VICTOR LUCAS TAVEIRA MENDES REBELO

CHILD LABOR AND POVERTY: A MULTIDIMENSIONAL APPROACH

Dissertation submitted to the Applied Economics Graduate Program of the Universidade Federal de Viçosa in partial fulfillment of the requirements for the degree of *Magister Scientiae*.

Adviser: Lorena Vieira Costa Lelis

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ABSTRACT

REBELO, Victor Lucas Taveira Mendes, M.Sc., Universidade Federal de Viçosa, April, 2021. **Child Labor and Poverty: A Multidimensional Approach**. Adviser: Lorena Vieira Costa Lelis.

The present study aimed to analyze whether the multiple dimensions of household poverty can be related to the occurrence of child labor in Brazilian children aged 5 to 15 years. The economic literature provides a wide range of empirical and theoretical evidence regarding the influence of poverty on child labor. However, it is believed that there are intrinsic factors related to poverty that can also significantly explain the decision on the supply of child labor, such as high household density, lack of access to electricity, sewerage, treated water and durable goods like stove, refrigerator, television and microcomputer. In this work, we sought to incorporate the element of multidimensionality of poverty, through dimensions of household poverty in order to analyze how these deprivations are related to the likelihood of a child working or not. Based on data from the National Household Sample Survey (PNAD) 2015, estimations were made via probit and linear probability model. The results obtained here reinforce the importance of combating child labor through poverty reduction, showing that a child free from all multiple deprivations is seven times less likely to be subjected to child labor than a child in the worst stratum.

Keywords: Child Labor. Multidimensional Poverty. Probit. Multiple Deprivations.

RESUMO

REBELO, Victor Lucas Taveira Mendes, M.Sc., Universidade Federal de Viçosa, abril de 2021. **Trabalho Infantil e Pobreza: Uma abordagem multidimensional**. Orientadora: Lorena Vieira Costa Lelis.

O presente trabalho teve como objetivo analisar se as múltiplas dimensões da pobreza domiciliar podem afetar a ocorrência de trabalho infantil em crianças brasileiras de 5 a 15 anos. A literatura econômica fornece uma ampla gama de evidências empíricas e teóricas a respeito da influência da pobreza sobre o trabalho infantil. Entretanto, acredita-se que há fatores intrínsecos à pobreza que podem também explicar significativamente a decisão sobre a oferta de mão de obra da criança, como a alta densidade domiciliar, a falta de acesso à energia elétrica, rede de esgoto, água tratada e bens duráveis básicos como fogão, geladeira, televisão e microcomputador. Neste trabalho, buscou-se então incorporar o elemento da multidimensionalidade da pobreza, por meio de dimensões de pobreza domiciliar a fim de analisar como estas privações se relacionam com a probabilidade de uma criança trabalhar ou não. A partir dos dados da Pesquisa Nacional por Amostra de Domicílios (PNAD) 2015, realizaram-se estimações via *probit* e modelo de probabilidade linear. Os resultados aqui obtidos reforçam a importância de combater o trabalho infantil por meio da redução da pobreza, mostrando que uma criança livre de todas as privações múltiplas apresenta uma probabilidade de ser submetida a trabalho infantil sete vezes menor do que uma criança no pior estrato.

Palavras-chave: Trabalho infantil. Pobreza Multidimensional. Probit. Privações Múltiplas.

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1. INTRODUCTION

A significant portion of Brazilian children are found in poverty and engaged in child labor. In 2015, Brazil had approximately 27 million children living under multiple deprivation, among which 2.5 million were subjected to some form of work (UNICEF, 2018). Given that, one can assume that those children, by exercising any form of labor activities, were subjected to a condition of vulnerability that could partially of fully compromise their development and human capital accumulation.

There are several channels through which it is possible to perceive the influence of child labor on individual development. In principle, an early entry into the labor market entails both physical and mental health status complications in the future stages of life (KASSOUF et al., 2001; NICOLELLA et al., 2008; LEE and ORAZEM, 2010). Secondly, as evidenced by Ilahi et al. (2000), Emerson and Souza (2002; 2003) e Bezerra, Kassouf and Arends-Kuenning (2009), the performance of labor activities in childhood substantially reduces the individual's earnings in adulthood. This fact can be explained by the substitution of education for the immediate income (provided by work outside the household) in the early stages of life, which can reduce future productivity, given that the human capital gain from education exceeds the skills obtained by child labor.

The reduction in both productivity human capital accumulation has an important link with the third channel through which child labor hinder development, which is through the intergenerational persistence of child labor, as presented by Emerson and Souza (2003). The authors show that higher incidences of child labor potentially occur in families where the parents also worked during childhood.[1]

In fact, the relationship between greater levels of human capital and higher future earnings is well documented in the literature (BECKER, 1995; ACEMOGLU, 1996; GLEWWE, 2002; ARAÚJO et al., 2017), so that a deficiency in this capital may place the individual, the household or even the country in a situation of poverty, where the future income from work depends directly on the set of skills and knowledge

[1] Emerson and Souza (2003) using data from PNAD 1996, explain that, of the children who performed child labor, 70.6% of the parents and 37.2% of the mothers worked as a child. For children who belonged to families where the father did not work during childhood, only 5.9% were in the labor market and 7.8% if the mother did not work as a child.

acquired during life, a set that is compromised by adverse conditions that hinder the learning and the well-being of agents, such as the occurrence of child labor.

Therefore, given the fact that early participation in the labor market can mitigate the future results of the child, it is necessary to understand what are the main factors that lead to the supply of child labor. In this sense, a substantial part of the economic literature assumes monetary poverty as one of its main determinants (BASU and VAN, 1998; BASU and TZANNATOS, 2003; KASSOUF, 2007; RAMALHO AND MESQUITA, 2013; DA SILVA, 2018).

However, it is believed that there are factors intrinsic to poverty that can also significantly explain this decision, such as high household density, lack of access to electricity, sewerage, treated water, and durable goods such as stove, refrigerator, television and internet access[2]. These, which can be seen as elements of multidimensional poverty, are analyzed in this work as aspects that can determine the decision for child labor.

The analysis of poverty through a multidimensional perspective assumes that its measurement must consider not only income, but a set of deprivations related to the individual's basic needs, such as health, quality of the household environment and access to goods and services that guarantee their subsistence, such as treated water, access to the sewage network and electricity. With regard to poverty as a determinant of child labor, to consider different factors in addition to monetary insufficiency expands the analysis of these determinants and enables better channels for the eradication of child labor, through fighting poverty in different dimensions (DA SILVA et al., 2018).

It is worthy to point out that, among the several factors that can lead a family to offer the child's work, poverty, despite being one of the most important, is not exclusively the only variable. The study around this topic is extremely broad and complex. It is known that, among the set of influences on child labor, there are variables such as the child's gender (Levison and Moe, 1998; Verner and Blunch, 1999; Kassouf and Santos, 2010; Alvi and Dendir, 2011), where, mainly in activities carried out in the household environment, there are higher occurrences of child labor in female children and adolescents; the environment where the family resides (Bhalotra and Hedy, 2003; Kassouf and Santos, 2010; Cuevas, 2018), so that child labor is more present in rural

[2] It is important to highlight that the causes of child labor form a complex set that includes several other relevant factors, such as: being the first-born, imprisonment of family members, family structure, parents' education, among others. However, like a part of the literature presented here, this paper seeks to focus directly on the relationship between child labor and multidimensional poverty in terms of deprivation in the home environment.

environments, compared to urban ones. Thus, the present study considers not only the analysis via income or poverty dimensions, but also conducts a study on the relationship between child labor and demographic variables such as color/race, region of residence and gender of the child.

Given that, this work contributes to the economic literature on child labor by investigating the extent to which the various dimensions of household poverty (such as lack of access to water, sanitation, housing and information) impact the work decision of Brazilian children (aged between 5 and 15 years old), using data from 2015. In addition, a breakdown by place of residence is also carried out, in order to verify whether household poverty is more strongly related to child labor in the rural environment. Regarding the working condition, individuals who performed some type of work activity in the reference week were considered both in work outside the household and in activities related to use/ consumption in the household.

By expanding the analysis of the factors associated with child labor to the context of multiple deprivations, this study contributes to the formulation of future public policies to combat this type of work, which focus not only on the monetary aspect of poverty, but also on improvement of household conditions, through the relief of different deprivations that surround the households of Brazilian children.

The present work is structured in five sections, in addition to this introduction. In the second section, a literature review about multidimensional poverty and its role as a determinant of child labor is presented. In the third section, the data used are presented, as well as the empirical strategy used, and in the fourth section, the results obtained by the estimates. Finally, in the fifth and last section are the final considerations.

2. LITERATURE REVIEW

This section is divided into two parts: first, the theoretical model developed by Basu and Van (1998) is presented, which serves as a reference for the hypothesis that poverty has a direct relationship with the family's decision to offer child labor. Then, an analysis is made about the multidimensional character of poverty, the Brazilian scenario of multidimensional poverty and the relationship between poverty and child labor around the world.

2.1 Theoretical Framework: Family Decision Model on Child Labor

In this section, the theoretical model for the child labor decision developed by Basu and Van (1998) is presented, which serves as a fundamental framework for the hypotheses of this dissertation.

The child labor model by Basu and Van (1998) is built under two important axioms: Axioms of luxury and substitution. The first axiom concerns the situation in which the family is forced to offer child labor. In the authors' view, this fact only occurs if the household income from sources other than child labor is lower than the subsistence level. The second axiom, Substitution, establishes that, from the point of view of the labor market, child and adult labor are substitutes.

Consider *N* identical families composed by an adult and a child, such as their preferences are represented by the set:

$$\{(c, e) | c \geq 0, e \in \{0, 1\}\} \quad (1)$$

Where *c* represents each family member's consumption and *e,* the child labor load, that could be 0 or 1. The model assumes that there are no unemployment and the consumption is the same for children and adults.

Next, consider the following assumption, derived from the Luxury Axiom: The family only chooses to offer the child's work if it is below a certain level of subsistence, that we'll call *s*.

$$\forall \delta > 0, \ (c, 0) \succ (c + \delta, 1), \quad \text{if } c \geq s$$
$$(c + \delta, 1) \succ (c, 0), \ \text{if } c < s \quad (2)$$

According to the preference relation of (2), the family opts for child labor ($e = 1$) only if its level of consumption is strictly less than a certain level of subsistence ($c < s$). Then, the family chooses the amount of consumption and the amount of child labor given the following restriction, which indicates that the consumption of the two members must be equal to or less than the family's wages:

$$2c \leq ew_c + w_A \quad (3)$$

Where w_c and w_A represent the child's and adult's wages, respectively. The solution for this maximization problem will be:

$$c(w_A) = \begin{cases} \frac{w_A}{2}, & \text{if } w_A \geq 2s \\ \frac{w_A + w_c}{2}, & \text{if } w_A < 2s \end{cases} \quad (4)$$

$$e(w_A) = \begin{cases} 0, & \text{se } w_A \geq 2s \\ 1, & \text{se } w_A < 2s \end{cases} \quad (5)$$

Given that, we can express equations (6) and (7), being (6) the adult's work supply (which is *N*, since there is no unemployment) and (7) the child labor supply.

$$S^A = N \quad (6)$$

$$S^C(w_A) = \begin{cases} 0, & \text{se } w_A \geq 2s \\ N, & \text{se } w_A < 2s \end{cases} \quad (7)$$

Equation (6) and (7) presents the idea that serves as the main basis for the present work, by exposing that the supply of child labor will be null if the family is above the exogenous level of subsistence, *2s*. That is, it is admitted that the family decision in relation to the allocation of time and effort of the child rests exclusively with the household poverty, so that the choice for child labor will be made based on a certain level of deprivation. In this work, we seek to empirically demonstrate this theoretical result, attributing to the subsistence level (2s) variables related to the multidimensionality of poverty.

Given the adult and child labor supply, the authors still derive the firms' demand for both jobs. The modeling of this demand uses the Axiom of Substitution, which imposes that the work performed by children and the work performed by adults have a degree of substitution, represented here by γ ∈ (0.1). Assuming then that there are *n* identical firms, producing only one good, we have that the production function of each firm *i* is represented by:

$$x_i = f(A_i + \gamma C_i), f' > 0, f'' < 0 \quad (8)$$

Where x_i is the good produced by the firm *i*. A_i and C_i represent the quantity of adult and child workers employed in the firm, respectively. The firm's problem is then given by:

$$\max_{\{A_i, C_i\}} f(A_i + \gamma C_i) - A_i w_A - C_i w_C \quad (9)$$

So that the solution to the maximization problem is: if $w_A < \frac{w_C}{\gamma}$, the firm will choose to employ adults only, similarly, if $w_A > \frac{w_C}{\gamma}$, only child labor will be demanded. Basu and Van (1998) point out $\frac{w_C}{\gamma}$ as being the "effective children wage", given that the firms will be indifferent between adult and child labor if $\frac{w_C}{\gamma} = w_A$. As firms are cost minimizers, it is assumed that:

$$f'(A_i + \gamma C_i) = \min\left\{w_A, \frac{w_C}{\gamma}\right\} \quad (10)$$

The aggregated demands for work are given by:

$$(11) \quad \begin{cases} \text{if } w_A > \dfrac{w_C}{\gamma}, & D^A = 0; D^C = D^C(w_A, w_C) \\ \text{if } w_A < \dfrac{w_C}{\gamma}, & D^A(w_A, w_C) = D^A; D^C = 0 \\ \text{if } w_A = \dfrac{w_C}{\gamma}, & f'\left(\dfrac{D^A + \gamma D^C}{n}\right) = w_A = \dfrac{w_C}{\gamma} \end{cases}$$

Hence, the equilibrium will be given by (w_A^*, w_C^*), thereupon:

$$D^A(w_A^*, w_C^*) = N$$
$$D^C(w_A^*, w_C^*) = S^C(w_A^*). \quad (12)$$

That is, the demand for adult's work is equal to the number of adults, *N*, and the demand for child labor is equal to the number of children offering work, a value that depends on whether w_A^* (the adult's wage on the equilibrium) is greater or less than *2s* (the subsistence level).

From equations (7) and (12), arises the hypothesis that the level of child labor in the market (supplied and demanded), is due to an exogenous threshold of household subsistence. Basu and Van's (1998) model, when introducing this foundation, supports the idea proposed in this dissertation that the family's choice to offer child labor depends directly on the deprivations, which, in this work, are treated under the scope of multidimensional poverty

2.2.1 On the Multidimensionality of Poverty

There are several approaches to the concept of poverty in the economic literature, the most common being established by monetary aspects, where family or individual income is the main determinant to establish whether the individual is poor or not. However, with the recognition that poverty can be related to a complex group of deprivations, the concept of multidimensional poverty emerges, as an alternative to the study of poverty where income insufficiency was seen as a universal proxy for all individuals' deprivations (MOSANER, 2016).

According to Da Silva et al. (2017), two approaches are essential in the study of multidimensional poverty: the basic needs' approach and the capabilities approach. With regard to basic needs, this line of thought gained ground in the second half of the twentieth century, having emerged as an alternative way of characterizing poverty, focusing on the idea that individuals naturally have the same fundamental needs for subsistence, regardless of their culture or social position (STEWART, 1989).

In this sense, Bourguignon and Chakravarty (2003) argue that even if higher levels of income could improve the quality of life of the individual, it is necessary to consider the existence of other factors that are not necessarily monetary, but also essential to life itself, such as adequate access to water. and sewage network, that is, there are elements external to the family income that describe the individual's situation of poverty. As Silva points out (2018, p. 29):

> Being poor is also (...) not having adequate shelter, basic sanitation, drinking water, etc. Each of these factors can provide an important reference on poverty, the point is that the poor are discovered, at the same time, of most elements essential to life. Therefore, no unidimensional aspect will be able to satisfactorily describe the state of poverty.

Rocha (2006) points out the efficiency of studying poverty via the basic needs' approach in opposition to the monetary approach, given that the first adopts parameters that reflect results in function of the individual's quality of life and not only of his income. The identification of these parameters that belong to the set of basic needs permeates the literature related to poverty in the last decades (STREETEN, 1984; STEWART, 1989; ROCHA, 2006). Salama and Destremau (2011) highlight that it is essential to consider, in the analysis of poverty, access to a set of goods and services capable of guaranteeing a healthy and dignified life for individuals, such as: access to treated water, adequate garbage collection and access transport, education and information services. It was then, from the perspective of basic needs, that the study around poverty began to adopt multiple non-monetary dimensions and to question the unidimensional perspective commonly adopted.

With regard to the capabilities' approach, Amartya Sen (2000) expands the concept of basic needs by incorporating in her discussion the idea that poverty and human development are related to the individual's substantive freedom, a freedom that goes beyond income, taking into account the citizen's ability to fulfill his personal achievements, that is, to obtain what he considers to be valuable to him, such as having access to health, quality food, opportunities and active participation in the society in which he lives.

Therefore, Sen (2000), when presenting poverty as a phenomenon not necessarily determined by the position of the individual in the income strata (being poor when being below a predetermined level), contributes to the convergence of the understanding of poverty as a multidimensional phenomenon. According to Vieira et al. (2017, p. 8), "the capabilities' approach advocates the study of poverty from non-monetary sources, but through a multidimensional view that contemplates the various aspects of people's lives".

Although it is feasible that multidimensional and monetary poverty most of the time occur simultaneously, it is believed that, as exposed by Kageyama and Hoffmann (2006, p. 84):

> Poverty has a double nature: on the one hand, it is due to regional and local underdevelopment, which imposes deprivations in basic conditions of existence, such as electricity, running water and sanitary facilities, and difficulty in accessing health and education services; on the other hand, poverty is rooted in demographic characteristics and in the limitations of the human and financial capital of families.

That said, when considering factors such as household density, lack of access to electricity, sewerage, treated water, and basic durable goods such as stoves, refrigerators, televisions and internet access, it is credible to admit that several aspects, in addition to monetary income, influence the individual's socioeconomic condition and well-being.[3]

However, despite the literature on multidimensional poverty, in its majority, to broach the theme under the prism of an index that encompasses all dimensions, arbitrarily considered, the present work follows the argument exposed by Ravallion (2011) that despite the fact that poverty has a character multidimensional, its study should not be reduced to a singular index, so that here are studied the multiple deprivations at household, in a disaggregated way, from possession of durable goods, water and basic sanitation to household density.

2.2.2 Empirical Evidence on Multidimensional Poverty In Brazil

In Brazil, the study of poverty as a multidimensional phenomenon has its origins in the 1990s, with the socioeconomic surveys of the Seade Foundation in São Paulo[4], however, it started to gain notoriety in the past decade, based on the work of Barros et al. (2006) and Kageyama and Hoffmann (2006).

Barros et al. (2006), following the formulation proposed by Chakravarty, Mukherjee and Ranade (1998), formulate an additively separable index of multidimensional poverty composed of 48 indicators grouped in 6 dimensions: vulnerability; access to knowledge; access to work; scarcity of resources; child development and housing shortages. Using both these dimensions and data from the PNADs from the years 1993, 1998 and 2003, the authors found that there was a reduction in the degree of poverty of Brazilian families from 5 p.p. in the period (from 30% in 1993 to 25% in 2003). As considering housing conditions, there was a reduction from 28% to 17%. The authors point out that the highest concentration of multidimensional poverty was found in the rural area of the Northeast region in 2003,

[3] According to Silva et al. (2016): “the option to focus on multidimensional poverty does not mean abandoning income as a dimension of poverty, although some studies do not include this variable. (...) income is an important dimension of poverty, but it cannot be considered the only one. "
[4] See Fundação Seade (1992) and Costa (2003).

where there was shortage in approximately half of the indicators and the difference from the rest of the country was of 9 p.p.

Kageyama and Hoffmann (2006) consider both the unidimensional element (income) and the multidimensional indicators of non-monetary poverty, them being: access to piped water in at least one room; access to a bathroom or toilet on the property and access to electricity at home. Based on these dimensions and the PNADs data between 1992 and 2004, the authors considered an individual as poor if: had an income lower than the poverty line (1/2 minimum wage) and belonged to a household where there was at least one of the previously mentioned indicators (Poor Type I); had income above the poverty line and less than two of the items previously mentioned (Poor type II) and as Extreme Poverty if the individual was below the monetary poverty line and hadn't running water, bathroom/toilet and electricity at home. As noticed by the authors, the percentage of Brazilians living in poverty was decreasing over the period, being 46.1% in 1992 and 35.7% in 2004.

Using microdata from demographic censuses from the 2000s and 2010s, Cobo, Athias and Mattos (2013), analyzed the situation of multidimensional poverty in Brazil using monetary and non-monetary indicators such as social security, household density, access to water, sewerage, collection of trash and electricity. From a multidimensional perspective, the results showed an 11.7 p.p. reduction in poverty between 2000 and 2010. In 2000, 75.8% of the population was included in at least one dimension of poverty among those considered, while in 2010 the number was reduced to 66.9%. Unidimensionally, 33.4% suffered from monetary deprivation in 2000 and 30.9% in 2010. The authors point out that, in both censuses, deprivations related to non-monetary factors prevailed over insufficient income.

Serra (2017) initially argues about the gap in scientific research around multiple deprivations compared to what is being studied about monetary poverty, with that being said, his work analyzes the changes in multidimensional poverty in Brazil over the past decade. Using data from the 2000 and 2010 Censuses, the author performs a study of both uni and multidimensional character, using indicators such as: income; access to water; bathroom; proper garbage collection; electricity; household density; access to durable goods, among others. Regarding the multiple deprivations that are related to the present work, that is, the dimensions of poverty related to the household well-being, the author reports that in 2010 about 6.8% of Brazilians did not have piped

water; 7.4% did not have access to an exclusive use bathroom; 20.4% did not have access to adequate garbage collection; 1.4% did not have electricity and 6% were deprived of a set of durable goods[5].

Toledo and Rodrigues (2020) map the profile of Brazilian multidimensional poverty through the methodology of Alkire and Foster (2011), decomposing poverty into 4 dimensions: Housing, Basic Services, Standard of living and Education, where an individual is considered poor if he suffers deprivation in at least two of these dimensions. When evaluating the Housing dimension, the authors consider household density, quality of the construction material and house security; as for Basic Services, lack of water, basic sanitation and electricity are considered; while the Standard of Life dimension identifies the insufficiency of income and the lack of durable goods and, finally, in the Education dimension, there is information about school absence, lag and level of education. The variables used by these authors are similar to those of the present work, except for the Education dimension. The main focus of this work is poverty at a household level, both in the structural scope (Housing and Basic Services) and the Standard of Life scope. The results found by the authors show that the highest concentration of multidimensional poverty in 2014 was in the North of the country and that, due to the decomposition of the poverty index, the dimension that most contributes to poverty is the Basic Services one.

Regarding child poverty, Mosaner (2016) carries out an unprecedented study on the multidimensional poverty suffered by Brazilian children using data from the National Demography and Health Survey (PNDS) in the year of 2006. Among the dimensions chosen, are: Access to water; basic sanitation; housing[6]; access to information; health and nutrition. The author performed his analysis on the age range of zero to five years old. According to the previously mentioned dimensions, he observed that about 87% of the sample suffered at least one deprivation and that most Brazilian children between zero and five years were poor in at least two of the considered dimensions.

In short, the incidence of multidimensional poverty in Brazil has taken a downward trend in recent decades. However, it appears that its greatest intensity

[5] Serra (2017) considers on his set of durable goods the following items: i) refrigerator; II) radio, television or telephone and iii) washing machine; microcomputer or vehicle.
[6] In this variable, the author adds the deprivations of electric energy, household density and quality of the construction material used in the residence.

occurs in the North and Northeast regions of the country, especially in the rural area (Barros, 2006). The present work also sought to verify this result, analyzing whether the presence of multidimensional poverty is greater in these regions.

Regarding the various indicators used to measure multidimensional poverty, the present study follows the line of Barros et al. (2006) and Toledo and Rodrigues (2020), considering the characteristic of multiple deprivations at the house environment, both in the structural scope (Housing and Basic Services) and the Standard of Life scope (Lack of durable goods). The description of the variables used as deprivation indicators can be found in Section 3.

That said, this paper enlarges the economic literature on the theme of poverty and child labor by considering multiple deprivations that are directly and indirectly related to the labor supply of Brazilian children, carrying out this analysis in different contexts, considering both child labor in its entirety, as well as domestic work and child labor carried out in the Rural environment.

2.2.3 Multiple Deprivations as Determinants Of Child Labor

In general terms, the economic literature on child labor acknowledge monetary poverty as one of its main determinants (BASU and VAN, 1998; BASU and TZANNATOS, 2003; KASSOUF, 2016). Among the main empirical works on “poverty versus child labor”, Verner and Blunch (1999) stand out, where the authors analyzed the determinants of child labor in Ghana. In addition to showing a positive relationship between poverty and child labor, the authors also find that girls have a greater presence in the labor market (2.5% versus 1.8% of boys)[7]

Ray (2000), analyzing Pakistan, finds results favorable to the hypothesis that the number of hours worked by children and household poverty are directly related. As explained by the author, when a household falls below the poverty line (here considered only monetary), the burden of paid child labor in this family increases by approximately 500 hours per year.

Amin et al. (2004), studying Bangladesh’s scenario, showed that in the poorest stratum (monetary poverty), younger boys (5-11 years old) have, on average, a probability of offering child labor of 7.7p.p. more than those outside the poorest group.

[7] It is worth mentioning that in their work, Verner and Blunch (1999) did not have data on domestic work and, even with this limitation, a considerable gap was found between genders.

For older boys (12-14 years old), the result was 26.4p.p. Among girls, the result was similar. Overall, the authors find that there is a positive relationship between poverty and child labor, and it is more prevalent among older children.

Although the economic literature provides several evidences that support poverty as a determinant of child labor, there is a lack of studies that recognize its multidimensional aspect in this context. Some works that bring this relationship between child labor and multiple deprivations are Levison and Moe (1998), Ray (2001) and Webbink et al. (2012).

Levison and Moe (1998), when studying girl's labor in Peru, include in their estimations, among other variables, two of the dimensions of poverty considered in this work: access to running water and the presence of a telephone in the residence. The results obtained, considering the hours worked by girls between 10 and 19 years old, showed that the presence of water at home reduces, on average, the child labor load in 90 minutes a week and the presence of a telephone in the residence (which in time served as a proxy for wealth) reduced the female child labor burden by approximately 140 minutes a week.

Ray (2001), when studying the scenario about child labor in Nepal, Pakistan and Bangladesh, also incorporates in his analysis variables related to the multidimensionality of poverty, in particular, access to water and electricity. The results obtained by the author indicate the possible relationship between these dimensions and the incidence of child labor in these countries. The author found a weak relationship between access to water and hours worked by children of both genders, and a positive impact of the presence of electricity in reducing child labor for boys and girls. Regarding the results of these dimensions, the author argues that this points to the vital role of household infrastructure and the provision of basic services for the reduction of child labor.

In a more recent scenario, Webbink et al. (2012) also consider, among other variables, the influence of the multiple deprivations on child labor. When analyzing the determinants of child domestic work in 16 countries in Africa and Asia, the authors point out that without the presence of basic services such as water and electricity, domestic work becomes more complex and extensive, thus increasing the need for child labor. in its realization. The results found by the authors showed a negative relationship between the presence of electricity in the household and the workload carried out by children, similar to the results of having access to water.

By taking into account not only poverty, whether monetary or multidimensional, but also income and asset shocks, it is possible to verify the relationship between child labor and the multiple deprivations suffered at home. Beegle, Dehejia and Gatti (2006) investigated the impacts of negative agricultural shocks in Tanzania on child labor, noting that transient crop shocks, such as crop losses, lead to a significant increase in the level of child labor offered by families.

Alvi and Dendir (2011) study the consequences of a negative shock of property loss, resulting from a flood in Bangladesh, on the incidence of child labor. The authors find a higher prevalence of child labor among male children, and show that, in families without access to credit, given a negative shock, there is a substitution between credit and child labor so that an increase of one percentage point in the loss of assets resulting from the shock results in an increase in the probability of offering the child's work between 0.6 and 0.8 percentage points.

Cuevas (2018), using microdata from 31 states in the Dominican Republic, analyzed the relationship between negative shocks, both in the urban area (referring to job loss) and in the rural area (measured by crop loss). Their results show that the occurrence of these shocks has a strong relationship with the increase in the work of children and adolescents, both in the urban and rural areas. It was observed that the effect is more intense among children aged 11 to 17 years of age.

The fact that different types of shocks suffered by families make them more prone to offering child labor may be an indication that multiple deprivations accentuate their vulnerability (providing an indication of the relationship between the dimensions of poverty and child labor). Although there is a relative consensus regarding the influence of poverty and negative income shocks on the decision to allocate children to work, there is a lack of studies that disaggregate the different dimensions of household poverty and assess the relative importance of each one. In Brazil, this analysis becomes even more relevant in view of the multidimensionality of deprivation to which many families are exposed and the possibility that child labor puts them in a low productivity trap, and consequently, poverty. The present work incorporates, in the analysis of the factors associated with child labor, some of the multiple deprivations at household that can affect the family's decision to offer, or not, the child's work.

3. METHODOLOGY AND DATA

This section is divided into two subsections. At first, the empirical strategy and the econometric models used are presented. Then, it is discussed the variables and indicators that served as the main data source.

3.1 Empirical Strategy

In view of the proposed objective of verifying factors that are associated with the probability of the occurrence of child labor, we seek to test the following relationship:

$$Y_i = \begin{cases} 1, & yi^* > 0 \\ 0, & yi^* \leq 0 \end{cases}$$

$$yi^* = \beta_0 + \beta_1 \boldsymbol{X}_{ij} + \beta_2 \boldsymbol{d}_{ij} + \varepsilon_i \qquad \text{(I)}$$

where Y_i is a dichotomous variable that assumes a value of 1 if the individual aged 5 to 15 years offers work (inside or outside home) and 0, otherwise[8]. The occurrence of child labor is considered for each of the children and adolescents in the given household. $\boldsymbol{d}_{ij}$ represents the jth dimension of poverty, with 9 dimensions in total (Housing, household density, household infrastructure, access to basic services such as water, electricity, sanitation and durable goods. More information in the next subsection).

$\boldsymbol{X}_{ij}$ is a vector of control variables composed of individual variables (Race/Color, which assumes value 1 for the individual White and value 0, otherwise and gender of the individual, variable equal to 1 for girls and 0, in the case of boys) and location (macroregion of the North, Northeast, South and Midwest domicile, where Southeast is the reference dummy). ε_i is an idiosyncratic error term.

In this model, it is assumed that yi^* is the latent variable indicative of the family's unobserved propensity for child labor. This propensity can be explained by the unobservable factors intrinsic to the behaviors of families that favor the children's work

[8] In Brazil, any work is prohibited to children under 16 years of age, except as an apprentice from the age of 14. According to article 403 of Law 10,097/2000: "The work of the minor cannot be carried out in places that are harmful to his formation, to his physical, psychological, moral and social".

or it may also be the result of a comparison between the utilities arising from the two situations: with and without the use of child labor. In this case, the family would allocate their children to work if the difference in these utilities is positive. In any case, there will be an option for child labor (Y_i = 1) whenever the unobserved latent variable (yi^*) assumes a positive value.

To estimate this binary model, it was decided to use the Linear Probability Model and a non-linear model, probit, which is widely used in the empirical literature on child labor[9].

In addition, we also created a variable that indicates the number of dimensions of poverty in which the individual is inserted: $I = \sum_1^9 d_j$. The purpose of using this variable is to express the probability of the individual offering child labor $(Y_i = 1)$ given the number of dimensions of poverty in which he finds himself.

Thus, the second model is represented by the following equation:

$$yi^* = \alpha_0 + \alpha_1 \boldsymbol{X}_{ij} + \alpha_2 I + \mu_i \qquad \text{(II)}$$

By estimating the predicted probability of the dependent variable in equation (II), that is: $\Pr(Y_i = 1 | I = j)$, it was possible to verify the effect of belonging to numerous dimensions of poverty on the probability of the occurrence of child labor.

It should be noted, however, that the same unobservable factors that can increase the likelihood of a family being poor in different dimensions can also help explain the option for child labor (such as culture, social norms, personal motivation, skills and others). Thus, the results exposed here expose directions and effects associated with the phenomenon under study and do not necessarily indicate causality.

3.2 Data: Source and Processing

In this work, we used data from the 2015's National Household Sample Survey (PNAD). Child labor is considered here as labor activity carried out by individuals aged between 5 and 16 years old. Regarding the working condition, individuals who performed any type of work activity in the reference week were considered both in work

[9] Some important works on the subject that use probit are: Emerson and Souza (2003); Duryea and Arends-Kuenning (2003); Beegle, Dehejia and Gatti (2006); Assunção and Alves (2008); Yeni (2018).

outside the household and in activities related to use/consumption in the household environment.

The original database from PNAD 2015 has 356,904 observations. Given that in Brazil any work is prohibited to children under 16, with the exception of apprenticeship programs, which are allowed from the age of 14, individuals whose age was equal to or greater than 16 years were excluded from the sample, leaving a total 82,861 observations. A final sample was obtained where 2,234 individuals under the age of 16 worked in the reference week. It is worth mentioning that the data are considered here at an individual level, that is, for a household with more than one child, the occurrence of child labor is considered for each of the children in this household and not only whether or not there was child labor supply in the household in question. The same goes for the dimensions of poverty that will be presented below. Even if there are multiple individuals in the same household, deprivations are believed not to be exclusive, so that two children in the same household are considered here to be deprived by the same dimensions.

On what the definition of multidimensional poverty is concerned, a series of variables was constructed, as shown in Table 1, which each one represents a different dimensions of household poverty. The choice regarding the indicators is ultimately arbitrary, given the complexity around the theme. Therefore, in this study, we chose to use the indicators of multidimensional household poverty suggested by Barros et al. (2006). The chosen variables refer to what is defended in the literature as essential when analyzing poverty via the basic needs' approach, encompassing factors that guarantee the minimum well-being and subsistence of individuals.

Table 1. Poverty Dimensions

Variável	Dimensão de Pobreza	Considerado como privado se...
Condições Domiciliares		
d1	Habitação	Domicílio não for próprio
d2		2 ou mais moradores por cômodo
d3		Material de Construção não for permanente
d4	Acesso a água	Possuir acesso inadequado a água
d5	Acesso à rede de esgoto	Possuir acesso inadequado à rede de esgoto
d6	Acesso a eletricidade	Sem acesso à rede elétrica
Acesso a bens duráveis		
d7	Fogão ou geladeira/freezer	Não tiver acesso a pelo menos um dos bens
d8	Fogão, geladeira/freezer, televisão ou rádio	
d9	Fogão, geladeira/freezer, televisão ou rádio, telefone ou computador	

Source: Elaborated by the author.

The Housing dimension is separated into three variables, d1, d2 and d3. The first concerns the condition of the household being owned or not, assuming a value of 0, if it is own (already paid or still paying) and 1, if it is rented, assigned by an employer or otherwise. The Household Density dimension is incorporated into variable d2 and refers to the number of residents per room in the residence, with a value of 1 for two or more residents per room and 0, otherwise.

The third variable, d3, represents the quality of the material predominant in the construction of the house, has a value of 0 for cases where the construction comes from masonry or rigged wood and a value of 1 for cases where the construction is made of mud, reused wood, straw or other material.

The variables d4, d5 and d6 depict the situation of the home in relation to adequate access to basic services necessary to maintain a certain level of well-being and health. The first, d4, assumes a value of 0 if the household has access to the water distribution network or if it has piped water in at least one room, and a value of 1 otherwise. The variable d5, referring to access to the sewage network, has a value of 1 if the form of sanitary sewer is not connected to the sewage collection network, or if there is no bathroom or toilet at home, and a value of 0, if there is adequate access to the sewage system. The variable *d6* has a value of 0 if the household has access to electricity, either via a network, generator or solar panel, and a value of 1 otherwise.

The choice of dimensions for access to water, sewerage, electricity and durable goods corroborates the approach of basic needs in the construction of the idea of multidimensionality of poverty. An individual with adequate access to these services is less likely to have their health and well-being compromised, in addition, the relative dimensions of possession of durable goods such as television, radio and telephone/computer take into account access to entertainment and information, which enable a better insertion of the individual in society.

Finally, the dependent variable, Child Labor, was built from data referring to work characteristics of PNAD 2015 and concerns both child labor in general and work for use/consumption in the home environment. Its construction was based on the responses of individuals to questions v9001, v9002, v9003, v9004, v9008, for children between 10 and 15 years old and v4746, v4749, v0701, v0702, v0703, v0704 and v0708 for children between 5 and 9 years old.

Table 2. Questions used to construct the child labor variable

PNAD's Question		Dependent variable equals 1 if...
v9001		Worked in reference week
v9002		Was temporarily away from paid work in the reference week
v9003	Housework or work intended to use/consumption in the household environment	Performed tasks in farming, fishing or raising animals, intended for the household's consumption
v9004	Housework or work intended to use/consumption in the household environment	Performed tasks in construction works at the household
v9008	Housework or work intended to use/consumption in the household environment	Worked as: self-employed in auxiliary services; Unpaid worker member of the household or Production worker for own consumption.
v4746		Occupation situation in reference week: Occupied
v4749		Occupation situation in the 365-day reference period: Occupied
v0701		Worked in the 365-day reference period
v0702	Housework or work intended to use/consumption in the household environment	Performed tasks in farming, fishing or raising animals, intended for the household's consumption in the past 365 days
v0703	Housework or work intended to use/consumption in the household environment	Performed tasks in construction works at the household in the past 365 days
v0704		Worked in the reference week
v0708	Housework or work intended to use/consumption in the household environment	Worked as: Unpaid worker member of the home unit; Production worker for own consumption or Construction worker for own use.

Source: Elaborated by the author based on 2015's PNAD.

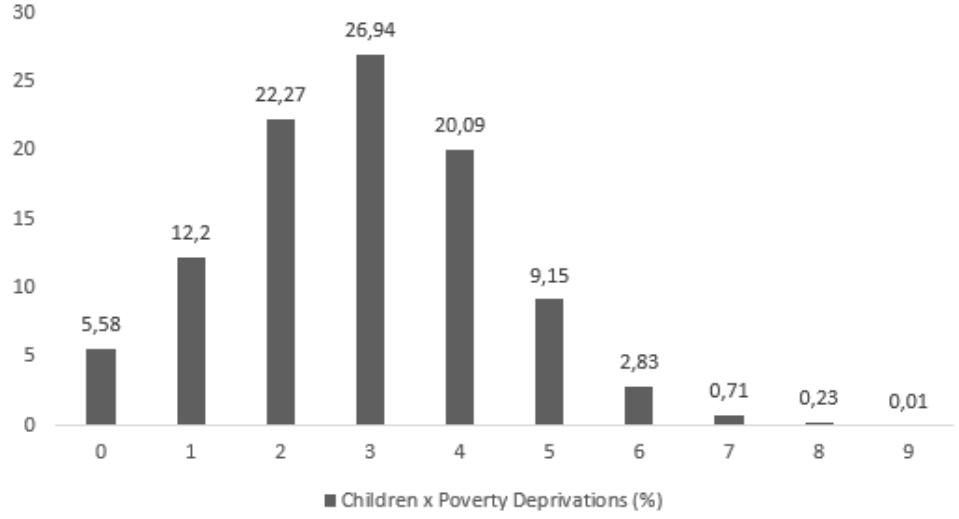
In the Appendix, table A5 presents all the variables used in the construction of the indicators, for both poverty and child labor.

4. RESULTS

4.1. Multidimensional Poverty And Child Labor In Brazil

Figure 1 provides an overview of the prevalence of Brazilian children and adolescents in the context of multiple deprivations. Most of the country's children and adolescents are subject to two (22.27%), three (26.94%), or four (20.09%) dimensions of poverty, while only 5.58% are in a situation where they are not subject to any deprivation of resources/services/goods among those considered here.

Figure 1.Number of multiple deprivations faced by Brazilian children (%)



Source: Elaborated by the author based on 2015's PNAD.

Table 3 below shows the percentages regarding the incidence of each dimension of poverty among Brazilian children and adolescents, 27.8% of these do not live in their own home, 62.5% live in homes with a density of two or more people per room and 2% in houses whose construction material is not permanent.

Regarding access to water, sewerage and electricity, 19.97% of Brazilian children and adolescents do not have piped water in at least one room in the household, 46.42% do not have access to the sewage network and 0.51% to electricity. With regard to the possession of durable goods, only 14% have all of the following items in their homes: stove; fridge; television; radio; telephone; microcomputer.

Table 3. Incidence of multiple deprivations in Brazilian children (%)

Poverty Dimension	Children Deprived
House is leased or rented	27.80%
2 or more residents per room	62.50%
Construction material is not permanent	2%
Inadequate access to water	19.97%
Inadequate access to sewerage	46.42%
No electricity	0.51%
No access to at least one of the following:	
Stove or fridge/freezer	3.58%
Stove, fridge/freezer, TV or radio	38.80%
Stove, fridge/freezer, TV or radio, phone or computer with internet	85.95%

Source: Elaborated by the author based on 2015's PNAD.

According to the 2015 data, 2.34% of Brazilian children between 5 and 15 years old were working in their homes or in the labor market. Of these, 70.81% are non-white and 44.58% are in the rural area. Therefore, in sequence, Table 4 shows the distribution of the dimensions of poverty and the incidence of Child Labor separated by Race. It is noted that, among the children between 5- and 15-years old in our sample, 29.19% of those who offer some type of work activity are white, while most of them, 70.81%, are non-white.

This discrepancy can be explained, in part, by the difference in the situation of poverty between Whites and Non-Whites, as shown in the same table. It is noted that the number of White children in 0 dimensions of household poverty, that is, free from all the multiple deprivations considered here, is 9.5%, while only 2.98% of Non-White children are in this favorable position. Another important point to be considered is the fact that the majority of White children are in two (24.27%) or three (26%) dimensions of poverty, while for Non-White children, the highest concentration is in three (27.56%) and four (22.62%) dimensions. Based on this inequality, it is credible to assume that families in the groups with the greatest deprivation are more likely to offer child labor, given their socioeconomic conditions.

Table 4. Poverty Dimensions and Child Labor by Race

Poverty Dimensions	White	Non-White
0	9,50%	2,98%
1	16,18%	9,56%
2	24,27%	20,95%
3	26%	27,56%
4	16,25%	22,62%
5	6,07%	11,19%
6	1,39%	3,79%
7	0,30%	0,98%
8	0,04%	0,35%
9	0%	0,02%
	White	**Non-White**
Child Labor	29,19%	70,81%

Source: Elaborated by the author based on 2015's PNAD.

Regarding the age of working children and adolescents, Table 5 below shows the occurrence of domestic work and child labor (which also includes domestic work), for each age group.

Table 5. Child Labor and Housework by Age

Age	Child Labor*	Domestic Labor
5	0,22%	0,27%
6	0,49%	0,55%
7	1,03%	1,93%
8	1,66%	2,76%
9	2,51%	2,91%
10	2,86%	6,48%
11	5,24%	8,55%
12	8,19%	11,45%
13	14,46%	16%
14	22,25%	20%
15	41,09%	29,10%
Total	100,00%	100,00%

* Also includes Domestic Labor

Source: Elaborated by the author

It is noticed that there is an oscillation of child labor depending on age, so that the highest concentrations are among children between 14 and 15 years old. As pointed out by Cuevas (2018), this higher occurrence of child labor in older children and adolescents can be partly explained by the increase in productivity, due to age, so that there is a greater opportunity cost in not offering their labor. In relation to domestic work, its frequency is also higher in the last stratum (14 and 15 years), however, there

is no sudden increase as it occurs in general work, and its distribution is smoother and more frequent in younger children. This fact can be partly explained by cultural factors, where from an early age the child participates in activities at home or in activities that refer to use/consumption in the home environment.

4.2. Multiple Deprivations and Child Labor: Econometric Results

The results regarding the effects of the dimensions of poverty on the chances of the child or adolescent (aged between 5 and 15 years) offering a job are shown in Table 6 below. The two columns show estimates via least squares (Linear Probability Model) and marginal effects obtained from the *probit* model, in order to allow comparison between the results. Given that the models present considerably similar results, both in sign and in the magnitude of their coefficients, only the coefficients obtained via Least Squares will be interpreted.

Among the deprivations considered, the dimensions related to the household not being owned and the household density showed a negative marginal effect, that is, being poor in these dimensions reduces the probability of child labor on average by 0.5 percentage points (pp), which can be explained by the fact that having sufficient conditions to afford paying rent indicates that the family may not need the additional income from the children's work. As for density, its negative coefficient can be explained by the fact that, with the largest number of members in the household, it is likely that there will be greater availability of income sources, thus reducing the marginal need for the child's work.

The third dimension, which concerns home infrastructure, showed a positive relationship with child labor, that is, children in households whose construction material is not permanent and adequate, have about 1.19pp more chances of offering work.

Regarding basic services, it was estimated that inadequate access to water leads to an increase of 2.24pp in the likelihood of the child offering child labor, both inside and outside the home, a result that corroborates with that found by Webbink et al. (2012) for their studies of Africa and Asia. In households without access to the central sewage system, there is an increase of 1.69pp in the likelihood of the child working and inadequate access (or lack of access to) electricity, leads to an increase of 3.61pp, both results similar to those found by Ray (2000), where both access to electricity and basic sanitation reduced the number of hours worked by boys in Pakistan and girls in Peru.

Table 6. Effects of poverty dimensions on the likelihood of child labor. Brazil, 2015

Explanatory Variable	**Model I OLS (Y = Child Labor)**	**Model II Probit (Y = Child Labor)**
House is leased or rented	-0.00585***	-0.00487***
	(0.00118)	(0.0228)
2 or more residents per room	-0.0127***	-0.0114***
	(0.00127)	(0.0203)
Construction material is not permanent	0.0119*	0.00613**
	(0.00635)	(0.0546)
Inadequate access to water	0.0224***	0.0168***
	(0.00193)	(0.0232)
Inadequate access to sewerage	0.0169***	0.0151***
	(0.00135)	(0.0237)
No electricity	0.0361**	0.0139**
	(0.0157)	(0.0933)
No Stove or fridge/freezer	0.0247***	0.0183***
	(0.00479)	(0.0456)
No Stove, fridge/freezer, TV or radio	-0.00391***	-0.00309***
	(0.00127)	(0.0215)
No Stove, fridge/freezer, TV, radio or internet	0.00955***	0.00875***
	(0.00148)	(0.0379)
Income	-0.00000150***	-0.00000238***
	(0.000000369)	(0.0000159)
Non-White	0.00822***	0.00734***
	(0.00120)	(0.0221)
Boy	0.0180***	0.0155***
	(0.00111)	(0.0197)
North	-0.0150***	-0.00987***
	(0.00190)	(0.0335)
North-east	-0.00258	-0.00192
	(0.00161)	(0.0283)
South	0.000797	0.00212
	(0.00182)	(0.0347)
Middle-West	-0.00158	-0.000384
	(0.00204)	(0.0369)
N	81447	81447

Standard errors in parentheses. Model II's coefficients represent marginal effects.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Source: Elaborated by the author

With regard to the possession of durable goods, an individual who does not have a stove, refrigerator, television/radio, telephone or computer has about 0.9pp more chance of offering child labor in relation to those who have at least one of these items. Regarding individual characteristics, non-white children are more likely to participate in the labor market compared to white children. As for the individual's gender, it was estimated that boys have about 1.80pp more chance of offering child labor compared to girls, similar to what was found by Alvi and Dendir (2011) for Bangladesh, where girls were less likely to work in the childhood and, among those who worked, they had an average workload of 11 hours/month less than boys. However, it should be considered that there is a possibility of underreporting of female child labor or that the activities performed by them are not considered work, so that they are not reported in the research.

As for the income variable, it presented a negative coefficient, as expected, which indicates that the probability of the child working is negatively correlated with family income, as pointed out by Verner and Blunch (1999) for Ghana, Ray (2000) for Pakistan, Amin et a. (2004) for Bangladesh, just to name a few.

The results obtained for the dimensions related to the structure of the household: access to water, sewerage, electricity and durable goods, reinforce the argument that the decision on whether or not to offer child labor depends directly on the subsistence conditions related to the household.

Whichever the deprivation suffered, the individual whose home environment is not conducive to personal development has his capacity for accumulating human capital, for production, and his future results compromised in relation to individuals whose poverty is not a present factor.

Given that different deprivations can be related to child labor depending on the environment where the child resides (KASSOUF AND SANTOS, 2010), Table 7 presents the results for the estimates restricted to individuals residing in the Brazilian rural area. For children and adolescents who live in the rural area of the country, the relationship between the dimensions of Housing (Home is not owned and Household Density) and the chances of work are considerably greater compared to the results obtained for child labor in general, considering rural and urban.

Table 7. Effects of poverty dimensions on the likelihood of child labor. Rural Areas, 2015

Explanatory Variable	**Model I OLS (Y = Child Labor)**	**Model II Probit (Y = Child Labor)**
House is leased or rented	-0.0221***	-0.0230***
	(0.00504)	(0.0457)
2 or more residents per room	-0.0311***	-0.0298***
	(0.00503)	(0.0366)
Construction material is not permanent	0.0105	0.0102
	(0.00915)	(0.0625)
Inadequate access to water	0.0147***	0.0152**
	(0.00463)	(0.0391)
Inadequate access to sewerage	0.0356***	0.0448***
	(0.00630)	(0.0761)
No electricity	0.0212	0.0172
	(0.0170)	(0.0982)
No Stove or fridge/freezer	0.0251***	0.0241**
	(0.00837)	(0.0606)
No Stove, fridge/freezer, TV or radio	-0.0127***	-0.0127*
	(0.00472)	(0.0397)
No Stove, fridge/freezer, TV, radio or internet	0.0180	0.0146
	(0.0150)	(0.148)
Income	0.0000111*	0.00000993*
	(0.00000670)	(0.0000383)
Non-White	0.0127**	0.0132*
	(0.00496)	(0.0409)
Boy	0.0633***	0.0657***
	(0.00420)	(0.0356)
North	-0.0183**	-0.0164*
	(0.00842)	(0.0597)
North-east	-0.0206***	-0.0178*
	(0.00785)	(0.0549)
South	-0.0241**	-0.0216*
	(0.00944)	(0.0757)
Middle-West	-0.0280***	-0.0272*
	(0.0101)	(0.0847)
N	13842	13842

Standard errors in parentheses. Model II's coefficients represents marginal effects.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Source: Elaborated by the author

For the first variable, it is found that individuals residing on agricultural property to which they do not belong (either because it is rented or assigned) are less likely to offer child labor. A similar result is also found in the economic literature by Bhalotra and Heady (2003) for Ghana and Pakistan and by Kassouf and Santos (2010) for Brazil. This negative relationship between land tenure and child labor may occur because, given the size of the agricultural property, due to market imperfections, where is possible that its owners find it difficult to find workers, thus having a greater incentive for the use of their children's work (KASSOUF E SANTOS, 2010).

In relation to household density, this negative coefficient is due to the same fact previously presented for the general context: it is credible to admit that in a residence with a greater number of individuals, there is a greater supply of workers, thus reducing the marginal need for the child's work.

Unlike the general context, shown in Table 6, the results regarding the variables related to the construction material of the residence and access to electricity were not statistically significant to explain the chances of child labor in the rural region. On the other hand, in relation to water and basic sanitation, it is observed that children who live in homes with inadequate access to water are 1.47pp more likely to be child labor and 3.56pp for the case of inadequate access to the sewage network.

Regarding individual characteristics, it is shown that non-whites are 1.27pp more likely to work when children compared to white children and that boys living in rural areas have 6.33pp more chance of working compared to girls, a result that corroborates with that found by Kassouf and Santos (2010), where the authors found that agricultural child labor in Brazil occurs predominantly among male children and adolescents.

Income, in this case, presented a positive relationship with the probability of child labor, a sign that is also explained by Bhalotra and Heady (2003), where there is the argument that, given greater land properties[10], there is a greater difficulty in seeking available labor, so that it remains to resort to the work of children and adolescents in the family.

In short, it is possible to observe a greater relationship between individual characteristics (gender and color) and child labor in rural areas. The exposed result indicates that, in comparison with the general context, non-white boys from rural areas

[10] Bhalotra and Heady (2003) use land size as a proxy for family wealth in rural Ghana and Pakistan.

have a higher marginal propensity in childhood. In addition, in the rural area, household amenities, such as electricity, water and durable goods, have lesser correlations with child labor.

Given that poverty is differently related to child labor between urban and rural areas, it is also interesting to investigate how the relationship between multiple deprivations and child labor is carried out not only in the labor market, but also in the housework. Thus, Table 8 presents the results referring only to domestic child labor, or for use/consumption in the home environment. Initially, it appears that the dimensions referring to Housing show a negative sign, as well as in the estimates previously presented, showing that, for domestic work, the higher household density is related to a lower probability of child labor. The same relationship is found for the case where the family lives in a ceded or rented residence.

For child labor in the home environment, all variables related to the lack of basic services were significant and positive. It is estimated that in households without basic sanitation, there is an increase of 0.9pp in the likelihood of child labor. Inadequate access to the electricity network shows an increase of 2.6pp in the dependent variable and, for households without access to treated water, there is an increase of 2.1pp in the probability of domestic work performed by children. This result follows the line of Webbink et al. (2012), where the authors also find a negative relationship between the presence of water and child labor. This relationship is due to the fact that, in the absence of basic services, such as electricity and water, daily activities become more difficult to be performed, so that the help of children can be demanded.

Regarding the possession of goods, the result for domestic work is similar to that found for the general result shown in Table 6, so that a child who does not have a stove, refrigerator, television/radio, telephone or computer has about 0.4pp to engage in housework in relation to an individual who owns at least one of these items. This positive relationship occurs because, in the absence of items such as a stove or refrigerator, there may be greater difficulty in carrying out the tasks, thus requiring more domestic work.

With regard to individual characteristics, it is again found that non-white individuals are more likely to perform child labor (it should be noted that this relationship was not statistically significant for the estimation via probit) and, even in the scope of domestic work, there is boys are about 0.8pp more likely to work than girls.

Table 8. Effects of poverty dimensions on the likelihood of housework.

Explanatory Variable	**Model I OLS (Y = Child Labor)**	**Model II Probit (Y = Child Labor)**
House is leased or rented	-0.00369***	-0.00468***
	(0.000597)	(0.000862)
2 or more residents per room	-0.00467***	-0.00434***
	(0.000725)	(0.000696)
Construction material is not permanent	0.00634	0.00182
	(0.00479)	(0.00137)
Inadequate access to water	0.0210***	0.0118***
	(0.00137)	(0.000774)
Inadequate access to sewerage	0.00991***	0.0153***
	(0.000694)	(0.00121)
No electricity	0.0267**	0.00304
	(0.0132)	(0.00213)
No Stove or fridge/freezer	0.0213***	0.00946***
	(0.00371)	(0.00123)
No Stove, fridge/freezer, TV or radio	-0.00377***	-0.00390***
	(0.000686)	(0.000759)
No Stove, fridge/freezer, TV, radio or internet	0.00454***	0.00946***
	(0.000559)	(0.00219)
Income	-0.000000488***	-0.00000131*
	(0.000000188)	(0.000000746)
Non-White	0.00117*	0.00103
	(0.000659)	(0.000751)
Boy	0.00867***	0.00908***
	(0.000634)	(0.000747)
North	-0.00771***	-0.00603***
	(0.00121)	(0.00109)
North-east	-0.00350***	-0.00349***
	(0.000924)	(0.000996)
South	-0.00263***	-0.00262*
	(0.000897)	(0.00134)
Middle-West	-0.00494***	-0.00552***
	(0.000983)	(0.00147)
N	81447	81447

Standard errors in parentheses. Model II's coefficients represents marginal effects.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Source: Elaborated by the author

The results presented so far show that there is a strong relationship between child labor and the multiple deprivations suffered by children in the home environment, both with regard to child labor in general, as well as domestic work. Household amenities such as access to electricity and water are important factors, which are negatively related to the likelihood of child labor. It is also found that higher probabilities are presented by non-white male children.

Table 9 shows the results related to the effect of the number of dimensions of poverty that the household is inserted on the chance of the children to offer work. That is, the results do not refer to what dimension of poverty the individual is in, but rather to the amount of deprivation suffered by the individual. The result presented below encompasses the general context, considering all types of child labor presented so far (domestic, rural, outside the home and by both genders).

Table 9. Probabilities of child labor occurrence by number of multiple deprivations – Brasil, 2015.

	Poverty Dimensions									
	I = 0	I = 1	I = 2	I = 3	I = 4	I = 5	I = 6	I = 7	I = 8	I = 9
Pr(Y = 1|I = j)	0.0134	0.0169	0.0213	0.0265	0.0327	0.0402	0.0489	0.0591	0.0708	0.0843

Source: Elaborated by the authors using data from PNAD 2015

Note: All coefficients are statistically significant at 1%;
Probit estimates; Each result represents the predicted probability (%) for a given value of variable I (number of deprivations suffered by the child).

From what is shown in Table 9, it is observed that the probability of the occurrence of child labor is positively related to the number of dimensions of poverty, regardless of which dimensions the individual is inserted in. The results indicate that individuals in the worst stratum of poverty (9 dimensions) have a probability almost seven times higher than that of individuals free from any deprivation (0 dimensions).

Following the result previously exposed in Figure 1, it is noted that most Brazilian children are subjected to two, three or four dimensions of poverty simultaneously, so that this majority has between 2.13% to 3.27% of probability of offer child labor. In the worst-case scenario among those considered, where the child is included in all multiple deprivations, his probability of submitting to child labor is 8.43%. While a child free from any dimension of poverty presents only 1.34%.

This result suggests that reducing one or more dimensions of poverty, whatever the initial situation is, will result in a decrease in the likelihood of child labor.

It is important to emphasize that the eradication of child labor is an extremely complex task, which goes beyond the scope of poverty, encompassing several other

factors, such as intergenerationality, family conflicts, national laws on the protection of children/adolescents and the prohibition of child labor, among others.

However, even considering that there are other factors associated with the family decision about the child's labor supply, the result obtained here reflects the fact that the fight against poverty (through the mitigation of the various deprivations suffered in the home environment) can be a efficient channel for the eradication of child labor, ensuring better livelihood conditions for children and thus preventing them from submitting to work activities that may jeopardize their development.

5. FINAL REMARKS

This study aimed to verify the relationship between household poverty, from a multidimensional perspective, and the likelihood that children will offer work in Brazil. The results obtained here indicate that individuals whose household structure is precarious, either due to lack of water, electricity or access to the sewage network, are more likely to offer child labor. In the context of multidimensional poverty, it is observed that about 70% of Brazilian children and adolescents are subjected to two, three or four dimensions of household poverty simultaneously. Brazil, along with 192 other member states of the United Nations, is committed to the achievement of the Sustainable Development Goals, which seeks, among other goals, to tackle poverty and eradicate child labor.

Regarding multiple deprivations of basic services, it was observed that the dimensions related to access to water, electricity and basic sanitation showed significant results in reducing the likelihood of child labor in all estimates. In general, children in households with inadequate access to water are about 2 percentage points more likely to perform work activities, both at home and outside the home, and this result is robust for urban and rural areas. Similarly, children without access to the electricity network and basic sanitation have, on average, 3.6pp and 1.6pp, respectively more likely to perform child labor.

On what the characteristics of children are concerned, it was observed that there is a higher incidence of child labor in non-white individuals between 12 and 15 years of age. This result reinforces the relationship between poverty and child labor, given that, on average, non-white Brazilian children are more inserted in multidimensional poverty in relation to white children. With regard to gender, there is a greater proportion

of boys performing work activities, both inside and outside the residence, however, this result may not be completely credible, as the data used here are subject to underreporting problems.

In general, this work presents data and results referring to dimensions of household poverty and the incidence of child labor in Brazil in 2015. It is suggested for future work to study the intertemporal comparison of the scenarios of multidimensional poverty and child labor, in order to analyze the causal impact of the reduction of these dimensions on the reduction of the labor supply of Brazilian children and adolescents.

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APPENDIX

Table A1. *Probit* Results

Explanatory Variable	**Probit (Y = Child Labor)**
House is leased or rented	-0.100***
	(0.0228)
2 or more residents per room	-0.212***
	(0.0203)
Construction material is not permanent	0.108**
	(0.0546)
Inadequate access to water	0.278***
	(0.0232)
Inadequate access to sewerage	0.288***
	(0.0237)
No electricity	0.220**
	(0.0933)
No Stove or fridge/freezer	0.278***
	(0.0456)
No Stove, fridge/freezer, TV or radio	-0.0615***
	(0.0215)
No Stove, fridge/freezer, TV, radio or internet	0.198***
	(0.0379)
Income	-0.0000467***
	(0.0000159)
Non-White	0.148***
	(0.0221)
Boy	0.304***
	(0.0197)
North	-0.222***
	(0.0335)
North-east	-0.0383
	(0.0283)
South	0.0405
	(0.0347)
Middle-West	-0.00759
	(0.0369)
N	81447
AIC	18919.6

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Source: Elaborated by the author

Table A2. *Probit* Results – Rural Areas

Explanatory Variable	**Probit (Y = Child Labor)**
House is leased or rented	-0.181***
	(0.0457)
2 or more residents per room	-0.234***
	(0.0366)
Construction material is not permanent	0.0805
	(0.0625)
Inadequate access to water	0.119***
	(0.0391)
Inadequate access to sewerage	0.353***
	(0.0761)
No electricity	0.135
	(0.0982)
No Stove or fridge/freezer	0.190***
	(0.0606)
No Stove, fridge/freezer, TV or radio	-0.100**
	(0.0397)
No Stove, fridge/freezer, TV, radio or internet	0.115
	(0.148)
Income	0.0000782**
	(0.0000383)
Non-White	0.104**
	(0.0409)
Boy	0.517***
	(0.0356)
North	-0.129**
	(0.0597)
North-east	-0.140**
	(0.0549)
South	-0.170**
	(0.0757)
Middle-West	-0.214**
	(0.0847)
N	13842
AIC	6647.5

Standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Source: Elaborated by the author

Table A3. Descriptive Statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
d1	82,861	.2786232	.4483244	0	1
d2	82,861	.6250347	.4841169	0	1
d3	82,861	.0193094	.1376111	0	1
d4	82,861	.1996717	.399756	0	1
d5	82,861	.4641991	.4987197	0	1
d6	82,861	.005117	.0713504	0	1
d7	82,861	.035819	.1858398	0	1
d8	82,861	.3879509	.4872862	0	1
d9	82,861	.8594634	.347545	0	1

Source: Elaborated by the author

Table A3. Descriptive Statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
Boy	82,861	.2786232	.4483244	0	1
Giel	82,861	.6250347	.4841169	0	1
Non-White	82,861	.0193094	.1376111	0	1
North	82,861	.1996717	.399756	0	1
North-east	82,861	.4641991	.4987197	0	1
South	82,861	.005117	.0713504	0	1
South-east	82,861	.035819	.1858398	0	1
Middle-West	82,861	.3879509	.4872862	0	1

Source: Elaborated by the author

Table A4. Correlation Matrix (poverty dimensions)

	d1	d2	d3	d4	d5	d6	d7	d8	d9
d1	1,0000								
d2	0.0890	1,0000							
d3	-0,0251	0,0555	1,0000						
d4	-0,0208	0,0735	0,1564	1,0000					
d5	-0,0459	0,1002	0,1187	0,4077	1,0000				
d6	-0,0152	0,0307	0,1588	0,1205	0,0710	1,0000			
d7	0,0042	0,0548	0,163	0,1694	0,1348	0,3473	1,0000		
d8	0,0762	0,0735	0,0564	0,0722	0,1083	0,0809	0,2323	1,0000	
d9	0,0990	0,1402	0,0515	0,1656	0,2612	0,0290	0,0821	0,3498	1,0000

Source: Elaborated by the author

Table A5. 2015 PNAD's Variables

Code		**Variable**
Individual Characteristics		
V8005		Age
V0404		Race
V0302		Gender
Household Variables		
v0207		Occupation
V0205		Number of rooms
v0105		Number of Residents
v0203		Predominant construction material
v0204		Predominant construction material
v0211		Has piped water in at least one room
v0212		Source of piped water
v0215		Has at least one bathroom at the property
v0216		Bathroom conditions
v0217		Sewerage
v0219		Electricity
Durable Goods		
v0221		Stove with two or more burners
v0222		One-burner stove
v0228		Fridge
v0226		Color TV
v0227		Black and White TV
v0225		Radio
v0231		Personal Computer
v2020		Telephone
v0220		Cell Phone
Work-Related Variables		
v9001		Worked in the reference week
v9002		Was temporarily away from paid work in the reference week
v9003		Performed tasks in farming, fishing or raising animals, intended for the own use of the household
v9004		Performed tasks in construction of building, room, well or other construction works.
v9008		Occupation in the reference week
v4746	(5 to 9 years old)	Occupation in the reference week
v4749		Occupation in the past 365 days
v0701	(5 to 9 years old)	Worked in the past 365 days
v0702	(5 to 9 years old)	Performed tasks in farming, fishing or raising animals, intended for the own use of the household in the past 365 days

v0703	(5 to 9 years old)	Performed tasks in construction of building, room, well or other construction works in the past 365 days
v0704	(5 to 9 years old)	Worked in the reference week
v0708	(5 to 9 years old)	Occupation in the past 365 days

Source: 2015 PNAD