



4th meeting ■ Rio de Janeiro, Brazil ■ 9-11th November 2011

Determinants of Income and Gender Discrimination in Brazilian Rural Areas in 2009

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ABSTRACT

Economic activities have grown to the suburbs, increasing the spatial integration between urban and rural and traditional cut between these areas is no longer enough to understand the socioeconomic dynamics. In Brazil, rural areas are divided by IBGE in: urban sprawl, villages, center, other agglomeration, exclusive agglomeration. The urban sprawls are adjacent to the urban areas; rural settlements (villages, center and other agglomerations) are distant from urban; and in areas of exclusive agglomeration there is no agglomeration. In this article, we attempt to analyze income and gender discrimination in urban sprawl, rural settlements and areas with no agglomeration. For this purpose, we used data from PNAD-IBGE (2009) and the population studied is workers employed and remunerated. Descriptive statistics are presented on the average income of workers and their occupational distribution. The determinants of income are estimated by linear regression, considering socioeconomic characteristics and occupation as explanatory variables, and impact of gender discrimination on earnings is estimated by the Oaxaca decomposition. The results show that the average income of the main job is R\$ 3.73 for women and R\$ 3.93 for men. The lowest average incomes are found in areas of rural settlements and larger incomes in areas of urban sprawl. Regarding the occupational distribution, the percentage of women in agricultural occupations varies: in urban sprawl is 1.35%, in rural settlements is 13.89% and areas with no agglomeration is 25.02%. For men, in urban sprawl, only 2.58% work in agricultural activities, in rural settlements there are 46.06% and in areas with no agglomeration this percentage rises to 70.18%. The analysis also identifies differential in earnings for men in three areas: 16.12% in urban sprawl, 8.74% in rural settlements, 1.64% in areas with no agglomeration. And the major impact of gender discrimination occurs in areas of rural settlements.

Key-words: income, gender discrimination

1. Introduction

The modernization of agriculture, from the mid-1960s, has changed the labor relations in Brazil. Kageyama (1987) and Staduto, Shikida and Bacha (2004) showed that the technological innovations led to the specialization of labor. Silva and Del Grossi (2002) argue that the modernization process also led to rural exodus, because tasks previously played by groups of people were later executed by a few workers, which led to unemployment in the countryside, leading to the rural - urban migration.

In addition to migration, Laurenti (1996) notes that there is a new division of labor within family units, making it possible that some family members work in other non-agricultural activities. Also, that family members still working in agriculture need to spend less time activity, and may combine agricultural production with other agricultural or non-agricultural activities.

The combination of innovation and new working relationships have opened space for part-time farming, pluriactivity and non-agricultural rural occupations (ORNA), which contributes to the

formation of the "New Rural". According to Silva and Del Grossi (2011), the new rural area is composed of: modern agriculture based on commodities and linked to agribusiness; non agricultural activities linked to housing, leisure, industrial activities and services; and agricultural activities driven by niche market, such as fish farming, horticulture, floriculture, fruit production etc.

However, the transformation of rural areas is a gradual process that affects rural areas in a continuous manner from areas closest to cities to more remote areas. According to Laurenti and Del Grossi (2008), rural areas are divided by the Brazilian Institute of Geography and Statistics (IBGE) in: urban sprawl, villages, center, other agglomeration, exclusive agglomeration. The urban sprawls are adjacent to the urban areas; rural settlements (villages, center and other agglomerations) are distant from urban; and in areas of exclusive agglomeration there is no agglomeration.

In this article, we attempt to analyze the income and gender discrimination in areas of urban sprawl, rural settlements (villages, center and other agglomeration) and exclusive agglomeration. And specifically:

- Differentiate rural areas: urban sprawl, rural settlements and exclusive agglomeration;
- Present, for each gender and rural area, the distribution of workers, the average income of those working in the agricultural sector and in the non-agricultural sector and the occupational distribution of workers;
- Estimate for each gender and rural area, the determinants of income;
- Analyze the impact of gender discrimination on income in each rural area.

For these purposes, we used data from the National Household Sample Survey (PNAD – IBGE, 2009) and the population studied is workers employed and remunerated.

The article is divided into five sections besides this introduction. The second section provides a literature review on the modernization of agriculture, pluriactivity and the new rural in Brazil. In third section, areas of urban sprawl, rural settlements and exclusive agglomeration areas are differentiated. Methodology is presented in fourth section. In fifth section, we discuss the results. And the final remarks conclude the paper.

2. Agriculture Development and the Formation of the “New Rural”

This section presents a literature review that points the agriculture development process through the modernization and the consequences above the labor market and the construction of new rural in Brazil.

According to Gremaud, Vasconcellos e Toneto Jr. (2007), the agricultural modernization process had the following characteristics: increase of mechanization and the use of fertilizer and pesticides, that promoted the increase of productivity and production, specially soy, orange and the reinvigoration of sugar cane, at the expense of coffee and cotton; displacement and expansion of agriculture border to Central-West region; increase of agribusiness with interconnection between the agriculture sector and the upstream and downstream production steps; and the increase of land concentration with the rise of transitory labor.

Del Grossi and Silva (2002) add that this modernization process caused the rural exodus. The authors say the increase of mechanization in Brazilian farming made the tasks previously played by groups of people to be carried out by a few workers, which led the unemployment in the countryside, causing the rural-urban migraton.

The agriculture modernization has impacts not just in production in these sectors, but in labor bound to these activities. According to Kageyama (1987) apud Staduto, Shikida and Bacha (2004), it is possible to separate in three the transformations in agriculture. The first one is the change in the labor relationships since 1960, passing from individual or family work to specialized groups. The second one is the change in mechanization, which in post war substitutes the animals and, in the 1960 decade, pursuits to substitute the man by machines; and the last change is the internalization of the inputs, machine and equipment industry in Brazil, which begins with the implementation of basic resources industries in the 1950s and 1960s.

Franco and Pereira (2008) argue that the Brazilian agriculture modernization process was accentuated in 1960s and 1970s, by the II National Plan for Economic Development (II PND). The main instruments used by the government to promote the modernization of agriculture and were: minimum prices guarantee policy to eliminate the risk of changes in prices; and subsidized rural credit policy, which aimed to stimulate the rural investments in goods and services and finance the costs of production commercialization and mechanization.

With the 1964 military revolution, according to Gramaud, Vasconcellos and Toneto Jr (2007), there was a creation of a new framework to the Brazilian agricultural policy that was constituted by the National System of Rural Credit (SNCR) in 1965, the revitalization of Minimum Prices Guarantee Policy (PGPM), created in the 1940s, and the creation of the Brazilian Agriculture Research Corporation (Embrapa) in the 1970s, that has supported the research and technical assistance to producers.

The SNCR intended to offer farmers cheap credit that would be applied in investment and sector modernization. The agricultural credit was granted with significant benefit, because, with high inflation rates at that time, the loans had negative interest rates.

The PGPM guaranteed minimum prices that provided farmers a minimum income in agricultural production. This system reduced the income uncertainty by the farmers. It had two basic mechanisms: a) the acquisitions by federal government – government purchasing of products with prefixed prices; and b) loans from federal government – a credit that aimed to finance the storage of product to be sold in a playable moment.

Bacha (2004) argues that rural credit policy contributed to the heterogeneous growth of agricultural production among the Brazilian states, to the extent that credit was directed to specific products. The Central-West, Southeast and South regions were more benefited in relation to North and Northeast regions in terms of sectorial policies for agriculture technical support. This led to uneven growth rates of productivity in these regions in 1970s and 1980s, according to Staduto, Shikida and Bacha (2004).

In the 1980s, Franco and Pereira (2008) claim that due to restrictive macroeconomic policies that aimed to contain the inflation and the farmers' debts, there was a decrease of rural credit and subsidies, so that commercial banks became more selective in lending. The 1980s were marked by government fiscal crisis and the reduction of its role as a promoter of agricultural activity, as a result. Adding to the much reduced role of the state, the lower prices of commodities in international markets, the reduced investment and rising production costs - partly due to the increase in the minimum salary - the internalization of low international prices, there was low income in agriculture (DEL GROSSI; SILVA, 2002).

Adding to the low wages, technical progress has increased the productivity of labor and this, consequently, caused the increase in idle manpower. The idle manpower was disengaged of the agricultural activity and released labor for other agricultural and non agricultural activities.

In the following decade, the government no longer regulated various activities that support or subsidize agriculture, leaving the sector unprotected. However, according to Gomes and Dias (2001), in certain years of the 1990s agriculture increased its share in GDP.

In addition, Ferreira Júnior, Baptista and Lima (2004) argue that the entire process of modernization of the activity is related to higher technological level, with intensive use of machinery, tractors, fertilizers, chemical control of pests and diseases, which increases the productivity of labor and land. Thus, the level of technology affects the organization of production and labor relations.

With respect to the transformation of labor relations cited by Kageyama (1987), Staduto, Shikida and Bacha (2004) argue that technological innovation cycles were responsible for transformation in those relations. From 1970 to 1985, there was growth in the portion of transitory labor in total employed workers in agriculture. This was due to the adoption of imported technologies that did not cover all stages of farming in Brazil and led to the seasonality in the use of labor. Since 1985, there was a new period of innovation that enabled the adaptation and development of technologies for the country and led to the reduction of seasonality and the use of

temporary workers, in favor of more qualified and capable to participate in the new cycle of technological innovation permanent labor.

Thus, due to specialization of labor and implementation of new technologies, Laurenti (1996) notes that there is a new labor division within family units, making it possible for some family members working in other non-agricultural activities; and that family workers who work in agriculture need to dedicate less time to the activity, turning possible to combine these activities with other or non-agricultural activity.

The changes observed by Laurenti (1996) increased the number of workers in non-agricultural rural occupations and so rose also the number of part time farmers and the pluriactivity in rural families. According to Del Grossi (1997), part-time-farmer is the chief of a production unit who is dedicated in part to the agricultural activity, while the pluriactivity has the basic unit of analysis the family, considering the non-agricultural activities of all family members, besides the chief.

The term pluriactivity and its unit of analysis were defined by Schneider (2006):

A phenomenon that requires the combination of two or more activities, one of them is the agriculture, in the same unit of production by individuals belonging to a domestic group bound by ties of kinship and consanguinity (kinship between them), may belong to him possibly other members of consanguineous (adoption), which shares a same space for housing and a same space for work (not necessarily in the same accommodation or housing) and identify themselves as a family (SCHNEIDER, 2006, p.2, our translation).

To Kageyama (1999), in order to study pluriactivity, it is also allowed to use the domicile reference as a unit of analysis. Agriculture domicile is defined as one “that has at least a person with 10 years or more, whose main activity, in the reference year, is agriculture” and pluriactive domicile that “in addition to people employed in agriculture, there is at least one person engaged in any other non-agricultural work.” (KAGEYAMA, 1999, p 37 and 38, our translation)

Both nationally and internationally there is a debate about the unit of analysis to be adopted for the study of pluriactivity. To Mattei (2007, p. 1059, our translation), “the pluriactivity has been used to explain the process of work diversification that occurs within family unit of production”. According to the author, the role of family as the unit of analysis has been reaffirmed by several studies. In other cases, the definition of families and the definition of production units are different, introducing the concept of pluriactive families.

To Silva and Del Grossi (2002), pluriactivity is a consequence of the diversification efforts of small farmers to be introduced in local markets that open themselves. Thus, pluriactivity cannot be considered as a part of a proletarianization process, but as a social and economic differentiation effort of agricultural families, rather than what Alves, Valente Jr and Brainer (2006) claim.

As a consequence of pluriactivity for the families, Mattei (1999) highlights the heterogeneity of economic activities, in other words, the diversification of families’ sources of income with rural residence and the use of pluriactivity as a survival strategy or complementary or income and accumulation alternative.

The third concept, the non-agricultural rural occupations (ORNA), includes the non-agricultural activities and, according to Schneider (2006, p. 5, our translation), “they are types of occupations in branches and sectors of economic productive activities classified as non-agricultural”. Thus, not necessarily increased non-agricultural rural occupations are related to the growth of pluriactivity, because it involves the combination of agricultural and non-agricultural activities in the same family or domicile.

For Silva and Del Grossi (2002), the generation dynamics of ORNA comes from impulses generated by the urban sectors that are close to these locations and from activities related to education, health, transportation, commerce, industry and mining, which can be performed in rural or urban spaces.

According to Silva and Del Grossi (2011), the countryside has been used for non-agricultural purposes. There is appreciation of ecological culture and increase of rural tourism, industries that

settle in rural areas to minimize costs and negative externalities and dwellers of urban area that keep houses in countryside for leisure or low-income individuals seeking to land its self domiciles around the cities.

For the authors, the new rural is composed of: modern agriculture based on commodities and linked to agribusiness, non-agricultural activities linked to housing, leisure, industrial activities and services, and agricultural activities driven by niche markets, such as fish farming, vegetables, flowers, fruits etc.

Silva and Del Grossi (2002) cite the example of fish (fishing establishments, fattening of fish and reproduction of fingerlings, exotic fish breeding, industrial demand), which, along with other segments, mobilizes a chain of rations specialized industries, the veterinary industry in the manufacture of growth hormones, reproduction or sex reversal, disease control, among several other products that are used throughout the production chain as worms, fishing rods, fishing tackle, fish waste to be used in fertilizer production, garments and related services, among other activities that the psiculture can stimulate.

The creation of noble and exotic birds, free-range chickens, frogs is another branch listed by the authors. This segment handles other areas such as agribusiness in meat consumption, the use of leather for ornamental purposes and laboratories for genetic improvement.

The creation of other slaughter animals such as freshwater shrimp, capybaras, caimans-chat-yellow, wild boars, rabbits and scargot, are destined to produce meat for fancy restaurants in urban centers of the country and abroad. Another activity related to this branch is the game farm which already includes the screenplay for rural tourism in some states such as Paraná.

In addition to these segments that move a large chain, there are a number of other economic branches such as the production of aromatic organic herbs, vegetables and oils for domestic and foreign market that are stimulated by pharmaceutical and food industries, the flowers and seedlings ornamental, fruit, agricultural exhibitions and auctions, rodeos, education, leisure and rural tourism, crafts etc.

Thus, the new rural is a multifunctional space and the reasons for the loss of mono-functionality based solely on agricultural activities, highlighted by Gama (1987), are: the spread of means of transport that increase the possibility of movement to other workplaces; the spread of the media influencing the cultural life of rural communities, the diffusion of energy that creates multiple possibilities for its use, and the rapid spread of new and different production techniques. These phenomena convert rural spaces in multifunctional and pluriactive areas.

However, the transformation of rural areas does not happen at once, but it is a gradual process that affects rural areas on an ongoing basis, from the rural areas closer to urban areas to more remote rural areas. In the next section, the existing areas are differentiated in rural Brazil.

3. Classification of Brazilian Rural Areas

Souza (2000) argues that cities expand beyond traditional boundaries by creating urban diffuse regions. Economic activities grow to the suburbs, increasing the spatial integration between urban and rural areas and thus the traditional division between urban and rural is not enough to understand the socioeconomic dynamics.

According to the IBGE (2011), the classification between urban and rural areas is made in accordance with current legislation in the Census year, so the last rank before 2009 was made in 2000. This means that it is not possible to capture the evolution of areas since the classification and therefore the differences between what is truly urban and rural has been intensified as years passed after 2000.

According to Laurenti and Del Grossi (2008), rural areas are divided by IBGE in:

- Urban sprawl: urbanized area adjacent to city limits, with less than one km away;
- Villages: overcrowding in rural areas, not linked to an owner who has permanent and adjacent buildings, with roads or means of communication and service stations to residents.

Among the service stations must be at least a business that sells consumer goods and two establishments like schools, health or religious temple;

- Center: rural agglomeration with at least ten homes and a maximum of 51 domiciles, in the ground belonging to a single owner, who may or may not have service stations;
- Other agglomeration: other settlements that have service stations on the ground and not on a single owner;
- Exclusive agglomeration: an area where there is no agglomeration or service station.

It can be seen that there is not a break that separates the urban and rural areas, in fact, rural areas approach the urban areas gradually. Areas of urban sprawl are constituted by the suburbs of the cities that expand on the countryside, and may already have been included in the urban areas of municipalities which belong to over the years from 2000 to 2009.

In villages, centers or other agglomerations, there is clustering with distance over a kilometer from urban area. These settlements can serve rural areas with service stations and gather non-agricultural activities of the new rural.

Finally, exclusive agglomeration areas concentrate agricultural activities which may be traditional or niche markets that grow with the development of rural areas.

Thus, in this research, rural areas are grouped into: urban sprawl, rural settlements (village, center and other agglomeration) and exclusive agglomeration. It is expected that this division reveals differences in the worker's income related to the changes that took place in Brazilian rural areas.

4. Methodology

To analyze the determinants of income and gender discrimination in rural areas, data used is from PNAD-IBGE (2009) and the population studied is workers employed and remunerated. Initially, descriptive statistics on the distribution of workers, average income and the occupational distribution are presented by rural area and gender.

Then, the determinants of income are estimated by linear regression for men and women in the areas of urban sprawl, rural settlements and exclusive agglomeration. It is considered as dependent variable the natural logarithm of income per hour at the main job and as explanatory variables, it is considered the main socioeconomic characteristics and groups of occupations.

The socioeconomic characteristics and occupations used in the regression are:

- N, NE, SE, S or CO: dummies for regions of the country;
- Age: age of the worker in years;
- Age2: age squared;
- White, Black, Mulatto or Indigenous: dummies for the worker's skin color;
- Schooling: years of schooling;
- Schooling¹⁰: years of schooling for workers with more than 10 years of education and 0 for the others;
- Stability: number of years the worker is in the same job;
- Managers: dummy for managers in general;
- Science and art: a dummy for professionals in the sciences and arts;
- Technical school: dummy for high school level technicians;
- Administrative: dummy for workers of administrative services;
- Services: dummy for service workers;
- Trade: dummy for vendors and service providers of trade;
- Industry: dummy for workers producing goods and services and repair and maintenance;

¹There is evidence that the return to schooling is not linear and rises from ten years of schooling, see Hoffman and Ney (2004).

- Agriculture: dummy for producers, supervisors and workers in agriculture in general.

For the analysis of the occupational distribution of workers, the category Agriculture is detailed in:

- Producer: agricultural producers;
- Workers: workers and supervisors in agriculture;
- Extractive: extractive producers, workers and supervisors in the forestry, hunting and fishing;
- Mechanization: workers at the mechanization of agriculture, forestry, irrigation and drainage.

Finally, the impact of gender discrimination on earnings in each rural area is estimated by the Oaxaca decomposition, which allows the analysis of the portion of the income differential between men and women is explained by the variables used in regression and the unexplained portion, ie, the portion of the difference in earnings that is due to gender discrimination.

The next section presents the results in order to differentiate the workers living in different rural areas and explain the income by gender.

5. Results

The sample used in the description of results is comprised of 10,790,640 workers occupied and paid, residents in Brazilian rural areas in 2009. This population is divided into areas of urban sprawl (4.2% of the sample), exclusive agglomerations (84.8%) and rural settlements (11%). Rural settlements, which accounts for 11% of the sample is formed by the following areas: villages (10.28% of the total sample), core (0.44%) and other rural areas (0.27%).

Table 1 allows observing the gender distribution of paid employees and occupied in each type of rural area.

Table 1. *Occupied and remunerated worker's distribution by gender and rural area (in percentage)*

Rural areas	Women	Men
Urban sprawl	42,23	57,77
Rural settlement	33,43	66,57
Exclusive agglomeration	24,98	75,02
All rural areas	26,63	73,37

Source: elaborated by the authors using data from PNAD (2009)

In the sample, men are 73.37%, but this percentage is quite different in each region, showing that the labor market for men and women differs depending on the area.

The male presence is higher in the exclusive agglomerations areas, where they are just over three quarters of individuals. In urban sprawl areas, men are 57.77% of the total, the lowest percentage among the areas in this study. This may be related to the higher level of integration of women into the labor market in urban areas, compared to that observed in rural areas. In regions of rural settlements, the percentage of men is 66.57%, indicating that these are a transition zone between the regions of urban sprawl and exclusive agglomerations.

Table 2 shows the results of the average income per hour, described by gender, location and economic activity.

Table 2. *Occupied and remunerated worker's average hourly income by gender, rural area and economic activity (in Reais)*

	Women		Men	
	Average	Standard Deviation	Average	Standard Deviation
Urban sprawl				
Agriculture	0,8689	0,3206	2,4644	3,2165
Non agriculture	4,3710	3,4330	5,4687	5,2806
Total	4,3398	3,4336	5,3818	5,2565
Rural settlement				
Agriculture	1,4593	0,9710	2,2590	3,5275
Non agriculture	3,3520	3,1670	4,4129	6,5051
Total	3,0933	3,0349	3,4213	5,4513
Exclusive agglomeration				
Agriculture	3,3080	8,7334	3,5905	7,7073
Non agriculture	3,9590	4,2904	4,7648	6,9922
Total	3,7975	5,7310	3,9332	7,5246
All rural areas				
Agriculture	3,1393	8,3514	3,4962	7,4952
Non agriculture	3,8993	4,0798	4,7736	6,7799
Total	3,7343	5,3173	3,9286	7,2861

Source: elaborated by the authors using data from PNAD (2009)

Considering all rural areas, the average income per hour for men is R\$ 3.92, while women earn R\$ 3.73 for hour of work, a 5.20% gap in favor of male workers.

Looking at income for each type of rural area, men's earnings are higher in all cases. In areas of urban sprawl are the highest values of hourly pay for both genders. However, these locations also observed the largest difference between the income of men and women, 24% in favor of men.

In regions of rural settlements is the lowest hourly income for both genders, on average. The amount received by men is R\$ 3.42 and women receive R\$ 3.09.

In exclusive agglomeration areas is the smallest difference in the amounts earned by each gender. The income of men is R\$ 3.93 per hour, while the average income of women is R\$ 3.79.

In all regions, non-agricultural activities have higher incomes, for both genders. In areas of urban sprawl are the larger income differential between non-agricultural activities and agricultural activities.

Considering these facts, we can return to the concept of the new rural, composed of modern agriculture based on commodities and linked to agribusiness; non-agricultural activities linked to housing, leisure, industrial activities and services; and activities driven by agricultural niche markets, such as fish farming, horticulture, floriculture, fruit etc. It is believed that the new rural development leads to greater demand for workers in non-agricultural occupations in urban sprawl areas, while in exclusive agglomerations areas there is greater demand for agricultural workers.

Table 3 shows the percentage distribution of workers employed and remunerated in groups of occupations. The data are presented disaggregated by gender and type of rural region. The sum of the values in each column is 100% and allows observing, for each gender and area in question, the percentage of individuals employed in each occupation.

Table 3. *Occupied and remunerated worker's occupational distribution by gender and rural area (in percentage)*

Occupation	Urban sprawl		Rural settlement		Exclusive agglomeration		All rural areas	
	Women	Men	Women	Men	Women	Men	Women	Men
Managers	2,15	4,07	2,15	2,05	1,36	1,56	1,52	1,69
Science and art	5,74	3,49	6,99	1,69	5,67	0,77	5,85	0,95
Technical school	6,28	7,01	8,30	3,36	8,38	1,69	8,23	2,03
Administrative	12,56	6,94	5,45	2,05	4,89	1,24	5,47	1,51
Services	50,29	15,11	40,69	11,56	34,92	5,57	36,74	6,48
Tradeo	12,68	11,62	10,93	5,21	7,74	2,52	8,51	3,09
Industry	8,94	49,19	11,62	28,03	12,04	16,49	11,78	18,72
Agriculture								
Producer	0,57	0,63	4,62	16,31	13,97	36,44	11,79	33,24
Workers	0,50	1,66	6,99	25,67	9,61	30,28	8,64	28,87
Extractivist	0,28	0,21	2,28	3,86	1,43	2,10	1,47	2,21
Mechanization	0,00	0,08	0,00	0,22	0,01	1,36	0,01	1,20
Total	1,35	2,58	13,89	46,06	25,02	70,18	21,91	65,52

Source: elaborated by the authors using data from PNAD (2009)

In the last two columns of Table 3 are the data for all rural areas together. There are major differences between men and women, since 65.52% of males are engaged in agricultural activities, compared to only 21.91% of women. Among men, agricultural producers and agricultural workers occupations represent more than 60% of the total sample. Industry occupations also have a high percentage in the sample. Among women, the service sector is the one with the largest share of employed persons, followed by occupations in the industry. It is observed that the agricultural producer occupation reaches 11.79%, more than half the number of women employed in agriculture.

In areas of urban sprawl, the occupations in agricultural activities comprise only 1.35% of female labor and 2.58% of male labor. We highlight the gender differences also in the non-agricultural sector, since more than 74% of women are dedicated to the activities of trade, services and administrative tasks, while among men, the largest share is occupied in its industry (49.19%).

In rural settlements, when compared to urban sprawl areas, the share of agricultural activities increases, representing 13.98% of women and 46.06% of men. Disaggregated data for agricultural activity allows noting that agricultural producer and agricultural worker occupations are the most frequent for both genders. Among the non-agricultural occupations, services, commerce and industry sectors are the ones who occupied more female labor. Among men, the industry sector has a large share (28.03%), followed by the services sector.

The largest share of men and women engaged in agricultural activities is in exclusive agglomerations areas. Over 70% of men and 25% of women are engaged in these activities. However, among women, the activity that employs the largest number of workers is the services sector, just as in other rural areas. Another highlight is 12% women industry activities. Looking at the agricultural activities, 13.97% of women in sample are employed as agricultural producers and 9.61% as agricultural workers. Among men in the exclusive agglomerations regions, more than 66% are employed in agricultural activities such as agricultural workers (30.28%) and agricultural producers (36.44%). In non-agricultural activities, only the industry activities are highlighted, representing the occupation of 16.5% of men in these regions.

When analyzing the data from the occupational distribution of workers in three regions, calls attention the large share of non-agricultural rural occupations (ORNA), highlighting the relevance of the new rural for workers living in rural areas. Among women, ORNAs are the majority in all areas: 98.65% in areas of urban sprawl; 86.11% in rural settlements and 74.08% in exclusive agglomerations areas. Among men, the most ORNAs are the majority in areas of urban sprawl (97.42%) and in rural agglomerations (53.94%). In exclusive agglomerations areas this percentage

is 29.82%. It is clear, then, the gradual reduction of the presence of non-agricultural rural occupations (ORNA), from urban sprawl to exclusive agglomerations areas.

However, that does not mean that exclusive agglomerations areas, where most people work in agricultural activities, have not been developing. In these regions, workers in agriculture have higher income, which indicates that productivity is higher and that agriculture was modernized in these areas.

Table 4 presents the results of regressions that aim to explain the determinants of income for men and women in the areas of urban sprawl, rural settlements and exclusive agglomerations.

Table 4. Determinants of income in rural areas

Variável	Urban Sprawl						Rural settlement						Exclusive agglomeration					
	Women			Men			Women			Men			Women			Men		
	Coef.	Std. Error		Coef.	Std. Error		Coef.	Std. Error		Coef.	Std. Error		Coef.	Erro padrão		Coef.	Std. Error	
N	-0,0119	0,0818		-0,0349	0,0698		-0,0311	0,0818		0,2052	0,0633	*	0,0457	0,0404		0,0459	0,0226	**
NE	-0,3510	0,0863	*	-0,3263	0,0735	*	-0,3784	0,0802	*	-0,1913	0,0622	*	-0,4092	0,0324	*	-0,4245	0,0191	*
S	0,4588	0,2152	**	0,0323	0,1462		0,1466	0,1270		0,1595	0,1028		0,1686	0,0355	*	0,2085	0,0223	*
CO	-0,0506	0,1612		0,1726	0,1242		0,1203	0,0969		0,3271	0,0779	*	0,1247	0,0442	*	0,2405	0,0255	*
Age	0,0435	0,0166	*	0,0381	0,0129	*	0,0553	0,0086	*	0,0560	0,0061	*	0,0345	0,0042	*	0,0254	0,0023	*
Age2	-0,0005	0,0002	**	-0,0003	0,0002	**	-0,0005	0,0001	*	-0,0005	0,0001	*	-0,0003	0,0001	*	-0,0002	0,0000	*
Black	-0,1712	0,1403		-0,0831	0,1015		-0,1585	0,0951	***	-0,1393	0,0707	**	-0,0593	0,0475		-0,0816	0,0278	*
Mulatto	-0,1184	0,0732		-0,0209	0,0624		-0,0913	0,0509	***	-0,0610	0,0378		-0,0830	0,0258	*	-0,1362	0,0153	*
Indigenous	-0,3565	0,5960		0,3717	0,5738		0,2038	0,6714		-0,8579	0,3382	**	-0,0010	0,2026		-0,2745	0,1235	**
Schooling	0,0262	0,0135	***	0,0423	0,0104	*	0,0426	0,0088	*	0,0425	0,0059	*	0,0495	0,0044	*	0,0429	0,0025	*
Schooling10	0,0598	0,0450		0,0126	0,0393		0,0514	0,0340		0,0351	0,0281		0,0369	0,0156	**	0,0262	0,0122	**
Stability	0,0181	0,0063	*	0,0015	0,0042		-0,0049	0,0030		0,0001	0,0018		0,0004	0,0014		-0,0007	0,0007	
Managers	1,9326	0,4406	*	1,3902	0,2222	*	0,7490	0,1798	*	1,1690	0,1142	*	0,9196	0,0948	*	0,7878	0,0509	*
Science and Arts	1,2445	0,3882	*	0,9342	0,2345	*	1,0107	0,1498	*	0,7495	0,1257	*	0,6341	0,0689	*	0,7420	0,0800	*
Technical school	1,3030	0,3750	*	1,0677	0,1920	*	0,8963	0,1115	*	0,8340	0,0971	*	0,6678	0,0498	*	0,6141	0,0507	*
Administrative	1,0501	0,3667	*	0,8132	0,1968	*	0,6770	0,1222	*	0,4281	0,1191	*	0,4183	0,0605	*	0,3260	0,0605	*
Services	0,9565	0,3492	*	0,6861	0,1758	*	0,2882	0,0793	*	0,2438	0,0532	*	0,1781	0,0315	*	0,1328	0,0282	*
Trade	1,0751	0,3609	*	0,8217	0,1833	*	0,3824	0,0992	*	0,3085	0,0755	*	0,2317	0,0473	*	0,1944	0,0414	*
Production	0,8687	0,3673	**	0,7284	0,1672	*	-0,2451	0,0926	*	0,4706	0,0420	*	-0,1312	0,0399	*	0,3214	0,0182	*
Constant	-0,8397	0,4573	***	-0,4900	0,2947	***	-0,8429	0,1976	*	-0,7591	0,1422	*	-0,3160	0,0949	*	0,2100	0,0539	*

* Significant at 1%, ** Significant at 5%, ***Significant at 10%

Source: elaborated by the authors using data from PNAD (2009)

In the areas of urban sprawl, the significant coefficients have the same sign for men and women. Those variables that lead to increased income of men also raise the income of women. The difference is the size of the impact on income, because for all these variables, except education, the marginal effects are larger in magnitude for women.

The schooling, as well as the age and stability, are variables related to worker productivity. Education is one of the determinants of human capital, which increases productivity at work. In contrast, age and stability are linked to the experience of the worker throughout his life (age) and current employment (stability) and the greater experience, greater productivity.

In the case of schooling, other variables held constant, an increase of one year of study raises, approximately, men yield in 4.32%, while the income of women increases only 2.66%. Schooling10 variable is not significant for both men and women, showing that in urban sprawl areas there is no additional return for cases in which schooling is over 10 years.

The coefficients for age and age2 are significant for men and women, making possible measuring the age at which men and women reach their maximum income: 43.5 years for women and 63.5 for men. And the effect of age is higher for women, indicating that the lifelong experience has more impact on female workers.

Stability variable is significant only for women. The longer the experience in employment, higher is the income for women. Analyzing the effect of stability together with age, it can be concluded that, in areas of urban sprawl, the experience is more relevant to the income of women than in men.

The region where the employee lives is also important for the determination of income, since each region has a different economic dynamics and labor mobility is limited. Living in the Northeast, when comparing to Southeast, reduces income for man and woman, probably because the region is poorer than the Southeast. Living in the South, where there is more traditional family farming and rural properties are smaller, has positive effect for women.

The dummy variables for color: Black, Mulatto and Indigenous, in relation to white skin, were not significant; indicating that, in areas of urban sprawl, there should be no discrimination by color.

And the analysis of dummies for occupational groups, when compared to agricultural occupations, shows that the coefficients are significant and positive. The greatest effects are found in the group of managers, which raises the income of women in 590.75% and 301.57% in men. And even in the occupational groups that have smaller effects in relation to agricultural occupations, there is still a differential: for women, the gap in the industry group is 138.38% and in the case of men, the gap in services is of 98.60%.

It is believed that the major difference found in relation to agricultural occupations occurs precisely because of the type of rural area. In areas of urban sprawl, there are greater opportunities for employment outside of agriculture, so there would be greater competition among companies to hire these workers. On the other hand, in these areas, there is less chances of employment in agriculture, reducing the competition for workers. This raises income in the non-agricultural occupations and reduces the income in agricultural occupations, in the areas of urban sprawl.

Just as happens in the areas of urban sprawl, the analysis of rural settlements areas shows that the signs of significant coefficients are the same for men and women and that most of the variables effects on income (in absolute values) are higher for women.

On the other hand, unlike the areas of urban sprawl, schooling, age and age2 have very similar coefficients for men and women. And besides, the variables schooling10 and stability are not significant for both women and for men. These results therefore indicate that, in areas of rural settlements, productivity is rewarded similarly for both genders.

The return for an additional year of schooling is approximately 4.35% for women and 4.34% for men and the age at which the employee reaches the maximum income is 56 years for women and 55.3 for men.

Regarding the place of residence, compared to the Southeast, the fact of living in the Northeast has greater impact in reducing the earnings of women than men, and this may occur due to local culture and the lower valuation of women's work. For men, the coefficients of the dummies in the North and Central-West are also significant and positive. Comparing to the Southeast, living in these regions increases the income. One possible explanation is the recent economic growth in the North and Central-West, which may have increased the demand for workers.

In rural settlements areas, a negative impact on income of black workers can be verified, for both men and women. For mulattos, negative impact on income is observed only for women. For indigenous workers, negative impact on income is observed only for men. This shows that in these areas, unlike urban sprawls, there is income discrimination by skin color.

Estimated results for the occupational groups show that, compared to agricultural occupations, all groups have positive effects on income, except industry sector for women. Regarding agriculture, the income gap reaches its maximum in the group of science and art for women (174.75%) and managers for men (221.88%). Smaller differentials are found in industry (-21.74%) and services (27.61%), for women.

It is noticed that in the areas of rural settlements, the income differential between agricultural and nonagricultural sector is lower than in areas of urban sprawl, but most non-agricultural occupations provides a positive income differential for the employee. This is justified because, in the areas of rural settlements, the possibilities of working outside of agriculture are limited, leading to lower demand for workers, compared to areas of urban sprawl.

Finally, in exclusive agglomerations areas, effects are found in the same direction (positive or negative) for both men and women, except in the group of industrial occupations, as also happens in the areas of rural settlements.

The impact of variables related to worker productivity is higher for women, unlike what happens in rural settlements. In the case of schooling less than 10 years, an additional schooling year has an impact in income of approximately 5.08% for women and 4.38% for men. For education over 10 years, there is an additional premium estimated at approximately 8.84% for women and 7.03% for men. Regarding age, it can be seen that the maximum income was reached at 57.5 years for women and 63.5 years for men.

Regarding the region compared to the Southeast, the impact on income has the same direction as those obtained in other rural areas, living in the Northeast has a negative effect on income and living in the South or Central-West has positive effect for both genders. Although the direction is the same, the magnitude of the impact varies. It is similar in the Northeast, but has some difference in South and significant difference in the Central-West, where the increase in income of men more than double that obtained women living in the same region. For men, there is a positive effect of living in the North region.

The variables concerning the skin color show that, in exclusive agglomerations areas there is discrimination by skin color, especially for men. Black, mulattos and indigenous workers have reduced income, when compared to white skin workers. In the case of women, only the negative coefficient of mulattos is significant evidence of income discrimination against that skin color.

And, completing the analysis of the areas exclusive agglomerations areas, just as in the areas of rural settlements, all the occupational groups have a positive impact on income (when compared to workers employed in agriculture), except the industry group for women.

However, the income differential between agricultural and non-agricultural occupations, which had declined from the areas of urban sprawl to the areas of rural settlements, further reduces. The biggest differential is estimated at 150.83%, for women, and 119.86% for men, both in the group of managers, and the smallest differential is estimated at -12.30% for women working in industry and 14.20% for men who work in services sector.

This reduction in the income differential can be caused by the type of rural area, since agricultural activities are dominant in areas of exclusive agglomerations and there is greater need for workers in this activity, increasing demand for workers and raising income of workers in agricultural occupations.

There is a gradual transition of the differential income by groups of occupations from the urban sprawl areas to rural settlements areas and exclusive agglomerations areas. This is due to the different dynamics of the economy of rural areas leading to greater or lesser demand for workers in the agricultural sector and in non-agricultural sectors.

Table 5 presents the results of the Oaxaca decomposition for gender discrimination.

Table 5. Oaxaca decomposition for gender discrimination

	Urban Sprawl			Rural Settlement			Exclusive agglomeration		
	Coef.	Std. Error		Coef.	Std. Error		Coef.	Std. Error	
Women	1,2362	0,0385	*	0,8311	0,0302	*	0,9422	0,0135	*
Men	1,3974	0,0316	*	0,9185	0,0200	*	0,9585	0,0075	*
Difference	-0,1612	0,0498	*	-0,0874	0,0362	**	-0,0164	0,0155	
Explained	0,0917	0,0681		0,3976	0,0356	*	0,2760	0,0156	*
Unexplained	-0,2529	0,0744	*	-0,4850	0,0386	*	-0,2924	0,0180	*

* Significant at 1%, ** Significant at 5%, ***Significant at 10%

Source: elaborated by the authors using data from PNAD (2009)

Oaxaca decomposition identified differential income for each type of rural area and the portion of this difference explained by the evaluated attributes (variables) and the portion not explained by these attributes, which represents the gender discrimination.

In urban sprawl areas the differential in earnings between men and women is 16.12% in favor of men. 9.17 percentage points are due to differences in attributes and the unexplained portion due to gender discrimination is -25.29 percentage points.

In the rural settlements areas, the effect of discrimination is even greater. The estimated income differential is 8.74% for men, the portion explained by characteristics of workers is 39.76 percentage points and the impact of discrimination is -48.50 percentage points.

And in exclusive agglomerations areas, the gap is estimated at 1.64%, which 27.60 percentage points are due to differences in attributes and -29.40 percentage points attributed to gender discrimination.

It is noticed that in all areas, the share is explained by attributes is positive. If women had the same characteristics as men, the differential would actually be favorable to them. However, the unexplained portion is always negative and larger (in absolute values) than the explained parcel. Due to gender discrimination, women's income is reduced.

It is necessary attention to carefully analyze the differences in income, because in spite of the greater differential income estimated to be in areas of urban sprawl, it is precisely those areas where the impact of discrimination is lower. It is believed that discrimination is smaller in this area due to the influence of the urban area and the ease of women entering the labor market.

On the other hand, the rural settlements areas and exclusive agglomerations areas have less contact with the urban area. Therefore, the elimination of the belief that women are not capable of performing the same jobs as men, or that women should not work, can be less intense. Thus, it is expected that discrimination in these areas is higher. But it is observed that while the impact of gender discrimination on the differential income in exclusive agglomerations areas is slightly larger than in the urban sprawls, in rural settlements this impact is almost the double. One possible explanation is that in areas of exclusive agglomerations, jobs are more homogeneous and the system of remuneration for a significant portion of workers depends on the production, regardless of the gender of the worker.

6. Final Remarks

The aim of this study is to analyze the income and gender discrimination in Brazilian rural areas, according to the division by PNAD-IBGE (2009) in urban sprawls, rural settlements and exclusive agglomerations areas. Our sample consists of occupied and remunerated population resident in rural areas in 2009.

The results show that the average income per hour for the main work is R\$ 3.73 for women and R\$ 3.93 for men. The lowest average incomes are found in rural areas and the largest income is found in urban sprawl areas. In all areas, the average income of agricultural workers is lower than the income obtained in non-agricultural sectors, with the smallest differential found in the areas of exclusive agglomerations.

Regarding the occupational distribution in the three areas studied, women workers are concentrated in the category of services, but the percentage of women in agricultural occupations varies: in urban sprawl is 1.35% in rural settlements is 13.89% and in exclusive agglomeration areas is 25.02%. For men, in areas of urban sprawl, only 2.58% work in agricultural activities and 49.19% in industry, repair and maintenance of assets. In rural settlements, there are 46.06% of agricultural workers and in areas of exclusive agglomerations this percentage rises to 70.18%.

The analysis identifies estimated earnings differential for men in the three regions studied: in areas of urban expansion, the income gap between genders was 16.12% in areas of rural settlements, this figure was 8.74%; and in exclusive agglomerations areas, 1.64%.

Finally, the evaluation of discrimination by gender shows that there are negative impacts on women's income estimated at: -25.29 percentage points in areas of urban sprawl, -48.50 percentage points in rural settlements and -29.40 percentage points in exclusive agglomerations areas.

These results highlight the differences in the labor market in rural areas, suggesting that rural development occurs gradually and that the characteristics of the new rural activities (modern agriculture based on commodities and linked to agribusiness; non-agricultural activities, linked to housing, leisure, industrial activities and services; and agricultural activities driven by niche markets, such as fish farming, horticulture, floriculture, fruit, etc.) are inserted differently on the urban sprawl, rural settlements and exclusive agglomerations areas.

From the results presented, it is clear that the positive marginal effect of non-agricultural occupations on income is higher in areas of urban sprawl, followed by rural settlements and is lower in exclusive agglomerations areas. Thus, it is believed that the new rural development leads to greater demand for workers in non-agricultural occupations in urban sprawl areas, while in exclusive agglomerations areas there is greater demand for agricultural workers.

In relation to discrimination by gender, the results show that there is a high impact that affects women, especially in areas of rural settlements. The positive marginal effect of non-agricultural occupations is larger for women, except in the industry sector. Thus, can be recommended to stimulate the work of women in these occupations, and this could be done in two ways: by encouraging firms to settle in rural areas, especially in areas of rural settlements, and increasing mobility of workers through public transportation, so that women can get non-agricultural jobs outside the rural areas. Also, should be focus in education to eliminate any beliefs that lead to gender discrimination.

Future research can deepen the study on how the new rural activities are distributed between the various rural areas and to pay attention to how to change the determinants of income of men and women, as well as the impact of gender discrimination on income in different areas rural areas over time.

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