WELLBEING OF SMALLHOLDERS MAINTAINING HOMEGARDENS: A CASE STUDY OF RURAL COMMUNITIES IN THE EASTERN AMAZON

[BIENESTAR DE PEQUEÑOS PRODUCTORES CON HUERTOS FAMILIARES: ESTUDIO DE CASO EN COMUNIDADES RURALES DEL ESTE DEL AMAZONIA]

Thiago Almeida Vieira[1]*, Leonilde dos Santos Rosa[2], Maria Marly de Lourdes Silva Santos[3]

[1] D.Sc. in Agrarian Science, Universidade Federal do Oeste do Pará, Brazil. E-mail: thiago.vieira@ufopa.edu.br
[2] D.Sc. in Sustainable Development in Humid Tropic, Universidade Federal Rural da Amazônia, Brazil. E-mail:leonilders@yahoo.com.br
[3] D.Sc. in Agronomy, Universidade Federal Rural da Amazônia, Brazil. E-mail: maria.marly@ufra.edu.br
** Corresponding author*

SUMMARY

The purpose of this study was to investigate the life quality of subsistence farmers in the municipality of Bonito, Pará, Brazil, by analyzing their objective and subjective well-being. Semi-structured interviews were used to collect socioeconomic and life satisfaction data, which were evaluated by tools of descriptive statistics and multivariate data analysis. The interviewed farmers have a low educational level and a modest family income. The average housing quality index was considered satisfactory. The degree of subjective well-being of the subsistence farmers was high and the family income had little influence on the farmer's well-being. It is believed that well-managed homegardens can provide an increase to the family income, with an effect over the economic wellbeing and a better quality of life, including the housing of these families.

Key words: Family farming; Global satisfaction; Quality of life.

RESUMEN

El propósito de este estudio fue investigar la calidad de vida de los agricultores de subsistencia en el municipio de Bonito, Pará, Brasil, a través del análisis del bienestar objetivo y subjetivo. Entrevistas semi-estructurada se utilizaron para recopilar datos socio-económicos y sobre la satisfacción de vida, los cuales fueron evaluados mediante herramientas de la estadística descriptiva y multivariante. Los agricultores entrevistados tienen un bajo nivel educativo y una renta familia modesta. El índice de calidad media de la vivienda media se consideró satisfactorio. El grado de bienestar subjetivo de los agricultores de subsistencia es alto y el ingreso familiar tuvo poca influencia en lo bienestar de los agricultores. Se cree que la buena gestión de los huertos caseros puede proporcionar un aumento en el ingreso familiar, con efecto en el bienestar y una mejor calidad de vida, incluida la vivienda de estas familias.

Palabras clave: Agricultura familiar; Satisfacción global; Calidad de vida.

INTRODUCTION

From the time of the invention of the wheel util today's most recent research results, with cutting edge technologies, such as cloning and nanotechnology, the desire for a better life never went out of date (Graziano, 2005). For this author, happiness and well-being are synonyms, because from his point of view, there is no happiness unless it is perceived by the person.

Well-being can be understood from two aspects: the objective and subjective. The objective well-being can be measured by socioeconomic indicators, based on objectives, quantitative statistics, but not on subjective perceptions (Diener and Suh, 1997). For the authors the subjective well-being is related to the life experiences of a person, to feelings of pleasure or cognitive satisfaction. In other words, it is an assessment of individual and social values and

expectations, as well as of organic and psychological factors (Neri, 2002).

Passareli (2007) claimed that it is a human habit to relate the subjective well-being with socioeconomic factors such as employment, income, or relationships, this is why someone will commonly say, for example: "I'm glad I got my salary" or "I feel depressed when I'm alone."

Despite a vast literature over the importance of this issue, few studies have addressed this subject in the tropics, for example for the Amazon region. In this region, an increasing proportion of the population is living in urban centers, in environments dominated by manmade structures and machinery, while the other part lives in rural areas.

The Amazon region, a frontline of economic and demographic expansion in Brazil, was included in a major process of nation-wide migration since 1970. Currently, this process is dominated by the migration flow, between rural and urban areas along the front of the land used by loggers, cattle ranchers and soy farmers (Becker, 2005) and more recently by oil palm growers.

In rural areas, landscape changes due to the expansion of economic activities are causing climate change that affect the well-being of the population (Corvalan *et al.*, 2005), as in the case of the farmers living in the Amazon region, whose subsistence activity is closely linked to natural resources, from which they derive their income.

In this context, this study was designed to identify the main factors that influence the objective well-being of family farmers, who maintain homegardens in the municipality of Bonito, as well as their subjective well-being, based on the understanding that the self-assessment of farmers about their level of well-being, in relation to different aspects of their life must be taken into consideration.

MATERIAL AND METHODS

The survey was conducted in the municipality of Bonito (latitude 01°21'48" S, longitude 47º18'21" W), in the region of Bragantina, Pará. Bonito is 142 km away from Belém, the capital of Pará.

Data were collected in December 2010. In this study, all 24 families of subsistence farmers maintaining homegardens in the communities Sumaúma, Cumaruzinho, Pau Amarelo, and São Benedito were interviewed. To collect data related to the objective well-being, they were questioned about the housing quality and level of income and education.

The communities targeted in this study are surrounded by cattle ranches, by properties with homogeneous reforestation of oil palm (*Elaeais guineensis* Jaquim), and more recently by a mineral company, which began production in the first half of 2011. These activities, along with the slash-and-burn practice used in shifting or migratory cultivation, have led the conversion to secondary forest areas in the study county.

The housing quality indicator was assessed based on variables such as, the material of the floor, walls and roofs of the houses, as well as the type of bathroom, stove, aside from the presence or absence of electricity, running water and garbage collection networks. These variables were used to define the housing quality, as described by IBGE (2008) and Liberato *et al.* (2006). For the calculation, the variables were quantified in numbers (weights).

To compute the housing quality indicator, the values of all variables per residence were added and divided by the maximum possible value (sum of the weights) of a house. This resulted in a housing quality indicator per family unit, between 0 and 1, as proposed by Liberato *et al* (2006).

To measure the level of subjective well-being of local peasants, three types of satisfaction were analyzed: global satisfaction, to understand how the person sees his life in general, compared satisfaction, based on comparisons with another farmer in the community / surroundings; and specific satisfaction, where the assessment is based on issues related to a specific activity, in this case, agriculture (Passareli, 2007).

The variables were assessed by means of semi-structured interviews consisting of eight questions, in which the responses were scored on a modified Likert scale of 1-4, where (1) represents no answer (2) - dissatisfaction (3) - satisfaction and (4) high satisfaction. The Likert scale serves as a measure of attitude, based on self-reports containing various statements about a certain subject (Oliveira, 2001a).

The study has a descriptive character, with non-probabilistic sampling. The data were analyzed using descriptive statistics, estimation of the Pearson linear correlation and factor analysis in principal components, the *varimax* method (orthogonal factor rotation), following the steps established by Hair Jr *et al.* (2009) and Passareli (2007).

The adjustment of the method to the data sample was performed based on Santana (2007) and Hair Jr *et al.* (2009). For this, two tests were applied: Bartlett's sphericity test (evaluation of the general significance of the correlation matrix), and the Kaiser-Meyer-Olkin (KMO) based on the principle that the inverse

correlation matrix approaches the diagonal matrix. For KMO, values above 0.50 are acceptable (Hair Jr. *et al.*, 2009).

RESULTS AND DISCUSSION

1) Objective well-being

Schooling

The survey stated that 12.5% of the peasants were illiterate, 79.1% had an incomplete primary education, 4.1% had an incomplete secondary education and 4.1% had completed high school.

This variable was negatively correlated (-0.695) with the farmers' age, in other words, the educational level of the senior farmers (over 60 years) was the lowest, with frequent cases of illiteracy.

The low schooling level in these communities can be explained by the need to start working at a very young age, interrupting the basic education. According to Silva (2002), in a survey conducted in Vale do Jequitinhonha, Minas Gerais, young people often leave school because they get entangled in a sequence of grade repeating, either because they have to migrate to urban areas to contribute to the family income, or drop out of school temporarily to help their parents on the farm, mainly in the planting phase, or because the local school offers no career prospects and opportunities, especially at the time of entry into the labor market.

Monthly family income

It was found that the income of the surveyed families ranged from R$ 400.00 to R$ 1,000.00, with an average of R$ 606.25. The recommended minimum for a family's survival and sustenance in Brazil (called by the government organs basket of basic foods) was R$ 226.09, in December 2010. This shows that the purchasing power for food of families with more than three members, would be low on the market.

The *per capita* income ranged from R$ 80.00 to R$ 500.00, with an average of R$ 189.17. The correlation between income and age was considered moderate (0.609), allowing the conclusion that, there is an increase in the family income with increasing age of the peasants, this can be explained by the construction of the family patrimony and the strengthening of commercial relations on the local agricultural market.

The *per capita* income is a good evaluation criterion of the economic well-being of families. According to Moraes (2006), the *per capita* income indicates the purchasing power that a member of a family or community has to buy essential goods and services and other goods, that provide some satisfaction.

For Salvato *et al.* (2010), the unequal income distribution in Brazil is related to the concentration of individuals with a low educational level (low human capital) and low physical capital, resulting in low income, as in the case of the North and Northeastern regions of Brazil.

Housing quality

The average indicator of housing quality was 0.64, it was considered adequate for inhabitants of rural areas. It is interestingly that approximately 58.3% of the visited homes scored above average, and 41.18% of the respondents have a residence with a housing quality index above 0.70, which can be understood as appropriate for housing conditions in this study.

The quality of most of the farm houses with homegardens was good, considering the construction material of the floor, walls and roof (Figure 1). A gradual development of improvements over the years was observed, since the housing conditions of the old farm houses, still standing next to the newer ones, were not adequate.

The improvement of the farmers' housing conditions in Bonito, was most likely a consequence of conditional cash transfer programs, for example the " Programa Bolsa Família", a family allowance, or the National Rural Housing Program (within the larger framework of "Minha Casa Minha Vida" - My House My Life Program, the Brazilian government's social housing initiative for low-middle income families), which is intended to subsidize the construction, renovation or acquisition of housing for family farmers and rural workers (Brasil, 2009).

Also with regard to housing quality, the study in Bonito showed that 12.5% of the farmers who maintain homegardens, still have not electricity in their homes. The lack of electricity in rural areas can be considered a barrier to the economic development in these regions, by preventing the processing and manufacturing of the agricultural goods, which would add value to the agricultural raw produtcs.

For Souza and Anjos (2007), residential electricity grants access to information and to the construction of critical thinking, based on sources about various national issues, allowing a more effective political participation in decision-making, aside from broadening the range of options for income generation.

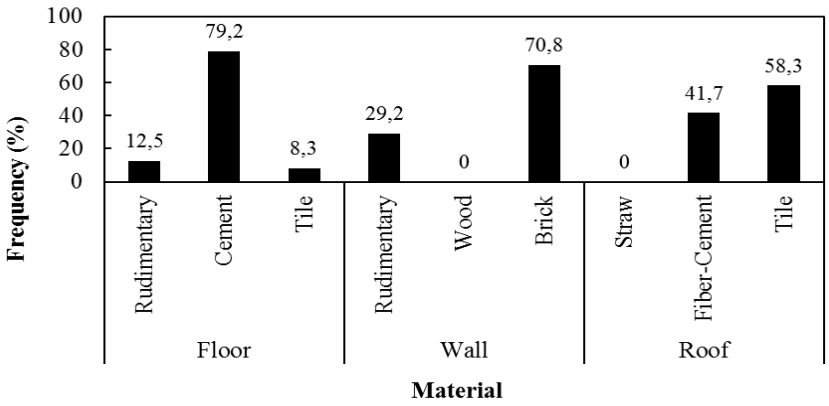

Figure 1. Quality of the floor, walls and roof material of selected households in rural communities of Bonito, Pará, Brazil.

According to Ribemboim and Menezes Junior (2008), there is a consensus among academics and politicians about the need for energy input, when discussing about the economic and social development of a region. In addition, electrification also leads to an expanded demand for appliances and other equipment, on addition to new consumer habits, such as cable TV and mobile phones, which are the positive consequences of rural electrification for the overall economy (Oliveira, 2001b).

In terms of water resources, 54.2% of the farmers tap groundwater, by digging shallow wells, for the residential water supply. The other farm houses (45.8%) are supplied by surface water, for example, water for personal hygiene, food and agriculture is derived from small rivers. These data indicate that from the point of view of water supply, the households in Bonito are inadequate. According to the IBGE (2008) the water supply of a household is considered adequate when fed by a main water supply system, connected to a sewage collection system or septic tank, attended by direct or indirect garbage collection, and not more than two residents per bedroom.

The farmers' health can also be affected by the lack of sanitation, since 12.5% of the surveyed properties have no sanitation and on 66.7% the sanitary installations are very primitive, consisting of holes dug in the ground without a proper protection, threatening the groundwater, and consequently exposing to a health risk. Only 20.8% of the farmers have bathrooms in the house, connected to a septic tank.

Bernardes and Soares (2011) warned that the sanitary infrastructure and water supply in five municipalities of the state of Pará is rather precarious, especially in rural regions and particularly in the riverine areas. These authors claimed that sanitation improving the water quality, will have great positive impacts over the health of the population in these regions.

Much of the waste produced in the communities is burned and buried. In some cases, the organic waste is used as fertilizer for plants grown in the homegardens.

A similar situation was observed by Veiga and Burlandy (2001) in rural settlement areas in the state of Rio de Janeiro. These authors showed that 34.5% of the sewage flowed through rudimentary cesspools, and 31.2% and 11.0% had no running water and bathroom, respectively. The quality of housing and health services appropriate for a healthy human life are the constructed conditions that reflect the quality of life (Umbelino, 2007).

2) Subjective well-being
Global satisfaction

The global satisfaction of the family farmer, according to the view of his own life, was approximately 93%. This is a very positive life assessment. However, when the farmers compared themselves with others (a neighbor, for example), the satisfaction decreased to almost 88%, though with no significant difference ($P > 0.05$). The reason is that in the rural areas of the Amazon, reciprocal relations, which enable labor exchange to complement the family labor, strengthen the ties between the farmer families, fostering the social network (Rosa, 2002) and reducing competition.

In urban areas, this relationship would probably be different, since people tend to have a self-concept in which they see themselves as superior to others. The

ever-present capitalist market in urban environments, can transform human relationships and people into commercial values, in addition it promotes the fragmentation of human solidarity and sociability skills (Gomes and Silva Junior, 2007).

In this study, the variables income and global satisfaction were weakly correlated (0.213), revealing low relationship. This shows that an income increase increases makes higher the subjective well-being of these farmers only slightly, it confirms the finding of Diener and Biswas-Diener (2002), that the correlation between subjective well-being and income is low.

This result was expected, because the satisfaction or self-assessment that a person makes about his/her life, is the result of the person's accumulated life experiences and the internal state, providing the feeling of happiness (Sposito, 2008), and is related to cognitive and affective evaluation (Graziano, 2005), rather than being only the result of good financial conditions only.

Specific satisfaction

When asking the farmers about specific satisfaction related to homegardens and socioeconomic conditions of the family farm (Figure 2), the highest frequency of specific satisfaction was recorded for the variable homegarden and housing conditions. The high level of satisfaction with homegarden, can be explained by the sociocultural and economic role this ecosystem plays for each family. In the case of housing, this satisfaction may be the result of government programs that promote the construction or renovation of houses, as explained above.

The peasants' satisfaction was lowest about the land preparation for crops and pastures, as well as the management of these systems. The slash-and-burn practice, very common, over in the study area in Amazonia, was identified as the main cause of non-total satisfaction, same to with the way of preparing the soil. In addition, the dependence on pesticides and chemical fertilizers required for the management of the agricultural systems, restricted the satisfaction of the farmers.

This reflects the lack of technical assistance, based on the principles of sustainability that are transmitted by the National Technical Assistance and Rural Extension Agency. This gap in the offer of public service was noted by Rosa *et al.* (2009) in a study about the obstacles for the adoption of agroforestry, by smallholders in the region of Bragantina.

Factorial Analysis

The analysis of the dependence's structure among the variables is presented in Table 1. The highest positive values on degree of association between variables were found for land preparation and management of agricultural systems, followed by the work capacity and family labor. The family income had a moderate and positive relationship with agricultural production.

The suitability of applying factor analysis for this data set, was demonstrated by mean of the value of the Kaiser-Meyer-Olkin (KMO) measure (0.524). Values above 0.50 indicate the feasibility of this tool to analyze a given problem (Hair Jr. *et al.*, 2009). This adjustment was confirmed by Bartlett's sphericity test, which determined a p value of approximately zero (0.000), i.e., below the level of significance $\alpha = 5\%$. The results allow the use of factor analysis to extract factors and estimate the factor scores.

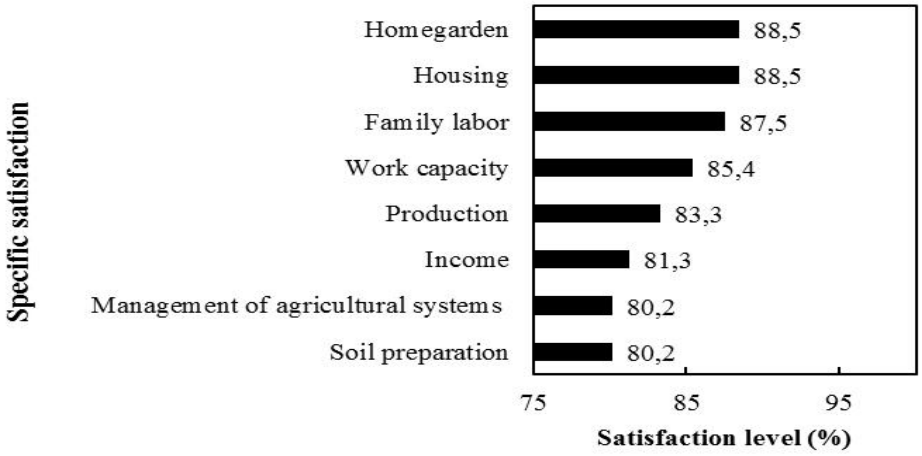

Figure 2. Specific satisfaction of family farmers for aspects related to agriculture, Bonito, Pará, Brazil.

Table 2 shows the results of the eigenvalues for the extraction of factors from the spectral decomposition of the correlation matrix. Factorial analysis revealed the existence of four components with eigenvalues above 1.000.

Factor 1 explained most of the total variance (22.06%), followed by factor 2 (20.76%), factor 3 (19.43%), and factor 4 (17.47%). The first three factors together explained 79.71% of the total data variance, above the acceptable minimum of 70%, since values closer to 100% improve the analysis results (Hair Jr. *et al.*, 2009).

The result of varimax rotation of the four factors extracted by principal component extraction, i.e., the loading factor of each variable in each factor, is shown in Table 3. This table also contains the communality values, which according to Santana (2007), indicate the degree to which each variable can be explained by the factors.

According to Santana (2007), a significance value must be attributed to the factorial solution. For the author, this is a substantive interpretation of the pattern of factorial loadings for the variables, including their signs, in an effort to name each factor. He suggested that the significant factorial loadings to be used in the interpretation process. Thus, the variables with greatest load, have most influence on the selection of names or labels to represent the factors (Table 4).

Table 1. Pearson correlation matrix for the variables of satisfaction: global (GS), compared satisfaction (CS), work capacity (WC), family labor (FAL), housing (house), family income (Inc.); agricultural production (Prod), homegarden (HG), soil preparation (SP), management of agricultural systems (Man.), based on the scale of subjective well-being of family farmers in Bonito, Pará, Brazil.

Variable	**GS**	**CS**	**W.F.**	**FAL**	**House**	**Inc.**	**Prod**	**HG**	**SP**	**Man**
GS	1									
CS	**.514***	1								
W.F.	**.473***	.174	1							
FAL	**.454***	.296	**.776****	1						
House	.126	-.006	.246	.153	1					
Inc.	.350	.298	.334	.137	.370	1				
Prod.	.274	.207	.243	.184	.292	**.598****	1			
HG	**.492***	.350	.279	**.459***	.303	.302	**.423***	1		
SP	-.061	.132	.129	.108	.026	.235	-.246	-.196	1	
Man.	.052	.132	.196	.181	.026	.155	-.326	-.268	**.937****	1

* Significant correlation at 0.05 (bilateral). ** Significant correlation at 0.01 (bilateral).

Table 2. Eigenvalues for the extraction of factors from the spectral decomposition and total variance**.**

Component	**Eigenvalues (λ) and initial variances**			**Variance after rotation**		
	Total variance	% variance	Accumulated variance	Total variance	% variance	Accumulated Variance
1	3.338	33.381	33.381	2.206	22.056	22.056
2	2.254	22.544	55.925	2.076	20.757	42.813
3	1.302	13.019	68.944	1.943	19.429	62.241
4	1.076	10.764	79.708	1.747	17.466	79.708
5	.705	7.048	86.756			
6	.497	4.973	91.728			
7	.416	4.160	95.889			
8	.251	2.506	98.394			
9	.129	1.287	99.681			
10	.032	.319	100.000			

Table 3. Matrix of factor loadings (α) of the variables under study, after orthogonal rotation by the *Varimax* method

Variables	Factors				Communalities
	F1	F2	F3	F4	
GS	-.062	.462	.149	.**679**	.700
CS	.124	.075	.053	.**884**	.806
Work cap	.131	.**874**	.213	.085	.834
FAL	.059	.**913**	.025	.216	.885
Housing	.024	.255	.**727**	-.247	.656
Income	.226	.027	.**815**	.337	.830
Production	-.334	.062	.**740**	.275	.739
Homegarden	-.362	.413	.354	.**444**	.624
Soil preparation	.**965**	.029	.046	.038	.935
Management	.**970**	.131	-.052	.036	.962

Where: GS: global satisfaction; CS: compared satisfaction; Work cap.: work capacity; FAL: family labor.

Table 4. Factors of well-being of farmers in the municipality of Bonito, Pará, Brazil.

Factor number	Factor label	Original determinant factors
1	Management of production systems	Soil preparation Management of agricultural systems
2	Workforce	Work capacity Family labor
3	Quality of life	Housing Income Production
4	Life satisfaction	Global satisfaction Compared satisfaction Homegarden

Factor 1, Management of Production Systems, consists of the satisfaction variables in relation to the Preparation of the Area and Management of Farming Systems, both highly and positively interrelated, showing that soil preparation and management are related variables. For the farmer, the satisfaction in relation to these variables is linked to the way these activities are carried out.

In Factor 2, labeled Workforce, the satisfaction variables were Work capacity and Family labor. As in the first factor, these variables had a high positive inter-relationship, indicating that they tend in the same direction. The variables are related to the available workforce on a property. On the one hand, the self-assessment the farmer makes about his own production capacity is considered, that is, his "satisfaction with the proper work capacity." On the other hand, the collective labor force available to do the farm work, represented by the "Satisfaction with family labor." From this, it was interpreted that, as the peasant's satisfaction with his own work capacity increases, his satisfaction with family labor increases as well.

The third factor, Quality of Life, consists of the satisfaction variables Housing, Income and Agricultural production on the property. These variables had positive loadings and high values, indicating strong interaction between each other. The

variables are related in some way or another with the degree of capitalization of the family farmer. Thus, the satisfaction of the farmer with regard to housing is related with the type of house, electricity, piped water, density of residents per household, and type of sanitation, etc. In turn, the satisfaction with the agricultural production is the result of income and is related to the economic conditions. This satisfaction will also depend on the techniques used to prepare the fields and in the management of the production systems. The satisfaction is the product of the harvest of various types of products obtained on the farms. In the case of Bonito, the production of cassava flour (*Manihot esculenta*) is particularly important.

For Sen (2000), well-being is an essentially mental characteristic that generates pleasure or happiness and is generally related to income, but depends crucially on various personal, as well as social circumstances. Consequently, it is evidently not a general truth, that people with a high income are happy and have a high level of subjective well-being.

The fourth and final extracted factor, called Life satisfaction, consisted of three variables: Global satisfaction, Compared satisfaction and Satisfaction in relation to the homegardens. These three variables were positively related, indicating a tendency in the same direction, with moderate to high interrelations of the first two, and a low of the third. This result indicates that global satisfaction is strongly related with compared satisfaction, that is, the assessment a farmer makes about his life in general, is always compared to another farmer, an acquaintance of his. In other words, since human beings always seek the best for themselves and their family, they will always compare themselves with someone else, who serves as a reference for comparison.

In the case of homegardens, the satisfaction can be explained by the role this agroforestry practice, plays in family farming in terms of nutrition, health, livelihood, social integration, and leisure. In the study area in Bonito, for example, all farmers maintain homegardens to produce food for consumption, and the surplus is sold. They highlighted the importance of gardens for the thermal comfort around the house, under the shade of the trees. This environment serves as a space for integration, where the family and others come together for leisure and to rest after lunch (siesta).

CONCLUSIONS

The farmers interviewed have full production capacity, a low educational level and a median household income. The analysis of the per capita income showed that with increasing age, the family income can increase, due to the construction of a family patrimony, and the strengthening of trade relations on the local agricultural market.

The indicator of housing quality is considered satisfactory in this rural area, where the supply of health services and drinking water are usually precarious. The garbage in the studied communities is not systematically collected, which indicates the need to teach and implement the recycling of organic and inorganic waste.

The degree of subjective well-being of the family farmers surveyed in this study is high in relation to their life and agricultural activities. Factors related to the socio-productive aspect such as satisfaction with the conduction of the production systems, workforce and quality of life in terms of housing conditions, income and production, influence the well-being of the farmer.

The global life satisfaction, associated to the compared satisfaction and appreciation of the homegardens have an influence on the well-being of the growers. It is believed that well-managed homegardens can provide an increase in the family income, with a view to the economic well-being and a better quality of life, including the housing of these families.

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