 ✓
10. Dinki	87	34	35	29	5	6	.7361 ✓
11. Debre Berhan	183	22	26	18	4	8	.7159 ✓
12. Yetmen	59	79	8	5	2	3	.6202
13. Shumsha	147	20	17	14	6	3	.7251 ✓
14. Sirbana Godeti	96	10	7	5	5	2	.5601
15. Adele Keke	97	7	9	5	2	4	.5974
16. Koro Degaga	109	70	62	59	11	3	.7414 ✓
17. Tirufe Ketchema	101	17	17	14	3	3	.7878 ✓
18. Imdibir	67	27	16	12	15	4	.3963
19. Aze Deboa	75	12	18	10	2	8	.6063
20. Adado	130	40	43	36	4	7	.8066 ✓
21. Gara Godo	96	75	79	73	2	6	.7447 ✓
22. Doma	72	35	37	33	2	4	.8348 ✓

Table 3.6. Cross Tabulation Results and Pearson's Rank Correlation/Urban Sites

Urban site	No of Households	CBN poor	FEI poor	CBN/FEI poor	&From CBN poor FEI has identified as non-poor	From FEI poor CBN has identified as non-poor	Pearson's R Correlation
Addis Ababa	895	408	392	362	46	30	.8288 ✓
Awassa	71	28	31	27	1	4	.8585 ✓
Bahir Dar	100	21	35	21	0	14	.7026 ✓
Dessie	91	27	37	27	0	10	.7847 ✓
Dire Dawa	126	16	54	16	0	38	.4404
Jimma	99	26	33	26	0	7	.8440 ✓
Mekele	98	31	40	30	1	10	.7744 ✓

Important Results

The selection of a particular method of poverty line has strong implication to the identification of the poor households, particularly in rural areas. This issue is important in the context of targeting.

3.1.3 Rural and Urban Sites: Correlation Coefficients of the CBN and FEI in relation to different measurement indices (using values)

Table 3.7. shows that in urban sites when comparing results obtained using the FEI and CBN methods it is found that, the CHU vs FGT index, and SEN vs THON index do not have the same and significant rankings using the FEI method. On the other hand using the CBN method both CHU vs FGT and SEN vs THON index have similar and significant ranking. To some degree it can be said that the CBN method is robust and appropriate for this data set.

Table 3.7 Urban Correlation Coefficients

	FEI	CBN
CHU vs FGT	.2342 P= .613 (insignificant)	.9364 p= .002 (significant)
SEN vs THON	-.6393 p= .122 (insignificant)	.9736 p= .000 (significant)

Table 3.8 RURAL Correlation Coefficient

	FEI	CBN
CHU vs FGT	.3683 p = .177 (insignificant)	.8862 ✓ p = .000 (significant)
SEN vs THON	.9521 p = .000 (significant)	.9409 ✓ p = .000 (significant)

Table 3.8 shows that when comparing results obtained using the FEI, SEN vs THON have similar and significant rankings unlike the Urban results. The other results are similar in both tables.

3.2 COMPARISON OF AGGREGATE INDICES BY SITE

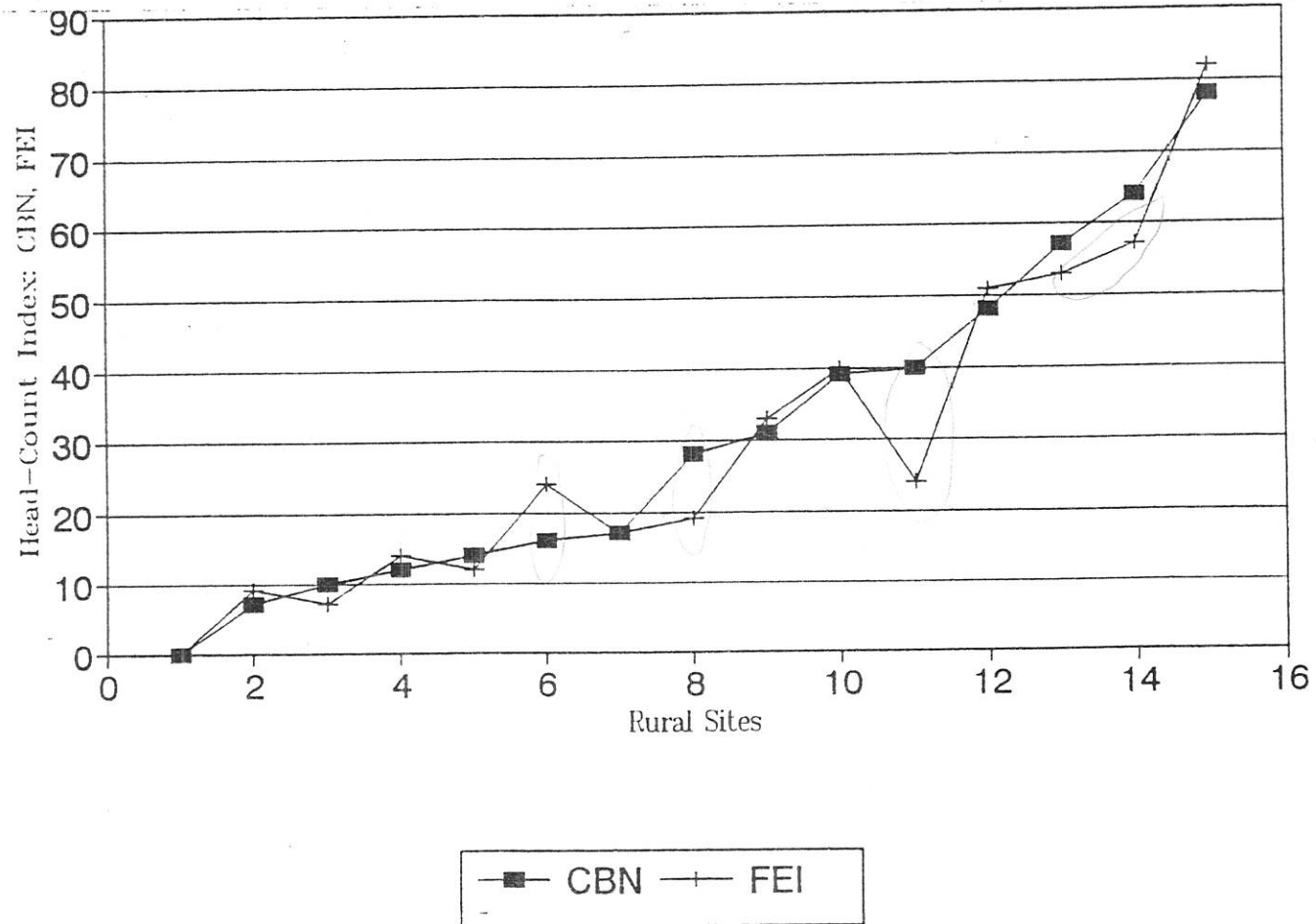
3.2.a) The HEAD-COUNT or Po

The head-count index was plotted to assess the ranking of the poor by the CBN and FEI methods. The attached graphs show a significant lack of robustness between CBN and FEI for the urban sites, while for rural sites there is a strong evidence of robustness, this could be due to the fact that in rural areas food expenditure and basic needs expenditure are almost similar. The head count index of rural and urban sites using the CBN and FEI poverty lines is provided below.

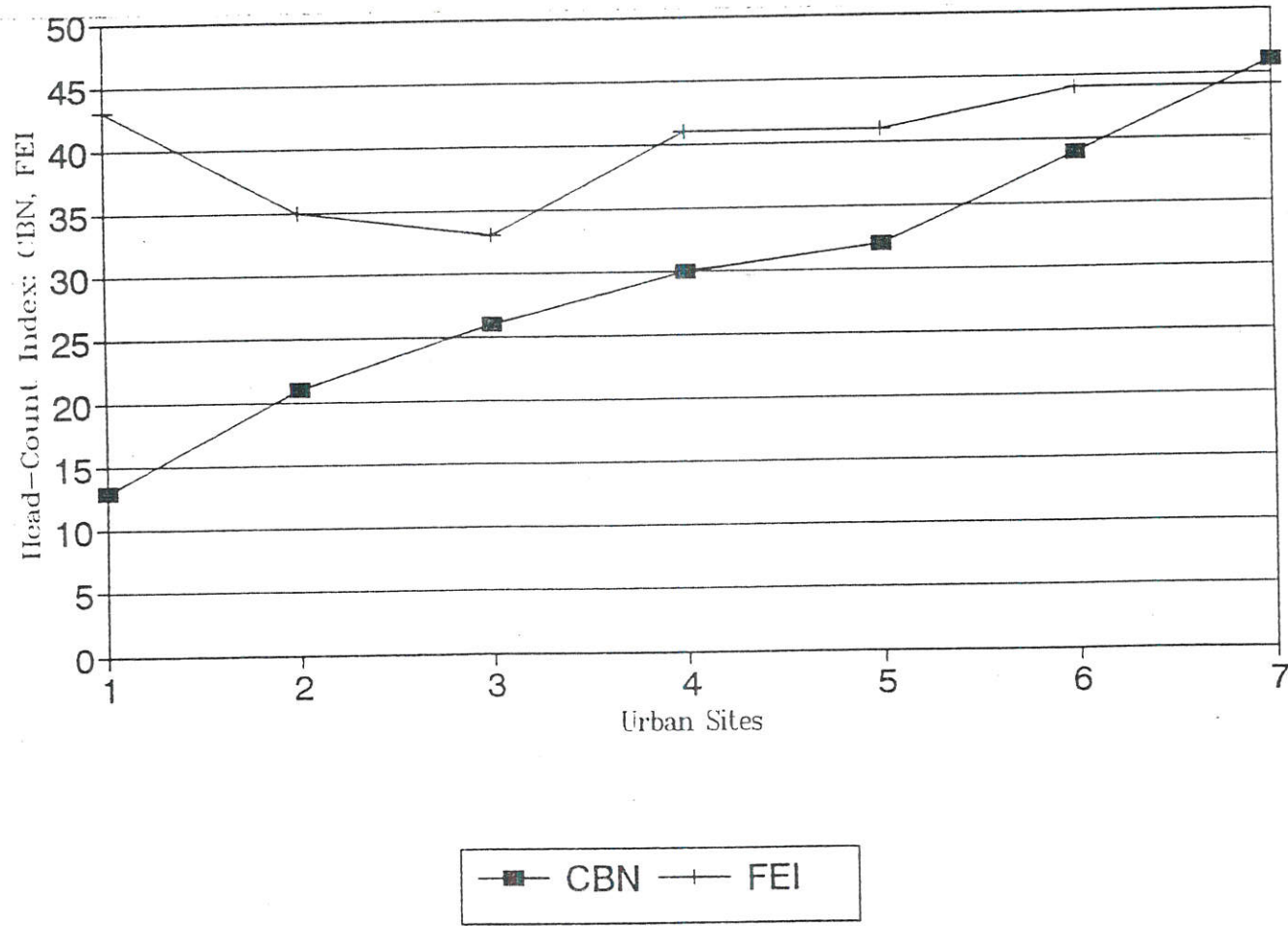
*Implication
For expenditure
can be used as
rank order
(instead of CBN)
to identify the
poor.*

*Check
FEI
Poverty
lines*

Rural Head-Count Index Using
the CBN and FEI Methods



Urban Head-Count Index Using the CBN and FEI Methods



Head Count Index of the Rural sites-CBN.

The highest percentage of poor of (78%) is found in Gara Godo site and the lowest percentage of poor (7%) is found in site Adele Keke. The next highest percentage of poor is found in Arssi in site Korodegaga with 64% poor, in Tigray in site Geblen with 57% poor and site Doma in Gamo Gofa with 48 % poor. The rest of the sites have the low percentages of poor which range from 7% to 17%. As can be seen from the background information on the rural sites fall mainly in the rich cereal producing areas thus their income is fairly high (except for Shumsha and Aze Deboa which were drought prone and over populated).

Head Count Index of Rural sites-FEI.

Overall the results range is from 7% to 82%, the highest being Gara Godo and the lowest being Sirbana Godeti the next highest are Korodegaga (57%), Geblen (53%), Geblen (51%) and Dinki (40%) which are comparable with the CBN results. The lowest number of poor are to be found in Sirbana Godeti (7%) and Adele Keke (9%) the rest have results in between 12% and 33%.

Comparison between the CBN and FEI methods.

While most of the results per site have some differences there have been marked differences in the results obtained for Haresaw and Imdibir. Thus one has to be cautious in the choice of the poverty line to be used in targeting so that one does not fall into erroneous conclusions.

3.2.b. The Poverty- gap (PG) or P1 measure

The Poverty - gap index or P1 measures the average share of the minimum standard of living which the poor are lacking, i.e it is a measure of the transfers needed to bring the poor at a minimum level of consumption. The poverty-gap index P1 measures the depth of poverty and is defined as the mean proportionate deviation from the poverty line across the whole population. It measures the poverty deficit of the poor relative to the poverty line.

The PG has an interpretation as an indicator of the potential for eliminating poverty by targeting transfers to the poor. The information obtained by knowing PG is important to policy-makers in targeting transfers to the poor. That is if PG is known then the government can know the minimum cost of eliminating poverty with perfect targeting.(see Ravallion 1992, P.37-38). The minimum cost to society of reducing poverty can be calculated as follows:

$$\sum_{i=1}^q Z - Y_i$$

Drawbacks to the PG is that it will be unaffected by transfers from a poor person to someone who is less poor, and it does not capture differences in the severity of poverty.

Even though P1 measures the depth of poverty it does not show the severity of poverty. (see Ravallion 1992, for an example).

Graphs: Comparisons of CBN and FEI poverty lines using different indices

In order to aid the analysis this research the robustness of the different indices and the result obtained using the CBN and FEI method of poverty lines were graphed in the results obtained are presented in the Annex. From the graphs one can note that specially for the urban areas the poverty lines give different lines thus they are not robust. The results are better in the case of rural sites.

3.3. ROBUSTNESS OF POVERTY INDICES

The poverty measures selected for this study are the indices based on the social welfare function (SFW). While CHU and FGT are utilitarian Thon and Sen base their measurement on the Gini coefficient.

To give a clear and overall view, the results obtained using different poverty indices by site are presented in the following table for both urban and rural sites. In order to make a useful comparison the rank order of the results is also presented.

*Select sites using
 ① High income
 criteria
 ② use FEI/ CBN
 ③ P₀, P₁, P₂*

Table 3.9 Poverty indices of the rural sites using the site poverty lines

Site No.	No. of HHs	CBN						FEI					
		P ₀	P ₁	P ₂ FGT	SEN Index	THON Index	CHU Index	P ₀	P ₁	P ₂ FGT	SEN Index	THON Index	CHU Index
8. Haresaw	84	.28	.10	.05	.04	.1750	.3924	.19	.07	.04	.08	.1328	.2752
9. Geblen ✓	66	.57✓	.21✓	.10	.07	.3330	.5009	.53✓	.19✓	.09	.21	.3089	.5897
10. Dinki	87	.39✓	.13	.06	.05	.2178	.4877	.40✓	.13	.06	.17	.2294	.4904
11. Debre Berhan	183	.12	.03	.01	.01	.049	.1803	.14	.03	.01	.04	.0598	.4064
12. Yetmen	59	.11	.01	.00	.004	.0271	.1785	.14	.06	.01	.06	.1078	.2046
13. Shumsha	147	.14	.03	.01	.01	.051	.1712	.12	.03	.04	.03	.0583	.2057
14. Sirbana Godeti	96	.10	.02	.01	.01	.0387	.1591	.07	.02	.01	.03	.0399	.1121
15. Adele Keke	97	.07	.03	.02	.01	.0644	.1166	.09	.04	.01	.05	.0712	.1450
16. Koro Degaga	109	.64✓	.27	.14	.08	.415	.6633	.57✓	.23	.02	.26	.3634	.6129
17. Tirufe Ketchema	101	.17	.05	.03	.02	.1015	.2485	.17	.07	.11	.09	.1329	.2474
18. Imdibir	67	.40	.11	.05	.004	.1953	.4950	.24	.05	.04	.06	.0936	.3249
19. Aze Deboa	75	.16	.03	.01	.01	.0653	.2359	.24	.07	.01	.09	.1335	.3299
20. Adado	130	.31✓	.08	.04	.03	.1502	.4104✓	.33	.10	.03	.13	.1744	.4283
21. Gara Godo	96	.78	.40	.24	.09	.5534	.7200	.82	.43	.04	.51	.5938	.7068
22. Doma	72	.48	.19	.10	.06	.3123	.5743✓	.51	.22	.27	.13	.3478	.5873

Table 3.10 Poverty indices of the urban sites using the site poverty lines

Site No.	No. of HHs	CBN						FEI					
		P ₀	P ₁	P ₂	SEN	THON	CHU	P ₀	P ₁	P ₂	SEN	THON	CHU
Addis Ababa	895	.46	.18	.10	.25	.3087	.5717	.44	.16	.09	.10	.2985	.5473
Awassa	71	.39	.15	.09	.21	.2664	.5119	.44	.18	.10	.10	.3037	.5424
Bahir Dar	100	.21	.08	.05	.11	.1438	.3106	.35	.13	.07	.18	.2290	.4690
Dessie	91	.30	.10	.05	.04	.1189	.4135	.41	.15	.08	.21	.2639	.5222
Dire Dawa +	126	.13	.04	.01	.05	.0703	.1990	.43	.11	.05	.16	.1970	.5484
Jimma	99	.26	.10	.04	.12	.1589	.3724	.33	.13	.07	.17	.2283	.4496
Mekele	98	.32	.12	.05	.15	.1901	.4376	.41	.14	.07	.19	.2350	.5207

Table 3.11 Rank Order of Sites by different indices

Rural sites	CBN						FEI					
	P ₀	P ₁	FGT P ₂	SEN	THON	CHU	P ₀	P ₁	FGT P ₂	SEN	THON	CHU
8. Haresaw	8	7	5	6	7	8	8	7	5	7	8	10
9. Geblen	3	3	3	3	3	4	3	4	3	3	4	3
10. Dinki	6	5	4	5	5	6	5	5	4	4	5	5
11. Debre Berhan	12	10	9	9	13	11	10	11	8	10	13	7
12. Yetmen	13	12	10	10	15	12	10	8	8	9	10	13
13. Shumsha	11	10	9	9	12	13	11	11	4	11	14	12
14. Sirbana Godeti	14	11	9	9	14	14	13	12	8	11	15	15
15. Adele Keke	15	10	8	9	11	15	12	10	8	8	12	14
16. Koro Degaga	2	2	2	2	2	2	2	2	7	2	2	2
17. Tirufe Ketchema	9	9	7	8	9	9	9	7	2	6	9	11
18. Imdibir	5	6	5	10	6	5	7	9	4	8	11	9
19. Aze Deboa	10	10	9	9	10	10	7	7	8	6	7	8
20. Adado	7	8	6	7	8	7	6	6	5	5	6	6
21. Gara Godo	1	1	1	1	1	1	1	1	4	1	1	1
22. Doma	4	4	4	4	4	3	4	3	1	5	3	4

Table 3.12 Rank order of urban sites by different indices

Urban Site	CBN						FEI					
	P ₀	P ₁	FGT P ₂	SEN	THON	CHU	P ₀	P ₁	FGT P ₂	SEN	THON	CHU
Addis Ababa	1	1	1	1	1	1	1	2	2	6	2	2
Awassa	2	2	2	2	2	2	2	1	1	6	1	3
Bahir Dar	6	5	3	5	5	6	5	5	4	3	5	6
Dessie	4	4	3	7	6	4	4	3	3	1	3	4
Dire Dawa	7	6	5	6	7	7	3	6	5	5	7	1
Jimma	5	4	4	4	4	5	6	5	4	4	6	7
Mekele	3	3	3	3	3	3	4	4	4	2	4	5

From the results of the rank order the rural sites show difference in the ranking by the different poverty indices. Generally the poorest are ranked similarly but for the rest the rankings differ.

The results of the rank order of the different indices are plotted in the and it shows that in most cases all the indices do not give the same ranking especially for the urban sites. For the rural areas at least for one site all the indices have identified the same site as the poorest. Thus one can conclude that the poverty indices are not robust care must betaken in the choice of a measure of poverty and the choice of the poverty line as well.

3.3.1 CORRELATION COEFFICIENTS OF THE INDICES (using rank order)

An important question is to know if the choice of a poverty index makes a difference to the construction of a poverty profile given a poverty line. From the results obtained using correlation coefficients the choice of a poverty index matters for the construction of a poverty profile (see table below).

Table 3.13 Correlation Coefficients

URBAN - FEI				
	P ₂	SEN	THON	CHU
P ₂	1.00			
SEN	.7171 (P=.070)	1.00		
THON	.8367 (P=.019)	.9643 (P=.000)	1.00	
CHU	.8964 (P=.006)	.7857 (P=.036)	.8929 (P=.007)	1.00

Table 3.14

URBAN - CBN

	P ₂	SEN	THON	CHU
P ₂	1.000			
SEN	-.4154 (P=.354)	1.00		
THON	.9503 (P=.001)	-.1976 (P=.671)	1.00	
CHU	.2236 (P=.630)	-.5139 (P=.238)	.2143 (P=.645)	1.00

From the above tables, correlation coefficients between different indices is high and significant, using the method of FEI. On the other hand, when we use CBN, correlation coefficients are low and insignificant.

Table 3.15 Correlation Coefficients

RURAL - FEI

	P ₂	SEN	THON	CHU
P ₂	1.00 (P.000)			
SEN	.4018 (P=.138)	1.00		
THON	.4318 (P=.108)	.9629 (P=.000)	1.00	
CHU	.4052 (P=.134)	.8589 (P=.000)	.8786 (P=.000)	1.00

Table 3.16

RURAL - CBN

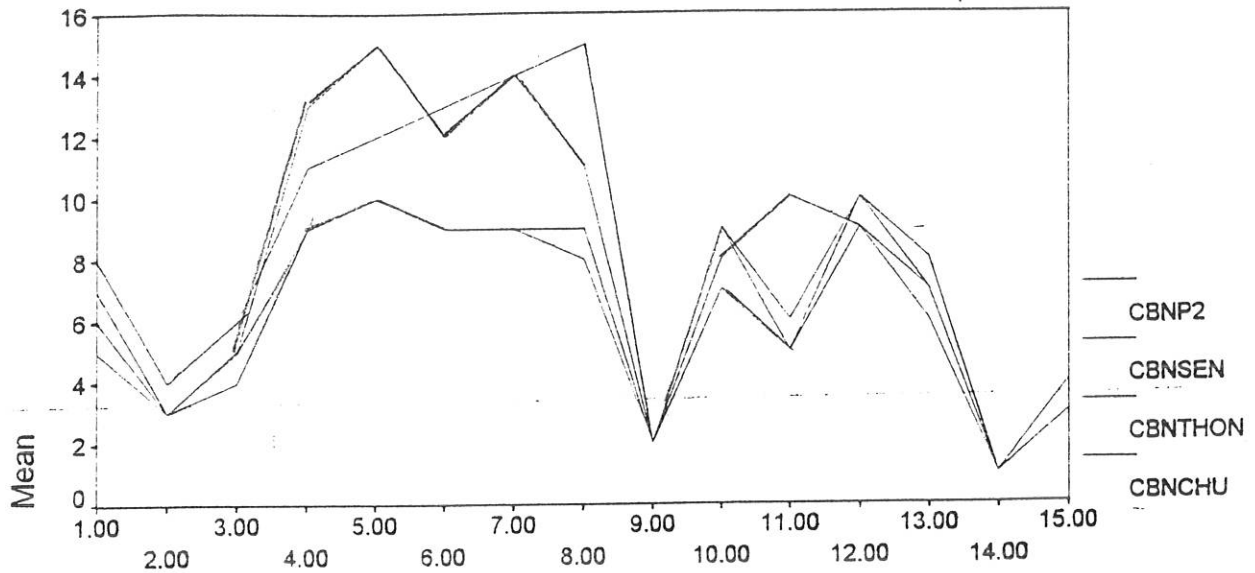
	P ₂	SEN	THON	CHU
P ₂	1.00			
SEN	.9062 (P = .000)	1.00		
THON	.9782 (P = .000)	.8789 (P = .000)	1.00	
CHU	.9229 (P = .000)	.8263 (P = .000)	.9357 (P = .000)	1.00

In the rural sites, correlation coefficients of the different indices using CBN is high and significant, whereas using the FEI, the result is mixed (high and significant and low and insignificant). In conclusion poverty indices using CBN in rural sites and FEI in urban sites are robust. The following graphs show:

Comparison of Ranking of Sites by different poverty indices using the same poverty line.

RANKING OF SITES BY DIFFERENT POVERTY INDICES

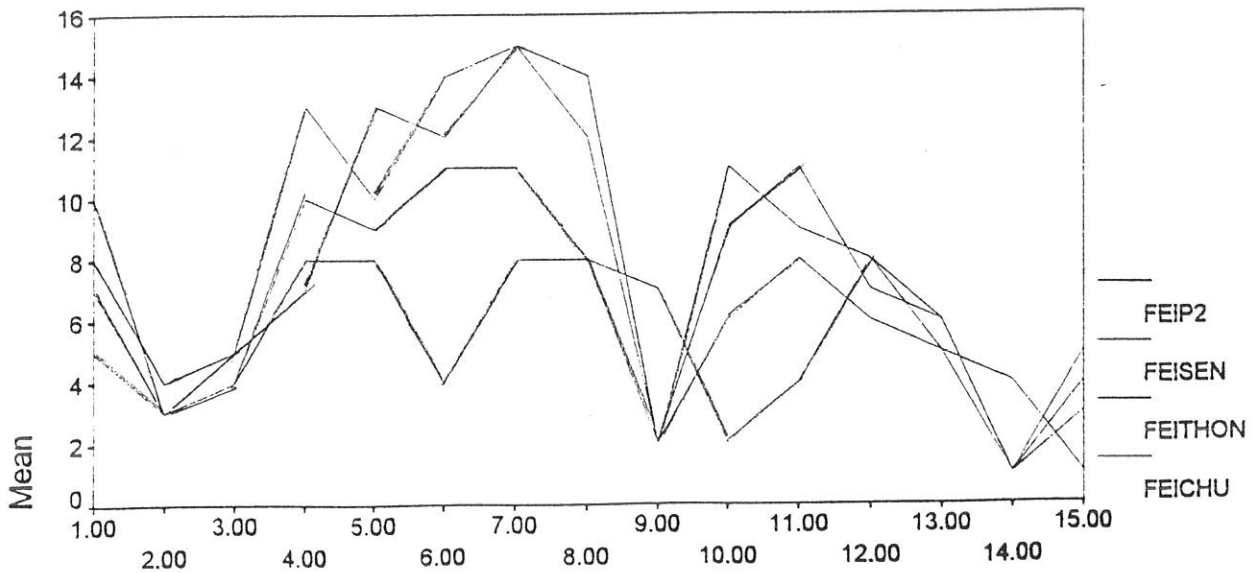
CBN



RURAL

RANKING OF SITES BY DIFFERENT POVERTY INDICES

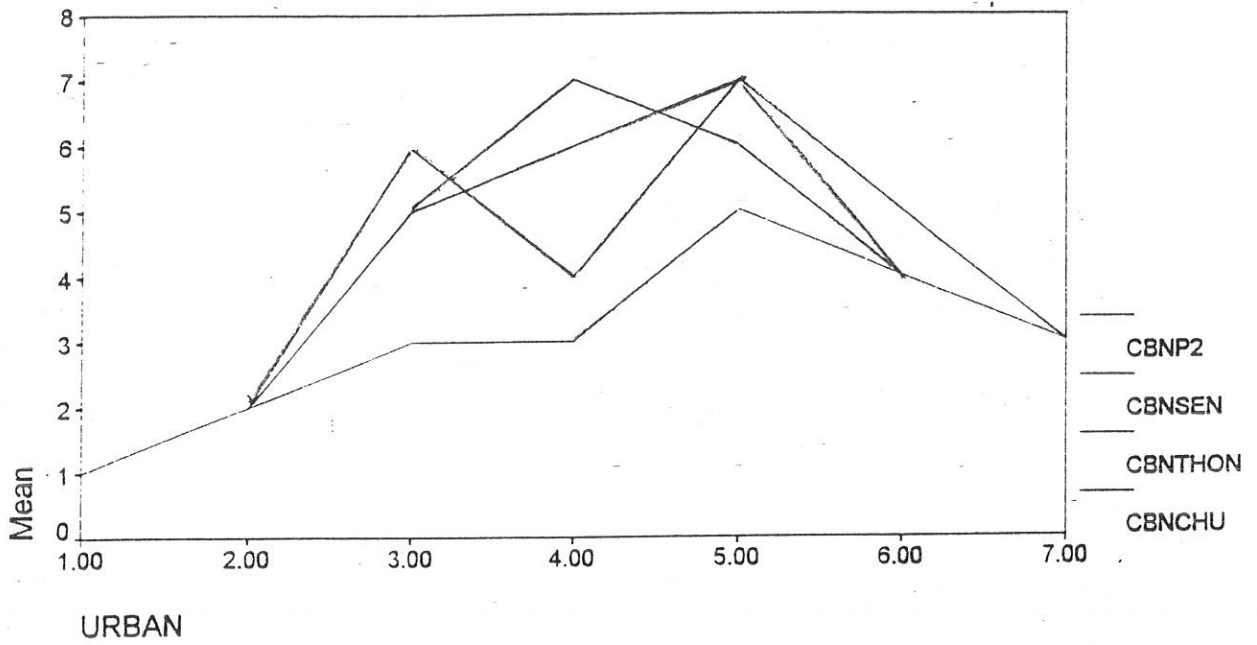
FEI



RURAL

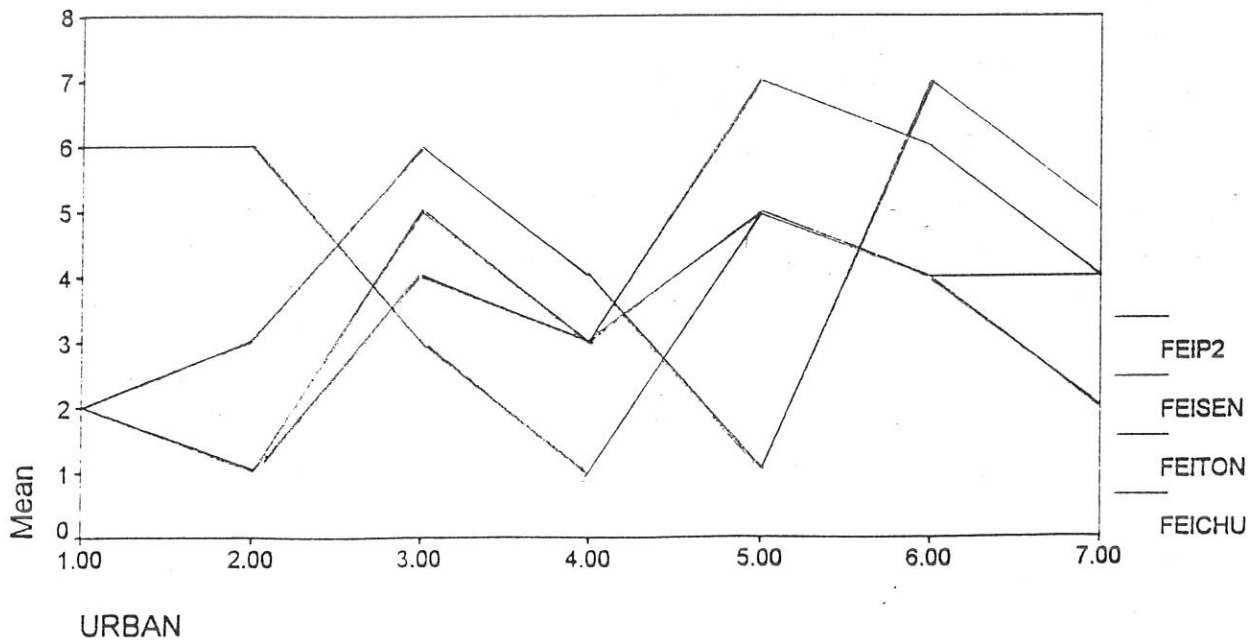
RANKING OF SITES BY DIFFERENT POVERTY INDICES

CBN



RANKING OF SITES BY DIFFERENT POVERTY INDICES

FEI



3.4 CORRELATES OF POVERTY

As stipulated in the outset poverty is hereby analyzed at the disaggregated level divided by urban and rural sites.

3.4.1 Urban Sites

3.4.1a Family head

The table below shows that in Addis Ababa female headed households among total female are greater than their male counter parts.

Bahr-Dar female headed households dominate in both the CBN and FEI methods, while in Mekele using the FEI method the result is that 50% of the poor are female headed and by the CBN method 55 % of the poor are female headed.

The urban total shows that using both the FEI and CBN methods that female headed households are more prevalent among the total female.

Table 3.17 Urban Sites: Percentage distribution of poor by family head (CBN)

Site	No of HHs	Total Male	Total Female	Total poor	Male poor	Female Poor	Male headed % poor from total male	Female headed % poor from total female	Female headed % poor from total poor
Addis Ababa	885	557	328	404	242	162	43.45	49.39	40.10
Awassa	68	53	15	28	22	6	41.51	40.00	21.43
Bahr-Dar	100	71	29	21	10	11	14.29	37.93	52.38
Dessie	91	54	37	27	16	11	29.63	29.73	40.74
Dire Dawa	126	72	54	16	7	9	9.72	16.67	56.25
Jimma	99	70	29	26	18	8	25.71	27.59	30.77
Mekele	97	48	49	31	14	17	29.17	34.69	54.84
Urban Total	1466	925	541	553	329	224	35.57	41.40	40.51

Table 3.18 Urban Sites: Percentage distribution of poor by family head (FEI)

Site	No of HHs	Total Male	Total Female	Total poor	Male poor	Female Poor	% male poor from total male	Female headed % poor from total female	Female headed % poor from total poor
Addis Ababa	885	557	328	388	237	151	42.55	46.04	38.92
Awassa	68	53	15	31	24	7	45.28	46.67	22.58
Bahr-Dar	100	71	29	35	16	19	22.54	65.52	54.29
Dessie	91	54	37	37	14	23	42.6	37.84	37.84
Dire Dawa	126	72	54	54	32	22	44.44	40.74	40.74
Jimma	99	70	29	33	24	9	34.29	31.03	27.27
Mekele	97	48	49	40	20	20	41.67	40.82	50.00
Urban Total	1466	925	541	618	376	242	40.65	44.73	39.16

Table 3.19 Urban Sites: Percentage distribution of poor by family head (FEI and CBN)

Site	Male Headed % poor (FEI)	Female Headed % poor (FEI)	Male headed % poor (CBN)	Female Headed % poor (CBN)
Addis Ababa	61.08	38.92	59.90	40.10
Awassa	77.42	22.58	78.57	21.43
Bahr-Dar	45.71	54.29	47.62	52.38
Dessie	62.16	37.84	59.26	40.74
Dire Dawa	59.23	40.74	43.75	56.25
Jimma	72.73	27.27	69.23	30.77
Mekele	50.00	50.00	45.16	54.84
TOTAL URBAN	60.84	39.16	59.49	40.51

3.4.1b Urban Sites: Age-group of head of household

Both FEI and CBN methods show similar results in the age-group of the poor. The total results show that using both methods about 77 % of the poor are in the age-group between 35 to 64.

Table 3.20 Urban percentage of poor by age-group of Head of the Household

Age-group/ CBN/FEI	Addis Ababa	Total
below 25 CBN FEI	0.50 0.77	0.36 0.81
25-34 CBN FEI	8.17 8.00	9.22 8.74
35-44 CBN FEI	24.50 23.45	25.14 24.11
45-54 CBN FEI	30.45 31.44	30.56 31.88
55-64 CBN FEI	21.78 21.65	20.80 20.55
65 and above CBN FEI	14.60 14.69	13.95 13.92



3.4.1c Urban Sites: Household size of the poor

Using the FEI and CBN methods give us similar results, that is the majority of the poor i.e about 68 % have household size in the range of 5 to 10.

Table 3.21 Urban percentage of poor by household-size

Site/ CBN/FEI	less than 5	5 - 10	greater than 10
Addis Ababa			
CBN	21.32	69.12	9.56
FEI	34.18	56.63	9.18
TOTAL URBAN			
CBN	21.90	68.58	9.52
FEI	22.35	68.01	9.65

3.4.1d Urban Sites: Percentage of poor by type of employment.

The results obtained show that using the CBN and FEI methods the results obtained are similar. Secondly the results surprisingly show that the lowest percentage of poor is found to be in the category of the unemployed, while employer or own account worker have the

highest percentage of poor. Overall the distribution of poor by type of employment has an even distribution.

Table 3.22 Urban percentage of poor by type of employment

Site/ CBN/FEI	1	2	3	4
Addis Ababa				
CBN	29.14	18.84	29.90	22.11
FEI	29.58	17.80	31.15	31.47
URBAN TOTAL				
CBN	30.46	20.55	29.36	19.63
FEI	31.64	21.31	29.02	18.03

Key: 1 = Employer/own account worker
 2 = Employed (salaried worker).
 3 = Casual/ domestic/ pensioner
 4 = Unemployed

3.4.1e Urban sites: Educational Level of the poor.

The results obtained using both the CBN and FEI methods are similar. The overall results show that about 79 % of the poor either have no schooling, they have only traditional or primary school only. Mention must also be made of the fact that about 2% of the poor are college graduates.

Table 3.23 Urban percentage of poor by educational level

Educational Level/CBN/FEI	Addis Ababa	URBAN TOTAL
1: CBN FEI	33.91 32.47	32.91 31.23
2: CBN FEI	16.34 17.01	15.37 16.34
3: CBN FEI	27.97 29.64	30.56 30.58
4: CBN FEI	7.18 6.19	7.76 7.77
5: CBN FEI	11.14 10.31	10.67 10.68
6: CBN FEI	0.99 1.55	0.72 1.29
7: CBN FEI	2.48 2.84	1.99 2.10

Key: 1 = No schooling
 2 = Traditional or religious
 3 = Primary school
 4 = Junior Secondary School
 5 = Secondary School
 6 = Vocational/Technical
 7 = College graduate

3.4.2 Rural Sites

3.4.2a Rural Sites Family head

In the rural areas the percentage of male headed household among the poor are about 85 % while female-headed households are only about 15 %. Both the CBN and FEI methods give similar results.

The percentage of poor female headed households among total female headed is 24 % (CBN) ✓ and 23 % (FEI) both the CBN and FEI give similar results.

Table 3.24 Total Rural: Percentage distribution of poor by family head

CBN/ FEI	No of HHS	Total poor	Male poor	Female poor	Total Female	Total Male	Female headed % poor from female	Male headed % poor from total male	Male headed % poor from total poor	Female headed % poor from total poor
CBN	695	154	130	24	100	595	24.00	21.85	84.41	15.59
FEI	695	154	131	23	100	595	23.00	22.00	85.06	14.94

Handwritten notes:
 ↓
 are these % adjustment for the sample fraction
 $\frac{100}{695} \times \frac{1}{2} = \frac{100}{1390}$
 14% adjustment

3.4.2b Rural Sites: Age-Group of head of household

Both FEI and CBN methods show similar results in the age-group of the poor. The total results show that using both methods over 70 % of the poor are in the age-group between 35 to 64.

Table 3.25 TOTAL RURAL percentage of poor by age-group of Head of Household

	below 25	25-34	35-44	45-54	55-64	65 and above
CBN	1.29	20.77	26.62	27.92	12.33	11.03
FEI	2.59	21.42	27.27	22.07	14.28	12.33

3.4.2c Rural Sites: Household Size of the poor

As in the urban sites the household size between 5-10 have more percentage of poor i.e about 70 % in CBN and about 64 % in FEI.

Table 3.26 TOTAL RURAL percentage of poor by Household-size

Household-size	CBN	FEI
less than 5	19.48	25.97
5 - 10	70.77	64.28 ✓
greater than 10	9.74	9.75

Sample fraction

3.4.2d Rural Sites: Educational Level of the poor

The results obtained using both the CBN and FEI methods are similar. The overall results show that about 90 % of the poor either have no schooling, they have only traditional or primary schooling only. Mention must also be made of the fact that there are no poor with education above the secondary level.

Table 3.27 TOTAL RURAL percentage of poor by educational level

CBN/FEI	1	2	3	4	5	6
CBN	74.02	0.65	15.58	7.79	1.94	0.00
FEI	70.78	0.64	20.12	7.14	1.29	0.00

Key: 1 = No schooling
 2 = Traditional or religious
 3 = Primary school
 4 = Junior Secondary School
 5 = Secondary School
 6 = Vocational/Technical

3.4.2e Rural sites: Size of land

The results obtained using the CBN and FEI methods give similar results. The results show that about 50 % of the poor own up to .5 hectares of land, which implies that one of the big /constraints is not having enough land size to farm. Another interesting finding is that about 20 % of the poor own land which is greater than 2 hectares. More investigation is needed to see the constraint.

Table 3.28 Rural: Percentage of Land Holdings among the poor

Land Size (Hectare)	0.5	0.5 - 1	1- 1.5	1.5 - 2	> 2
CBN	53.20 /	15.35	7.67	3.32	20.46
FEI	53.05 /	16.98	6.90	2.92	20.16

3.4.2f Rural sites: Oxen Owned by the household

From the table one can clearly see that the majority of the poor i.e about 95 % do not own any oxen, which is the main means for farming in rural Ethiopia. Thus lack of oxen can be considered as major contributor to poverty in the rural areas.

Table 3.29 Rural: Percentage of oxen owned by the household

	none	1	2	> 2
CBN	94.50	2.00	2.50	1.00
FEI	93.33	3.08	2.31	1.28

The conclusions and recommendations from the findings of the above empirical analysis is presented in the following chapter.

CHAPTER IV

CONCLUSION AND RECOMMENDATIONS

4.1 Conclusion

In a developing country like Ethiopia, where poverty is a chronic problem, poverty alleviation and reduction policies must be at the core of the government development plans. In order to achieve its goal of poverty reduction policies, the government must be able to identify the poor and have information on the socio-economic characteristics of the poor, so that resources can be used efficiently.

This thesis has attempted to assess if different poverty lines identify the same households as poor. It also examined the sensitivity of the different poverty indices to the poverty line and the different correlates of poverty. In order to achieve this objective cross-sectional data of the rural and urban household survey carried out in 1994-95 was used. Using different methods discussed in the body of the paper, the results obtained lead to the following conclusions:

Using the consumption based absolute poverty lines, i.e the CBN and FEI, all in all it was found that in urban areas both CBN and FEI identify almost the same households as poor. Contrary to this, in rural areas they do not identify the same households (see table 3.5 and 3.6).

When the head-count index was calculated using the different poverty lines the conclusion reached is that in the case of urban sites there is a marked difference between the CBN and FEI unlike the rural areas. This could be due to the differences in cost of food and non-food items in the two sites. That is in urban sites people could consume expensive but low caloric content food items, while in rural areas the cost of food is relatively low and the caloric content could be high.

The choice of the poverty line and the difference between the CBN and FEI methods was also investigated by Ravallion and Bidani (1994) and they also point out the insensitivity of the FEI based measures to differences in absolute levels of living.

The sensitivity of different poverty indices when used in different poverty lines, have led to the conclusion that most of the indices do not give exactly the same result (in terms of ranking). In particular, Sen's index is very sensitive to the poverty line used and the results obtained are almost reversed (see tables 3.9 and 3.10).

The inquiry into the robustness of the poverty indices has led to the finding that in almost all cases the indices are not robust (see attached graphs).

The correlates of poverty

Gender Characteristics - The female headed households among all female households are poorer than the male headed households in the case of Addis Ababa, but for the other

sites they are not prevalent. As for the rural areas there are more poor male headed households than female headed households.

*1
because there are
more headed hhs
in the rural*

Generally the age group above 65 and below 25 are less poor while households that have 5 to 10 members are more poor. In the case of the educational level, those at the primary level and below are more poor. Among the rest, the technical graduates seem to be doing well. The interesting finding is that in the occupational groupings, those that are employers and self employed are the poorest. The unemployed are relatively better off, this contradiction could be due to the fact that the unemployed must be temporarily out of work, they could be living from their savings and most of all since the survey was done of those people that had houses or lived in houses the real unemployed are not accounted for.

In the rural sites the main correlates to poverty are lack of land and lack of oxen both of which account for over 90 %. Thus since their livelihood is based on farming they account for the bulk of the poor.

4.2 Recommendations

From the results obtained it is recommended that depending on the objective of the poverty alleviation programme, care must be taken in the selection of the type of indices.

The choice of the poverty line is very important to the results one obtains in the calculation of the poverty indices as there is difference in the standard of living between urban and rural areas.

As the results of the correlates of poverty have shown there is a marginal difference between male and female headed households in the urban sites, whereas in the rural sites female headed households are less poor. Hence the alleviation of poverty should target both male and female headed households.

To alleviate poverty in the rural areas there is strong evidence that lack of land and oxen are the main attributes for poverty, thus any policy to alleviate poverty should address the question of land distribution and how to make resources available for oxen and other farm implements.

One of the shortcomings of the household survey is that it ignores the poor that do not have houses therefore, a large segment, of the poor especially in urban areas, such as street children, and the homeless etc.. are not accounted for. This dimension of the problem should be looked into.

Analysis done from information from the household survey is very important in guiding policies and in monitoring the progress made from these policies. It is therefore, recommended that more attention should be given to encourage researchers to do more

research in this area and to develop different methodologies that can be used for poverty measures especially that can fit the particular conditions of Africa.

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APPENDICES

Appendix 1. Background Information of Rural Sites

Survey site	Site Number	Location	Background	Agriculture	Terrain/soil	subsistence crops	main cash source	Main crops	Rainfall	Technology and infrastructure
8 Haresaw	1	Tigray	Poor and vulnerable area	cereals formerly rich but now vulnerable to famine	flat slopes woyena dega	barely, wheat lentils, genfo tuffulo, beans peas, cabbage	cattle, milk, sheep goats, salt trade migration to Eritrea an Saudi Arabia	cereals	Bimodal	oxplough There is dry-weather road to Atsbi (land 1/2 hours on foot)
9 Geblen	2	Tigray	Poor and vulnerable area; used to be quite wealthy	cereals vulnerable to famine	on escarpment dega taf	barely, maize, cactus (wild food) wheat (aid or buy)	goats, cattle, sheep (few) casual label in town	cereals	Bimodal	oxplough, 3 hours walk from Adigrat, water and soil conservation techniques
10 Dinki	3	N.Shoa	Badly affected in famine in 84/85; not easily accessible even though near Debre Berhan	cereals bordering nomadic vulnerable to famine	hilly gorges kila erosion	tef, sorghum maize, banana, sugarcane	cattle, sheep, goats, animal products, spinning, yarnmaking, weaving	Millet, teff	Bimodal	oxplough, irrigation, wereda capital is 24 km from village
11 Debre Berhan	4	N.Shoa	Highland site Near town	cereal producing self-supporting	flat lenllem taf	barely, peas horsebeans wheat linseed	dungcakes sheep, goats cattle, milk, butter crops (if harvest is good)	Teff, barley, beans	Bimodal	oxplough 4 PAS in the vicinity of Debre Birhan
12 Yetmen	5	Gojjam	Near Bichena Ox-plough cereal farming system of highlands	cereals especially tef and wheat rich	flat woyena dega lem	tef, wheat maize, tentils chickpeas	tef, wheat cattle, milk, skins sheep, wool bees, trade some migration	Teff, wheat and beans	Bimodal	oxplough PA linked to Bichena (15kms) and Dejen (17kms) by all-weather read
13 Shumsha	6	S.Wollo	Poor area in neighbourhood of airport near Lalibela	cereals famine for the last ten years	flat kola	tef, chick-peas, lentils sorghum, barely, peas, linseed	spinning, basket work, selling tella and araki, selling firewood migration for agricultural wage labour	cereals	Bimodal	oxplough The PA is on the dry-weather road from Lalibela to Woldia, near airport and new all weather road
14 Sirbana Godeti	7	Shoa	Near Debre Zeit Rich area Much targeted by agricultural policy Cereal, ox-plough system	cereals (tef) pulses vegetables rich	flat woyena dega lem	tef, wheat beans, maize chickpeas sorghum barley	tef, wheat cattle, meat, milk sheep trade	Teff	Bimodal	oxplough PA next to main road to Debre Zeit (1 hour walk)
15 Adele keke	8	Hararghe	Highland site Drought in 85/86	cereals, chat potatoes rich	flat hills woyena dega	maize sorghum wheat, barely millet, lentils field peas	chat, potatoes, cattle sheep, goats	Millet, maize, coffee, chat	Unimodal	oxplough PA linked to Dire Dawa, Alemayaa (7 km), Harar by main road

16 Korodegaga	9	Arssi	Poor cropping area in neighbourhood of otherwise quite rich valley	cereals bordering nomadic vulnerable	flat kola erosion	maize, tef barley, wheat haricot beans millet, beans peas, vetch	selling firewood cattle, goat, sheep	cereals	Bimodal	oxplough was irrigation PA linked to Dheera by dirt road and Awash Malkassa by a raft over Awash
17 Turfe kechemane	10	S.Shoa	Near Shashemene Ox-plough cereal farming system of highlands	cereals, diversified rich	flat woyena dega lem	tef, dagusa millet, barely maize, wheat horsebeans potato, enset vegetables	potatoes maize, wheat barley, tef cattle, milk, butter goats, sheep, eggs trade, baskets	Wheat, barley, teff, potatoes	Bimodal	oxplough PA linked to Shashemene by 10kms all weather road and 2-4 kms dry weather road
18 Imdibir	12	Shoa (Guraghe)	Densely populated enset area	enset		enset, maize potato gommen	cattle, sheep bananas, oranges, coffee, eucalyptus trade, spinning pottery	Enset, chat, coffee, maize	Bimodal	hoe/rare ploughing. The PA is on the all-weather road between Hosania and Wolite
19 Aze Deboa	13	Shoa (Kembeta)	Densely populated long tradition of substantial seasonal and temporary migration	cereals and permanent crops, very mixed	flat and hilly woyena dega	enset, wheat benas, barley tef, sorghum peas, potatoes gommen guderie	cattle, butter, cheese, eggs, sheep goats, gesho eucalyptus, chat kocho, coffee trade migration	Enset, coffee, maize, teff, sorghum	Bimodal	hoe/oxplough An all weather road links Aze Debo'a to Durame (4 kms) and Hosaina
20 Addado	16	Sidamo (Dilla)	Rich coffee producing area: densely populated	coffee-growing enset rich	mountainous woyena dega lem	enset, barley maize, beans cabbage	coffee, fruit enset cattle sheep, goats trade, migrate for land goldmining	Coffee, enset	no clear pattern	hoe/few oxplough. The nearest big town is Dila (23km) on deryweather road. Nearest town 5 km.
21 Gara godo	15	Sidamo (Wolayta)	Densely packed enset-farming area. Famine in 83/84. Malaria in mid-88.	enset and cereals vulnerable to famine	flat woyena dega	maize, sweet potato, tef cassava, enset potato, yam soybeans vegetables bananas, oranges	trading, food for work, migration to Awash to harvest cotton, butter coffee, cattle, goats sheep	Barley, enset	Bimodal	oxplough, spade and axe, densely populated area
22 Doma	16	Gamo Gofa	Resettlement Area (1985) Semi-arid: droughts in 85,88,89,90; remote	cereals resettlement village vulnerable to famine	flat kola lem	maize, sweet potato, tef goderie banana	cotton, weaving, spinning, trading, cattle, milk, butter	Enset, maize	Unimodal	irrigation oxplough, nearest town of Wacha is 20 minutes walk

Appendix 2. Adult equivalent conversion factors

AGE	MALE	FEMALE
< 1	0.328	same
1-2	0.46	same
2-3	0.54	same
3-5	0.62	same
5-7	0.74	0.7
7-10	0.84	0.72
10-12	0.88	0.78
12-14	0.96	0.84
14-16	1.06	0.86
16-18	1.14	0.86
18-30	1.04	0.8
30-60	1.0	0.82
> =60	0.84	0.74

Appendix 3. Head Count index of the urban sites using site poverty lines of CBN and FEI (percentages)

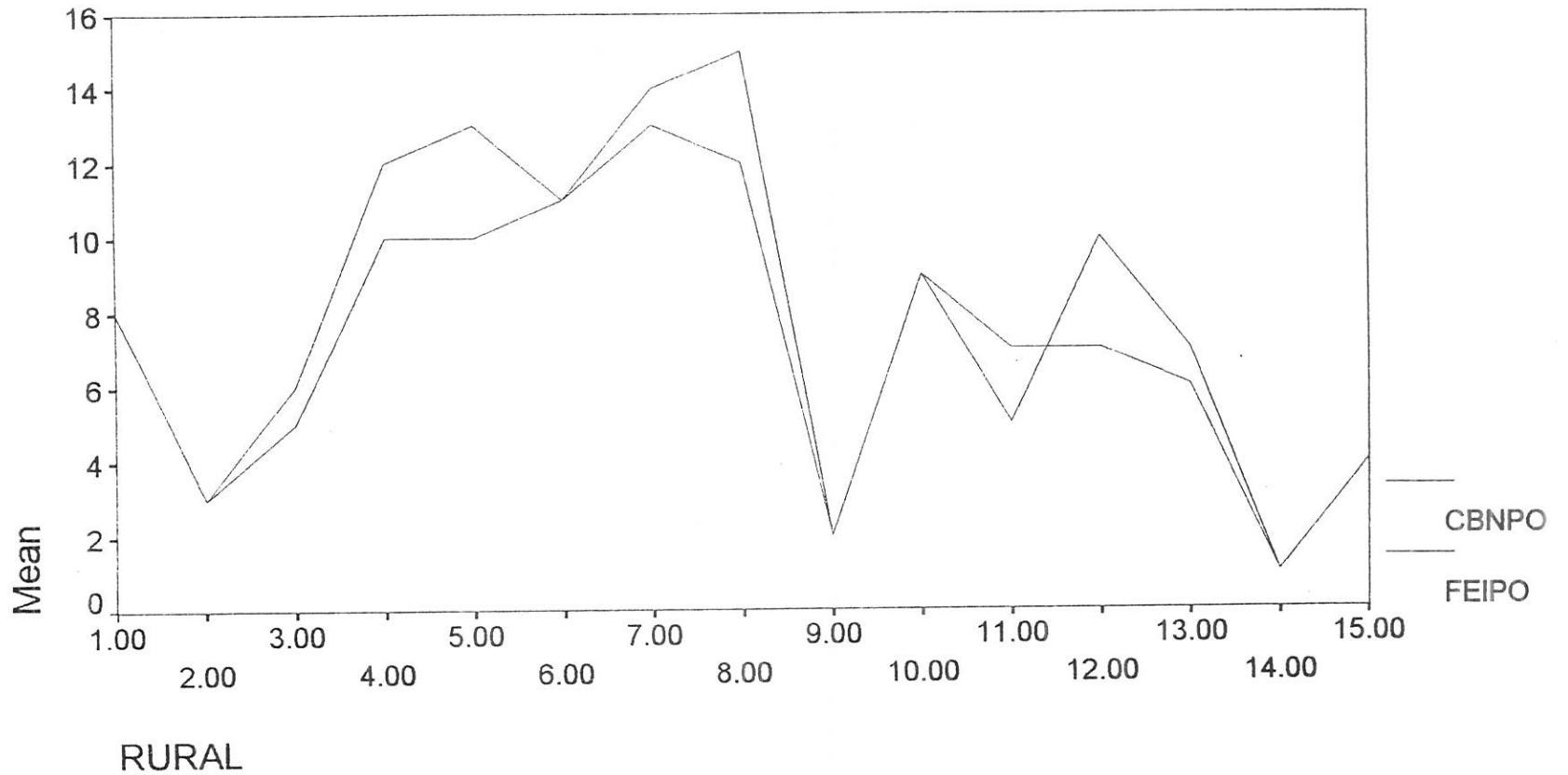
Urban Site	No. Of Households	CBN Po	FEI Po	Rank CBN	Rank FEI
1. Addis Ababa	895	46	44	1	1
2. Awassa	71	39	44	2	1
3. Bahr-Dar	100	21	35	6	3
4. Dessie	91	30	41	4	3
5. Dire Dawa	126	13	43	7	2
6. Jimma	99	26	33	5	4
7. Mekele	98	32	41	3	3

Appendix 4. Head Count Index of the Rural sites using the CBN and FEI site poverty lines (percentages).

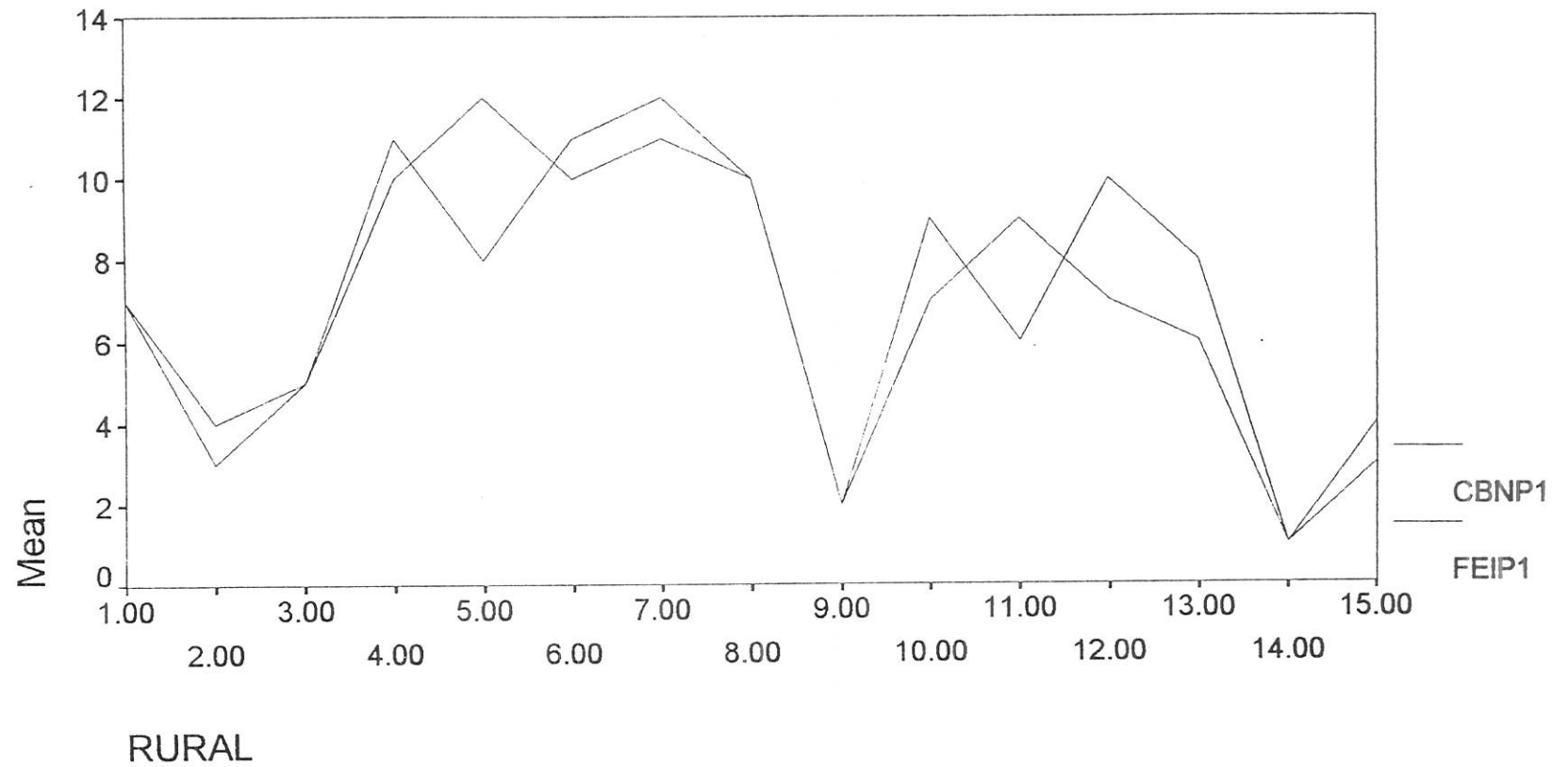
Survey Site	Location	Household size	CBN Po	FEI Po	Rank	Rank
8 Haresaw	Tigray	84	28	19	8	8
9 Geblen	Tigray	66	57	53	3	3
10 Dinki	N.Shoa	87	39	40	6	5
11 Debre Berhan	N.Shoa	183	12	14	12	10
12 Yetmen	Gojjam	59	11	14	13	10
13 Shumsha	S.Wello	147	14	12	11	11
14 Sirbana Godeti	Central Shoa	96	10	7	14	13
15 Adele Keke	Hararghe	97	07	9	15	12
16 Korodegaga	Arssi	109	64	57	2	2
17 Turfe Kechemane (Shashemene)	S. Shoa	101	17	17	9	9
18 Imdibir	Shoa (Gurage)	67	40	24	5	7
19 Aze Deboa	Shoa (Kembata)	75	16	24	10	7
20 Adado	Sidamo (Dilla)	130	31	33	7	6
21 Gara Godo	Sidamo (Wolayta)	96	78	82	1	1
22 Doma	Gama Gofa	72	48	51	4	4

COMPARISON OF CBN and FEI POVERTY INDICES USING P0 INDEX

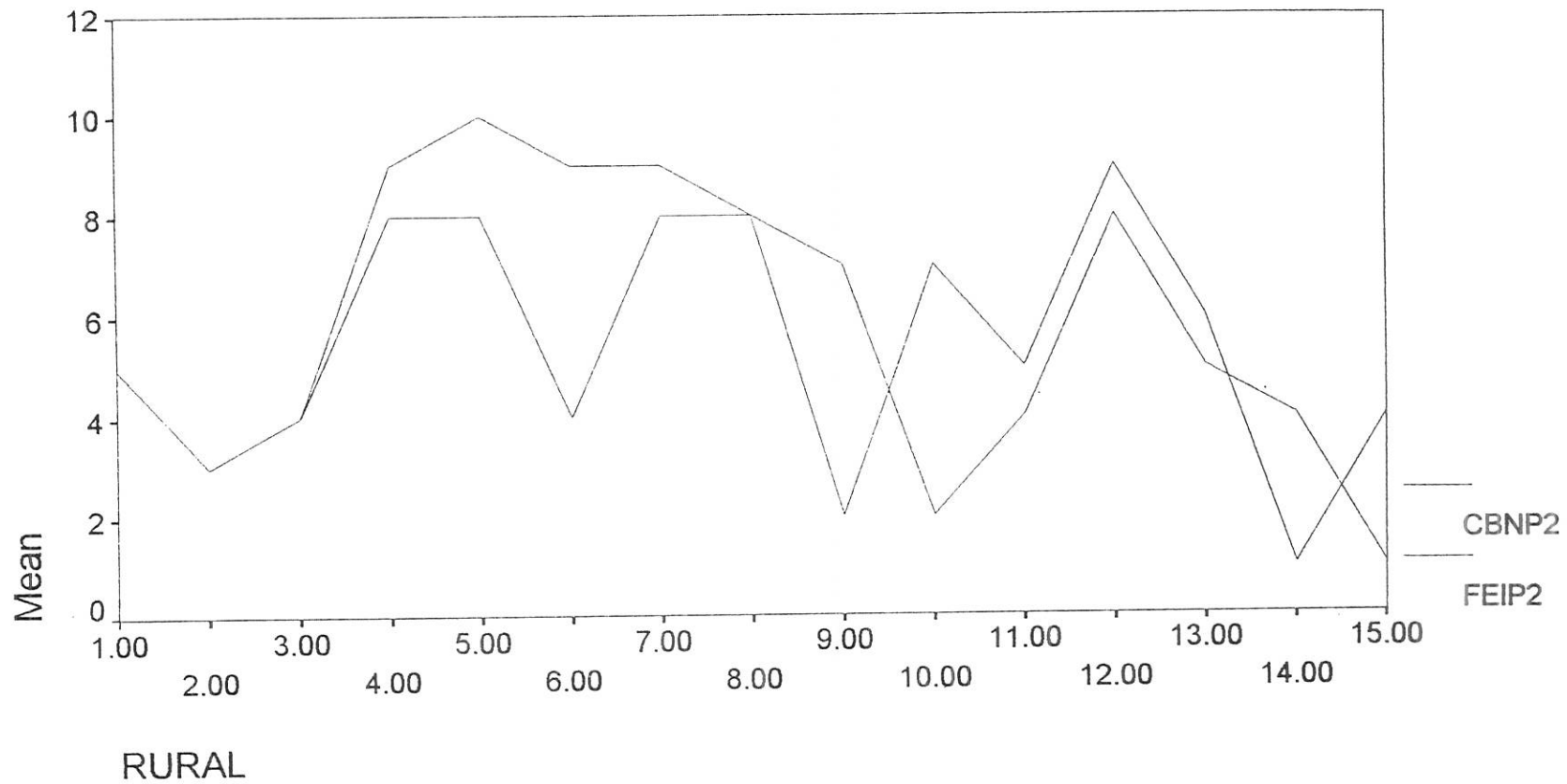
92



COMPARISON OF CBN and FEI POVERTY INDICES USING P1 INDEX

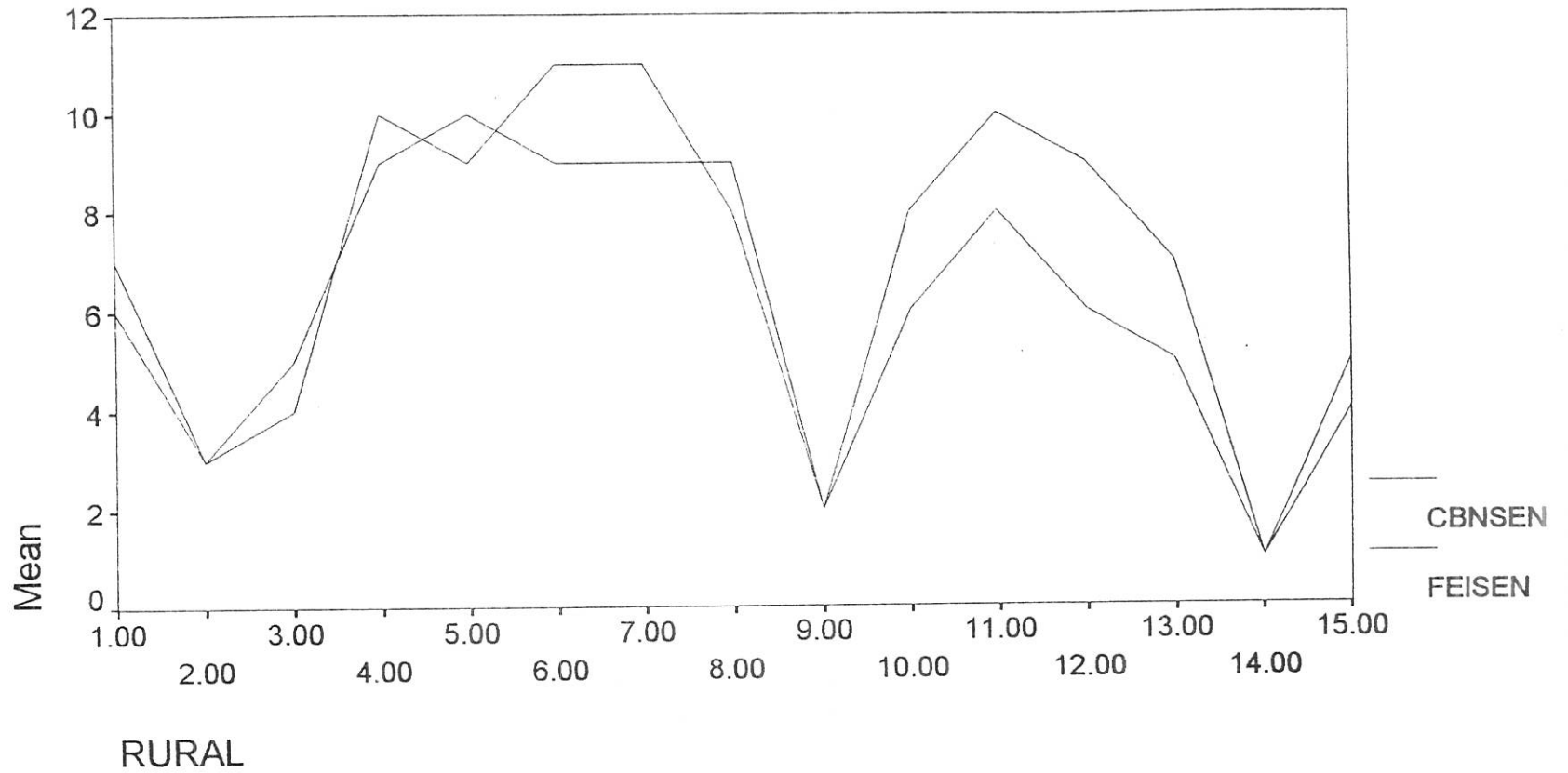


COMPARISON OF CBN and FEI POVERTY INDICES USING P2 INDEX

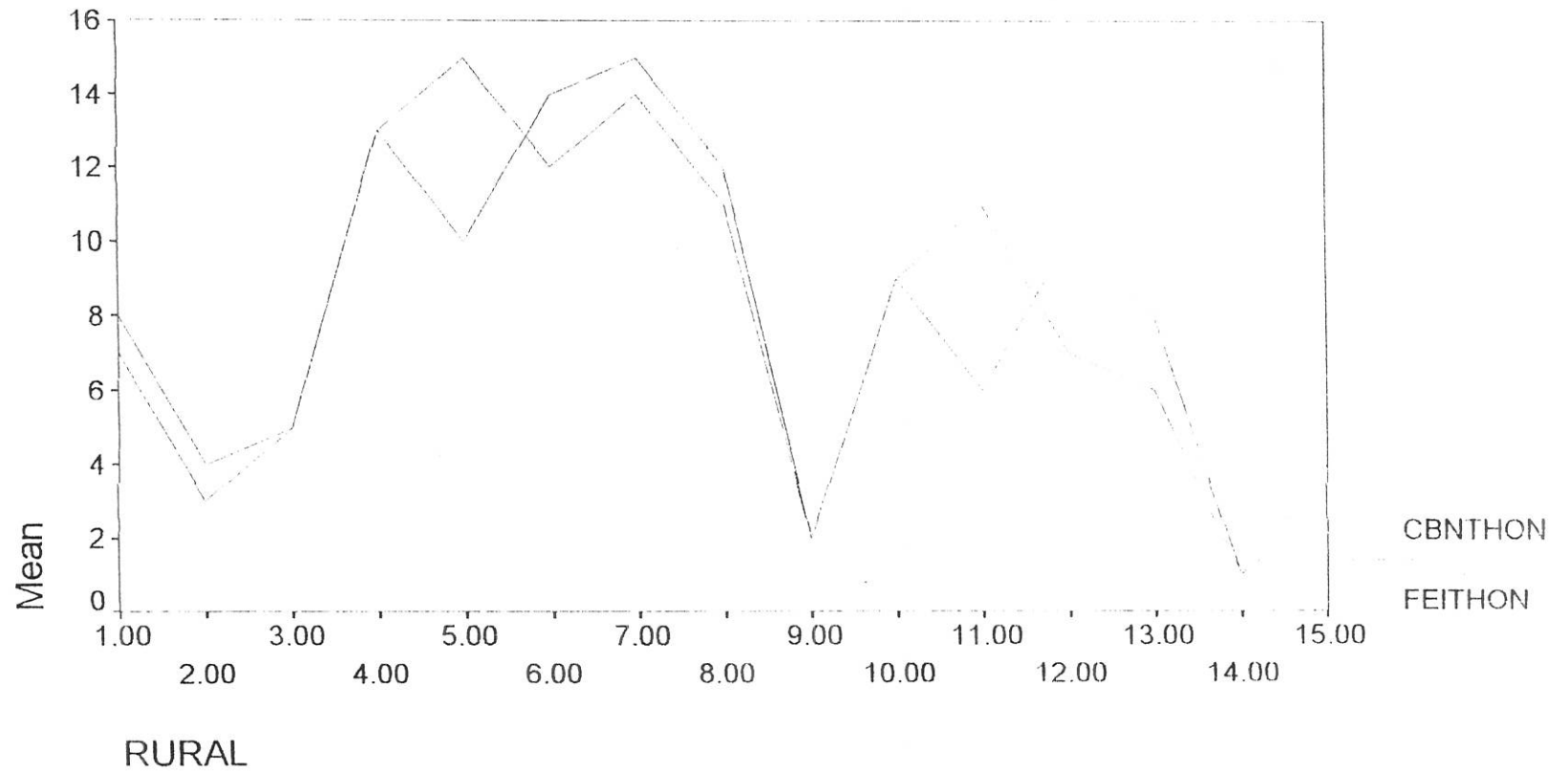


4/4

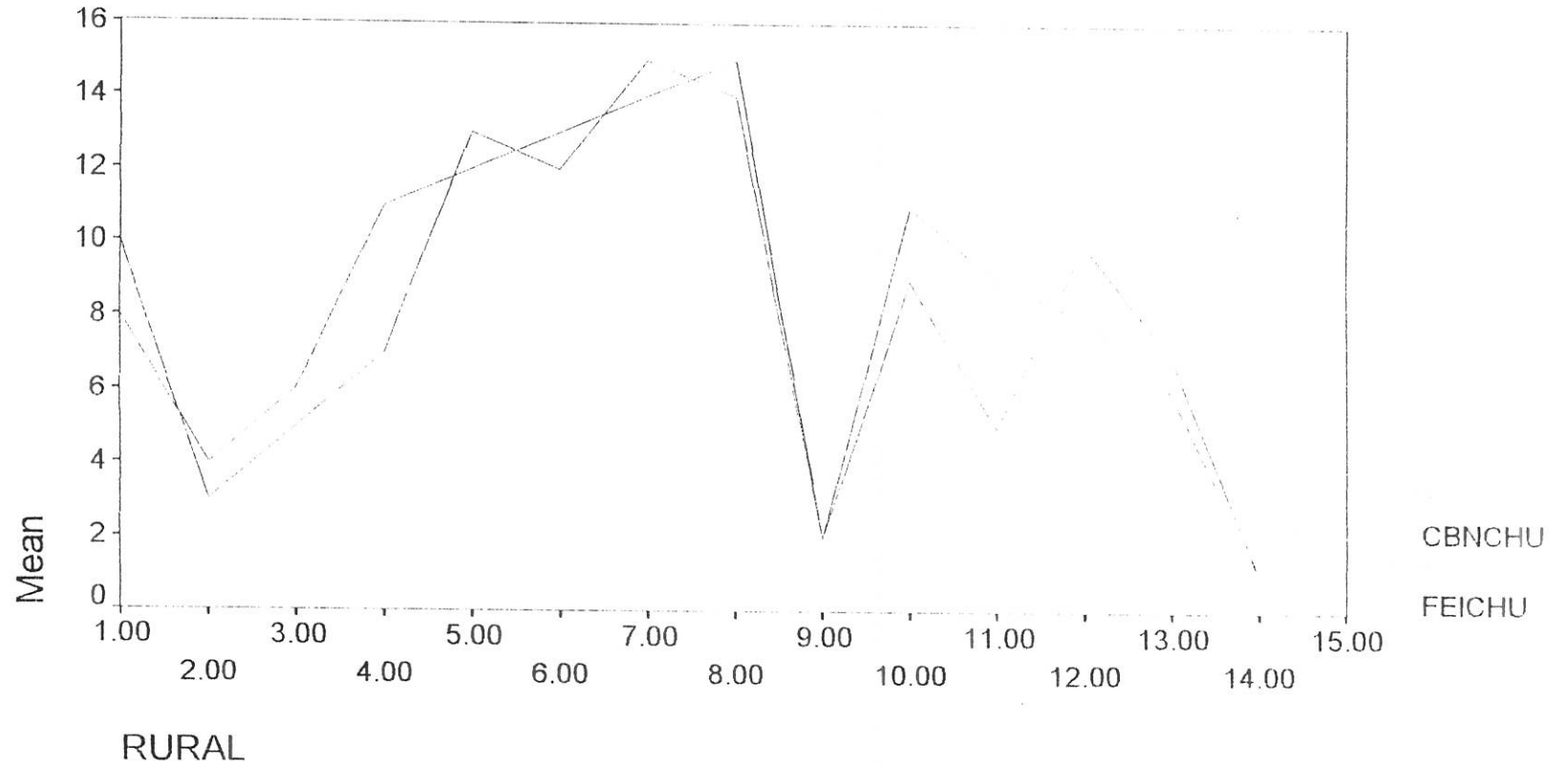
COMPARISON OF CBN and FEI POVERTY INDICES USING SEN INDEX



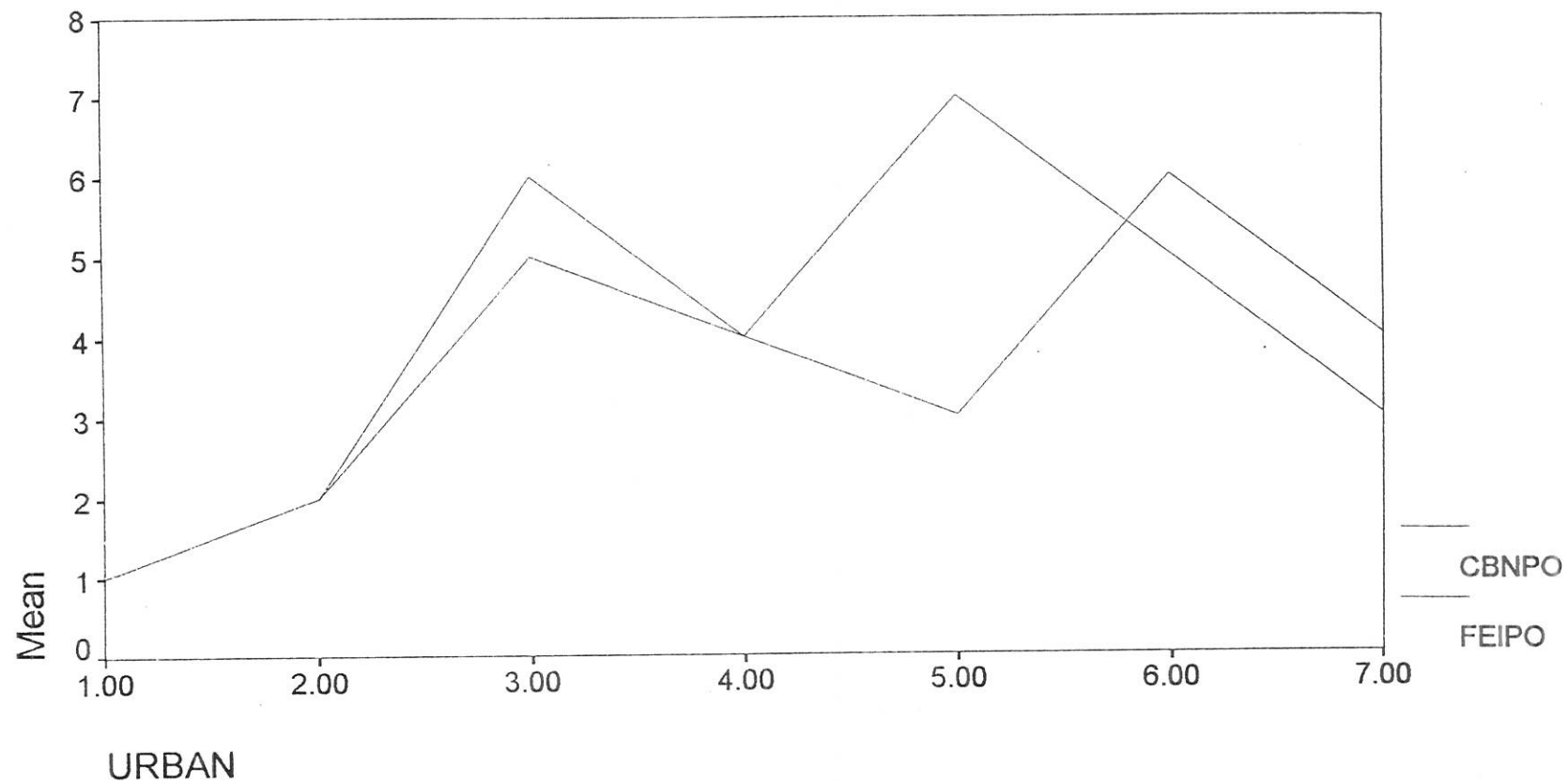
COMPARISON OF CBN and FEI POVERTY LINES USING THON'S INDEX



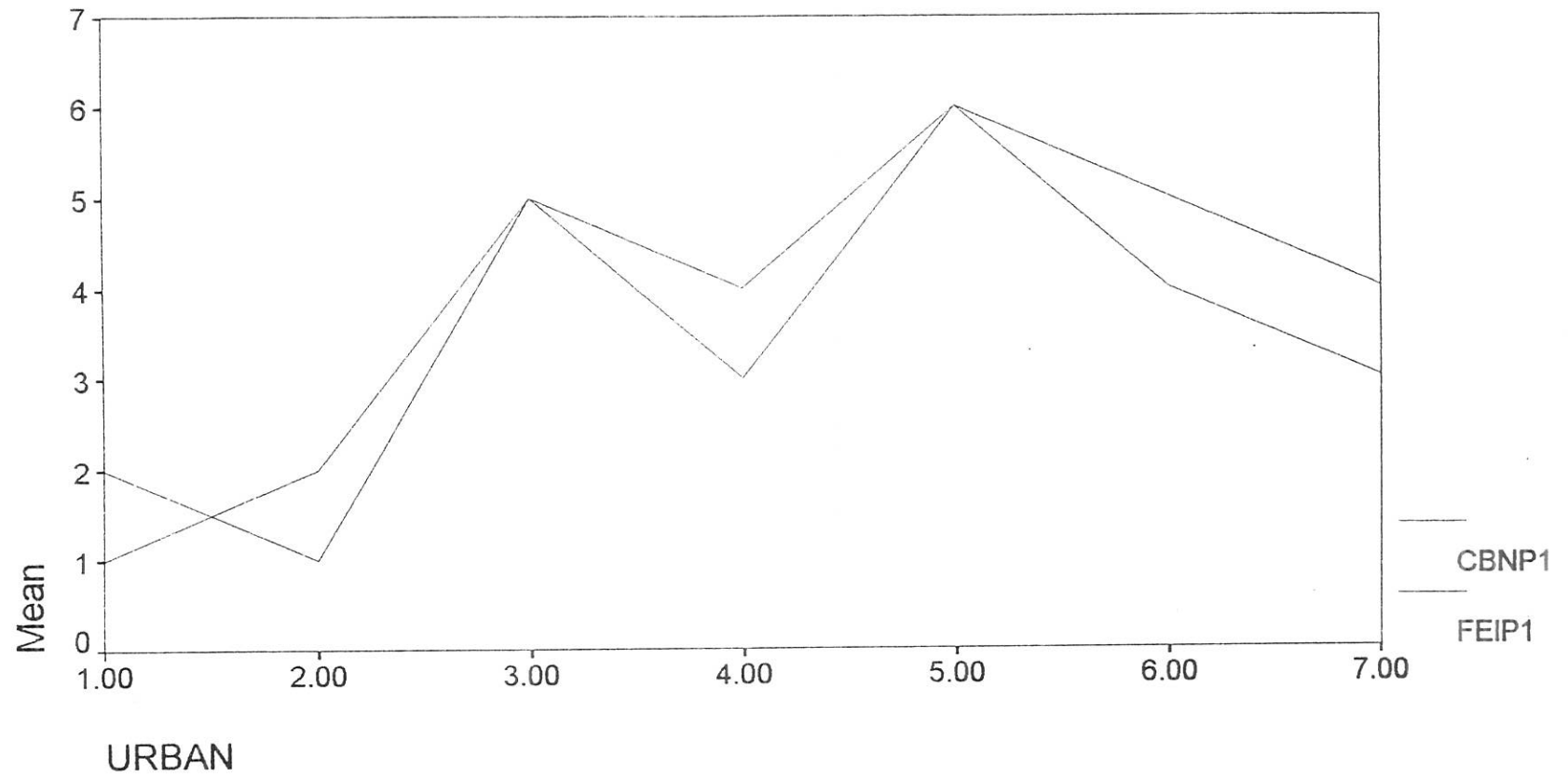
COMPARISON OF CBN and FEI POVERTY LINES USING CHU'S INDEX



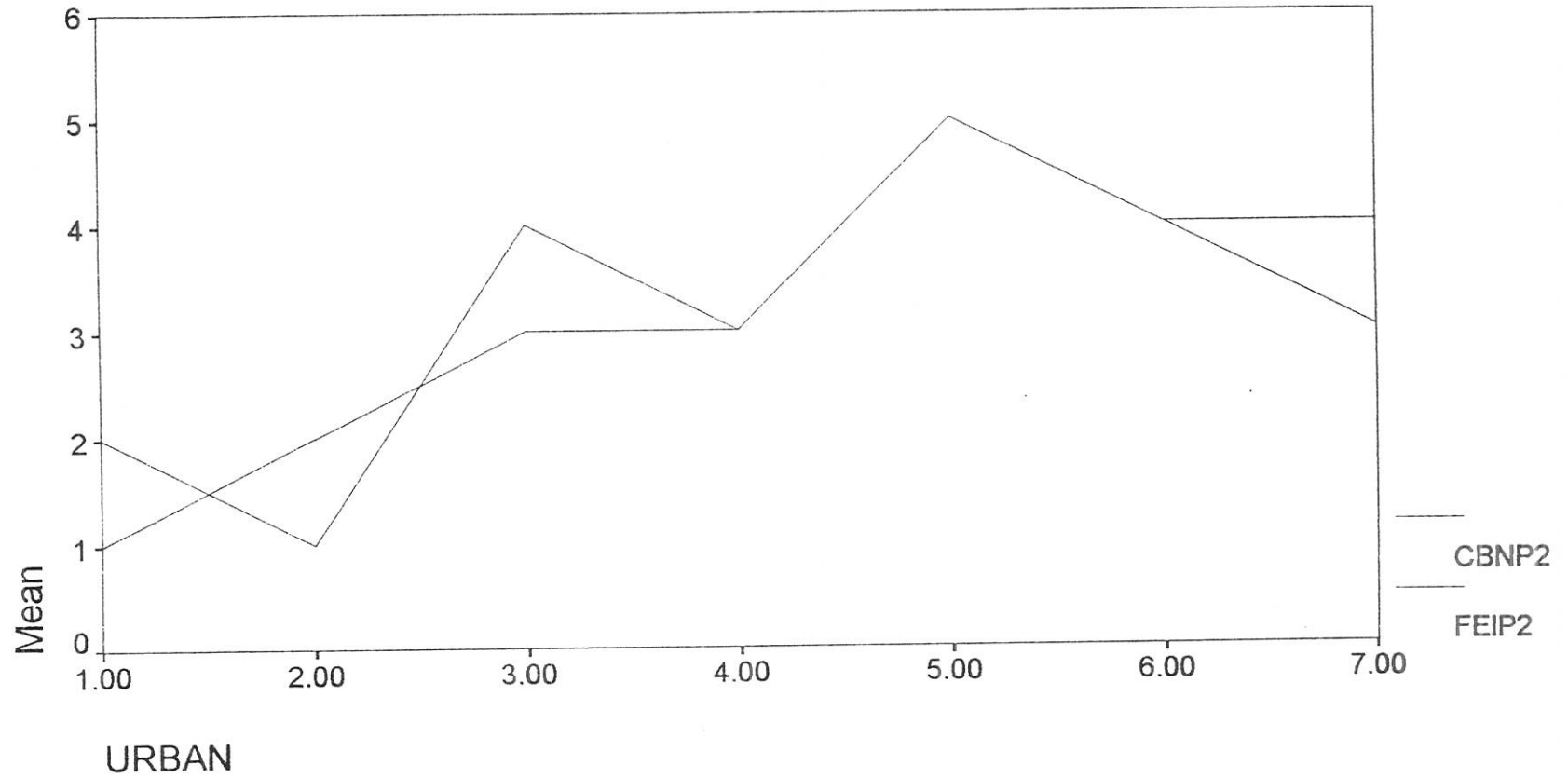
COMPARISON OF CBN and FEI POVERTY LINES USING P0 INDEX



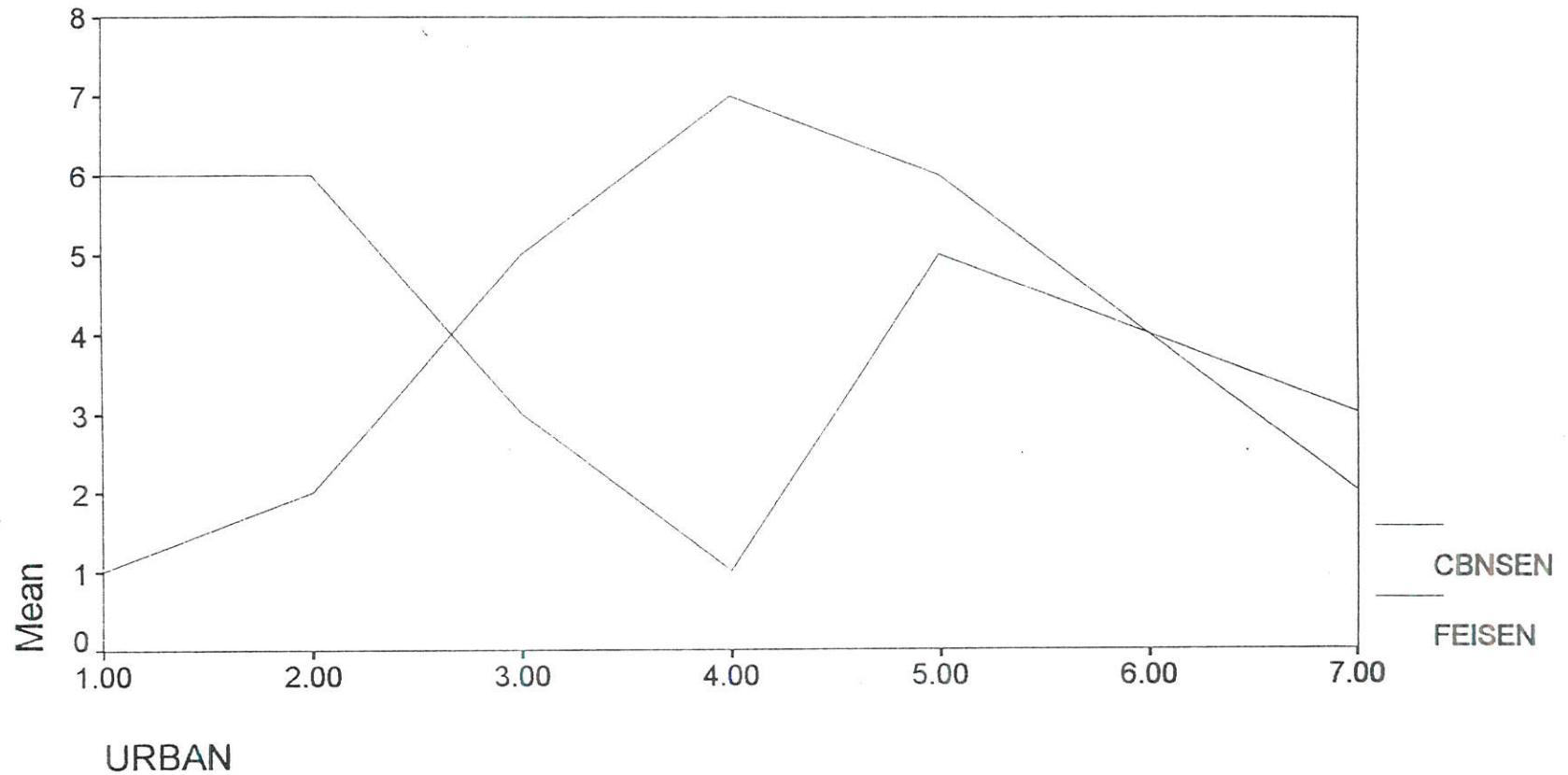
COMPARISON OF CBN and FEI POVERTY LINES USING P1 INDEX



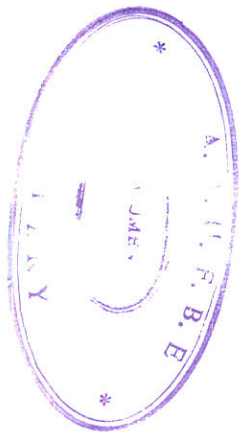
COMPARISON OF CBN and FEI POVERTY LINES USING FGT (P2) INDEX



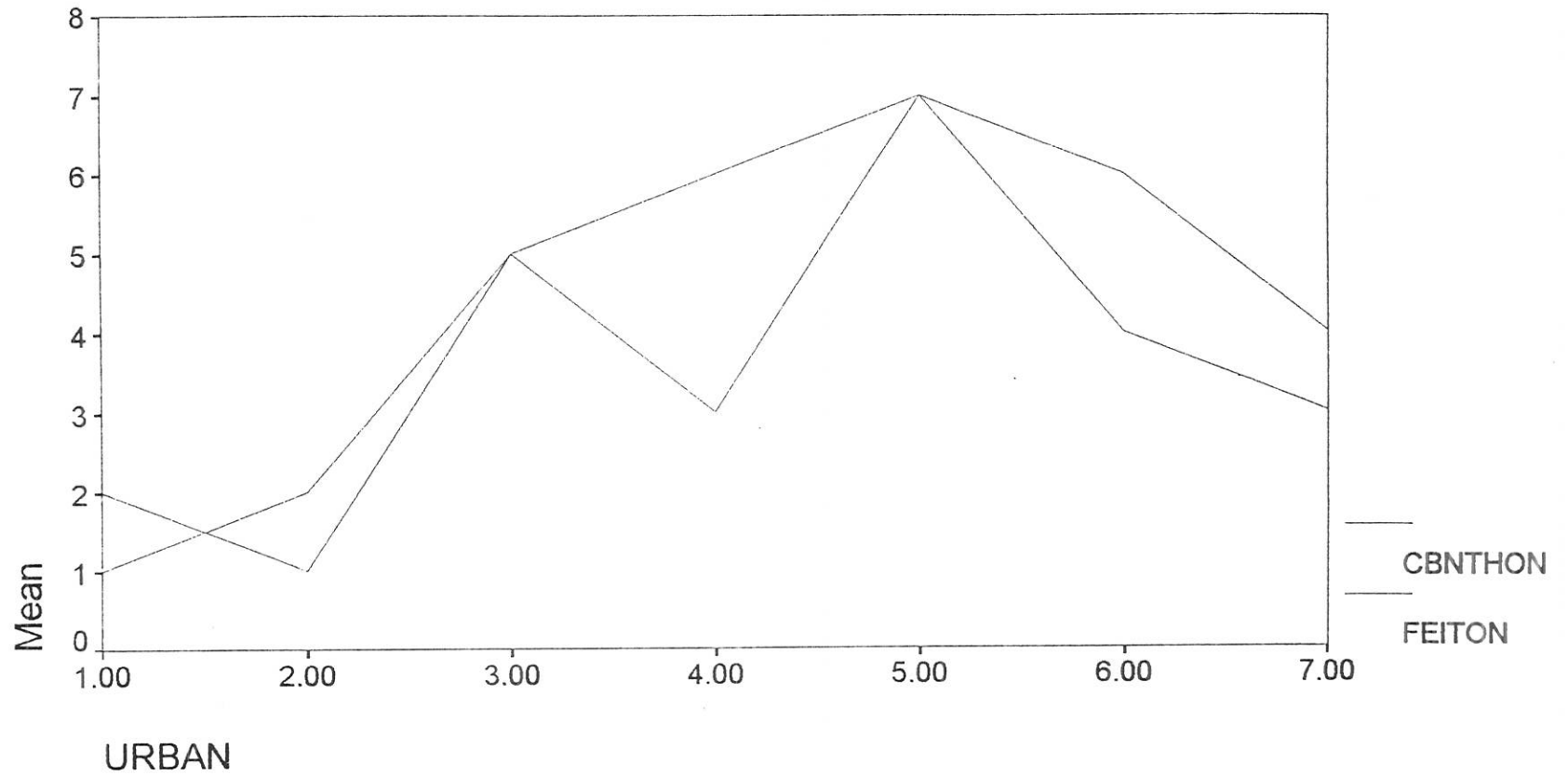
COMPARISON OF CBN and FEI POVERTY LINES USING SEN'S INDEX



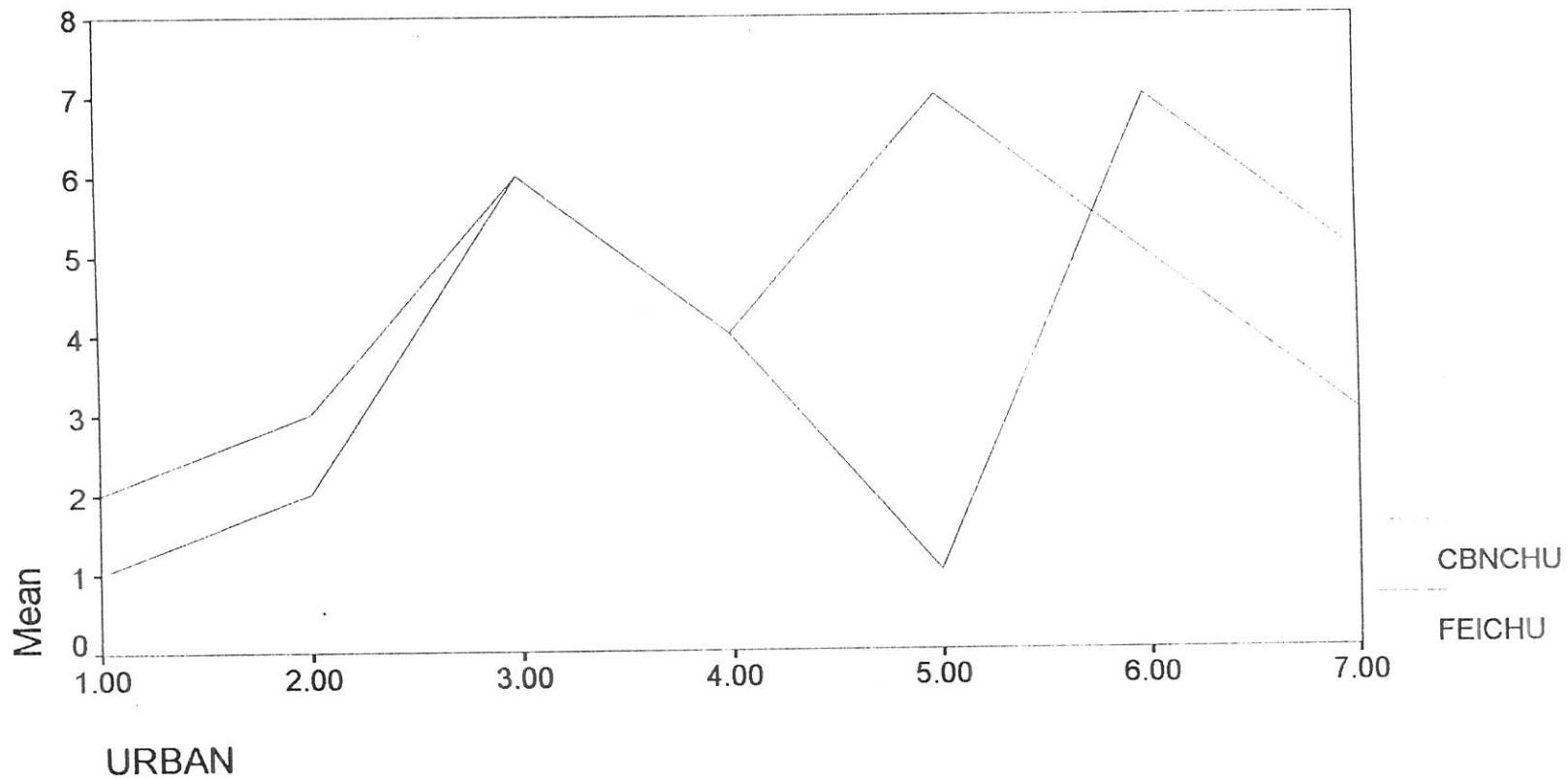
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COMPARISON OF CBN and FEI POVERTY LINES USING THON'S INDEX



COMPARISON OF CBN and FEI POVERTY LINES USING CHU'S INDEX



DECLARATION

I, the undersigned, declare that this thesis is my own original work and has not been presented in any University. All sources of materials for this thesis have been fully acknowledged.

Name: Elizabeth Woldemariam

Signature: 

Date: June, 1997

Place: Addis Ababa