



Analysis of poverty and inequality in Sofala province

Análise da Pobreza e da Desigualdade na Província de Sofala

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Abstract: The study analyzes poverty and inequality in Sofala Province, based on data collected from 28 localities in 2011. It addresses two main dimensions: income/consumption-based poverty and multidimensional poverty. The first dimension is measured using the Foster, Greer, and Thorbecke (FGT-0, FGT-1, and FGT-2) class indicators, which assess the incidence, depth, and severity of poverty. The second dimension applies the Multidimensional Poverty Index (MPI), which considers deprivations in education, health, housing, and access to durable goods. The analysis also includes inequality measures such as the Gini coefficient, the Lorenz curve, and the Kuznets ratio to evaluate income distribution among households. Based on a poverty line of 1,567.50 meticaïs, the study estimates that 28.8% of households in Sofala were poor, and 15.8% were in extreme poverty. The Gini coefficient (0.37) indicates moderate inequality, though higher than national and regional averages. The multidimensional analysis reveals that about 99% of families experienced at least one form of deprivation, particularly in access to durable goods and adequate living conditions. The study concludes that, despite some improvements since 2007, poverty and inequality remain significant in Sofala Province. Eliminating poverty would require a total income transfer of 84.67 million meticaïs to poor households. These findings emphasize the need for integrated public policies that combine economic growth, social inclusion, and equitable access to essential resources to promote sustainable well-being across the province.

Keywords: poverty; social inequality; multidimensional poverty; income distribution; Multidimensional Poverty Index (MPI); Sofala Province.

Resumo: O estudo analisa a pobreza e a desigualdade na Província de Sofala, com base em dados coletados em 28 localidades no ano de 2011. A pesquisa aborda duas dimensões principais: a pobreza baseada na renda/consumo e a pobreza multidimensional. A primeira dimensão é mensurada por meio dos indicadores da classe Foster, Greer e Thorbecke (FGT-0, FGT-1 e FGT-2), que avaliam a incidência, a profundidade e a severidade da pobreza. A segunda dimensão utiliza o Índice de Pobreza Multidimensional (IPM), considerando privações nas áreas de educação, saúde, habitação e acesso a bens duráveis. A análise também incorpora medidas de desigualdade, como o coeficiente de Gini, a curva de Lorenz e a razão de Kuznets, para avaliar a distribuição de renda entre os domicílios. Com base em uma linha de pobreza de 1.567,50 meticaïs, o estudo estima que 28,8% dos domicílios da Província de Sofala encontravam-se em situação de pobreza, enquanto 15,8% estavam em condição de extrema pobreza. O coeficiente de Gini (0,37) indica um nível moderado de desigualdade, embora superior às médias nacional e regional. A análise multidimensional revela que aproximadamente 99% das famílias apresentavam pelo menos uma forma de privação, especialmente no acesso a bens duráveis e a condições adequadas de moradia. O estudo conclui que, apesar de alguns avanços observados desde 2007, a pobreza e a desigualdade permanecem desafios significativos na Província de Sofala. A eliminação da pobreza exigiria uma transferência total de renda de 84,67 milhões de meticaïs para os domicílios em situação de pobreza. Esses resultados evidenciam a necessidade de políticas

públicas integradas que conciliem crescimento econômico, inclusão social e acesso equitativo aos recursos essenciais, a fim de promover o bem-estar sustentável em toda a província.

Palavras-chave: pobreza; desigualdade social; pobreza multidimensional; distribuição de renda; Índice de Pobreza Multidimensional (IPM); Província de Sofala.

INTRODUCTION

The concept of poverty has evolved, each entity, each author or researcher, has found a way to conceptualize poverty experienced at some point in the world. Sometimes the same concept is valid throughout the world. The author Vieira (2005) brings in his concept of poverty as a matter of privations experienced by an economic agent (family)

Poverty is a matter of deprivation, which affects people's well-being. The deprivations suffered by individuals in poverty are varied and can be analysed from different points of view that complement each other more than they oppose (Vieira, 2005).

In view of the above, the main objective of this research is to make an analysis of the situation of poverty and inequality among households in the Province of Sofala, with 28 villages and towns surveyed in 2011.

In specific terms, characterise poverty and inequality in Sofala province, taking into account the 28 villages/populations; Calculate and analyse the indicators of the FGT class for this group; calculate and analyse the GINI indicator and the corresponding Lorenz curve, finally, calculate and analyse the MPI indicators taking into account the weighting system for your case.

To realise these objectives, two perspectives of poverty are taken into account, such poverty measures, using consumption or income as a basis, and the second, called multidimensional poverty. In the second, certain deprivations that plague the communities of Sofala will be considered.

Following the structure of the work, which includes Chapter I, we present Chapter II, a literature review, where the concepts of the theme are exposed through bibliographical research. Then, in Chapter III, the methodological design is presented where the methodological option and type of research is mentioned, the method of approach, the techniques of data collection and the participants/subjects of the research, in this chapter the steps that were taken during the research and that guided it, also defines the variables used in the study, in addition to the sections of the database selected for the study and the software used. Later on, Chapter IV, data analysis and interpretation, is presented, where the data collected was given meaning by transforming it into information that can be useful for concluding on the scenario of poverty and inequality in Sofala. Then comes the last chapter, Chapter V, which deals with the conclusions and recommendations, where the conclusions regarding the scenario of Poverty and Inequality in Sofala are presented.

LITERATURE REVIEW

The main objective of this chapter is to gather the most relevant concepts that best suit the study to be carried out based on specific literature by authors who have dealt with issues related to the subject in question, i.e., to check the state of the art.

The first part presents the fundamental concepts that refer to poverty and inequality, presents the theoretical indicators on this subject, and discusses the main studies on the subject.

Concepts of Poverty and Inequality

From Vieira's (2005) point of view, in his concept of poverty as a question of deprivation experienced by a household, poverty is a question of deprivation, which affects people's well-being. The deprivations suffered by individuals in poverty are varied and can be analysed from different points of view that complement rather than oppose each other.

Another concept, presented by Todaro (2012), is that the poor are individuals or households living below a specific minimum level of real income, defined internationally as the poverty line.

Still, according to Todaro (2012), the poverty line is not limited to national boundaries, and is independent of the level of national per capita income, and takes into account differences in price levels, taking as poor anyone living on less than \$1.25 a day, or \$2 a day of Purchasing Power Parity (PPP).

With this, the international minimum of \$1.25 per day is probably not accepted when it comes to planning a local study on poverty. A practical strategy to establish an absolute poverty line is to begin by defining an appropriate food basket, based on nutritional needs, reflecting studies of calorie, protein and micronutrient needs (Todaro, 2012).

Using data from local household surveys, a typical basket of food purchased by local households can be identified that at least meets these nutritional needs.

Other expenditure by these households, such as clothing, shelter and health care, is then added to determine the local absolute poverty line. Depending on how these calculations are made, the resulting absolute poverty line may be more than \$1.25 per day in PPP terms.

Income poverty, mentioned above, certainly provides us with valuable information. However, according to Santos (2011), the poor themselves define poverty more broadly to include lack of access to education, health, housing, empowerment, employment, security and much more. This is the second measure of poverty analysed in this study, called multidimensional.

No indicator such as income is capable of capturing the multiple aspects that contribute to poverty in the broad sense as cited in the paragraph above (Poverty and Welfare in Mozambique, Fourth National Assessment, 2016).

For this reason, since 1997, Human Development Reports (HDRs) have measured poverty differently from traditional income-based poverty. The Human Poverty Index (HPI) was the first of these measures, which was replaced by the Multidimensional Poverty Index (or Multidimensional Poverty Index, MPI) in 2010.

The MPI is an index designed to measure acute poverty. According to Santos (2011), acute poverty refers to characteristics that include individuals living in conditions that do not meet internationally accepted minimum standards in basic functional indicators, such as having good nutrition, access to education, access to drinking water, adequate sanitation, decent housing, among others. In other words, the MPI measures the situation of individuals experiencing multiple deprivations.

Income/Consumption Based Poverty Measures

FGT Class Indicators (0, 1 and 2);

According to Rocha (2005, citing Foster, 1984), the Foster, Greer and Thorbecke Class Indicators can be calculated following three moments. For the discrete case (not continuous), with representative data at the individual level, the generic expression for the FGT poverty measure is given by equation 1 below:

$$FGT^{\alpha} = \frac{1}{n} \sum_{i=1}^q \left(\frac{z_p - y_i}{z_p} \right)^{\alpha} \quad (1)$$

Where n is the number of individuals in the population; q is the number of individuals below the poverty line (z_p); y_i is the individual's income i e, α is the degree of aversion to poverty.

Poverty rates belonging to the FGT class are differentiated by the parameter α . This can take the values 0, 1, and 2, which correspond respectively to the designations "incidence or rate of poverty" (*poverty headcount*), depth of poverty (*poverty gap*), and severity of poverty (*squared poverty gap*).

If α is equal to zero, the index now only represents the extent of poverty, not capturing the intensity, as shown in equation 2:

$$FGT^0 = \frac{q}{n} \quad (2)$$

In the case of α is equal to 1, the index now incorporates the poverty intensity, given by equation 3, to the extension measure FGT0. The FGT1 index corresponds to the average value of the distance of the income of the poor from the poverty line.

$$FGT^1 = \frac{1}{n} \sum_{i=1}^q \left(\frac{z_p - y_i}{z_p} \right)^1 \quad (3)$$

However, the FGT1 index is not able to consider the effects of changing income distribution among the poor. To solve this problem, it is enough to give more weight to individuals with lower income. The FGT2 index, equation 4, corresponds to the average square distance of the poor from the poverty line.

$$FGT^2 = \frac{1}{n} \sum_{i=1}^q \left(\frac{z_p - y_i}{z_p} \right)^2 \quad (4)$$

According to Rocha (2005), as we move from FGT0 to FGT2, the indices begin to give more weight to the poorest individuals in the population. In the FGT0 index, all individuals below the poverty line enter with identical weights. For the FGT1 and FGT2 indices, the individuals are weighted proportionally to the distance and the square of the distance of their income from the poverty line.

In the case of this work, the poverty index calculated for the working population in sofalana province of Sofala is carried out using the database *sec_d1dv1* of section D1 (*paid work outside their own holding in the last 12 months*) of the questionnaire.

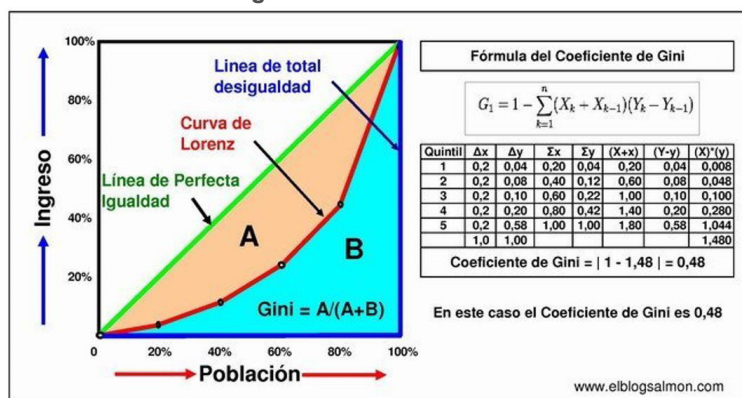
Measures of Inequality and Income Distribution

Gini coefficient

The Gini coefficient used in the study is an aggregate measure of inequality and can range from 0 (perfect equality) to 1 (perfect inequality). According to Todaro (2012), the Gini coefficient for countries with a high unequal income distribution typically lies between 0.50 and 0.70, while for countries with a relatively equal income distribution it lies between 0.20 and 0.35.

This coefficient is obtained (see Figure 1 below) from the ratio of the area between the diagonal and the Lorenz curve, divided by the total area of the half square where the curve is located.

Figure 1 - Gini coefficient.



Fonte: Adapted from Moreno (2021).

Lorenz Curve

The Lorenz curve shows the total percentage of yield, $y\%$, that a given percentage of the population, $x\%$, received in a given period (Todaro, 2012).

Looking at Figure 1 above, as the Lorenz curve moves away from the diagonal (perfect equality line), the greater the degree of inequality. The extreme case of perfect inequality (i.e., the situation in which an individual receives all of the national income while the others receive nothing) would be represented by the congruence of the Lorenz curve with the lower horizontal and vertical right axes.

Because, according to Todaro (2012), no country exhibits perfect equality or perfect inequality in the distribution of its income, the Lorenz curve for several countries somewhere to the right of the diagonal. The greater the degree of inequality, the greater the curvature and the closer the curve is to the lower horizontal axis of the diagram.

MPI Indicators - Multidimensional Poverty Index (Alkire-Foster Method)

The Alkire-Foster methodology (A-F), applied in this study, is one of the most widely used at the international level for the aggregation of indicators and dimensions of deprivation, and the creation of a multidimensional poverty index, MPI. The methodology allocates weights to each dimension of deprivation and, in turn to each deprivation indicator within each dimension (Poverty and Welfare in Mozambique, Fourth National Assessment, 2016).

Each indicator is a binary variable, which only takes the values 0 (deprivation) and 1 (no deprivation). The indicators and dimensions of deprivation may have the same weight or different weights, depending on the importance we attach to each indicator/dimension for the state of poverty.

Next, according to Santos (2011), is the definition of a poverty threshold or cutoff, i.e., a percentage of joint deprivation of the various dimensions that identifies a family or an individual as poor. For example, we can consider that private households in at least 40 per cent (or 50, 60, 70 per cent) of the (weighted) dimensions are poor. In this way it is possible to identify families as “poor”, see in which and in how many dimensions the poor are deprived, and finally calculate a joint index of multidimensional poverty.

The Incidence of Poverty (H) is the percentage of individuals or households identified as poor, i.e., individuals or households facing a percentage of deprivation above the established (cut off) poverty line.

Percentile and Kuznets Ratio

The analysis of inequality also uses the calculation of percentiles and their ratios. Ratios compare the consumption of individuals at one percentile of the distribution (of consumption) with the consumption of individuals at another percentile. For example, the p80/p20 ratio compares the consumption of individuals at the 80th and 20th percentiles (Todaro, 2012). This ratio tells us how many times the consumption of the first group of individuals is higher than that of the second group.

One of the common measures of distribution analysis using the percentiles is the Kuznets Ratio (KR), which calculates inequality between the poorest and upper income groups, given by the formula below.

$$mRK = \frac{Top20\%}{Bottom40\%}$$

METHODOLOGICAL DESIGN

According to Gil (1999), research methodology is the fundamental element in any research project because it involves the presentation of procedures for data analysis, i.e., the use of the approach method (inductive and deductive) and procedure methods (historical, comparative, case study, statistical). The methodology also includes the presentation of the techniques chosen for data collection (interview, questionnaire, documentary research, bibliographic research, observation and tests) and their treatment.

Using the two approaches (consumption/income poverty and MPI), the results of the study are then compared with those published in official national reports, for example, the reports on “Poverty and Well-being in Mozambique: The Fourth National Assessment”, published in 2016, in addition to other information contained in reports by international organizations such as the World Bank. The comparison allows lessons to be learned about the poverty situation in the province.

Research Paradigm

To speak of an investigative paradigm is to address a basic set of beliefs that guide investigative practice, that is, beliefs about how the researcher interprets reality, beliefs about how to gain knowledge of what is known, beliefs about the place of values in the investigative process, beliefs about what the investigative process is like, and beliefs about what the language of investigation is. Therefore, the grouping of such beliefs gives rise to the formation of research paradigms. Hence, according to Cohen, Manion and Morrison (2011), there are four basic paradigms of research: (i) positivist; (ii) socio-critical; (iii) pragmatic; and (iv) interpretative.

Miranda (2008) states that there are three paradigms at the service of educational research, which may be: the positivist paradigm, which has a rationalist and quantitative nature; the interpretative paradigm, with a naturalist and qualitative nature, and finally the socio-critical paradigm.

For the present research, the positivist paradigm has been chosen, since it presents the desired characteristics for data analysis and interpretation. This research presents a deductive method, a rationalist character, and a quantitative character. Therefore, these characteristics fit into the type of paradigm being alluded to.

According to Miranda (2008), the positivist paradigm is based, as the name indicates, on logical positivism and empiricism. The nature of perceived reality is unique, static, fragmented, tangible, convergent, and simplifying. The research process in the positivist paradigm is free of values and, as such, the researcher can take a neutral, independent position, insofar as it is situated outside the research and the subjects are seen as mere objects of research.

Miranda (2008) also states that the analysis of the data collected, in favour of this paradigm, is done with emphasis on descriptive statistics and inductive/inferential statistics.

As regards the Objectives

As for the objectives, this research is exploratory. According to Gil (2007), the exploratory research aims to provide greater familiarity with the problem, with a view to making it more explicit or building hypotheses.

As Regards Procedures

As for procedures, the research concerns a case study. According to Fonseca (2002, as cited in Gerhardt & Silveira, 2009), a case study can be characterized as a study of a well-defined entity such as a program, an institution, an educational system, a person, or a social unit. It aims to know in depth the how and why of a certain situation that is supposed to be unique in many aspects, seeking to discover what is most essential and characteristic about it. The researcher does not intend to intervene in the object to be studied, but to reveal it as he perceives it.

Also according to Fonseca (2002, as cited in Gerhardt & Silveira, 2009), the case study can take place according to an interpretative perspective, which seeks to understand what the world is like from the participants' point of view, or a pragmatic perspective, which aims simply to present a global perspective, as complete and coherent as possible, of the object of study from the researcher's point of view.

Sample/ Research Subjects

There are 28 villages corresponding to 9 administrative posts in the province of Sofala, with no distinction between urban and rural areas, and partial analysis can be made where necessary.

Data Processing

Using the Stata software, the study calculates and analyses, for households in the Sofala province of Sofala, (i) the indicators of Foster, Greer and Thorbecke's class, called FGT (0, 1 and 2); (ii) the Gini coefficient; (iii) the Lorenz curve; (iv) the MPI indicators and (v) the percentiles and Kuznets ratios. The disaggregation carried out is up to the district level, where it is shown to be feasible.

For the analysis of household poverty in Sofala province, as mentioned above, the study uses the database of section D1 (how much it earned monthly); and section P (indicators of household well-being, food security and vulnerability); the questionnaire used in the study of price dynamics in central and northern Mozambique in 2011.

In section D1, the basis for the analysis was the answers to question *D109mt*, specifically, *"how much did you earn monthly?"*.

ANALYSIS, INTERPRETATION AND DISCUSSION OF RESULTS

In this chapter, the data collected is analysed and interpreted. This is where the data that has been collected from the research tools makes sense. Once the data

has been organized and descriptive statistics have been made, they become the carriers of some information. This chapter presents this information. To organise the analysis and interpretation of the data, first the description of the research subjects was presented, and then the indicators of poverty and inequality were analysed respectively.

The analysis of poverty based on income/consumption was carried out using section D1 (*paid work outside their own holding in the last 12 months*) of the survey of price dynamics in the Centre and North area in 2011.

Poverty measures for urban and rural areas in Sofala

FGT Class Indicators

A quick analysis of the information contained in the study database allows us to assess that, as shown in Table 1 below, the minimum monthly income acquired by survey respondents was 200 MT, with the maximum recorded at 8,000.00 MT, with the mean and standard deviation of the observations also contained in the table.

Table 1 - Summary of monthly income given by variable d109mt.

Variable	Obs	Mean	Std. Dev.	Min	Max
d109mt	347	3094.149	2032.472	200	8000

Fonte: Estimates based on the sec_d1bv1 file, combined with the basis of section A.

Based on these data, Stata established the poverty line at 1400.00 MT, and the poverty measures are presented in Table 2, where the FGT0, measured by Headcount Ratio or incidence of poverty, indicates the proportion of households whose consumption is below the poverty line, set at 26,225%. For the Extreme Poverty Headcount ratio, it is at 10,951%.

Table 2 - Poverty Measures (pre-defined by Stata).

The poverty line is set at 1400 units
(1/2 of median value)

Poverty measures of d109mt	d109mt
Headcount ratio %	26.225
Extreme Poverty Headcount ratio %	10.951

Fonte: author (stata file, sofalatrabalhada2)

In detail, Table 3 reflects the analysis based on the above data.

Table 3 - Detailed Poverty Measure (pre-defined by Stata).

The poverty line is set at 1400 units
(1/2 of median value)

Poverty measures of d109mt	d109mt
Headcount ratio %	26.225
Extreme Poverty Headcount ratio %	10.951
Aggregate poverty gap	69,320.000
Per capita poverty gap	199.769
Poverty gap ratio %	14.269
Income gap ratio %	54.411
Watts index	25.497
Index FGT (0.5) *100	18.757
Index FGT (1.5) *100	11.369
Index FGT (2.0) *100	9.371
Index FGT (2.5) *100	7.919
Index FGT (3.0) *100	6.814
Index FGT (3.5) *100	5.943
Index FGT (4.0) *100	5.235
Index FGT (4.5) *100	4.648
Index FGT (5.0) *100	4.150
Clark et al. index (0.10) *100	23.800
Clark et al. index (0.25) *100	21.570
Clark et al. index (0.50) *100	18.537
Clark et al. index (0.75) *100	16.160
Clark et al. index (0.90) *100	14.976
Thon index *100	25.723
Sen index *100	17.889
Takayama index *100	13.399

Fonte: Estimates based on the status file, sofalatrworked2

However, this poverty line previously established by the software lacks treatment for the study.

For the analysis we intend to perform, we establish the poverty line using 3 criteria:

- i. USD 1.90 PPP (Purchasing Power Parity) of 2011 minimum daily consumption in the country, according to information from the World Bank (2018);
- ii. Multiply that daily consumption by 30 days to obtain the total monthly household consumption;
- iii. Multiply the result by the annual average exchange rate (BAT/USD) for 2011, the year of the survey.

Thus, the poverty line established in the study (given by the expression $lipm$) is $USD\ 1.90 \times 27.50\ MT \times 30\ days = 1567.50\ MT$.

With this poverty line, the incidence of poverty given by the Headcount Ratio indicates that in 2011, 28,818% of households in Sofala province were poor, of which 15,850% were considered to be extra poor, as measured by the Extreme Poverty Headcount Ratio, as shown in the table below.

Table 4 - New Poverty Measures (defined in the study).

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. apoverly d109mt, varpl (lipm)
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The poverty line is set by variable lipm

Poverty measures of d109mt	d109mt
Headcount ratio %	28.818
Extreme Poverty Headcount ratio %	15.850

Fonte: Estimates based on the work done in the Stata file.

According to the Poverty headcount ratio at \$1.90 per day (Purchasing Power Parity in 2011), given by the World Bank (2018), indicates for Mozambique, 81.6% incidence of poverty in 1996, 79.3% in 2002, and 68.7% in 2008.

Comparing the results of our study with World Bank data for our country, we conclude that households in Sofala province were poorer than previously.

In Table 5 below, we present other poverty indicators of the FGT class in detail.

Table 5 - Detailed Measures of Poverty (defined in the study).

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. apoverly d109mt, varpl (lipm) all
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The poverty line is set by variable lipm

Poverty measures of d109mt	d109mt
Headcount ratio %	28.818
Extreme Poverty Headcount ratio %	15.850
Aggregate poverty gap	84,670.000
Per capita poverty gap	244.006
Poverty gap ratio %	15.616
Income gap ratio %	54.189
Watts index	28.483
Index FGT(0.5) *100	20.296
Index FGT(1.5) *100	12.594
Index FGT(2.0) *100	10.471
Index FGT(2.5) *100	8.900
Index FGT(3.0) *100	7.693
Index FGT(3.5) *100	6.738
Index FGT(4.0) *100	5.962
Index FGT(4.5) *100	5.318
Index FGT(5.0) *100	4.774
Clark et al. index (0.10) *100	26.510
Clark et al. index (0.25) *100	23.932
Clark et al. index (0.50) *100	20.454
Clark et al. index (0.75) *100	17.751
Clark et al. index (0.90) *100	16.413
Thon index *100	27.932
Sen index *100	19.859
Takayama index *100	14.637

Fonte: Estimates based on the sofalaatrworked stata file.

The Poverty Gap Ratio, which indicates the FGT1, shows us that, on average, households in Sofala province have an income of 15,616% below the poverty line.

Using comparisons with World Bank data (2018) that indicate for Mozambique the Rural Poverty Gap at National Poverty lines at 29.9% in 1996, 20.9% in 2002, and 22.2% in 2008, we find that, on average, households in Sofala province have a higher income in relation to the poverty line when compared to the national average.

Additionally, the results of the analysis show us the Aggregate Poverty Gap, which represents the FGT2, of 84,670,000 MT, which indicates the total income required (in 2011) to be transferred to poor households to raise their per capita income to the value of the poverty line to eliminate poverty.

Possibility of Calculating FGT indices using another poverty line

In the above analysis, we establish the poverty line from USD 1.90 daily income (from PPP in 2011) x average annual exchange rate of the year in reference x 30 days.

The fourth national poverty assessment report for Mozambique indicates different poverty lines for 13 spatial areas (including the poverty line for Sofala-rural), which served as the basis for the analysis carried out in that national report. This calculation methodology could be applied in this study.

Table 6 - Poverty lines by space domains.

Space Domain	Total Poverty Lines
Niassa & Cabo Delgado-rural	29.6
Niassa & Cabo Delgado-urban	33.6
Sofala-rural	19.7
Sofala-urban	26.7
Sofala & Zambezia-rural	19.6
Sofala & Zambezia-urban	26.9
Manica & Tete-rural	24.5
Manica & Tete-urban	34.0
Gaza & Inhambane-rural	28.2
Gaza & Inhambani-urban	32.7

Fonte: Fourth National Evaluation - IOF 2014/15.

According to the report on Poverty and Welfare in Mozambique: Fourth National Evaluation (2016), poverty lines are calculated for 13 sufficiently homogeneous spatial domains, and are expressed in Meticaís per person per day. The average poverty line at national level is 26.7 Meticaís per person per day.

If this study were to use this methodology to calculate the poverty line for a household in the province of Sofala, it would be given by

19.7 Meticaís, which was the poverty line per person per day in rural Sofala province in 2011 X 30 days X 3.9, which represents the average total number

of people per household in rural Sofala province, according to the National Institute of Statistics (2008) = 2,304.90 MT.

With this poverty line, the results of our Headcount Ratio and Extreme Poverty Headcount Ratio analysis would certainly be worse than those obtained previously.

Calculation of Inequality Measures

Gini coefficient

The results of the analysis below show a Gini coefficient of 0.3695, which means a rather high inequality among agricultural producers in Sofala Province.

Table 7 - Inequality measures for PA in the rural sector of the Province.

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. inequal d109mt
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inequality measures of d109mt	
relative mean deviation	.26910422
coefficient of variation	.65687599
standard deviation of logs	.97956788
Gini coefficient	.3695164
Mehran measure	.53739525
Piesch measure	.28557696
Kakwani measure	.13106463
Theil entropy measure	.23445475
Theil mean log deviation measure	.34076018

Fonte: Estimates based on the Sofala stata file worked out.

Assessing inequality in Sofala, we find that inequality among households in Sofala province is high, with a 0.85 Gini coefficient, as shown in the image above.

Table 8 below shows the Gini coefficient for national poverty assessments that occurred in Mozambique in 1996, 2002, 2008 and 2014.

Table 8 - Gini coefficient of the country and by regions.

Gini	IAF96	IAF02	IOF08	IOF14
National	0.40	0.42	0.42	0.47
Urban	0.47	0.49	0.48	0.55
Rural	0.37	0.36	0.37	0.37
North	0.38	0.39	0.41	0.40
Center	0.38	0.39	0.38	0.41
South	0.43	0.48	0.46	0.54

Fonte: Poverty and Welfare in Mozambique: Fourth National Evaluation - IOF 2014/15.

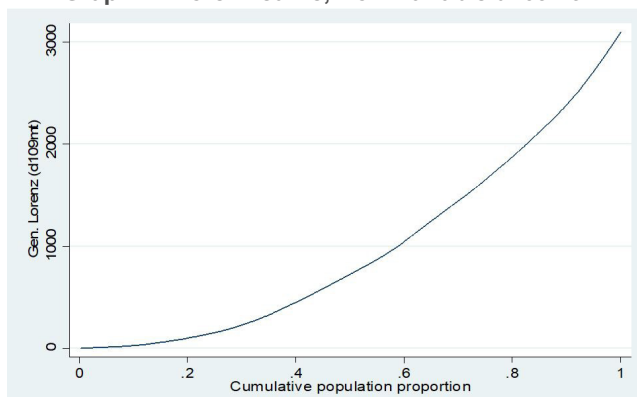
Comparing the results of the study with those of the report on poverty and well-being in Mozambique - the fourth national assessment, we find that inequality between households in Sofala is quite high, relative to inequality between Mozambican families at national level (0.42 in 2008), or at central region level (0.41

in the same year 2008). Moreover, compared to any region, the inequality between these households in Sofala is higher.

Lorenz curve

This high level of inequality is also apparent from the Lorenz curve, which is located closer to the extreme right and farther from the diagonal, reflecting greater inequality between households.

Graph 1 - Lorenz curve, from variable d109mt.



Fonte: Author's calculations based on the 2011 household survey data (variable d109mt).

Income Distribution in Percentiles and Kuznets Ratio

The common measure that can be calculated from this distribution is the Kuznets ratio (RK). This measure calculates the inequality between the poorest and high-income groups.

Table 9 - Income distribution in percentiles.

Percentile shares (proportion) Number of obs = 62

d112mt	Coef.	Std. Err.	[95% Conf. Interval]	
0-20	.0046728	.0021671	.0003395	.0090061
20-40	.0123574	.0058654	.0006288	.024086
40-60	.0275496	.0122194	.0031154	.0519837
60-80	.0744547	.0309651	.0125362	.1363731
80-100	.8809656	.0496987	.7815869	.9803442

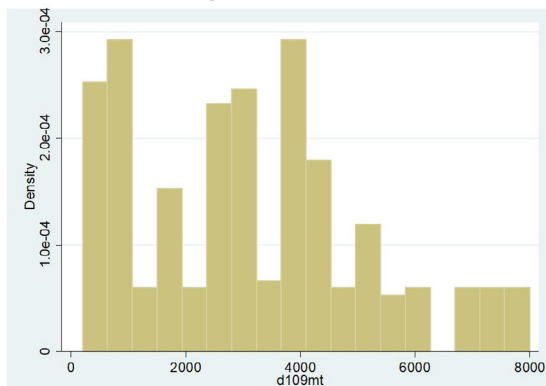
Fonte: Estimates based on the Stata file.

$$RK = \frac{Top20\%}{Botton40\%} = \frac{88.09}{1.69} = 52.12$$

This ratio shows that 20% of higher-income households receive more than 50 times the total income of 40% of lower-income households. These results reinforce

the findings that among households in the Sofala province, the income distribution is quite unequal.

Graph 2 - Histogram of income distribution.



Fonte: Author's calculations based on the study database (variable d109mt).

This level of inequality is also evident from the histogram presented above.

Multidimensional Poverty

In recent years, the consensus has grown that poverty is a multidimensional phenomenon, which involves dimensions other than consumption/income, namely access to and quality of health and education, housing, possession of durable goods, freedom, and others (Santos, 2011). The two approaches, consumption and multidimensional, provide information on different characteristics of poverty, and therefore their estimates can be seen as complementary.

Durable Goods Possession Analysis

For the analysis of durable goods, we generate the variable deprivation1 (priv1). Looking at section P, we define in variable p3, p05a, and p12 and their cut lines for some deprivations. Therefore, the household that has no improved barn or has not bought products in the last 3 days or has spent a hunger period in the last 12 months would have privations; based on this, we realize that only 0.81% of households have experienced these privations.

From the analysis of durable goods, the result obtained (Table 10) shows that all households suffer deprivation in accessing at least one of those goods listed above, i.e., 99% of households suffer at least one deprivation.

Table 10 - Deprivation due to lack of durable goods.

. tab priv1

priv1	Freq.	Percent	Cum.
0	12	0.81	0.81
1	1,478	99.19	100.00
Total	1,490	100.00	

Fonte: Estimates based on sec_pv1 file.

FINAL CONSIDERATIONS

This study uses the two dimensions of the concept of poverty, income and multidimensional, to assess poverty and inequality among households in Sofala province.

In the analysis of poverty from an income perspective, the study established the poverty line at 1567.50 MT. With this poverty line, the Headcount Ratio indicates that in 2011, 28,818% of households in Sofala province were poor, of which 16,850% were considered extra poor, as measured by the Extreme Poverty Headcount Ratio.

These results have been compared with those of the report on Poverty and Welfare in Mozambique, Fourth National Evaluation, and it was found that the incidence of poverty among households in Sofala province was higher than that of those poverty evaluation reports published in 1996, 2002, 2008 and 2014.

The results of our study were also compared with World Bank data for our country, and it was also concluded that households in Sofala province were poorer than households at the national level.

The total income required (in 2011) to be transferred to poor households to raise their per capita income to the value of the poverty line to eliminate poverty would be MT 84,670,000.00.

Extending the analysis to the perspective of inequality, the results show a Gini coefficient of 0.3695, which means that inequality is not quite high for households in Sofala province.

The level of inequality between these aggregates is also evident from the Lorenz curve, which is closer to the right extreme and away from the diagonal.

In the multidimensional perspective of poverty analysis, based on the evaluation of the possession of durable goods, the results of the study reveal that all households in the province suffered from deprivation in accessing at least one of the goods in the questionnaire; that is, 99% of households suffered from at least one deprivation.

Observing the possession of durable goods in the province of Sofala, given by the socio-demographic indicators from the 2007 General Census of Population

and Housing, it can be seen that about 42% of the rural area population did not have any durable goods in 2007, a better result than those obtained in the study. However, attention is drawn to the fact that this comparison is subjective, since these are surveys carried out in different years (2007 and 2011) and for different goods in some cases.

These findings, although referring to the year 2011, show that the province has improved a lot but still has a long way to go in the country to alleviate and remove from poverty a considerable part of families employed in the province of Sofala. This scenario of Sofala does not differ from the general panorama of poverty that the country faces, which can be seen from indicators available in reports on poverty in Mozambique.

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