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RESEARCH

Aging demographic profile in municipalities in the state of Pará, Brazil

Perfil demográfico do envelhecimento nos municípios do estado do Pará, Brasil

Perfil demográfico del envejecimiento en los municipios del estado de Pará, Brasil

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ABSTRACT

Objective: To investigate socioeconomic and demographic differences regarding population aging in municipalities of the state of Pará, Brazil. **Method:** Ecological study with secondary demographic, socioeconomic and health data from the 144 municipalities of the state of Pará, Brazil. Data were treated with segmentation analysis, the Mann-Whitney U test and logistic regression models, with a significance level of $p \leq 0.05$. **Results:** Segmentation analysis provided a single variable to describe aging in the municipalities of Pará and originated two clusters, the high and low aging rate ones, with 104 (72.22%) and 40 (27.78%) municipalities in each, respectively. The fitted model revealed an association between aging and *per capita* income ($p = 0.021$), vulnerability to poverty ($p = 0.003$), rich to poor ratio ($p = 0.012$) and density of people ($p = 0.019$). **Conclusion:** There is heterogeneity in the population aging among the municipalities of Pará, mainly regarding socioeconomic conditions and number of people living in the municipalities.
Descriptors: Demographic Aging; Aged; Social Inequity; Social Vulnerability; Health Policy.

RESUMO

Objetivo: investigar as diferenças socioeconômicas e demográficas entre os municípios paraenses, em relação ao envelhecimento. **Método:** Estudo ecológico com a utilização de dados secundários demográficos, socioeconômicos e de saúde referentes aos 144 municípios do estado do Pará, Brasil. Os dados foram tratados adotando-se a análise de segmentação, o Teste U de Mann-Whitney e os modelos de regressão logística, com nível de significância estabelecido em $p \leq 0,05$. **Resultados:** A análise de segmentação criou uma variável única para explicar o envelhecimento entre os municípios paraenses, formando dois *clusters* distintos: alto e baixo envelhecimento, com respectivamente 104 (72,22%) e 40 (27,78%) municípios. O modelo final ajustado revelou associação entre envelhecimento e renda *per capita* ($p = 0,021$), vulneráveis à pobreza ($p = 0,003$), razão ricos/pobres ($p = 0,012$) e densidade de moradores ($p = 0,019$). **Conclusão:** Conclui-se que existe heterogeneidade no envelhecimento da população idosa entre os municípios do Pará, especialmente em relação às condições socioeconômicas e tamanho do município.
Descritores: Envelhecimento da População; Idoso; Iniquidade Social; Vulnerabilidade Social; Política de Saúde.

RESUMEN

Objetivo: Investigar las diferencias socioeconómicas y demográficas entre los municipios paraenses respecto del envejecimiento. **Método**: Estudio ecológico, con utilización de datos secundarios demográficos, socioeconómicos y de salud correspondientes a los 144 municipios del estado de Pará, Brasil. Datos tratados adoptándose el análisis de segmentación, el Test U de Mann-Whitney y los modelos de regresión logística, con nivel de significatividad establecido en $p \leq 0,05$. **Resultados**: El análisis de segmentación determinó una variable única para explicar el envejecimiento en los municipios paraenses, formando dos clústeres distintos: alto y bajo envejecimiento, respectivamente con 104 (72,22%) y 40 (27,78%) municipios. El modelo final ajustado demostró asociación entre envejecimiento e ingreso per cápita ($p = 0,021$), vulnerables a la pobreza ($p = 0,003$), razón ricos/pobres ($p = 0,012$) y densidad de habitantes ($p = 0,019$). **Conclusión**: Se concluye en que existe heterogeneidad en el envejecimiento de la población anciana entre los municipios de Pará, particularmente respecto de condiciones socioeconómicas y tamaño del municipio.
Descriptores: Envejecimiento de la Población; Anciano; Inequidad Social; Vulnerabilidad Social; Política de Salud.

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INTRODUCTION

In Brazil, the marked decrease in the fertility rate and reduction in mortality resulted in a faster population aging in the last century in comparison with the process observed in more developed societies[1]. Brazil and other countries in Latin America experience a type of epidemiological transition named "prolonged polarized model", which combines high morbidity and mortality rates provoked by chronic and degenerative illnesses with a high incidence of infectious and parasitic diseases and the continuation of distinct levels of transition between different social groups[2].

Demographic changes lead to challenges in social policies. In the healthcare field, one of the consequences of a higher longevity is the increase in the prevalence of chronic diseases, which are usually more common among elderly people and present a higher complexity and higher costs[3-5].

The number of elderly people in Brazil is expected to change from 8.6% to 13% of the population from 2010 to 2020, and can reach 20% of the population in 2050. That means that the number of elderly people will exceed the number of people younger than 15 years old[4,6]. This likely new population profile poses challenges and difficult solutions regarding the adoption of public and social policies. Most importantly, a high life expectancy is related to aging weakening, which makes elderly people more prone to develop dementia and physical and mental limitations[7-9].

The Brazilian Unified Health System (SUS, as per its acronym in Portuguese) considers that this new population profile indicates a problem that tends to increase the demand for specialized health services for this population. The lack of effective policies and programs oriented to elderly people observed in most municipalities in Brazil also occurs in the state of Pará, and is possibly more serious because of the size of the state and its striking social inequalities.

According to the Atlas of Human Development in Brazil, issued by the United Nations Development Programme, all Brazilian states in the North region were classified as being in the low human development indexes interval in 2000. Between 2000 and 2010, the states of Tocantins and Amazonas obtained the highest increases in the index, 0.174 and 0.159, respectively. The state of Pará also registered a significant increment in the Municipal Human Development Index (HDI-M), which advanced from 0.518 to 0.646 during the ten-year time interval. Despite this improvement, the state has the highest number of municipalities with the worst indicators[10].

As for longevity, only 10% of the municipalities in the North region presented results above the Brazilian average in 2010 (0.816). In Pará, the longevity HDI-M evolved from 0.640 in 1992 to 0.789 in 2010, showing that 4.8% of its population was older than 65 years old[10].

Healthcare indicators were designed to facilitate the quantification and assessment of information in the field, similarly to their social counterparts. According to the Pan American Health Organization, indicators are measurements containing relevant information on certain health status attributes and dimensions, as well as on the performance of the health system. Considered as a whole, they must reflect the sanitary situation of a population and contribute to the surveillance of health and life conditions[11].

Economic, social and demographic transformations in Brazil impacted life and work conditions and consequently the health of the population and made it indispensable to study socioeconomic indicators oriented to aging to reduce health inequities. Problematizing these issues may help elucidate the differences among municipalities, provide more information about the implementation of health policies and contribute to improve strategies for monitoring and evaluating health systems and services[12].

The acquisition of epidemiological data through quantitative indexes and indicators obtained in public databases is important and provides a deeper knowledge of population aging. Taking that into account, the present study aimed to investigate the socioeconomic and demographic differences among municipalities in the Brazilian state of Pará regarding aging.

METHOD

Ethical aspects

Because the present study used secondary public data extracted from the Brazilian Institute of Geography and Statistics[4] (IBGE, as per its acronym in Portuguese), the Atlas of Human Development[10], the website of the Unified Health System Informatics Department (DATASUS, as per its acronym in Portuguese) and the United Nations Development Programme[13], no procedures to obtain permission to use data were carried out, except listing the used references.

Study design, setting and period

This was an ecological study with the use of secondary data obtained in the IBGE demographic census in 2010, the electronic Atlas of Human Development, DATASUS and the United Nations Development Programme[4,10,13].

The investigation was performed in the 144 municipalities of the state of Pará, in the North region of Brazil. It is the second largest Brazilian state, with an area of 1,247,954.666 km², an estimated population of 8,073,924 people in 2014 and a population density of 6.07 people per km².

Target population

Elderly people, aged 60 years old or older, living in municipalities in the state of Pará who were surveyed by IBGE in 2010[4] and whose demographic information was used as secondary data in the present study.

Study protocol

To design a synthetic aging indicator as a dependent variable, segmentation analysis was used to group municipalities according to their aging levels from the combination of the following indicators: aging index, sex ratio and elderly dependence ratio.

This is an analytical statistics tool to create variables that encompass more than one element or aspect. The subgroups or categories of the variable are established based on the

similarities among data, with no *a priori* information about their allocation in the clusters or groups. When the grouping process succeeds, the objects in a specific group are more similar with each other, which makes groups present a high internal homogeneity and a high external heterogeneity[14].

The k-mean clustering method was used to group the sample based on similarities in the answers to the questionnaire. In this method, an F analysis of variance (F ANOVA) test was run for descriptive purposes and to point the questions that contributed the most to the formation of the clusters. For each question, the higher the F value, the more important and effective the clustering[14].

Subsequently, the Statistical Package for the Social Sciences (SPSS) software created a variable named "aging" by the authors, which was listed in ascending order in two categories: low and high. The cluster "high aging" gathered the municipalities with the highest values for aging index, elderly dependence ratio and sex ratio among elderly people.

The aging index is defined as the number of people aged 60 years old or older for each 100 people younger than 15 years old for the population living in a specific geographical space in the year in question. The elderly dependence ratio represents the weight of the elderly population classified as inactive (60 years old or older) in comparison to the potentially active population (15 to 59 years old). The sex ratio for elderly people is the ratio between the number of men 60 years old or older for each group of 100 women in the same age group in a specific geographical space in the year in question.

The *independent variables* were the socioeconomic conditions assessed by the literacy rate in 2013, the HDI-M in 2013[13], the Theil index[15], the GINI index[16], the vulnerability to poverty ratio and the 20% richest/40% poorest ratio.

The literacy ratio is the percentage of people aged 15 years old or older that can read and write at least a simple note, divided by the total population in the same age group, in a specific geographical space in the year in question. This variable expresses the minimal educational situation of a population. The municipal human development index (HDI-M) is a development indicator that assembles economic data from the real *per capita* Gross Domestic Product and other data related to education (adult literacy rate and combined schooling rates for primary, secondary and higher education) and health (average life expectancy at birth).

The GINI index expresses the level of inequality in the distribution of people according to the *per capita* household income. Its value ranges from 0, when there is allegedly no inequality and all the members of the family have the same income, to 1, when the inequality is maximal and only one person is responsible for all the income.

The Theil index is a statistical income distribution measure and is defined as the ratio of the arithmetic and geometric means of the average *per capita* household income. If the ratio equals 1, the index equals 0, indicating a perfect distribution. The higher the ratio between the means, the higher the Theil index and the worse the income distribution.

The proportion of people vulnerable to poverty corresponds to the proportion of people with a monthly *per capita* household income equal to or lower than R$ 255, according to the real value in August 2010. This amount corresponded to half a minimum wage at that time. The universe of people is limited to those who live in permanent private properties. The ratio between the average incomes of the 20% richest and the 40% poorest is the measure of the level of inequality in the distribution of people according to the *per capita* household income. This indicator compares the average income of people that belong to the richest two tenths of the population with the average income of the people that belong to the poorest four tenths.

Housing conditions were assessed through the percentage of people living in houses with piped water, the percentage of people living in houses with sewage system, the percentage of people living in houses with waste collection, the percentage of people living in houses with electricity and the number of people per residence.

The health indicators used in the present study were child mortality, life expectancy, fertility rate and service coverage of the Family Health Strategy. The child mortality rate is the number of children that die before turning one year old in a specific place (municipality, region, country, continent) per 1,000 live births. Life expectancy at birth is the average age in years that a newborn is expected to live if the mortality standard of the population is kept, in a specific geographical space in the year in question. The fertility rate is an estimate of the average annual number of live births per woman per year.

The service coverage of the Family Health Strategy refers to the fraction of the population assisted by this policy. It is calculated by dividing the population registered in the Basic Care Information System by the local total population in the same period; the result is multiplied by 100.

Analysis of the results and statistics

The formulation of the database and the analyses were performed using the statistics software SPSS, version 19. Initially, a descriptive analysis of all the variables in the study was carried out, with the calculation of mean, standard deviation, median and minimum and maximum values.

The comparison between the aging indicator and independent variables was conducted with the Mann-Whitney U test and logistic regression models, with a significance level established at 5% ($p \leq 0.05$).

Sequential logistic regression analysis was used to examine the relationships between the aging indicator and potential predicting factors among the municipalities of Pará, considering the group of municipalities with the lowest aging indicator as a reference. The independent variables were grouped in hierarchical conceptually coherent sets: socioeconomic conditions, housing conditions and health indicators. The adequacy of the final model was evaluated through the application of the test for the homogeneity of slopes and the multicollinearity test with a Pearson curve fitting.

RESULTS

Table 1 presents the descriptive statistical analysis of the studied variables. All the municipalities were classified as having the average HDI. The distribution of Theil and GINI indexes

reveals a high concentration of income in the group of examined municipalities, pointing to an inequality in income distribution. This disparity is corroborated by the low *per capita* income (R$ 304.97 ± R$ 125.71) and the high illiteracy rate registered in these places (21.97% ± 8.02%).

As for housing conditions, 79.13% (± 16.29%) of the population lived in houses that presented piped water, but only 44.80% (± 17.77%) had access to the sewage system. The average coverage of the Health Family Strategy program was low (66.88% ± 28.79%), with striking differences among municipalities (minimal coverage of 0% and maximal coverage of 100%). These data are shown in Table 1.

The municipalities of Pará are experiencing a slow process of population aging, with an aging index of 24.74 (± 21.37), but a high elderly dependence ratio (10.71 ± 1.72).

Segmentation analysis provided a single variable to explain aging in the municipalities of Pará, originating two clusters: high and low aging, with 104 (72.22%) and 40 (27.78%) municipalities, respectively.

Table 2 exhibits the comparison of clusters through the Mann-Whitney U test regarding socioeconomic conditions, housing conditions and health indicators. This nonparametric test is used to evaluate the equality of medians between two nonhomogeneous groups. The values displayed in Table 2 are only the joint classification of the observed values. Therefore, the position (or score) of a value in a set of *n* values is a natural number that indicates its position in the ordered set, that is, all the observations receive a score through the use of natural numbers (1, 2, 3, 4, ..., *n*). In the bivariate analysis, statistically significant differences among clusters were observed regarding all the examined variables, except *per capita* income, illiteracy rate and fertility rate (Table 2).

The indicators of association between aging and socioeconomic conditions can be seen in Table 3. In the analysis of the raw odds ratio, there was a strong association between aging and people vulnerable to poverty in all regression models, and the association showed a 1.16 increase between model 1 (OR = 1.42; p = 0.000) and model 3 (OR = 1.62; p = 0.003). As for the illiteracy rate, the municipalities with the highest aging rate presented 1.08 more chances to have a higher illiteracy rate among elderly people (OR-1.08, CI95% = 0.98 – 1.19). In the final model, fitted by housing conditions and health indicators, there was an association between aging and *per capita* income (p = 0.021), people vulnerable to poverty (p = 0.003), rich/poor ratio (p = 0.012) and number of people per residence (p = 0.019).

Table 1 – Descriptive analysis of socioeconomic conditions, housing conditions and aging and health indicators of the municipalities of Pará, Brazil, 2015

Variables	Minimum value	Mean	Standard deviation	Median	Maximum value
Socioeconomic conditions					
HDI*	0.42	0.58	0.06	0.58	0.75
Theil index	0.33	0.57	0.10	0.56	0.98
GINI index	0.42	0.56	0.05	0.56	0.70
Per capita income (R$)	130.40	304.97	125.71	279.46	853.82
People vulnerable to poverty (%)	12.03	42.81	13.79	44.03	73.43
20% richest/40% poorest ratio	6.41	15.30	7.08	13.68	54.87
Illiteracy rate (%)	3.99	21.97	8.02	21.74	47.26
Housing conditions					
Population coverage of piped water (%)	21.06	79.13	16.29	84.44	96.19
Population coverage of sewage system (%)	6.68	44.80	17.77	44.83	86.84
Population coverage of waste collection (%)	36.72	84.11	13.29	88.13	100.00
Population coverage of electricity (%)	62.55	87.84	10.06	90.35	99.97
Number of people per residence	26.63	51.19	12.79	48.97	86.43
Health indicators					
Child mortality (/1000 live births)	14.90	22.84	3.46	22.90	31.90
Fertility rate**	1.69	2.88	0.47	2.88	4.12
Life expectancy at birth (years)	68.41	71.46	1.27	71.42	74.66
Family Health Strategy coverage (%)	0.00	66.88	28.79	65.04	100.00
Aging indicators					
Elderly dependence ratio	7.16	10.71	1.72	10.44	15.76
Aging index	22.09	24.74	21.37	24.71	27.92
Sex ratio (60 years old and older)	67.21	118.54	23.11	112.54	190.88

*Notes: *human development index; **average annual number of children born alive per woman per year.*

Table 2 – Clusters of municipalities in Pará with high and low aging index, compared with each other through the Mann-Whitney U test according to socioeconomic and housing conditions and health indicators, Brazil, 2015

Variables	Aging		*p*** value
	High (n = 104)	Low (n = 40)	
Socioeconomic conditions			
HDI*	85.41	36.24	**< 0.001**
Theil index	67.24	84.69	0.025
GINI index	65.16	90.23	0.001
Per capita income (R$)	73.53	67.92	0.471
People vulnerable to poverty (%)	54.94	117.49	**< 0.001**
20% richest/40% poorest ratio	62.51	97.29	**< 0.001**
Illiteracy rate (%)	70.08	77.12	0.366
Housing conditions			
Population coverage of piped water (%)	87.39	30.95	**< 0.001**
Population coverage of sewage system (%)	87.13	31.65	**< 0.001**
Population coverage of waste collection (%)	77.59	57.09	0.008
Population coverage of electricity (%)	85.70	35.47	**< 0.001**
Number of people per residence	55.56	115.85	**< 0.001**
Health indicators			
Fertility rate**	68.62	81.01	0.111
Life expectancy at birth (years)	76.41	60.23	0.037
Child mortality (/1000 live births)	67.59	83.77	0.037
Family Health Strategy coverage (%)	79.04	53.23	0.001

*Notes: *human development index; **Mann-Whitney U test; ***average annual number of children born alive per woman per year.*

Table 3 – Indicators of association between aging and socioeconomic conditions, housing conditions and health indicators of the municipalities of Pará, Brazil, 2015

Variables	Model 1			Model 2			Model 3		
	OR	CI95%	*p* value	OR	CI95%	*p* value	OR	CI95%	*p* value
Socioeconomic conditions									
HDI	2.91	1.60-4.37	0.800	1.47	1.05-5.00	0.201	2.96	1.01-3.43	0.178
Theil index	2.35	1.05-2.99	0.702	0.26	0.10-1.02	0.906	0.26	0.05-1.02	0.926
GINI index	0.80	0.50-2.00	0.506	2.00	0.98-4.92	0.080	1.27	0.05-3.19	0.060
Per capita income	1.01	1.00-1.01	0.065	1.01	1.00-1.02	0.023	1.01	1.00-1.02	0.021
People vulnerable to poverty	1.42	1.21-1.67	0.000	1.42	1.14-1.77	0.002	1.62	1.18-2.23	0.003
Rich/poor ratio	0.88	0.75-1.02	0.086	0.73	0.58-0.93	0.010	0.65	0.47-0.91	0.012
Illiteracy rate	1.08	0.98-1.19	0.032	1.10	0.96-1.27	0.162	1.12	0.95-1.33	0.185
Housing conditions									
Piped water coverage				1.00	0.91-1.10	0.956	1.01	0.90-1.12	0.915
Sewage system coverage				0.94	0.83-1.07	0.332	0.91	0.78-1.07	0.273
Waste collection coverage				0.96	0.91-1.02	0.208	0.94	0.88-1.01	0.109
Electricity coverage				0.99	0.88-1.12	0.882	0.97	0.84-1.12	0.677
Density of people				1.21	1.03-1.41	0.017	1.27	1.04-1.55	0.019
Health indicators									
Child mortality							2.32	1.29-2.82	0.136
Fertility rate							1.06	0.08-4.64	0.968
Life expectancy at birth							0.51	2.22-1.55	0.134
Family Health Strategy coverage							0.98	0.94-1.02	0.302

Notes: Model 1: socioeconomic conditions; Model 2: socioeconomic conditions, fitted by housing conditions; Model 3: socioeconomic conditions, fitted by housing conditions and health indicators; HDI-M: municipal human development index.

DISCUSSION

The population of the state of Pará is growing old. This finding corroborates the national data from 2010 that point to an elderly population of 18.5 million. The percentage of the age group older than 65 years old increased from 5.9% in 2000 to 7.4% in 2010[4].

Ecological studies are considered appropriate to investigate the effects of the environment on the health of a population and to help monitor health conditions and manage public policies. These investigations allow to compare health and socioeconomic indicators in different geographical areas.

Studies about the epidemiological profile of a population are important in this context because they enable to identify the determining and etiologic factors of aging[17-19].

Most of the Brazilian population is made up of women, a consequence of the male excess mortality, especially among young people and adults, provoked by the high incidence of violent deaths. This difference is even more evident in the elderly population[20]. In Florianópolis, state of Santa Catarina, there was a prevalence of women, according to the studies Profile of Elderly People and EpiFloripa Idoso in 2009, with percentages of 50.1% and 62.5%, respectively[17]. Other studies in the Amazon region also show the feminization of aging[21-23].

The present investigation revealed the growing participation of elderly people in comparison to young people in the population, which reflects a reduction in fertility and an increase in life expectancy. These findings corroborate national official data[4,24]. A slow decrease of the dependence ratio was observed in all Brazilian regions, a result related to the process of demographic transition. The decrease in fertility rates leads to a reduction in birth rates, causing a decrease in the young share of the population. Consequently, the relative contribution of the elderly population is higher, and combines with an increased absolute number of people in this age group. The North and Northeast regions present the highest dependence ratios, associated with the highest fertility rates in the country[25].

Aging in Brazil is occurring in an unfavorable socioeconomic context and at an accelerated pace. In the last national census, carried out in 2010, the regions South and Southeast presented the highest aging indexes (54.94 and 54.59, respectively) and the North region showed the lowest value (21.84)[4,26-27].

The present study revealed that aging is strongly correlated with socioeconomic conditions in the state of Pará. If considered individually, the associations were not relevant, but the set of analysis demonstrates that the increase in the *per capita* income and in vulnerability to poverty and the decrease in the rich/poor ratio was related to a higher aging index in the municipalities of the state, even after the fitting by housing conditions and health indicators. Contrarily, the analysis of the odds ratio for the *per capita* income (OR = 1.01) does not allow to infer the existence of a difference between the two groups.

The association between inequalities in health during aging and social determining factors suggests that it is important to question what aspects can be associated with extra years to some people and not to others, in addition to taking into consideration the known individual biological conditions. In this context, the design of policies must include actions to reduce social inequities and strategies to extend human life with quality of life, autonomy and independence. Studies show that this is the best way to reduce health inequalities during aging[3].

Social inequality in Brazil and Latin America is a polemic and old issue and does not seem to have a solution in the short term[27]. Income inequality in Brazil is historical and well described in literature. A study about regional economic inequality in Brazil in the period from 1985 to 2008 revealed that the marked regional inequity persists, even with an improvement in the macroeconomic environment in the country after mid-1990[28].

Another investigation analyzed the effects of social costs in education and health in poverty indicators and income inequality indexes in the period from 2004 to 2009. There was an inverse relationship between social expenses in the fields of education and health and poverty, but it is not known whether there is a significant impact on the income inequality[29].

A possible solution to the problem involves an extended citizenship, but it is impaired by a perverse inheritance of a lasting and naturalized poverty, in a society increasingly unfair[28-29]. Consequently, knowing the different age structure demographic profiles and social dynamics allows to formulate more appropriate policies and actions.

Study limitation

Some limitations of the present study must be emphasized. The use of secondary data has issues known in literature, such as data reliability; in the present investigation, the main concern is the imprecision of the database used to calculate the aging indicator, caused by flaws in the declaration of age in statistical surveys or the methodology applied to formulate population estimates and projections. Consequently, the results of the present study should be interpreted with caution, given that the examined sample has singular features (the municipalities of the state of Pará, which have different populations and socioeconomic conditions). The positive aspect of the sample is that the higher the geographical dimension encompassed by the secondary data, the more significant the compilation of information and the higher the chances to compare the regions under discussion.

Contributions to the nursing, health, or public policy fields

Despite its limitations, the present study reveals perspectives of aging among the elderly people of the state of Pará, indicating the need to anticipate health actions. However, other investigations are necessary to assess the impact of aging indicators on municipalities and regions where socioeconomic conditions are unfavorable. It is fundamental to discuss the effects of population aging in a region with marked health inequalities.

CONCLUSION

There is heterogeneity in the aging of the elderly population in the municipalities of Pará, mainly regarding socioeconomic conditions and the size of the municipality. It is possible that a higher number of indicators and more consistent information allow to produce more detailed evidence about the population aging process in the examined places.

Nevertheless, together with a better characterization of the demographic profiles, it is necessary to invest in more social development public policies oriented to the elderly population and coordinated to people from other generations and that surpasses the health sector. This could benefit areas with a higher demand for education, job offers (including for the elderly people), environmental safety and basic sanitation, contributing to the reduction of inequalities.

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REFERENCES

1. Malta DC, Leal MC, Costa MFL, Morais Neto OL. Inquéritos Nacionais de Saúde: experiência acumulada e proposta para o inquérito de saúde brasileiro. Rev Bras Epidemiol [Internet]. 2008 [cited 2016 Apr 4];11(Suppl-1):159-67. Available from: http://www.scielo.br/pdf/rbepid/v11s1/16.pdf
2. Duarte EC, Barreto SM. Transição demográfica e epidemiológica: a Epidemiologia e Serviços de Saúde revisita e atualiza o tema. Epidemiol Serv Saúde [Internet]. 2012 [cited 2016 Apr 4];21(4):529-32. Available from: http://scielo.iec.gov.br/pdf/ess/v21n4/v21n4a01.pdf
3. Veras R. Population aging today: demands, challenges and innovations. Rev Saúde Pública [Internet]. 2009 [cited 2016 Apr 4];43(3):548-54. Available from: http://www.scielo.br/pdf/rsp/v43n3/en_224.pdf
4. Fundação IBGE. Censo Demográfico 2010: características da população e dos domicílios: resultado do universo. Rio de Janeiro; 2010.
5. Carvalho MHR, Carvalho SMR, Laurenti R, Payão SLM. Tendência de mortalidade de idosos por doenças crônicas no município de Marília. Epidemiol Serv Saúde [Internet]. 2014 [cited 2016 Apr 4];23(2):347-54. Available from: http://www.scielo.br/pdf/ress/v23n2/1679-4974-ress-23-02-00347.pdf
6. Brasil. Secretaria de Assuntos Estratégicos da Presidência da República. Instituto de Pesquisa Econômica Aplicada. IPEA. PNAD 2009 – Primeiras Análises: Tendências Demográficas; 2010.
7. Polaro SHI, Gonçalves LHT, Nassar SM, Lopes MMB, Ferraz V, Monteiro HK. Dinâmica da família no contexto dos cuidados a indivíduos na quarta idade. Rev Bras Enf [Internet]. 2013 [cited 2016 Apr 4];66(2):228-33. Available from: http://www.scielo.br/pdf/reben/v66n2/12.pdf
8. Gonçalves LHT, Polaro SHI, Carvalho J, Goes TM, Medeiros HP, Souza FJD. Condições de vida e saúde de idosos amazônidas: realidade de comunidades periféricas de cidades paraenses. Rev Enferm UFPE [Internet]. 2015 [cited 2016 Apr 4];9(1):39-46. Available from: https://periodicos.ufpe.br/revistas/revistaenfermagem/article/download/10304/10971
9. Campos ACV, Ferreira EF, Vargas AMD, Gonçalves LHT. Healthy aging profile in octogenarians in Brazil. Rev Latino-Am Enfermagem [Internet]. 2016 [cited 2017 Feb 23];24:e2724. Available from: http://dx.doi.org/10.1590/1518-8345.0694.2724
10. Brasil. Instituto Brasileiro de Geografia e Estatística. IBGE. PNUD/Brasil Atlas de Desenvolvimento Humano[Internet]. 2010 [cited 2016 Apr 4]. Available from: www.atlasbrasil.org.br
11. Organização Pan-Americana da Saúde. Indicadores básicos para a saúde no Brasil: conceitos e aplicações. Rede Interagencial de Informação para a Saúde[Internet]. 2ª ed. Brasília: Organização Pan-Americana da Saúde; 2008 [cited 2016 Apr 4]. Available from: http://tabnet.datasus.gov.br/cgi/idb2006/indicadores.pdf
12. Campos ACV, Borges CM, Leles CR, Vargas AMD, Ferreira EF. Indicadores socioeconômicos e de saúde da Atenção Básica nos municípios da região metropolitana de Belo Horizonte. Arq Odontol [Internet]. 2012 [cited 2016 Apr 4];48(1):6-12. Available from: https://seer.ufmg.br/index.php/arquivosemodontologia/article/view/1952/1418
13. Hair JF, Black WC, Babin JB, Anderson RE, Tatham RL. Análise multivariada de dados. 6 ed. Porto Alegre: Artmed; 2009.
14. Brasil. Instituto Brasileiro de Geografia e Estatística. IBGE. IDH/PNUD Brasil Atlas do Desenvolvimento Humano dos Municípios [Internet]. 2010 [cited 2016 Apr 4]. Available from: www.br.undp.org/contentbrasil/pt
15. Hoffmann R. O índice de desigualdade de Theil-Atkinson. Rev Econometria. 1991;11(2):143-60
16. Thomas V, Wang Y, Fan X. Measuring education inequality: Gini Coeficientes of Education, World Bank Institute, World Bank; 2000.
17. Antes DL, Ribeiro DF, Schneider IJC, Benedetti TRB, d'Orsi E. Perfil socioeconômico dos idosos de Florianópolis: análise comparativa dos estudos-Perfil do Idoso 2002 e EpiFloripa Idoso 2009. Rev Bras Epidemiol [Internet]. 2014 [cited 2016 Apr 4];17(1):189-202. Available from: http://www.scielo.br/pdf/rbepid/v17n1/1415-790X-rbepid-17-01-00189.pdf
18. Pinto RBR, Bastos LC. Abordagem das pesquisas em epidemiologia aplicada à gerontologia no Brasil: revisão da literatura em periódicos, entre 1995 e 2005. Rev Bras Epidemiol [Internet]. 2007[cited 2016 Apr 4];10(3):361-9. Available from: http://www.scielo.br/pdf/rbepid/v10n3/06.pdf

19. Mastroeni MF, Erzinger GS, Mastroeni SSBS, Silva NN, Marucci MFN. Perfil demográfico de idosos da cidade de Joinville, Santa Catarina: estudo de base domiciliar. Rev Bras Epidemiol [Internet]. 2007[cited 2016 Apr 4];10(2):190-201. Available from: http://www.scielo.br/pdf/rbepid/v10n2/06.pdf

20. Moreira MO. O envelhecimento da população brasileira: intensidade, feminização e dependência. Rev Bras Est Pop. 1998;1:79-94.

21. Organização das Nações Unidas. Desenvolvimento humano nas macrorregiões brasileiras: 2016 [Internet]. Brasília: IPEA; 2016[cited 2016 Apr 4]. Available from http://www.atlasbrasil.org.br/2013/pt/download/publication

22. Fernandes DS. Avaliação da capacidade funcional de idosos longevos amazônidas[Dissertação]. [Internet]. UEPA/UFAM. Belém, PA, 2015[cited 2016 Apr 4]. Available from: http://paginas.uepa.br/ppgenf/files/pdfs/DISSERTAO_DAIANE_FERNANDES_2.pdf

23. Camarano AA. Cuidados de longa duração para a população idosa: um novo risco social a ser assumido? Rio de Janeiro: IPEA; 2010.

24. Brasil. Banco Central. Razão de Dependência Demográfica. Boletim Regional do Banco Central do Brasil [Internet]. 2015[cited 2016 Apr 4];104-6. Available from: https://www.bcb.gov.br/pec/boletimregional/port/2015/01/br201501b3p.pdf

25. Closs VE, Schwanke CHA. A evolução do índice de envelhecimento no Brasil, nas suas regiões e unidades federativas no período de 1970 a 2010. Rev Bras Geriatr Gerontol [Internet]. 2012[cited 2016 Apr 4];15(3):443-58. Available from: http://www.scielo.br/pdf/rbgg/v15n3/v15n3a06.pdf

26. Camarano AA. (Org.). Novo Regime Demográfico: uma nova relação entre população e desenvolvimento. Rio de Janeiro: IPEA, 2014.

27. Galeano EAV. Evidências da manutenção das desigualdades econômicas entre as regiões do Brasil no período de 1985 a 2008. Inc Soc [Internet]. 2012[cited 2016 Apr 4];6(1):116-37. Available from: http://www.brapci.inf.br/index.php/article/view/0000022551/72c91b111797dd01d8db7756ab813882

28. Araujo JM, Alves JA, Besarria CN. O impacto dos gastos sociais sobre os indicadores de desigualdade e pobreza nos estados brasileiros no período de 2004 a 2009. Rev Econ Contemp [Internet]. 2013[cited 2016 Apr 4];17(2):249-75. Available from http://dx.doi.org/10.1590/S1415-98482013000200003

29. Yazbek MC. Pobreza no Brasil contemporâneo e formas de seu enfrentamento. Serv Soc Soc [Internet]. 2012[cited 2016 Apr 4];110:288-322. Available from: http://www.scielo.br/pdf/sssoc/n110/a05n110.pdf