THE RELATIONSHIP BETWEEN GROWTH, POVERTY AND INCOME

INEQUALITY:

AN ASSESSMENT OF THE PRO-POOR GROWTH OF SOFALA PROVINCE

DURING THE PERIOD OF 1996-97 AND 2002-2003

BY

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ABSTRACT

Mozambique like many other developing countries has faced lack of information and sometimes there is no detailed information about the poverty and inequality at district levels. This research investigates the quality of growth in Sofala province, a province which is located in the central region of Mozambique. Since the quality of growth comes from the analysis of poverty and inequality indicators, the research specifically investigates the relationship between growth, poverty and inequality thorough an assessment of the pro-poor growth of Sofala province during the period of 1996 to 1997 and 2002 to 2003.

The methodology used to analyze the pro-poor growth in Sofala province combines both, qualitative and quantitative data. A recent technique of Poverty Mapping that user Small Area Estimation which consists of combining two data sources: Census and Household Survey was used to estimate poverty and inequality class of measures at disaggregated geographical units such as districts. Applying the technique of Poverty Mapping, a Census of 1997 and IAF 1996 to 1997 and IAF of 2002 to 2003 data sources were combined to update poverty and inequality indicators of Sofala's 13 districts.

The welfare measures of interest, poverty and inequality class of measures were updated applying consumption model using the household expenditure of 8,604.391 Meticais a day. Once the estimates were computed, maps creation using the GIS information was straightforward. A number of maps concerning poverty, inequality and the assessment of these indicators during the period 1996 to 1997 and 2002 to 2003 were presented.

In general, the conclusion of this study shows that 59% of the districts have presented a pro-poor growth of 33% which presented an anti pro-poor growth, and 8% which present an inconclusive growth.

In order to reduce poverty in Sofala province in general there is a need to design policies of poverty reduction. Some of the following points have to be taken into account: agricultural performance, the number of existing schools, hospitals and food security. These are the variables that appear to explain poverty and inequality in the province of Sofala.

ACKNOWLEDGMENTS

DEDICATIONS

To my Father, Hassane Mussagy and Mother, Culsumo Issufo

To my Dear and Beloved Wife, Cátia Vanessa Mussagy

To my Beautiful daughters, Humayra Ayana Mussagy and Rayssa Chanila Mussagy

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ACRONYMS

BN   Basic Needs

CBN   Cost of Basic Needs

EA   The Enumeration Areas

EPM   *Enquête Permanente des Ménages*

FEI   Food Energy Intake

FGT   Foster-Greer-Thorbecke

FRELIMO   Frente de Libertação de Moçambique

GDP   Gross Domestic Product

GIC   Growth Incidence Curve

GIS   Geographic Information System

GLS   Generalized Least Square

GMM   Generalized Method of Moments

HPI   Household Specific Price Deflators

IAF   National Household Survey of Living Conditions

IFPRI   International Food Policy Research Institute

IHS   Integrated National Household Survey of Living Conditions

IMF   International Monetary Fund

INE   National Institute of Statistics

INPC	Consumer Price Index
MDG	Millennium Development Goals
MIQ	Minimum Income Question
MPF	Ministério do Plano e Finanças
NGO'S	Non Government Organizations
NPV	Net Present Value approach
PARPA	National Action Plan for the Reduction of Absolute Poverty
PBG	Bias of Growth
PEGR	Poverty Equivalent Growth Rate
PG	Poverty Gap index
PH	Poverty headcount index
PIG	Poverty-Growth-Inequality
PNAD	Annual National Household Survey of Living Conditions
PRE	Economic Recovery Program
PS	Priority Survey
PSU	The Primary Sampling Units
RENAMO	Resistência Nacional Moçambicana
SADC	Southern African Development Community
SES	Socio-Economic Surveys

SPG	Square Poverty Gap
SSA	Sub-Sahara African
SSPL	Social Subjective Poverty Line
UEM	Universidade Eduardo Mondlane
UNDP	United Nations development program
UNHS	Uganda National Household Survey of Living Conditions
VLSS	Vietnam Living Standard Surveys
WB	World Bank
WDR	World Development Report
WMS	Welfare Monitoring Surveys

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CHAPTER 1:

INTRODUCTION

1.1. Background to the Study

The relationship between economic growth and the change in the incidence of poverty or the people who benefit from that change in economic growth (pro-poor growth) is multifaceted because poverty is a complex and a multidimensional phenomenon. Despite this multifaceted relationship, the term pro-poor growth has recently become present in various discourses of development practitioners.

Mozambique, like many other developing countries, is currently focusing its developmental plans towards poverty reduction. The government still emphasizes on poverty reduction despite the fact that the country has reached a remarkable rate of growth in the recent past (Fox, et. al., 2005). Consequently, finding ways to reduce poverty and inequality class of measures between and among provinces is a huge challenge faced by the national policymakers.

Several studies have seen the type of relationship between increase in income, measured by the performance of the economy in terms of economic performance, and poor people, calculated using the number of people living under the poverty line, across countries over the years (Ravallion and Chen, 1997). Therefore, these studies have found a straightforward relationship between growth of per capita income and growth of income of poor households. In other words

an increase of 2 % in income leads to an increase of the same proportion of income of the poor. However, income inequality tends to have a different pattern in most cases and some countries with higher economic growth do not contribute much to poverty reduction. Conversely, others with lower economic performance have ensured a decrease in poverty; in other words the economic growth benefits the poor.

According to Ravallion and Chen (2000), in recent decades, the African continent has been one of the continents which have experienced low performance in terms of poverty reduction. In the period 1987 to 1998 the poverty incidence measured by the Poverty Headcount Index (PH) was about 50 % and the people who were living under the poverty line increased from 217 million to 290 million. This represents an increase in the number of poor people by 33.64 %. But in the 1990's the Sub-Sahara African (SSA) countries have registered some improvements in the macroeconomic management and poverty reduction, with a slight increase of 4 % in the per capita income. There are some significant regional or urban changes versus the differences in income in rural areas (Bigsten, 1980, Bigsten et. al, 2003).

A recent technique of poverty mapping using Small Area Estimation provides a way to estimate poverty and income inequality class of measures at disaggregated geographical units such as districts (*distritos*), administrative posts (*postos administrativos*), rural areas (*localidades*), and urban areas (*bairros*) in the country. With these useful estimates, the policy towards poverty growth evaluation and income inequality reduction can be achieved (Elbers et. al., 2002). In general, income inequality observed in urban areas in Africa, using Small Area Estimation, tends

to be higher than in rural areas. These scenarios make the task of some African countries difficult to achieve their first Millennium Development Goals (MDG) of cutting the proportion of poverty by half, as the proportion of people living on less than a dollar a day is high. Therefore, the PH indicator is expected to fall to 10 % by 2015, compared to 27.9 % in 1990.

1.2. Study Area

Geography of Mozambique

Mozambique is located on the eastern coast of Southern Africa, bordered in the north by Tanzania, Zambia and Malawi in the northwest, South Africa and Swaziland in the south, Zimbabwe in the west and in the east by the Indian Ocean. The northern half (north of the Zambezi River) is a large plateau, with a small coastal plain bordered by coral reefs which are bordered with montains ranges belonging to the system of the Great Rift Valley. The southern half is characterized by a wide coastal alluvium plain, covered by grasslands and valleys that are cut by several rivers, among which the most important is the Limpopo River (WFP, 2009).

The country is divided into three different regions namely: north, central and south. In these regions 10 provinces made part of this regionalization namely: Nampula, Cabo Delgado, Niassa, Sofala, Zambezia , Manica , Tete , Gaza , Inhambane and Maputo. The provinces are subdivided into 128 districts, the districts are also divided into administrative posts. Mozambique has

created 43 municipalities so far 10 were created in April 2008, which is a clear sign of growth of the country (http://196.28.235.11/publicacoes/Lista1.pdf).

Population

The last 2002 Census conducted in the country, has estimated the population of Mozambique to be about 22,000 million. It is a multiracial country with overwhelming black majority, however social tensions do not arise between different ethnic groups, but it occurs between the north (poor) and the south (more developed). Regarding the ethnic composition are spinefeet 46.1 %, 53 % Tsongos, Malavis and Chonas, and other 0.9 %. (National Institute of Statistics, INE, 2002)

About 30 % of the population is concentrated in the urban areas, and the remaining lives in the rural areas. The major cities are Maputo, the capital of the country located in the south, with 931,600 inhabitants, Beira, located in the central region, with 561.255 inhabitants and Nampula, in the north of the country, with 250,500 inhabitants. Despite the war, disasters and epidemics, the population growth rate continues to rise. Before independence in 1975, the total population of Mozambique increased from 6,603,651 inhabitants in 1960 to 8,168,933 inhabitants in 1970 (INE, 2002).

In 1960, the estimated white population was 97,268 people. In 1975, 2000 Portuguese who lived in Mozambique were mostly linked to civil service, and a few of them were on agriculture and small businesses. The Indian community in 1975, was linked to trade, they were estimated to be

between 20,000 and 30,000. At the time of independence, there was a small Chinese community of about 4000 people which was concentrated in Maputo and Beira and were mainly dedicated to small businesses. The black accounted to about 98% of the population (Abrahamson and Nilsson, 1995).

During the colonial period, the economic growth in Mozambique experienced a slow down. After independence in 1975, despite the good endowment and diversified resources, the economy was dependent on the service needs of South Africa and other neighbouring countries and it was full of income inequality. The war of independence was headed by Frente de Libertação de Moçambique (FRELIMO) against the Portuguese colonial forces.

From the Portuguese colonialism, Mozambique inherited a weak development of natural resources characterized by a high level of poverty of skilled human capital, when compared to other countries in Southern Africa. During this period, the national economy had a structure which was constructed to serve colonial interests; in particular the national economy that depended heavily on revenues from rail and port services and contracts for cheap labour to neighboring countries. As a consequence, the country emerged in a deep economic recession characterized by low level of productivity and growth. In attempt to reduce the impact of the recession, the Mozambican government introduced radical changes, including nationalization and socialization of the major means of production and economic and social infrastructure. Agriculture, which accounts for most of the human resources of the country, was designed as the basis for the development of industry and agricultures was the enabling factor. On the other hand

the restructuring of the economy, the patterns of socialist economy heavily controlled by the state, did not lead to economic recovery advocated by the Government (Abrahamson and Nilsson, 1995).

Two years after it gained its independence, Mozambique entered a fifteen-year period of civil war between FRELIMO and the Resistência Nacional Moçambicana (RENAMO). During the same period, the country experienced a transition period from a centrally planned economy based on socialist principles to market-led development encouraging the private sector rather than the state to take all decisions concerning economic growth and economic production (http://www.portaldogoverno.gov.mz/noticias/news_folder_politica/outubro2006/news_264_p_1 0_06/?searchterm=parpa)

The civil war damaged large part of the country's infrastructure, caused as many as 1 million deaths, and slowed down the economy. In October 1992, in Rome, the civil war ended in a peace agreement between FRELIMO and RENAMO and the country became a multiparty system, and had the first free elections in 1994. During this period, the agricultural and livestock production declined to alarming levels and survival of a significant part of the population had to depend on external food aid. The armed conflict that ravaged the country for about a decade and a half, not only destroyed economic and social infrastructure, but also did not allow a consolidation of the health and education programmes that had started in the early years of Independence. In the early 90s, the World Bank ranked Mozambique as the poorest country in the world, because its per capita income had decreased to about 80 U.S. dollars (Abrahamson and Nilsson, 1995).

However, from the mid-80s, the government began a program of economic reforms and dialogue with the main international economic institutions, namely the World Bank (WB) and International Monetary Fund (IMF) in order to reactivate the economy of Mozambique. These reforms were introduced in 1987 by the structural adjustments guided by the Economic Recovery Program (PRE). The programmes undertaken by the IMF such as Structural Adjustment Programmes (SAPs) has focused on the main objective of the recovery of developing countries' economies. These programmes have been implemented by the IMF since 1980s. They were designed by the International Monetary Fund (IMF) and the World Bank (WB) and imposed as a condition for further loans. Despite the civil war which affected the country during this period, Mozambique experienced a slight economic growth during this period (Wuyts, 1995).

The main objectives of the Economic Recovery Program (PRE) were to

1. Reverse the decline in production,

2. Ensure a minimum level of consumption and income, especially for the rural population,

3. Reduce financial imbalances,

4. Strengthen balance of payments position and

5. Create the conditions for economic growth.

According to Todaro and Smith (2006), the IMF (International Monetary Fund) stabilization programmes consist of correcting macroeconomic instability and promoting stabilization of policies. These stabilization programmes have four basic components:

- Liberalization of foreign exchange and imports control

- Devaluation of the official exchange rate

- Stringent domestic anti-inflation program

- Opening up of the economy to international commerce

According to National Institute of Statistics, INE (2002), during the 90's the country experienced a successful effort on political and economic levels. The Government's commitment to economic reform resulted in a growth control in the economy and financial mechanisms and reactivation of domestic production. As a result, in 1994, the annual rate of inflation reached over 70%, in 1996 it had decreased to about 17% and, in 1997; there was strong evidence that drops to a single digit. Moreover, the exchange rate have stabilized, economic growth has increased substantially over the past two years (Table 1.1).

Table 1.1: Macroeconomic indicator for Mozambique

	1995	1996	1997	1998	1999	2000	2001
Gross Domestic Product (in millions of Meticais-MZM)	21,590	32,719	39,819	46,908	51,915	58,905	74,675
Growth rate	4.3	7.1	11	12.6	7.6	1.6	13.9
GDP per capita	2,39	2,90	3,45	3,96	4,09	3,75	3,61
Inflation rate	57%	16.20%	5.90%	2%	6.20%	11.40%	21.90%
Exchange rate (USD/MZM)	15.5	15.8	16.1	16.5	16.8	17.2	17.6

Source: INE (2002)

The benefits from the IMF stabilization programmes had not been shared uniformly. The first component of the stabilization program, liberalization of foreign exchange and imports control, has promoted a small sector of the peasantry, the renewed functioning of official market channels, and the improved supply of goods. The failure of this structural adjustment is highly

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attributed to the civil war and climatic conditions. Reliable statistics are not yet available, but existing evidence indicates that after 1987, unfavorable terms of trade had prevailed. The combination of war and the PRE led to the near collapse of the social sectors, in particular health and education (Bowen, 2000).

The Gross Domestic Product (GDP) varied considerably during the 1995 to 2011. It has been markedly less volatile than total revenue growth. Continuous economic growth only really began after 1996 to 2008. Mozambique has experience decades of conflict. After the civil war, the country emerged in Africa as one of the best-performing economies in the Southern African Development Community (SADC) region. After the independence, in 1975, Mozambique inherited an economy characterized by high levels of poverty and low levels of productivity in several sectors of the economy. Then between 1996 and 2008, after the signature of the General Peace Agreement, Mozambique has reached an annual rate of growth, measured by the Gross Domestic Product (GDP), of 8% per year, the highest growth rate among African oil-importers (INE, 2002). This resulted in improvement of the level of poverty guiding more than a million people being lifted out of the poverty line (Figure 1.1).

When the civil war ended in 1992, the country experienced a great recovering in all sectors of the economy stimulated by the peace. The sustainable annual growth rate continues and has reached 8% since 1996 until 2008. This growth rate lead to a poverty reduction by 15 percentage points between 1997 and 2003, raising about 3 million people above the extreme poverty line (of a total population of 20 million). This has meant a reduction in 35 % of infant mortality rate and an increase of 65 % of primary schooling. To maintain this impressive performance, new

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investments and reforms to improve the business environment were needed. This made the legal and judicial sector more effective, and strengthened the management of public finances and the overall governance framework, decentralize and streamline the delivery of essential services, especially in rural areas. It is still a huge challenge to reduce the high rate of HIV infection, currently rated at 16 %.

Figure 1.1: GDP of Mozambique in Billions of USD from 1970-2010
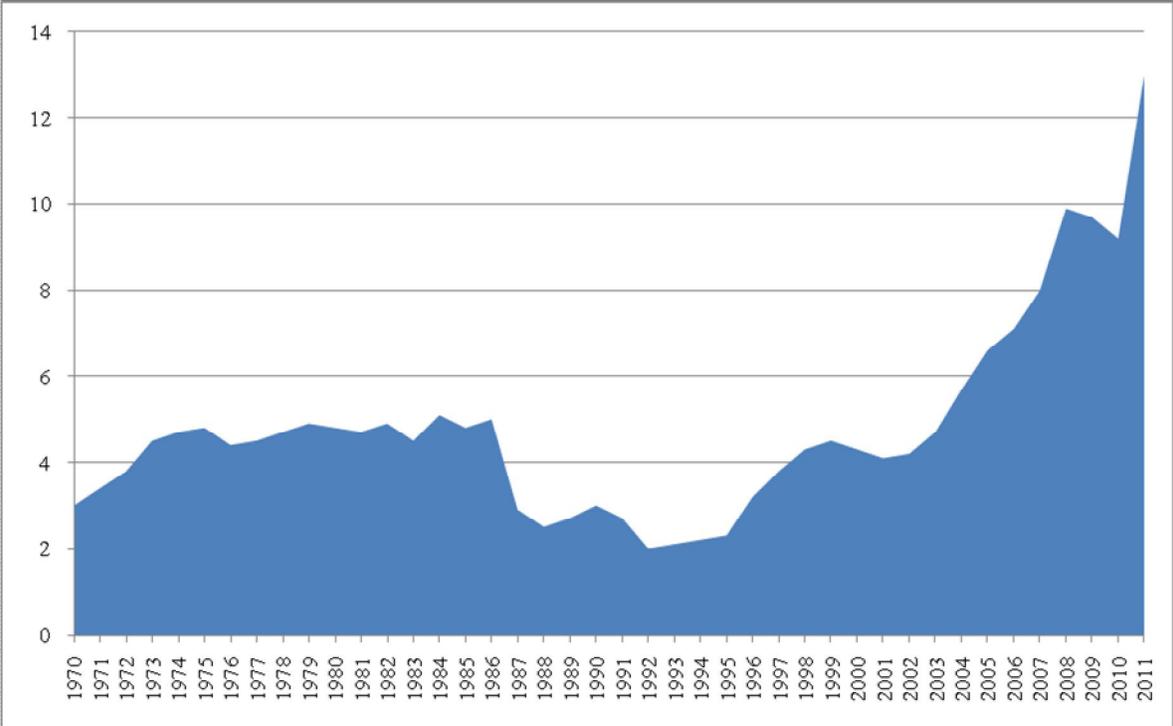
INE (2008). Anuario Estatistico.

Progress towards reaching the goals has been uneven. Some countries have achieved many of the goals, while others are not on track to realize any. Progress has been made toward the MDG key of reducing infant mortality rate and increasing primary school enrollment (Byiers, 2005). The main achievements include improvements in education, external debt management, financial

sector reform, improvements in water availability, rising health standards and rebound in agriculture (World Bank, 2005).

The geographical location of Mozambique has posed several challenges to the country. The occurrence of natural disasters such as floods, cyclones, drought and economic impact of HIV/AIDS had a significant impact on people and the economy. These are some of the main risks to the achievements of Mozambique on poverty reduction strategy (United Nations development program, UNDP, 2009).

Mozambique has been affected by heavy and persistent rain which resulted in the floods in 2000. The persistent rains across the country at the same time lead to flooding on main rivers in Mozambique namely, Limpopo, Incomati, Umbeluzi, Save, Buze and Pungue rivers. The results of this flooding were terrible leading to several deaths, people were displacement from their homes, and in general 4.5 million were affected. The flooding devastated the agricultural sector, partly because of the prolonged nature of the inundation in some areas. These scenarios influenced the authorities to change policies towards more active state intervention in the economy. In 1996 to 1998 the GDP of Mozambique, using the real prices, started registering an accelerated growth (WFP, 2013). In the period 1996 to 1998 the GDP of Mozambique at real prices grew by about 3.6 % and in subsequent period, it slightly increased by only 2.32 % (Figure 1.1).

The recent positive aspects of the Mozambican economy are: strong control of inflation and exchange rates, the increase in per capita GDP; recovery and consolidation of agricultural and industrial activities, growth in exports and growing investor interest in the country, both

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domestic and foreign. However, there are still many unfavorable and negative aspects of the Mozambican economy (IMF, 2013).

Despite the significant economic growth achieved during the period described in the preceding section, more than 50 % of the population in Mozambique still lives under the poverty line (Table 1.2). The PH index was fixed at 69.1 % in 1996 but this number considerably decreased in 2002 to 54.1 % (PARPA II).

Table 1.2: Poverty Measures in Mozambique by Province

Measures	*Poverty Headcount*			*Poverty Gap*			*Squared Poverty Gap*		
Provinces	*1996*	*2002*	*%*	*1996*	*2002*	*%*	*1996*	*2002*	*%*
All	69.1	54.1	-21.7	28.6	19.9	-30.4	15.1	9.9	-34.4
Urban	61.7	51.6	-16.4	25.8	18.9	-26.7	13.9	9.0	-35.5
Rural	71.0	55.2	-22.3	29.3	20.4	-30.4	15.4	10.3	-33.1
Niassa	69.9	49.5	-29.2	29.1	14.5	-50.2	15.3	6.2	-59.5
Cabo Delgado	56.8	62.8	10.6	19.2	20.8	8.3	8.8	8.9	1.1
Nampula	68.7	53.6	-22.0	28	18.7	-33.2	14.7	8.6	-41.5
Zambezia	68	45	-33.8	25.2	13.4	-46.8	11.7	5.6	-52.1
Tete	80.3	58.7	-26.9	38.5	25.7	-33.2	22.2	14.9	-32.9
Manica	62.3	44.4	-28.7	23.3	16.8	-27.9	11.1	9.1	-18.0
Sofala	*88.2*	*34.1*	*-61.3*	*48.9*	*10.1*	*-79.3*	*31.8*	*4.1*	*-87.1*
Inhambane	83.2	34.1	-59.0	37.4	42.1	12.6	20.2	25.8	27.7
Gaza	83.8	81.1	-3.2	23.2	19.9	-14.2	11.1	8.8	-20.7
Maputo	65.4	59.7	-8.7	27.4	30.9	12.8	14.5	16.9	16.6
Maputo City	47.3	53.2	12.5	15.7	20.1	28.0	7.3	9.8	34.2

Source: Fox, Louise et. al. (2005)

Therefore, the other two measures of poverty from the class of Foster-Greer-Thorbecke (FGT)[1] fell in general; the Poverty Gap (PG) index decreased to 30.4 % and the Square Poverty Gap (SPG) index fell even more, to about 34.4 %. Therefore, the results suggest that the growth was broad in Mozambique due to a decline in the measures of poverty (Table 1.2).

After the civil war of 1977 to 1992, the country experienced a general lack of data. The existing data is based on the National Population and Housing Census known as *I Recenseamento Geral da População e Habitação* undertaken in 1980. The 1980 Census data covered, in general, aspects related to social characteristics of the population. The main issues considered in the questionnaire were the social characteristics of the families, labour force, education, housing characteristics, standard of living and migration.

However, due to this lack of data, the National Institute of Statistics known as *Instituto Nacional de Estatística* (INE) carried out the first National Household Survey of Living Conditions known as *Inquérito Nacional aos Agregados Familiares Sobre as Condições de Vida* (IAF) conducted in 1996 to1997. This instrument collected data on household information on living conditions at individual household and community levels. This household survey collected information on household's expenditures. In addition, the Second National Population and Housing Census known as *II Recenseamento Geral a População e Habitação 1997* were conducted. The Census of 1997 collected information on a range of aspects including household characteristics, labour force, education and agricultural possessions (MPF/UEM/IFPRI, 1998).

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[1] It belongs to the well-known Foster-Greer-Thorbecke (FGT) class of measures. Foster, Greer and Thorbecke (1984) famously showed that this class of poverty measures has a unique set of convenient properties.

However, using IAF of 1996 to 1997, a national poverty assessment was conducted and a poverty profile was done by the *Ministério do Plano e Finanças/ Universidade Eduardo Mondlane*/ International Food Policy Research Institute (MPF/UEM/IFPRI) in 1998. The national poverty assessment report was a key input for the National Action Plan for the Reduction of Absolute Poverty known as *Plano de Acção para a Redução da Pobreza Absoluta para 2000 to 2004* (PARPA I). The main objectives that drive the national poverty assessment were:

1. To predict the level of absolute poverty,
2. To draw the poverty profile of the poor people,
3. To identify the vulnerable groups,
4. To formulate policy actions to reduce the level of poverty, and
5. To develop human and resource capacity within Mozambique to analyze poverty.

In 1999, the International Food Policy Research Institute (IFPRI) developed a proposal to construct poverty Maps for Mozambique. Simler and Nhate (2002) used the information from IAF 1996 to 1997 and Census of 1997 to estimate poverty and income inequality class of measures, from the entire country, using the consumption per capita as a proxy. Based on their estimates, maps displaying poverty from the class of FGT including the Poverty Headcount index (PH), the Poverty Gap index (PG) and the Squared Poverty Gap index (SPG) or Severity of Poverty and the income inequality class of measures were constructed.

Most of the population that lives under the poverty line was concentrated in rural areas (Table 1.2). In both periods the PH index in rural areas was slightly higher compared to the poverty in urban areas. It can be fairly stated that in Mozambique, like many other African countries, poverty is a rural phenomenon. Agriculture constitutes the population's main source of food and income. But these rural communities are extremely vulnerable to natural disasters such as droughts and floods, which recur particularly in the southern and central areas of the country. Therefore, this natural phenomenon considerably affects the level of poverty and income inequality in the country (Bigsten, 1980, Bigsten et. al., 2003).

In Mozambique, income inequality varies considerably across regions, provinces or areas. The level of income inequality that prevailed in the country during the period of 1997 was considered to be high whichever income inequality class of measure was used. The national level of the GINI coefficient was 0.40 which was in line with some Sub-Saharan African countries such as Uganda (Simler and Nhate, 2002).

Geography of Sofala province

The study was conducted in Sofala province. Sofala Province, one of the ten provinces of Mozambique, is one of the three that does not have borders with the Hinterland. It is surrounded on the north of the province by the Zambezi River, which separates it from the provinces of Tete and Zambezia (305 Km). The southern boundary lies Inhambane, along the Save River (135 km). The West is Manica (650 Km).

The east of Sofala province lies the Indian Ocean (330 Km). In general, the whole coastline and the southern province are flat. In the central interior of the province are mountains among which stands out are the Gorongosa. Along the Zambezi river are delta plains (INE, 2008).

Sofala province is divided into 11 districts: Cidade da Beira, Buzi, Caia, Chemba, Cheringoma, Chibabava, Dondo, Gorongosa, Machanga, Maringue, Marromeu, Muanza and Nhamatanda

Map 1.1: Mozambique and Sofala Province

Source: INE (2008)

Population

The size, structure and growth of the population of a given territory are basic variables in demographic analysis. The population size refers to the number of people residing within an area and growth of that size changes within time. The structure is simply the composition of the population by sex and age (Eduardo, 2005). In 1997, the Census conducted in the country surveyed in Sofala province 1,289.4 thousand people of which 41.2% live in urban areas and 58.8% in rural areas. The city of Beira, capital of the province, accounts for almost one third of the total population. Other numerous districts are Buzi (11.1%), Nhamatanda (10.7%) and Dondo (9.1%). The population pyramid is the most common form to graphically display the structure of the population (Antonio, 2010).

The pyramid model observed in most countries with high rates of fertility and mortality has a base with expansive bars that correspond to the five year groups arranged in a ladder. Figure 1.2 shows the pyramid corresponding to Sofala province.

It can be seen that this pyramid fits the typical model, except by small irregularities. For example, in the case of males, the bars correspond to the 40-44 age group and 45-49 years old have similar length. In the case of women this happens with bars corresponding to the age groups 10-14 and 15-19.

Figure 1.2: Pyramid of Population age Range
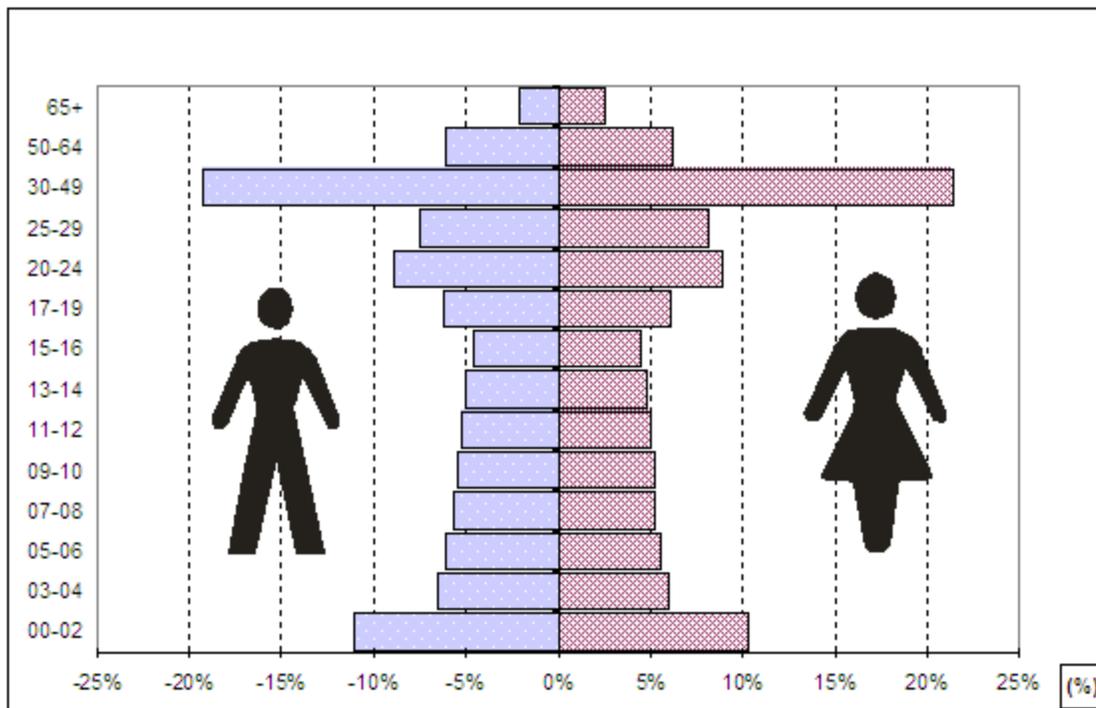
Source: INE (1997)

However, the pyramid has a fairly classical population of fecundity and high mortality (INE, 1997). The population of Sofala province is very young according to what can be observed in the graph of age groups (Figure 1.2), due to the high birth rate experienced by this population in previous years. There are approximately 277,576 children under five years of age, compared to 37,864 people over 65 years.

During the period 1980 to 1997, the population of the Sofala Province increased by 224.2 thousand inhabitants, which represents an increase of 21.0 %. In this period the average annual growth was 1.1 %, lower than that of the country (1.7 %). With this growth rate, the doubling time of the population of Sofala Province is almost 61.7 years. In the considered period, the rural

population decreased from 834.5 thousand to757.6, thousand i.e. in 76.9 thousand people (- 9.2 %), the average annual rate of growth was -0.6% (INE, 1997).

Nevertheless, during the same period in urban areas population increased from 230.7 thousand to 531.8 thousand, the average annual growth was 4.9 %. High immigration, especially by men, suggested high masculinity index observed in these areas are one of the reason of this high population growth. It is worth mentioning that the growth of the urban population and the negative growth experienced by the rural population, suggests that urban areas seem to have attracted not only immigrants from rural areas but also from outside the province (INE, 1997).

Education

Sofala province currently has 711 primary schools, of which 34 are private. Nearly 287,825 students are enrolled of these, 10,988 corresponding 3.9 % are in the private schools. The estimates of the current population in this age groups, ranges from 300-350 thousand children. At secondary level, the network is composed of 14 schools, covering the city of Beira and 6 districts, covering a student population of more than 15,210 students and 1,059 teachers. In addition to the public schools there are 25 private schools establishments. At the middle level of vocational technical education level, there are two installations in Beira, teaching various technical courses, none of which is agrarian (MNED, 2004).

Health Care

The provision of health care in Sofala province is essentially guaranteed by the public sector. The province has 1 central hospital, 6 rural hospitals in operation, 87 health centers and 88 health clinics. HIV Prevalence Rate in the province is 26.3 % (World Bank, 2000).

Immediately after the civil war, from 1996 to 1999, the country was characterized by a strong increase in per capita income. During this period the average GDP per capita was USD 241. Seasonal floods took place in 1999 and devastated the agricultural sector and inundated some areas. Thousands of hectares of crops in inundated areas were destroyed and seriously damaged in the whole of Mozambique. In Sofala province, in particular, 18 % of the population was seriously affected and the average GDP per capita experienced a contraction due to the tragic floods (World Bank, 2000).

However, poverty is also largely a rural phenomenon in Sofala province, the same as the vast majority of provinces. Poverty measurements are relatively high in most of the districts such as Marromeu, Maringue, Chibabava, Chemba and Caia (Table 1.3). Before the floods, the majority of the population lived under conditions of extreme deprivation, when measured both in terms of consumption and other basic elements of development. However, the high level of poverty worsened the existing conditions in most of Sofala's 13 districts. This classified the poverty rate quite high in Sofala province as compared to other provinces. Despite the high poverty level in 1996 to 1997, the province performed well in terms of the same indicators in the period, 2002 to 2003. Accordinh to PARPA II (2011) poverty measures from the FGT class of measures at the

provincial level decreased considerably: the PH, PG and SPG indices decreased by 0.61, 0.79 and 0.87, respectively (Table 1.3).

Table 1.3: Poverty in Sofala in 2002

Codes	Districts	PH	PG	SPG
1	Cidade da Beira	0.39	0.13	0.15
2	Buzi	0.24	0.65	0.07
3	Caia	0.40	0.09	0.10
4	Chemba	0.59	0.18	0.20
5	Cheringoma	0.31	0.09	0.10
6	Chibabava	0.49	0.15	0.17
7	Dondo	0.36	0.09	0.10
8	Gorongosa	0.30	0.08	0.09
9	Machanga	0.23	0.07	0.08
10	Maringue	0.46	0.12	0.13
11	Marromeu	0.41	0.74	0.08
12	Muanza	0.13	0.31	0.03
13	Nhamatanda	0.26	0.61	0.06
	Sofala province	*0.34*	*0.10*	*0.04*

Source: IAF 2002-2003

The pattern of income inequality in Sofala province was closely similar to the national pattern. The GINI coefficient was 0.40 which was in line with the national level of income inequality (Table 1.3).

1.3. Statement of the Problem

Almost all the countries have accepted that the main objective of economic and social development is the reduction and consequently elimination of poverty. This is also one of the main objectives of the Mozambican government's medium term programme.

The PARPA II explained in more detail the commitment of poverty reduction from 54 % in 2003 to 45 % in 2009. Particularly, the results from the first and second National Assessment of Poverty in Mozambique, communicated that poverty reduction was greatest in the centre of Mozambique. This movement of changes in poverty reduction was driven by one of the provinces in the region; Sofala province.

However, most of the programmes on poverty reduction fail to reach the desired objective, to reduce poverty at district levels, and the gains from these policies are rather small. The technique of Small Area Estimation allows space for the estimation of poverty and income inequality at disaggregated geographical units.

However, Sofala was one of the provinces with the highest number of people living under the poverty line in the first National Household Survey of Living Conditions; IAF 1996 to 1997. In

the second National Household Survey of Living Conditions, IAF 2002 to 2003[2], the province registered one of the main reductions in the PH index.

The poverty reduction was greatest in this province especially in rural areas; thus there were two opposite outcomes in two different periods. In this period, the PH indexes declined from 88.2 % to 34.1 % while the PG and the SPG indices declined by 79.3 and 87.1 %, respectively.

Therefore, looking at these measures and following an absolute definition of the term pro-poor we can infer that this falls in the poverty measures is broad based and pro-poor. However, this conclusion is somewhat misleading due to lack of consideration in relative terms of poverty. It is also necessary to see whether or not the income inequality remained the same or fell, using the poverty and income inequality class of measure at disaggregate levels.

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[2] The abbreviation IAF derived from Portuguese name for the survey, *Inquérito aos Agregados Familiares,* or Household Survey.

1.4. Aim and Objectives

The aim of the study is to undertake an analysis of the relationship between economic growth, income inequality and poverty in Sofala province. These indicators allow the description of the actual profile of poverty in Sofala province in 1996 to 1997 and 2002 to 2003. To achieve the aim, four objectives have been identified to guide the rest of the thesis:

1. To estimate the poverty and income inequality class of measures

2. To use poverty maps for mapping poverty and income inequality among the districts

3. To analyze if the economic growth in Sofala province has been pro-poor

4. To recommend an effective strategy of poverty reduction

1.5. Hypotheses

The decline in measures of poverty in Sofala province highlights the central question addressed in this study: "Has economic growth in Sofala province been pro-poor?" To answer this question two possible hypotheses were formulated:

1. Null Hypothesis: The economic growth has been pro-poor in Sofala province.

2. Alternative Hypothesis: The economic growth has been non pro-poor in Sofala province.

1.6. Significance of the Study

A number of studies conducted by many researchers have been concerned with the poverty measures in Mozambique. Very few researchers have tried to observe the relationship between poverty and economic growth in Mozambique and particularly in Sofala. However, this study is

an attempt to fulfill this existing gap and it seeks to measure progress, as accurately as possible, progress in the fight against absolute poverty and income inequality changes in Sofala province. Naturally, based on the results of this study, a number of policies can naturally be made by the local government in the future and it can be strongly used by Non Government Organizations (NGO's) especially, those that are working to eradicate poverty and reduce income inequality in the province.

The discourse of poverty reduction in Mozambique has become a top priority of the policy agenda. The main objective of the Government's medium term economic program is to reduce poverty by 50 % by the end of the decade. This would be possible by delegating a certain level of authority at district levels.

A limited number of studies conducted by some researchers, Simler and Nhate (2002) and Elbers et. al. (2004a), were concerned with poverty and income inequality class measures in Mozambique. They have used the technique of small area estimation to derive these indicators in all provinces.

There is no claim that this study produces the first poverty map using the technique of small area estimation in Mozambique, particularly in Sofala province. However, the poverty maps created by Simler and Nhate (2002) and Elbers et. al. (2004a) are out of date and this study seeks to

update poverty and income inequality class of measures at disaggregated geographical units in Sofala province so that it can be concluded whether the growth was broad based and pro-poor.

Finally, the study provides essential data for monitoring poverty and income inequality class of measures at disaggregated geographical units such as district levels. Naturally, the results of the study can feed a number of district policies and this can help the local government to rank the poor districts towards prioritizing anti-poverty programme. It can also be strongly used by NGO's especially, those that are working towards poverty reduction in order to accomplish the main objective of the Government's medium term economic programme.

1.7. Delimitation of the Study

The delimitation of the study period was done taking into account the periods of the main data base used in the study, namely the National Household Survey of Living Condition (IAF) undertaken in two dissimilar periods 1996 to 1997 and 2002 to 2003 in Mozambique. The study sought to analyze the distribution of income inequality, particularly the extent to which the economic growth, experienced by the province, or the poverty reduction in Sofala province has benefited the poor.

Because poverty is a multidimensional and complex concept, a simple definition is considered using only absolute measures of poverty from the class of FGT measures such as the PH to analyze poverty in general.

According to United Nation Development Programme (UNDP), defining poverty concept is not an easy task. According to UNDP (1996), poverty is considered to be a multidimensional and multifaceted concept that involves lack of capabilities, vulnerability in every situation, and influence on institutions that affect one's life.

Therefore, to adopt this straightforward multidimensional definition of poverty would make the rank of poverty in most of the districts more difficult. This definition is avoided in this study and the Cost of Basic Needs (CBN) approach is used (Ravallion, 1994). Therefore, poor households in Sofala province are considered those who live under the poverty line of 8.604,391 Meticais a day in Sofala province.

Although, during the study other income inequality indicators have been mentioned and sometimes been discussed as a part of the literature review, for this study the income inequality class of measurement that deserves attention is the GINI coefficient.

The methodology used in the study to estimate not only the absolute measures of poverty but also the income inequality measures is developed by Elbers et. al. (2002). It consists of combining two sources of information, household survey and population Census, to generate estimates of poverty and income inequality class of measures at disaggregated geographical units of the province such as districts, administrative posts, rural areas, and urban areas. However, for

this study, the estimates for poverty and income inequality class of measures are only calculated at district levels. No attention is given to administrative posts, rural areas and urban areas.

Finally, the disaggregated geographical location of poverty and income inequality class of measures are just to provide information concerning the distribution of poor households and to see the level of income inequality across Sofala's 13 districts. Thus, no attention is given to the best government policy and programmes to be applied in each district, although, some points are highlighted for possible policy interventions like the targeting of anti-poverty programme through resource allocation.

1.8. Organization of the Study

This thesis is organized into five chapters. Chapter one starts by presenting the introduction to the area of the study, the background information for the whole research. It is followed by a discussion on the statement of the problem, aim and objectives, research questions, delimitation of the study and finally the definition of special terms and expressions applied in the research.

Chapter two first looks extensively on the position of poverty indicator, income inequality, economic growth and pro-poor growth in recent literature. It then goes to explain the relationship between poverty, inequality and growth. It then explores the literature related to the poverty mapping techniques and a particular discussion, on the method applied in the research, on the Small Area Estimation method. The literature examination continues with a discussion of the

application of poverty mapping across countries including Mozambique. The chapter proceeds by building analytically the concept of pro-poor growth. Finally, the chapter ends with the application of the concept in the case of Mozambique and with highlights on unresolved issues.

Chapter three presents the methodology of the research. The chapter commences by presenting the research paradigm and the research process. It then moves to data collection and the instruments applied in this research. The chapter then goes to the discussion of the poverty and income inequality class of measures using in the research and it is followed by the discussion of small area estimation. Then the decision rule of pro-poor growth appears in the final section. This point is important because it identifies the different combination to assess the quality of growth in Sofala.

Chapter four focus on data analysis and interpretations. This chapter starts by validating the model of small area estimation for the case of Sofala. It then moves to the assessment of poverty and income inequality class of measures in two different periods, 1996 to 1997 and 2002 to 2003, to see the changes that took place in these indicators. Highlights of main findings concerning the pro-poor growth conclude the chapter.

Chapter five concludes the thesis by recapitulating of the main issues and findings of the analysis. This is followed by recommendations and implications of the findings for research and policy.

1.9. Definition of Special Terms and Expressions

The definitional and conceptual issues in this work relate specifically to poverty and its arguments i.e. income inequality and growth. These definitions are given below, starting with poverty, then income inequality, growth and finally the pro-poor growth concept.

1.9.1. Definition of Poverty

The reduction of absolute poverty has been a major objective in government programme in various countries. However, there is no consensus about the definition of the term poverty. For the purposes of policy drawing, poverty is related to the lack of monetary income to satisfy the basic needs. Notice that this definition follows a monetary approach, and did not cover all aspects of the phenomena of poverty; the concept was gradually expanded to different aspects related to poverty like, the lack of access to education, health services, safe water, sanitation, clothes among others. Looking at non monetarist approach, we can see that the concept of poverty also includes aspects such as isolation, social exclusion, powerlessness, vulnerability and others.

In Mozambique, the document that has a broader definition of poverty is PARPA. According to PARPA I (2001), poverty is the inability of individuals to guarantee themselves and their dependents, with their monthly or annual income, a set of minimum conditions for their livelihoods and well-being, according to set conditions established by the World Bank. A Similar definition was brought in 2005, by PARPA II. The second document defines poverty as

impossibility, disability, or lack of opportunity for individuals, families and communities to have access to minimum conditions, according to the basic rules of society.

In conclusion, both definitions proposed by PARPA I and PARPA II follow a relative approach of the concept. It means that for both documents, poverty is not seen as monetary phenomena in itself and they take into account the relative aspects. Conversely, the approach applied in this study follows the definition in terms of monetary income. For the study, poverty is seen as the lack of income necessary for meeting food and other basic commodities.

1.9.2. Economic Growth

The Economic growth is defined as an increase in the Gross Domestic product (GDP) that an economy produces over a period of time (Mankiew, 2003)

1.9.3. Inequality in Terms of Income

Ngepah (2010), states that inequality is a broader concept. It can be defined in various contexts. However, the most considered dimension is that of income, obviously because of the consideration of income as an indicator of welfare. More specifically with a certain level of income the issue of accessibility of basic need is satisfied. This is the approach followed in this study. The indicator to measure income inequality is the GINI coefficient (Figure 1.3).

Figure 1.3: Lorenz Curve
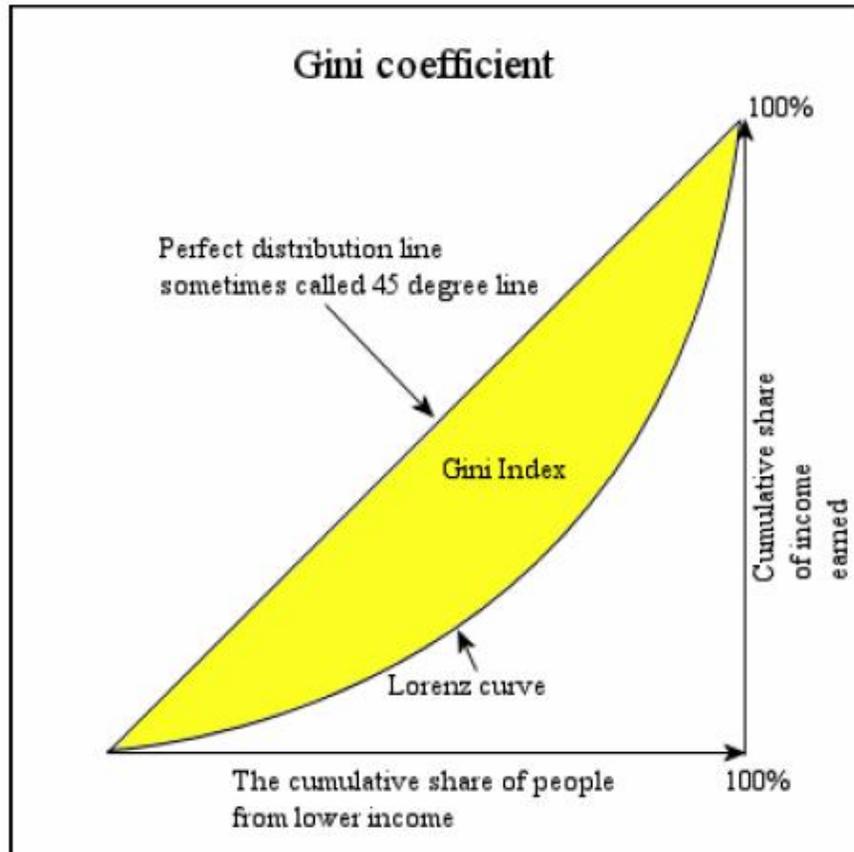
Source: Todaro and Smith (2006)

The GINI coefficient is the index which was developed by Conrad GINI, in 1912, and it is strictly related to the representation of income inequality using the Lorenz Curve. The horizontal axis of the Lorenz curve plot the distribution of the population and on the vertical axis the curve plots the cumulative income share of the population. The curve uses the straight line of equal distribution (45° line) to see the income distribution of the population. (Figure 1.3)

The calculated value may take on values between 0 and 1 with zero interpreted as no income inequality. Therefore, large values for GINI coefficient are associated with higher level of inequality. Conversely, small values are associated with lower levels of income inequality (Farris, 2010).

1.9.4. Pro-poor Growth

The debate of the term pro-poor growth can be divided into two different groups.

The first group composed by Kakwani and Pernia (2000) and Dollar and Kraay (2002) argue that the poor households should share a positive impact on their income as a result of growth rate. The first 20% of the distribution income should gain more than those on the average or above the last 20% of the income distribution.

Then the second group composed by Ravallion and Chan (2001) and Amman et. al (2002) argue that the benefit from growth rate that the poor people can benefit should be accompanied by a fall in income inequality class of measure. Bourguignon (2004) and Son and Kakwani (2003) have established that high income inequality reduces the impact of growth on poverty reduction. In other words, Ravallion and Chan (2001) consider pro-poor economic growth, if and only if, it benefits the poor in absolute terms. By having a decrease in the FGT and income inequality class of measures the economic growth is deemed as pro-poor. This is the approach from which the term pro-poor growth for this thesis is adopted.

1.10. Chapter Summary

Chapter one contextualizes the research by starting the discussion on the background of poverty, growth income inequality in Mozambique and in Sofala province. The general information on poverty and income inequality presented in this chapter suggest that both class of measures are high in Sofala province and the reduction of poverty cannot be concluded as being benefit for the poor people. This allows the formulation of the statement of the problem clear followed by the objectives and the hypotheses are linked to the problem raised. The significance of the study highlight the existing gap knowledge and it justifies the need to undertake this research.

The definition of terms and expressions are extensively discussed. The important terms discussed here were the poverty, income inequality, growth and pro-poor growth.

CHAPTER 2:

REVIEW OF RELATED LITERATURE

2.1. Introduction

This chapter discusses the literature which is related to poverty, income inequality, growth and pro-poor growth. It follows that the discussion on the definitions of poverty in terms of objective poverty line and subjective poverty line. The researcher discussed these two definitions to clarify the one which is used in the research. Despite the long speech of the term pro-poor, there is no irrefutable definition of the term. The debate discussion concerning the pro-poor growth, from which the decision rule was formulated in chapter three, is explored.

The chapter continues to revisit the relationship between poverty, income inequality and growth. In this section, some studies carried out in several developing countries are applied to illustrate the empirical relations between these concepts in these countries. Then the poverty mapping technique is explored with the purpose to demonstrate the greater advantages associated with this technique.

Finally, the chapter concludes with a discussion on pro-poor growth across countries and then it moves to the pro-poor growth in the case of Mozambique.

2.2. Definitions and Measures of Poverty, Income inequality and Growth

2.2.1. Poverty

Poverty in general is defined as the lack of necessities. Thus, the lack of necessities can be evidenced by the lack of basic needs such as food, shelter, medical assistance, and security. These values are

based on the share aspects of human self-respect (Bradshaw, 2006). But the needs may be different or relative depending on the individual needs. What seems to be a necessity to one individual may not be seen as a need for another individual (Sen, 1999). Others have focused their definition taking into account the level of income inequality.

Valentine (1968) argues that poverty is essentially income inequality. Therefore, there is no room to dissociate these two concepts. However, these authors have purely focused their definition on social aspects. Therefore, the inclusion of the social aspects makes the concept of poverty relative. On the contrary to the relative definition of the term poverty, the objective definition is rather simple and it avoids some of the problems that arise from the first definition. It is based on a statistical measure established by the local government as the annual income required for an individual or family to satisfy the minimum condition in order to survive (Bradshaw, 2006). The poverty line was initially developed by Mollie Orshanky in 1963 at the United States Department of Agriculture.

The poverty line specified in money terms a society's judgment concerning the acceptable normal of living to which everyone must be permitted. It has helped to concentrate on the extent of poverty and helps to formulate policies for fighting poverty. The definitions proposed can be divided into two main groups. The first group provides a practical definition of the term looking at subjective aspects of poverty. While the second group defines the poverty line in practice from an objective perspective (Ravallion, 1994).

There are several methods which have tried to give an objective explanation of poverty. But only two objective methods are considered in practice: the Food Energy Intake (FEI) and the Cost of Basic

Needs (CBN). Although they have been in the same group and considered as objective methods used to calculate the poverty lines, they radically give different results. Ravallion and Bidani (1994) used data from Indonesia and found different results produced by these two methods. In fact, poverty profiles constructed by these methods differ considerably. However, the choice of the method to be undertaken depends on the policy choice. The method chosen should be carefully analyzed in order to select the appropriate one, according to the policy needs. Depending on the method applied, policies such as geographic targeting can lead to surprising results. So there is a need to critically analyze the method before the policy is implemented.

The FEI method can be interpreted as simple function with dependent and independent variables. The function is built over just one function, namely the Food Energy Intake. The basic idea is that you are given some level of consumption expenditure or per capita income at which FEI is enough to meet the required food-energy to give a good health. The food-energy intake varies naturally at given income level from one region to another. In practice poverty lines, following this method, are both calculated for urban and rural areas separately. Contrary to many other methods of poverty lines, this method has been used often by authors like Dandekar and Rath (1971), Osmani (1982), Greer and Thorbecke (1986), and by several governments. It is normally used in practice by poor countries (Ravallion and Bidani, 1994).

The FEI method has one disadvantage when comparing the results in rural areas and urban areas. The results of poverty estimates using this method, needs to be consistent with the capabilities for the households living in both areas (Ravallion and Lokshin, 2006). The problem arises because normally the prices of the goods in the rural areas are relatively lower comparing to the prices of urban areas. These differences in process can guide to a higher demand for goods in urban areas which will be

lower than in rural areas at any given point in time. But one can infer that given the lower demand for food energy intake in urban areas, the poor households are more concentrated in urban areas. This is rather a wrong conclusion.

Problems also arise in comparisons over time. There is no clear distinction that when the prices increase, the FEI based poverty line increases. Probably one can correctly infer that the change in relative process leads to tastes change. People will be encouraged to consume relatively cheaper calories, and thus the FEI poverty line falls. Wodon (1997) has illustrated the problem created by the FEI method using data from Bangladesh. Surprisingly the poverty line calculated using the FEI method falls when the prices of the basic food were generally increased.

The CBN method is calculated using a pre established set of basket and considered that the goods included in the basket are adequate to satisfy the basic consumption needs. Then the costs of the baskets are compared among several groups in the poverty profile. The same basket might cost different prices in urban and rural areas if the price of goods included in the baskets varies from one area to another (Ravallion and Bidani, 1994). This is the approach followed by Rowntree (1901)when he conducted a study on poverty in New York and England, in 1899. The poverty basket is normally developed under the basic idea of food-energy requirements consistent to common diets in the specific context. However, some non-food goods are sometimes allowed and included in the baskets.

Poverty line from the subjective side has relied on the answer to the Minimum Income Question (MIQ) such as, "What is the absolute minimal income level do you personally consider?" (Kapteyn et. al.,1988). This question is similar to the special case on the income evaluation, to which several

questions and possible answers were formulated concerning the evolution of the necessary income to satisfy the needs. More accurately, Van Praag (1968) has asked what level of income is considered to be *very bad, bad, not good, not bad, good, very good*. There is room to define as poor people all those whose actual per capita income is less than the amount they selected to be an appropriate answer to the question of MIQ. However, this would almost certainly lead to ambiguous results when calculating the poverty measures. People that seem to agree to have the same income may not necessarily have the same needs, they should be treated differently.

However, a room to allow the existence of *heterogeneity* must exist, such that people with the main way of living may well select different options to the MIQ, but must be classified as equally 'poor' to avoid the problem of discrepancies that might exist. Several studies have made their contributions in this regard. Groedhart et. al. (1977), Dazinger et. al. (1984), and Kapteyn et. al. (1988) have found that the mean value of the response to the MIQ depends on the actual income and tends to be positively correlated to the income earned in the present. There are other determinants that might affect the level of income and consequently increase the Social Subjective Poverty Line (SSPL). These determinants include the size of the family and demographic composition.

The MIQ has been applied in Organizations for Economic Cooperation and Development (OECD) countries and there have been few attempts to apply it in developing countries. But this attempt in most cases fails completely to work due to some problems. The first problem is the income itself which need to be clearly defined in developing countries, because there are several activities, including in the informal sector, that generate income for individual and they need to be clarified and decided if it is included or not on the MIQ questionner. This clarification is also applied for the activities undertaken in rural areas. There are no reliable answers to the MIQ and the second problem

is that, it is not at all clear whether the respondents give reliable answers to the MIQ (Dazinger et. al.,1984).

Furthermore, a technique for predicting the SSPL was based on a qualitative data on expenses so that the problem emerged through the answers from MIQ could be more reliable and could generate more appropriate questions. The questions were formulated in such a manner that they would capture the average income to have an adequate consumption. Instead of asking respondents what the exact minimum level of consumption needed to satisfy the basic needs. The multidimensional extension turns to the one-dimensional MIQ. The SSPL is calculated comparing the total level of income expenditure which respondents say yes, on average, with the required expenditure to satisfy the needs. The SSPL gave a similar overall poverty rate to pre-existing objective poverty lines for both countries, though the structure of the poverty profile was different in some respects. (Pradhan and Ravallion, 2000).

The discussion on poverty line methods provides a good lesson on the methods used in practice. The discussion provides two different methods to calculate the poverty line: (1) the objective poverty line that uses the FEI and CBN and (2) the subjective poverty line that uses the MIQ. From these two methods discussed above, the CBN method was chosen for this study do to the convenience and to avoid defining poverty in relative terms.

2.2.2. Income Inequality

According to Litchefield (1999) the term income inequality has a lot of meanings. According to situations, income inequality means different things to different people. The authors go beyond by

explaining that the income inequality can include ethical aspects or relative considerations or it can only care about differences in income. In this study income inequality is conceptualized as the dispersion of a distribution, whether that is income, consumption or some other welfare indicator or attribute of a population.

The analytical expressions that capture the level of inequality avoid the interpretations raised by Litchefield (1999). There are several indicators to measure inequality such as: Generalized Entropy index, Dalton Atkinson and GINI coefficient.

During the research the income inequality indicator used to assess the level of inequality is the GINI coefficient.

Generalized Entropy

The Generalized Entropy (GE) is another income inequality measure which is also applied to see the distribution of the consumption among the households. The mathematical expressions given below (equations 2.1, 2.2. and 2.3) detail this class of measure:

$$GE(\lambda) = \frac{1}{\lambda^2 - \lambda} \left[\frac{1}{W} \sum w_i \left(\frac{y_i}{\bar{y}} \right)^{\lambda} - 1 \right] \quad \text{for} \quad (\lambda \neq 0, \lambda \neq 1) \qquad (2.1)$$

$$GE(0) = \frac{1}{W} \sum w_i \log \frac{y_i}{\bar{y}} \qquad (2.2)$$

$$GE(1) = \frac{1}{W} \sum w_i \frac{y_i}{\bar{y}} \log \frac{y_i}{\bar{y}} \qquad (2.3)$$

In the above definitions (equations 2.1, 2.2. and 2.3) w_i is the weight of household i, W is the total population, y_i is per capita consumption of households i, and $\bar{y}$ is the average per capita consumption, and λ is a weighted parameter.

Lower values of λ are associated with high sensitivity to income inequality among the poor households and higher values of λ are associated with income inequality among the rich households. The parameter λ may take any value. The most common values are 0, 1 and 2 which correspond to Generalized Entropy class of measures GE (0), GE (1) and GE (2).[3]

And the last measure of income inequality used to describe the income inequality in Sofala province was the Atkinson class of measure. This class of measure takes the form given in equation 2.4 below.

$$A(c) = 1 - \left[\frac{1}{W} \sum w_i \left[\frac{y_i}{\bar{y}} \right]^{1-c} \right]^{\frac{1}{1-c}} \qquad (2.4)$$

---

[3] The GE (0) is also called as the Theil L or mean log deviation measure and the GE (1) measure is also known as the Theil entropy measure.

In the equation 2.4, w_i is the weight of household i and W is the total population, y_i is per capita consumption of households i, and $\bar{y}$ is the average per capita consumption, and c is a weighted parameter.

All in all, several indicators can capture the income inequality. Note all of them are discussed here. The above section only presents three of the most used indicator to measure inequality. Notice that from the three of them, the researcher prefers to use the GINI coefficient because this indicator is broadly used do to the facility to analyze the indicator.

2.2.3. Economic Growth

According to Mankiew (2003), Gross Domestic Product (GDP) represents the sum in money values of all final goods and services produced in a given region during a given period of time. GDP is one of the most used indicators in macroeconomics, and has the primary objective of measuring the economic activity of a region. In calculating the GDP only final goods and services are considered, excluding account of all intermediate goods production. The GDP can be calculated from three different points of view: the expenditure approach, the supply approach and the income approach. On the expenditure approach, the GDP is calculated based on the costs incurred by various economic goods and services for final use, and correspond to domestic spending, which includes spending by households and state consumer goods and expenditure investment companies. The general formula to calculate the GDP is given by:

$$GDP = C + I + G + NX \tag{2.5}$$

Where: C stands for private consumption, I stands for gross investment, G stands for government expenditure and NX are net exports given by the difference between exports and imports.

To analyze the behaviour of the GDP of a country there is a need to differentiate nominal GDP and Real GDP. Nominal GDP estimates at current prices, i.e , the year in which the product was produced and marketed, and real GDP is calculated at constant prices , which is chosen as a base year to eliminate the effect of inflation, and real GDP is the most suitable for analysis. On the supply approach, the GDP is calculated from the value generated in each of the companies operating in the economy. Already in optical performance, the GDP is calculated from the income of production distributed by companies, i.e., the sum of labour income with the proceeds of other productive factors (Blanchard, 2003).

The growth rate of the GDP can be nominal or real and it is calculated using the percentage change expression:

$$GR = \frac{Y_t - Y_{t-1}}{Y_{t-1}} * 100\%$$

(2.6)

Where: GR measures the growth rate of GDP, and Y measures the GDP on period t and t-1.

2.3. Channels of Economic Growth that lead to Poverty Reduction

There is no consensus on the discussion on "how growth benefits the poor". There are some conditions that have to be taken into account when we want to analyze the conversion of economic growth into poverty reduction, or into development. Economic growth translates into human development when it

is able to, through the expansion of the resource base in a given society, improve the quality of life of its population. To understand this effect it is important to consider the economic growth not only through its quantity measured by the annual growth rate, but also by quality in terms of improving the quality of life, access to basic services provided by the government institutions, opportunities, etc. In short, it is important not only to check the percentage by which the macroeconomic aggregates grow annually, but how was this economic growth and consequently that the income distributional impact is the same. The emphasis given to the study of poverty in the last fifteen years by international organizations produced many studies on the relationship between different types of poverty and economic growth (WDR, 2000/2001).

Meier (2001) stresses the important role that can be played by distribution of resources in the promotion of human development. In his point of view, economic growth is no longer seen as a necessary and a sufficient condition for the promotion of well-being as the generation of development economists, evidenced by the debate around the empirical relevance of the stated Kuznets curve. Thus, we cannot assume that economic growth is a sufficient condition for poverty reduction. Several variables can influence the conversion of annual economic growth into a well-being and reduce poverty.

Ravallion and Datt (2002) highlight the question of convertibility of economic growth into a reduction of poverty in the case of India. In his case study he stated that it's crucial to have reasonable initial conditions in human resources development and rural infrastructure so which is fundamental to a composition of pro-poor economic growth rate of rural areas.

We can generally conceptualize the conversion of economic growth on poverty reduction on seven groups of factors: geographic distribution of growth, sector channel of growth, the use of factors of production, degree of inequality of income and wealth, non-income dimensions, pattern of government expenditure and environmental impact (Ribeiro and Comim, 2008). The next phase is to detail each of the factors that can convert growth into poverty reduction.

1. Geographic Distribution of Growth: when growth is taking place in one region it probably improves the geographical distribution in that region rather than if that growth does not take place. The development pattern of economic activity reduces poverty according to the spatial distribution of the same, for example, if the people who live under the poverty line, the one declared by the World Bank, are in region A, the probability of that growth benefit region B is little. It is not always that the flows are able to solve this problem without dramatic social restructuring. It is essential to check whether the regional standard/local growth coincides with the regional aspects of poverty. There may be confusion here between economic growth and poverty reduction. Several situations are possible, but more often in developing countries the focus is to combat absolute poverty (in the case of Mozambique PARPA II reflects that dimension) usually concentrated in isolated rural areas, where the intensity of poverty is severe, but not often resolved by urban industrial economic growth created by huge industries or small enterprises (Ribeiro and Comim, 2008).

2. Sector Channel of Growth: the contribution of every sector in the economy can be quantified. Thus economic growth happens within sectors. The impact of growth will depend on the links with the economic sectors and the poor. According to UNDP (2012) in Mozambique, some of the most important economic sectors only contributed with 8 % to total GDP growth. To be more precise,

agriculture employs more than 79 % of the labour force but only contributes a modest rate of 6.8 % to total GDP growth, and the remaining sector only contributes 10 % for industry and 7.7 % for services.

Usually, emphasis is placed on promoting agriculture and rural poverty reduction but a different kind of growth is necessary to combat the recent phenomenon of global metropolis of poverty. In general, the vast majority of poor people in developing countries are concentrated in rural areas and agricultural growth depends on the structure of land ownership. The growth can reduce poverty because it creates a multiplier effect by increasing the level of income for farmers and consequently create the demand for basic goods and normal services in rural areas that can be easily produced by the people with lower income (Ribeiro and Comim, 2008).

In line with this assertion raised by Ribeiro and Comim (2008), Datt and Ravallion (1998) have concluded in the case of India, that the increase in production in agriculture sector and the informal sector had a greater effect on reducing poverty, while little effect was generated by the growth in manufacturing. A simple reason is given to these positive results. The vast majority of the population in India is involved in these two sectors: the agricultural sector and the informal sector. The annual growth in manufacturing industry reduces the poverty index directly by increasing the income of workers and growth in agriculture is not related to a bad income distribution among workers. More accurately the study of Datt and Ravallion (1998) suggests that 85 % of poverty reduction in India was successfully done thanks to a good performance in agriculture. Thorbecke and Jung (1996) reached a similar conclusion for Indonesia.

3. The Use of Factors of Production: several studies have concluded that a pattern of growth that results in a relatively high growth in low-skilled employment shows better results in poverty reduction. Thus, the more labour-intensive growth is, the best is for poverty reduction. If new jobs have been created for low-skill workers, the higher the impact of growth, at least in the short term when it is harder to qualify poor people (those who usually have low levels of human capital) (Ribeiro and Comim, 2008).

4. Degree of Inequality of Income and Wealth: societies with income distribution and wealth which are very unequal are less successful in converting growth into poverty reduction. That is, the most unequal society has a lower impact on poverty reduction than a more egalitarian society. The factor of inequality is one of the most important elements in analyzing the impact of economic growth on poverty reduction (Ribeiro and Comim, 2008).

5. Non-Income Dimensions: conversion of growth into a well-being of individuals also depends on the existing variation in non-economic dimensions such as the level of security, health, choices, education, discrimination, opportunities, and other qualitative aspects. This is because, the existing non-economic dimensions in lower levels can create an obstacle to individuals participating in and enjoying the fruits of economic growth. Particularly, under conditions where only men have access to the labour market it is natural that women do not benefit from the opportunities created by economic growth. In this case, gender inequality may be responsible for the low impact of economic growth in household welfare. In many countries racial discrimination in the labour market should not be ignored as a non-income dimension. Additionally, differences in levels of education generate unequal opportunities conversion of growth in welfare for different groups of society (Ribeiro and Comim, 2008).

6. Pattern of Government Expenditure: the public sector controls the means of production where the ownership and management belongs to the State or other public entities. Public finances designate the methods, principles and financial processes through which governments perform their functions: allocative, distributive and stabilizing. The allocative function relates to the allocation of resources by the government to provide public goods (e.g. roads, security), semi-public goods or meritorious (eg education and health), development (e.g. construction of plants) etc, the distributive function is the redistribution of incomes realized through transfers, taxes and government subsidies add a stabilizing function in the application of various economic policies to promote employment, development and stability, given the failure of the market to ensure the achievement of these goals. The government acts as a distributive mechanism and redistribution of wealth in the society, affecting channels as growth is structured and articulated (Ribeiro and Comim, 2008).

As recently explored by the World Development Report have shown that the quality of government spending has an important role in the welfare of the poorest. A low-level pro-poor targeting of public spending with a low level of institutional development may seriously affect the efficiency of public policies. This problem is actually more serious involving lack of incentives for the provision of public spending to the level of provision, leading to dysfunctional schools and health services inoperable and inaccessible to the poorest. Thus, the quality of the pattern of public expenditure is an important factor for conversion of economic growth in the quality of life of the population of a country (WDR, 2004),

7. Environmental Impact: economic growth may disproportionately affect the poor through environmental degradation leading to the erosion of their asset. Thus, the distributional impact can be given indirectly via negative externalities to cause pollution or erosion or contamination of the

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resources previously used by the poorest people, hindering or impeding their survival strategies. This is not only relevant to rural areas. The same problem can happen in urban areas (Ribeiro and Comim, 2008).

Besides these main groups of factors there are a number of other factors that affect the conversion of economic growth into poverty reduction. Specific factors such as failures in the credit markets and capital, degree of dualism economies, distortions in currency markets and imperfections in other markets, such as insurance, also play a role in converting growth. It is empirically impossible to control all these factors but they should remain as a reminder that the relationship between economic growths is complex. They can help guide policies needed to promote a welfare which is broad-based, inclusive, where the poor are integrated into society and paid for their own work and house that pushes to have an incentive to increase its long-term human capital via inclusion in the economic development process (Ribeiro and Comim, 2008).

2.4. Pro-Poor Growth

2.4.1. Theoretical Discussion of the term Pro-Poor

In attempting to show mathematical and practical expressions to the term of pro-poor growth, Kakwani and Pernia (2000) proposed the first definition. The definition basically compares the income of the poor households with respect to changes in the income of the non poor. Using this narrow definition, growth can be observed as pro-poor if the distributional growth changes to benefit the poor. In short, this definition suggests that the pro-poor growth should consider progress in inequality.

However, this relative definition of pro-poor growth communicates three constraints, particularly when applied in an operational context.

First, the term pro-poor growth using this definition can be considered as inequality (the gap between the non poor and the poor) in reducing growth. By focusing heavily on inequality the relative definition of pro-poor growth could lead to a sub-optimal result for both poor and non poor households. Let's say if a community wants to achieve pro-poor growth based on this restrictive definition would have room for an average increase growth of 2 % where the income of the poor households of the community grows at 3 % over an outcome where the average growth was 6 %, but the incomes of poor households grows by 4 %. Whereas the distributional pattern of growth favours the poor households in the first case, both the poor and the non poor are more comfortable in the second case (Kakwani and Pernia, 2000).

And the second, an economic recession (fall in income) could be pro-poor if the income of poor households decreased in a small proportion compared to the proportion decrease in the income of non

poor households. The opposite way can be analysed; during a period of expansion, an increase in inequality, despite the benefit that the poor might have, this growth perhaps cannot be deemed as pro-poor. Finally, this definition might favour public sector actions that reduce inequality despite their impact on growth (Kakwani and Pernia, 2000). .

Dollar and Kraay (2000) also focus on a narrow definition of pro-poor growth. They have used cross sectional data from 65 countries during the period of 1980's and 1990's, and they have defined the poor as being the bottom quintile (fifth) of the income distribution. They have argued that 20% of the income of the poorest rises directly with the economic growth. Thus, on the average, the income (expenditure) of the poor households raises one-to-one with the economic growth. An increase in the economic growth in a certain proportion induces the same increase in the level of the income of the poor households. Therefore, economic growth is a necessary and sufficient condition to reach pro-poor growth. They concluded that "economic growth is good for the poor".

The main criticisms from Dollar and Kraay study are related to the straightforward one-to-one relationship highlighted in their conclusions. Growth is not enough in itself and it depends on the initial levels of inequality (initial distribution). If the initial percentage of the poor in national income is considered to be small, then they gain a small part from the benefit of economic growth. An increase in the average income of the poor quintile may lead to a higher increase in the richest quintile than the poor. Or as Amman et. al. (2002) suggests, the average income of the poor quintile may increase on a one-to-one basis but also the richest quintile may rise in the same proportion. Although the problems rose by their definition, in both cases the economic growth is unfairly considered to be pro-poor.

A similar definition to that proposed by Dollar and Kraay (2000) and Amman et. al. (2000) is made by White and Anderson (2004). They proposed three definitions of the term pro-poor growth taking into account the poor share or the division in equal parts on the size of the distribution, the fifths or tenths (incremental income). The meaning of pro-poor growth must be such that: The poor's share (tenths or fifths) of additional income exceeds their present share and the poor's share of additional income exceeds some international norm.

Conversely, Ravallion and Chan (2001) suggest a broader definition (second definition) which focuses on the relationship between poverty reduction and change in growth. Therefore, it avoids some of the problems arising from the above definitions; the problems with increase in the income of the rich quintile (fifths) and of the poor quintile (fifths). According to his definition growth is considered to be pro-poor if and only if the poor households benefit in absolute terms. In short, growth is pro-poor when the poverty incidence falls. This is a rather comprehensive definition of pro-poor growth and in most cases it will classify the economic growth process deemed as pro-poor. Therefore, this definition is not free of problems. For example, an outcome characterized by average growth of 6% of the poor household's income growing at a slight 1 % extra would be considered as pro-poor growth. Under this definition, the economic growth process can be called pro-poor even if the poor household benefit from a small fraction of the total growth.

The above definitions on the term pro-poor growth played an important contribution to the study in Sofala province to give an idea in order to fill the gap due to lack of a clear definition of the term. Therefore, two broad groups of definitions are highlighted in the previous definitions. The first definition proposed by Kakwani and Pernia (2000), Dollar and Kraay (2000), Amman et. al. (2002) and White and Anderson (2004) emphasize a more restrictive definition and it takes into account the

links between the changes in the incidence of poverty with changes on the average income (expenditure) and changes in inequality. Using this relative definition, economic growth is considered to be pro-poor if the mean income of the poor people increases more than the mean income of the non-poor people. This implies, in general, that growth is accompanied by a decrease in the inequality level of income (expenditure) of the poor households. And the second definition proposed by Ravallion and Chan (2001) considers pro-poor economic growth from a larger perspective and it focuses only on the relationship between poverty using absolute measures, for example the FGT class of measures. Using this absolute definition, growth is considered to be pro-poor, if and only if, it benefits the poor in absolute terms. By having a decrease in the FGT class of measures, the economic growth is deemed as pro-poor.

2.4.2. Analytical Discussion of the term Pro-Poor

The theoretical discussion on the concept pro-poor is vast and controversial. An opposite and welcome contribution using quantitative methods has gained an increasingly important role in this discussion. The World Bank has at present three different classes of measures (aggregate, absolute and relative) that allow quantifying the pro-poor growth (World Bank, 2002).

Aggregate Measures of Pro-poor Growth

Ravallion and Chen (2003) have presented a useful measure to analyze the consequences of aggregate economic growth over the income distribution of household. The concept proposed to quantify the pro-poor growth was the graph represented by the Growth Incidence Curve (GIC). The GIC compares the consumption of the households (Yt) presented in percentile of the distribution in two different periods in order to see if any improvements on the income of that group were verified.

Analytically the expression of GIC can be presented by comparing the consumption of two different periods t-1 and t by letting p vary from 0 to 1.This can be calculated as follows:

$$GIC = \left[\frac{Y_t(p)}{Y_{t-1}} - I(p) - I \right]$$

(2.5)

If $GIC \geq 0$ then at all points up to some percentile p^*, then poverty has fallen for all headcount indices up to p^*. In other words we can conclude that growth is broad based and pro-poor for those who benefit from less income at the percentile distribution. Conversely, then one cannot in general infer about the pro-poor growth. The growth rate area calculated using the National Household Survey of Living Conditions in two different periods. Figure 2.1 give an estimate of GIC, Urban Areas from Brazil.

Figure 2.1: GIC, Urban Areas in Brazil

Source: Meneses-Filho and Vasconcellos (2004)

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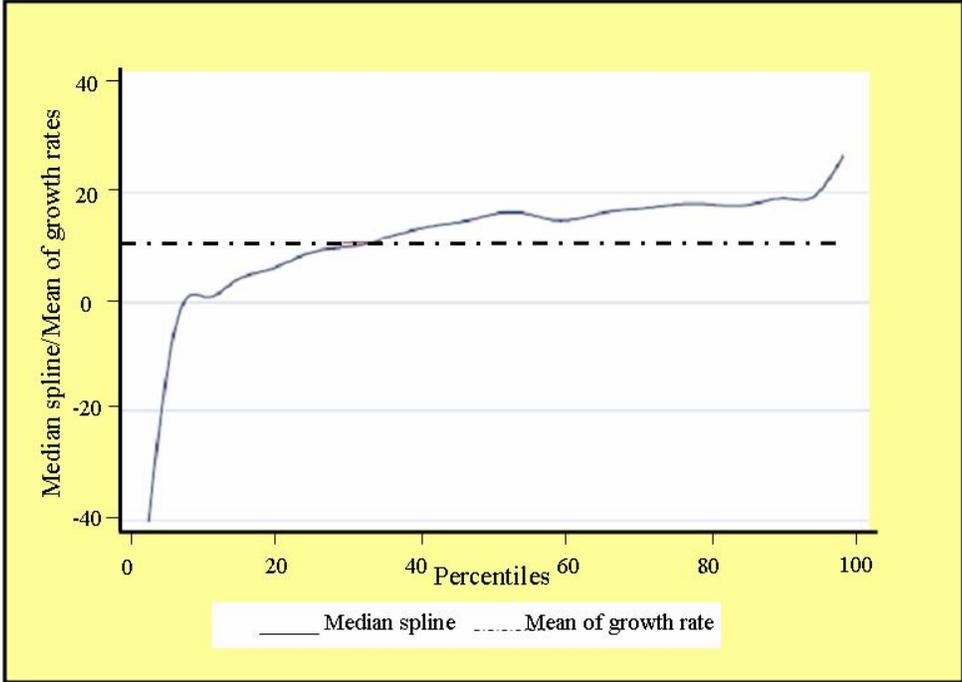
When interpreting the various slopes of the GIC we need to take care. The parts where the GIC are upward sloping, it does not mean that individuals who are at the bottom end of the income distribution in the initial period gain less than those at the higher end of the income distribution.

Following the same approach on aggregate measures of the pro-poor growth, Datt and Ravallion (1991) have contributed to the discussion with a conceptually useful tool to analyze the growth. They have used the Decomposition of Growth and Inequality to conclude about the quality of economic growth. The decomposition applies the poverty measure and the Lorenz curve, presented as a graphical representation of the cumulative distribution function of the empirical probability distribution of wealth. Let $PH(\mu_t, L_t)$ denote poverty and μ_t mean income, L_t the Lorenz curve measured by the GINI coefficient and R the disturbance term.

The decomposition is then given by the formula shown below:

$$\Delta PH = \left[PH(\mu_2, L_\sigma) - PH(\mu_1, L_\sigma)\right] + \left[PH(\mu_\sigma, L_1) - PH(\mu_\sigma, L_2)\right] + R \tag{2.6}$$

The first term of the Decomposition of Growth and Inequality represents the change in poverty that would have been if the inequality measure, used by the Lorenz curve, has remained fixed while the second term of the decomposition proposed by Datt and Ravallion (1991) is the poverty that would have been if the inequality has changed.

Absolute Measures of Pro-poor Growth

The contribution of absolute measure of pro-poor growth was made by Ravallion (1997) and Bourguignon (2002). They have distinguished two different types of measures from: the total growth-elasticity of poverty and partial growth-elasticity of poverty. The total growth-elasticity of poverty, denoted by ε_{PH}, is defined as percentage change in poverty headcount index (PH) between two different periods and the percentage change on average income of the households. The expression for absolute measure of pro-poor growth is given by the formula shown below:

$$\varepsilon_{PH} = \frac{\partial PH}{\partial \mu} * \frac{\mu}{PH}$$

(2.7)

Bouguignon (2003) defines partial growth elasticity of poverty as the slightly relative change in the poverty headcount index for a one percent on economic growth in mean income remaining constant the level of inequality. Both indicators, total growth-elasticity of poverty and partial growth-elasticity of poverty, are useful synthetic index to sum up the relationship between growth and poverty. The lower these indicators are, the higher is the level of inequality and less developed is the country.

Relative Measures of Pro-poor Growth

Bias of Growth (PBG) is a concept developed by Kakwani (2000). This definition focuses on the level of inequality reduction as shown below:

$$\Delta PH = \Delta y + \Delta i$$

(2.8)

Where the change in poverty, ΔPH, is given by the sum of pure change in growth, Δy, and inequality, Δi, effects. Both parts of change in poverty can be either negative or positive. The sign of both terms are depending on whether growth is followed by increasing (worsening) or decreasing (improving) the level of inequality.

Kakwani and Son (2006) have looked into the existing relationship between the economic growth, poverty and inequality in some Asian Countries. The data from Korea comes from the National Household Survey of Living Conditions called Family Income and Expenditure Surveys and it covers the periods 1990 to 1999. The sample population accounts for more than 20,000 households in urban and rural areas. And the Data source from Thailand was gathered from the Socio-Economic Surveys (SES) from the period of 1988 to 1998.

The SES contain on average more than 17,000 households in towns/cities, districts and villages. Finally, the Vietnam case, the National Household Survey of Living Conditions is called Vietnam Living Standard Surveys (VLSS) and it covers the periods 1992 to 1993 and 1997 to 1998. In the first National Household Survey of Living Conditions, VLSS 1992 to 1993, the number of households ware 4,800 and in the second period VLSS 1997-1998 the number of household interviews increased to about 6,000. In all countries, the per capita consumption expenditure as a welfare measure to estimate the level of poverty was used (Kakwani and Son, 2006)

Kakwani and Son (2006) have used an index to measure the degree of pro-poor growth known as Poverty Equivalent Growth Rate (PEGR) on data from the Republic of Korea, Thailand and Vietnam. The PEGR combines three different factors into one index. The factors that affect the PEGR are the

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economic growth, the level of inequality and poverty. Thus, the higher rate of economic growth tends to reduce the level of inequality and consequently it increases the impact of poverty reduction. To reach the PEGR index, it is important to see how the poverty elasticity of growth is calculated.

The poverty elasticity with respect to growth (η) is defined as the percentage in poverty in response to a positive growth rate of 1% and it can be affected by two terms: the growth effect (δ), that shows the proportional changes in poverty when income inequality does not change, and the inequality effect (ε). See equation 2.9 below:

$$\eta = \delta + \varepsilon \tag{2.9}$$

The two effects may take both, positive or negative values. If δ takes a positive value and inequality remains constant, it implies that the growth rate is positive, and therefore there is an effect on poverty reduction. And if ε is positive, it implies that the growth rate is negative and there is an increase in poverty. Therefore, growth can be deemed as pro-poor if ε is negative. And the degree of pro-poor growth can be measured by the index (see equation 2.10) proposed by Kakwani and Pernia, 2000.

$$\phi = \frac{\eta}{\delta} = \frac{\delta + \varepsilon}{\delta} \tag{2.10}$$

The index of pro-poor ϕ will be greater than1 when the ε is negative. Thus the economic growth is considered as pro-poor if $\phi>1$, meaning the poor people benefit from economic growth more than the rich households. The level of inequality reduces considerably and the redistribution growth favours the

poor household. And when the index lies between 0 and 1, the economic growth is not strictly pro-poor, although it still reduces the level of poverty (trickle-down situation). If $\phi<0$, the economic growth leads to an increase in the level of poverty and it implies that growth is pro-poor. Conversely, growth is considered to be anti-poor if $\phi>0$.

2.4.3. The Factors that Make Growth more Pro-poor

The discussion of pro-poor growth gained some space on the policy discussion issues in developing countries. Martin and Ravallion (2003) have conducted a study with the purpose of assessing different alternative approaches to defining and measuring pro-poor growth. The study also analyzed whether economic growth is always pro-poor and identifies the factors that make growth more pro-poor and finally, the study analyzes the factors that make the distribution of gains from growth more pro-poor than the cost to the growth rate.

The emerging concept pro-poor is extensively discussed in various literatures. Two different ways of defining the term pro-poor separated two different groups of authors. The first group defines pro-poor growth when the economic growth benefit the poor people proportionately more than the non-poor people (Baulch and McCullock, 2000; Kakwani and Pernia, 2000). In other words, growth is considered to be pro- poor when the income of the poor people grows at a rate higher than the growth rate of the non-poor people. The concern of this definition is that the increase in inequality during a period of global economic expansion may come with large absolute gains for the poor, but this is not considered pro-poor growth. Likewise, the recession will be considered pro- poor if poor people lose proportionally less than the non-poor.

The second group of authors composed of Ravallion and Chen (2003) define pro-poor growth as a growth that reduces the level of poverty in a certain community. The extent to which growth is pro-poor depends on the measure of poverty changes used to assess the benefits from the growth. Naturally, this will depend partially on what happens to the income distribution, but also will depend on what happens to the average income of living standards.

In both groups no clear definition of the poverty measure is to be applied, when quantifying the pro-poor economic growth.

Both groups define poverty as a state in which an individual cannot afford a minimum consumer needs and having an accepted standard of living with their income. But then how is the poverty line determined? This question becomes important because in the current context there is a clear distinction between absolute poverty and relative poverty. In these two contexts the poverty line is determined in a different manner. In the case of absolute poverty, the poverty line is fixed by the purchasing power parity of families. The real income is then rated as either poor or non-poor. The poverty line is usually determined to ensure that with the amount earned by an individual, his nutritional needs are met and it can have a healthy life. And for the case of relative poverty, poverty is defined as a constant proportion of average income. This technique can show an increase in the level of poverty even when the earned income of every poor have in fact increased.

In general, the measure most often used is the poverty index measured by the proportion of poor people by the number of population. The poverty index evaluates the estimated percentage of the relevant population that lives in families with consumption expenditure or income level below the

established poverty line. The poverty index explains what happens to the distribution of individuals below the poverty line.

The other measure often used is the poverty gap. This indicator, from the class of FGT, measures the average deficit from the total population of the poverty line (counting the non-poor as having zero shortfalls). The poverty gap illustrates the depth of poverty as well as its incidence and better reflects changes in average levels of living among the poor.

Economic growth is always accompanied by an increase on the level of GDP which means an increase in the average income of the individual of a country. Is the economic growth always pro-poor?

A common experiential result in the recent literature has shown that changes in income inequality at the country level have virtually no relation with the economic growth rates. Particularly, an index of inequality such as the GINI index can not reflect changes in the distribution as well as have an impact on poverty, which depends on precisely how distributional changes occur. Theoretically, it is possible that the GINI index increases, while the percentage of people living below the poverty line remains the same, which in practice seems to be impossible.

Martin and Ravallion (2003) listed the factors that make growth more pro-poor and more inclusive. The authors supported the position that the rate of economic growth is an important determinant of the rate of absolute poverty reduction.

A question may arise. "Why does the same rate of growth bring different rates of poverty reduction for the same country?" Two groups of factors can be recognized as the main immediate causes of the different rates of poverty reduction in specific growth rates: the first is the initial level of income inequality and the second is the changes in the distribution over time.

The first cause of different rates of poverty reduction is the initial level of inequality. It is said that the higher the initial inequality level in a country the lesser the growth earnings to be shared by the poor. And lower initial portion tends to mean a share in the earnings of lower subsequent economic expansion. Evidence from this interaction effect between initial level of inequality and growth is found in comparing the rates of poverty reduction (Ravallion, 1997 and Kraay, 2003).

And the second cause of different rates of poverty reduction is the distribution changes. Clearly there are a large number of factors in a country (such as natural disasters that affect the agricultural income, changes in trade regime, demographic changes, reform of welfare policies and tax systems) that directly affect the distribution changes of the population. Concentration of poor people is pronounced in regions and or sectors which is predominant at points of growth for overall poverty reduction.

Poverty is normally seen as an effect of a lower income and the high income inequality is normally seen as an obstacle of future growth. In many developing countries, the high level of inequality is associated with the various market failures, which means that some people are unable to benefit from the growth promoting investment opportunities and this causes poverty to continue. It was also argued that high level of income inequality can promote macroeconomic instability and impede efficiency, and the promotion of several reforms.

The challenge for the correct policy to promote broad based and more inclusive growth is to combine policies that promote rapid economic growth in a country with the right policies to guarantee that the people who live under the poverty line can contribute actively in their community and gained the opportunities created, and thus contribute to growth. If a country has the right mix of policies, growth and poverty reduction can be rapid.

2.5. The Triangle Poverty, Inequality and Growth

2.5.1. The Relationship Between Inequality and Growth

In the early 1950's the relationship between economic growth and inequality was extensively discussed. This discussion focused on whether the countries would engage in trade of between growth and inequality or vice versa, or the countries would reach certain level of growth and therefore reduce the level of inequality. Another possibility was that countries would engage in a vicious circle in which most of them would promote growth that in turn would reduce inequality, or the countries would reduce inequality that in turn would promote growth. The main contribution for this topic was made by Kunzts (1955) and Kaldor (1955-1956).

The most famous contribution on the debate of inequality and growth was raised by Kuznets (1955) in his article. Kuznets presented the proposition of an inverted-U hypothesis (Kuznets' curve) in which the inequality (measured by the GINI coefficient) will first increase as the GDP per capita increases and then it will decrease when it reaches its turning point or when the curve changes the concavity. Kuznets noted that inequality had declined in several nations across the mid 20th century, and supposed that it probably had risen earlier. Thus Kuznets' law, as some authors have elevated the hypothesis to this category, states that as the GDP per capita increases, the inequality first worsens (GINI coefficient increase) and then improves (GINI coefficient decrease) with development.

The Kuznets' law was built up based on mere part of data of rich, poor and very few European countries were available at the time. This constitutes one of the weak points in his study. However, the last five decades have been dominated by Kuznets' law and several studies have confirmed that inequality enhances economic growth (Ahluwalia et. al., 1979).

The findings from Kaldor's hypothesis (1955- 1956) suggest that there is a positive relationship between the income earning with the saving level. Kaldor's said that the people who earn more money are a better off to save more that the people who earn less income. Thus, if the additional saving in response to a change in the growth rate (marginal rate of saving) of the rich people is higher, and the saving rate affects directly the level of investment, and investment affects positively the economic growth rate, then the more unequal countries can be expected to grow at higher rate. This hypothesis is consistent with Kuznet's inverted-U hypothesis. In short, Kaldor concludes that inequality is not a prerequisite for growth.

In contrast, new studies on cross-country growth regressions have found evidence that inequality might cause slower growth rate, especially in some countries with lower level of income. A counter argument from those presented by Kuznets (1955) and Kaldor (1955-1956) is presented by Persson and Tabellini (1990) and Alesina and Rodrik (1991). They argued that greater inequality actually reduces economic growth. Thus, by increasing the level of inequality (GINI coefficient increase), the country will engage in a slower rate of economic growth.

Persson and Tabellini (1990) and Alesina and Rodrik (1991) used several countries regressions to reject the theoretical hypothesis that the economic growth was conducive to rapid growth. An increase

in the inequality will lead to more active government interventions: due to higher level of inequality in the economy, the government in an attempt to redistribute the wealth in the economy will be encouraged to implement a contractionary fiscal policy leading to higher taxes. This, in turn, lowers the level of consumption, according to classical theory, and consequently the rate of economic growth.

The negative impact of inequality on economic growth was also strengthened by several studies. Clarke (1992) stated that inequality is often regarded as a necessary evil that has to be accommodated to allow growth. As a result, hypotheses like Kuznets' and Kaldor's, have accepted that inequality leads to a higher accumulation of wealth, and that everyone's income increases consequently, in turn, the inequality also decreases this would somewhat "trickle down". The overall effect is that the rich becomes richer and the poor become poorer.

Clarke (1992) used data from the World Bank database and the United Nations Social Indicators to reject or confirm the Kuznet's hypothesis, that the inequality will first increase as the GDP per capita increases and then it will decrease. In order to quantify the inequality using cross countries data, some of the most common measures of inequality were used: the Coefficient of Variation, Theil's index and the GINI coefficient. The result suggests that initial inequality is negatively related to economic growth. There is a smaller level of the relevance in the coefficient that captures the effect of the relationship between inequality and economic growth. Therefore, by decreasing the magnitude of inequality, the long run economic growth slightly increases in subsequent periods; reducing inequality in the present, may lead to an improvement in the future rate of economic growth. Therefore, the arguments presented by Clarke (1992) relax on a total disagreement of the Kuznet's hypothesis.

All in all, admittedly, in the period of the 50's and 70's most economists argued that inequality leads to a faster growth. Theories proposed by Kuznets (1955) and Kaldor (1955-56) have some consensus on the link between growth and inequality or vice versa. Both argue that the inequality is a prerequisite to economic growth. These theories are indeed a "trickle down", because they assume that the benefits of economic growth are automatic to all segments in the society. As an alternative, at the end of the 1980's and beginning of the 1990's several studies discarded the possibility that inequality promotes growth.

Persson and Tabellini (1990), Alesina and Rodrik (1991), and Clarke (1992) have empirically confirmed that inequality is not sufficient in itself to reach economic growth. Despite this long debate on the relationship between economic inequality and growth, no attention to the relationship between poverty, growth and the effect of that change on the level of inequality was examined.

2.5.2. Relationship Between Poverty, Inequality and Growth

The relationship among growth, poverty and the level of inequality is difficult to explain, because, as stated before poverty is multidimensional and complex. Since the 1990's, the term pro-poor growth, developed by the World Bank, has become a topic of intensive discussions. These discussions are surrounded by a number of studies, Dollar and Kraay (2000), Estawod et. al. (2001), Ravallion and Chen (2001) Kakwani et. al. (2004), Fuentes (2005). They have attempted to see the linkages between poverty, inequality and economic growth. Without reviewing them all, some of the main issues concerning, the relationship between growth and inequality are followed by the linkages between poverty, inequality and economic growth which are presented.

Chen and Ravallion (1997) have used two national Household Surveys of Living Conditions for 23 developing countries, to test the hypothesis whether or not the inequality increased. They have suggested that at higher level of inequality the rate of poverty reduction becomes relatively flatter (almost no response) to growth on income and it can reach zero. The welfare metric to calculate the inequality measure (GINI coefficient) used is based on the consumption or income per capita. The results found indicate that as the GINI coefficient increase (high inequality), countries which have prospect of economic growth combining with lower levels of inequality, may have slightly or no overall economic growth, and consequently little progress in poverty reduction.

Deininger and Squire (1996) put together a comprehensive cross country data set and used the data to measure inequality and to test whether Kuznets' hypothesis holds or not. Due to a data set of a better quality they were able to examine the data in a manner so that they could see the changes in the bottom quintiles (the poorest 20 %). The study found that there was no relationship between the income inequality measured by the GINI coefficient and the economic growth. Therefore, the pattern of the inverted-U, proposed by Kuznet (1955) was not evident.

Commenting along the lines from his previous study undertaken in 2000, Dollar and Kraay (2002) define the poor people as those that are found in the bottom quintile of the distribution, the botton quintile (the poorest 20 %) in the Lorenz curve agglomerates the poor households. They used large sample of developed and developing countries over the past four decades to test the null hypothesis that change in income (measured by the GDP per capita) of the poor rise a one-to-one relationship with changes in average income.

The regression was based on these two variables; changes in the GDP per capita and the average income. Both variables of 137 countries were defined in logarithms. They have transformed the variables in logarithms to perform the regression analysis. The evidence from the regressions performed, shows a strong positive relationship between the two variables involved. The slope was approximately 1.07 which does not differ from the one-to-one relationship change in income share of the bottom quintile and the change in the average income. This confirms a strong empirical regularity that the 20% of the population does not vary systematically with average GDP per capita, in a large sample of developing and developed countries over the last four decades.

However, the empirical model drawn by Dollar and Kraay (2002) does not take into account the various interactions between change in income inequality (measured by the GINI coefficient) and change in per capita GDP as suggested by many other studies with the same nature. The data from the countries communicate a little relationship between change in economic growth and change in income inequality. The results encountered by Dollar and Kraay (2002) suggests that the variations in income and changes in income inequality are consistent with the results found by other studies such as from Chen and Ravallion (1997) and Deininger and Squire (1986). Both conclusions suggest that the inequality does not matter in economic growth.

The discussion about the relationship between income inequality and economic growth is not at all finished. Conversely, Forbes (2000) found an alternative conclusion to those formulated above. She discussed the potential problems involved in the empirical studies that have suggested that the inequality does not have an effect on income distribution proposed by Chen and Ravallion (1997) and Deininger and Squire (1996). This conclusion was somewhat misleading due to a number of problems encountered in the data itself. The first problem analyzed was that the empirical models built were not

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robust at all because they did not include additional explanatory variables. She noticed that when the regional dummy variable was included; the coefficient that illustrates the negative relationship becomes less significant. The second problem was related to the econometric models such as the measurement error problem and omitted variables bias. Although, the inclusion of the dummy variable leaves the regressed coefficient on inequality without much significance, this suggests that regressed coefficient on inequality may actually explain the effects of the excluded variable on growth rather than have a direct influence on the level of inequality. Finally, the last issue with this empirical cross section work on these variables (inequality and growth) is that it does not directly show the crucial question of how, really, the change in a country's level of the GINI coefficient affects the country's growth of rate.

However, to reduce the problems raised by the existing empirical work that has concluded the negative relationship between income inequality and economic growth they have applied to panel data to estimate the new model. Forbes (2000) has used a more comprehensive data set compiled by Deininger and Squire (1996). By focusing on the Generalized Method of Moments (GMM) technique developed by Arellano and Bond (1991), she concluded that in the short and medium run, a raise in the level of income inequality originate and increase in the nominal rate of economic growth. In short they have concluded that changes in income inequality are moved in the same direction to the changes in economic growth.

Altogether, the discussions raised by Deininger and Squire (1996), Chen and Ravallion (1997) and Dollar and Kraay (2002) are more consensual and they found no impact of growth on income inequality; the rate of economic growth is neutral to changes in inequality. An improvement in the

economic performance does not lead to low levels of inequality. This disagreement relaxes on whether there is no relationship between GDP per capita and the GINI coefficient.

Conversely, others have offered different explanations and have focused on the relationship between income inequality and growth. The results found in the relation of income inequality to growth are less consensual and there are two opposite explanations. The first explanation offered by Alesina and Rodrick (1994) found inequality-to-growth direction of causation. The income inequality measured by the share in income of the 3rd and 4th quintiles is negatively related to the changes in subsequent economic growth. An increase in the level of inequality causes the economic growth to decrease.

Instead, Forbes (2000) reviewed most of the empirical work using the GMM estimator to see how changes in inequality pattern measured by the GINI coefficient affects the subsequent growth. She discards the negative relationship between inequality and growth proposed by Alesina and Rodrick (1994). Her results suggest that inequality is positively related to economic growth. The discussions above are summarized in Table 2.1 below:

Table 2.1: Growth Inequality Link

Impact of Growth on Income Distribution	
Deininger and Squire (1996)	No Impact
Chan and Ravallion (1997)	No Impact
Dollar and Kraay (2002)	No Impact
Impact of Income Inequality on Growth	
Alesina and Rodrick (1994)	Negative
Forbes (2000)	Positive

Source: Adapted from Humberto Lopez (2008)

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The preceding discussion did not also take into account the concept of poverty. Arguing in the same line of the discussion (growth and inequality or vice versa), the concept of poverty is now included. The interrelationship among these three elements: growth, poverty and inequality lead to overall discussion of pro-poor growth.

2.5.3. Economic Growth and Reduction of Inequality on Poverty: Latin America

The governments are focusing their public policy to reach macroeconomic growth and social equality. The high levels of poverty need sustainable economic growth and a decline in the level of income inequality measured in terms of income or non-income, to reduce the initial level of poverty. To achieve a satisfactory range of policies that combat poverty more effectively it is necessary to ensure that poverty is more sensitive to reductions in the degree of inequality that is the set of policies that informs about what can be done, or clarifying economic growth that is desirable.

Barros and Mendonça (1997) have conducted a study in Brazil to analyze the Impact of economic growth and reduction of inequality on poverty. They have compared the economic growth versus income inequality. They sought to compare the magnitude of the impact of economic growth and reduction of inequality on poverty, in order to evaluate policies to fight poverty in Brazil. The starting point for the quantification of poverty was based on the proportion of the population living in households in their families with a per capita income below a preset level, called poverty line.

The data collected to make the analysis proposed by Barros and Mendonça (1997) are of three types: first, it was necessary to have a recent estimate for the income distribution in Brazil. In order to satisfy this demand it was estimated based on household surveys on living conditions in 1993, the distribution

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of individuals according to their household income per capita. Secondly, it was necessary to define the poverty line. Note that the objective poverty line measured in monetary terms was applied. They have decided to choose the poverty line, the level of income per capita that sampling 35 % of the population who were considered poor in 1993. Finally, the estimates of Lorenz curves were required for different countries selected for this study. These estimates were obtained from World Bank (1993) and are reproduced and compared with GINI coefficients of other countries. The study revealed that the degree of inequality in Brazil was significantly higher than in all Latin American countries used in the comparison such as Bolivia, Colombia, Costa Rica, Mexico, Panama, Uruguay and Venezuela. They simulations involving the seven countries were to isolate and compare the impact of economic growth and reduction of inequality on poverty. To perform this analysis it was crucial to be able to decompose the income distribution in a component representing the level of income and the other representing the degree of inequality.

The results are interesting and show that a policy is purely focused on economic growth or redistribution is deployed, the reduction in poverty was only 15 percentage points. However, if policies for promoting economic growth are combining with policies to reduce the degree of income inequality, it would be possible to achieve a reduction in poverty by more than 15 percentage points.

Deininger and Squire (1998) have used the same data set, to assess the impact of growth on the change in the level of the poor people. By looking at different quintiles of the cumulative income distribution (Lorenz curve), they have examined how the initial level of inequality (measured by the GINI coefficient) or the changes in the inequality affects the poverty incidence. Their results suggested that there were very strong relationships between the rate of growth and the inequality, as stated before. The bottom quintile (the poorest 20 %) benefit from the factors that stimulate growth and they suffer

from a decline in growth. The emerging link forms their conclusion that, by enhancing growth the poverty reduction is assured and the level of inequality is consequently reduced.

The main association among these three aspects: poverty, inequality and growth were also explored by Bigsten and Levin. Bigsten and Levin (2001) noted that the initial level of PH around the world was extensive, but the proportion of people living under poverty line declined significantly over the period of 1987 to 1998. The evidence provided by this study suggests that the success in poverty reduction is likely to be caused by a successful rate of economic growth. The growth effect might have a strong impact on the poverty reduction depending on the initial level of inequality (income distribution). The study completely failed to prove the conclusion made by the theoretical models from Kuznets (1955), Kaldor (1955-1956), Ahluwalia (1979) in which they believed that higher level of inequality enhanced growth. Bigsten and Levin (2001) believe that, there is no stable relationship between the economic growth and changes in inequality. However, the main point raised by Bigsten and Levin (2001) was that in countries which have registered lower levels or unchanged economic growths in per capita incomes, poverty reduction remains insignificant or the poor people persist in poor countries (see Table 2.2).

Table 2.2: Poverty Headcount by Regions (1987-98)

Regions	Percentage of Population Living on Less than US$ 1 a day				
	1987	*1990*	*1993*	*1996*	*1998 (est.)*
East Asia and the Pacific	26.6	27.6	25.2	14.9	**15.3**
Excluding China	23.9	18.5	15.9	10.0	**11.3**
Eastern Europe and Central Asia	0.2	1.6	4.0	5.1	**5.1**
Latin America and the Caribbean	15.3	16.8	15.3	15.6	**15.6**
Middle East and North Africa	4.3	2.4	1.9	1.8	**1.9**
South Asia	44.9	44.0	42.4	42.3	**40.0**
Sub-Saharan Africa	46.6	47.7	49.7	48.5	**46.3**
Total	28.3	29.0	28.1	24.5	**24.0**
Excluding China	**28.5**	**28.1**	**27.7**	**27.0**	**26.2**

Source: Chen and Ravallion (2002)

The relationship between the rate of economic growth, the success of poverty reduction and changes in the level of inequality was also raised by Bourguignon (2004). He found that there is a general consensus that the reduction in absolute poverty is a developmental goal. Therefore, a direct relationship between development, growth and distribution may be done. He built an arithmetic identity link based on these three elements; growth of the means income in a given population (income), changes in distribution of the income or the inequality (inequality) and the reduction of absolute poverty (poverty).

The poverty reduction (measured by the PH) in a given country is in large part explained by the rate of economic growth (percentage change in the mean welfare level) and the change in the inequality (disparities in relative income across the entire population). Consequently, a development strategy

based on the objective of poverty reduction is meaningfully determined by the growth percentage and distributional changes in the level of income. Figure 2.1 shows the "Poverty-Growth-Inequality (PIG) Triangle".

Figure 2.2: Poverty Growth Inequality Triangle
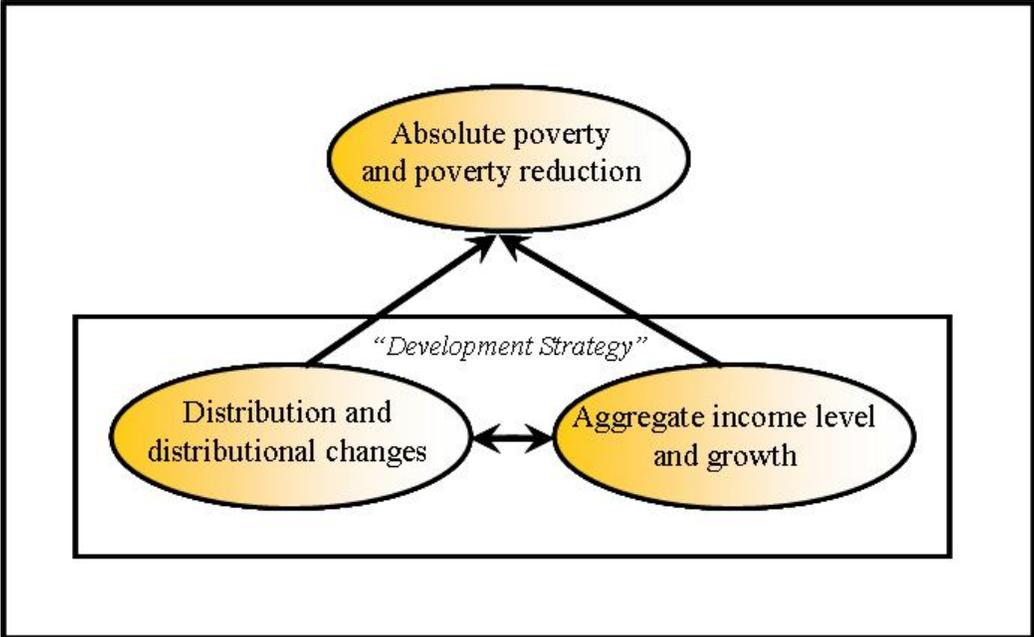
Source: Bourguignon (2004)

Using the PIG Triangle, Bourguignon (2004) conducted an experimental study on the basis of log-normal distribution of relative income based on the middle-income country with initial level of high inequality and low-income country where the initial level of inequality was considered to be middle level of inequality. Therefore, he concluded that the growth and the income distribution should be considered during the analysis of poverty. Both (income distribution and growth) play an important role on the issue of poverty reduction. The long run growth is one of the main factors for poverty reduction and in itself is "good for the poor". This conclusion is somewhat in line with the assertion made by Dollar and Kraay (2000) state that "economic growth is good for the poor". And the other

point raised is based on the empirical studies that growth sensitivity of poverty is considered to be high in the case of the middle-income country. Thus, the growth strategies for poverty reduction depend on the initial level of inequality. Two countries with different initial proportion of poor people, different level of inequality and different rate of economic growth would have different strategies aiming at poverty reduction. Countries with middle-income should focus their strategies on the changes in the distribution, while countries with low-income should concentrate their strategies on economic growth.

The overall preceding discussions suggest that the initial level of inequality matters on poverty reduction. Deininger and Squire (1998) found that the economic growth is beneficial for poor household and factors that negatively affects the rate of economic growth tends to worsen conditions among the poor households. Bigsten and Levin (2001), failed to find any clear pattern of change in rate of economic growth and the income distribution. But the main point raised is that countries which have been successful in promoting economic growth have better conditions to be successful in poverty reduction. Finally, Bourguignon (2004) proposed an identity linking poverty reduction, growth and distribution; the so called PIG Triangle. Initial distribution matters for economic growth and poverty reduction; a progressive redistribution of income leads to a successful poverty reduction and thereby positive results on economic growth.

2.5.4. The Effect of Inequality on the Poor

Ravallion (2005) argued that income inequality cannot be seen as something very bad in poor countries. The real concern should go for absolute poverty in terms of consumption (or income). In his view it is clear that the rate of economic growth is the only thing that really matters in reducing absolute poverty. The issue of inequality in the growing economies tends to be neutral. The income inequality tends to fall at the same rate as it rises, that is, the growth tends to be neutral in terms of

distribution in medium term. Looking at income distribution, if all income levels grow at roughly the same pace then it is clear that absolute poverty will reduce and benefit everyone.

Ravallion (2005) put forward a conclusion that there is no correlation between changes in income inequality and economic growth can be wrong. Three factors contribute to this explanation. First, consider that there is no change in overall level of inequality and the level of inequality not is consistent. Second, inequality measures are typical measures of relative inequality, where all income multiplied by a constant leaves the measure of income inequality remain constant. Thirdly, there are clear signs that the growing processes in many economies have been seen in putting more pressure on the systematic inequality.

While recognizing these data problems and warnings, the need for correlation between changes in relative inequality and economic growth does not indicate that, in order to combat poverty in any country policy makers, can concentrate safely on economic growth in itself. All this experimental observation tells us that, on average, there was little redistribution effective pro-poor. That redistribution rarely happens and that the distribution is not important for the results to the people of poor economic growth.

Another important aspect highlighted by Ravallion (2005) is the issue of income inequality and the necessary speed to reduce poverty. Ravallion clearly concludes on the issue of of economic growth and poverty reduction, at the same time, pointed out that the two factors can be identified as the main primary causes of different sensibilities of poverty reduction: the initial level of income inequality and changes in inequality over time.

Regarding the initial income inequality, there is a consensus that the higher the initial level of income inequality in a country, the less the poor will share the benefits from the economic growth, unless there is sufficient change in the distribution as a result of an effective policy towards inequality reduction.

The initial level of income inequality can be an important determinant to different rates of poverty reduction for a given rate of economic growth in a country. To help inform policy makers there is a need to investigate further on relevant sources of income inequality. There are inequalities in a number of dimensions (something already highlighted by Comim and Ribeiro, 2008), including access to property both private assets and public goods.

Inequalities in terms of access to infrastructure and social services naturally become more difficult for poor people to benefit. Another factor that influences the rate of poverty reduction for a given rate of economic growth is changing the distribution of income. If inequality is increasing or not it can make a huge distinction to the rate of poverty reduction.

2.5.5. Inequality, Poverty and Growth in *Santa Catarina* and *Mato Grosso*

Grasel, et. al, (2008) points out that the study of poverty is of great importance because it involves the fairness and effectiveness component of the programme implemented in order to combat poverty. The effects of poverty on the population affected are huge and are not subject for discussion. It is known that poverty reduction requires economic growth and reduces inequality, or both. The purpose of the study conducted by Grasel, et. al, (2008) was to try to understand why and to what extent differences in production and social structures of *Mato Grosso* and *Santa Catarina* determine situations more or less favourable to the impact of economic growth in reducing poverty and social inequality.

The study examined the relationship between income and poverty in municipalities belonging to two states of the Brazilian federation: *Mato Grosso* and *Santa Catarina*. It is believed that the local reality is quite heterogeneous and timely consuming of more detailed studies to better understand the problem. The state of *Santa Catarina* has been chosen as a benchmark for being the state with the lowest income inequality, measured by the GINI coefficient. On the other hand, *Mato Grosso* has been highly successful in terms of economic growth over the past decades.

The analysis of inequalities in this research used the GINI index and Theil index. The GINI index is one measure of inequality used more widely (see Litchefield, 1999 for further detail). Its calculation is derived from the Lorenz curve, formed by the points that unite the cumulative proportions of income corresponding cumulative proportions of the population. GINI values are between the zero (no inequality) and one (maximum inequality) extremes. The Theil index is obtained from the logarithm of the ratio between the geometric and arithmetic means of individual incomes, being zero when there is no income inequality and increasing positively when inequality tends to be maximum.

The estimates obtained from the regression were considered quite satisfactory. The correlation coefficients indicate that the independent variable included in the model (income) has significant explanatory power of differences in poverty. Furthermore, all tests for all individually model parameters were statistically significant.

The study showed that income growth was able to reduce poverty in *Mato Grosso* and *Santa Catarina*. However, the impact is much greater in the state of *Santa Catarina*, due to lower inequality presented. Moreover, more than 60 % excess of relative poverty in *Mato Grosso* can be attributed to the relative

excess of inequality. These results confirm the hypothesis of the study. The low relative efficiency of economic growth in *Mato Grosso* raises the discussion on the need for complementary approaches about the aim of reducing poverty in the State by presenting socially less efficient groth which, *Mato Grosso* requires for some type of additional compensation in terms of social investment.

Closer observation on the data indicates that income and poverty in poorer municipalities is of greater sensitivity to poverty on economic growth. In these cases, policies are more focused on the imperative groth. On the other hand rich municipalities, have the poverty rate declines less steeply with income growth, suggesting greater emphasis on reducing inequality.

2.6. Poverty Mapping Technique

A number of methods on poverty mapping have been put forward in literature and in a variety of countries. According to Davis (2002 and 2003), the major methods for spatial distribution of the poor include:

1. Small Area Estimation,

2. Multivariate Weight Basic Needs Index,

3. Combination of Qualitative Information and Secondary Data,

4. Extrapolation of Participatory Approaches,

5. Direct Measurement of Household Survey of Living Conditions Data, and

6. Direct Measurement of Census Data.

The main method applied in this study is the Small area Estimation. An overview of these various methods of poverty mapping and their applications under different conditions are presented.

2.6.1. Small Area Estimation

The small area estimation is a statistical method of linking two data sources. The Household Survey of Living Conditions and population Census data to generate welfare measures such as poverty indicators, inequality indicators or other indicators for disaggregated geographical units such as districts, administrative posts, and rural and urban areas. Small area estimation uses the Household Survey of Living Conditions to estimate parameters from a predictive consumption model to identical variables in population Census or other database used. It is assumed that the relationship defined by the model remains fixed for the whole population as well as for the original sample. This statistical method of small area estimation has been used by some developed countries like the United States of America (Davis, 2002).

2.6.2. Household Unit Level Method

The method requires two data sets namely the Household Survey of Living Conditions and population Census data both taken approximately at the same period (Davis, 2002). The time varies according to economic change in a given country. For example in Nicaragua poverty maps have been built using population Census from 1995 and Household Survey of Living Conditions from 1998, in Ecuador Household Survey of Living Conditions from 1990 with population Census from 1990 and in Mozambique the first poverty map was built using the Household Survey of Living Conditions from 1996-1997 and Census of 1997.

However, most of the cases have combined the population Census with Household Survey of Living Conditions in order to estimate the welfare measures (Davis, 2003). But there is also room for combined agricultural Census which normally include basic information on demographic aspects with the Household Survey of Living Conditions to estimate the welfare measures. Elbers, et. al, (2001)

provides an example in Brazil of doing small area estimation with a large scale Household Survey of Living Conditions instead of a population Census.

The first step starts with an estimation of consumption model derived from the Household Survey of Living Conditions data. The model is statistically estimated by representative regions or areas such as urban or rural areas. The variables involved in this estimation should be available in both data sources that is, population Census and Household Survey of Living Condictions of Living Conditions. Thus, the general consumption model is shown below:

$$\ln C = \alpha + \beta_1 X + \beta_2 V + \varepsilon \tag{2.11}$$

Where C is the total per capita consumption, X is a matrix of household and V is a matrix of geographical characteristics.

After estimating the consumption parameter, the result is applied in the population Census. Therefore, for each household, the estimated parameters from the regression are used to calculate the probability associated with each household in the population Census living in poverty. The poor people are identified after establishing specific poverty line for that region.

More accurately, for each household in the population Census, the household level of the explanatory variable is multiplied by the associated parameter estimate and each in this case gives a predicted

value of the log of total consumption for each household. The calculated value is then used to predict which household is poor, or the probability of a household being poor.

$$
\begin{aligned}
F_{ij} &= 1 \, if \, \ln C_{ij} < \ln Z \\
F_{ij} &= 0 \qquad otherwise
\end{aligned}
$$

(2.12)

Following Hentschel et. al. (2000) and using the model of consumption from Equation 2.1, the poverty can be calculated for different levels. This includes the FGT class of measures: the PH, PG and the SPG indices.

$$
F^* = E\left(\frac{F}{X}, \hat{\beta}, \hat{\sigma}\right) = \frac{1}{N} \sum_{i=1}^{N} \Phi\left[\frac{\ln z - X_i^{'} \hat{\beta}}{\hat{\sigma}}\right]
$$

(2.13)

Where F* is the FGT class of measures, Φ is the cumulative standard normal distribution, $\hat{\beta}$ and $\hat{\sigma}$ are both estimators of the household i in the Census. And N is the number of households in a specific region or geographical unit.

Although the model is straightforward, the application in practice offers a series of econometric challenges, which include the data manipulation, the large size of the population Census, non normality, the errors generated such as the *autocorrelation* and *heteroskedasticity* (Elbers et. al., 2002). This technique has recently been used by some developing countries for planning and targeting

purposes. In Ecuador by Hentschel et. al. (1998), Madagascar by Mistiaen, et. al. (2002), Mozambique by Simler and Nhate (2002) and in Uganda by Hoogeveen, et. al. (2003) and then later by Rogers, et. al. (2006).

2.6.3. Community Level Data Method

An alternative method of small area estimation does not involve using the Household Survey of Living Conditions and population Census but averages values from disaggregated geographical units, such as communities or small towns to estimate the welfare measures of interest (Davis, 2000). There is no difference in steps to be followed in comparison with the Household Unit Level Method. Thus, the two small area estimation techniques follow basically the same steps. In summary the steps here involve estimating the consumption model and then using the resulting parameters to predict the welfare measures for communities. The alternative method of small area estimation has been used in Ecuador by Hentschel et. al. (1998), Vietnam by Minot (2000), Burkin Faso by Bigman et. al. (2000), in Bangladesh by Godilano et. al. (2000) and India by Bigman and Srinivasan (2001).

Altogether, from the two methods of small area estimation namely, Household Unit Level Method and Community Level Method Data, the specific method applied in this study is the Household Unit Level Method. However, the availability of data constitutes one of the key points in choosing a poverty mapping method of small area estimation. Another important key point that favours the method employed in this study is the theoretical and philosophical belief that the small area estimation may be the best poverty mapping method to estimate the welfare measures.

2.6.4. Importance of Poverty Mapping

Poverty maps have two primary objectives. The first objective is the identification of the poor. Most often poverty mapping has been employed to target a number of social, agricultural, emergency, environmental, and anti-poverty programme. Deichmann (1999) and Henninger and Snel (2002), provided examples of poverty mapping application around the world. And the second objective is that, poverty maps serve to create dependent and independent variables that explain poverty (Davis, 2002).

Deichmann (1999) also found that poverty maps constitute an important tool for policy making. Most of the welfare measures are given at higher level of aggregation and they can be useful to measure the overall performance of the economy. Therefore, policy makers and researchers are constructing disaggregated geographical indicators to provide spatial distribution of detailed information about poverty and inequality class of measures. Deichmann (1999) encounters four different aspects that justify the use of poverty maps and these are, capturing heterogeneity within a country, identifying geographical factors such as the rivers, location, road access, that influence poverty improvement targeting of resources and interventions, and improving communication about poverty conditions.

1. Capturing Heterogeneity within a Country

Most of the poverty and inequality class of measures are given at higher level of aggregation that is country or provincial levels. Using these indicators at this higher level of aggregation gives the impression that poverty and inequality conditions in the country are rather uniform. Most often this is not the case. There are significant differences in poverty and inequality class of measures between the small regions due to several factors such as difference in endowments, the levels of education among the population, health services, and the transport routes. Consequently, inequality in terms of poverty

and also in terms of income distribution exists across regions as it does between individuals (Deichmann, 1999).

However, poverty maps enable us to show indicators at disaggregated geographical units and consequently the geographical variability that was latent due to the use of indicators at higher level of aggregation becomes apparent. Simler and Nhate (2002) illustrated maps that display the poverty and inequality class of measures at disaggregated geographical units. They illustrated the disparities between the regions in Mozambique.

2. Identifying Geographical Factors that Influence Poverty

Poverty maps also help to identify the geographical aspects that affect the standard of living of the poor. The detailed information provided by poverty maps display the distribution of the poor in different regions. It is then possible to identify the disparities that have been caused by geographical factors. These factors can be agro-ecological, accessibility to markets, availability of health facilities and education, and other factors, all of which influence directly or indirectly the well being of households (Deichmann, 1999).

3. Improving Targeting of Resources and Interventions

The use of poverty maps constitutes an important tool for local government in designing policies aimed to reduce the level of poverty and income inequality in the region/country. These social interventions for resource allocation are more effective if policymakers can avoid two errors. The first is the *Type I error*, which should minimize the transfer of payments to the non-poor and minimize the risk that a poor person will be missed by the transfer, *Type II error* (Deichmann, 1999). Hoddinot

(1999) also commented the reasons that make the social programmes focusing on poverty reduction, through transfer, unlikely to be. The first is the *Error of Exclusion*, in which intended beneficiaries cannot benefit from the intervention. And the second is the *Error of Inclusion*, in which an intervention reaches individuals who were not intended to be beneficiaries. These errors are known as *Type I* and *Type II* errors, respectively, and they cannot be avoided altogether.

All in all, both authors agreed that the social programme should be aware of the two errors. They named them differently but they mean absolutely the same. Avoiding transferring benefits to non-poor and avoiding transfer exclusion to the poor households. However, the detailed information on the location of the beneficiaries or the poor households is one of the critical issues for the success of the policy. These two errors highlight the errors associated with the estimates. Thus, the use of poverty maps should be balanced and practitioners should take into account these errors.

4. Improving Communication About Poverty Conditions

Poverty maps are an important way of illustrating information on income inequality within a country. They are important tools when presenting condensed information in a way that is easily comprehensible by a non-specialist audience. These maps are also used by governments, decision makers and local communities.

Rogers, et. al. (2006) and Deichmann (1999) found that the poverty maps are very important tool for government and for development agencies in designing policies on poverty reduction. Deichmann (1999) identifies three important points that the poverty maps provide: firstly, a description of poverty class of measures and secondly, an explanation for the observed spatial distribution of the poverty

class of measures. Thirdly, they allow an estimation of the degree and distribution of poverty in different regions under different periods. Altogether, following Rogers et. al. (2006) approach, the importance of poverty mapping can be summarized as targeting, explanation and estimation.

2.7. Application of Poverty Mapping across Countries

2.7.1. Poverty Mapping and its Application in Developing Countries

Hentschel et. al. (1998) have used detailed National Household Survey of Living Conditions data from Ecuador to compare the errors associated with the estimates of rankings using the consumption as a metric welfare with another type of welfare indicator, namely Basic Needs (BN). This indicator is rather subjective and it was constructed using qualitative data. Most often it combines different information available only in the Census. The indicator was constructed using weighted composite 5 variables capturing access to safe water, access to sanitation and waste disposable services, education and the number of people per bedroom. Then they explored the extent to which maps or estimates can be improved in presence of a Household Survey of Living Conditions containing income or consumption data. Using data from the Household Survey of Living Conditions, they examined how good the BN indicator is in identifying poor households. They found that the rankings which emerged with the BN indicator are much more accentuated using the consumption data. Their results suggest that, rural areas seemed to be poor using the BN indicator than consumption, and urban areas looked less poor.

Based on the unexpected result using the BN, Hentschel et. al. (1998) considered the possibility of using the household consumption to form the basis of poverty maps. This course of action can be undertaken if the National Household Survey of Living Conditions corresponding nearly to the same

period covered by the population Census. Hoogeeven (2003) developed an extension to the model of small area estimation to estimate poverty and inequality class of measures in Burkina Faso in absence of a contemporaneous Census. Fortunately, the data available in Ecuador was contemporaneous, both population Census and Household Survey of Living Condictions were undertaken roughly at the same period, 1990 and 1994 respectively.

However, to estimate the expenditure to the household population Census, the first step was to estimate the consumption model using the National Household Survey of Living Conditions. The variables involved in both data sources used to predict the consumption model consisted of various demographic variables, household quality data, access to public services, principal language spoken and location of residence.

The summary model of Community Level Data Method used by Hentschel et. al. (1998) is given by Equation 2.14. Where, they model the consumption model for household i, $\ln y_i$, vector of explanatory variables, X_i, common to National Household Survey of Living Conditions and population Census, and a disturbance term ε_i.

$$\ln y_i = Xi^{'}\beta + \varepsilon_i \quad \varepsilon_i\_N(0,\sigma^2) \tag{2.14}$$

Two separate models were computed for each region, *Costa, Sierra and Oriente*. The average R^2s ranged from 0.64 in rural areas to 0.595 in urban areas. Then the poverty estimates from each region using the consumption model combined the population Census and Household Survey of Living

Conditions was quite close to that calculated by the Household Survey of Living Conditions alone. They concluded that using the method of BN to construct the poverty maps based on a population Census data the poverty seems to be more accentuated in certain regions and it can be quite risky. However, by combining the Household Survey of Living Condictions and population Census data, the estimates on poverty are more realistic and can be as good as the estimates from the National Household Survey of Living Conditions alone.

Bigman et. al. (2000) have also used the same technique of small area estimation particularly the Community Level Data Method for helping targeting anti-poverty programmes in Burkina Faso. Van de Walle (1991) argues that targeting requires a best criterion to choose the eligible recipient given the resources to the geographical regions or the poor regions. Deichmann (1999) has also argued along these lines by saying that poverty mapping can improve the reallocation of resources.

Differently from, Hentschel et. al. (1998), Bigman et. al. (2000) have applied the small area estimation, not to compare the ranking associated with the use of an indicator derived from population Census or estimates derived from both data sources National Household Survey of Living Conditions and population Census, to present a method for geographical targeting at the disaggregated geographical units such as villages and urban communities. Geographical targeting at disaggregated geographical units like villages or the urban communities can reduce the errors of transferring the benefits to the non-poor households in countries or regions where the community characteristics are rather *homogeneous*. As discussed in Davis (2002), the specific prediction model is also given in Equation 2.14.

Bigman et. al. (2000) combined a large number of sources to drive the welfare measures of interest. The population Census which covered all the villages, was one of the most important data. Other data covered information relating to a sample of villages and detailed household data of the Priority Survey (PS) within each village and finally they applied the Geographic Information System (GIS) from Burkina Faso. The PS was designed to be national and regional representative and it contained a limited information, although, it was used to explain the households consumption.

The variables that were used to explain the households' consumption levels were limited by the set of variables encountered in the PS. As a consequence, a set of several important variables such as the level of education of the households were not included. The exclusion of these variables reduced the robustness of the model. However, the R^2s are quite low, if compared with other studies, with R^2s equal to 0.28 and 0.17 for the urban and rural population. The low R^2s are primarily due to the restriction of variables included in the model (Bigman et. al., 2000).

Then Bigman et. al. (2000) have applied the poverty estimates to rank the communities into poorest to the least poor. Based on these rankings, they have suggested that targeting anti-poverty programme at the provincial levels is less efficient than targeting at village levels. The possible reason encountered by Bigman et. al. (2000) was that the province is bound to include villages with different incidence of poverty. Contrary to the targeting anti-poverty programme at provincial levels, they have simulated the impact of targeting at disaggregated geographical units such as administrative areas of the village and they have found a clear advantage. Baker and Grosh (1994) analyzed geographical targeting in Venezuela, Mexico and Jamaica and concluded that targeting priority regions can be a more effective way of transferring resources to the poor people.

The discussion on Community Level Data Method is not yet finished. Fujii (2003) used data from Cambodia applying the technique of small area estimation with two different purposes. The first purpose was to present the finished poverty mapping from Cambodia. Therefore, with the existing poverty mapping, he expected to help the government and international organizations in identifying target areas in order to formulate effective programme and policies for poverty reduction. The second purpose was to illustrate the application of the poverty maps as an important tool for formulating targeting policies. This point was also strengthened by Deichmann (1999) and Rogers et. al. (2006). There is no precise rule that a certain policy is suitable for a certain region. Although, he discussed how best poverty maps can be used to identify target areas.

Specifically, Fujii (2003) also used the Community Level Data Method first applied in Ecuador by Hentschel et. al. (1998) to derive the welfare measures at disaggregated geographical units. The basic idea is the same for these methods and the welfare measure at the household or community level is regressed on a set of common variables existing in both, National Household Survey of Living Conditions and population Census data sets. The brief summary of the model used by Fujii (2003) is given in Equation 2.4.

Fujii (2003) estimates of welfare measures of interest were based on the household consumption expenditure. He pointed out some advantages of using consumption as a good proxy for measuring welfare. He argues that consumption is expressed in monetary terms and the meaning of that measure is easy to understand. Though, this cannot be inferred that consumption gives the best poverty and inequality estimates than other indicators.

To produce the poverty maps, four different data sets, two National Household Survey of Living Conditions data sets, a population Census and a GIS data set were applied. The consumption model was derived from the two socioeconomic surveys from 1997 and 1999. Only one National Household Survey of Living Conditions is needed, thus, the 1999 National Household Survey of Living Conditions was used only for auxiliary purposes. These are the common data set that included detailed information on consumption. The second data set was population Census conducted over the period of 1982. The population Census covered all people staying in Cambodia, including foreigners. Finally, a set of geographical aspects was included in the analysis. These indicators include the distance calculation; land use and land cover information, climate conditions, vegetation, agricultural production, and flooding. In general Fujii (2003) generated estimates for all villages and communities in Cambodia.

Poverty maps are very useful for designing targeting policies for educational programme such as school-feeding programme. Fujii (2003) used poverty maps from Cambodia not only for the identification of the poor households but also for application of the produced maps to educational programmes. Thus, he concluded that the poor areas were those with lower levels of basic education. In those areas children could not go to school due to higher levels of poverty. Therefore, policies targeting school-feeding should be placed in those areas. However, the main association that can be made among these studies undertaken by Hentschel et. al. (1998), Bigman et. al. (2000) and Fujii (2003) is that all have used, particularly, the Community Level Data Method to estimate the welfare measures of interest.

Mistiaen et. al. (2002) used National Household Survey of Living Conditions (*Enquête Permanente des Ménages-EPM*) from 1993 with population Census (*Deuxième Recensement Gènèral de la*

Population et de L'habitat) also conducted at the same period to estimate the welfare measures of poverty from the FGT class of measures and inequality measures including the GINI coefficient and the GE class of measures from Madagascar. In general the population Census data contained information for each household in the country, but contained no income or expenditure information. But the National Household Survey of Living Conditions data provides information on household characteristics and also the required information to derive the consumption model to estimate the welfare measures.

Mistiaen et. al. (2002) emphasized some of the purposes of poverty maps undertaken in Madagascar. The first purpose was to provide some information to local administrations and communities towards empowerment policy-making. The second one was that, various projects could make use of the information in order to best allocate the resources and finally the country can use the poverty maps to update their Poverty Reduction Strategy Papers documents to help outline its strategy for poverty reduction.

The methodology used to estimate the poverty and inequality class of measures at *Faritany* (province), *Fivondrona* (district), and *Faraisana* (community) levels is straightforward and it involves two stages. The first stage estimation involves modeling the consumption model at levels where the National Household Survey of Living Conditions is representative. And in the second stage the estimated consumption model is used to estimate the consumption model of each household in the population Census data.

The summary of technical details of the methodology fully elaborated by Elbers et. al. (2002) and employed by Mistiaen et. al. (2002) in Madagascar is given by the consumption model of household *h*

in location c, where the explanatory variables, x_{ch}, are given by the limited variables encounter in the Household Survey of Living Conditions:

$$\ln y_{ch} = E[\ln y_{ch}|\mathbf{x}_{ch}] + u_{ch} \qquad\qquad (2.15)$$

However, to combine the population Census data with the National Household Survey of Living Conditions data, the observable characteristics must be found in both data sets or in any other source that can be linked to both data sets. Then using the linear approximation to the conditional expectation, the consumption model is modelled as shown below:

$$\ln y_{ch} = \mathbf{x}_{ch}'\boldsymbol{\beta} + u_{ch} \text{ with } u_{ch} = \eta_c + \varepsilon_{ch} \qquad\qquad (2.16)$$

Finally, in the second stage, the estimated parameters from the first stage are used to calculate estimates of the welfare measures, FGT class of measures, GINI coefficient and the GE class of measures including only the GE (0) and GE (1) indices for each spatial subgroup of the population.

The variables included in the model were identified by comparing the questionnaires used in National Household Survey of Living Conditions and population Census. In general, the variables found by Mistiaen et. al. (2002) include the demographic aspects, education, housing and infrastructures and location.

Since the regression model is an association of models, and the parameters estimates of the independent variables cannot be interpreted as causal effects. Therefore, the variables somehow help to explain the welfare measures. These causal effects were also strengthened by several studies. Davis (2002) argued that the variables included in this type of model are not causal; they do not explain the determinants of poverty or inequality but seek to maximize the precision to identify the poor areas.

The regression models for the urban areas were more successful in explaining the variation of the household consumption than those found in rural area. The adjusted R^2s encountered ranged from 0.445 to 0.638 in urban areas and 0.239 to 0.46 in rural areas. Two possible reasons were highlighted for the relatively low adjusted R^2s. The first plausible justification was that there were some disparities across rural households' consumption or expenditure and also there were some variation in terms of household access to services. There are some sets of variables that are very important to estimate the welfare measures. Bigman et. al. (2000) have also encountered a low adjusted R^2 in their regression model and in their case, the excluded explanatory variables were found to be important variable in explaining the welfare estimates in Burkina Faso. And the second reasons encountered were that some of the variables were dropped in the initial stage of the model due to being non-comparable.

The findings from Mistiaen et. al. (2002) suggest that the poverty rate that prevailed in Madagascar in 1993 was relatively high, although, this high rate of poverty was not found in most of the provinces. Therefore, a considerable *heterogeneity* in poverty levels across administrative units within provinces was encountered. Concerning the lower level of inequality in the country, the encountered inequality was due to inequality within administrative units rather than mean differences in expenditure between administrative units. These findings are also in line with the findings from Madagascar where most of the communities have significantly lower levels of inequality than the national levels, especially in

rural areas. Concerning the level of poverty, they found higher levels of poverty within rural areas than in urban areas. In addition, they found that the level of inequality in general was lower in rural areas than urban areas. Therefore, the results relax on the agreement from the findings from Bigsten (1980) and Bigsten et. al. (2003) that poverty is a rural phenomenon.

Kenya like Madagascar and many other developing countries is also focusing much of the effort on their development policies to reduce poverty. The main objective of the policy of the Kenyan Government is to create a preferred guide in general and broad based income growth especially to target the poor groups. Kilele and Ndeng'e (2003) have built the first poverty maps for Kenya with the objective to show the spatial distribution of the poor at various levels such as national, regional, district, location and constituency levels so that it can be used by the local Governments to reach their objective to target the poor groups.

The methodology used is the one fully elaborated by Elbers et. al. (2002) Equations 2.15 and 2.16. Kilele and Ndeng'e (2003) have combined data from Welfare Monitoring Surveys (WMS) from 1997 and 1999 with Census 1989 to estimate the welfare measures at disaggregated geographical units such as communities. The variables used were statistically and similarly distributed over households in the population Census and in households surveys and they included demographical aspects, household characteristics, housing, and access to basic services. These are the key variables also found by Mistiaen et. al. (2002).

Similar to Mistiaen et. al. (2002), Kilele and Ndeng'e (2003) have also found that the regression model was slightly successful in explaining the variation of the household consumption in urban areas

consumption than those found in rural area. The adjusted R^2s relatively low from the study of Mistiaen et. al. (2002) ranged from 0.32 to 0.49 in urban areas and 0.31 to 0.49 in rural areas. Differently from Bigman et. al. (2000) and Mistiaen et. al. (2002), Kilele and Ndeng'e (2003) fail to explain the reasons behind the relatively low adjusted R^2s in their welfare estimates.

Kilele and Ndeng'e (2003) have limited the study simply by identifying the poor regions. They do not claim to explain the reasons why particular regions were poorer than others. Similarly, they do not go further in identifying the priority regions that deserve to have relatively higher resource allocation than others. They simply argue that the results could be much more useful and powerful for addressing critical issues of targeting anti-poverty programmes. Henninger and Snel (2002) review the uses and impacts of poverty in other countries and conclude that poverty maps are important tools in implementing poverty reduction programmes, to improve targeting of public expenditure, to help in emergency response and food aid programmes, to help in decision making process, and to increased transparency of public decision-making.

Altogether, the discussion raised by Mistiaen et. al. (2002) and Kilele and Ndeng'e (2003) are consensual in the sense that they have used both the Household Unit Level Data that combine different data source to estimate the welfare measures at disaggregated geographical units, the set of selected variables were roughly the same and the adjusted R^2s were relatively low. Both studies have used one National Household Survey of Living Conditions and population Census, both undertaken approximately at the same time, to estimate the welfare measures of interest such as poverty and inequality class of measures.

But, Hoogeveen et. al. (2003) have used a different approach from those used by Mistiaen et. al. (2002) and Kilele and Ndeng'e (2003). Until now, the discussion on small area estimation have shown how welfare estimates can be derived through the combination of Household Survey of Living Conditions and population Census. The pivot assumption of the model is that the Household Survey of Living Conditions and population Census have to be collected approximately at the same period; the data sources should be contemporaneous. Thus, the model developed by Elbers et. al. (2002) leave room for unreliable estimates for non-census years. Different from Mistiaen et. al. (2002) and Kilele and Ndeng'e (2003), Hoogeveen et. al. (2003) have extended on the Elbers et. al. (2002) methodology and update poverty such as the FGT class of measures and inequality, using the GINI coefficient, in the absence of a new population Census in Uganda.

Three data sources were used to update the FGT class of measures and the GINI coefficient for the periods 1992 and 1999-2000. Two National Household Survey of Living Conditions and one population Census were used, the Integrated National Household Survey of Living Conditions (IHS) and Uganda National Household Survey of Living Conditions (UNHS) were combined with 1991 population Census.

Updated welfare estimates require expenditure obtained for the more recent period. Consequently, three conditions must to be met: First, the National Household Survey of Living Conditions has to be reweighted. Second, a set of common variables should be identified in both data sources. And finally, the consumption mode has to be estimated. The process of reweighting the National Household Survey of Living Conditions for year $t+1$ is based on the information on household from year t. More formally, from the Equation 2.15 the time period ($t+1$) is included in 2.15*

$$\ln y_{ch,\,t+1} = E[\ln y_{ch,\,t+1} | \mathbf{x}_{ch,t+1}] + u_{ch,t+1} \qquad (2.15^*)$$

The final consumption model can be re-written form Equation 2.16 to 2.16*

$$\ln \widetilde{y}_{ch,t+1} = \mathbf{x}_{ch,t+1}' \widetilde{\beta} + \widetilde{\eta}_c + \widetilde{\varepsilon}_{ch,t+1} \qquad (2.16^*)$$

Equation 2.6* changes the original consumption model proposed by Elbers et. al. (2002). Instead of a contemporaneous association between per capita consumption and household characteristics, per capita consumption from a *different time period* is made conditional on household characteristics collected in the Census year.

The variables included in the regression model are those found elsewhere in this type of study by Mistiaen et. al. (2002) and Kilele and Ndeng'e (2003). They involved demographic aspects, education, housing and infrastructures and location. These variables were found in both data sources that are the two National Household Surveys of Living Conditions and the population Census.

Hoogeveen et. al. (2003) have also found a relatively low adjusted R^2s of 0.31. The relative low adjusted R^2s was found to be due to two reasons. First, the variables encountered in the population Census were restricted to household composition, the level of educated people and ethnic aspects. Second, the composition of the household family and the level of educated people modify gradually over time. Despite the relatively low adjusted R^2s most of the studies undertaken in this field are comparable to those found in Uganda. In rural Madagascar the adjusted R^2s ranged from 0.239 to 0.46

in rural areas (Mistiaen et. al.,2002) and in Kenya they ranged from 0.31 to 0.49 (Kilele and Ndeng'e, 2003). However, they found that estimated poverty and inequality class of measures in absence of a new population Census is theoretically straightforward and possible. Although mentioning that they have updated poverty maps, no attention was given to the best targeting anti-poverty programme.

2.7.2. Poverty Mapping and its Application in Mozambique

The first National Household Survey of Living Conditions representative in Mozambique was undertaken in the period 1996-1997 (IAF 1996 to 1997) and it was repeated in the period 2002-2003 (IAF 2002-2003). In general, the data provide household characteristics and expenditure information. The data is not statistically significant at district levels because the National Household Survey of Living Conditions usually includes a limited number of households. This Household Survey of Living Conditions have been used for different purposes by a number of studies in recent years, MPF/UEM/IFPRI (1998), Datt et. al. (2000), Handa (2002), Tarp et. al. (2002), Handa and Simler (2005), and Channing and Simler (2005).

Simler and Nhate (2002) have also used the data from the IAF 1996 to 1997 and Census of 1997 to estimate the welfare estimates, poverty and inequality class of measures, with the associated errors at disaggregated geographical units. Then they explore several aspects of poverty and inequality class of measures, but specifically, they have focused their attention to geographical targeting of anti-poverty efforts. Past Government official statement focus their objective on reducing regional disparities (PARPA I). Therefore, one of the main objectives of the study was to feed into the poverty reduction policies.

The methodology employed in the study is straightforward and it is fully elaborated in Elbers et. al. (2002). They have combined IAF 1996 to 1997 with Census of 1997 to regress the consumption model on a set of common variables to both data sources. Then they have calculated the FGT class of measures, GINI coefficient, and GE class of measures.

The variables included in the model are similar to those found in identical studies elsewhere. Simler and Nhate (2002) included in their model the following variables: age of the household, sex and composition of the household, educational levels, the sex and age of the head of household, the level of employment in the household, the production of agricultural goods, house characteristics, and other.

The regression model found to be well successful in some provinces and not in others. The adjusted R^2s in the country ranged from 0.27 in Nampula to 0.55 in Maputo City. Particularly, Sofala province was found to have a relatively high adjusted R^2 of 0.47, in comparison to Nampula. The possible explanation to the lower levels of adjusted R^2s was that after a closer examination of the variables some of them were dropped because they appear to be different and also the variables were limited by the set of common variables.

Simler and Nhate (2002) estimated the FGT and the inequality class of measures for each of the Mozambique's 128 districts. They found that poverty varies considerably across the country and these changes are due to variation within provinces and also within districts. Concerning inequality, it was found that in Mozambique it is explained not by the existing differences in averages from one administrative post to another administrative post, but by large variations in consumption expenditure inside the administrative posts.

Particularly, one of the most populated areas with poor people was Sofala province (Beira Corridor) where the poverty rates were high. The PH index by districts and by administrative posts ranged from 0.80 to 0.99 and the PG index ranged from 0.68 to 2.59. According to this study, some of the Sofala's 13 districts are extremely poor and almost all the population was considered to be poor. Concerning the inequality, they have found that the GE (0) index, which is the mean log deviation, varies from the 0.20 to 0.60 values in some districts. The north of the province, on average, was associated with lower inequality but in contrast the south with high inequality.

The results from Simler and Nhate (2002) suggest that higher poverty rates are associated with higher levels of inequality. And they also found that most of the disaggregated geographical units were *heterogeneous*, with poor and non-poor households living in close proximity. They argue that these would be less efficient in targeting programmes. However, they estimated the total amount to reach everyone's income that is below the poverty line. They used the PG index to calculate the total poverty gap for all disaggregated geographic units such as the districts. They assumed that the increase in income was perfectly targeting to the poor. The areas found to have the largest shares of poverty gap were located in Sofala province (Beira Corridor), Zambezia and Nampula provinces.

Altogether, Elbers et. al. (2004a) used the completed poverty maps from three developing countries namely of Ecuador, Madagascar and Mozambique to estimate the level of inequality within communities. The purpose of the study was to show that the level of inequality may affect decentralized anti-poverty programme. The methodology adopted was the same as employed in Ecuador by Hentschel et. al. (1998), in Madagascar by Mistiaen et. al. (2002) and in Mozambique by Simler and Nhate (2002) and it consists of combining the the two data sources to estimate the level of inequality at disaggregated geographical units such as inequality within communities. Naturally, the

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variables included in the consumption model are those founded by Hentschel et. al. (1998), Mistiaen et. al. (2002) and Simler and Nhate (2002).

These results suggest that communities are found to vary considerably in terms of inequality and typical poor community in any of these developing countries was found to be as unequal as other communities. Although, concerning decentralized anti-poverty programmes, another measure of welfare, inequality at community level, constitutes an important measure for design of anti-poverty programmes.

2.8. Pro-Poor Growth across Countries

2.8.1. Pro-poor Growth: Brasil

Neto (2002) used the database of the Census 2000, which highlighted the situation in Northeastern Brazil were more than 50 % of the population was poor. The main objective of the study was to see if the economic growth was pro-poor.

From the various dimensions that poverty can be defined, this study focused only on one dimension that is, looking at per capita income, that is to say, insufficient income to satisfy the basic needs. The poverty line was defined in this study looking at the income earned by households. This choice of poverty line is explained by the objective of maintaining the same data source in relation to that obtained for the growth of income per capita, population censuses, and these sources has allowed a regional disaggregation beyond the federal units operated.

From the desegregation of 188 homogeneous regions into districts in, Map 2.1, it is possible to see the conditions and dynamics of poverty in the Northeast region of the country.

Map 2.1: Maps from *Santa Catarina* and *Mato Grosso*
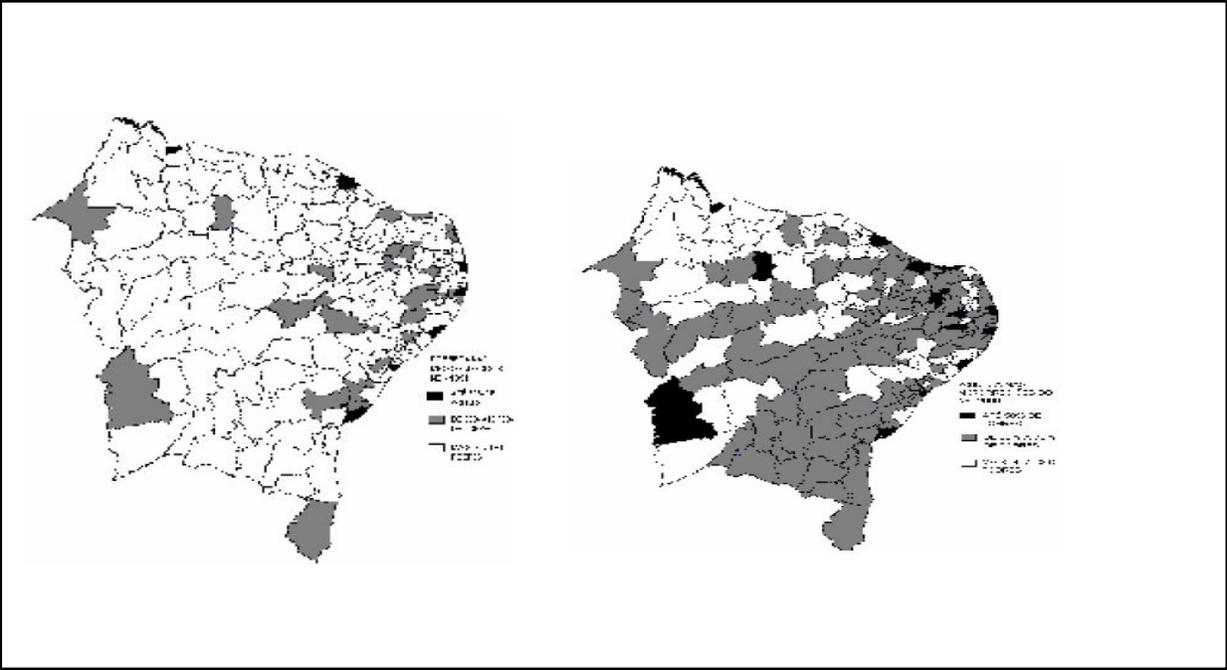
Source: Neto (2002)

Thus, while the 9 districts with a percentage of less than 50 % of the poor in 1991 had good proximity in their participation in the total poor population in the region and in the country, the remaining 179 districts with the highest percentage of poor people were in fact over-represented in the population of poor in the region and in the country.

There are two different notions associated with pro-poor growth in the recent empirical literature on Economic Development (Ravallion, 2004; Lopez, 2005). The first defines the concept of pro-poor growth when poverty reduction take place (Ravallion and Chen, 2003; Ravallion, 2004). Thus, there is a direct association, and not conditional on changes in income distribution, between growth and welfare gains of the poor. The second definition, proposed by Kakwani and Pernia (2000) and

Anderson and White (2000) emphasize that growth is considered to be pro-poor when it is directly associated with a reduction in income inequality and not directly to absolute gains in the welfare of the poor.

The results obtained on the "quality" of economic growth in the period 1991-2000 in the Northeast Brazil, suggests a strong linkage or association between the two notions.

Meneses-Filho and Vasconcellos (2004) used data from Brazil's Annual National Household Survey of Living Conditions (PNAD)[4] between 1981 and 2001 to see whether the economic growth had been pro-poor or not. The questionners used in this survey, as usual, contained information about the most important component to answer their question; the level of expenditure (income), characteristics of the households among others. Due to changes in relative prices over time, they used Consumer Price Index (INPC)[5] to deflate the income and allow more consistent comparison among the periods. The same technique was used by Grimm and Gunter (2004) in the case of Burkina Faso.

The FGT class of measures declined over the sample period 1981-2001. In 1981-2001 the PH declined considerably from 32% to about 26%, respectively. But the major decline registered in this indicator took place in 1993-1997 where the PH decreased by about 9%. Thus, the proportion of poor households declined in general. The other poverty measures, the total amount of the necessary income to rise until the poverty line (PG) and the SPG also followed a slight decline. Particularly, the PG registered, on average, 11% and it somewhat registered a decline over the period. This situation leads

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[4] The abbreviation of PNAD derived from the Portuguese name of the survey, *Pesquisa Nacional por Amostra de Domicílios* (Household Survey of Living Conditions).
[5] The abbreviation of INPC derived from the Portuguese name of consumer price index, *Índice Nacional de Preços do Consumidor.*

to an improvement in the level of income of the households in relation to the poverty line. The average income rose substantially over the period 1993-1997 from Reais (R$) 200.12 to R$ 262.58.

Meneses-Filho and Vasconcellos (2004) also found that the inequality measured by the GINI coefficient, rose from 1981-1989, but then it slightly decreased from 1989-1997 (Table 2.3 describes the evolution of the poverty measures, Watts index and the GINI coefficient). These results are in line with the findings from Bourguignon (2004). Bourguignon (2004) points out that the growth elasticity of poverty is positively related with the level of development and a negatively related with the degree of relative income distribution. Combining the PH and the indigence line, the growth elasticity of poverty is -0.89 and when combining with the PG, the growth elasticity becomes -0.52. In both cases, a percentage increase in the per capita income leads to a decrease in the poverty measures (see the summary results Table 2.3).

Table 2.3: Poverty Measures, Mean Income and GINI Coefficient from Brazil

	PH	*PG*	*SPG*	*Watts Index*
Indigence Line R$65.07				
	-0.890	-1.023	-1.164	-1.146
	(0.104)	(0.125)	(0.159)	(0.173)
Poverty Line R$65.07				
	-0.521	-0.706	-0.844	-0.829
	(0.071)	(0.084)	(0.097)	(0.106)
N	95 (17 States*5 years)			

Source: Meneses-Filho and Vasconcellos (2004)

Meneses-Filho and Vasconcellos (2004) found that the GIC for Brazilian case in 2001 was negative in the range of the 5th percentile and then it slightly increased above the mean of growth rate. The behavior of the GIC in rural and urban areas was relatively different in terms of the pattern of the national GIC. In the urban areas the curve had the same shape but the mean growth rate was relatively lower if compared to the mean growth rate of the whole country. While in rural areas the growth rate favoured those on the bottom of the distribution. Thereafter, the inequality rose worsening the poor conditions and improving the income of the top in the distribution (Figure 2.3)

Figure 2.3: GIC, Total Income Distribution from Brazil
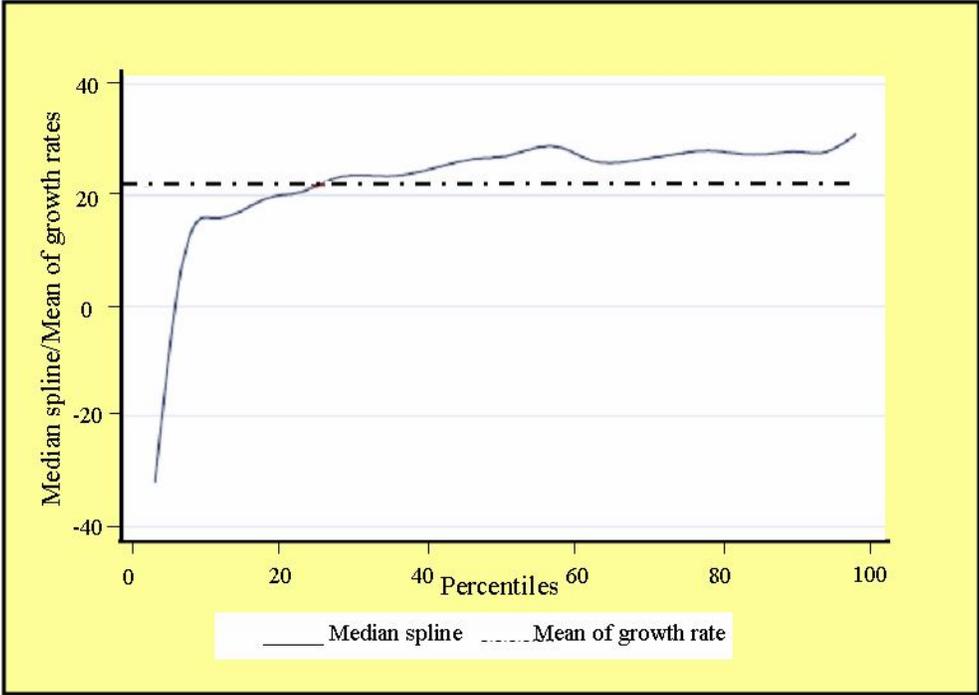
Source: Meneses-Filho and Vasconcellos (2004)

Kakwani and Pernia (2000) stated that in choosing two different projects to be undertaken, the higher the pro-poor index the higher will be the poverty reduction. This claim lies on the idea behind the Net Present Value approach (NPV). Among two mutually exclusive projects, select the one with the higher NPV. The higher the NPV the higher the return and the safer the project.

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2.8.2. Pro-poor Growth: Burkina Faso

Grimm and Gunter (2004) have used the two national Household Surveys of Living Conditions in Burkina Faso which collected data from household income and the level of expenditure in 1994-1998 and 1998-2003. The study addressed one of the key questions: why do the poor not benefit from economic growth and what should be done so that the economic growth becomes more pro-poor.

Grimm and Gunter (2004) calculated pro-poor indices such as the Growth Incidence Curves (GIC), given by a graphical technique that looks for how individuals benefit from both (income) and non-income measures over time and the growth elasticity of poverty, given by the percentage change in poverty in response to a one percentage increase (decrease) in average income, to see whether share of the income distribution has benefited from economic growth.

During this period (1994 to 1998 and 1998 to 2003), the same pattern followed by the PH was also followed by two other measures from the FGT class of measures. The total amount of income necessary to raise income for everyone who is below the fixed level of poverty line up to the line (PG) was 20.9% in 1994 and in 2003 it decreased to 16%. This decline in the PG communicates that on average poor people are close to the poverty line, implying a higher growth of elasticity of poverty. Thereafter, in the same period the income distribution has changed and the GINI coefficient remained the same in urban areas while in rural areas it increased to 0.39.

The relationship between the growth of the GDP per capita and relative change in national poverty lines (growth elasticity of poverty) took both, positive and negative values during the periods 1994-1998 and 1998-2003. During the period 1994-1998, the growth elasticity of poverty in relation to the

PH index in urban areas was 5.8 %, implying that, a one percent change in the GDP per capita led to an increase of 5.8 % in the PH index. In the same period, the growth elasticity of poverty was relatively lower in rural areas. Conversely, in the following period 1998-2003, the elasticities in urban and rural areas were -3.2 and -2.7 % respectively. These declines in these elasticities show that the economic growth in this period drove the poverty reduction. In both periods the elasticities were slightly smaller than the urban areas. These results rely on the agreement that poverty is a rural phenomenon as suggested by Bigsten (1980) and Bigsten et. al. (2003). See the summary results in Table 2.4.

Table 2.4: Growth Elasticity of Poverty from Burkina Faso

FGT Class of Measure	*1994-1998*			*1998-2003*		
	Urban	*Rural*	*National*	*Urban*	*Rural*	*National*
PH NPL	5.8	0.7	-3.2	-2.7	-2.7	-2.9
PG NPL	7.2	-4.0	1.9	0.6	-3.7	-1.3
SPG NPL	8.1	-4.5	2.1	0.6	-4.4	-1.6

Source: Grimm and Gunter (2004).

However, the analysis of growth elasticity of poverty does not give in details of the pro-poorness growth. Therefore Grimm and Gunter (2004) have decided to calculate the GIC separately for urban, rural and national level to see whether the living conditions in rural, urban and national has improved or deteriorated. They divided the data in deciles and they used household specific price deflators (HPI)

to avoid fluctuation in expenditure over time. They have found that only at the 87th decile, the negative growth rate decreased in absolute terms.

In short in 1994-1998, the income distribution registered a decline and the living conditions did not improve. In rural areas, the GIC also followed the same pattern from the one in the national level and the curve was wide in range above the mean of growth rate. The GIC started to become narrow below the mean of growth by around 60th percentile. In contrast, the GIC of rural areas in the following period (1998-2003) presented positive growth rates over a long extension in the distribution improving the living conditions of the population. It starts to show a positive slop from the 10th percentile until almost the end of the distribution (Grimm and Gunter, 2004).

Grimm and Gunter (2004) concluded that in the period 1994-1998, the economic growth was pro-poor in some areas and not poor in others. This conclusion, of course, depends on which definition they used. So, in light of the definition proposed by Ravallion and Chen (2001), growth at the national level was deemed as not pro-poor. Instead, following a narrow definition proposed by Kawkani and Pernia (2000), growth was deemed as pro-poor in rural areas. Conversely, in the following period 1998-2003 in the sense of growth it was deemed as pro-poor. The GIC for rural areas showed a strong positive growth rate in absolute terms. In relative terms, economic growth in rural areas was not deemed as a pro-poor growth (see Table 2.5).

Table 2.5: Annual Rate of Pro-Poor Growth from Burkina Faso

	1994-1998			1998-2003		
	Urban	*Rural*	*National*	*Urban*	*Rural*	*National*
Pro-Poor Growth PH	-79	-5.2	-5.2	4.2	6.6	6.6
Pro-Poor Growth 20%	-8.2	-4.6	-4.7	4.0	5.2	5.4
Mean Percentile Growth	-6.2	-5.9	-5.8	2.7	7.0	6.7
Growth Mean	-2.7	-6.3	-4.7	1.3	7.6	5.6

Source: Grimm and Gunter (2004).

2.8.3. Effective Growth Rate of Poverty Reduction

The PEGR (effective growth rate of poverty reduction) is given by $g*$, the growth rate is denoted by g and ϕ is the pro-poor index. The two equations below (see equations 2.17 and 2.18) express the PEGR measure. The $g*$ is positively associated with the poverty reduction. Higher values of $g*$ tend to cause higher proportion of poverty reduction (Kakwani and Pernia, 2000).

$$g* = g\phi \tag{2.17}$$

$$g* = g + (\phi - 1)g \tag{2.18}$$

Table 2.6, shows some of the possible outcomes of how growth benefit the poor (ϕ) and its effect on the PEGR. Having made the message of PEGR clear, the next step is the reserve to discuss the pro-poor growth across the selected Asian countries using the PEGR's for the PH, PG and SPG indices.

Table 2.6: Pro-Poor index and PEGR Possible Outcomes

Growth Effect (δ)	Inequality Effect (ε)	Poverty Elasticity (η)	Pro-Poor Index (ϕ)	Poverty Equivalent Growth Rate (g^*)
Constant	Positive	Decrease	Anti-Poor	Anti-Poor
Constant	Negative	Increase	Pro-Poor	Pro-Poor
Positive	Constant	Increase	Pro-Poor	Anti-Poor
Negative	Constant	Decrease	Anti-Poor	Pro-Poor

Source: Author's Own Assessment

In the year 1990-1991, the growth rate in Korea was, in general, lower than the poverty measures from the FGT class of measures. The same pattern was followed in the period 1994-1995 in which the PEGR was about 9% and the growth was about 8%. These results suggest that the non-poor people benefited more than the poor households. Conversely, in 1995-1996 the growth rate benefited the poor. And during the economic recession (Korea crisis) the growth rate decreased by about 8%, but then the economy suddenly recovered in the next period (see Table 2.7).

However, the PEGR was high if compared to the actual growth rate and this pattern was followed before the crisis. Despite this decrease in the headcount ratio, Kakwani and Son (2006) considered the growth process in Korea as anti-poor. The economic growth benefits the non-poor more than the poor household.

Table 2.7: Poverty Equivalent Growth Rates for Korea

Years	Actual Growth Rate	Poverty Equivalent Growth Rate		
		PH	PG	SPG
1990-1991	9.6	10.7	10.4	**10.0**
1991-1992	4.0	4.1	3.7	**3.6**
1992-1993	4.8	5.8	6.6	**6.8**
1993-1994	7.3	7.2	7.3	**7.5**
1994-1995	8.2	9.7	9.5	**8.9**
1995-1996	5.8	5.1	5.0	**4.6**
1996-1997	1.8	9.0	8.3	**9.6**
1997-1998	-7.6	-9.0	-10.0	**-10.9**
1998-1999	**9.8**	**9.6**	**10.5**	**11.5**

Source: Kakwani and Son (2006)

Thailand's experience during the 1980's and 1990's varied considerably. During the period 1988-1992, both the growth rate and the PEGR decreased. Thus growth benefited to a considerable extent the non-poor proportionally more than the poor. The magnitude of the PEGR's slightly decreased over the period of 1990-1992. The trends changed during the 1992-1996, when on average the PEGR's exceeded the growth rate. Thus, the economic growth was deemed as being pro-poor (see Table 2.7).

During the economic recession (1996-2000) the economy was affected by the world financial crisis (Table 2.8). The economic impacts were substantially unfavorable because the country was experiencing a recession of an economic growth in per capita income declining at a rate of 1% a year and, the poverty incidence increasing from 11.4 % to 16.2 % (Son, 2003). However, Thailand has not at all experienced the pro-poor growth (Kakwani and Son, 2006)

Table 2.8: Poverty Equivalent Growth Rates for Thailand

Years	Actual Growth Rate	Poverty Equivalent Growth Rate		
		PH	PG	SPG
1988-1990	9.06	5.5	5.9	**6.1**
1990-1992	7.49	4.3	3.4	**3.0**
1992-1994	7.65	8.8	8.7	**8.8**
1994-1996	5.57	7.4	7.2	**7.2**
1996-1998	-1.00	-2.7	-2.5	**-2.5**
1998-2000	-0.85	-2.3	-3.8	**-4.4**
1998-2000	**4.68**	**3.6**	**3.3**	**3.1**

Source: Kakwani and Son (2006)

Finally, Vietnam PEGR's for the PH, PG and SPG indices were relatively higher than the growth rate during the period 1992-1993 to 1997-1998. This economic performance took place as a consequence of a series of reforms undertaken by the government. The reforms focused heavily on the agricultural sector, which contributed more than 40 % of the GDP and absorbed large part of the employment. Besides other actions, these reforms consisted of redistributing the land among those peasants with no space to produce (see Table 2.9). Thus, the results from these reforms suggest that during the period of

analysis, the poor benefited proportionally more than the non-poor, growth has been pro-poor (Kakwani and Son, 2006).

Table 2.9: Poverty Equivalent Growth Rates for Vietnam 1992-1993 to 1997-1998

	Total	*Urban*	*Rural*
Actual Growth Rate	5.02	5.28	**4.04**
PH	5.08	6.28	**4.61**
PG	5.33	6.46	**5.04**
SPG	**5.43**	**6.59**	**5.19**

Source: Kakwani and Son (2006)

Altogether, the methodology developed by Kakwani and Son (2006) was applied to a few Asian countries (Korea, Thailand and Vietnam). The economic growth pattern in the 1990s in Korea and Vietnam was considered as pro-poor growth while the economic growth in Thailand, in general, has not been pro-poor. The main point raised by this methodology developed by Kakwani and Son (2006) is that by promoting growth, the impact on poverty reduction will be considerably high. This relies on the finding from Dollar and Kraay (2000) that "economic growth is good for the poor".

2.9. The Case of Mozambique

2.9.1. Poverty Line and Poverty Headcount Index

In Mozambique the main document that reflects the government intention to reduce poverty is the "Action Plan for the Reduction of Absolute Poverty (PARPA II). The period covered by this document

ranged from 2006-2007. The PARPA II defines poverty as the incapacity or inability for individuals, families and communities to have access to basic conditions and have a healthy life according to the basic rules of a society or the international standards set by organizations worldwide.

This definition is all in line with the discussion raised from several authors when defining the term poverty (Ravallion, 1994, Valentine 1998, Sen 1999 and Bradshaw, 2006). The CBN method sets the total poverty line as the aggregation of food poverty lines and no food poverty lines (Ravalion and Bidani, 1994). The food poverty line is calculated using the average of individual income against taking into consideration the individual caloric needs, which are approximately 2,150 kilocalories.

According to Hanlon (2007) the estimates on the level of consumption are based on a pair of family National Household Survey of Living Conditions (IAF 1996 to 1997 and 2002 to 2003). There are separate poverty lines for urban and rural areas of each province. This also varies when comparing provinces from different regions and different areas. These differences are totally understandable because poverty is a multidimensional phenomena and dynamic.

Poverty line is a separation point in the distribution of a given welfare indicator below which a household or an individual is regarded as poor, because they live below one dollar per day (Ngepah, 2010). The first National Household Survey of Living Conditions (IAF 1996 to 1997) have concluded that almost 70% of the population lived below the absolute poverty line, most of them reside in rural areas. And the second National Household Survey of Living Conditions conducted in 2002 to 2003 has shown a reduction in poverty of 15.3 percentage points. In Mozambique one can fairly state that,

the results from both National Household Survey of Living Conditions, have shown that poverty is a rural phenomena. According to Hanlon (2007, 12):

Inhambane province has 80.1 % , followed by the province of Maputo fixing their level at 79.1 % and in Gaza province has 59.7 %. All these provinces are located in the south of the country. The absolute number of poor people is relatively large in provinces such as Nampula and Zambezia . This is due to existing population concentration in these two provinces. An analysis of the ten provinces of Mozambique, during 1997-2003 has revealed that the evolution of poverty has decreased in eight provinces. The poverty rates have decreased considerably in the central and northern regions of the country. Particularly, poverty rates have declined by 28 percentage points and 11 percentage points respectively in these two regions. These reductions are quite remarkable and show a good performance of public policies to fight poverty. The central and northern region included the provinces with the highest rates of rural poverty across the country.

The inequality on income measured by the GINI coefficient calculated at the national level, slightly increased from 0.40 in 1997 to 0.42 in 2004, indicating that the inequality level has slightly worsened. The stable income distribution in rural areas were more fixed with a value of 0.37 compared with urban areas were the inequality tends to increase from 0.47 to 0.48. At the provincial level, this indicator has increased considerable in the south of the country, especially in Maputo City. The deterioration in the level of inequality in Maputo City (capital of Mozambique) shows that disparities have increased between rich and the poor. The explanation of this increase is simple. During this period, first, the increase in spending on durable goods of rich people rose, and secondly, there was a contraction in the level of expenditure of individuals living below the poverty line. This illustrates that the standard of living of the poor worsened in Maputo City. (PARPA II, 2005-2008).

2.9.2. Poverty Inequality and Growth in Mozambique

In Mozambique the first representative Household Survey of Living Conditions at national level was undertaken in the period 1996 to 1997 (IAF 1996 to 1997) and it was repeated in the period 2002 to 2003 (IAF 2002 to 2003). In general, these data provide household information, welfare levels, poverty, and other household and individual characteristics. This data is not statistically significant at district levels because the survey usually includes a limited number of households. However, information about inequality and poverty can only be calculated for these two periods at provincial and regional levels. In 1997, the Census of 1997 (Second General Population and Housing Census) [6] took place in the country. It included extensive information on household and it excluded information about the level of expenditure (income).

Both studies used this information to assess the level of inequality, poverty and growth. Simler and Nhate (2005) combined two different sources of information: National Household Survey of Living Condictions (IAF 1996 to 1997) and Census of 1997 to estimate the poverty and inequality measures at lower levels, while Channing and Simler (2005) used only the national household's survey to assess the pattern of economic growth.

Simler and Nhate (2005), as stated before, used the data from the IAF 1996 to 1997 and Census of 1997 to estimate the relationship between the variables used in the questionnaire. They used the consumption per capita (measuring the welfare) to test with other variables that seemed to be correlated with the consumption per capita. After they calculated the estimated coefficients for consumption, they applied the results in the Census of 1997 to estimate the consumption of the

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[6] Derives from the Portuguese II Recenseamento Geral a População e Habitação

population, the FGT class of measures such as the PH and indices, the GINI coefficient, Atikinson index, and the GE indices.

However, this method of combining the common information from surveys with Census is used for small-area estimation (districts, administrative posts) in Mozambique. This technique consists of combining the common points of each data in order to generate small areas estimates of income (or expenditure), poverty and inequality Elbers et. al. (2004).

Smiler and Nhate (2005) estimated the PH for each of Mozambique's 128 districts. Particularly, Beira corridor is one of the area's most populated where poverty rates are high. The PH of districts and administrative post (Sofala province) range from 0.80 to 0.99 and the PG ranges from 0.68 to 2.59. According to this study, some of the districts in Sofala are highly poor and almost all the population is considered to be poor. These results (high results) are consistent with those found in the IAF 1996 to 1997 (compare these results with the results in Table 1.2). Concerning the inequality, they have found the GE (0), which is the mean log deviation, varies from the 0.20 (the minimum) to 0.60 (the maximum) values in some districts. The north of the province, on average, is associated with lower inequality but in contrast the south is full of inequality.

2.9.3. Pro-Poor Economic Growth: Mozambique

Based on the data from IAF 1996 to 1997 and IAF 2002-2003 Channing and Simler (2005) have examined the level of income, inequality and poverty in Mozambique. This information was necessary to carry out a study under the umbrella of the term pro-poor. They have used the consumption per capita as the welfare metric and to examine the impact of poverty in both national households'

surveys, the cost of basic needs approach (including food and non food) to calculate the absolute poverty lines was used (Ravallion 1994, 1998).

However, two general measures of inequality were employed to estimate the inequality in Mozambique; the most often used indicator, the GINI coefficient and the GE measures of inequality. They have reported the GINI coefficient and the GE measures of inequality at regional and provincial levels. Note that Smiler and Nhate (2005) calculated these inequality measures at district levels because they combine two different sources of information; survey (representative at regional levels) and Census (country representative). In both surveys a change in inequality measures varies somewhat and there is a clear ranking by regions and province. The region with higher score in the GINI coefficient is the south (excluding Maputo) with 0.44 followed by the north and central regions with 0.39 each. Despite these discrepancies they have considered that a broad-based consumption occurred in Mozambique (Channing and Simler, 2005).

To find whether the economic growth was pro-poor or not, Channing and Simler (2005) assess the economic growth under different definitions. By following the restrictive definition of the term proposed by Kakwani and Pernia (2000), in which economic growth is considered to be pro-poor when it considers progress in inequality; economic growth in Mozambique did not benefit the poor households, implying that the pattern of economic growth was not pro-poor.

Conversely, using the second definition proposed by Ravallion and Chen (2003), in which they suggest that economic growth is deemed as pro-poor when the absolute measures of poverty registers decline. However, looking at the absolute measure of poverty in these periods, they have

communicated a significant decline. Consistent with this broader definition they have stated that the pattern of economic growth in Mozambique was considered to be pro-poor.

2.10. Chapter Summary

This chapter aimed at examining the existing literature on concepts such as poverty, inequality growth and pro-poor growth. Then the effect of growth on poverty reduction was conducted. The generally agreed discussion on this section was that growth has seven groups of factors affecting poverty reduction they are: geographic distribution of growth, sector channel of growth, the use of factors of production, degree of inequality of income and wealth, non-income dimensions, pattern of government expenditure and environmental impact. Then the discussion moves on to clarify the relationship between poverty, inequality and growth. Several methods of poverty mapping were also presented. The technique involves where: Small Area Estimation, Household Unit Level Method and Community Level Data Method. Reasons for undertaking only Small Area estimation in this study were given.

The literature on pro-poor growth was then reviewed, looking specifically at the debate on the effect of growth on poverty and inequality reduction. It follows from the literature review that depending on the definition followed the conclusion about the pro-poor growth may be different. The first definition suggests that growth can be observed as pro-poor if the distributional growth changes benefit the poor. In short, this definition suggests that the pro-poor growth should consider progress in inequality. And the second definition considers that growth is considered pro-poor if and only if the poor households benefit in absolute terms. These definitions were important to give an idea of the concept pro-poor in order to fill the gap due to lack of a clear definition of the term and allow the choice of the second definition as the definition adopted for this research.

The discussion on the assessment of the pro-poor growth was undertaken across several countries. In the case of Mozambique, Channing and Simler (2005) have concluded that economic growth in the period was pro-poor. It is important to note that the contribution of this thesis is to address the issue of pro-poor growth at lower levels such as districts not the country as a whole.

CHAPTER 3:

RESEARCH METHODOLOGY AND DESIGN

3.1. Introduction

This chapter addresses the methodology applied in this research with a purpose to achieve the objectives proposed in chapter one. It starts by presenting the discussion of the research paradigm undertaken in the research followed by the data collection method.

The next section, Data Collection Instruments and Procedures, outlines the analytical issues of poverty, inequality, and pro-poor growth, and the methodology of Small Area Estimation. Each concept deserves a greater attention for the purpose of clarification and advantage of their in this research. The researcher creates a subsection to present decision rule of the term Pro-poor growth of each district in Sofala province.

The chapter ends with a Triangulation, Validity and Reliability Issues. The researcher used several types of triangulation as described by Begley (1996). The application of triangulation allows the researcher to explore more about the problem considered in the research.

The methodology of linking surveys and Census data is used in geography for small-area estimation. It has been adapted to study poverty and inequality, with an application in Ecuador, by Hentschel et. al.

(2000) and Mozambique, by Similer and Nhate (2005). This chapter, first describes, the sources of information used for the study and then it specifies the full methodology used.

3.2. Research Paradigme

Mackenzie and Knipe (2006) have stated that a research paradigm is an outlook about research undertaken by groups of several researchers taking into account a set of rules, assumptions, concepts, experiments, and practices. In short, it is a way of thinking about and doing research. Therefore, there are three different approaches to think about. Creswell (2003) explains the existence of the three major educational research paradigms or approaches: quantitative research, qualitative research, and mixed research.

The researcher found a mixed research, combining both quantitative and qualitative approaches, more appropriate for the current research. Based on the aims and the objectives of the research and the research questions, it becomes clear the need of use of these two data sources allowing the linkages between two different types of data sources. One quantitative data source (National Household Surveys) and another more qualitative data source (Census). This methodology of using National Household Surveys and Census data used in geography for Small Area Estimation has been adapted to study poverty and inequality, with an application in Ecuador, by Hentschel et. al. (2000) and Mozambique, by Similer and Nhate (2005).

3.3. Research Design

The methodology is simple and it consists of several steps. Collect the needed data from the national household's surveys (IAF 1996 to 1997) and the Census (Census of 1997). After collecting the data, the next step was to select the common variables existing in both sources for the variables selected.

Due to the transformation (generate new variables) the distribution in some cases was different. In this step some of the variables were excluded due to differences in distribution. Then the next step was to construct a consumption model using some of the variables. Poverty lines as an input to get the welfare measures of interest: the poverty measures (FGT class of measures) and the inequality (GINI coefficient) measures. See Figure 3.1 for the basic idea of the model.

Figure 3.1: Schematic Representation for PovMap
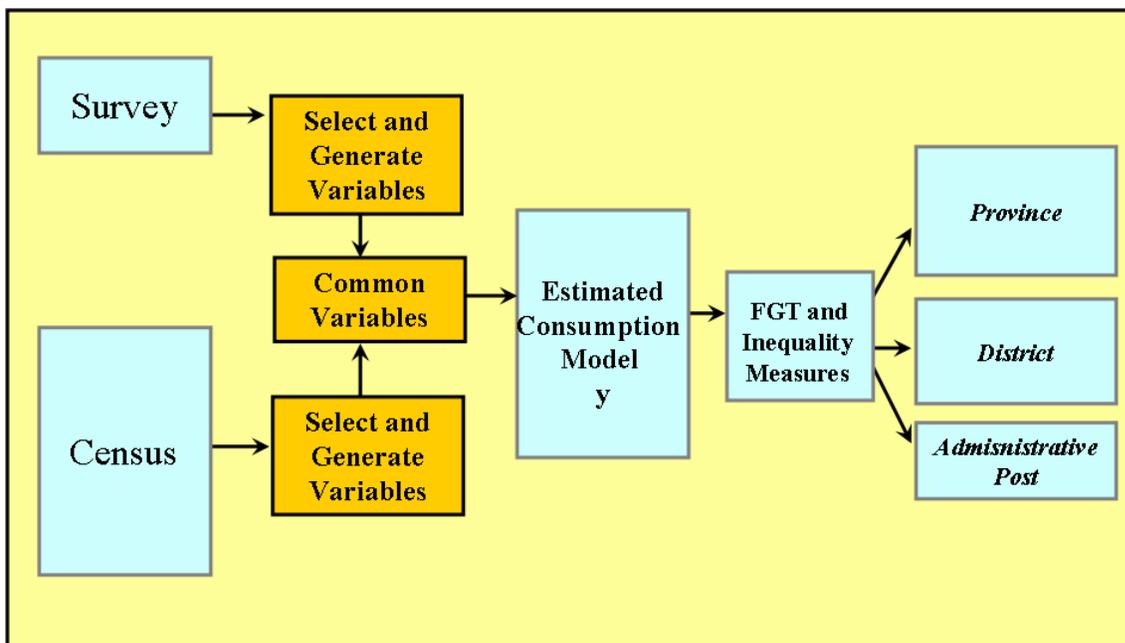
Source: Adapted from Elbers et. al. (2002)

3.4. Data Collection Instruments and Procedures

3.4.1. Data description

The National Institute of Statistics (INE) conducted both National Household Survey of Living Conditions IAF 1996 to 1997 and IAF 2002 to 2003, throughout the country. These surveys focus on the main objective, which is to analyze the budget of the households. Particularly, these surveys aimed at calculating the level and composition of income and expenditure and other socio-economic and demographic aspects of the households, in order to obtain various indicators of living conditions of the population. To achieve this objective, the survey collected different information. The information includes, education access, demographic characteristics, level of employment, health services, housing, victimization and poverty indicators.

The household surveys focused on the basic nucleus of the households of the society. This analysis provides various indicators to monitor and evaluate the impact of plans and programme in a given population. The study of household characteristics is important to determine the composition, structure and family relationships that are established within them.

To generate poverty and inequality measures for the periods 1996 to 1997 and 2002 to 2003, two sources of data were used. The first data source is composed of the National Household's Surveys from two dissimilar periods (IAF 1996 to 1997 and IAF 2002 to 2003) collected by the INE (1996, 1998). The main objective of both National Household Survey of Living Conditions are to gather information concerning per capita Household expenditure and other socio - economic characteristics in

order to estimate the incidence of poverty and other synthetic indicators such as the human development index of families in Mozambique.

According to INE (2002) the specific objectives from IAF 1996 to 1997 and IAF 2002-03, are to:

1. Provide the necessary information to calculate the re-estimation of the basket of consumer goods and services used to create the Consumer Price Index, an indicator that serves as the basis for calculating inflation in Mozambique;

2. Provide the basis for launching and updating of public accounting;

3. Obtain updated information on the families concerning their housing conditions, other durable goods, health status, conditions of employment, education levels and incidence of crime information;

4. Support the formulation of sectoral policies and programmes of the Government, as well as provide essential information for monitoring the evolution of the living conditions of the population residing in the national territory and to

5. Develop national capacity to develop and implement household surveys.

The first source is the National Household Survey of Living Conditions (IAF 1996 to 1997 and IAF 2002 to 2003) which covered the entire country and collected information from households living conditions at different levels (individual, household and community). These surveys are multipurpose and several poverty studies have used this information (MPF/UEM/IFRI 1998, Datt et. al. 2000, Handa 2002, Tarp et. al. 2002, Handa and Similer 2005, Chaning and Similer 2005, Similer and Nhate 2005).

The National Household Survey of Living Conditions Combined three Different Questionners. The questioner design was divided into four different parts (used four different questioners). Each questioner collects specific information.

3.4.2. Description of New Variable Included in the Model

Poverty is a multidimensional phenomenon with many strands, some of which are related to lack of access. According to Ravallion (1997) the poor have no access to education, production, health, road access, social and political participation, etc. An important factor to gain access and thus contribute to the fight against poverty is the existence of roads, agriculture, and health. These aspects are crucial to improve the living conditions of the population, especially in rural areas. Following this approach, the research used these variables to update the data base from IAF 2002 to 2003 using the technique of Small Area Estimation. Next, the reasons for selecting each of the variables which are health indicators, education, agriculture production and road access are shown below:

1. Health Indicators

The vast majority of the population in Mozambique live with problems of health and poverty, two fundamental characteristic in less developing countries. But the relationship between the level of poverty and good health is not straightforward. Several studies have concluded that there is no coincidence to find bad health in areas with poor people. The relationship between health and poverty has been treated as having two different effects because bad health can create conditions for poverty and poverty in turn can also lead to poor health (Ursula, 2005). A detailed explanation is given for the two different effects.

Several channels of poverty can affect the health of a household. The first reason is that poor people in developing countries do not have enough resources and income to acquire the necessary goods and health assistance. The second reason is that the poor people live in concentrated areas with no access to safe water and public health services in general. As a result the poor people develop a propensity to get diseases. The third reason is that, even with the availability of the public health sectors, sometimes the poor people do not have access to these services, because they normally live in areas far from the hospitals, such as rural areas. In summary there are several ways to explain how poverty cause bad health.

Then on the other side, the economic theories suggest that health has a direct effect on economic performance, through human capital.

Table 3.1: Health Indicators 2003

Districts Codes	Districts	New born	Vaccination	Medical Assistance	Number of Hospitals
1	Cidadae da Beira	11,639.00	162,341.00	247,116.00	19.00
2	Buzi	30,119.00	61,810.00	76,796.00	22.00
3	Caia	2,308.00	71,990.00	59,642.00	8.00
4	Chemba	473.00	22,984.00	22,552.00	9.00
5	Cheringoma	686.00	19,707.00	26,533.00	7.00
6	Chibabava	1,275.00	61,486.00	62,244.00	12.00
7	Dondo	3,161.00	62,259.00	101,286.00	12.00
8	Gorongoza	1,634.00	47,299.00	49,851.00	16.00
9	Machanga	646.00	17,773.00	16,975.00	7.00

10	Maringue	406.00	29,502.00	18,660.00	5.00
11	Marromeu	1,644.00	46,737.00	46,312.00	16.00
12	Muanza	244.00	59,993.00	6,529.00	12.00
13	Nhamatanda	3,999.00	87,988.00	99,228.00	17.00

Source: INE (2003)

In the social dimension, the situation is different. Improving access to health facilities is advantageous especially for women. Pregnant women come more easily and quickly to the health and medical assistance of their children.

2. Education

Alayón (1995) states that if a household has access to education and other basic services, then the basic rights will be guarantee, and therefore the structural problems of the society will be resolved. The level of education is one of the main channels by which people with lower level of income and low access to basic services can improve their standard of living and lived out of poverty.

According to several studies conducted, the relationship between the level of educated people and the level of poverty is positively correlated, that is to say, education is closely related to the access to employment, and consequently, the development of a family and then of a country. (Orazem, Glewwe and Patrinos, 2007). The research applied data on number of schools in 2012 to relate to poverty in Sofala.

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Table 3.2: Population and Number of Schools 2003

Districts Codes	Districts	Density (Hab/km2)	Number of Schools
1	Cidadae da Beira	827.3	85
2	Buzi	20.3	71
3	Caia	27.1	48
4	Chemba	10.7	46
5	Cheringoma	2.1	39
6	Chibabava	9.8	53
7	Dondo	68.5	58
8	Gorongoza	11.9	61
9	Machanga	10.4	40
10	Maringue	13	35
11	Marromeu	12.5	51
12	Muanza	2.3	33
13	Nhamatanda	48.1	65

Source: INE (2003)

One of the main objectives of PARPA II (2005-2008), approved in May 2006, was "to guarantee quality education for everyone, make sure that all the Mozambican get access to education. This objective is also in line with the Millennium Development Goal (MDG) declared by the United Nations (UN). A specific objective of PARPA II is to increase the participation of women, girls and orphans in all kinds of educational opportunities, taking into account the MDGs, and to reduce the high illiteracy rates, which affect this group strongly and families experiencing income below the poverty line.

3. Agricultural Products 2001-2002

Agriculture plays an important role in growth and hence poverty reduction in Mozambique. The contribution of agriculture in GDP has varied over time due to differences in rainfall distribution pattern. In the past decade, agriculture contributed about 20-25%. The stability in the contribution of each sector of the economy in GDP is surprising given the high economic growth and low agricultural productivity (PNUD, 1998).

There are several factors related to low agricultural productivity and decreasing trend, and below is a brief description of some of them.

Disproportion in public spending allocated to agriculture is relative to other sectors of the economy. In the period 2004-2006, agriculture received an annual average of about 6% of total government expenditure (Zavale et. al., 2009). In 2007, agriculture received only 3.7% of total spending, disproportionately below the contribution of agriculture to the economy or the proportion of the population living on agriculture.

Table 3.3: Production Campaign 2001-2002

Districts Codes	Districts	Vegetables		Maze		Cereal	
		Area (Hectares)	Production (Tones)	Area (Hectares)	Production (Tones)	Area (Hectares)	Production (Tones)
1	Cidade da Beira	2,300.00	9,897.70	5,941.00	4,947.00	2,546.00	1,502.00
2	Buzi	6,570.00	23,131.90	7,977.00	5,961.00	5,993.00	3,535.00
3	Caia	4,160.00	10,044.20	19,552.00	11,039.00	5,383.00	3,175.00
4	Chemba	9,000.00	23,278.50	5,079.00	3,795.00	3,117.00	1,838.00
5	Cheringoma	960.00	1,491.50	658.00	612.00	752.00	443.00
6	Chibabava	1,000.00	1,836.40	2,955.00	1,324.00	4,328.00	2,553.00
7	Dondo	7,320.00	19,941.90	8,041.00	6,695.00	4,691.00	2,766.00
8	Gorongoza	6,500.00	13,898.10	6,570.00	5,751.00	4,927.00	2,906.00
9	Machanga	5,000.00	6,207.60	3,090.00	1,485.00	2,726.00	1,608.00
10	Maringue	720.00	1,241.50	4,548.00	3,496.00	3,879.00	2,289.00
11	Marromeu	580.00	1,129.40	6,374.00	6,056.00	3,523.00	2,078.00
12	Muanza	600.00	819.10	58.00	28.00	110.00	65.00
13	Nhamatanda	3,030.00	15,200.00	17,667.00	19,047.00	15,402.00	9,085.00

Source: FAO (2005)

Mozambique inherited Weak infrastructure of roads at independence, poor infrastructure for example roads, and this was further undermined by civil war, creating an unfavorable environment for agricultural development (Boughton et. al., 2007). In recent years there has been some improvement of roads, witnessed by the reduction in the time required to travel to major cities.

Health and nutritional status also affects production. In Mozambique, poor access of the majority of the population to health services, coupled with high fertility rates and consequently high dependency rates are associated with low productivity and high levels of poverty (Datt et. al., 2000).

4. Road Access

Roads play an important role in reducing the impact of poverty. According to Fiege (2006) under the five dimensions the following impacts were observed and predicted:

Economic Dimension: A creation of jobs in the rehabilitation and maintenance of roads is rare in the province of Sofala. Thus, their impact on poverty reduction is particularly important. The money earned by employees is used in various forms and is an important incentive for the local economy.

With regard to agriculture, the new situation of access causes a new dynamic in agricultural production. With the roads rehabilitated to reach districts, new buyers, especially buyers of corn and goats, which allow the marketing of these products. The ability to sell is one of the key factors for improving the living conditions in the districts. Moreover, the consequent introduction of new cash crops like sesame generates a diversification of agricultural production. One problematic aspect is that the producers do not have bargaining power on prices and are forced to sell their products at prices stipulated by buyers (Fiege, 2006).

On the other hand, the profit margin of the buyers is negligible due to high transportation costs. Another problematic aspect related to the marketability of new products is the fact that the population should be enticed to sell large amounts of product above the usual, thereby reducing the reserves intended for consumption. Maize for example has often been sold and sellers do not keep enough reserves for their own consumption, causing famines shortly after (Fiege, 2006).

Ecological dimension: Fiege (2006) says that the construction of roads always means a change in the environment and brings ecological impacts. In this case it is not a new opened construction road and, so that the negative impacts are minimal. The biggest problem is Ecological that envisions the increased exploitation of timber in the districts. Above all simple licenses may bring negative impacts in the near future because they imply the obligation to reforest the areas explored.

Social dimension: The network of social infrastructure in rural areas of Sofala Province is weak. In this context roads access are of great importance because it is one of the favourable conditions for the construction and expansion of social infrastructure. However, in the present study it was not possible to observe the construction of new infrastructure both in education and in health in connection to the new roads. Infrastructure observed predated the rehabilitation of roads.

In the health sector, almost all respondents mentioned the improvement of their health situation in connection to the roads rehabilitated to the extent that their families can now easily to reach the health facilities. The employees of the health sector particularly highlighted the improvement in service delivery, for example with regard to the transportation of patients or access to medicines and medical

equipment. The improvement of services had the direct impact on reducing morbidity and maternal mortality. Given the improvement of service delivery and the impact has already occurred, respondents predicted a further improvement of the health situation in general. However, employees of health facilities increased the fear index of HIV / AIDS in the region, due to the experiences in other regions in which, after the rehabilitation of roads and the consequent facilitation of mobility and movement of people, one observes an increase of rates of HIV / AIDS (Fiege, 2006).

One of the current hypotheses in connection with the construction of roads is that the level of education of the population improves due to impacts resulting from good access to roads. This impact cannot be observed yet during the course of this study. However, we can observe positive trends pointing towards improving the quality of public education in the future. Regarding the improvement of service delivery there is an increase in supervisory activities and teaching support in schools (Fiege, 2006).

Physical Dimension: through its rehabilitation, road quality improved significantly, this facilitates the movement in general. In this sense, there are bikes, cars and trucks. Being the most used mode of transport, the bicycle has a special importance. It caters for individual travel and for the transportation of goods and it is accessible even to the poorest groups of the population. With the improvement of the quality of roads, the average length of a bicycle trip is substantially reduced. Despite a general increase in traffic, the movement of motorized vehicles is extremely weak in all road sections and transport services were established in a few sections. Only 90 km of the 653 km rehabilitated roads for transportation services daily was done. Poor transport system is an obstacle to the development and reduces the impact on poverty reduction. Due to high prices, few transport options are not affordable

for everyone (Fiege, 2006). However, one can observe a slight decrease in transport costs on the routes most frequented compared to the less frequented routes.

3.4.3. Instruments Used

1. IAF Questionnaires

Questionnaire 1:

The first questionnaire, community questioner (Questionário Comunitário-QC), collected information from the community in which the main objective was to record the general characteristic of the community and to see the market prices for selected products.

Questionnaire 2:

The second questionnaire, the general households characteristics questioner (Características Gerais do Agregado Familiar-QCG), was designed to collect information related to household information and household member information. In the first part (household information) the questionnaire gathered information related to housing characteristics and amenities, poverty predictors and victimization. The last part (household member information) covered the demographic aspects: education, wealth.

Questionnaire 3:

The third questionnaire, daily households questionnaire (Despesas Diárias-QDD), gathered week information of households purchases, household consumption, own production and gifts in kind by the household.

Questionnaire 4:

And finally, the last questionnaire, monthly household expenses and income questioner (Despesas e Receitas-QDR) recorded data from a number of durable goods purchased in the last 12 months, education expenditure in the last 12 months, income revenues and transferences received.

2. Census

And the second source is the *II Recenseamento Geral a População e Habitação* (Second General Population and Housing Census) which collected information on a range of variables (Similer and Nhate, 2005). These variables included dwelling characteristics, household characteristics, employment characteristics, the educational level, and agricultural possessions.

3.5. Sample Sized and Composition of Households of Sofala Province

A sample of the IAF 1996 to 1997 and IAF 2002 to 2003 were prepared based on the mother Sample constructed from the results of the 1997 population Census. This sample is a stratified random comprising of three stages of selection:

1. The Primary Sampling Units (PSU):
2. The Enumeration Areas (EA) and

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3. Household within AE's.

The selection of households within each EA sampling was done randomly and systematically with equal probability.

The universe of the sample sized for each province were calculated including the population of Mozambican residing in households, and excluding those residing in prisons, army camps, hotels, and so forth. According to Solomon (2011), sample size is the process of selecting a subset of a population of interest, extract the representativeness of the population, so that through the analysis of the selected sample, we can make generalizations upon a sample results for the entire population. The sample size for each province in Mozambique was selected in three different levels and geographically stratified to guarantee that:

1. The sample size is a national representative:
2. The urban and rural samples were selected from families and enjoy the representativeness of these sets.
3. Each sample is representative at a provincial level.

In the first stage of the selection process, the total population naturally included the 10 provinces of the country, and the sample was recorded based on the 10 provinces of Mozambique. The population was divided into urban and rural strata, added to Maputo city strata which represent another province. Administrative divisions for urban areas obey the following classification (the highest to lowest classification, taking into account the importance of economic activity) are: district, neighborhood or

ward and block. The divisions in rural areas are classified as administrative post, locality and village (Figure 3.1)

Figure 3.2: Sample Design for the Mozambique National Household
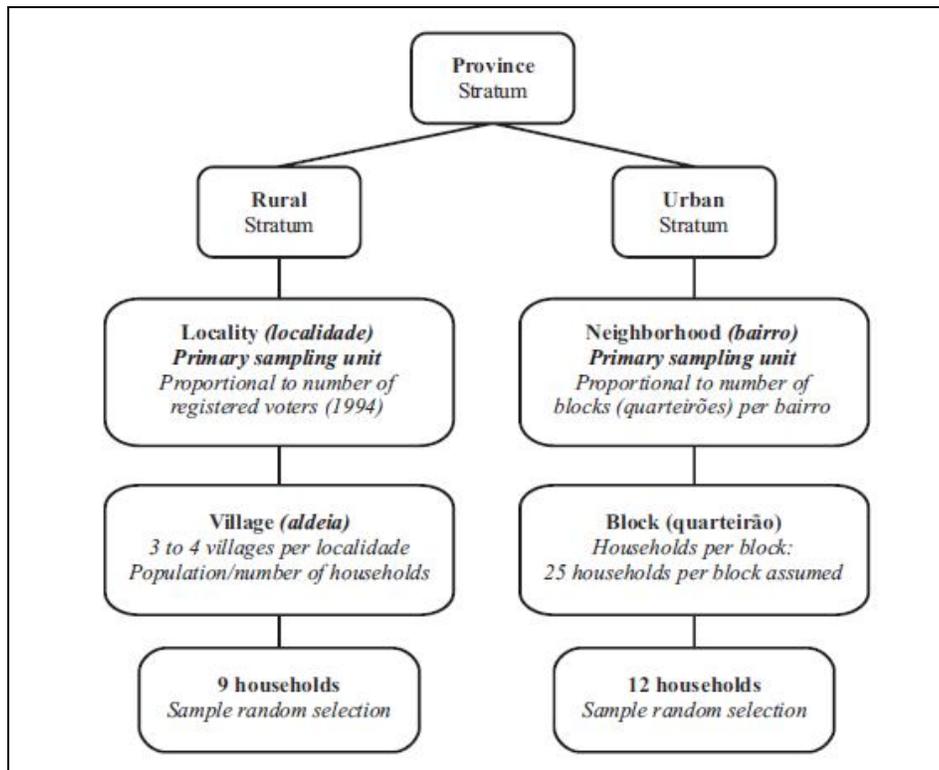
Source: Cavero (1998)

The data collection covered 8,289 and 8,700 households in both periods throughout the country, respectively. The data collection covered the entire population for the country, approximately 16 million people living in 3.6 million households (Table 3.1).

The sample size of the surveys conducted in 1996 to 1997 and 2002 to 2003 are 8,289 and 8,700 households throughout the country, of which 50 % are in urban areas and 50 % are from rural areas. This sample allows reliable estimates at the national, provincial area of residence (urban , rural) and

regional (North , Central and South) survey covered only households living in private households, therefore, the survey has excluded those who were in collective accommodation, the homeless and resident diplomats in embassies / representations (Caveiro, 1998) .

The country's most populous provinces, Zambezia and Nampula are the ones with the higher number of households with 19.5 % and 20.7 %, respectively. These two provinces are home to 38.0 % of the population of the country. Conversely, Maputo City (4.4 %) and Niassa (4.8 %) are the provinces with the lowest number of households (INE, 2002).

According to INE (2002), the average number of people per household in the whole country is 5 people. The distribution of households by the number of members per area residence is a little different. Thus, in rural areas, 34.3 % of household's families consist of 3-4 members, against 29.0 % in urban areas. However, the urban area overcomes rural area with respect to the percentage of households consisting of 7 or more members, as this figure is 26.3 % in urban areas, compared to 19.4 % in rural areas.

The urban area has an average above the national average, 5.2 people per household, compared to 4.3 in rural areas. Among provinces, differences in the composition of household family are also noted. Thus, in the provinces of Cabo Delgado and Nampula households predominate family members comprising between 3 to 4 members, 38.1 % and 41.0 %, respectively. As for the average number of people per household, the province of Cabo Delgado is the one which has a value below the national average, 3.9 members per household, and while Maputo City (6.3) always has a number well above the national (INE, 2002).

Table 3.4: Number of Households

Provinces	Households		
	IAF 1996-1997	IAF 2002-2003	Census 1997
Niassa	657	816	189,935
Cabo Delgado	747	738	336,472
Nampula	960	756	794,438
Zambezia	888	733	726,310
Tete	618	756	268,022
Manica	666	816	201,970
Sofala	765	795	275,832
Inhambane	729	753	259,618
Gaza	639	786	228,310
Maputo Provincia	720	829	174,810
Maputo Cidade	900	923	178,900
Country	**8,289**	**8,700**	3,634,617

Source: INE (2002).

For Sofala province, the total number of households interviewed in IAF 1996 to 1997 was 765 and the number increased by almost 4% in the Second National Household Survey of Living Conditions (IAF 2002 to 2003). In the second source of information (Census of 1997), the number of households included is about 276.000 and it represents almost 7.6% of the total number of households.

However, these quantitative surveys have difficulties in providing certain types of information. For example, the qualitative perceptions of the population about the nature and causes of poverty are difficult to capture. The surveys can provide qualitative and participatory information that is hardly captured by conventional surveys. The disadvantage of qualitative studies is that they often rely on small and unrepresentative samples that hamper the generalization of the results.

3.6. Poverty and Inequality Indicators

To answer the research question if the *economic growth has been pro-poor in Sofala province*, it was necessary to determine the changes in the level of poverty and the change in the income distribution (inequality). The FGT class of measure followed by some inequality measures was calculated. The inequality measure involves the GINI coefficient[7] and for the poverty measures the PH was calculated in both periods (1996 to 1997 and 2002 to 2003).

Poverty Measures

The FGT class of measures (P_α) from Foster-Greer-Thorbecke (1994) was used to contextualize the poverty in Sofala province. These measures range from 0 to 100%. Equation 3.1 defines the FGT poverty measures. Where α is the nonnegative parameter, z denotes the poverty line, y is the household consumption expenditure and n is the population. The poverty headcount index (PH) for $\alpha=0$, the poverty gap index (PG) for $\alpha=1$ and squared poverty index (SPG) for $\alpha=2$.

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[7] From its first proposal in 1921, the GINI coefficient has been widely used as a measure of social and economic inequality.

$$P_{\alpha} = \frac{1}{n}\sum_{y \leq z}\left(1 - \frac{y}{z}\right)^{\alpha} \quad (\alpha \geq 0) \tag{3.1}$$

The PH index is calculated by dividing the number of people whose consumption per capita is below the poverty line, according to the definition of the poverty line in a given region. This index may also be expressed mathematically as $P0 = q/n$, where q is the number of poor people in a given region and n is the population of the region. The higher the number of this index the higher is the population living under the poverty line and experience bad conditions.

PG index shows the average percentage distance that measures the consumption gap below the poverty line using all households incomes contained in the sample. To calculate the PG, families living above the poverty line are assigned a value of zero, since they have no need for additional income. Analytically, the PG means the same as the average difference between the consumption levels of the poor and poverty line, (expressed as a percentage of the poverty line) multiplied by the number found for the poverty headcount index.

Thus, the poverty gap index captures changes in poverty levels. Therefore, the poverty gap index, shows that the poverty rate does not detect "how poor are the poor"? The PH is not as accurate as possible and it ignores the differences between incomes among the population. Sometimes it is possible to have the same PH for different areas but have different PGs for the same areas. In this case the worst conditions are associated with the area with higher PG.

Finally, the last measure from this class of FGT is the SPG index. It is calculated using the average of the square of poverty gaps. It measures the severity of poverty, and takes into account inequality among the poor. For example, if a relatively poor individual makes a transfer for someone else whom has far below the poverty line, the poverty gap index will decrease, because one of the individuals who had levels of life far below the poverty line, improved. Therefore, the living standards of the poorest of the poor improved slightly. Surprisingly, for analytical purposes, this transfer would neither affect the PH levels nor the PG because the transfer occurred among the poor who remained below the poverty line.

In short, for this study the PH is only applied to assess the level of poverty of the population.

Measures of Inequality

The GINI coefficient measures twice the surface between the Lorenz curve, which plots the cumulative income share of the households on the vertical axis and the distribution of the population on the horizontal axis, and the line of equal distribution (45° line). The calculated value may take on values between 0 and 1 with zero interpreted as no inequality. Therefore, large values for GINI coefficient are associated with higher level of inequality. Conversely, it is associated with the low levels of inequity (Todaro and Smith, 2007).

A large number of mathematical expressions have been proposed to express the GINI coefficient. Therefore, the mathematical expression used in this study to calculate the GINI coefficient is shown below:

$$Gini = \frac{W+1}{W-1} - \frac{2}{W(W-1)\bar{y}} \sum w_i y_i \left[\rho_i + 0.5(w_i - 1) \right] \text{ and } \rho_{i+1} = \rho_i + w_i \quad (3.2)$$

In the equation 3.1, w_i is the weight of household i and W is the total population.

3.7. Methodology to Calculate the Poverty and Inequality Income Indicators

The methodology applied in this study to calculate poverty and inequality class of measure is Small Area Estimation. The idea behind the methodology is straightforward. Small-area estimation, combines household surveys and Census data (both collected nearly at the same period) to estimate welfare indicators (poverty and inequality) at lower level of the strata (District, Administrative Posts, and Rural and Urban areas) (Elbers et. al, 2002). In this case it would be perfect if there were two National Household Survey of Living Conditions and two Censuses (both undertaken approximately at the same period). Unfortunately, this is not the case.

In Mozambique, two national households' surveys were conducted (IAF 1996 to 1997 and IAF 2002 to 2003) and in association with the national households' surveys two Censuses were conducted in the country (Census of 1982 and Census of 1997). However, there is a large space between the first Census and the first National Household Survey of Living Conditions (IAF 1996 to 1997). Therefore, the Census of 1981 is excluded in the analysis and the Census of 1997 is combined with both surveys. The model follows two stages:

Zero Stage (Variables in Common)

National Household Survey of Living Conditions are used in combination with the Census to derive the welfare. In the zero stage, questionners used in both sources are analyzed in great detail. This analysis aimed at identifying similar variables (explanatory variables) from both data sources. In most cases the variables were similar but they were asked in different ways and the orders of the questions were different. Therefore, new variables (with the same content and the same expected answers) were created so that it could capture answers from both data sources. In the set of these variables, several new dummy variables were generated.

The next step was to investigate whether these variables in both data sources (surveys and Census) were statistically and similarly distributed. This analysis was based upon the following decision rules:

1. It compared the distribution of each variable (rather arbitrary) using the bar charts; and

2. It also compared the mean and the standard error of each variable.

After selecting the set of common variables, the model dropped (automatically) the variables that were not significant and the selected variables that the model was built on are Health indicators, Education, Agriculture production, Road Access and Area of the district.

First Stage (Modeling Per Capita Consumption)

After selecting the set of common variables and dropping some of the insignificant variables, the next step was to model per capita household expenditure (consumption model) at the lowest level for which

the survey is representative (provincial level). The model begins with the estimation of the expenditure function:

$$\ln y_{ch} = E[\ln y_{ch} | \mathbf{x}_{ch}] + u_{ch} \tag{3.3}$$

The c (cluster) represents an aggregation level in survey and Census data sets, h represents the subscript for household within the cluster c, y_{ch} represents per capita expenditure of household h in cluster c and $\boldsymbol{x}_{ch}$ is the household characteristics for household h in cluster c.

More formally, a liner approximation to the conditional expectation of the household's logarithmic per capita equation 3.3, the model can be written as:

$$\ln y_{ch} = \mathbf{x}_{ch}'\boldsymbol{\beta} + u_{ch} \tag{3.4}$$

The model (equation 3.4) is also referred to as *Beta* model. Since the survey data are just a sub sample of the whole population, the location information is not available for all regions in the Census data. Therefore, we cannot include the location variable in the survey model. Thus, the disturbance term u (equation 3.3) must contain the location variance. The disturbance term u is an estimate using the Generalized Least Square (GLS) taking into account the household survey and the heteroscedasticity of the household component of the disturbance term, ε_{ch}. The individual residual is shown below:

$$u_{ch} = \eta_c + \varepsilon_{ch} \tag{3.5}$$

The disturbance term u involves two components: The first component, η_c, is the cluster component (applies to all households within given cluster) and ε_{ch} is specific to the households. As mentioned above, the estimate of η_c for each cluster in the Census data set is not applicable. Thus, these two components are uncorrelated to one another and they are independent to the regressors.

Second Stage (Bootstrap)

The full specified model (consumption model) involves people with the same characteristics: same income, $\mathbf{x}_{ch}'\beta$, people earnings differing by location, η_c and people with the same characteristics earning differently denoted by $\tilde{\varepsilon}_{ch}$. The mathematical representation for the model as shown below:

$$\ln\tilde{y}_{ch} = \boldsymbol{x}_{ch}'\tilde{\beta} + \tilde{\eta}_c + \tilde{\varepsilon}_{ch} \qquad\qquad (3.6)$$

Therefore, the next step was to estimate the consumption ($\ln\tilde{y}_{ch}$) from 100 simulations. The estimated $\ln\tilde{y}_{ch}$ generated simulated parameters and disturbances which then were applied to the Census data, to calculate the poverty (FGT class of measures) and inequality measures (GINI coefficient). Thus, the poverty and inequality measures were estimated based on the inputs from the poverty line. The poverty line considered in the first period 1996 to 1997 was 8.604,391 MT and in the next period 2002 to 2003 the poverty line used was 14.250,00 MT

The method produced two main errors in the estimated welfare measure. The first error *(model error)* is due to the fact that the parameters from the first-stage model in equation 3.8 were estimated. The second error *(idiosyncratic error)*, is due to the disturbance term in the same model, which implies that households' actual expenditures deviated from their expected values. While population size in a location does not affect the model error, the idiosyncratic error increases as the number of households in a target subgroup decreases. The full methodology is described in Elbers et. al. (2002).

3.8. Analytical Steps to Measure Pro-poor growth

The question of whether economic growth is pro-poor has recently been a subject of academic and policy debate (Kakwani and Pernia, 2000 and Ravallion and Chan, 2001). The approach followed in this research is the one presented by Chan and Ravallion (2001), Bourguignon (2004) and Son (2004) which is analytically detailed next.

The analysis of the relationship between poverty-growth-inequality undertaken by Bourguignon (2004) and Son (2004) has shown that the impact of growth on poverty is shown to be a decreasing function of inequality. The framework to quantify the benefits from the growth is discussed as follows.

Suppose the degree of poverty *PH*, and indicator from the class of FGT, measured by average deprivation is given in terms of poverty line *(z)*, the minimum amount that an individual can afford to have a reasonable life conditions, and income *x* by

$$PH = \int_0^z p(z,x)f(x)dq$$

(3.7)

Where *p(z,x)* represents the general expression proposed by Foster-Greer-Thorbecke (1994), and), and *f(x)* a probability shows the density function. Let *L(p)* be the portion of the income of the bottom *p* percent of the population. For societal mean income $\mu = \int_0^1 x(q)dq$, $L(p) = \dfrac{1}{\mu}\int_0^p x(q)dq$

Where $L(p) = 0$ when $p = 0$; $L(p) = 1$ when $p = 1$; $L(p) \le 0$ for $0 \le p \le 1$; and $\dfrac{dL(p)}{dp} = \dfrac{x(p)}{\mu} \succ 0$

and $\dfrac{d^2 L(p)}{dp^2} \succ 0$: $L(p) = p$ gives perfect equality in income distribution. (3.8)

Based on Atkinson's (1987) relationship between second order dominance and poverty reduction, if $\Delta(\mu L(p)) \ge 0$ for all p, then change in poverty is negative i.e. $\Delta P \le 0$ for all poverty line and the entire family of poverty measures in (equation 3.7) From the definition of Lorenz curve with mean income of the bottom *p* percent of the population as: $\mu_p = \dfrac{1}{p}\int_0^1 x(q)dq$ can be written as $L(p) = \dfrac{\mu_p p}{\mu}$

Using elasticity's to have the values in percentage change:

$$\ln(\mu_p) = \ln(\mu L(p)) - \ln(p)$$

(3.9)

Then we can have:

$$g(p) = \Delta \ln(\mu l(p))$$

(3.10)

Where $g(p) = \Delta \ln(\mu_p)$ is the growth rate of the mean income of the bottom p percent of the population when individuals are ranked by their per capita income, also called the poverty growth curve (Son, 2004). Son and Kakwani (2008) show that if $g(p) \succ 0 (\prec 0)$, for all p, then poverty has decreased (increased) unambiguously between two periods. They suggest a pro-poor growth rate in terms of the area under the poverty-growth curve:

$$\gamma^* = \int_0^1 g(p) dq = \int_0^1 \Delta \ln(\mu L(p)) dp \ \text{ or } \ \gamma \equiv \gamma^* - \Delta \ln(G^*) \tag{3.11}$$

Where γ is the growth rate of societal mean income and $\Delta \ln(G^*)$ is the rate of change of inequality. If inequality decreases (increases) in a given period, then the pro-poor growth rate is greater (less) than the actual growth rate for that period.

3.9. Software's Used to Analyze Data

The Packages used to perform the model were the PovMap 1.1a (Poverty Mapping)[8] that was designed to calculate poverty and inequality at lower levels in the sample and STATA 9 (Statistical Software for Professionals) that was integrated and designed to manage, analyze and graph the data.

The data from the national households surveys and Census were stored in STATA 9. Then the variables were combined from different data sources (survey and Census) in order to create a common standard variable. Therefore, the files were imported for PovMap 1.1a in order to run the consumption model and to estimate the welfare measures. Two projects were created: the first project combined

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[8] The Package was developed by the World Bank

information from IAF 1996 to 1997 and Census of 1997 and the second project was created combining the IAF 2002 to 2003 and Census of 1997.

The final outputs provided by both packages (STATA 9, ArcGIS and PovMap 1.1a) were transferred to Microsoft Excel in order to create new personalized graphs so that they could add visual impact to the work.

3.10. Summary of the Decision Rule for the Case of Sofala

The following table presents the effect of positive growth on the level of inequality and on the level of poverty. The combination of both indicators (poverty and inequality) generates the pro-poor index. The possible combinations of pro-poor index are given in the last column (Table 3.5)

Table 3.5: Decision Rule for the case of Sofala

Growth Effect (δ)	Inequality Effect (ε)	Poverty Effect (η)	Pro-Poor Index (ϕ)
Positive	Decrease	Decrease	Pro-poor
Positive	Decrease	Increase	Anti-Poor
Positive	Increase	Decrease	Anti-Poor
Positive	Increase	Increase	Anti-Poor
Positive	No change	Decrease	Inconclusive
Positive	Decrease	No change	Inconclusive

Source: Adapted from Chan and Ravallion (2001)

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After calculating the poverty and inequality class of measure, a decision rule for the case of Sofala province is made. Taking into account that growth is pro-poor when poverty incidence falls and inequality also falls, we would conclude that the first line represents the optimistic scenario (pro-poor growth).

3.11. Triangulation, Validity and Reliability Issues

The researcher used the Hussein (2009) discussion on the types of triangulation to frame the issue of triangulation undertaking in this research. He referred to five types of triangulation namely: data triangulation, theoretical triangulation, investigator triangulation, analysis triangulation and methodological triangulation.

The first type of triangulation, data triangulation, shows the use of different and multiple data sources in the same study for validation purposes. Begley (1996) believes that the robustness of data can vary over time based on the data that was collected due to people involved in the data collection process. The second type of triangulation described by Hussein (2009) is the theoretical triangulation. Theoretical triangulation is defined as the use of multiple theories in the same study for the purpose of supporting or refuting the findings. Then the third type of triangulation is called investigator triangulation that is defined as the use of more than two researchers in any of the research stages in the same study. Fourthly we have the analysis triangulation. It is stated as the method of analyzing data applying two or more different methods. Finally, we have the methodological triangulation defined as the use of more than two methods in studying the same phenomenon under investigation (Mitchell, 1986).

In this study, the researcher used almost all the types of triangulation described by Hussein (2009). The researcher used a number of methods to gather the data to estimate de indicators of interest (poverty and inequality). A number of sources were consulted to find the needed information. As an example, for this research both National Household Survey and Census, undertaken in Mozambique, were applied.

Two broader theories were combined to conclude the quality of growth. The first theory was proposed by Kakwani and Pernia (2000) which discusses the theory about the concept of pro-poor growth and Ravallion and Chen (2003) have presented a conceptually useful tool to analyze the impact of aggregate economic growth over the income distribution of household. This discussion on the concept of pro-poor growth was then combined with the methodology of Small Area Estimation. Another important triangulation undertaken by the researcher was the combination of estimated figures with maps to allow for a better illustration and discussion.

The use of triangulation allows the researcher to get into more depth well as it enables different dimensions of the problem to be considered (Barbour, 2001). The triangulation improves the consistency and accuracy of data by providing a more clear idea of poverty in Sofala province (Roberts and Taylor, 2002).

3.12. Chapter Summary

This chapter describes the research methodology applied in this research. Research paradigm starts to clear and to guide the remaining sections of this chapter. This chapter highlights the mixed research paradigms applied in this research. The data collection was mainly done using questionnaire designed to undertake the National Household Survey of Living Conditions in two dissimilar periods 1996 to 1997 and 2002 to 2003. And the second instrument used was the questionnaire applied in census 1997. Then data presentation, analysis, and interpretation procedures were discussed. This section explores the softwares used to produce the outputs to allow the discussion. The STATA 9.1 was applied to manipulate the databases (the National Household Survey of Living Conditions and the Census), then Poverty Mapping (PovMap 1.1) enters to estimate the poverty and inequality class of measures for the districts of Sofala and finally, the ArcGIS joined the pair of softwares to display the poverty and inequality class of measures for the districts of Sofala.

The stages that estimate the inequality and poverty indicators were explained. The new variables included in the model were education, agriculture, health. These are some of the selected variables than can help to explain the level of poverty and inequality found in the districts of Sofala province. Finally, the chapter ends with a discussion related to triangulation, validity, and reliability.

CHAPTER 4:

DATA PRESENTATION, ANALYSIS, AND INTERPRETATION

4.1. Introduction

This chapter focused on the data presentation, analysis, and interpretation. The discussion of this chapter is guided by the research objectives presented in chapter one. It first starts with the validation of the model by comparing variables and adjusted correlation coefficient using similar studies. Particularly the discussion was created around the concept of poverty, inequality and then pro-poor growth. Before the analysis of the results, the model applied in this study was validated. This validation was done taking into account the variables included in the model to estimate this measures of interest.

The welfare measures of interest, poverty and inequality class of measures were updated applying consumption model using the household expenditure of 8,604.391 Meticais a day. These indicators were calculated for the 13 districts of Sofala province in two dissimilar periods, 1996 to 1997 and 2002 to 2003. Once the estimates were calculated, maps creation using the ArcGIS information was straightforward. A number of maps concerning poverty, inequality and the assessment of these indicators during the period 1996 to 1997 and 2002 to 2003 are presented.

The map's illustration of Sofala province suggests that there is no clear pattern of this indicator for the two dissimilar periods, 1996 to 1997 and 2002 to 2003. In some cases either poverty and inequality increase from one year to another or decreased in some districts. No regular distribution of variables included estimating poverty and inequality class of measure was found in Sofala districts.

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4.2. Validation of the Model

The final variables included in the model to estimate the welfare measures of interest are those found in identical studies. They include demographic aspects, education, housing and infrastructures and location, which capture the location effects. These variables are in line with the variables used in some studies (Hentschel et. al., 1998, Mistiaen et. al., 2002, Kilele and Ndeng'e, 2003 and Simler and Nhate, 2002).

The adjusted R^2 did not reach at least 50%; the adjusted R^2 of the model is 0.43. This is not a particular high adjusted R^2, which can be fairly attributed to at least two reasons: First, the variable in the Census 1997 were limited to the number of existing variables in IAF 2002-2003. Second, the new variables included in the model may have changed over time. Therefore, the inclusion in both data sources with the pivot assumption that they do not change over time is probably broken. The abbreviation of the variables is given by:

Agriculture	AG	Good Walls	GW
Age	AGE	Head of the Family	HF
Agricultural Zone 1	AZ1	Income	Y
Agricultural Zone 2	AZ2	Income on Cereals	YCE
Area	ARE	Income on Vegetables	YVE
Cereals	CE	Industry	IN
Commerce	COMM	Male	M
Consumption	C	Maze Production	MAZ
Dependency Rate	DR	New Born	NB

Dependency Rate	DRA	Numer of Hospital	HOSP
Dependency Rate	DRA	Perimeter	PER
Electricity in House	ELH	Productivity	PROD
Female	F	Public Service	PUSER
Female Divorced	FD	Safe Water	SW
Commerce of Goods	COMM	Service	SER
Good House	GHOU	Transport	TRASN
Good Toilet	GTO	Vegetables	VE

Then having present the legend it is now possible to combine the variables, as presented in the following table

Table 4. 1: Variables Included in the Regression Model for 2002-2003

Variables	Coefficient	Standard Error	t-Statistic
Constant	8.274731	0.580868	14.245457
AG*CE	-0.000011	0.00036	-0.029918
AG*VE	0.000053	0.000028	1.904559
AG*DR	-0.41648	0.244341	-1.704503
AG*YVE	0.122224	0.06421	1.903503
AG*YCE	-1.756483	0.562608	-3.122039
AG*Y	-1.226675	0.774856	-1.583101
ARE	3.976131	1.465384	2.713372

GHOU	0.116689	0.082776	1.409705
ELH	0.273761	0.092346	2.964512
GTO	-0.301005	0.124284	-2.421904
CE*PROD	0.000813	0.000356	2.282455
C*COMM*TRASN	0.399727	0.15279	2.616189
DRA*FD	0.581183	0.206689	2.811879
DRA*F	-1.388601	0.428887	-3.237685
DRA*M	0.372171	0.399228	0.932228
F	-0.064105	0.264788	-0.242102
FHF	0.380486	0.112879	3.370733
HFA	-0.042878	0.011334	-3.783042
	0.000419	0.000118	3.538844
AG*MAZ	0.000023	0.000008	2.880124
IN*SER	0.527637	0.161639	3.264287
NB	0.000017	0.00002	0.8618
GW	0.222126	0.07126	3.117138
PER	-0.000321	0.000174	-1.852431
SW	0.296398	0.06079	4.875804
PUSER	0.459341	0.19154	2.398141

HOSP	0.014997	0.009421	1.59189
FCOMM	0.172088	0.077002	2.234839
AZ1	-0.35646	0.12018	-2.966049
AZ2	0.821343	0.117949	6.963563

Source: Authors' Computerised Data

Despite the relative low adjusted R^2, the explanatory level of the variables included in the model are comparable to those obtained elsewhere in Developing countries. For Burkina Faso, the adjusted R^2s of the models vary from 0.17 to 0.28 (Bigman et. al., 2000), in Madagascar the adjusted R^2s vary from 0.239 to 0.46 (Mistiaen et. al., 2002), and in Kenya, the adjusted R^2s and 0.31 to 0.49 (Kilele and Ndeng'e, 2003). In Mozambique, particularly, the first poverty map was produced with an adjusted R^2s which varied from 0.27 to 0.55 (Simler and Nhate, 2002).

4.3. Population in Sofala Province

The size of the population is an important indicator to identify the geographical areas or groups that have high average incidence of poverty (Van de Walle, 1991). Then by identifying the geographical areas, targeting programme aiming to reduce poverty can be more effective.

The province has approximately 1,6 million people distributed over 5 regions namely: South, Central, North, Coast and Beira City Regions. From these regions the highest concentration of people is found in Beira City and Central Regions with more than 50% of the total population. And the regions which are less populated parts are the South, North, and Coastal Regions with less than 30% of the total population. Interestingly, the total number of people in Beira City Region represents nearly the same

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number for both regions: South and North Regions. Map 4.1 present the geographical distribution of

the population in Sofala province across regions and of Sofala's 13 districts based on Table 4.2.

Table 4.2: Population by Regions and by Districts

Districts	Regions	Population
Machanga	South	48.829
Chibabava		78.831
Buzi		153.712
Dondo	Central	184.549
Nhamatanda		208.728
Goromgosa		93.462
Muanza	Coast	12.458
Cheringoma		16.9
Marromeu		80.613
Maringue	North	67.939
Caia		94.781
Chemba		45.107
Cidade da Beira	Beira City	561.255

Source: INE (2005). Sofala em Números 2005. (p.5)

The districts that are particularly densely populated are the City of Beira, Nhamatanda, Buzi, Caia and Marromeu, located in Beira City, Central, South, North and Coast Regions. The districts with sparse population across the same regions, excluding Beira City Region, are Gorongosa, Machanga, Chemba, and Cheringoma, respectively.

Map 4.1: Population by Regions and by Districts

Source: Secondary Data Based on IAF 2002-2003 and Census 1997 Data

The reason for the sparsely populated districts (Map 4.1) is associated to the 16 years of civil that ravaged Mozambique. In these districts, Gorongosa, Machanga Chemba, and Cheringoma, where the effects of the war were more severe and migration occurring with greater intensity, thousands of people migrated to urban areas or other provinces.

4.4. The Effects of the Civil War in Sofala Province

In the decades beyond its independence, Mozambique has faced a series of natural disasters that have increased the level of poverty throughout the country, especially in rural areas.

After 26 years of war, 16 years of which were from civil war, the results were that more than 1 million people dead and the number of displaced people reached more than 3 million. In addition the economic structures, school, health networks and road access were destroyed or severely damaged.

During and after the civil war that affected the country, the social organization was deeply affected. Most of the rural infrastructure were destroyed and large portions of arable land was infested with landmines. The civil war forced a large number of people to move to urban areas. Other effects of the civil war were:

- Increased the level of poverty, caused isolation, destruction of infrastructure, and lack of access to goods and services;

- Lack or road access mainly in rural areas;

- Inadequate basic services, which results in two thirds of the rural population travel more than an hour to reach the nearest hospital;

- Lack of safe drinking water. Only 60 % of the rural population has access to safe water; and

- Lack of access to education in rural areas.

The same effects of the civil war apply to the case of Sofala province but the effects here were more severe than in other provinces. In Sofala the vast majority of road infrastructure is inoperable especially in rural areas. This makes rural areas isolated from the socio-economic development of the country. Only in recent years Sofala benefited from a large-scale state investment directed to road infrastructure access.

The situation of the industries was precarious, during the proclamation of the independence; a considerable number of industries processing agricultural products were closed because the owners left the country. The situation has been worsened by the civil war from 1976 to 1992. Sofala province has been more affected because the region has been the largest concentration base of RENAMO, which discontinued the production of the few factories that were still working. The political polarization between the former belligerents hindered the rebuilding process of the province after the end of the civil war, whose socio-economic consequences are felt even today.

The few existing industries and the road access were mostly paralyzed or became inoperable. Today only a few sugar factories, including the Sena Sugar Estate, the largest sugar factory in Mozambique, are still producing. The railway line linking the north to the neighboring province of Sofala, Tete,

crossing the Zambezi River, also became inoperable during the war years and it was rehabilitated in the 2000s and reopened in 2008.

In general the results of the civil war have drastically affected the level of poverty and inequality in this province more than in other provinces.

4.5. An Assessment of the Poverty Headcount Index in Sofala

This section discusses the issues concerning the evolution of poverty in 13 districts of Sofala province in the periods 1996-97 to 2002-03. Poverty is admittedly a multidimensional phenomenon characterized by several shortages. The PARPA II highlights that poverty is also defined as a state in which the quality of life of a person does not have the recognized standard of well-being and, therefore, it is necessary to consider other dimensions. It should be stressed that the analysis to be developed focuses on poverty in terms of income, the so called income analysis (Ravallion and Bidani, 1994). The income approach is essential to characterize poverty in the context of a modern society that presents the degree of urban complexity. Poverty indicators presented here were estimated taking into account these parameters.

It should be stated that the analysis is done taking into account the various factors that may have influenced this indicator. The factors that were taken into account on this analysis are the objective indicators, the roads access, health facilities, education level, and the conditions for farming practice in different districts among others.

A similar approach to this one applied in this research were used by Smiler and Massingarela (2003). In an attempt to explain the indicators of poverty, they have related indicators of FGT class of measures with some social indicators. Specifically, they argue that if the aim is to fight poverty, then the indicators related to education, food and nutrition security, health conditions should be improved.

This research does not consider to the third objective proposed by Deichmann (1999) which is to improve the effectiveness of programme designed to fight poverty. The discussion surrounds the remaining three objectives that are: geographical factors affecting poverty, the population, the rate of grain production and the number of infrastructures that the districts have.

Looking at the rate of poverty estimated for the 13 districts of Sofala province, a rating using three intervals, classify the districts into low- poverty, moderate poverty and high poverty. Table 4.3:

Table 4.3: Classification according to Estimated PH

Classification	Range of PH (%)
Low Level of Poverty	10 to 30
Moderate Level of Poverty	31 to 49
High Level of Poverty	50 to 71

Source: Own Assessment

This classification was made according to PH that each district has. This classification relates to the fact that it enables a greater understanding when analyzing the distribution of poverty in each district.

The poverty estimates were generated based on the method of Small Area Estimation. The range of the poor district and the poorest in Sofala province in 1996 to 1997 is 13 % to 69 % and in 2002 to 2003 the variation between the poor district and the poorest was 10 % to 71 %. In both periods, there is an opposite situation as a (one very low poverty rate in one hand in one district and in the other a very high in the other district) result of the heterogeneity that exists in the districts of Sofala province.

Table 4.4: Poverty Headcount by Districts

Districts	*PH in 1996-97*	*PH in 2002-03*
Machanga	0.57	0.59
Chibabava	0.35	0.34
Buzi	0.15	0.12
Dondo	0.34	0.28
Nhamatanda	0.13	0.10
Goromgosa	0.23	0.22
Muanza	0.67	0.71
Cheringoma	0.25	0.30
Marromeu	0.20	0.20
Maringue	0.69	0.68
Caia	0.41	0.38
Chemba	0.32	0.29

|		
Cidade da Beira	0.31	0.28

The three districts that registered higher rates of poverty, during the 1996-97 and 2002-03, were Machanga with 57 %, located south of the province, Maringue with a PH of 69 %, and finally Mwanza with a PH of 67 %, in the coastal area of the province of Sofala (Figure 4.2). The PH of these districts is above average of PH of the province which stood at about 36 %.

Map 4.2: Poverty Estimates for Sofala province in 1996-1997
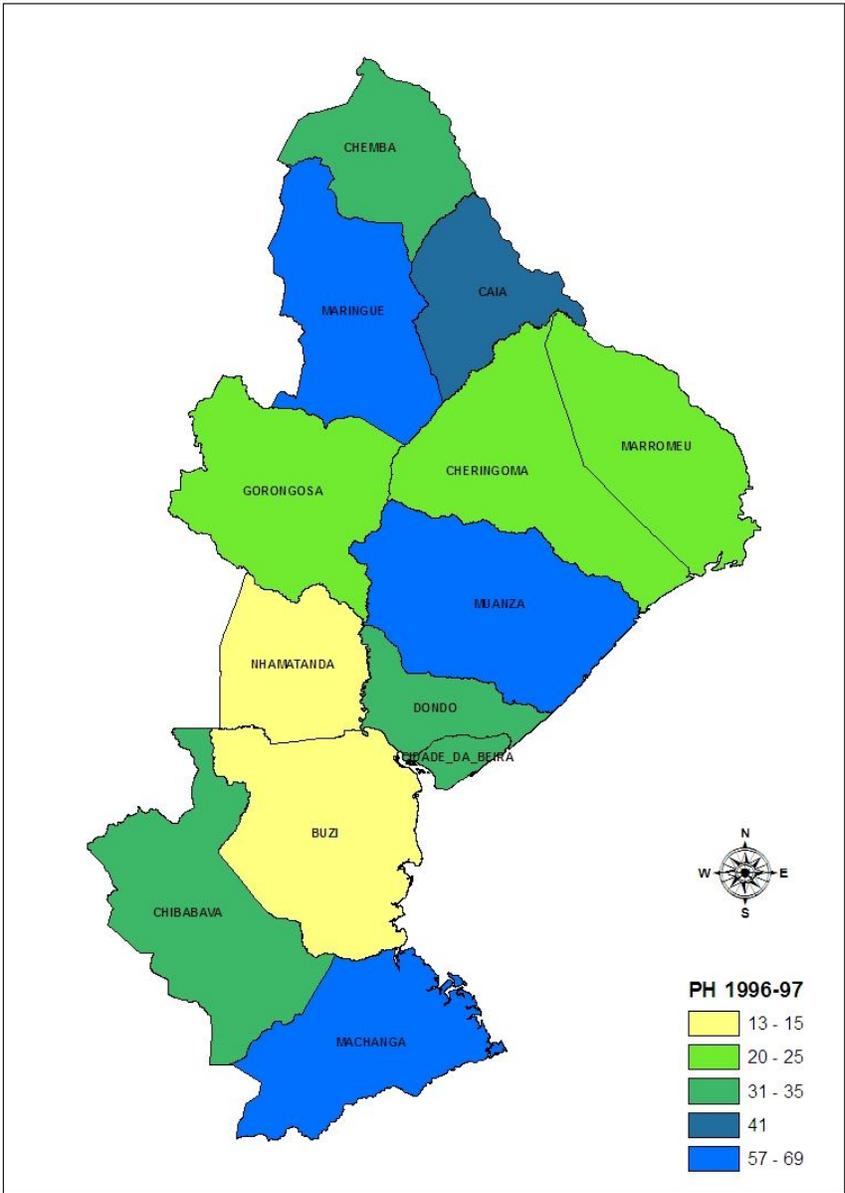
Source: Author's Representation Based on ArcGIS

Map 4.3: Poverty Estimates for Sofala province in 2002-2003
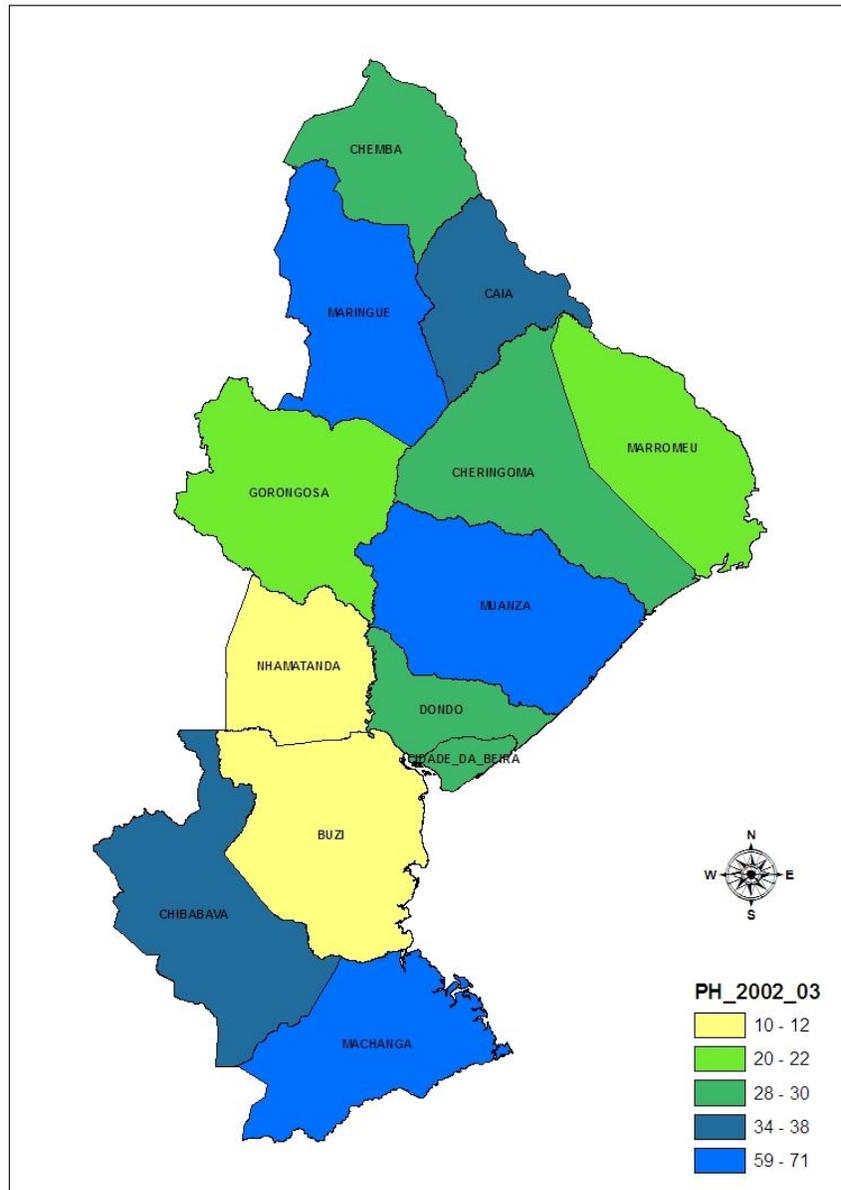
Source: Author's Representation Based on ArcGIS

In developing countries, agriculture plays an important role in the economy, both as a source of employment and income for the majority of the population as well as a source of government revenue through export of agricultural products. In Mozambique, agriculture employs more than 75 % of the

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population (INE, 2007). A similar percentage found in the country is also found in Sofala province where 75 % of the population lives in rural areas and has agriculture as the main source of income (see Figure 4.3).

Food production in the districts of Machanga, Maringue and Mwanza is not the best. Arndt et . al. (2006) points out that the increase in agricultural production is responsible for being one of the main factors in reducing the incidence of poverty in Mozambique from 69% in 1996-97 to about 54 % in 2002-03 (see Figure 4.3). Most of the land used in these districts is explored for food crops. Overall, these districts have a structure that reflects the household farm production of subsistence farming. Droughts that have affected these districts have originated food insecurity and require local government initiatives to rectify this situation.

The district of Maringue, the poorest district in the province, had in 1996-97 about 120.000 hectares of arable land, but only 12.000 hectares were used for the practice of agriculture. Thus it can be seen that the production of food such as corn, sorghum and rice is low, setting their quantities in 3.496.0002, 289.000 and 1.429.000, respectively. The terrible conditions that households in the district of Maringue are living under, justify the present high rate of PH that the district has, the highest in the Sofala province. According to the district profile, only 1 % of the population has piped water, 3 % has improved latrines and 0 % has electricity (MAE, 2005-5). Slight progresses were made in combating poverty in the period 2002-03. During the Second National Assessment of Poverty in Mozambique, the district of Maringue has reduced poverty by 1 percentage point fixing its poverty rate at 68 %. Note that the other two districts with high poverty rates, Machanga and Mwanza experienced setbacks in fighting poverty in the period 2002-03. In this period, the poverty rate in Machanga worsened by 2 percentage points and in Mwanza, the same indicator increased by 4 percentage points. According to the PARPA II, the factors that contribute to the poor performance of poverty reduction are associated

with agriculture. Note that 80 % of the population practice agriculture and 60 % of the population is poor. For this reason we may conclude that the poor live on the basis of agriculture. If the agriculture practice is affected by natural disasters and depend on the nature of course that the poor people will also be affected. Therefore agriculture registers a slow reduction of poverty in Mozambique (see Figure 4.3).

Agricultural productivity in Mozambique remains low and tends to decline (MPD / DNEAP, 2010; Mosca, 2011). In the last decade, the poor performance of agriculture is considered a major obstacle in reducing the incidence of poverty (Arndt et. al., 2010; MPD / DNEAP, 2010). In 2008-09, 55% of the population living below the national poverty line compared to a rate of 54 % in 2002-03, showing that, on average, poverty has not decreased in recent years.

In both periods 1996-97 and 2002-03, poverty was moderate in Chibabava district, located in the south of the province, with a PH of 35 % and 34 %, respectively and Caia located in the north of Sofala province with a PH 41% and 38 %, respectively (Table 4.2). Chibabava district has agricultural potential which is the main economic activity of the local families. The family sector explores a portion of arable land equivalent to 4 % of the whole district. This district had its road network also destroyed by the 16 years civil war.

The beginning of 2002 was marked by floods that affected the country and destroyed crops. In the following years, the scenario of drought characterized by irregular rains created food insecurity situation in the district of Chibabava. However, after the programme of rehabilitation of roads in 2002-

03, the situation improved, as a result, a reduction of poverty by 1 percentage point took place (Table 4.2).

In this group of districts with moderate poverty, Caia had the best achievements in terms of poverty reduction. Even with more than 50 % of district roads blocked, with about 80 % of the population illiterate population and a very low rate of enrollment, Caia has reduced poverty. Poverty reduced from 41 % in 1996 to 1997 to 38 % in 2002 to 2003, respectively (Table 4.2). The important fact to highlight to the materialization of this reduction in poverty is without doubt the location of this strategic junction with a road that served the center-north of the country and the point of Caia linking the north and center of the country. Also agriculture contributed to this remarkable achievement. From the 40.00 hectares of arable land, 11 % is exploited by the household sector.

The low level of poverty rates were found in the districts of Nhamatanda, Buzi, Marromeu, Gorongosa, Cheringoma, Beira, Chemba and Dondo. These districts had their PH 's below the average PH of the whole 13 districts of Sofala. Unlike the conditions of the poorest districts, districts with lower rates of poverty showed an obvious opposite scenario with respect to investments in health, road access, education, and food production. These districts have a higher number of infrastructural and a remarkable production of cereals.

Here we highlight the Dondo district, located on the left bank of the river Pungue which flows towards the city of Beira. From the 13 districts of Sofala province, Dondo district has recorded the greater poverty reduction. The farm enrolled is predominantly smallholder sector, where 80% of the cases are led by the father. Despite a considerable number of school unit in this district 60 % of the population remains illiterate. Associated with this, it was found that the districts health network also improved during the period 1996-97 to 2002-03 (Table 4.2).

4.6. An Assessment of Inequality in Sofala

Regional and district disparities are a reality. In Mozambique there is a considerable interest about regional inequality, particularly inequality trends during periods of economic expansion (PARPA I and PARPA II). Generally there is a huge debate on the speech on the effects of economic distribution in particular to what extent economic growth benefits the poor.

This research applies the GINI index, which measures the income disparity of individuals to analyze the income distribution of Sofala. The estimated inequality measures were derived from the consumption data. Maps 4.5 and 4.6 present the inequality measures of Sofala's 13 districts consistent in Table 4.3.

It is important to note that the analysis made here, applies to the assumption already made in the classification of districts with high poverty, moderate poverty and low poverty (Table. 4.2). The evolution of this indicator (GINI index) is done following the same sequence made above on the poverty headcount indicator. Table 4.5 presents the GINI indicators for the 13 districts of Sofala province.

The provincial level of inequality based on the GINI coefficient derived from the combination of IAF 2002 to 2003 and Census of 1997, is 0.44 which represents a fairly high level of inequality. These estimates were not out of the line of the national GINI coefficient based only IAF 2002 to 2003 alone.

Table 4.5: Inequality Estimates by Districts

Districts	GINI in 1996-97	GINI in 2002-03
Machanga	0.38	0.40
Chibabava	0.36	0.36
Buzi	0.43	0.40
Dondo	0.48	0.46
Nhamatanda	0.37	0.31
Goromgosa	0.38	0.37
Muanza	0.36	0.39
Cheringoma	0.41	0.43
Marromeu	0.42	0.37
Maringue	0.39	0.35
Caia	0.36	0.34
Chemba	0.37	0.37
Cidade da Beira	0.45	0.46

Source: Author's Computarised Data

Inequality, based on the GINI coefficient, varies considerably within Sofala's 13 districts. The GINI coefficient, on average in all 5 regions, ranges from 0.37 to 0.44. The *North, Costal, South Regions* have on average GINI coefficient of 0.37 and 0.39, respectively. Therefore, this range is considered to

be somehow low. However, these regions were far more equal across the population than the *Central* and *Beira City Regions* in which this indicator is considerably higher 0.40, 0.41 and 0.44, respectively (see Map 4.4).

The lowest GINI coefficient appears in the *North, Costal, South* and *Central Regions*. The districts that have the lowest inequality, in these regions, are Caia, Muanza, Chibabava with an estimated GINI coefficient of 0.36 and Chemba and Nhamatanda with 0.37 for each district. This lower GINI coefficient is out of the line from the high provincial GINI coefficient of 0.44. Although the remaining regions, *Central* and *Beira City Regions,* where the GINI coefficient is estimated to be relatively high, the districts that have contributed to this high inequality level are Dondo and Cidade da Beira with 0.48 and 0.45, respectively. In addition to the lower level of inequality, the *South Region* also presents one of the highest levels of GINI coefficient, with 0.40 in Buzi. From these districts, Dondo represents an outlier with higher GINI coefficient was found elsewhere in the province (see Map 4.4).

Map 4.4: GINI coefficients Estimates for Sofala province in 1996-1997
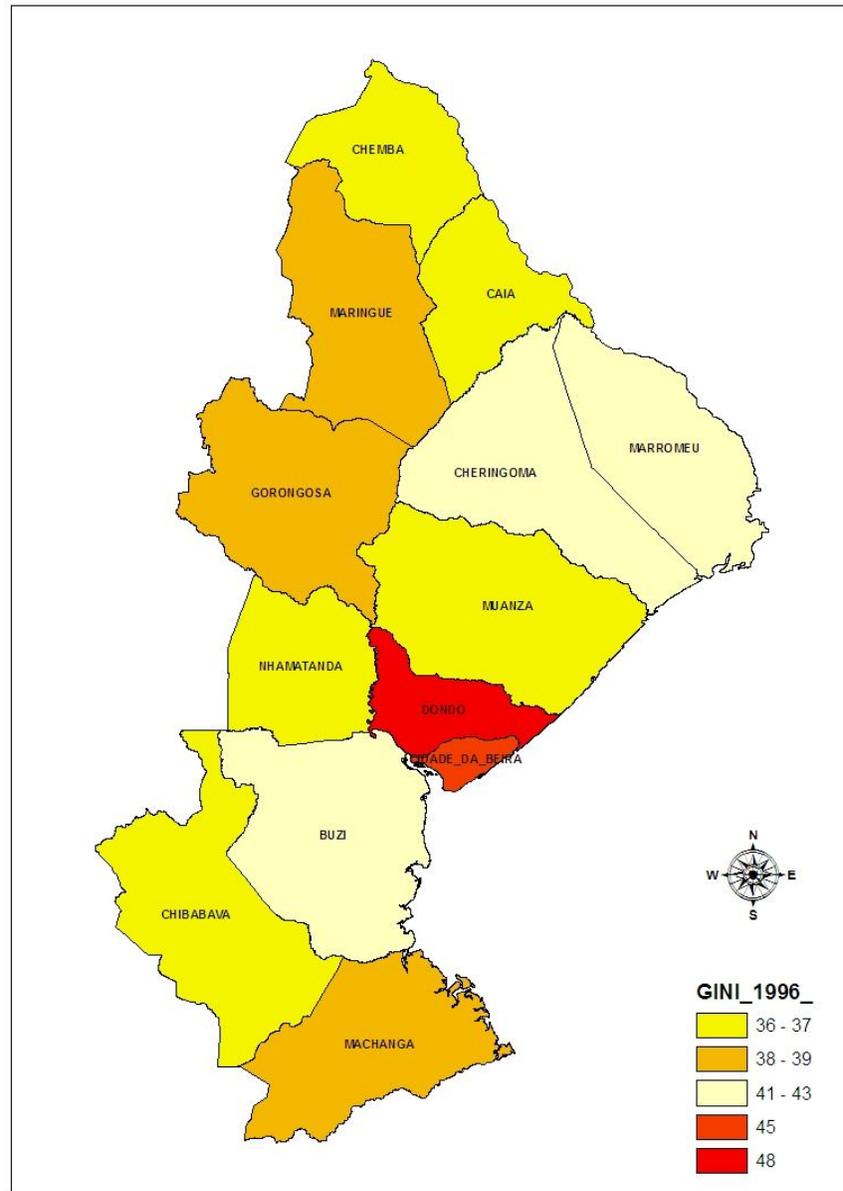
Source: Author's Representation Based on ArcGIS

Map 4.5: GINI coefficients Estimates for Sofala province in 2002-2003
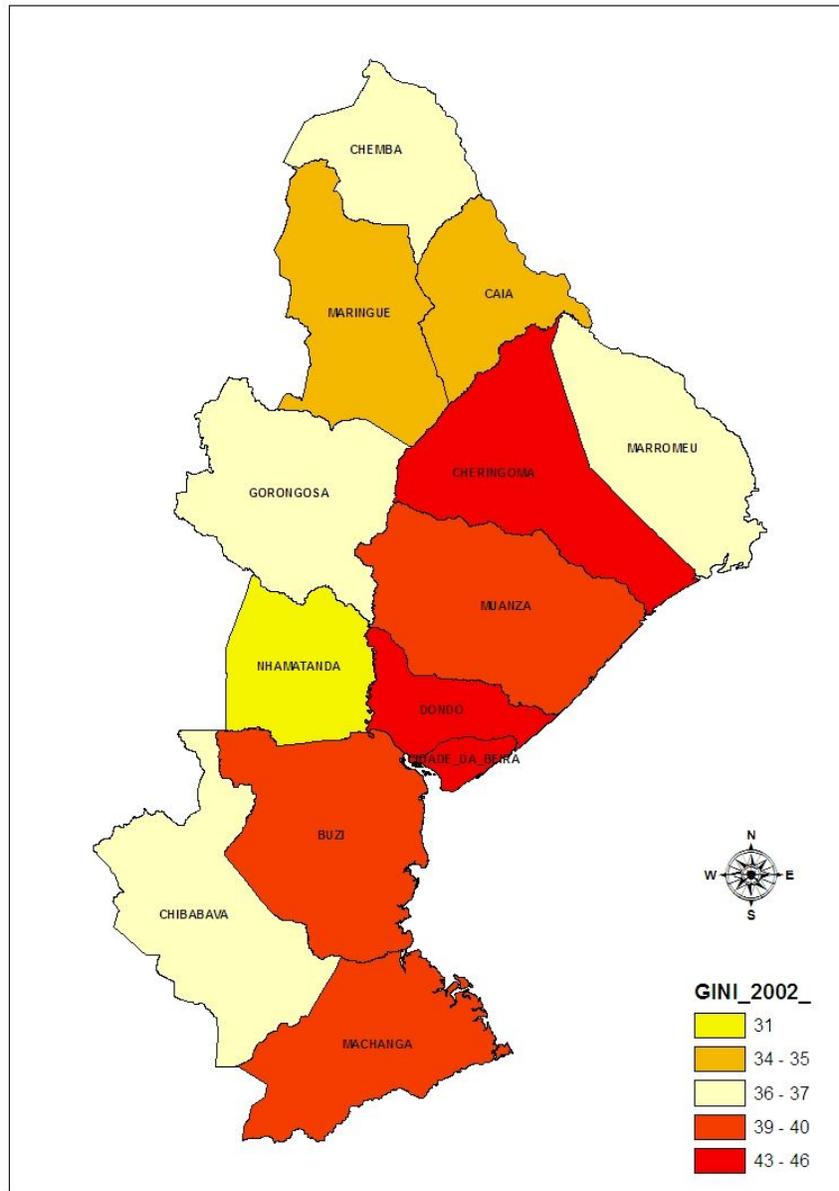
Source: Author's Representation Based on ArcGIS

The evolution of income inequality in Mwanza and Machanga districts has increased. In both districts, during the period 1996-97 to 2002-03, inequality increased by 2 percentage points in Machanga and 3 percentage points in Mwanza, the district least populous with 12,458 inhabitants (see Map 4.5). A different pattern in the level of inequality in this group of districts with a high poverty rate is found in

Maringue. Maringue district, with an estimated population of 67,939, recorded improvements in the indicator of income inequality measured by the GINI index. The GINI index decreased from 0.39 in 1996-97 to 0.35 in 2002-03, respectively (Table 4.5).

In the districts with moderate level of poverty, Chibabava and Caia, inequality tends to be controlled. It is observed that in Caia inequality reduced from 0.36 in 1996-97 to 0.34 in 2002-03. In the case of Chibabava district inequality remained stable at 0.36 in both periods (Table 4.5).

Districts characterized by a low level of poverty such as Nhamatanda, Buzi, Marromeu, Gorongosa and Dondo, have intense reductions in inequality indicator. A different pattern was found in Beira, Chemba and Cheringoma. In these districts there were no improvements in the inequality measure. However this scenario suggests that smaller (or absence) increases in income inequality are associated with decreases in poverty indicators (see Map 4.5).

### 4.7. Assessment of the Pro-Poor Growth in Sofala Province

The decision rule adopted in this study stated that, growth is considered to be Pro-poor if the growth results in a reduction of both, poverty and inequality class of measures (Table 4.6). In Sofala province, the quality of growth is divided into three main groups: pro-poor growth, anti pro-poor growth and inconclusive growth. Table 4.4. summarizes the results.

Table 4.6: Quality of Growth by District

Districts	ΔPH	ΔGINI	Quality of Growth
Buzi	-0.03	-0.03	Pro-Poor
Chibabava	-0.01	0.00	Inconclusive
Machanga	0.02	0.02	Anti Pro-poor
Dondo	-0.06	-0.02	Pro-poor
Goromgosa	-0.01	-0.01	Pro-poor
Nhamatanda	-0.03	-0.06	Pro-poor
Caia	-0.03	-0.02	Pro-poor
Chemba	-0.03	0.00	Inconclusive
Maringue	-0.01	-0.04	Pro-poor
Cheringoma	0.05	0.02	Anti Pro-poor
Marromeu	0.00	-0.05	Inconclusive
Muanza	0.04	0.03	Anti Pro-poor
Cidade da Beira	-0.03	0.01	Anti Pro-poor

Source: Author's Computation

The districts that have experienced a pro-poor growth, during the period 1996 to 1997 and 2002 to 2003, were Buzi, Dondo, Goromgosa, Nhamatanda, Caia and Maringue.

Map 4.6: The Quality of Growth Maps
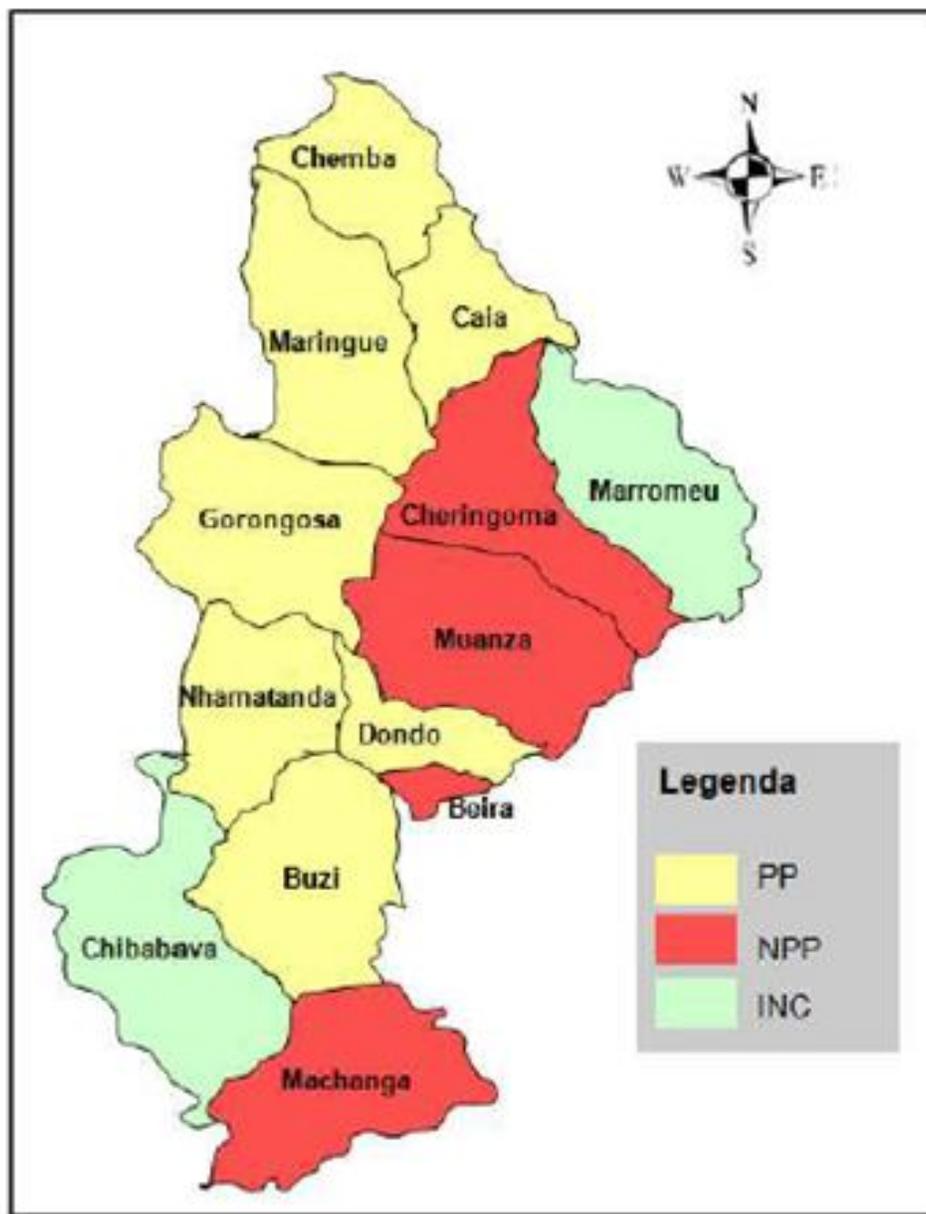
Source: Author's Representation Based on Table 4.6

4.8. Chapter Summary

This chapter focused on the data presentation, analysis, and interpretation. The discussion of this chapter is based on the research objectives presented in chapter one. The discussion was particularly created around the concept of poverty, inequality and then pro-poor growth. Before the analysis of the result, the model applied in this study was validated. This validation was done taking into account the variables included in the model to estimate this measures of interest.

The welfare measures of interest, poverty and inequality class of measures were updated applying consumption model using the household expenditure of 8,604.391 Meticais a day. These indicators were calculated for the 13 districts of Sofala province in two dissimilar periods, 1996 to 1997 and 2002 to 2003. Once the estimates were calculated, maps were created using the ArcGIS information was straightforward. A number of maps concerning poverty, inequality and the assessment of these indicators during the period 1996 to 1997 and 2002 to 2003 are presented.

The maps illustration of Sofala province suggests that there is no clear pattern of this indicator in the two dissimilar periods, 1996 to 1997 and 2002 to 2003. In some cases either poverty and inequality increased from one year to another or decreased in some districts. No regular distribution of the variables included to estimate poverty and inequality class of measure was found on the Sofala is districts.

CHAPTER 5:

FINDINGS, DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1. Introduction

This study has applied a recently developed methodology of poverty mapping using Small Area Estimation to derive detailed information concerning poverty and inequality in Sofala's 13 districts. The idea behind the methodology is straightforward and it consists of combining two data sources: IAF 2002-2003 with Census of 1997 via a set of common variables to estimate the welfare measures of interest (poverty and inequality class of measures). Then the estimates were used to asses the quality of growth in Sofala province.

5.2. Conclusions

The adjusted R^2 of the model is 0.42. Two observations regarding this low adjusted R^2 can be made. First, looking at other studies that have used the same methodology of small area estimation (Bigman et. al., 2000, Kilele and Ndeng'e, 2003 and Simler and Nhate, 2002), an adjusted R^2 of 0.42 is not particularly low and in fact it is quite encouraging. Secondly, concerning the welfare estimates, the results encountered are somehow consistent with the official estimates or the results encountered from the IAF 2002-2003 alone. However, this adjusted R^2 of the model is considered to be fairly good and the estimates can be considered reliable enough to be useful.

The variables used to update the welfare measures of interest (poverty and inequality class of measures) are presented in Table 4.1. Thus, the consumption model is derived based on the association of different models. Therefore, these variables cannot be due to causal effects. They are not the

determinants of poverty. This point was strengthened by Davis (2002) and by Mistiaen et. al. (2002). The variables that appear to explain in general poverty and inequality class of measure in Sofala's 13 districts are the indicators associated with agricultural performance, schools, hospitals and food security. The poorest districts, Maringue, Muanza and Machanga, are associated with lower levels of each of these indicators.

The level of poverty in Sofala province, during the period 2002 to 2003, is considered to be low both, when applied the IAF 2002 to 2003 alone or when applied the small area estimation to estimate poverty and inequality class of measures. Based on the FGT class of measures, the official results (IAF 2002 to 2003 alone) and the estimates (applying Small Area Estimation) at provincial level from PH indices are 0.31 and 0.34.

However, this low level of poverty at provincial level does not hold when disaggregated geographical units such as districts are analysed. Particularly, Maringue, Muanza and Machanga are the districts with higher poverty rates with estimates of PH index of 0.69, 0.67 and 0.57, respectively. While Nhamatanda and Buzi are the districts with lower rate of poverty rates, 0.13 and 0.15, respectively. Admittedly, the poorest districts are those which are found to be sparsely populated and are located in *North, Coast* and *South Regions* of the Sofala province.

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Different from the poverty class of measures, is the level of inequality in Sofala province, during the period 2002 to 2003, which is considered to be high. The GINI coefficient is considered to be high when applied the IAF 2002-2003 is applied alone or when the small area estimation to estimate inequality class of measures. The official results (IAF 2002-2003 alone) and the estimates (applying

small area estimation) at provincial level from GINI coefficient is 0.44. Interestingly, the estimates for the inequality class measures, rounding to two decimal places, are exactly the same as the official estimates, when using the IAF 2002-2003 alone.

Based on the estimated GINI coefficient across the regions, consumption in *North* and *South Regions* was found to be far more equal across the population than the *Central* and *Beira City Regions*. In particular, Dondo and the City of Beira registered the highest estimated level of inequality, 0.48 and 0.45, respectively. Conversely, *North* and *South Regions* have low levels of inequality and are more economically *homogeneous*. The districts that have performed well in terms of GINI coefficient are Caia, Muanza, Chibabava, Chemba and Nhamatanda.

In determining whether growth in Sofala province has been pro-poor, it is clear that this depends on what definition is used. The first group composed by Kakwani and Pernia (2000) and Dollar and Kraay (2002) argued that, for growth to be pro-poor, the poor households should share a positive impact on their income as a consequence of growth rate. And the second group composed by Ravallion and Chan (2001) and Amman et. al (2002) argued that the benefit from growth rate that the poor people can benefit should be accompanied by a fall in inequality class of measure. By having a decrease in the FGT and inequality class of measures the economic growth is deemed as pro-poor. This is the approach from which the term pro-poor growth for this thesis is adopted.

Using the definition of the first group composed by Kakwani and Pernia (2000) we will have difficulties to qualify the growth in Sofala province. But certainly, applying the definition proposed by Ravallion and Chan (2001), which stated that growth is pro-poor when poverty incidence falls and

inequality also falls, we would conclude that growth was pro-poor in some districts. The pattern of growth in some districts of Sofala province between 1996-97 to 2002-03 has benefited the poor to a considerable extent. Three different outcomes for the 13 districts in Sofala province were founded. This is in line with the findings from Resende (2004) which also encounters different patterns to qualify growth in his study. The conclusion of this study shows that 59% of the districts have presented a pro-poor growth, 33% have presented a anti pro-poor growth and 8% have present inconclusive growth. Based on the outcomes the Null Hypothesis: The economic growth has been pro-poor in Sofala province is not rejected.

5.3. Recommendations

The vast majority of developing countries have accepted that the main objective of economic and social development is the reduction, and consequently the elimination of poverty. This commitment is also part of the Mozambican government's medium term program. Thus, estimating poverty and inequality at disaggregated geographical units is a good starting point to achieve this objective due to the geographical identification of the poor households.

However, in designing policies aiming at reducing poverty in Sofala province, some of the points would be carefully considered these are: the agricultural performance, schools, hospitals and food security. These are the variables that appear to explain poverty and inequality in the province using the small area estimation technique. Although, the maps created in this study cannot be used solely to formulate targeting anti-poverty programme. Thus, updated information should be demanded and combined with this information in order to design effective programme aimed at reducing poverty.

The creation of minimum conditions of agricultural markets and improved productivity may lead to enlargement of, especially the poorest. The development of the agricultural sector can create conditions for the emergence of other non-agricultural activities, thereby reducing the vulnerability of the poorest.

Develop an agriculture that ensures sustainable growth and consequent poverty reduction. If these are secured, the development of the agricultural sector can create conditions for the emergence of other non-agricultural activities, thereby reducing the vulnerability of the poorest.

Promote mechanisms to create better conditions for medical assistance. This can be achieved by increasing the health units. Associated with this infrastructure can also include more schools, because access to education can improve levels of inequality.

Finally, this study has sought to describe poverty and inequality in Sofala's 13 districts for possible anti-poverty programmes designed during the period 2002-2003 rather than state the best policy aiming to reduce poverty. Clearly, attention should be turned to the policy design in Sofala province. The government should lead policies to ensure that the growth in Sofala continues to benefit the poor people. In some of the districts the inequality is found to be *heterogeneous*. Efforts to create estimates at administrative posts rather than districts can be useful in targeting the programme.

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