Diagnosis of
Income and Multidimensional Poverty
in the North and Northeast regions of Brazil

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1. Introduction

The main objective of this study is to define, through CadÚnico data, a poverty profile for low-income families in the North and Northeast regions of Brazil. The Income Poverty Profile and the Multidimensional Poverty Profile are presented for different groups: by household location (urban or rural), for traditional communities, by the color of the head of household, by the age of the head of household (youth or not), by biome, and if the household is on semiarid region or not. Particularly, the Multidimensional Poverty Index (MPI) incorporates multiple aspects related to living conditions. Additionally, it considers not only the percentage of the population that is in poverty condition but also the variation in the number of deprivations faced by the population, also providing the relative participation of each dimension in the Index.

Top-10 most unequal countries (income)			
Ranking	Country	Reference year	Gini index
155	Botswana	2015	0.533
156	**Brazil**	**2018**	**0.539**
157	Mozambique	2014	0.540
158	Swaziland	2016	0.546
159	Central African Republic	2008	0.562
160	São Tome and Principe	2017	0.563
161	Zambia	2015	0.571
162	Suriname	1999	0.576
163	Namíbia	2015	0.591
164	South Africa	2014	0.630

Source: WORLD BANK. World Development Indicators. Washington, DC, 2020.

Brazil is one of the most unequal countries in the world when it comes to income distribution among its inhabitants, according to the Synthesis of Social Indicators (IBGE, 2020)[1], which considered Gini index estimates from the World Bank (2020) . In that publication, there is a ranking of the countries with the highest inequalities, and Brazil, with a Gini index of 53.9% based on 2018 data, fell among the top-10 most unequal countries, being the only Latin American country in a list that is mainly composed of African countries. Brazil is more unequal than Botswana, a small country neighboring South Africa, with just over two million inhabitants, which had an index of 53.3%. This ranking is reproduced below (**Table 1**).

The inequality observed in Brazil on the international scenario is also reflected internally among its regions, and can be expressed through numbers on economic, social, political, cultural and environmental inequality. More worrying than the differences in levels of economic and social activity among regions is the maintenance of this disparity over the years. The inequality observed in economic activity ends up being reflected in labor income, employment rate, development of human capital, and measures of poverty and concentration of income in the regions of Brazil, thus becoming a vicious circle. Therefore, it is important to promote public policies that are capable of reducing regional inequality and interrupting this circle. Subsequently, there is the presentation of some information highlighting the socioeconomic weaknesses of northern and northeastern Brazil.

The Northeast region of Brazil, where FIDA operations are concentrated, stands out due to economic and social disparities and development needs, confirming that the actions taken have been well focused. The contribution of the Northeast region to Brazil's GDP was of only 13% in 2019. The unemployment rate was

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1 An instrument created by the Italian mathematician Conrado Gini in 1914 to measure the degree of income concentration. The Gini coefficient is calculated based on the Lorenz curve, previously developed in 1905 by the American economist Max O. Lorenz. This curve is made from the ordering of income, from the smallest to the largest, and illustrates its proportion. It enables the graphical visualization of how each fraction of the population appropriates the total income. The horizontal axis (X) shows the fractions received by each proportion of population and the vertical axis (Y) shows the accumulated fractions of the total income. The index varies from 0 to 1, with 0 denoting the situation where everyone has the same income, while 1 represents the opposite extreme. Therefore, the closer the index is to 1, the greater is the income inequality among the individuals. For more information on the Gini Index, see Hoffmann (2006).

	UNEMPLOYMENT	INCOME	EDUCATION	FGT INDEX
NORTH	**11.9%**	**R$1,809,09**	**40.1%**	**3.2%**
NORTHEAST	**16.8%**	**R$1.703,11**	**45.9%**	**4.7%**
CENTER-WEST	**11.1%**	**R$2.686,00**	**34.5%**	**2.0%**
SOUTHEAST	**13.8%**	**R$2.736,00**	**31.4%**	**2.3%**
SOUTH	**8.3%**	**R$2.556,00**	**36.6%**	**2.1%**

higher than those recorded for the other regions, showing an increase from 14.52% in 2019 to 16.89% in 2020. As for the Southeast, North, Center-West and South regions, the unemployment rates were 13.85%, 11.93%, 11.13% and 8.27%, respectively.

With regard to labor income from the main occupation, the Northeast region had the worst performance for 2020, with an average of R$ 1,703.11, followed closely by the North region, which had an average value of R$ 1,809.09. The other regions have much higher average values: R$ 2,736 for the Southeast; R$ 2,686 for the Center-West and R$ 2,556 for the South. Northeastern Brazil has the highest percentage of population below the poverty line (Foster-Greer-Thorbecke Index - FGT): for the line of US$1.90/day per capita - the rate is 4.67% in 2020 - and for the line of US$5.50/day per capita - 14.40% in 2020. The Northeast region has the highest concentration of income when compared to the other regions, having achieved a Gini Index of 52% in 2019 and 50% in 2020.

Despite the slight decrease in inequality, the region remained with the highest index. In the second place, there is the Southeast region with 49.42%; next, the Center-West region with 48.47%; in the fourth place, the North region with 46.40%; and finally, the South region with 44.18%.

Regarding education, it is noticed that a large part of the population did not even finish elementary school, when considering metropolitan areas within the analyzed sample. The northeastern population with incomplete elementary school accounted for 45.91% of the total in 2020, while in the Southeast this percentage was much lower, 31.36%. In the Center-West, 34.50%; in the South, 36.56%, which makes clear the distance of the Northeast to the other regions. In the North region, the percentage of the population with incomplete elementary school is closer to the Northeast region with 40.12%. The situation is even more critic in the countryside as 56.30% of the non-metropolitan population from the Northeast has not com-

NORTH REGION
Acre, Amapá, Amazonas, Pará, Rondônia, Roraima and Tocantins

NORTHEAST REGION
Alagoas, Bahia, Ceará, Maranhão, Paraíba, Pernambuco, Piauí, Rio Grande do Norte and Sergipe

CENTER-WEST REGION
Distrito Federal, Goiás, Mato Grosso and Mato Grosso do Sul

SOUTHEAST REGION
Espírito Santo, Minas Gerais, Rio de Janeiro and São Paulo

SOUTH REGION
Paraná, Santa Catarina and Rio Grande do Sul

pleted elementary school, while only 8.80% of this population have completed college (IBGE, 2020). Taking this context into account, public policies, such as the projects carried out by the IFAD in partnership with the Brazilian Government and aimed at developing human capital in the Northeast of Brazil, become paramount.

The North region, as well as the Northeast, also presents several socioeconomic weaknesses and, in several aspects, it is evident the disparity to the other regions. The unemployment rate in the North was of approximately 11.93% in 2020, reaching the third position in the ranking behind the Northeast and Southeast. In relation to labor income from the main occupation, the North region had an average of R$ 1,809.09. This value is very close to that of the Northeast region, which had the worst performance in 2020, reaching an average of R$ 1,703.11. It is worth stressing that labor income decreased for all regions from 2019 to 2020, but the disparity between North/Northeast and the other regions is clear, as shown above.

For the North region, the FGT Poverty Index, which estimates the percentage of population below the poverty line to US$1.90) was of 3.17% in 2020, which is lower than the value calculated for the Northeast and above the ones from the Southeast, South and Center-West regions, of 2.34%, 2.14% and 2.03%, respectively. Considering the poverty line of US$5.50, the FGT index rises to 10.66%. With regard to income concentration, the North region falls behind the Northeast, Southeast and Center-West regions, with a Gini Index of 46.40%. Inequality in this region can also be exposed with schooling levels. In the metropolitan areas, the population with incomplete elementary education was of 40.12%, with an even higher percentage of 47.07% in the countryside; additionally, only 11.82% of the population have completed higher education (IBGE, 2020). Thus, the distance of the Northeast and North regions to the other ones is clear. As discussed above, the Southeast, Center-West and South regions have a percentage of the population with incomplete elementary school far lower (31.36%, 34.50% and 36.56%, respectively).

In addition to this introduction, this study is divided into four more parts. In section two, theoretical discussions about the challenges of sustainable development and its multiple dimensions are briefly presented. In the third section, we present the methodology used to calculate MPI. In the fourth section, the results of the Headcount Index and Multidimensional Poverty are shown for the different groups analyzed in the North and Northeast regions. Finally, the article ends with the concluding remarks.

2. The challenges of sustainable development and its multiple dimensions

Achieving economic progress is clearly a choice of the society, organizations, communities and individuals. As it involves several choices, change is only possible if there is great involvement from the society.

Celso Furtado (1984) understands development as a process of transformation of the world carried out by mankind in order to meet its needs. To this enda, human beings and societies would need to increase their potential to innovate, thus achieving the expected transformations.
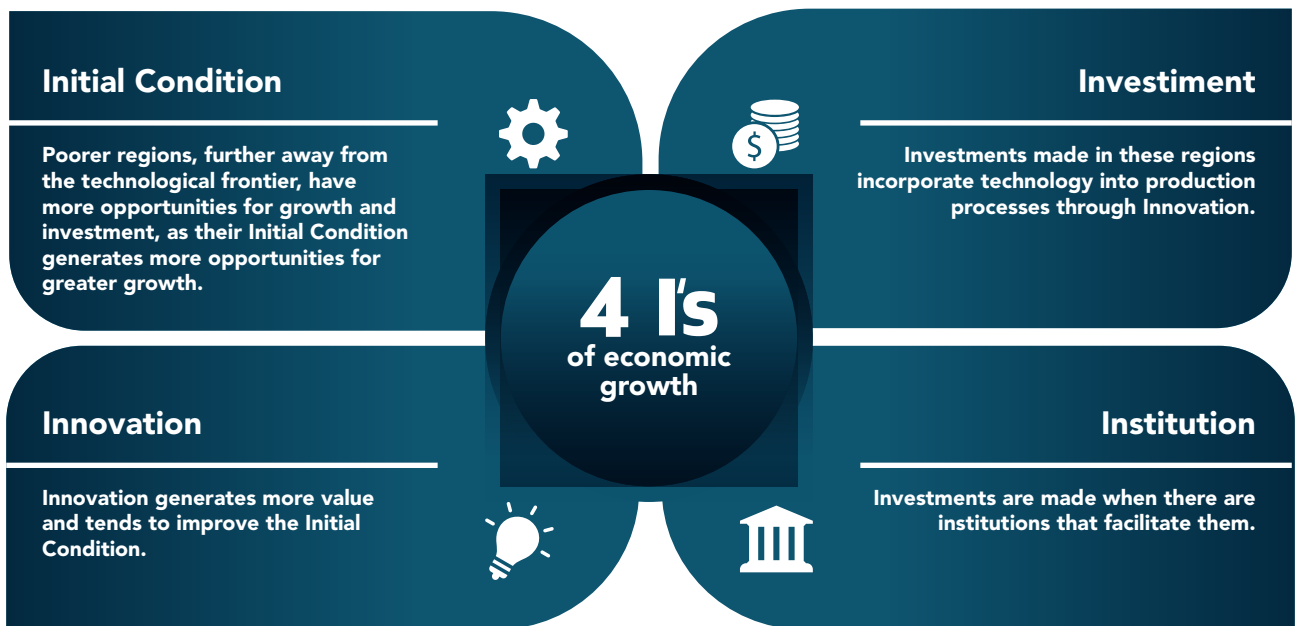
According to Rutherford (1997), one must look at the problem of development from different perspectives. For the author, the main dimensions of development are generally the following: economic, environmental and social. When these three spheres of development are reached, sustainable development is achieved. However, still according to the author, development should not to be restrict only to these dimensions, but expand the insights to explore other factors that can lead to growth and economic development.

Based on the idea that multiple dimensions can lead to development, Fatas and Mihov (2009) explored, more specifically, the economic and institutional factors that lead to greater economic growth, the so-called 4 I's of Economic Growth.

The 4 I's of economic growth are interconnected. The poorest regions, which are further away from the technological frontier, have more opportunities for growth and investments because their *Initial Condition* generates more opportunities, which allows for greater growth. The *Investment* carried out in these regions, in turn, incorporates technology into production processes through *Innovation*, which generates more value and tends to improve the Initial Condition. Finally, investments are made when there are *Institutions* that facilitate them.

The concept of the 4 I's provides a new perspective on development, by pointing out different fronts of action to promote it. This perspective meets the way FIDA formulates its Projects in partnership with the Government of Brazil. By observing the reality of rural communities from the semiarid region living in poverty and by identifying the main needs in force, as well as the constraints that prevent their development, the Fund aims at carrying out actions that lead to improvements in human, social and physical capital, even generating an intergenerational effect, thus improving life perspective of future generations.

All this reasoning also meets a more comprehensive approach, elaborated by Amartya Sen, which became known in the literature as the Capability Approach. This approach gained notoriety for considering development as an expansion of freedoms, and, for this, it is necessary to remove the main sources of deprivation of freedoms and take into account multiple dimen-

Initial Condition

Poorer regions, further away from the technological frontier, have more opportunities for growth and investment, as their Initial Condition generates more opportunities for greater growth.

Investiment

Investments made in these regions incorporate technology into production processes through Innovation.

4 I's
of economic growth

Innovation

Innovation generates more value and tends to improve the Initial Condition.

Institution

Investments are made when there are institutions that facilitate them.

sions of the human condition. So, according to Sen, there are multiple conditions that lead to development.

From the perspective of Sen (2000), in his Capability Approach, poverty should be seen as the deprivation of basic capabilities, rather than merely as low income. The perspective of poverty as a deprivation of capabilities does not involve any denial of the idea that low income is clearly one of the main causes of poverty, since lack of income can be a prime reason for a person's deprivation of capabilities. However, the expansion of freedoms also depends on other factors, such as social and economic provisions (for example, education, health, housing, food security, community participation, etc.) and civil rights. Therefore, Sen (1985) proposed a new way of measuring human development, by using a matrix of vectors of capabilities, multiple dimensions, to measure the evolution of individuals' real freedoms.

Sen's Capability Approach offers a comprehensive perspective of development, in which ev-

erything revolves around improving people's well-being, i.e., development should focus on people. From the contributions of Sen to the measurement of multidimensional poverty, relevant possibilities of operationalizing the Multidimensional Poverty Index emerged since the measurement of the poverty index should include different types of deprivation. In light of this, income and other dimensions are defined to measure the welfare conditions of families benefiting from IFAD Projects, such as human capital, social capital, nutrition and food security, housing conditions and sustainability.

3. Methodology

3.1. Data

The data used in this study were made available by the Unified Registry (CadÚnico). Access to data is restricted, but can be obtained upon request for research purposes. CadÚnico is an instrument that identifies and characterizes

low-income families, allowing the government to better understand the socioeconomic reality of this population. It records various socioeconomic information about households, families and their members, such as housing conditions, identification of each person, education, color, age, employment situation and income, some expenses, participation in social programs, among others. The temporal coverage is from 2012 to 2018, and the data used in this survey was from the last year of availability (2018). The database has approximately 30,760,710 observations for the Northeast region and 9,024,771 observations for the North region.

3.2. Alkire and Foster's multidimensional poverty approach

A "true" measure of the condition of poverty should not depend on income indicators alone, but also on other indicators. The poverty situation of a population is a manifestation of insufficient well-being and depends on monetary and non-monetary variables. Therefore, taking income as the only indicator of well-being is inadequate and should be complemented by other attributes or variables, e.g., housing conditions, literacy, life expectancy, provision of public goods, etc. (BOURGUIGNON; CHAKRAVARTY, 2003).

Multidimensional poverty is an alternative to the income approach. From this perspective, the identification of the poor is a way to verify if the person has a set of minimum basic needs. Each person is characterized not only by income, but also by a vector of various factors that constitute the experience of deprivation of people in poverty (TSUI, 2000).

Measurement of multidimensional poverty, as well as one-dimensional measurement, involves two main steps, according to Alkire and Foster (2011):
1) **Identification** - Who is poor? – Used to decide who should be multidimensionally poor through the dual cutoff point.

2) **Aggregation** - How poor is the population? - At this stage, a poverty index is built to summarize information about the poor and reflect on the poverty of the population in a robust way. These are the classes of poverty measures: the adjusted FGT.

The first step in determining MPI is, from a matrix of achievements of each of the rural families, to determine the individuals who suffer deprivation in each dimension, i.e., their achievements are below the cutoff point. After the identification of the number of deprivations, the first cut-off point is defined, i.e., the value necessary to characterize a condition of poverty.

Being a matrix of deprivations $g^0 = [g^0_{ij}]$, of extent n x d, with "n" representing the size of the sample (i = 1,2, 3, …, n) and "d" denoting the number of dimensions (j = 1,2, 3, …, d), each sample representative (y_{ij}) is connected to a vector line (z_i). This vector represents the poverty line. There will be deprivation of a certain dimension when it is below its established poverty line ($y_{ij} < z_j$). Therefore, by using the vector z, one can conclude if a particular household i is suffering deprivation in some dimension j (ALKIRE; FOSTER, 2011).

After the stage of identification of the dimensions in which there is deprivation, i.e., those that have a value below the corresponding poverty line, the count is performed to identify the total amount of deprivations in dimension. The total number of deprivations in each dimension is counted in the column vector c_i (ALKIRE; FOSTER, 2011).

After this count, the identification approach used by Alkire and Foster (2011) is applied. Also known as the Dual Cutoff Approach, it considers a double cut-off point to define who is poor,

i.e., a second cut-off point is defined in order to identify the poor. Suppose the cutoff is set at 3 (k = 3), so the family must suffer deprivation in at least three dimensions to be considered poor. Therefore, the person will be poor if the deprivation count (ci) is higher than the cutoff (k), i.e., ci > k.

In order to identify poverty, the notation used is ρ_k. If a sample family is identified as poor, ρ_k (y_i, z) = 1. Otherwise, it is identified as nonpoor ρk (y_i, z) = 0. Unlike the traditional Headcount Index, the Adjusted Headcount Index (M0) proposed by Alkire and Foster (2011) reflects the incidence, the percentage of the population that is poor (H), and the intensity of poverty, i.e., the number of deprivations suffered by each individual (A). So, the adjusted index is given by equation 1.

$$M_0 = H \times A \tag{1}$$

Fahel, Teles and Caminhas (2016) draw attention to the flexibility and ability of the Multidimensional Poverty Index (MPI) to adapt to different contexts, in addition to the possibility of comparative analysis, where the index can be broken down into different regions and broken down according to the contribution of each indicator, so that it is possible to identify the incidence and intensity of poverty.

In this respect, the global MPI measures the phenomenon of poverty. In this material, six dimensions were considered, all with the same weight and with their respective indicators also equally weighted, due to the lack of consensus or satisfactory theoretical justification to apply a particular weight structure.

Also, in relation to the Multidimensional Analysis of Poverty, the cutoff points or poverty line

CHART 1. Dimensions, Indicators, Variables and cutoffs for the construction of MPI in the North and Northeast regions of Brazil

Dimension	Indicator	Description	Cutoff
Dimension: Housing Conditions and Access to services	Housing conditions - Home infrastructure	Type of household: - 1 - Permanent Private; 2 - Improvised Private; 3 - Communal	If the household is Improvised Private or communal
		Number of room(s) serving as bedroom	
		Predominant material of house floor: 1- Earthen; 2 - Cement; 3 – Recycled wood; 4 - Wood; 5 - Ceramic, slab or stone; 6 - Carpet; 7 - Other Material	If the house has earthen floor
		Predominant material of house external walls: 1 - Masonry/brick with coating; 2 - Masonry/brick without coating; 3 – Trimmed wood; 4 – Coated taipa; 5 - Uncoated taipa; 6 – Recycled wood; 7 - Straw; 8 - Other Material	If the material on the walls corresponds to items 4, 5, 6 or 7
		Is there at least one bathroom? 1 – Yes; 2 – No	If there is no bathroom on the house
		Number of people living in the house	
		Number of families living in the house	If there is more than one family living in the house
		If the house has running water: 1 – Yes; 2 – No	If the home has no running water
	Access to services	Type of water supply: 1 – Water distribution system; 2 – Well or spring; 3 – Cistern; 4 – Other form	If the type of water supply is Well or Spring, Cistern, or Other form
		Type of wastewater disposal: 1 – Sewage disposal system or pluvial; 2 – Septic tank; 3 – Cesspit; 4 – Open ditch; 5 – Straight to a body of water; 6 - Other type	If the type of wastewater disposal correspond to items 2, 3, 4, 5 and 6
		Type of waste collection: 1 – Collected directly; 2 – Collected indirectly; 3 – Burned or buried on the property; 4 – Thrown into wasteland or the street; 5 – Thrown into a body of water; 6 – Other destination	If the form of garbage collection corresponds to items 3, 4, 5
			If the lighting source corresponds to items 4, 5 and 6
Dimension: Health	Deficiency	Person with disability: 1 – Yes; 2 – No	If there is a disabled person in the family
	Expenditure on medicines	Amount of expenses on medicines divided by the average family income	If spending on medicines exceeds 30% of the budget
	If there are no hospitalized people in the family	There are no hospitalized person between the ages of 0-17: 0 – Unchecked option; 1 – Checked option	If there is at least one person in the family
		There are no hospitalized person between the ages of 18-64: 0 – Unchecked option; 1 – Checked option	
		There are no hospitalized person 65 years old or older: 0 – Option not checked; 1 – Option checked	
Dimension: Education	Literacy	1 – Yes; 2 – No / 1 – If it is reference persons	If the head of household cannot read
	Age	Date of birth of the person in MMDDAAAA format	
	Education attainment	Highest level of education completed – Years of study	If the person is between 17 and 60 years old and does not have completed high school / If the person is more than 60 years old and does not have completed elementary school

Dimension	Indicator	Description	Cutoff
Dimension: Labor	Type of work	Main function: 1 – Self-employed; 2 – Temporary worker in rural areas; 3 – Worker with no contract of employment; 4 – Worker with contract of employment; 5 – Domestic worker with no contract of employment; 6 – Domestic worker with contract of employment; 7 – Unpaid work; 8 – Military or public servant; 9 – Employer; 10 – Trainee; 11 – Apprentice	If the main job corresponds to items 2, 3, 5, 7, 10 and 11
	Salary	Has not been paid at work: 0 – Unchecked option; 1 – Checked option	If the person of reference has not received remuneration for the work
	Salary for the last 12 months	Person has had paid work for the last 12 months: 1 – Yes; 2 – No	If the person of reference has had paid work for the last 12 months
	Participation in Social Programs	1 – Beneficiary of PBF; 0 – Non-Beneficiary of PBF	If the family is a beneficiary of the PBF
Dimension: Vulnerable groups	Age (youth)	Date of birth of the person in MMDDAAAA format	If the the head of household is 17 to 29 years old
	Indigenous or Quilombola Communities	Indigenous Family: 1 – Yes; 2 – No Quilombola Family: 1 – Yes; 2 – No	If the family is indigenous If the family is quilombola
	Household location (rural)	Characteristics of the place of residence: 1 - Urban; 2 - Rural	If the household is in a rural area
	Semiarid	Biome in which the household is situated: 1 – Semiarid; 0 – Another biome	If the household is in the semiarid region
	Child Labor	Child labor in the family: 0 – Unchecked option; 1 – Checked option	If there is child labor in the family
	Color/race	Color: 1 – White; 2 – Black; 3 – Yellow; 4 – Brown; 5 – Indigenous	Whether the color/race is black or indigenous
	Food Expenditure - Extreme Poverty	Value of expenses with food	Defined based on the cut-off point for minimum expenses with food (R$168.00), as per IBGE.

Source: Elaborated by the researchers for this study.
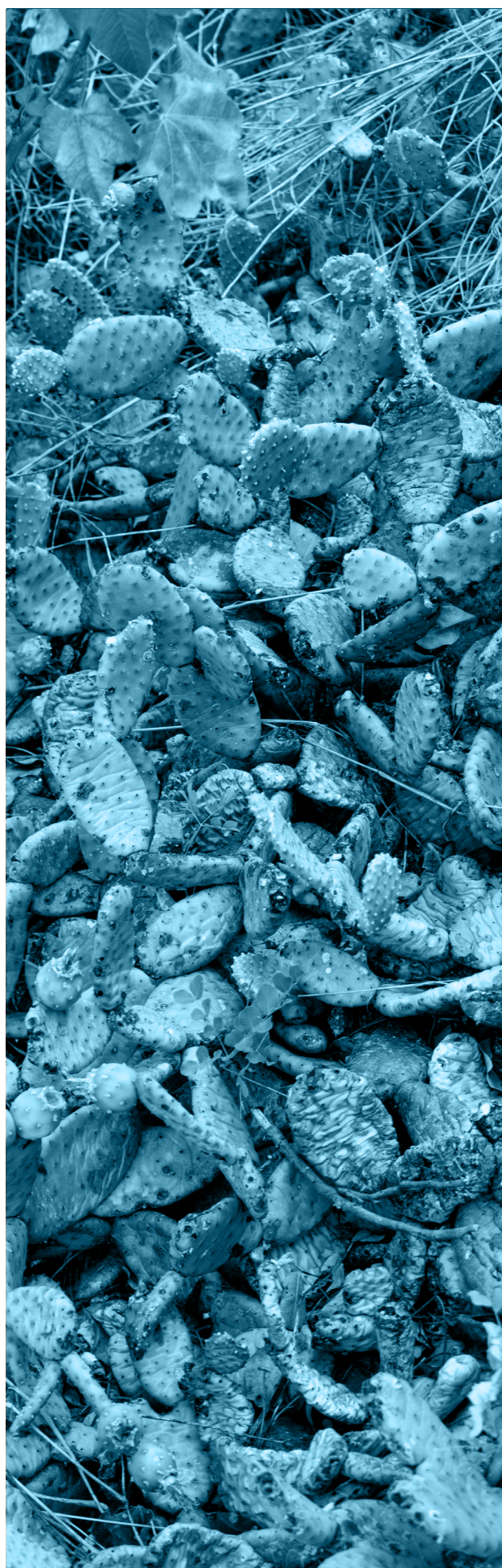
are highlighted. The first cutoff point is performed within each dimension, and was given as follows: Income (R$550.00); Housing conditions and access to services (1); Health (1); Education (1); Work (1) and Vulnerable Group (1).

These values were chosen based on statistical analysis of the indicators, as well as the decision criterion of Alkire and Foster (2011), which expects that the cutoff point should be chosen when there is a large discontinuity in the number of households in situations of poverty in multiple dimensions. Regarding the dual cut-off point, that is, the point on all dimensions, which defines in how many dimensions the household must simultaneously suffer deprivation to be considered poor, it is important to analyze different MPI values, for different cutoff values (k) as advised by Alkire and Foster (2011). The decision takes place where there is a big drop of the MPI. Therefore, the chosen dual cut-off point, used to define who is poor, is k = 2.

4. Results

This section presents the Headcount Poverty Index, income, and Multidimensional Poverty Index for the total sample in the North and Northeast regions; the breakdown of MPI to verify the

contribution of each dimension to the General Index; and the Multidimensional Index for the different groups considered: youth, traditional communities; color/race, rural households, biome and semiarid.

4.1. Income and Multidimensional Poverty in municipalities from northeastern Brazil

For the sample of municipalities from northeastern Brazil, it was found that, in 2018, the income poverty rate was of 92.91%, i.e., a large portion of the population was below the poverty line defined by IBGE – R$550 per capita per month. This high percentage for the FGT index was due to the fact that the CadÚnico database is an instrument that identifies and characterizes low-income families. Multidimensional poverty, by combining several aspects related to living conditions, presents a lower percentage of the population identified as poor in at least two of the dimensions considered (k = 2).

Table 2 shows that the multidimensional poverty rate (M0) for the Northeast region as a whole at the dual cut-off point chosen (k=2) was 47%. When analyzing the MPI for different groups, the differences and socioeconomic weaknesses for certain groups are clear, reinforcing the need for public policies to address them.

The population living in rural areas had a MPI well above the value of the Northeast as a whole, 66%. The vulnerability of the rural population is even more evident when compared to the population living in urban areas, for which the MPI was 37%, i.e., 29 percentage points below the percentage calculated for rural households. These results confirm that rural poverty in Brazil is a serious problem that persists over the years, thus becoming a constant in the discussions about poverty and social development in Brazil that cannot be naturalized.
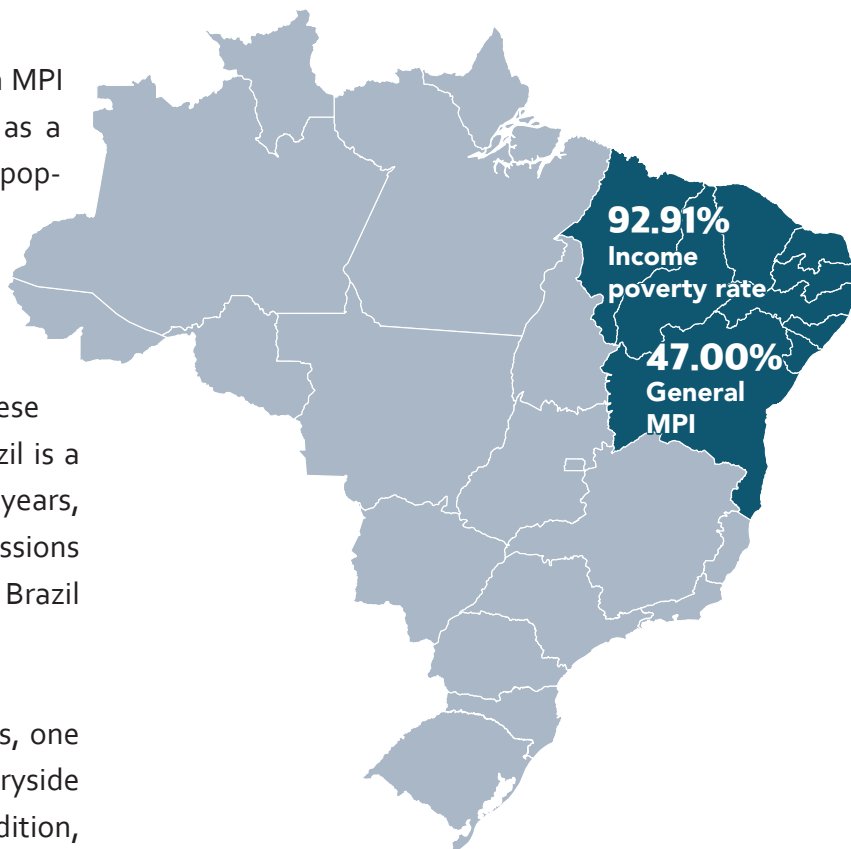
According to the 2010 Population Census, one out of four Brazilians living in the countryside is in a situation of extreme poverty. In addition, the inequality between rural and urban access to public services such as health, education, water supply and sanitation also demonstrate the difficulties of the rural population.

When the analysis of MPI for the semiarid region is carried out, it is observed that the index is indeed higher for the population in this area since 50% of them were characterized as multidimensionally poor. This confirms that the semiarid, due to its climate vulnerability, needs public policies aimed at breaking with social and economic con-

92.91%
Income poverty rate

47.00%
General MPI

straints that prevent the achievement of better living conditions and sustainable development.

The results reinforce the idea that any discussion about reducing inequalities and overcoming poverty in Brazil cannot be done without diagnoses, strategies and actions that consider the social and economic situation of rural populations in poverty. Further on, it will also be important to understand which dimensions contribute most to MPI.

TABLE 2. General Multidimensional Poverty Index for the Northeast region and for different groups

Groups	MPI	Groups	MPI
Rural households	66%	Urban households	37%
Semiarid region	50%	Other regions	44%
Amazon	50%	Out of Amazon	47%
Caatinga	49%	Out of Caatinga	45%
Cerrado	52%	Out of Cerrado	46%
Atlantic Forest	42%	Out of Atlantic Forest	49%
Traditional groups	66%	Other groups	47%
Black	57%	Non-black	46%
Youth	46%	Non-youth	47%
General MPI		**47%**	

Source: The research data.

In relation to the Biomes, the MPI was higher for the populations that belong to them, in relation to those that are outside them. That is, for families that are in the biomes of the Amazon, Caatinga and Cerrado, poverty rates are higher, especially the Cerrado that has reached a multidimensional poverty rate of 52%. On the other hand, the Atlantic Forest region presented the lowest MPI. This result is consistent since in these areas predominate the humid coastal tropical climate with average temperatures and high air humidity throughout the year and rainfall are regular and well distributed, which favors more economic development in the region.

Differences in the MPI between groups remain when analyzing traditional peoples and communities. The poverty rate for individuals belonging to the indigenous peoples or quilombola communities is much higher than for individuals who do not belong to these groups, 66% versus 47%. These results reflect the reality of an unfair and unequal country and also reinforce the need for attention to policies directed to such groups, seeking to achieve greater human and social development, improve sustainable productive development, income generation (both agricultural and non-agricultural), so that they can have a greater role in society.

This result can be confirmed by another variable that captures the color/race of individuals. Accordingly, the group composed of black or indigenous people has a MPI higher than the group of non-blacks, respectively 57% and 47%.

When analyzing the group of individuals who are the person of reference in the household and who are young, aged between 17 and 29 years, it is noted that multidimensional poverty is lower for these individuals than for those who are not young. Although the difference is of only 1 p.p., it is noted that in the sample analyzed, this group is not as vulnerable as the others that have already been mentioned.

Table 3 shows the contribution of each of the dimensions considered in the analysis to the MPI of the Northeast region. Income was the dimension that most contributed to multidimensional poverty in this region with a 30.33% share. Income is an important instrument to ensure better living conditions and the well-being of the population, so policies to encourage the generation of agricultural and non-agricultural income have its highlight. In line with this result, there is the Labor Dimension that showed a participation of 18.41% in the MPI, being the second largest. This dimension is related to the Income Dimension, since the job position and whether it is remunerated or not will determine the amount of income.

Subsequently, the Education Dimension also presented a considerable percentage of contribution to MPI (17.78%), indicating that the fact of not knowing how to read and the low level of education are important factors to increase the incidence and depth of multidimensional poverty, which deserve a close look from the public sector.

The health dimension may be underrepresented due to the limitation of variables in the database for the construction of this dimension.

TABLE 3. Contribution of each dimension to the general MPI of the Northeast region

Dimension	M0
Income	30.33
Housing Conditions and Access to services	12.50
Health	8.02
Education	17.78
Labor	18.41
Vulnerable group	12.96

Source: The research data.

It would be important to consider whether the individual has health insurance, access to health services, subjective questions about their provision and whether they had assistance when needed, among others.

93.11%
Income poverty rate

47.00%
General MPI
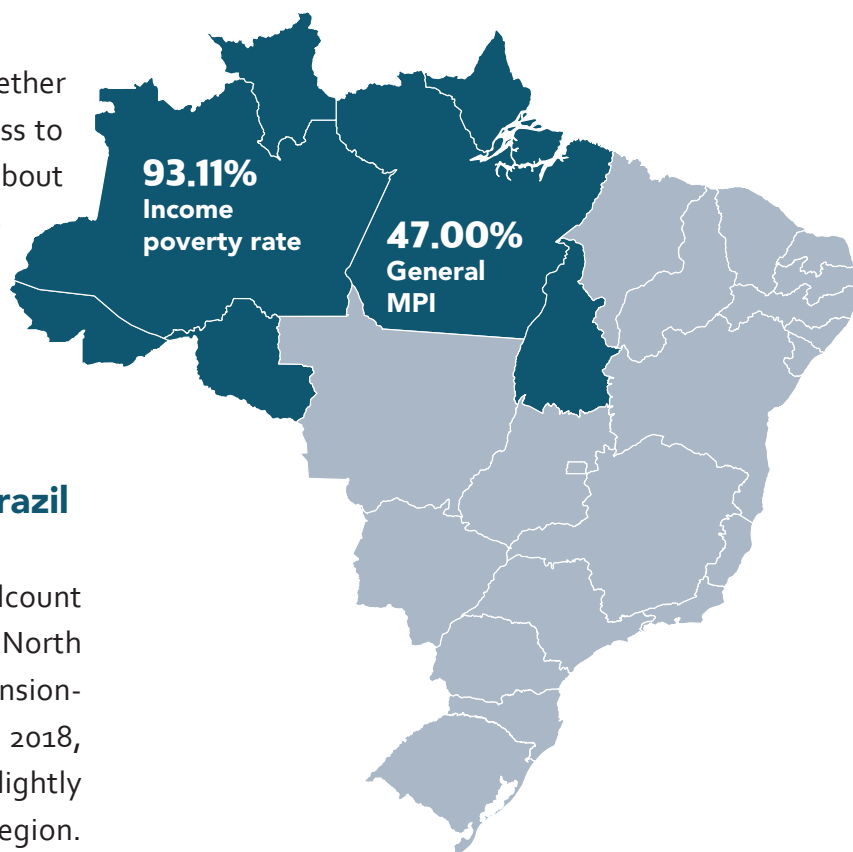
4.2. Income and Multidimensional Poverty in municipalities from northern Brazil

In this section, we first analyzed the headcount index for the CadÚnico sample in the North region and, after that, the Multidimensional Poverty Index. It was found that, in 2018, the income poverty rate was 93.11%, slightly higher than presented in the Northeast region. Therefore, in this region, there is also a large portion of the population below the poverty line defined by IBGE – R$ 550 per capita per month.

Multidimensional Poverty for the North region reached 47%, the same value achieved by the Northeast, a result that is consistent with the history of poverty and inequality rates for these two regions when compared to the national value and to the value of other regions.

In addition to a high poverty index, as shown in **Table 4**, a significant difference in the incidence of poverty was also identified in the North region when distinguishing between rural and urban areas. Considering the rural households from northern Brazil, 67% of them could be characterized in a situation of Multidimensional Poverty. These values were significantly reduced when the focus was on the urban area of the region, which presented a MPI of 38%. The difference between rural and urban areas, 29 p.p., demonstrates the great inequality within the region.

In the North region of Brazil, two biomes predominate: the Amazon and the Cerrado. In the same way as it was observed for the Northeast region, the MPI was higher for the population from the Amazon biome, 48%, than otherwise. As for the Cerrado, it was quite different, with the MPI for the population belonging to this biome reaching 41%, which was lower than for that registered for households out of the Cerrado, 47%. Quite a different situation occurred in the Northeast, where the Cerrado had the highest MPI with 52%.

In relation to groups of traditional peoples and communities, it is noted that they have a much higher level of multidimensional poverty (69%) than those who do not belong to this group, which have a MPI of 46%. This result for quilombola communities and indigenous peoples is very similar to that one found for the Northeast region, in which the MPI was of 66%. Similar behavior occurred when calculating the MPI by the color/race of individuals. For black people and indigenous people, the level of multidi-

TABLE 4. General Multidimensional Poverty Index for the North region and for different groups

Groups	MPI	Groups	MPI
Rural	67%	Urban	38%
Amazon	48%	Out of Amazon	41%
Cerrado	41%	Out of Cerrado	47%
Traditional groups	69%	Other groups	46%
Black	62%	Non-black	46%
Youth	44.5%	Non-youth	47%
General MPI		47%	

Source: The research data.

mensional poverty was much higher (62%) than for non-blacks (46%). These similar results between the North and Northeast regions confirm the social fragilities and vulnerability of certain groups in these regions.

For Northern Brazil, youth-headed household also presented a lower level of multidimensional poverty than those headed by individuals older than 29 years. The difference between the two age groups in the North region was 2.5 p.p. Poverty among youth-headed households in the North was lower than in the Northeast.

From **Table 5**, we sought to observe the participation, separately, of each dimension in the constitution of poverty in Northern Brazil.

From the data in **Table 5**, it is possible to observe a significant participation of the dimensions 'Income' and 'Education' in the constitution of poverty in Northern Brazil with 30.37% and 19.93%, respectively, thus following the same

behavior of the participation of the dimensions for the MPI in the Northeast region. The 'Health' dimension also had the lowest influence on the poverty index, 6.44%.

In general, through the use of microdata from CadÚnico, it is possible to observe a similarity between the multidimensional poverty profile in the North and Northeast regions, with a joint MPI of 47%. In addition, the contribution of the dimensions taken into account to the construction of the MPI was also similar in the ordering by importance, but there was a variation in the percentage of contribution of each dimension to multidimensional poverty.

5. Final Considerations

This article presents the results of the Income and Multidimensional Poverty Indexes for the North and Northeast regions of Brazil. Having as a starting point the realization that poverty is a phenomenon capable of impacting families in various ways, this research innovates when calculating the MPI for a sample of low-income families from the CadÚnico, in addition to calculating the MPI by groups such as rural population, population of the semiarid region, the biomes of the Amazon, Caatinga, Cerrado, and Atlantic Forest in the Northeast, and the biomes of the

TABLE 5. Contribution of each dimension to the general MPI of the North region

Dimension	M0
Income	**30.37**
Housing Conditions and Access to services	15.34
Health	**6.44**
Education	19.93
Labor	15.92
Vulnerable group	11.99

Source: The research data.

Amazon and Cerrado in the North, as well as traditional groups and color/race groups, enabling the calculation of the participation of each of the dimensions considered for the general MPI.

It is considered that the measurement of poverty includes different types of deprivations, besides the lack of income. In this regard, the following dimensions were incorporated: Housing Conditions and Access to Services, Health, Education, Labor and Vulnerable Groups.

In general, it was observed a similarity between the multidimensional poverty profile in the North and Northeast regions, and the two regions presented the same MPI. The contribution of the dimensions to the general MPI was also similar in terms of importance, but there was variation in the value in which each one contributes to multidimensional poverty. The dimensions of 'Income' and 'Education' stand out as the ones with the greatest participation in the poverty index. The results also showed the vulnerability of the rural population, the semiarid population, the population from the biomes of the Amazon, Caatinga and Cerrado in the Northeast, and the Amazon biome in the North, as well as traditional groups and black and indigenous individuals.

In this way, the results reinforce the need for commitment to the promotion of inclusive sustainable rural development, generation of monetary and non-monetary income, and the poverty reduction agenda, especially in the poorest areas and with target groups, which face a long history of social and economic inequalities. It is still a great challenge to be able to reach the different dimensions of poverty and totally eliminate the restrictions faced by the vulnerable population of these regions, which prevents them from entering the productive process and effectively achieving development in multiple aspects.

Referencias

ALKIRE, S., FOSTER, J. Counting and Multidimensional Poverty Measurement. **Journal of Public Economics,** n. 95, pg. 476–487, 2011.

BOURGUIGNON, F., CHAKRAVARTY, S. R. The Measurement of Multidimensional Poverty. **Journal of Economic Inequality**. Vol. 1, 2549, 2003.

FAHEL, M.; TELES, L. R.; E CAMINHAS, D. A. PARA ALÉM DA RENDA. Uma Análise Da Pobreza Multidimensional No Brasil. **Revista Brasileira de Ciências Sociais**. 2016.

FATAS, A. & MIHOV I. **The 4 I's of Economic Growth**, INSEAD Working Papers – The Business School for the World. 2009.

FURTADO, Celso. **Cultura e Desenvolvimento em Épocas de Crise**. Rio de Janeiro: Paz e Terra, 1984. Celso Furtado (1984).

HOFFMANN, Rodolfo (2006), "Transferências de renda e a redução da desigualdade no Brasil e cinco regiões entre 1997 e 2004". **Revista Econômica**, 8 (1): 55-81.

RUTHERFORD, I. Use of Models to link Indicators of Sustainable Dvelopment. In: Moldan, B.; Bilharz, S. (Eds.) **Sustainability Indicators**: report of the project on indicators of sustainable development. Chichester: John Wiley & Sons Ltd., 1997.

SEN, AMARTYA. **Desenvolvimento como liberdade**. Companhia das Letras, 409 pg. São Paulo. 2000.

Síntese de indicadores sociais: uma análise das condições de vida da população brasileira : 2020 / IBGE, Coordenação de População e Indicadores Sociais. - Rio de Janeiro : IBGE, 2020. 148 p. : il. - (Estudos e Pesquisas. Informação Demográfica e Socioeconômica, ISSN 1516-3296 ; n. 43)

TSUI, K. Multidimensional Poverty Indices. **Social Choice & Welfare**. Vol.19, pp. 69-93, 2002.

WORLD BANK. **International Comparison Program (ICP)**. Washington, DC, 2020. Disponível em: https://www.worldbank.org/en/programs/icp.