HOUSEHOLD SIZE AND DEMOGRAPHIC DIVIDEND IN BRAZILIAN HOUSING MARKET

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INTRODUCTION

Social sciences, including Sociology, Economy and Anthropology, traditionally, recognize the importance of the approach of housing and families and, for that reason, there is a wide literature concerning the theme. Demographers, on the other hand, have neglected the quantitative dimension of size, composition and changes of housing and their causes and consequences (BONGAARTS, 2001).

The drop of recent fertility, experienced by Brazilian society, brings as a result the decrease of the housing size. In that sense, the study of housing demand, considering the housing size, is important for the design of public policies and also for the commercial production of housing units. Brazilian literature reports an increase of the stock of single person household and the progressive decrease of households of five or more residents and it highlights that the transition is not the same for male and female, being more common the existence of female single person households (ALVES, 2004; DIEESE, 2004). Although housing is currently a widely discussed issue in Brazil, the majority of the housing quantitative studies include issues such as housing deficit and assessment of the housing stock. The demographic demand for households, considered as the need of new housings resulting from the demographic dynamics in a population, has not been usually included in such studies.

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This article is part of institutional project developed to the Secretariat of Housing of Brazilian Ministry of Cities. The deals of that institutional work were quantifying the future demographic demand for housing that was used in the National Policy on Housing. Besides the demographic projection of demand by age and sex for Brazil, federation states and municipalities until 2023, the demand for housing by categories of size of the household, income and Housing Deficit were also estimated. This paper deals with a standard applied demography exercise, associated with housing demand and the household size in Brazil between 1993 and 2023 including issues associated with the demographic dividend and gender relations in housing demand.

The method applied was the specific headship rate method, combined with population projection by sex and age. These methods are widely used in estimates of future demand for housing in the international literature and are similar to the observed data when the population projection is well done. The headship function, in that study, was modeled and projected by Age Period Cohort models.

ANTECEDENTS

The average household size is mentioned as a useful measurement in preliminary indications of housing structure, concerning international comparisons. When the medium size of households is really big, it is assumed the existence of extended housings or high fertility. Small units, on the other hand, are usually associated with nuclear families, based on a couple with children. In smaller levels of household size, big families are associated with high fertility regime and, on the other hand, low fertility or high child mortality is associated with small households (LASLETT, 1969).

Historically, in countries from Europe and in The USA and Canada, the average household size declined in values from five or six residents, around 1850, to values lower than three residents, at the end of the millennium. Concerning Brazil, the demographic census data from 1970 to 2000 shows that, in 1970, the average size of the Brazilian households was of 5.3 persons and, in just 30 years that indicator was already of 3.8 persons per households (figure 1). Geographically, the biggest households are located in the north and northeastern of the country and the smallest ones in the. The drop of fertility is undoubtedly the main

determinant of the average household size decrease and, that way, the result that was discovered is not a surprise, once smaller quantities of children mean smaller families. Kuznets (1978) and the U.S. Census Bureau (1999) estimated that the total of children living in the households, in USA, declined from 2.3 to 0.6 between 1850 and 1998. Considering Brazilian fertility was around five children per woman in 1970 and in 2000, it was close to the replacement rate. In that way, it is natural that the housings size had also decreased.

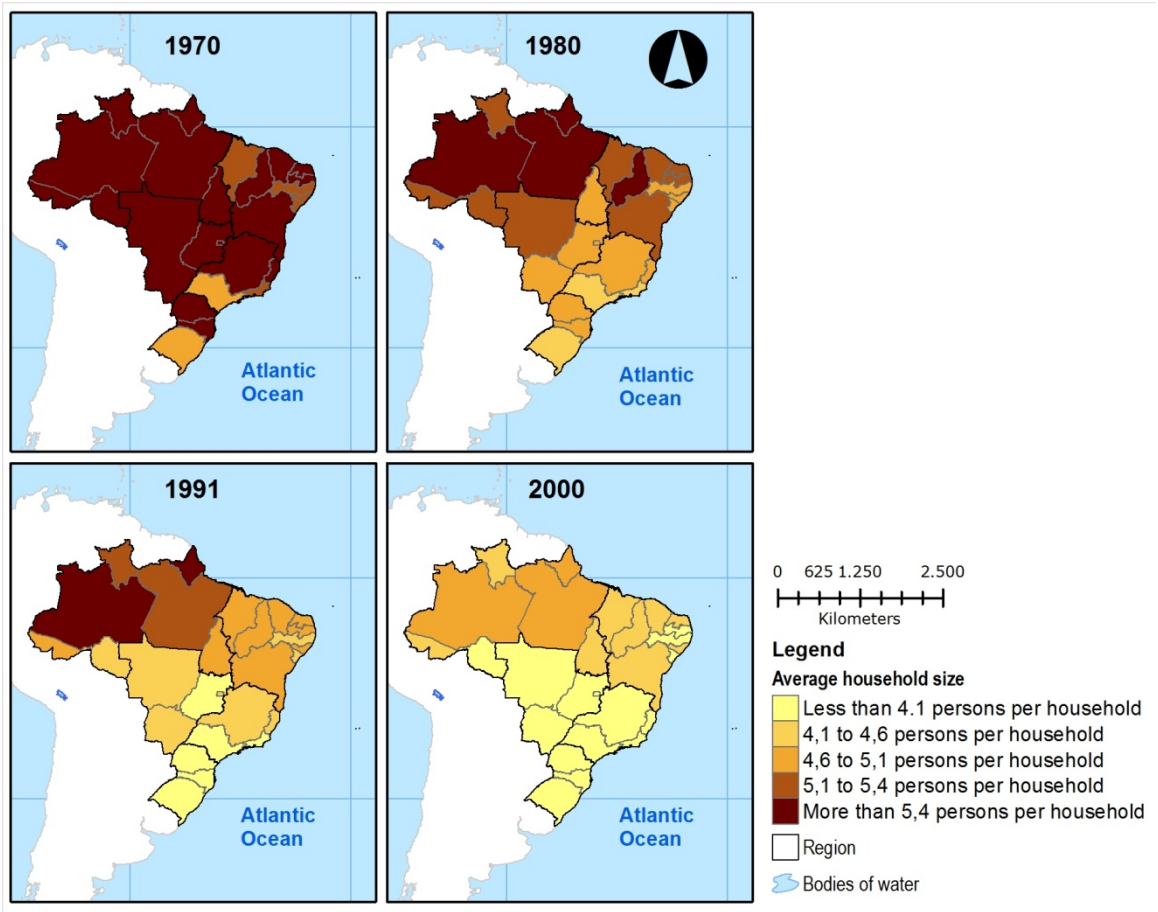

Figure 1 Observed average household size, by federation units and period. Brazil, 1970, 1980, 1991 and 2000
Source: Demographic Census (IBGE)

A second factor that should be highlighted is the reduction of the number of adults living in housings. In The USA, between 1850 and 1998, the total of adults living in housings declined from 3.2 to 2.1 (KUZNETS, 1978 and the U.S. CENSUS BUREAU, 1999). Concerning Brazil, data from the National Household Sample Survey– PNAD suggests that in 2007, there were 2.3 adults living in household on average. The decline on the average number of adults reflects changes in the household arrangements due to changes

that go farther than the drop of fertility as, for instance, age to the first marriage, adult mortality, the tendency of adults to remain in their parents' house, divorces and the end of relationships and the elderly population living by themselves, among other factors. Those characteristics change significantly the size and the composition of households and they vary according to social, cultural and economical characteristics.

METHODOLOGY

The headship rate method for housing projection assumes that the number of housing units in a population is the same as number of heads of household. The number of household heads can be controlled by several socio-demographic attributes and, in this case, are controlled by age, sex of the household heads and the size of the household. Generally, the definition of head of household is based on a hierarchy of main supplier as well as age, and a tradition of matriarchy or patriarchy is usually maintained. The projection of housing demand using headship rates model has been most frequently used methodology in the recent years. A reasonable projection of the total number of households in the future may be obtained when an adequate population projection by age and sex is made. This methodology has some advantages over other methodologies, as it reflects expected changes in the population age structure and sex. Since population projections reflect the past and future trends of fertility, mortality and migration, the method may indirectly reflect these three components of population changes (KONO, 1987).

We adopt a strategy, namely, to project the headship rates by sex based on an age-period-cohort (APC) estimation procedure (RIOS-NETO e OLIVEIRA, 1999; RIOS-NETO, OLIVEIRA e GIVISIEZ 2003). The use of a demographic method to estimate the household demand is justified by the fact that differential demands will result as all individuals from a population pass through the stages of the life cycle. (RIOS-NETO, GIVISIEZ e OLIVEIRA, 2008; RIOS-NETO, GIVISIEZ e OLIVEIRA, 2008a; e BRAZIL, CEDEPLAR, IUCAM, 2007).

The headship rate in the age group between *x* and *x+n*, of the sex S, ($_nT_x^s$) is defined by the percentage of households heads of each age group (equation 1) and it was estimated based on data from the PNAD, from 1992 to 2004.

$$_nT_x^s = \frac{_nn_x^s}{_nN_x^s} \qquad \text{Equation 1}$$

$$_n^jHS_x^s = \frac{_n^jhs_x^s}{_nN_x^s} \qquad \text{Equation 2}$$

Considering:

$_nHS_x^{s,j}$	Headship ratio for category *j*, in the age group from *x* to *x+n* years, in the year *t* and in the sex *s*.
$_nhs_x^{s,j}$	Household, that belongs to the *j-th* category, headed by individuals of the age group from x to x+n year and sex s, in the year t.
$_nT_x^s$	Headship ratio, in the age group from *x* to *x+n* years, in the year *t* and in the sex *s*.
$_nN_x^s$	Population in the age group from *x* to *x+n* years, in the year *t* and in the sex *s*.
$_nn_x^s$	Household headed by individuals in the age group from *x* to *x+n* years, in the year *t* and in the sex *s*.

The number of heads was obtained based on the household size category, gender and age (Figure 2). Note that the sum of the headship rates in each household category in each age group and gender is the headship rate within this age and sex category, i.e., $\sum_{r=0}^{n} HS_r = {}_nT_x^s$. The methodology was implemented in two stages: the first one which projects the headship rate by age group and sex, and the second one moulds the headship rate according to housing deficit categories. For the modeling of the headship rate (T, in Figure 1) a binary logit model was used. The APC modeling of headship rates, disaggregated by household size categories, used a multinomial logit model which is a generalization of the binary logit model.

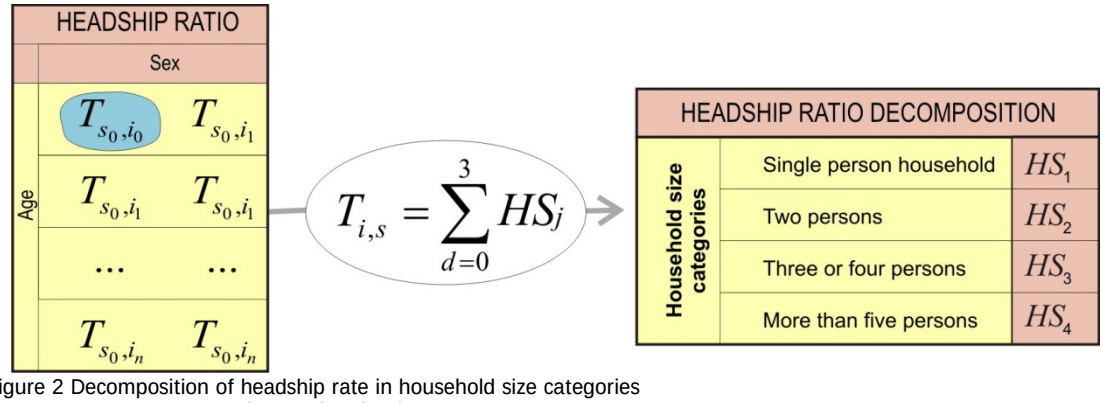

Figure 2 Decomposition of headship rate in household size categories
Source: BRAZIL, CEDEPLAR and IUCAM (2007) and IBGE

The model used in the first stage assumed that the response variable is the probability that an individual is the household head (Equation 3). The second model, in turn, assumes that the response variable is the probability that a household belongs to a particular household

size category. The explanatory variables used in the models were Age, Period and Cohort. The Federation Unit was used as a covariable in the second stage and the estimates, in both models, were performed separately for men and women.

$$\ln\left(\frac{n}{N}\right) = \alpha_r + \theta_r I + \pi_r . P + \gamma_r . C \qquad \text{Equation 3}$$

$$\ln\left(\frac{\Pr(HS_1)}{\Pr(HS_j)}\right) = \alpha_j + \theta_j I + \pi_j . P + \gamma_j . C + \upsilon_j . UT \qquad \text{Equation 4}$$

Considering

${}_nHS_x^{s,j}$	Headship ratio for category j, in the age group from x to x+n years, in the year t and in the sex s.
I	Age category
P	Period category
C	Cohort category
UT	Federation state

For the identification of the age, the period and the cohort of the households heads, the data were charted as suggested in Table 1. It is shown that the variables of age, period and cohort are linearly related, i.e., C (cohort) = P (period-year) - A + 12. This fact generates a collinearity constraint that makes it impossible to estimate regression models. In literature it is common to address this problem through the imposition of one or more linear constraints on any independent variable. That is, one can assume that the parameters for any cohort pair, or period or age are equal. In this study, the criterion adopted was that the two older cohorts present equal coefficients. This solution, common in literature, tends to be an acceptable assumption when there are no substantial changes in the past.

Table 1
Age, period, cohort matrix

Estage 1

Age		Cohort	Period 1983	1988	1993	1998	2003
			5	4	3	2	1
15-19	12	5	4	3	2	1	
20-24	11	6	5	4	3	2	
25-29	10	7	6	5	4	3	
30-34	9	8	7	6	5	4	
35-39	8	9	8	7	6	5	
40-44	7	10	9	8	7	6	
45-49	6	11	10	9	8	7	
50-54	5	12	11	10	9	8	
55-59	4	13	12	11	10	9	
60-64	3	14	13	12	11	10	
65-69	2	15	14	13	12	11	
70+	1	15	15	14	13	12	

Estage 2

Age		Cohort	Period 1993	1998	2003
			3	2	1
15-19	12	3	2	1	
20-24	11	4	3	2	
25-29	10	5	4	3	
30-34	9	6	5	4	
35-39	8	7	6	5	
40-44	7	8	7	6	
45-49	6	9	8	7	
50-54	5	10	9	8	
55-59	4	11	10	9	
60-64	3	12	11	10	
65-69	2	13	12	11	
70+	1	13	13	12	

Source: BRAZIL, CEDEPLAR and IUCAM (2007) and IBGE

RESULTS

The projection results can be compared with the 2007 population count (IBGE, 2007) and the Table 2 shows that the used population projection is a good estimate of observed population. The population projection displayed in Figure 3 clearly presents the age structure effects determined by the observed and predicted steady decline in TFR and the predicted decline in mortality rates.

Table 2
Selected population projections. Brazil

Population Projection	Total Population	Error %
2007 Population Count	183.987.291	
Cedeplar Projection (2005 revision)	185.444.882	0,79%
IBGE Projection (2004 revision)	189.335.118	2,91%
IBGE Projection (2000 revision)	185.738.317	0,95%

Source: BRAZIL, CEDEPLAR and IUCAM (2007) and IBGE

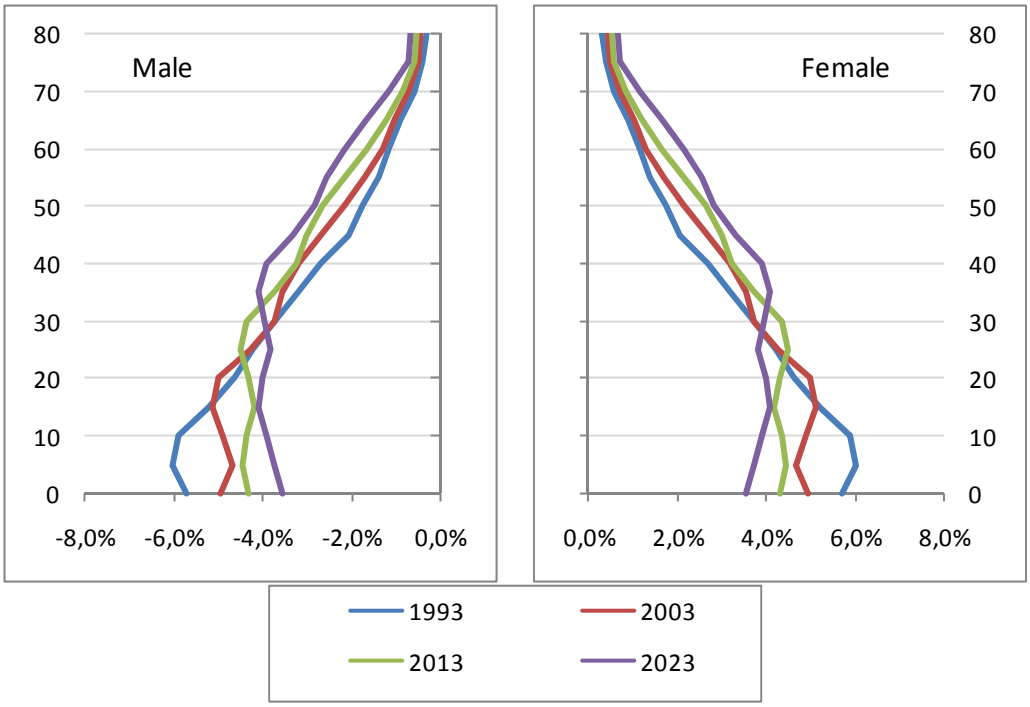

Figure 3 Age Pyramid. Brazil, 1993, 2003, 2013 and 2023
Source: BRAZIL, CEDEPLAR and IUCAM (2007) and IBGE

The headship rates estimated and projected are presented in Figure 4. The pattern is clearly determined there is a steady decline in the headship rates for males and an increase in the rates for females. The age pattern is somewhat different for men and women. While the

headship rates for men increase until age 35-39, reaching a plateau thereafter, the rates for women are increasing with age during all brackets. Another interesting point that may turn the Brazilian case different from the developed world is the low institutionalization level of the elderly population, which fact leads to a decline in headship rates only in the last age bracket (70 and more).

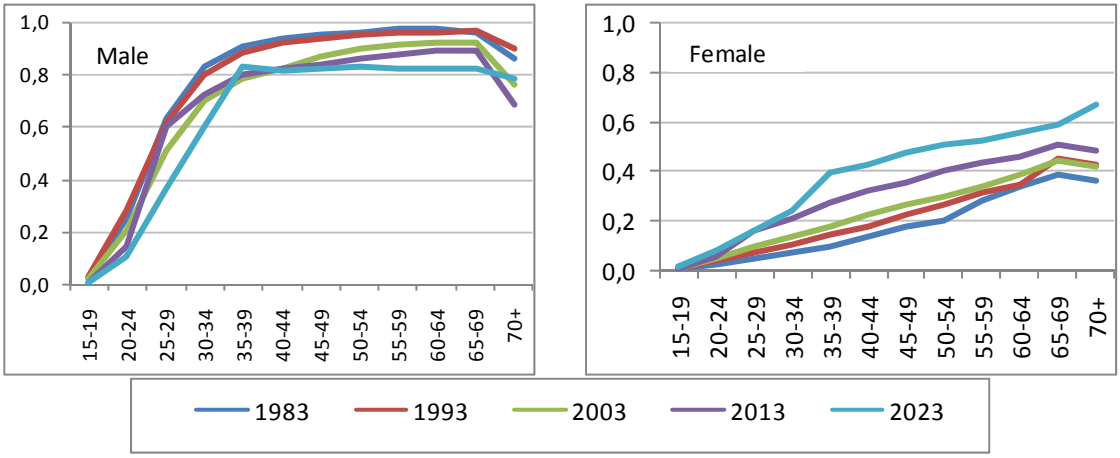

Figure 4 Estimated and projected headship rates, by sex. Brazil, 1983, 1993, 2003, 2013 and 2023
Source: BRAZIL, CEDEPLAR and IUCAM (2007)

HOUSEHOLD STOCK PROJECTION

The projection of demographic demand for households estimates, in 2023, a stock of 80.2 million households (Table 3). This total is 40% higher than the stock estimated for 2008, with an average growth of 2.26% per year in the period between 2008 and 2023. As regards the North region of the country, the average growth rate would register, in this case, 3.08% on average, increasing the final household stocks in 59% over 15 years. In order to draw a comparison, it is stressed that the population stock estimated for 2023 was of 214 million inhabitants, 14.4% higher than the population in 2008, representing an average annual growth of 0.9% in 15 years. In this way, it is registered that the households' stock growth, if the projection hypotheses are confirmed, will be faster than the population growth.

It is noteworthy that from 2018 the projected scenario forecasts that the population will be increased in levels lower than the households' total. However, the projection does not incorporate the hypothesis of the institutionalization of the elderly, a still uncommon phenomenon in the Brazilian society. Supposing there is an increasing institutionalization trend, there will be a cooling in the household formation flow.

Table 3
Projected and estimated households, population and average household size, by region and period. Brazil and regions, 1993 to 2023

Population							
Region	**1993**	**1998**	**2003**	**2008**	**2013**	**2018**	**2023**
North	10.580.659	12.222.919	13.775.499	15.232.945	16.664.427	18.028.169	19.315.319
Northeast	43.515.148	46.394.284	49.839.741	53.530.045	57.006.016	60.117.281	62.834.873
Southeast	64.748.720	70.364.929	74.648.623	78.013.306	81.069.605	83.521.147	85.472.729
South	22.733.338	24.422.947	25.999.111	27.418.546	28.699.964	29.798.990	30.690.876
Middle East	9.862.142	11.128.578	12.275.625	13.322.912	14.339.150	15.281.287	16.148.127
Brazil	**151.440.006**	**164.533.657**	**176.538.600**	**187.517.753**	**197.779.161**	**206.746.874**	**214.461.924**
Household stock							
Region	**1993**	**1998**	**2003**	**2008**	**2013**	**2018**	**2023**
North	2.270.449	2.710.224	3.181.240	4.036.805	4.775.742	5.507.909	6.410.395
Northeast	9.802.735	11.223.546	12.196.447	14.785.869	16.827.586	18.641.704	20.975.646
Southeast	17.392.797	19.600.378	21.342.446	24.922.168	27.773.523	30.374.166	33.795.399
South	6.221.337	7.107.488	7.606.057	9.104.766	10.230.280	11.298.089	12.687.486
Middle East	2.558.257	3.107.098	3.482.744	4.300.145	4.935.523	5.543.568	6.296.459
Brazil	**38.245.575**	**43.748.733**	**47.808.934**	**57.149.753**	**64.542.653**	**71.365.435**	**80.165.386**
Average household size							
Region	**1993**	**1998**	**2003**	**2008**	**2013**	**2018**	**2023**
North	4,66	4,51	4,33	3,77	3,49	3,27	3,01
Northeast	4,44	4,13	4,09	3,62	3,39	3,22	3,00
Southeast	3,72	3,59	3,50	3,13	2,92	2,75	2,53
South	3,65	3,44	3,42	3,01	2,81	2,64	2,42
Middle East	3,86	3,58	3,52	3,10	2,91	2,76	2,56
Brazil	**3,96**	**3,76**	**3,69**	**3,28**	**3,06**	**2,90**	**2,68**

Source: BRAZIL, CEDEPLAR and IUCAM (2007)

The differences between the population growth and the household formation rates are consistent with the population dynamics experienced by the country. The fertility decline brings about as its direct consequence the households' size decrease. Considering that extended households are not common in Brazil, it is expected, necessarily, the occupation of a greater number of dwellings to house the population. Moreover, the mortality levels drop and the life expectancy rise suggest that in the medium term, the elderly population will be living in one-person or two persons households.

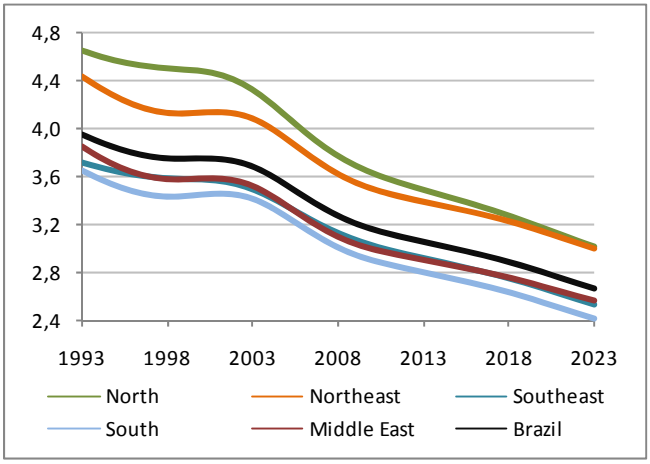

Figure 5 Projected and estimated average household size, by federation units and period. Brasil, 1993-2023
Source: BRAZIL, CEDEPLAR and IUCAM (2007)

The households average size variation analysis reveals that the trend is declining and continuing throughout the entire projected period (Figure 5). It is projected that the households average size in 2023 will be of 2.68 persons per household in Brazil. The decline trend pattern is similar in all large regions, although different levels and more pronounced drops were observed in the North (4.66 in 1993 and 3.01 in 2023) and Northeast (4.44 in 1993 and 3.00 in 2023) states. In the other large regions of the country the projected scenario forecasts average size households between 2.4 and 2.6 persons (Table 3).

The households' average size spatial distribution among the Federal Units of the country also reveal that the households from North and Northeast regions states, on average, are larger. If the projection's hypotheses are kept, it is likely that only few states the households' average has rates above 3.1 in 2023. In the states located in the South, Southeast and Center-West regions of the country, in turn, the households average size will be lower than 2.7 persons.

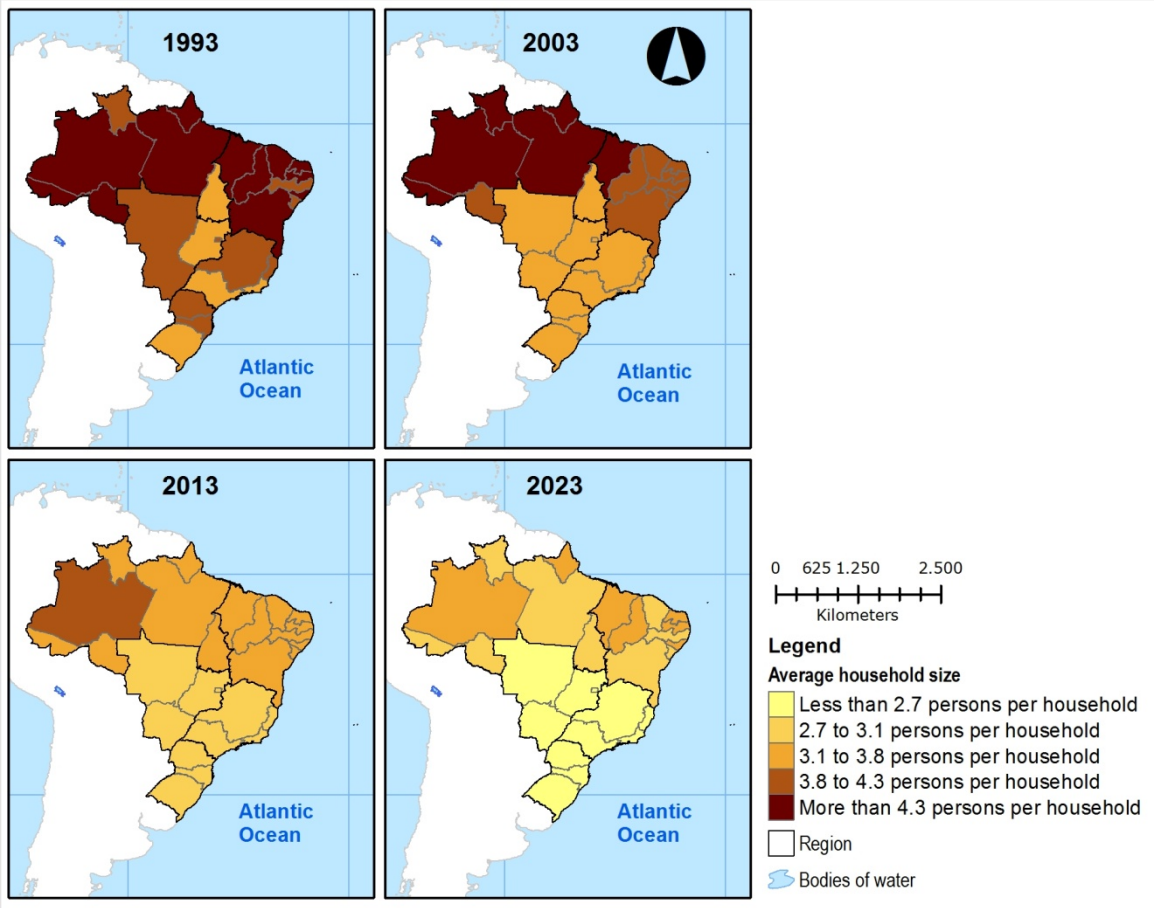

Figure 6 Projected and estimated average household size, by federation units and period. Brazil, 1993, 2003, 2013 e 2023
Source: BRAZIL, CEDEPLAR and IUCAM (2007)

The gender and age pattern of household headship shows that in 1993, 80% of Brazilian households were headed by men, and in 2003, this proportion had decreased to 78%. In 2023, in turn, it is expected that 61% of the households will be headed by men and 39% by women (Table 4). This phenomenon of the household headship feminization is associated with behavioral changes with regard to female autonomy and their participation in the labor market, as well as the male over-mortality, given that part of these women will be widows. This upward trend can also be attributed to the increase in the number of separations and divorces that end up in new household formations, where the woman is the reference and carries the main burden of her children's upbringing.

Table 4
Projected and estimated households and population by period and sex. Brazil, 1993-2023

Absolute values

Period	Population			Household		
	Male	Female	Total	Homens	Mulheres	Total
1993	74.712.549	76.727.410	151.439.959	30.737.412	7.508.162	38.245.575
1998	81.034.153	83.499.366	164.533.519	33.981.675	9.767.059	43.748.733
2003	86.833.477	89.705.425	176.538.902	35.975.887	11.833.046	47.808.934
2008	92.150.818	95.365.858	187.516.676	41.197.577	15.952.177	57.149.753
2013	97.133.926	100.649.244	197.783.170	44.236.655	20.305.998	64.542.653
2018	101.485.792	105.246.126	206.731.918	46.102.101	25.263.334	71.365.435
2023	105.268.979	109.248.761	214.517.740	48.543.225	31.622.161	80.165.386

Relative values

Period	Population			Household		
	Male	Female	Total	Homens	Mulheres	Total
1993	49,3%	50,7%	100,0%	80,4%	19,6%	100,0%
1998	49,3%	50,7%	100,0%	77,7%	22,3%	100,0%
2003	49,2%	50,8%	100,0%	75,2%	24,8%	100,0%
2008	49,1%	50,9%	100,0%	72,1%	27,9%	100,0%
2013	49,1%	50,9%	100,0%	68,5%	31,5%	100,0%
2018	49,1%	50,9%	100,0%	64,6%	35,4%	100,0%
2023	49,1%	50,9%	100,0%	60,6%	39,4%	100,0%

Source: BRAZIL, CEDEPLAR and IUCAM (2007)

In the households' stock distribution according to the head's age and sex, one can notice a progressive increase in the total of households headed by people over 65, as opposed to the drop in the number of households headed by young people (Table 5). This pattern is consistent with the relative aging of the Brazilian population and the expansion of adolescence, as well as ones' postponing the transition to form new families. Analyzing the sex and age pattern distribution, one can perceive that the greater portion of the heads between 15 and 59 years old are male. Nonetheless, the households' heads over 60 years old, in the medium and long term, will be equally distributed between men and women. In the view of decreasing the sex ratio among the elderly, one can expect a relative increase in the proportion of female household headship.

Table 5
Households projected and estimated, by sex, age group and period Brazil, 1993-2023

Period	Households headed by men			
	15 to 39year	40 to 59 years	More than 60 years	Total
1993	14.775.086	11.157.205	4.805.121	30.737.412
1998	15.454.343	13.033.620	5.493.711	33.981.675
2003	15.257.966	14.754.887	5.963.035	35.975.887
2008	17.755.533	16.765.281	6.676.762	41.197.577
2013	18.509.184	18.176.529	7.550.943	44.236.655
2018	17.760.683	19.782.361	8.559.057	46.102.101
2023	15.888.336	21.806.240	10.848.649	48.543.225
Period	**Households headed by women**			
	15 to 39year	**40 to 59 years**	**More than 60 years**	**Total**
1993	2.083.671	2.955.624	2.468.867	7.508.162
1998	2.807.734	3.961.887	2.997.438	9.767.059
2003	3.326.684	4.952.133	3.554.229	11.833.046
2008	4.628.424	6.854.891	4.468.861	15.952.177
2013	5.848.465	8.782.420	5.675.112	20.305.998
2018	6.849.927	11.028.815	7.384.592	25.263.334
2023	7.430.924	13.564.914	10.626.323	31.622.161

Source: BRAZIL, CEDEPLAR and IUCAM (2007)

NEW FORMED HOUSEHOLD

The graph shown in Figure 7 depicts the household formation flow within the interval of analysis. The new formed households are the absolute variation in the stock of dwelling, or, in other word, the amount of households that will be added to the household stock at each year (RODRIGUEZ, CURBELO e MARTIN, 1991). In the period between 1993 and 2023 the flow is always positive, denoting no tendency for households' dissolution. However, the pattern of increase and decrease presents variations that should be highlighted.

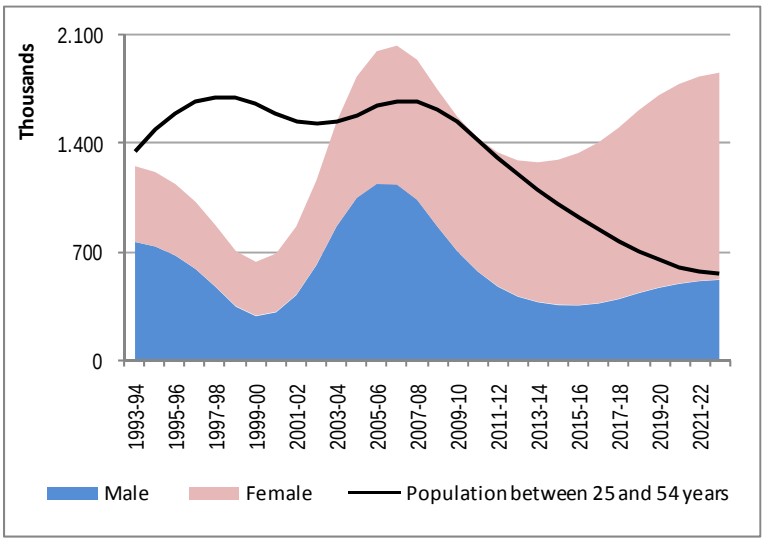

Figure 7 Project new formed households, by sex, and projected population, between 25 to 54 years old, annual increment. Brazil, 1993-2023.
Source: BRAZIL, CEDEPLAR and IUCAM (2007)

If we stick to the population and headship projections in the twenty first century then we can observe that the early years of this century were marked by a very high entry of new households in the housing market. Nevertheless, it is projected a relative decline in the absolute number of new entrants from 2003 until approximately 2015. This is the finding that could lead one to speculate whether age structure would not be finally playing a role in the decline of new housing needs, something that could be interpreted as a demographic dividend or a window of opportunity in the housing market. The age structure could be associated to this household function shape and figure 7 shows also that population flow of the 25 to 54 years old population has a similar shape to the household flows.

In view of the mounting incidence of *female household headship,* previously mentioned, it is expected that the contribution to the total stock will be mainly characterized by female-headed households, growingly from 2013 until 2023.

HOUSEHOLD SIZE CATEGORIES PROJECTION

The household size categories adopted for the projection of household demand correspond to *One-Person*, *Two Persons*, *three or four persons* and *five or more persons* households (Figure 8).

Household size categories		
Code	Name	Description
1	One	One-person household
2	Two	Household with two persons
3	Three and four	Household with three and four persons
4	Five and more	Household with five and more persons

Figure 8 Description of household size categories
Source: BRAZIL, CEDEPLAR and IUCAM (2007)

The historical tendencies for the proportion of households observed for each household size category show a significant and continuing decline in the proportion of households of five or more people, with a decrease of 11.5 percentage points during the researched period (Figure 9). In the other categories the proportions were increased in 3.0, 4.3 and 4.2 percentage points, in *one-person*, *two persons*, *three or four persons* household categories respectively.

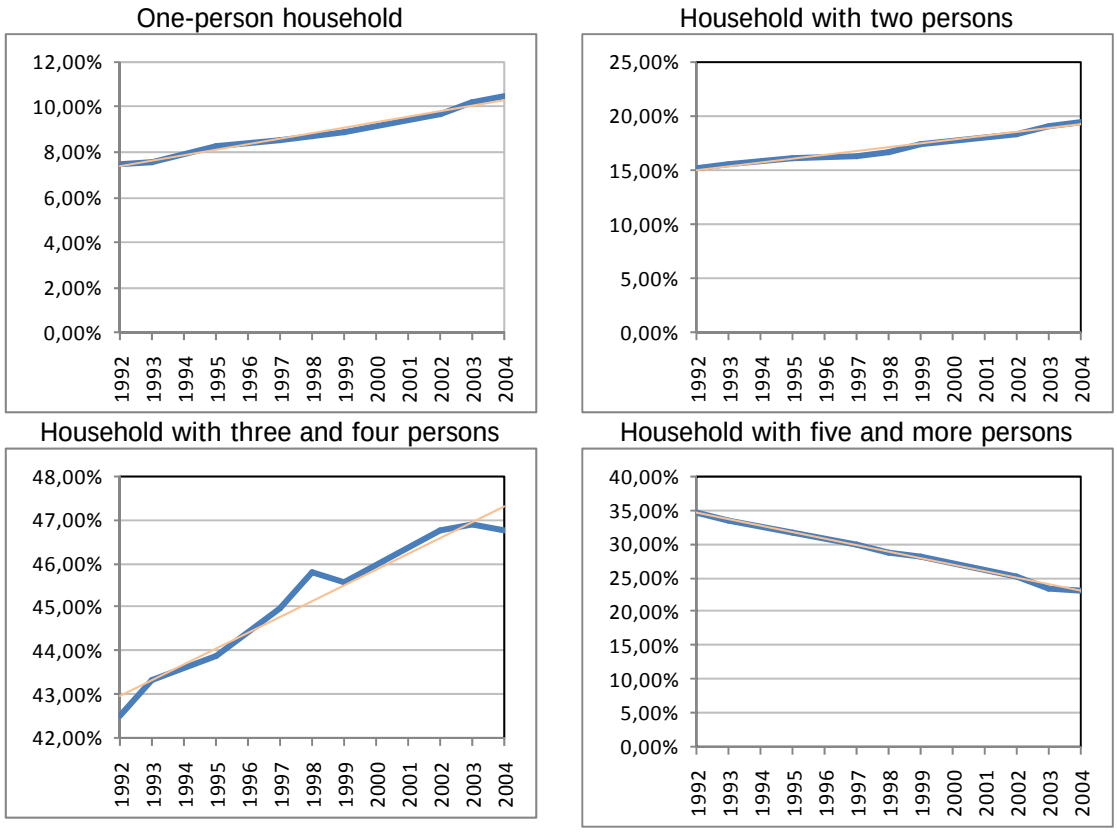

Figure 9 Proportion of households, per year, by household size category. Brazil, 1992 a 2004
Note: The scales of the axes of abscissa are different
Source: BRAZIL, CEDEPLAR and IUCAM (2007)

The estimate for 2008, lists that 11.1% were one-person, 20.6% with two or three persons, 47.9% of households with three or four persons and 20.3% with more than five persons (Table 6). This distribution is consistent with the pattern of the most common household family in Brazil, represented by nuclear families of parents and children. A relative decrease

in the total of larger households was noticed in contrast to the decrease in the proportion of small households. It is expected that the proportion of households with three or more residents, estimated at 68.2% in 2008, decreases 11.1 percentage points by 2023.

Table 6
Projected and estimated households, by household categories and period. Brazil, 1993 a 2023

Period	Absolute values				
	One	Two	Three and four	Five and more	Total
1993	3.055.817	6.411.682	16.930.541	11.847.535	38.245.575
1998	3.663.801	7.486.675	20.292.103	12.306.155	43.748.733
2003	4.637.966	8.880.502	22.632.444	11.658.022	47.808.934
2008	6.357.097	11.791.319	27.397.620	11.603.718	57.149.753
2013	8.099.622	14.439.366	30.677.184	11.326.482	64.542.653
2018	10.071.692	17.255.866	33.063.909	10.973.968	71.365.435
2023	12.966.089	21.279.677	35.322.863	10.596.757	80.165.386
Period	Relative values				
	One	Two	Three and four	Five and more	Total
1993	*8,0%*	*16,8%*	*44,3%*	*31,0%*	*100,0%*
1998	*8,4%*	*17,1%*	*46,4%*	*28,1%*	*100,0%*
2003	*9,7%*	*18,6%*	*47,3%*	*24,4%*	*100,0%*
2008	*11,1%*	*20,6%*	*47,9%*	*20,3%*	*100,0%*
2013	*12,5%*	*22,4%*	*47,5%*	*17,5%*	*100,0%*
2018	*14,1%*	*24,2%*	*46,3%*	*15,4%*	*100,0%*
2023	*16,2%*	*26,5%*	*44,1%*	*13,2%*	*100,0%*

Source: BRAZIL, CEDEPLAR and IUCAM (2007)

Among the regions of the country, the most significant differences highlight that the North and Northeast regions present a higher proportion of households categorized with five or more residents in contrast to the smaller number of households with one or two residents. However, all regions of the country tended to decrease the proportion of large households (*five or more persons*) in contrast to the decrease of the proportion of smaller households (Table 7).

Table 7
Proporção de domicílios estimados e projetados, por categoria de tamanho do domicilio, segundo o período e grande região. Brasil, 2008 e 2023

Period	Region	Asolute values				
		One	Two	Three and four	Five and more	Total
2008	North	355.910	646.602	1.847.820	1.186.473	4.036.805
	Northeast	1.505.062	2.611.809	6.637.963	4.031.036	14.785.869
	Southeast	2.946.107	5.487.171	12.267.726	4.221.163	24.922.168
	South	1.047.306	2.166.339	4.530.008	1.361.113	9.104.766
	Middle East	502.711	879.397	2.114.104	803.933	4.300.145
2023	North	841.504	1.341.578	2.882.895	1.344.419	6.410.395
	Northeast	3.115.533	4.782.174	9.175.725	3.902.214	20.975.646
	Southeast	5.806.668	9.635.600	14.880.084	3.473.047	33.795.399
	South	2.122.767	3.875.197	5.561.083	1.128.440	12.687.486
	Middle East	1.079.618	1.645.129	2.823.076	748.637	6.296.459
Period	Region	Relative values				
		One	Two	Three and four	Five and more	Total
2008	North	8,8%	16,0%	45,8%	29,4%	100,0%
	Northeast	10,2%	17,7%	44,9%	27,3%	100,0%
	Southeast	11,8%	22,0%	49,2%	16,9%	100,0%
	South	11,5%	23,8%	49,8%	14,9%	100,0%
	Middle East	11,7%	20,5%	49,2%	18,7%	100,0%
2023	North	13,1%	20,9%	45,0%	21,0%	100,0%
	Northeast	14,9%	22,8%	43,7%	18,6%	100,0%
	Southeast	17,2%	28,5%	44,0%	10,3%	100,0%
	South	16,7%	30,5%	43,8%	8,9%	100,0%
	Middle East	17,1%	26,1%	44,8%	11,9%	100,0%

Source: BRAZIL, CEDEPLAR and IUCAM (2007)

The graph of Figure 10, by presenting the flow of categories of household size, suggests that, from 2015, the household formation flow with one or two persons will be more frequent than the one with three or four persons. It is noteworthy that from 2008 it is expected that small households' formation (one and two persons) will be more frequent than the average households' formation (three or four residents).

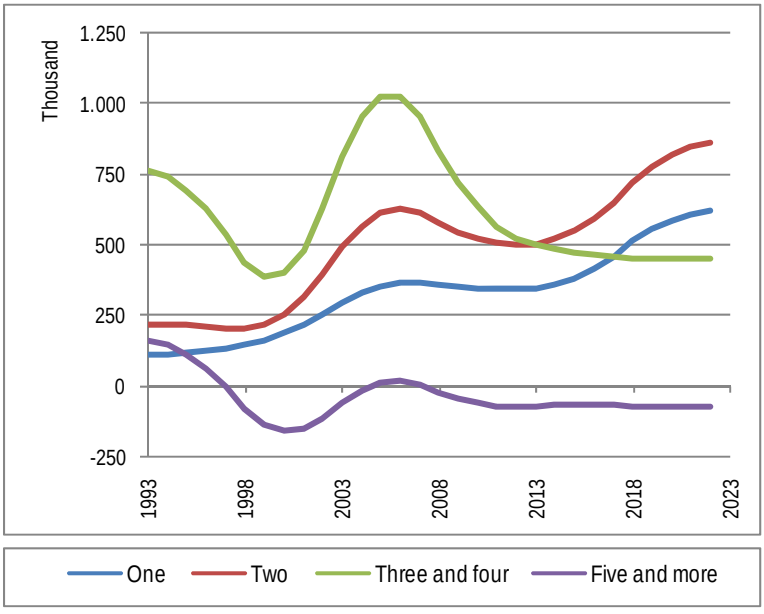

Figure 10 New formed households, per year, by size categories. Brazil, 1993 a 2023
Source: BRAZIL, CEDEPLAR and IUCAM (2007)

In the pattern by sex, the absolute number of one-person households is evenly distributed between men and women. Nevertheless, in relative values, the percentage of female-headed households which was one-person remained virtually unchanged in the projection period (Table 9). As regards men, this household category represented 8.2% in 2008 and tends to 13.9% in 2023 (Table 8). On the other hand, the households with more than five persons present a decreasing behavior throughout the projection period for both sexes.

Table 8
Projected and estimated households headed by men, by household categories and period. Brazil, 1993 a 2023

Period	Absolute values				
	One	Two	Three and four	Five and more	Total
1993	1.639.193	4.484.412	14.257.823	10.355.984	30.737.412
1998	1.869.817	4.953.859	16.643.230	10.514.769	33.981.675
2003	2.410.528	5.839.334	18.113.334	9.612.691	35.975.887
2008	3.367.243	7.470.957	21.231.725	9.127.651	41.197.577
2013	4.291.739	8.691.375	22.802.582	8.450.958	44.236.655
2018	5.311.222	9.839.984	23.272.284	7.678.612	46.102.101
2023	6.734.823	11.565.275	23.383.179	6.859.950	48.543.225
Período	Valores Absolutos				
	One	Two	Three and four	Five and more	Total
1993	*5,3%*	*14,6%*	*46,4%*	*33,7%*	*100,0%*
1998	*5,5%*	*14,6%*	*49,0%*	*30,9%*	*100,0%*
2003	*6,7%*	*16,2%*	*50,3%*	*26,7%*	*100,0%*
2008	*8,2%*	*18,1%*	*51,5%*	*22,2%*	*100,0%*
2013	*9,7%*	*19,6%*	*51,5%*	*19,1%*	*100,0%*
2018	*11,5%*	*21,3%*	*50,5%*	*16,7%*	*100,0%*
2023	*13,9%*	*23,8%*	*48,2%*	*14,1%*	*100,0%*

Source: BRAZIL, CEDEPLAR and IUCAM (2007)

Table 9
Projected and estimated households headed by women, by household categories and period. Brazil, 1993 a 2023

Period	Absolute values				
	One	Two	Three and four	Five and more	Total
1993	1.416.624	1.927.270	2.672.718	1.491.551	7.508.162
1998	1.793.984	2.532.816	3.648.873	1.791.387	9.767.059
2003	2.227.438	3.041.168	4.519.110	2.045.331	11.833.046
2008	2.989.854	4.320.362	6.165.894	2.476.066	15.952.177
2013	3.807.882	5.747.990	7.874.602	2.875.523	20.305.998
2018	4.760.470	7.415.883	9.791.625	3.295.356	25.263.334
2023	6.231.266	9.714.402	11.939.684	3.736.808	31.622.161
Período	Valores Absolutos				
	One	Two	Three and four	Five and more	Total
1993	*18,9%*	*25,7%*	*35,6%*	*19,9%*	*100,0%*
1998	*18,4%*	*25,9%*	*37,4%*	*18,3%*	*100,0%*
2003	*18,8%*	*25,7%*	*38,2%*	*17,3%*	*100,0%*
2008	*18,7%*	*27,1%*	*38,7%*	*15,5%*	*100,0%*
2013	*18,8%*	*28,3%*	*38,8%*	*14,2%*	*100,0%*
2018	*18,8%*	*29,4%*	*38,8%*	*13,0%*	*100,0%*
2023	*19,7%*	*30,7%*	*37,8%*	*11,8%*	*100,0%*

Source: BRAZIL, CEDEPLAR and IUCAM (2007)

The pattern of household formation and dissolution are distinct when households headed by men and women are compared (Figure 11). In regard to men, the formation flow of households with more than five persons is always negative. In the case of women, all household size categories had positive flow during the projected period. The smaller households, with one or two persons, will gradually increase the stock for both sexes. However, male-headed households with three or four persons will have flows lower than those of one-person and two persons ones. Regarding female-headed households, noticeably, only from 2018 will the flow of formation of two people households be greater than that of three or four persons households.

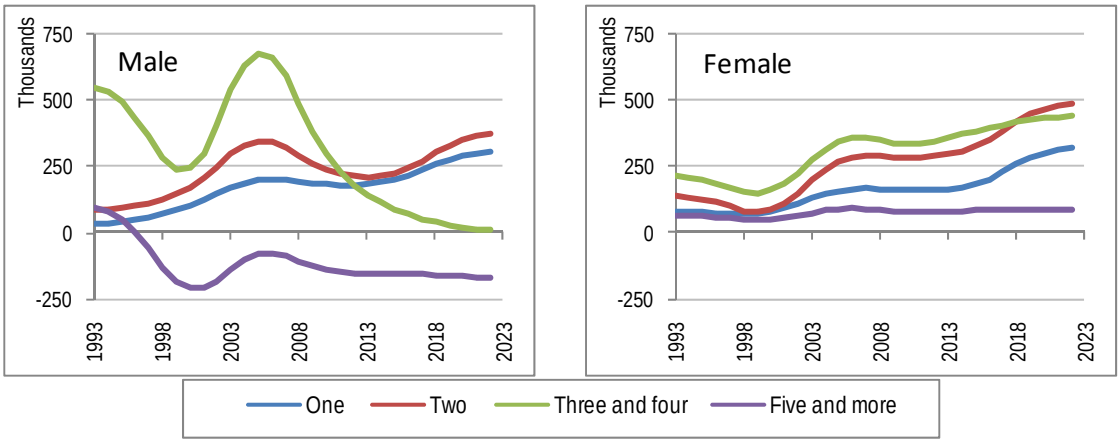

Table 11 New formed households, per year, by size categories and sex. Brazil, 1993 a 2023
Source: BRAZIL, CEDEPLAR and IUCAM (2007)

The cartographic representation of the proportion of one-person and five or more persons households' in the regions of the country are consistent with previous assessments and highlight the higher frequency of one-person households in the South and Southeast regions of the country. The proportion of five or more persons households, in turn, suggests the spatial distribution in an opposite way, note that these households are more frequent in the North and Northeast than in the South and Southeast regions (Figure 13).

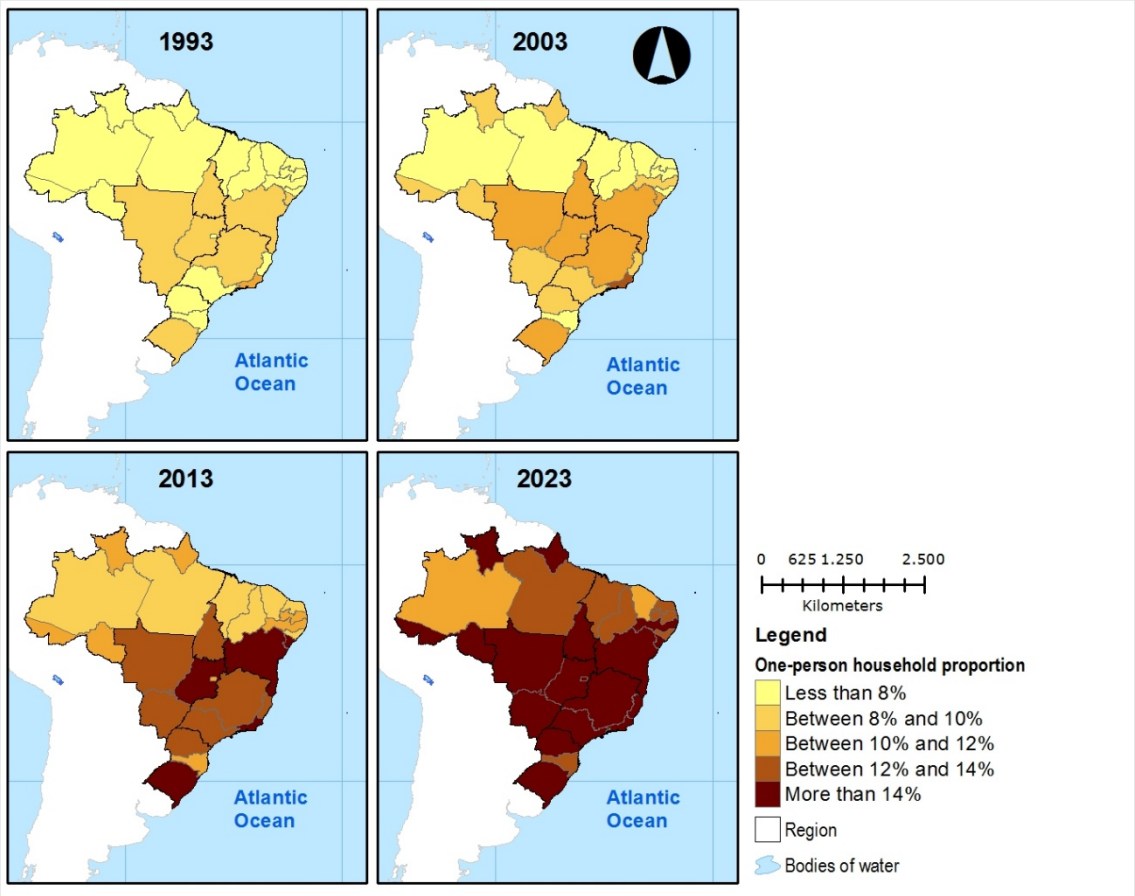

Figure 12 Estimated and projected proportion of one-person household, by period and federation state. Brazil, 1993, 2003, 2013 and 2023
Source: BRAZIL, CEDEPLAR and IUCAM (2007)

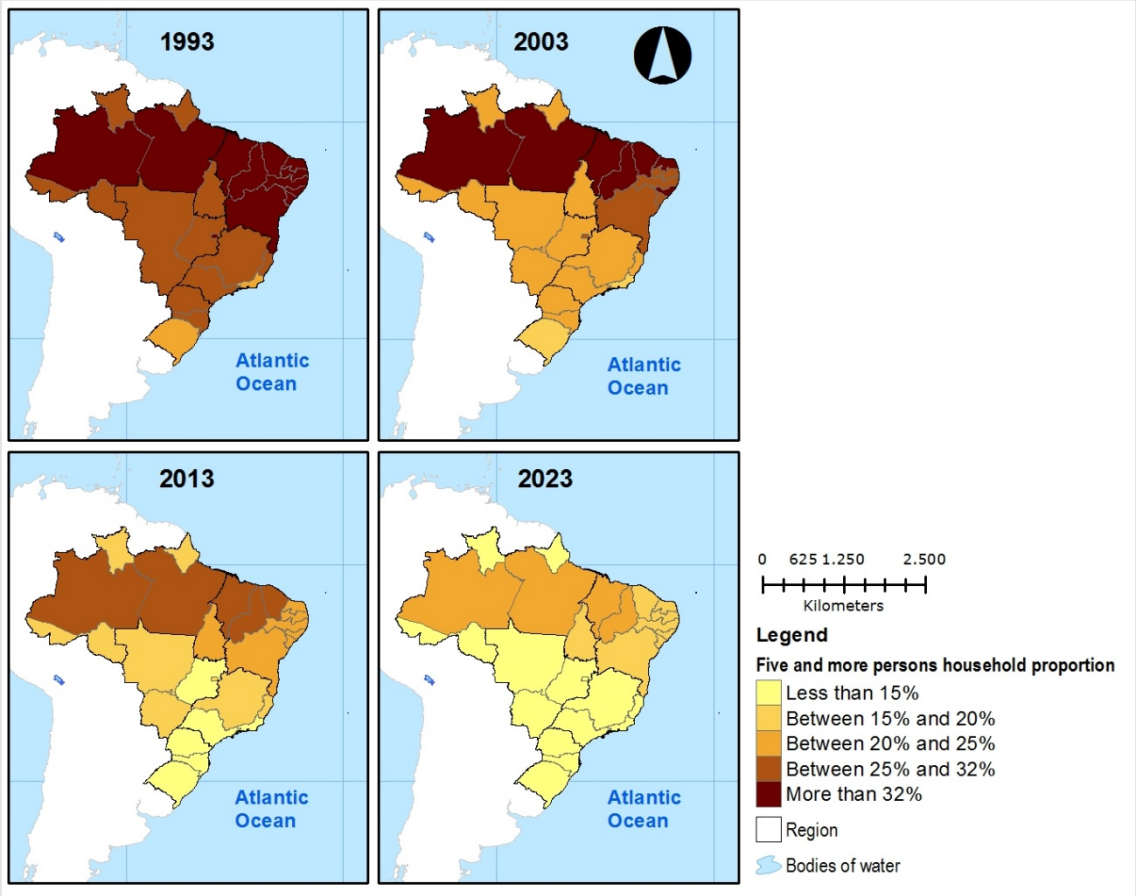

Figure 13 Estimated and projected proportion of household with five and more persons, by period and federation state. Brazil, 1993, 2003, 2013 and 2023
Source: Brazil, CEDEPLAR and IUCAM (2007)

FINAL CONSIDERATIONS

The study presented here has been employed as subsidies for the design of the National Housing Plan – PlanHab which is in process of development by the National Housing Secretary (*Secretaria Nacional de Habitação*), from the Ministry of Cities (*Ministérios das Cidades*). The PlanHab aims to guide the planning of public and private actions for the housing in the country and it is part of a long-term planning process from the Brazilian Federal Government (*Governo Federal*). The planning horizon of PlanHab is the year of 2023 and it presupposes the association with other planning and budget instruments, with periodic reviews programmed for the years 2011, 2015 and 2019.

In this sense, the results of the projection have been helpful when quantifying the demands and the volume of the resources and, to date, they have shown to be robust and reliable.

Like any other population projection, it is desirable that periodic reviews are done so as to adapt the projection hypotheses to the information which is continually retrieved by official statistics bodies. It is reinforced that the projected Brazilian households average size, in the long term, may be underestimated and, therefore, the projection would be overestimating the total of projected households. In view of the population aging, it has been considered that the probable institutionalization of the elderly population, a still uncommon phenomenon in the Brazilian society, can occur such as observed in Europe and North America.

Furthermore, it is emphasized that a relative decline in the increase in the number of households was projected between 2003 and 2015. This finding suggests that Brazil is going through a window of opportunity in the housing market and this moment is very positive in terms of the application of public policies, for it is allowed to make the most of the decreasing current demand flow to correct deficit and past inadequacies.

Finally, in view of the mounting incidence of female household headship, one can expect that the contribution to the total stock will be mainly characterized by female-headed households, growingly from 2013 until 2023. This behavior is consistent with the demographic dynamics of the Brazilian population and it has demonstrated the emergent importance of the gender issue in the housing demand in the country.

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