

# SYNTHETIC INDICES FOR FAMILY PRODUCERS IN THE NORTHEAST OF BRAZIL

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In the 1990's, the discussion over growth on family farm culminated in regulation by Law 11,326 or the Family Farming Law created on July 24, 2006. The penning of this law opened a legal precedent for the creation of official statistics and studies that provide new analytical perspectives to support the more efficient implementation of public policies. In this context, the 2006 Agricultural Census, conducted by The Brazilian Institute of Geography and Statistics (IBGE), emerges as a significant information source. Initial analysis showed that 84% of Brazilian rural households presented the family model, with the Northeast region containing more than half of family farms in Brazil (2.2 million), where 6.4 million people were employed in the year of the survey. In light of such developments, the Northeastern region of Brazil shows great potential for studies concerning these themes. This paper seeks to explore the aforementioned potential, focusing on family producer characteristics in order to create, through multivariate statistical modeling, municipal synthetic indices representative of these characteristics in order to identify patterns that exist within the Northeast of Brazil. Additionally, this study will initiate a comparison of spatial behavior related to these indices and the target population of these governmental programs created to family farmers.

## Family producer: concept and representation in the Northeast of Brazil

The 2006 Agricultural Census Handbook (IBGE, 2007) defines as producer of an agricultural establishment a person or entity, regardless of sex, that is responsible to make decisions concerning the use of the resources and also to control administratively the operations involving the agricultural establishment exploitation. The producer has the responsibility for economic and/or technical exploitation control and may exercise all the functions directly. Finally, he will be recognized as a family producer if his respective establishment also meets the criteria stipulated by the Family Farming Law, previously mentioned.

### Family producers, according to the Northeast Federal States - 2006

Federation Units	Male		Female		Total
	Number	%	Number	%	
Nordeste	1,816,698	83.86	370,433	16.94	2,187,131
Alagoas	92,214	4.22	19,536	0.89	111,750
Bahia	537,660	24.58	128,107	5.86	665,767
Ceará	301,523	13.79	39,986	1.83	341,509
Maranhão	125,053	5.83	46,989	2.15	172,042
Paraíba	123,022	5.62	25,047	1.15	148,069
Pernambuco	222,785	10.19	52,935	2.42	275,720
Piauí	189,987	8.69	30,748	1.41	220,735
Rio Grande do Norte	62,760	2.87	8,450	0.39	71,210
Sergipe	71,694	3.28	18,635	0.85	90,329

In the Northeast, in 2006, 2,187,131 were accounted as family producers of which 83% (1,816,698) are male and 17% (370,433) are female. The Bahia state concentrates the largest quantity of family producers totaling approximately 666,000. On the other hand, the lowest number was observed in Rio Grande do Norte state, with more than 71,000 family producers.

The federal statute 11,346, also called "The Family Farming Law," was signed in July 24th of 2006. According to Article 3 of this law, a farming unit will be considered a family farm and a rural family business when in addition to existing in a rural area, it also meets the following criteria:

- > The area of the establishment or rural enterprise may not exceed four fiscal modules;
- > The labor used in economic activities must be predominantly of one's family;
- > Family income must be predominantly originated by these activities; and
- > The establishment or enterprise shall be directed by the family.

Farmers who do not fall into this category are called non-family farmers or farmer/employers.

## Governmental programs and policies

The intensification of debates concerning family farming from the early 1990's was accompanied by the emergence of public policies and programs that are specific to this category, as follows:

- > National Program for Strengthening Family Farm (PRONAF) - created in 1995 with the purpose of providing financial support to agricultural activities, employing the producer workforce and his family (MTE, 2010).
- > Program for Generating Employment and Income in the Rural Area (PROGER Rural) - created by the Federal Government in 1995 aiming the finance investment and funding activities in the agricultural sector in order to promote the development of activities to create jobs and income;
- > Harvest Guarantee - created in 2002, it is actually a benefit granted to farmers living in areas affected by calamities or emergencies due to drought or excessive rain (MDA, 2010);
- > Food Acquisition Program (PAA) - created in 2003, it aims to ensure that those living with food and nutritional insecurity have access not only in quantity but also in regularity (MDA, 2010). It has different modes: Support to stocks formation for Family Farming, Buy Direct of Family Farming, Purchase with Simultaneous Donation; Incentive for Milk Production and Consumption; and Purchase Institutional; and
- > Rural Social Security (Special Insured) - its universalization in rural areas occurred in the early 1990's, very late if compared to other professions. Consolidated with the 1988 Constitution and the laws 8,212 (Funding Plan) and 8,213 (Benefit Plan), both 1991, but was only in effect in 1992.

## Synthetic indices construction

The index calculation is performed through a multivariate statistical modeling, using data from variables related to family producer in the Northeast of Brazil. More specifically, the factor analysis is applied, using the principal components technique with Varimax rotation. Among all the variables raised by 2006 Agricultural Census, the ones that were selected are related to the family producers characterization, in order to present a social reality overview. The chosen variables are related to schooling, time in years at the family establishment helm, the land condition, place of residence and membership in cooperatives and/or class entity.

### Variable used for construction indices

Variable	Factor 1	Factor 2	Factor 3	Factor 4
Time ahead of the establishment	0.672	0.428	0.431	0.244
Literacy	0.807	0.175	0.178	0.306
Land condition	0.151	0.751	0.111	-0.047
Place of residence	0.205	0.150	0.343	0.686
Memberships	0.152	0.005	0.077	0.838

### Factor loadings after Varimax rotation

Variables	Factor 1	Factor 2	Factor 3	Factor 4
Less than 1 year	0.672	0.428	0.431	0.244
1 to less than 5 years	0.810	0.293	0.374	0.204
5 to less than 10 years	0.807	0.175	0.178	0.306
10 years and over	0.723	0.099	0.188	0.108
None (read and write)	0.640	0.394	0.527	0.210
Adult Literacy	0.748	0.350	0.285	0.146
Primary Schools (Incomplete)	0.249	0.622	0.207	0.275
Elementary Education (Full)	0.471	0.648	0.378	0.301
Agricultural Technician (Full)	0.097	0.850	0.059	-0.011
Secondary (Complete)	0.151	0.751	0.111	-0.047
Higher education	0.413	0.649	0.198	0.037
Partner	0.436	0.348	0.709	0.168
Occupant	0.347	0.158	0.691	0.253
Elementary Education (Full)	0.367	0.199	0.762	0.283
Agricultural Technician (Full)	0.153	0.086	0.840	0.161
Secondary (Complete)	0.205	0.150	0.343	0.686
Higher education	0.301	0.448	0.128	0.584
In urban area of county	0.119	-0.053	0.227	0.805
In rural zone of the county	0.152	0.005	0.077	0.838

Each of the four rotated factors showed a group of variables with factor loadings higher than the others, creating different configurations, which can be interpreted as follows:

- > Factor 1: represents family producers that are living in the property for a long time. These are characterized by being landowners, reside on the property, had low education level and are also associated with cooperatives and/or associations (Index 1);
- > Factor 2: represents family producers that are recently on the property or have precarious possession (Index 2);
- > Factor 3: represents family producers with at least elementary level education (Index 3), and
- > Factor 4: represents family producers who do not reside in the family establishment (Index 4).

Therefore, each of these new dimensions created represent a separate index, whose respective values for each county in the Northeast of Brazil will be the factor scores obtained after factor analysis. These scores were standardized so as to vary the interval among zero and one, through the methodology used by other authors as Alves (2009) and Neto (2006) called transformation 0-1. Thus, the closer to 1 the index is a more prominent aspect analyzed in the county. However, the closer to zero the index is, the smaller the existence of the analyzed aspect in the county.

## Closing remarks

The county indices created by the factor analysis proved suitable for the proposed analysis. However, it is important to emphasize that the county indices distribution showed no behavior of a normal distribution, which brings certain limitations to the use of these other statistical procedures.

The creation of these indices serves as a stimulus for the development of new indices, referring not only to the family producers, but also representing other aspects of family farming.

The spatial associations' comparison of these indices with the spatial associations for the target population of governmental public policies and programs raised by 2006 Agricultural Census showed similar patterns in two of these indices. The representative index of family producers rooted longer in property presented spatial behavior among municipalities in the region much like the basin of the São Francisco River with those observed in the programs PRONAF B, Proger Rural and Special Insured. More over, the representative index of family producers that are recently on the property or have precarious possession showed spatial behavior in counties in Maranhão, Piauí and Ceará with much resemblance to those seen in programs Harvest Guarantee program and Food Acquisition modalities direct purchase and stock formation.

Finally, the analysis performed in this paper revealed the possibility of other future works, mainly in relation to the spatial similarities found in the indices of the municipality and the target public of the governmental programs.

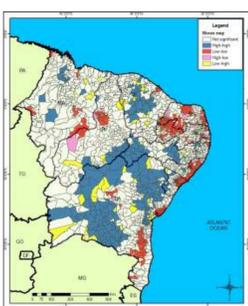
## REFERENCES

- ALVES, P. P. Índices sintéticos para caracterização dos municípios paulistas na perspectiva da cana-de-açúcar – 2005 a 2009. 2009. 205p. Dissertação (Mestrado em Estudos Populacionais e Pesquisas Sociais) – Curso de Pós-Graduação Estudos Populacionais e Pesquisas Sociais, Escola Nacional de Ciências Estatísticas, Rio de Janeiro, 2009.
- BRASIL. Lei 11.326, de 24 de julho de 2006. Estabelece as diretrizes para a formulação da Política Nacional da Agricultura Familiar e Empreendimentos Familiares Rurais. Diário oficial da União, Brasília, 25 de julho de 2006. Disponível em <[http://www.planalto.gov.br/ccivil\\_03/ato2004-2006/2006/lei/l11326.htm](http://www.planalto.gov.br/ccivil_03/ato2004-2006/2006/lei/l11326.htm)> Acessado em novembro de 2010.
- BRASIL. Lei 8.212, de 24 de julho de 1991. Dispõe sobre a organização da Seguridade Social, institui o Plano de Custeio, e dá outras providências. Diário Oficial da União, 25 de julho de 1991. Disponível em <[http://www.planalto.gov.br/ccivil\\_03/leis/8212cons.htm](http://www.planalto.gov.br/ccivil_03/leis/8212cons.htm)> Acessado em novembro de 2010.
- BRASIL. Lei 8.213, de 24 de julho de 1991. Dispõe sobre os Planos de Benefícios da Previdência Social e dá outras providências. Diário Oficial da União, 25 de julho de 1991 e publicado no Diário Oficial da União em 14 de agosto de 1998. Disponível em <[http://www.planalto.gov.br/ccivil\\_03/leis/8213cons.htm](http://www.planalto.gov.br/ccivil_03/leis/8213cons.htm)> Acessado em novembro de 2010.
- HAIR, J. F. et al. Análise multivariada de dados. 5ª ed. Porto Alegre: Bookman, 2005.
- IBGE. Censo Agropecuário 2006. Agricultura Familiar. Primeiros resultados. Brasil, Grandes Regiões e Unidades da Federação. Brasília/Rio de Janeiro: MDA/MPOG, 2009.
- IBGE. Censo Agropecuário 2006. Brasil, Grandes Regiões e Unidades da Federação. Rio de Janeiro: MPOG, 2009.
- IBGE. Censos 2007 – Censo Agropecuário 2006. Manual do Recenseador CI – 1.09A. Rio de Janeiro, 2007.
- JANNUZZI, P. de M. Indicadores sociais no Brasil: conceitos, fontes de dados e aplicações. 3ª ed. Campinas: Editora Alínea, 2004, 141 p.
- MDA - Ministério do Desenvolvimento Agrário. Disponível em <<http://www.mda.gov.br>> Acessado em dezembro de 2010.
- MTE - Ministério do Trabalho e Emprego. Disponível em <<http://www.mte.gov.br/proger/rural.asp>> Acessado em novembro de 2010.
- NETO, W. J. S. Síntese que organiza o olhar: uma proposta para construção e representação de indicadores de desenvolvimento sustentável e sua aplicação para os municípios fluminenses. 2006. 120 p. Dissertação (Mestrado em Estudos Populacionais e Pesquisas Sociais) – Curso de Pós-Graduação Estudos Populacionais e Pesquisas Sociais, Escola Nacional de Ciências Estatísticas, Rio de Janeiro, 2006.

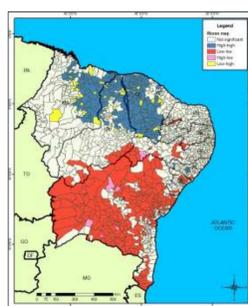
## Analysis of the results

The four indices created showed the existence of a statistically significant positive spatial correlation between the indices and their municipal neighbors by global Moran index. A more detailed investigation of the spatial association between municipal rates was done through the local Moran indices, as show below.

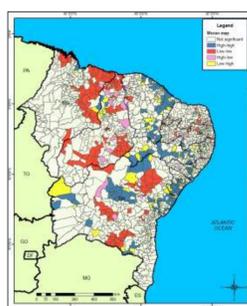
Moran map of index 1



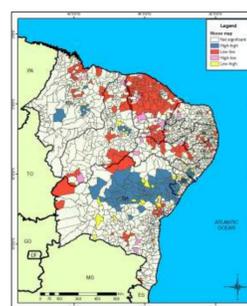
Moran map of index 2



Moran map of index 3

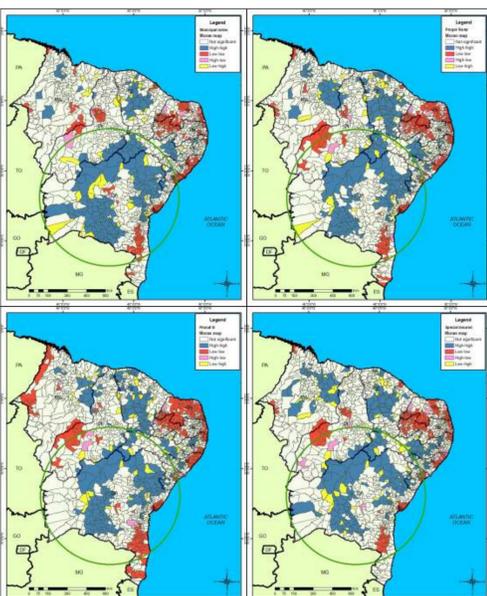


Moran map of index 4



Comparing the spatial behavior of these indices with respect to the target audience of governmental public programs and policies, spatial similarities observed in two of the four indices. Index 1 showed similarities in the spatial associations of the "high-high" located mainly in the São Francisco River basin with the associations observed in the variables related to the target audience of Proger Rural, PRONAF B (one of the lines existing credit) and Special Insured. I.e., in this region there is a potential target group of these three programs characterized by family producers owning their land and having low level of education. Already Index 2, presented spatial associations of type "high-high" similar to those observed in variables related to the target population of Harvest Guarantee Program and Food Acquisition modalities direct purchase and stock formation.

Spatial comparison through Moran map among Index 1 and variables related to the target audience of the programs Proger Rural, PRONAF B and Special Insured



Spatial comparison through the Moran map among between Index 2 and variables related to the target audience of the Harvest Guarantee Program and Food Acquisition modalities direct purchase and stock formation

