

**Área 13:** Desigualdade, pobreza e políticas sociais

# **Understanding the determinants of poverty in Brazil: a household level analysis<sup>1</sup>**

**Fabrizio Ferreira Caetano Santos**

Mestrando em Economia Regional e Políticas Públicas  
Universidade Estadual de Santa Cruz (UESC)

Endereço: Rodovia Jorge Amado, km 16, Bairro Salobrinho. Ilhéus-Bahia  
Telefone: (73) 991068270. E-mail: fcsantos@uesc.br

**Mônica de Moura Mires**

Doutora em Economia Rural

Professora do Departamento de Ciências Econômicas da Universidade Estadual de Santa Cruz  
(UESC)

Endereço: Rodovia Jorge Amado, km 16, Bairro Salobrinho. Ilhéus-Bahia  
Telefone: (73) 3680-5043. E-mail: mpires@uesc.br

**Carlos Eduardo Iwai Drumond**

Doutor em Desenvolvimento Econômico

Professor do Departamento de Ciências Econômicas da Universidade Estadual de Santa Cruz  
(UESC)

Endereço: Rodovia Jorge Amado, km 16, Bairro Salobrinho. Ilhéus-Bahia  
Telefone: (73) 3680-5215. E-mail: ceidrumond@uesc.br

---

<sup>1</sup>Essa pesquisa foi financiada, em parte, com recursos da FAPESB.

# Understanding the determinants of poverty in Brazil: A household level analysis

## Abstract

This study aimed to identify the determinants of household poverty in Brazil using heads of households as unit of analysis. Thus, data from the Pesquisa Nacional por Amostras de Domicílios Contínua (Continuous National Household Sample Survey) (PNADC) referring to the individual characteristics of the head of the household and the household were used. The empirical investigation aimed to determine the probability of the head of the household being in a situation of poverty using a probit model. The results indicate that households led by men, households led by individuals with more years of study, and households located in urban areas have a lower probability of being in a situation of poverty. On the other hand, households located in the North and Northeast regions, led by black or mixed-race people, and households led by individuals who work in activities connected to the agriculture sector have a higher probability of being in a situation of poverty.

**Keywords:** *Deprivation. Feminization of poverty. Regional development. Microdata.*  
**JEL Classification:** *R58; I32.*

## Resumo

Este estudo buscou identificar os determinantes da pobreza familiar no Brasil utilizando os chefes de família como unidades de análise. Desse modo, foram utilizados dados da Pesquisa Nacional por Amostras de Domicílios Contínua (PNADC) referentes às características individuais do chefe de família e do domicílio. A investigação empírica buscou determinar a probabilidade do chefe de família estar em uma situação de pobreza utilizando um modelo probit. Os resultados indicam que famílias chefiadas por homens, por indivíduos com mais anos de estudo e domicílios localizados em áreas urbanas possuem menor probabilidade de estarem em uma situação de pobreza. Por outro lado, domicílios localizados nas regiões Norte e Nordeste, famílias chefiadas por indivíduos negros ou pardos e por indivíduos que laboram em atividades ligadas ao setor agrícola possuem maior probabilidade de estarem em uma situação de pobreza.

**Palavras-chave:** *Privação. Feminização da pobreza. Desenvolvimento regional. Microdados.*  
**Classificação JEL:** *R58; I32.*

## 1 Introduction

Poverty is a phenomenon that occurs in all societies and, as such, there is great interest in understanding it by seeking to identify the determinants that condition individuals to find themselves in such a situation. In some ways, poverty is a more visible phenomenon in poor and developing countries, which therefore results in a large part of the studies in the literature being directed towards regions in such conditions (Rocha, 2006).

The most recent literature has been dealing with understanding poverty based on increasingly disaggregated data, such as microdata from household surveys. In addition to the use of this lower level of aggregation enabling more accurate analyses of the phenomenon in question,

it also enables longitudinal analyses such as accompanying the characteristics of a household in a determined period. In this context, some studies have been conducted with the aim of answering three main questions: Who are the poor? What is the extent of poverty? What are its determinants? (Ataguba, Fonta, & Ichoku, 2011; Biyase & Zwane, 2018; Salardi, 2006).

The identification of who is or is not poor is key and involves various nuances. One such nuance refers to the measurement to be used – whether monetary or one of consumption; whether it should be a one-dimensional or a multidimensional measurement; or even if the poverty line is of an absolute or relative nature. Most of the time, a poverty line is constructed in which the individual is considered poor when their income (one-dimensional, monetary measurement) is lower than a stipulated limit of a determined value. Another possible approach is analyzing whether the individual has a broader set of elements, which, in addition to income, involve minimal conditions of well-being in the household (multidimensional measurement), being below a stipulated limit value (Rocha, 2006; Sen, 1976, 1983).

In relation to the extent of poverty, it is intrinsically linked to the question of identifying who is poor, as the quantity of poor people will vary according to the chosen measurement of poverty. As Civardi and Chiappero Martinetti (2004) explain, the incidence and intensity of poverty are positively related to the degree of inequality of a society. A relative poverty line, for example, considers the individual with income below the mean or median income of the population as poor, this being, therefore, a statistically stipulated limit without qualitative considerations on the concept of poverty.

The identification of determining factors of the condition of poverty is another very important element, as, based on said determinants, it is possible to develop public policies to attenuate or even eradicate this type of situation. On a global level, some empirical studies have identified elements that condition individuals to a situation of poverty. In a study in Mexico, J. Garza-Rodriguez (2004) found evidence that households led by women, households with more members, households located in rural areas, and households in which the head of the households works in the agriculture sector, have a higher probability of being in a situation of poverty. In a study in South Africa, Biyase and Zwane (2018) found evidence that elements such as sex, race, and the sector of work of the head of the household are determinants of poverty among South African families.

The studies on poverty focused on the Brazilian reality have found similar results to those found in the international literature, showing evidence that the gender of the head of the household, the race of the head of the household, the number of members in the household, the sector of occupation, and the level of education of the head of the household are key elements in determining poverty. Households with women and/or black heads of household, households with more members, households that work in rural occupations, and households that have less education, generally have a higher probability of being poor (Barros, Fox, & Mendonça, 1997; Couto & Brito, 2018; De Maria, 2012; Ferreira, Lanjouw, & Neri, 2003).

The present study connects with the literature described above by seeking to establish the determinants of poverty on a household level in Brazil, using observable characteristics of the head of the household as reference. This study differs from the pre-existing literature in Brazil, such as Ribas (2005), as it uses more recent data from sample households from the Pesquisa Nacional por Amostras de Domicílios Contínua (Continuous National Household Sample Survey) (PNADC), which has methodological advances in relation to older household sample surveys. In addition to using updated data, this study also sought to refine the econometric analysis by testing different model specifications. The hope is that this study can contribute to the empirical debate on poverty in Brazil, both in the academic literature and from the point of view of drawing up public policies. The next section presents a non-extensive review of the econometric

literature on the theme.

## 2 Empirical literature review

This section presents some of the main empirical studies on the determinants of poverty on a household level, including several countries besides Brazil, such as Mexico, South Africa, Nigeria, and Kenya.

[Ferreira et al. \(2003\)](#) cross referenced multiple databases from the Pesquisa Nacional por Amostras de Domicílio (PNAD) with the aim of drawing up a profile of poverty in Brazil. These authors used variables referring to the characteristics of the head of the household, such as age, race, gender, and years of study, in addition to variables referring to the household unit, such as size of residence, and availability of piped water and electricity. Moreover, the authors added dummy variables of location to the econometric model, including dummies for the case of households living in a rural/urban area, in an attempt to measure the influence of the location of the household on poverty. From the application of a probit model, they identified evidence that households with more members and children had a higher probability of being poor. Furthermore, the educational factor played an important role in the explanation of poverty, as households in which the head had a higher level of education had a lower probability of being poor.

When studying Brazil, [Ribas \(2005\)](#) found evidence on the determinants of household poverty risk using three years of PNAD data (1992, 1997, and 2002). The authors selected variables related to the household and the head of the household, applying a logit model. The results converged with those found by [Ferreira et al. \(2003\)](#) for Brazil, indicating that households led by young people and women, in addition to households with more members, had a greater risk of being poor. However, the effects were shown to be diffuse, as for older individuals there was a reduced risk of being poor, even when controlled for such characteristics.

[J. Garza-Rodriguez \(2004\)](#) used microdata from the National Survey of Incomes and Expenditures of Households to examine the determinants of poverty in Mexico. As such, 16 variables were selected in reference to the head of the household, such as sex, race, age, family size, and literacy. The author applied a logit model and found evidence that households led by women, households located in rural areas, as well as households in which the head was working in the agriculture sector, had a higher probability of being poor. On the other hand, households in which the head had a higher level of education, was older, or was the proprietor of a small business had a lower probability of being poor.

In Kenya, [Geda, de Jong, Kimenyi, and Mwabu \(2005\)](#) used microdata from the Welfare Monitoring Survey with the aim of investigating the determinants of poverty on a household level, using 10 variables related to the habitational conditions and the household, such as employment status, age, gender, education level, and family size. Based on the application of a logit model, the authors found evidence that households led by men and households located in urban areas had a lower probability of being poor. In contrast, heads of household working in activities connected to the agriculture sector had a higher probability of being poor when compared to households with heads that worked in sectors connected to manufacturing.

In Nigeria, [Ataguba et al. \(2011\)](#) used a multidimensional approach to explore factors associated with deprivation and poverty in Nsukka. Using a probit approach, the analysis used 23 variables such as per capita consumption expenditure, living conditions of the household, and characteristics related to the head of the household, such as education and health. In this study, the measurement of poverty differs from those previously presented in this section as it

uses consumption rather than income. However, the results converged with those of [J. Garza-Rodriguez \(2004\)](#) and [Geda et al. \(2005\)](#), showing evidence that heads of household with lower levels of education, that were unemployed, or in poor health, and households with a larger number of members, and households located in rural areas were associated with a higher probability of poverty in the household.

[Biyase and Zwane \(2018\)](#), in a study applied to South Africa, investigated the determinants of poverty and household welfare. To do so, the authors used microdata from the National Income Dynamic Study, selecting 30 variables such as poverty incidence, income per capita, dependency ratio, age, levels of education, and the gender of the head of the household. A probit empirical model was used. The authors found similar evidence to the previously cited studies in this section, demonstrating that single heads of household, households led by women, heads of household with lower levels of education, in addition to black heads of household were factors that increased the probability of the household being poor.

In the studies presented in this section, it can be noted that two categories are used in the analysis of poverty; individual characteristics related to the head of the household (gender, race, employment sector, etc.) and household characteristics (location, number of members, etc.). Among these elements, certain characteristics should be highlighted, such as the gender and race of the head of the household, their sector of employment, and their level of education. In the case of household characteristics, being located in a rural or urban area is an important factor in several of the cited studies. Considering this non-extensive review of the empirical literature on the theme, the variables mentioned herein shall be incorporated into the empirical analysis of the determinants of household poverty in this article. The section below presents the methodological aspects of the study and the database.

## **3 Methodology**

### **3.1 Geographical area of interest**

The geographical area for this study is Brazil, which, despite being a developing country, is characterized by high levels of extremely persistent poverty and inequality. The country has a Federal District, which is Brasília — the capital — and 5,570 municipalities, distributed across 26 states, with a population of 190,755,799 people, according to data from the last Demographic Census of 2010 ([IBGE, 2011](#)). The population estimate for 2021 was 213,317,639 people, according to the Instituto Brasileiro de Geografia e Estatística (Brazilian Institute of Geography and Statistics) (IBGE). For 2020, [The World Bank \(2022\)](#) estimated that 4.6% of the entire Brazilian population was below the poverty line of an income of US\$1.25 per day in purchasing power parity (PPP).

### **3.2 Data source and variable selection**

The data used in this study are the microdata of the PNAD Contínua, which are available from IBGE. The PNAD Contínua is produced quarterly using around 211,000 households, covering approximately 16,000 census sectors — representing 5% of all the census sectors in the Demographic Census of 2010. The sample consists of a conglomeration in two selection stages, with stratification of the primary sample units ([IBGE, 2017](#)). This study uses the microdata from the PNAD Contínua on an annual level for 2019, in which sample expansion factors (sample weights) are annualized.

A total of 10 variables were selected based on the literature cited in section 2. The variables were divided into two categories: individual characteristics of the head of the household and characteristics related to the household. Table 1 summarizes the set of variables of the empirical model.

Table 1: Variables of the empirical model

Variable	Description	Type
Dependent variable		
poor	If household head is poor, the variable is 1; otherwise, is 0.	Discrete
Explanatory variables		
Household head characteristics		
gender	If the household head is men, the variable is 1; otherwise, is 0.	Discrete
age	Represents the age of household head.	Continuous
race	If the household head is black or mixed-race, the variable is 1; otherwise, is 0.	Discrete
educ	Represents the years of study of household head.	Continuous
literate	If the household head know to read and write, the variable is 1; otherwise, is 0.	Discrete
hsize	Number of members of household.	Continuous
agric	If the household head works in agricultural sector, the variable is 1; otherwise, is 0.	Discrete
Household characteristics		
urban	If the household locate in a urban area, the variable is 1; otherwise, is 0.	Discrete
region	If the household locate in North or Northreast regions, the variable is 1; otherwise, is 0.	Discrete

Source: Prepared by the authors.

The variable on which poverty lines are constructed is the household income per capita. According to the dictionary of variables of the PNAD Contínua of IBGE, this variable is composed of the habitual monthly income from all work and from other sources, excluding the income of people in the household who are pensioners, domestic workers (as housekeepers, for example), or relatives of the domestic employee working in the household.

Thus, two poverty lines were defined as dependent variables based on household income per capita: in the first, heads of households with a household income per capita of less than half the 2019 nominal minimum wage were considered poor; in the second poverty line, heads of households with a household income per capita less than the mean household income per capita of the country in the year in question were considered poor.

Currently, Brazil uses various poverty lines as a parameter for the concession of welfare benefits. The now-defunct Bolsa Família (Family Allowance) (PBF) used an income cut-off of R\$77.00 (seventy-seven Brazilian Reals) per month for the concession of the benefit. The Benefício de Prestação Continuada (Continuous Cash Benefit) (BPC), in turn, uses the cut-off of 1/4 of the minimum wage for the concession of benefits. Auxílio Emergencial (Emergency Assistance) (AE), implemented in 2020, used a cut-off for the concession of benefits of 1/2 of the minimum wage. Studies such as those [De Maria \(2012\)](#) and [Couto and Brito \(2018\)](#) adopted 1/4 of the minimum wage as the poverty line, which was the line used at the time for the concession of PBF. Other studies, such as those of [Biyase and Zwane \(2018\)](#) and [Garza-Rodriguez et al. \(2021\)](#), used household income per capita received by the heads of households as the poverty line. Thus, in this study, in nominal terms, the first line corresponds to R\$499 and the second line to R\$1,364.46.

### 3.3 Econometric model

We used a probit model to identify the determinants of poverty in Brazilian households. According to [Cameron and Trivedi \(2005\)](#), when a response variable is qualitative, applying a binary response model is recommended. In the context of analyzing the determinants of poverty, considering the use of poverty lines as a binary variable, probit is a widely used model. The response variable in the article is a Bernoulli-type variable, which can take two distinct values: 1, if the head of the household is poor; or 0 if the head of the household is not poor. The associated probabilities are as follows:

$$Y_i = \begin{cases} 1, & \text{if the household head is poor, with probability } p_i \\ 0, & \text{if the household head is not poor, with probability } 1 - p_i \end{cases} \quad (1)$$

Having modelled the nature of the response variable, the probit model can then be specified as follows:

$$P(Y = 1 | X_1, X_2, \dots, X_k) = \Phi(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k) \quad (2)$$

Where:  $P(Y = 1 | X_1, X_2, \dots, X_k)$  is the probability of the individual  $i$  being poor given  $k$  explanatory variables;  $\beta_0$  is the constant coefficient of the model;  $\beta_1, \beta_2, \dots, \beta_k$  are the  $k$  parameters of the model;  $X_1, X_2, \dots, X_k$  are the  $k$  explanatory variables, and  $\Phi$  is the function of the standard normal accumulated distribution, which is defined as follows:

$$\Phi(z) \equiv \int_{-\infty}^{\infty} \phi(v) dv \quad (3)$$

The main purpose when estimating binary response models is to explain the effects of explanatory variables  $X_1, X_2, \dots, X_k$  on the probability of the response variable  $P(y = 1 | X_1, X_2, \dots, X_k)$ . Therefore, the marginal effects are obtained through numerical bootstrapping.

Given Equation 2, if  $x_j$  is a continuous random variable, the marginal effects on  $(x) = P(Y = 1 | x)$  are obtained as follows:

$$\frac{\partial G(\cdot)}{\partial x_i} = g(\cdot) \beta_i \quad (4)$$

In which:  $g(\cdot)$  is a probability density function which, in the case of the probit model, follows a normal distribution.

Given Equation 2, if  $x_j$  is a discrete random variable, the marginal effects are obtained as follows:

$$G(\hat{\beta}_0 + \hat{\beta}_1) - G(\hat{\beta}_0) \quad (5)$$

Thus, each individual  $i$  of the sample will have a marginal effect. To find a mean of the marginal effects of the sample, which is the metric of interest, it is sufficient to find the expected value of the probability of the response variable in relation to the explanatory variables:

$$E(\partial Pr / \partial x_j) \quad (6)$$

Which, by analogy, can be described as:

$$1/N \sum_{i=1}^N g_i \beta_j \quad (7)$$

To identify the determinants of poverty in Brazilian households, we applied the following probit model:

$$P(\text{poor} = 1 | \text{gender}, \text{age}, \text{race}, \text{educ}, \text{literate}, \text{hsize}, \text{agric}, \text{urban}, \text{region}) = \Phi(\beta_0 + \beta_1 \text{gender} + \beta_2 \text{age} + \beta_3 \text{race} + \beta_4 \text{educ} + \beta_5 \text{literate} + \beta_6 \text{hsize} + \beta_7 \text{agric} + \beta_8 \text{urban} + \beta_9 \text{region}) \quad (8)$$

In which: *poor* is the poverty line,  $\beta_0$  is the constant of the model, *gender* is the sex of the head of the household, *age* is the age of the head of the household, *race* is a binary variable that indicates if the head of the household is black or mixed-race if it is equal to one, *educ* is the years of formal education of the head of the household, *literate* is a binary variable that indicates if the head of the household can read or write, *hsize* is the number of persons living in the household, *agric* is binary variable indicating if the head of the household works in the agriculture sector or not, *urban* is a binary variable indicating if the household is located in an urban area or not, *region* is a binary variable that indicates if the household is located in the North or Northeast of Brazil,  $\beta_1, \beta_2, \dots, \beta_9$  are the parameters to be estimated, and  $\Phi$  is the standard normal cumulative distribution function.

In the next section, we present the results of the econometric analysis. We also explore a series of descriptive statistics we consider relevant to our research.

## 4 Results

### 4.1 Descriptive statistics

In Table 2 we present the descriptive statistics of the main variables used in the empirical model estimation. To do so, we incorporate a procedure that allows us to expand our sample. In the so-called complex surveys, each individual represents a number of individuals in the population as a whole, according to their sample weights or survey weights. Using these sample weights it is possible to estimate many relevant statistics about the population by using the survey sample expansion. In the microdata from the PNAD Contínua, to expand the sample, we use a ratio estimation sampling procedure in which the independent variable is the total population geographically distributed among the 77 original geographical units of the survey. Using this information and using a computational procedure we were able to expand the original survey sample of about 110 hundred households to a new sample of 70 million households.

Back to the data, the household income per capita of the heads of household is higher than the mean Brazilian household income per capita in 2019. On the other hand, it can be observed that this income is extremely heterogenous given that the standard deviation was 65.6% higher than the mean income of heads of household. The sample is mostly composed of mixed-race heads of household, followed by white, black, Asian, and indigenous. Of all the households present in the expanded sample, 61.3 million are located in urban areas and 9.2 million in rural areas, totaling 70.65 million permanent private households.

Figure 1 shows the spatial distribution of household income per capita of the head of the household among the Federal Units (UF) of Brazil, excluding the Federal District, which is usually removed from this type of analysis for having an extremely high household income due to the number of civil servants residing in the federal capital. Figure 1 indicates high heterogeneity between the Brazilian states in the income distribution of heads of households.

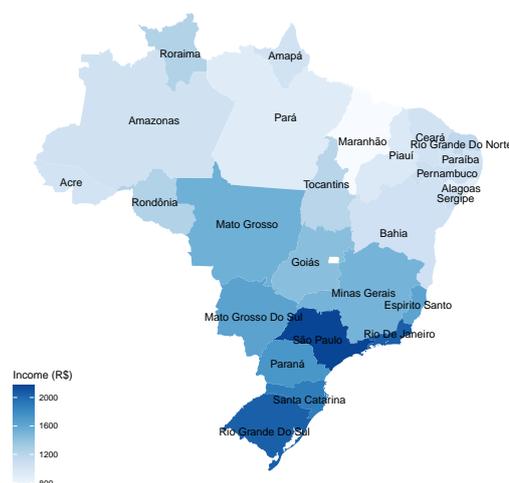
Table 2: Descriptive statistics of the Pesquisa Nacional por Amostras de Domicílios (PNAD) Contínua, selected variables, Brazil, 2019

Variable	Mean	Standard deviation	Standard error (SE)
Nominal household income per capita	1,617.75	2,678.78	22.89
Age	48.10	16.13	0.08
Years of study	9.36	4.75	0.03
Race of head of household			
Mixed-race	32,671,085.12		223,822.71
White	30,979,124.38		240,366.14
Black	7,851,557.56		108,581.94
Asian	582,067.60		33,726.66
Indigenous	301,266.87		15,847.54
<i>Missing values</i>	9,626.43		3,529.40
Household location			
Rural area	9,266.75		97,948.38
Urban area	61,379.02		365,021.37
Sample with household head only (in millions)	70.65		0.38
Total sample (with projection, in millions)	209.50		1.26

Source: Prepared by the authors based on microdata from the PNAD Contínua (2019).

States in the North and Northeast regions have the lowest level of head of household income. Among the states in the South, Southeast, and Central-West, São Paulo and Rio de Janeiro stand out as those in which the head of the household has the highest level of income.

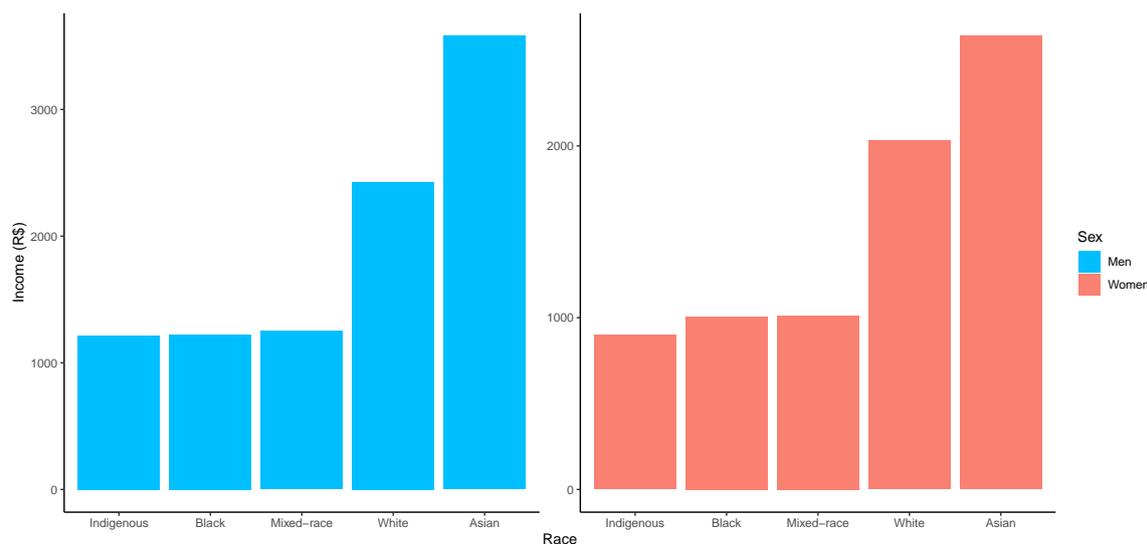
Figure 1: Spatial distribution of household income per capita of the head of the household among the Federal Units (UF) of Brazil in 2019



Source: Prepared by the authors based on microdata from the PNAD Contínua.

In addition to the regional heterogeneity shown on the map, income distribution among the heads of household is also unequal when broken down by race and gender, as in Figure 2. Based on this figure, it can be observed that Asian or white heads of household have higher levels of income compared to black, mixed race, and indigenous heads of household, who have lower incomes. Regarding the gender of the head of the household, women show a lower level of income in comparison to male heads, which occurs in all the race strata.

Figure 2: Distribution of mean household income per capita of the head of the household by sex and race, Brazil, in 2019



Source: Prepared by the authors based on microdata from the PNAD Contínua.

## 4.2 Determinants of household poverty in Brazil

In the first econometric specification, the head of the household with a household income per capita below R\$ 499 was considered poor; in the second specification, the poverty threshold was R\$1,364.46. The maximum pseudolikelihood (MPL) approach was used for the estimation of both econometric models. Table 3 presents the Wald Test of statistical significance for the two econometric exercises. The Wald Test indicated that the estimated parameters of both models,  $\beta$ , are statistically significant and statistically different from zero.

Table 3: Wald Test of statistical significance of the estimated parameters

Models	F-Statistic	degrees of freedom	ddf	p-value
Model 1	960,73	10	11468	2.22e-16
Model 2	1190,97	10	11468	2.22e-16

Source: Prepared by the authors.

Table 4 presents the estimated parameters of the two econometric models. Due to the missing values, which are very common in household surveys, the sample consists of 87,793 observations. Both estimations incorporated robust standard errors with the aim of correcting a

possible heteroscedasticity problem. The Cox-Snell pseudo  $R^2$  coefficient for the first model was 0.246 and in the second model it was 0.322, demonstrating reasonable fit of the models to the data.

In the first model, all the variables were statistically significant at 1% and presented the expected signal. In the second model, the variable that identifies if the head of the household works in an occupation connected to the agriculture sector was not statistically significant. This may have occurred because the poverty line used in the second estimation is 173.4% higher than the poverty line in the first model. Therefore, working in an activity connected to the agriculture sector may present an effect for individuals when the poverty threshold is less excluding.

Table 4: Estimated parameters of poverty of the two econometric exercises – poverty lines: 50% of the minimum wage (MW) (1) and the mean household income per capita (2), Brazil, 2019

	<i>Dependent variable:</i>	
	lin_pob_sm (1)	lin_pob_rdpc (2)
gender	-0.290*** (0.016)	-0.344*** (0.015)
age	-0.030*** (0.001)	-0.030*** (0.001)
race	0.213*** (0.017)	0.309*** (0.014)
educ	-0.118*** (0.002)	-0.168*** (0.003)
literate	0.132*** (0.032)	0.367*** (0.049)
urban	-0.354*** (0.021)	-0.226*** (0.025)
hsize	0.301*** (0.006)	0.337*** (0.006)
agric	0.227*** (0.024)	0.032 (0.027)
region	0.719*** (0.017)	0.564*** (0.017)
Constant	0.375*** (0.056)	2.153*** (0.065)
Pseudo $R^2$ Cox-Snell	0.246	0.323
Observations	87,793	87,793

*Note:* \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

Source: Prepared by the authors.

### 4.3 Marginal effects on the probability of poverty

Table 5 presents the average marginal effects of the determinants of household poverty for the estimation that uses the cut-off of 50% of the MW as the poverty line. It can be observed that if the household is located in the North or Northeast, the probability of the household being poor increases 13%, on average. Larger households have a higher probability of being poor, with the inclusion of an extra member in the household increasing the probability of being poor by an average of 6%. Households in which the head of the household's work is connected to the agriculture sector, or the head of the household is black or mixed race, have a 4% increase in the probability of being poor compared to their counterparts. The head of the household not knowing how to read or write also increases the probability of the household being poor by an average of 2%.

In effect, an extra year on the age of the head of the household means the household's probability of being poor is reduced by 1%, compared to households led by younger individuals. An extra year of study in the education of the head of the household means the household's probability of being poor is reduced by an average of 2%. The gender of the head of the household also has an impact on the probability of the household being at or below the poverty line, with households led by men having their probability of being poor reduced by 5%, on average. Finally, households located in urban areas have their probability of being poor reduced by 6% when compared to households located in rural areas.

Table 5: Average marginal effects of the determinants of household poverty in Brazil – poverty line: 50% of the minimum wage, 2019

term	estimate	std.error	statistic	p.value
region	0.13	0.00	47.77	0.00
hsize	0.06	0.00	51.79	0.00
agric	0.04	0.00	9.65	0.00
race	0.04	0.00	12.28	0.00
literate	0.02	0.01	4.07	0.00
age	-0.01	0.00	-44.16	0.00
educ	-0.02	0.00	-54.14	0.00
gender	-0.05	0.00	-17.79	0.00
urban	-0.06	0.00	-17.51	0.00

Source: Prepared by the authors.

Table 6 presents the average marginal effects of the determinants of household poverty for the estimation that uses the mean household income per capita as the poverty line. The magnitude of all the estimated parameters of the marginal effects had a significant increase, with the exception of the sector of employment of the head of the household, which was not statistically significant. Here again, if the household is located in the North or Northeast, the probability of the household being poor increases 15%. Households in which the head of the household does not know how to read or write have a 10% higher probability of being poor. Larger households, in turn, have a higher probability of being poor when compared to smaller households, with the inclusion of an extra member in the household increasing the probability of being poor by 9%. Finally, households in which the head of the household is black or mixed race have a 4% higher probability of being poor.

Table 6: Average marginal effects of the determinants of household poverty in Brazil – poverty line: mean household income per capita, 2019

term	estimate	std.error	statistic	p.value
region	0.15	0.00	33.65	0.00
literate	0.10	0.01	7.58	0.00
hsize	0.09	0.00	57.98	0.00
race	0.08	0.00	21.99	0.00
agric	0.01	0.01	1.21	0.23
age	-0.01	0.00	-51.94	0.00
educ	-0.04	0.00	-82.75	0.00
urban	-0.06	0.01	-9.17	0.00
gender	-0.09	0.00	-23.71	0.00

Source: Prepared by the authors.

Upon analyzing the characteristics that reduce the probability of the household being poor, it can be observed that the gender of the head of the household is the main element in the determination of poverty. In households with a male head of household, the probability of the household being poor is reduced by 9%. Regarding the location of the household, residing in urban areas reduces the probability of poverty by 6%. Education also plays an important role in the determination of poverty, with an extra year of study in the education of the head of the household reducing the probability of being poor by an average of 4%. On the other hand, an extra year on the age of the head of the household reduces the probability of the household being poor by 1%, compared to households with younger heads of household.

Thus, when the poverty line of household income per capita is used, the variables related to household location, education, and sex are those that most effect the magnitude of the estimated parameter. This may be related to inequality in the incomes of the household heads when broken down for such characteristics. In Figure 1, it was observed that the states of the North and Northeast regions are those that have the lowest level of income. Therefore, a poverty line with a higher cut-off means there are many more poor households in these regions compared to the other regions, which consequently affects the magnitude of these parameters.

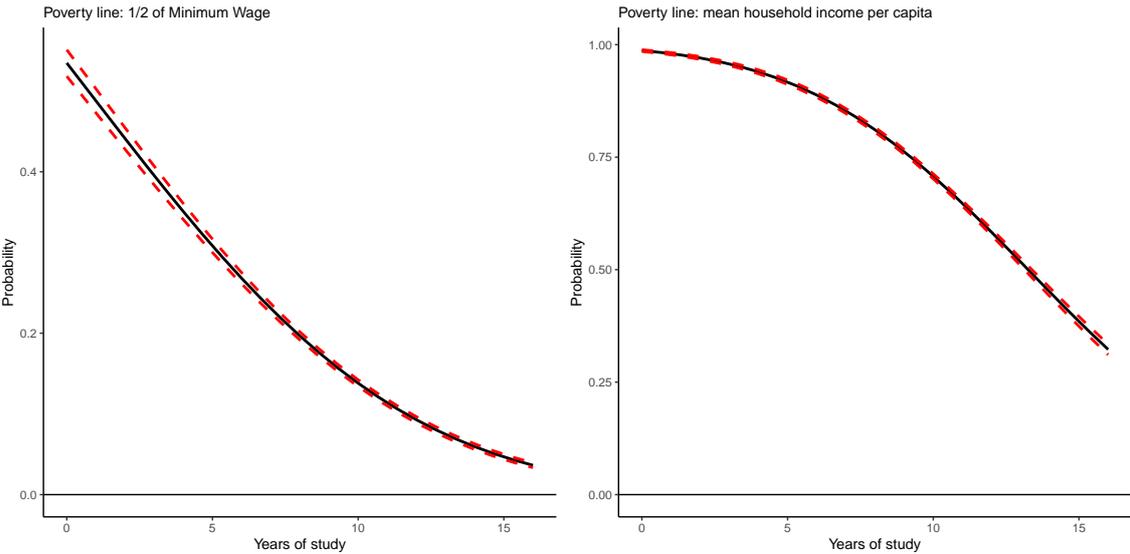
It was observed that race was not the main determinant of poverty at the household level. Households in which the head is black or mixed race do in fact have a higher probability of being poor; however, the magnitude of the marginal effect in this case is lower than the other characteristics – whether individual or of the household. In both of the estimated models, the characteristic with the most relevant marginal effect on the increased probability of poverty refers to the location of the household. In contrast, the most relevant characteristic in the reduction of the probability of the household being poor was the head of the household being male – a characteristic verified in both estimations. This result is similar to the results found by [Barros et al. \(1997\)](#), reinforcing the idea that, in Brazil, poverty tends to occur with greater intensity in households led by women.

#### 4.4 Estimated probabilities of household poverty

Figure 3 presents the estimated probabilities of the household being poor according to the years of study of the head of the household for the two econometric models. Thus, it can be observed

that the probability of poverty decreases as the education of the head of the household increases. However, this relationship is distinct in the different estimations, as when the poverty line is half of the MW, the probability of poverty decreases almost linearly. When the poverty line of mean household income per capita is used, however, the impact of the years of study on the decrease in the probability of poverty occurs much more incisively for a determined level of education, which in this case is 7 years of study.

Figure 3: Estimated probabilities of the household being poor according to the years of study of the head of the household, Brazil, 2019



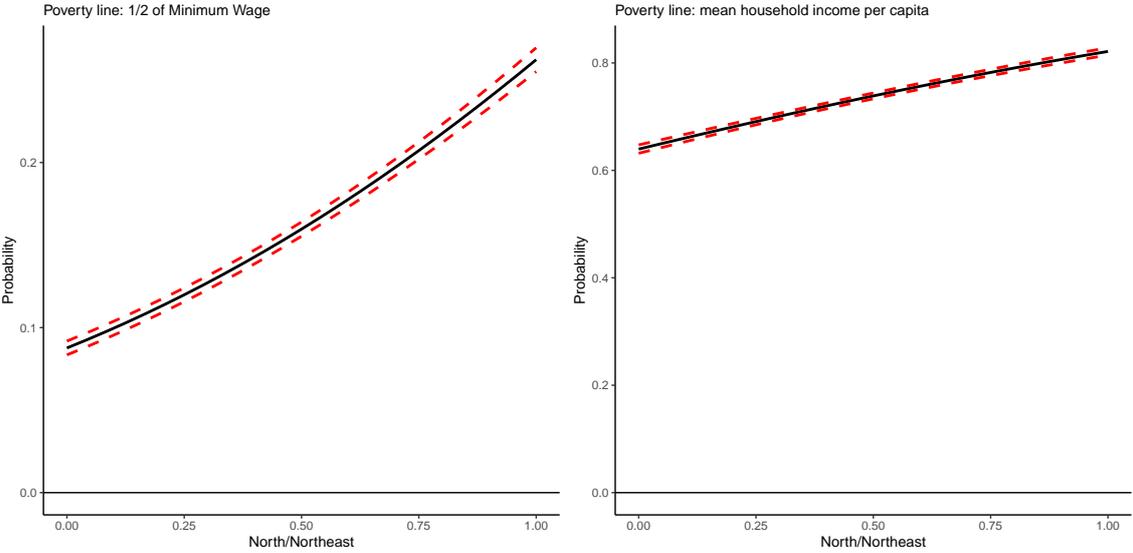
Source: Prepared by the authors.

Furthermore, it can be noted that the poverty line used influences the magnitude of the estimated probabilities. In effect, education is an element that increases the human capital level of the head of the household, and, therefore, productivity and income, which is also observed in the literature [see, for example, [Garza-Rodriguez et al. \(2021\)](#)]. Thus, it was expected that the probability of the household being poor would be inversely related to this characteristic. This relationship tends to be stronger for poverty lines with a higher income limit value since more educated individuals have a higher level of income.

Figure 4 presents the estimated probabilities of the household being poor according to household location. It can be observed that the probability of the household being poor increases substantially when the household is located in the North or Northeast region. Similar to what was observed for the years of study variable, a higher poverty threshold influences the magnitude of the estimated probabilities. In household location, specifically, this is related to the fact that these regions have a lower level of income, a lower level of education, and greater inequality, thereby reflecting in the determination of poverty.

Figure 5 presents the estimated probabilities of the household being poor according to number of members. Here it can be verified that households that have a higher number of members have a higher probability of being poor when compared to their counterparts. Once again, the magnitude of the probabilities is affected by the poverty line with the higher income cut-off. In this case, for larger households, the probability of being in a situation of poverty is much more intense for the poverty line with a higher income limit value. As stated by [Garza-Rodriguez et](#)

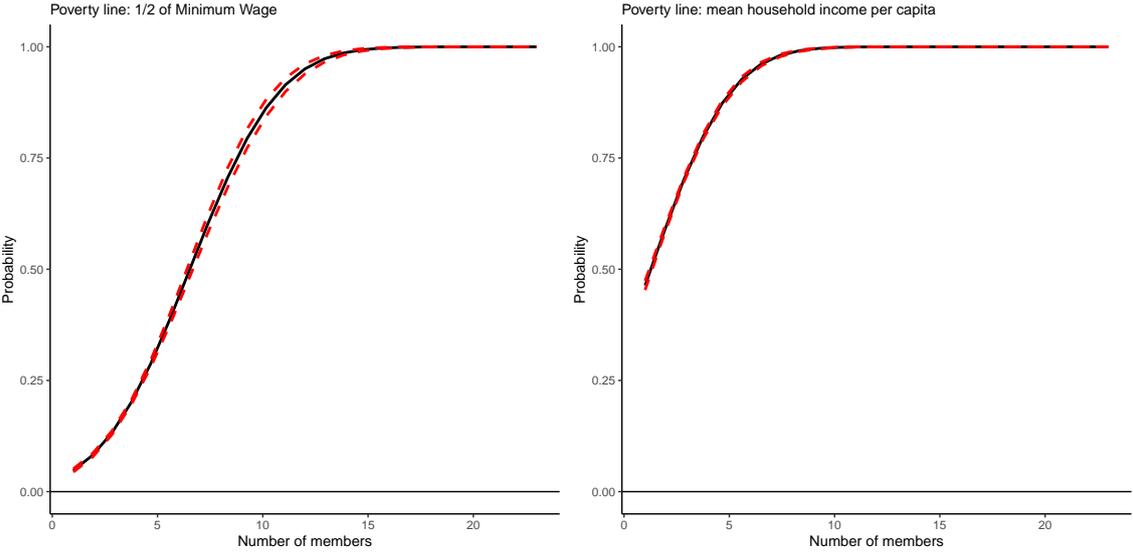
Figure 4: Estimated probabilities of the household being poor according to household location (North and Northeast regions), Brazil, 2019



Source: Prepared by the authors.

al. (2021), this phenomenon is much more profuse in countries that have a poor social security system and a low level of savings, which increases the fertility rate. Larger households have a higher rate of dependency and, therefore, poverty.

Figure 5: Estimated probabilities of the household being poor according to number of members, Brazil, 2019

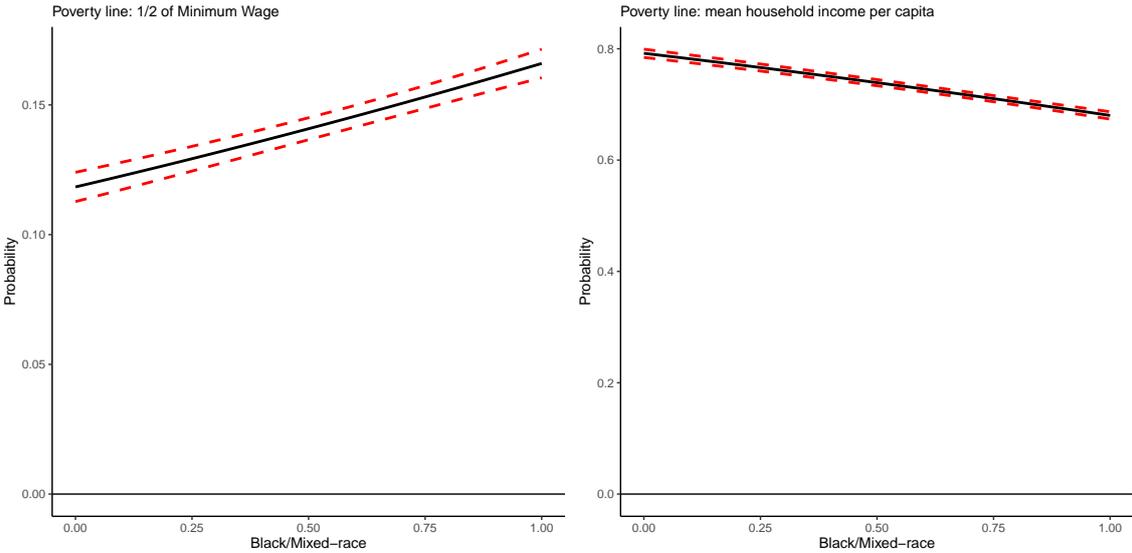


Source: Prepared by the authors.

Figure 6 presents the estimated probabilities of the household being poor according to the

race of the head of the household. It can be seen that households led by black or mixed-race people have a higher probability of being poor. Ribas (2005), using PNAD microdata from three different years, found similar results to those of the present study, whereby black heads of household have a higher probability of being poor. This once again reinforces that black individuals have a lower income when compared to white and Asian individuals in Brazil. Moreover, there is also under-representation in the labor market, whereby blacks have greater difficulty entering the formal job market.

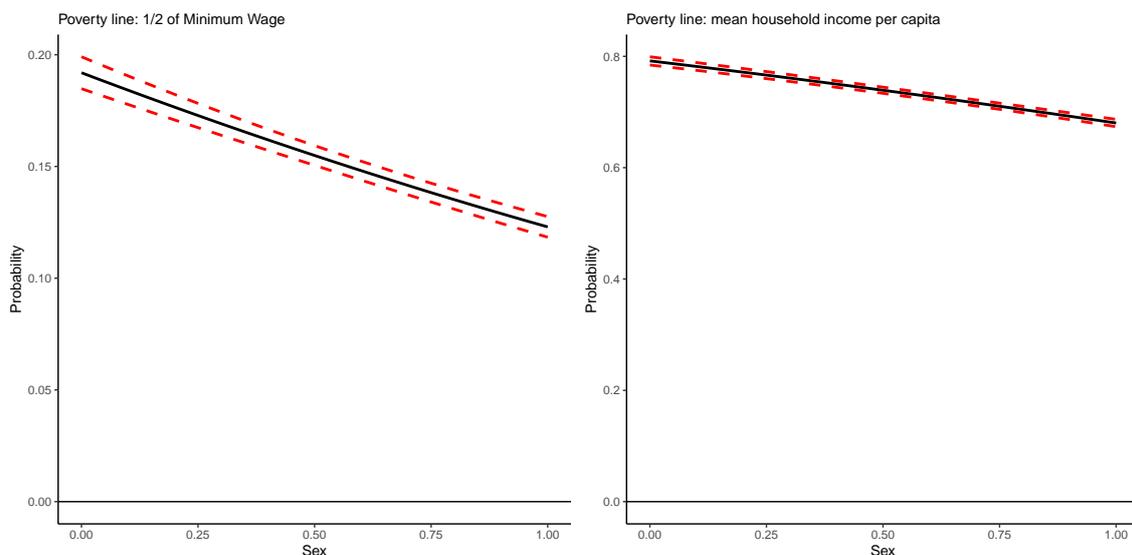
Figure 6: Estimated probabilities of the household being poor according to whether the household head is black or mixed race. Brazil, 2019



Source: Prepared by the authors.

Figure 7 presents the estimated probabilities of the household being poor according to the sex of the head of the household. It can be seen that households led by men have a lower probability of being poor when compared to households led by women. This phenomenon, known as the “feminization of poverty”, occurs through aspects related to the labor market – the discrimination to which women are more exposed, access to opportunities, education, and remuneration (Biyase & Zwane, 2018; Couto & Brito, 2018).

Figure 7: Estimated probabilities of the household being poor according to the sex of the head of the household, Brazil, 2019



Source: Prepared by the authors.

The PNAD Contínua microdata reveal an extremely worrisome reality for the country, and, above all, for a large portion of the population, given the greater vulnerability that women and black people have to being poor in relation to their counterparts. This vulnerability is often connected to the lack of access to opportunities: access to the job market, access to education, and the very discrimination that remains so present in society. The analysis shows that this is a structural problem, whereby female heads of household have a lower level of income than men at all levels of education, the difference being greater for higher education and post-graduate level.

## 5 Conclusion

This study aimed to identify the determinants of poverty in Brazil, capturing the possible effects of regional heterogeneities, by using two different poverty lines (R\$499 and R\$1,364.46). As such, it was ascertained that the limit value of the poverty line influences the magnitude of the parameters of the determinants of poverty.

Of the nine variables used in the empirical model, four demonstrated as being associated with a reduction in the probability of the household being poor, these being a male head of household, an older head of household, a more educated head of household, and households located in urban areas. On the other hand, households in the North and Northeast regions, heads of household that did not how to read and write, black or mixed-race heads of household, households with a higher number of members, and heads of household that worked in agriculture are elements associated with an increase in the probability of the household being poor.

The results of the present study corroborate the main findings in the literature, such as the presence of the phenomenon known as the “feminization of poverty” – in which households led by women have a higher probability of being poor. On the other hand, households in which the head is black or mixed race also have a higher probability of being poor. This reality, in turn,

is extremely delicate since the Brazilian population is mostly composed of individuals in these racial groups.

The methodological choice of the present study was to use two poverty lines that are standard among the Brazilian regions. Future research on poverty should attempt, among other things, to capture the effects of different poverty lines by region, since the cost of living varies by location.

## References

- Ataguba, J. E., Fonta, W. M., & Ichoku, H. E. (2011, September). *The determinants of multidimensional poverty in nsukka, nigeria* (PEP PMMA Working Paper). Partnership for Economic Policy (PEP). Retrieved from [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1937721](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1937721)
- Barros, R., Fox, L., & Mendonça, R. (1997). Female-headed households, poverty, and the welfare of children in urban brazil. *Economic Development and Cultural Change*, 45(2), 231–257. Retrieved from <http://www.jstor.org/stable/1154534>
- Biyase, M., & Zwane, T. (2018, January-M). An Empirical Analysis Of The Determinants Of Poverty And Household Welfare In South Africa. *Journal of Developing Areas*, 52(1), 115-130. Retrieved from <https://ideas.repec.org/a/jda/journal/vol.52year2018issue1pp115-130.html>
- Cameron, A. C., & Trivedi, P. K. (2005). *Microeconometrics: methods and applications*. Cambridge University Press.
- Civardi, M., & Chiappero Martinetti, E. (2004, 11). Poverty between and within groups: a reformulation of the fgt class of index. *publisher=Università degli Studi di Pavia, Dipartimento di Economia Pubblica e . . . .* Retrieved from <http://www-3.unipv.it/webdept/q3-2004.pdf>
- Couto, A. C. L., & Brito, E. C. (2018). Determinantes da probabilidade de pobreza no paran : 2004 e 2015. *A Economia em Revista-AERE*, 26(1), 89–101.
- De Maria, P. F. (2012, nov.). *Determinantes da pobreza no brasil: estudo com regress es logit* (Tech. Rep.). Unicamp. Retrieved from [http://vigo.ime.unicamp.br/Projeto/2012-2/ms777/ms777\\_Pier.pdf](http://vigo.ime.unicamp.br/Projeto/2012-2/ms777/ms777_Pier.pdf)
- Ferreira, F. H., Lanjouw, P., & Neri, M. (2003). A robust poverty profile for brazil using multiple data sources. *Revista Brasileira de Economia*, 57, 59–92.
- Garza-Rodriguez, Jorge, Ayala-Diaz, G., Coronado-Saucedo, G., Garza-Garza, E., & Ovando-Martinez, O. (2021). Determinants of poverty in mexico: A quantile regression analysis. *Economies*, 9(2), 60.
- Garza-Rodriguez, J. (2004). *The determinants of poverty in mexico: 2002* (MPRA Paper No. 65995). University Library of Munich, Germany. Retrieved from <https://ideas.repec.org/p/prapa/mprapa/65995.html>
- Geda, A., de Jong, N., Kimenyi, S. M., & Mwabu, G. (2005). *Determinants of poverty in kenya: a household level analysis* (Tech. Rep.). University of Connecticut. Retrieved from [https://opencommons.uconn.edu/econ\\_wpapers/200544](https://opencommons.uconn.edu/econ_wpapers/200544)
- IBGE. (2011). *Censo demogr fico—2010: caracter sticas da popula o e dos domic lios* (Tech. Rep.). Rio de Janeiro: INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTAT STICA IBGE.
- IBGE. (2017). Pesquisa nacional por amostra de domic lios cont nuas notas t cnicas. *Diretoria de Pesquisas, 1.4*. Retrieved from <https://biblioteca.ibge.gov.br/>

[visualizacao/livros/liv101435.pdf](#)

Ribas, R. P. (2005). *Determinantes do risco de pobreza urbana no brasil durante a década de 90* (Tech. Rep. No. 266). Minas Gerais: UFMG/Cedeplar.

Rocha, S. (2006). *Pobreza: afinal do que se trata?* (Vol. 3). Editora FGV.

Salardi, P. (2006). *Brazilian poverty between and within groups: Decomposition by geographical, group-specific poverty lines* (PRUS Working Papers No. 1509). Bocconi University. Retrieved from [https://mpra.ub.uni-muenchen.de/1509/1/MPRA\\_paper\\_1509.pdf](https://mpra.ub.uni-muenchen.de/1509/1/MPRA_paper_1509.pdf)

Sen, A. (1976). Poverty: An ordinal approach to measurement. *Econometrica*, 44(2), 219–231. Retrieved from <http://www.jstor.org/stable/1912718>

Sen, A. (1983). Poor, relatively speaking. *Oxford Economic Papers*, 35(2), 153–169. Retrieved from <http://www.jstor.org/stable/2662642>

The World Bank. (2022). *World development indicators database*. (data retrieved from World Development Indicators, <https://databank.worldbank.org/embed/CountryProfile/id/b450fd57/wd/0/ht/0/tbar/y/dd/y>)