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Human development and food (in)security in Brazil: Prioritisation of regions for policies targeting rice and bean production

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Introduction

Rice and beans represent staple crops in Brazil. They are grown mainly for domestic consumption. Small farmers, in Brazil commonly considered as ‘family farmers’, do a significant part of the production of both staples.

The Human Development Index (HDI) as considered in the UN Human Development Report, considers important areas of human development to ensure quality of life for the population, such as health, education and income. Health, measures the longevity index (long and healthy life); in education, it is considered the access to knowledge, i.e. investigates the average years of adult education and expected years of schooling for children at the age of starting school life and, with respect to income (standard of living), measure the GDP per capita. Brazil is among the countries with high human development.

In Brazil, rural poverty often relates to regions where small farming is the main form of agricultural production. In those areas, farming is directly linked with food security of rural population.

Thus, the objective of this study was to identify the main poverty areas in Brazil and check if they are important in growing rice and beans in order to be considered as priority areas for agricultural research and extension services.

Material and Methods

As poverty, we consider a monthly per capita income of less than US\$ 100 and very low (0 - 0.499) and low (0.5 – 0.599) HDI according to the Human Development Report 2014 (UNDP, 2014).

The HDI at municipality level (HDI-M) has been obtained from the Brazilian Institute of Geography and Statistics (IBGE, 2015a/b) and are considered as follows: very low (0.0 – 0.499), low (0.5 – 0.599), average (0.6 – 0.699), high (0.7 – 0.799) and very high (0.8 – 1.0).

Poverty data are based on national household survey data.

Rice and bean production data is based on national statistics from several official sources (Agricultural Census and annual estimations). According to last Agricultural Census, Brazil had 313,561 farms growing rice (Silva and Wander, 2014) and 1,208,545 farms producing dry beans (cow peas and common beans) (Silva and Wander, 2013).

Cluster analysis and spatial correlation is done to identify priority target regions for implementation of technology transfer and extension services focusing on improving food security.

Results and Discussion

Analysing the average national bean production in the municipalities that have the lowest HDI, their average yields are much below expectations for common beans (*Phaseolus vulgaris* L.). In 2013, average common bean yield was 1,214 kg/ha and 1,205 kg/ha in 1st and 2nd harvest seasons, respectively. Rice yields in these municipalities with low HDI were also much lower than the national average of 5,003 kg paddy/ha in 2013, being 1,701 kg paddy/ha for upland rainfed rice and 7,219 kg paddy/ha for lowland irrigated rice.

Looking to data from selected Brazilian states (Table 1), it becomes clear that states like Maranhão, Tocantins, Piauí and Bahia are among the regions that have weak human development and high poverty rates, and low yields for rice and beans. Together, these states form the region called MATOPIBA (Figure 1), which is considered the last agricultural frontier in Brazil and one of the last frontiers worldwide. Several policies are targeting this region in order to promote agribusiness development in this region.

Table 1: Rice and bean production combined with poverty and human development indicators, selected Brazilian states.

State	Crop*	Harvested area (1,000 ha)	Production (1,000 t)**	Average yield (kg/ha)	Number of 'family farms' (in 1,000)***	Poverty index (%)	HDI-M
Brazil (whole country)	Beans	3,065	3,041	992	1,209		0.744
	Rice	2,506	12,270	4,895	314		
Maranhão	Beans	90	40	449	28	56.38	0.639
	Rice	431	543	1,260	121		
Tocantins	Beans	25	28	1,111	3	41.28	0.699
	Rice	120	435	3,640	11		
Piauí	Beans	197	49	247	98	53.11	0.646
	Rice	121	164	1,360	56		
Bahia	Beans	327	187	570	200	43.47	0.660
	Rice	14	25	1,748	4		
Minas Gerais	Beans	399	594	1,488	100	26.6	0.731
	Rice	30	62	2,113	16		
São Paulo	Beans	119	213	1,793	4	26.6	0.783
	Rice	23	96	4,273	1		
Paraná	Beans	485	731	1,507	64	39.07	0.749
	Rice	36	182	5,115	11		
Mato Grosso	Beans	186	240	1,289	2	34.34	0.725
	Rice	168	536	3,186	5		
Goiás	Beans	134	314	2,335	2	33.90	0.735
	Rice	58	177	3,061	6		
Rio Grande do Sul	Beans	81	100	1,236	93	25.94	0.746
	Rice	1,097	8,244	7,514	6		
Santa Catarina	Beans	89	136	1,521	33	27.19	0.744
	Rice	149	1,033	6,924	6		

* Beans represent the sum of 3 cropping seasons. ** Rice is considered as paddy (before milling). *** 'Family farms' in Brazil refer to small holdings with mainly family labor and farm income represent main part of total household income (Brasil, 2006). Source: Own compilation from several official sources (UNDP, IBGE etc.).

Within the MATOPIBA states Maranhão, Tocantins, Piauí and Bahia states, several municipalities will be the focus of development-oriented projects. Food crops like rice and beans are crucial for local communities but there are open questions not answered yet, like if those crops will be competitive at local level, since cash crops (soybeans, cotton, maize etc.) are being promoted at large scale.

Figure 1: Map of the MATOPIBA region inside Brazil.



Source: <https://www.embrapa.br/busca-de-noticias/-/noticia/2248938/gestao-territorial-e-essencial-para-compreender-a-dinamica-da-producao-agricola-do-matopiba>.

MATOPIBA region is formed by 31 micro regions and 337 municipalities of four states. The total area is 73 million hectares.

Since rice and bean yields are comparatively low in MATOPIBA states, except Tocantins, specific measures focusing on increasing efficiency of staple crops are to be taken. Among those actions are extension services to delivery adequate knowledge about good agricultural practices associated with credit and infrastructure.

In May 2015 Brazil launched the Development Agency of the Matopiba region. This Agency will be in charge of research, innovation, precision agriculture and technical assistance to farmers in this region.

Conclusions and Outlook

In the majority of municipalities with the lowest HDI, rice and bean production is weak and of low technological level, mainly done by family labour. In the states of Maranhão and Piauí, who are part of the “MATOPIBA” region (last agricultural frontier region of Brazil, as part of the states of Maranhão, Tocantins, Piauí and Bahia), the lowest HDI’s are found. Education dimension represent the weakest part of HDI in those states. The municipalities with the lowest HDI’s are also located in those states. They represent poverty zones where families have less income than the daily limit of US\$ 1.25 recommended by the United Nations. Low HDI in those municipalities require targeted policies including training and extension services in order to improve rice and bean production and, thus, improving food security of poor population.

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