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ORIGINAL ARTICLE

Household growth and demographic transition in Latin America: implications for the analysis of housing needs*

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The advancement of demographic transition brings immediate changes that shape household growth. This article examines the evolution of this process in Latin American countries and its implications for housing policy. Using census data from 17 countries in the region, as well as Spain and Portugal, this study employs a decomposition method to analyze the demographic factors influencing recent household growth. The findings highlight the diminishing impact of population growth itself. Furthermore, it underscores the increasingly influential role of age structure and behavioral factors in household formation. Since it is less predictable and closely linked to socioeconomic conjunctures, this last determinant introduces elements of uncertainty. As a result, the article concludes that enhancing methods to incorporate these components and their cyclical and uncertain trajectories into modeling household growth is essential. It also emphasizes the need to adopt housing policy planning strategies for the post-transitional future, where uncertainties will prevail.

Keywords: Latin America. Household growth. Growth determinants. Demographic transition. Housing need.

* This article is based on Marcos, García-García and Módenes (2022a).

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Introduction

The dynamics of household growth can be understood as its rate of growth and the factors that determine it. It constitutes a fundamental input that, along with other elements, enables the anticipation of the intensity and changes in the demand for a set of goods and services whose consumption occurs within this unit of residence and expenditure (United Nations, 2017). A compelling example of the utilization of household growth is the demand for housing, highly determined by the inflows and outflows of the household stock (Myers; Pitkin; Park, 2002). An inadequate comprehension of this dynamic may justify insufficient or excessive production of housing, with corresponding implications in economic terms, quality of life, and environmental aspects.

The variation in the number of households is a consequence of numerous influences. Among these, demographic dynamics serve as immediate factors (Belsky; Drew; Mccue, 2007; Givisiez; Oliveira, 2005), and can be summarized by three factors: a) growth in population size, b) changes in age structure, and c) changes in age-specific household headship rates (Hugo, 2005), which indicate the propensity to form household at different ages (Pitkin; Myers, 1994). By synthesizing the transformations in birth and mortality rates, Demographic Transition (DT) has become a crucial theoretical tool to understand and address significant demographic trends, including those related to the first two factors mentioned (Bongaarts, 2009). As a result, it is foreseeable that the progression of DT is associated with household growth dynamics. However, the connection between DT and the third component mentioned –household formation– is less evident, given its complex nature as a multi-causal behavioral factor highly influenced by economic conditions that do not follow inertial trends (Paciorek, 2016).

In this paper, DT is evaluated as a fundamental theoretical framework to examine the historical trajectory of household growth and its implications for the future. Latin America presents a particularly valuable context for testing this framework, as there are still countries in various stages and with different experiences of DT (Turra; Fernándes, 2021). The main aim of the study is to explore the recent shift of each immediate demographic determinant on household growth in Latin American countries and to establish their correlation with the stages of DT. The study includes a comparison with the cases of Spain and Portugal, which serve as examples of countries in post-transitional stages. In these phases, it has been demonstrated that there is a need to incorporate uncertainty into the understanding and forecasting of demographic trends (Vallin, 2002). Based on the findings, the paper contributes to the discussion on the forthcoming challenges for studying household growth in Latin America. It delves into its implications for public policies, emphasizing the housing sector as a pertinent example.

Literature Review

Household growth and demographic transition

Traditional standardization techniques can be employed to quantify the contribution of different immediate demographic determinants on household growth. Previous studies conducted in Canada (Beaujot, 1977; Beaujot; Bland, 1978), United States (Sweet, 1984), Brazil (Givisiez; Oliveira, 2005), and Australia (Hugo, 2005) have explored the specific effects of the three factors. These preceding case studies demonstrate that population growth accounted for a significant portion of new household formation, whereas the other factors contributed comparatively less and exhibited more fluctuation over time.

One central contribution of demography as an applied social science is its ability to anticipate population growth (Lee, 2003; Vial; Barrabés; Moreno, 2012) and to model it in the DT paradigm (Coale, 1974; Kirk, 1996; Thompson, 1929). Through this, a shift is identified from stages of low population growth due to high mortality and fertility rates, to stages of accelerated demographic growth associated with reduced mortality while maintaining fertility and even temporarily increasing it. This growth tends to stabilize and decline as a result of reduced fertility (Bongaarts, 2009). However, extensive use of the paradigm has shown that DT does not follow a single trajectory, and Latin America is a clear example of this. Within the region, there are divergences regarding various milestones, including the initial levels of mortality and birth rates, the time gap between declines in mortality and fertility, the speed and causes of these changes, the internal heterogeneity of social groups within countries (Chackiel, 2004; Chackiel; Schkolnik, 1998; Zavala de Cosío, 1992) and the causal relationship between demographic change and societal modernization (Canales, 2003). These divergences give rise to distinct trajectories in the evolution of population growth, resulting in varied population sizes, growth rates, and age structures.

Recognizing the impact that the forms and stages of the DT's progression have on population and household growth, raises questions about the certainties provided by the paradigm in post-transitional scenarios associated with low fertility regimes. Empirical evidence concerning demographic dynamics in the advanced stages of the DT has revealed deviations from inertial patterns, challenging their predictability (Guzmán, 2003; Vallin, 2002; Vial; Barrabés; Moreno, 2012). In Latin America, predicting fertility dynamics has proven to be challenging in all stages of DT. The rate of decline in the 1970s and subsequent decades surpassed all expectations Chackiel (2004). By the twenty-first century, the total fertility rate in a significant number of Latin American countries had declined below replacement level (Guzmán *et al.*, 2006). Due to this, it was examined whether fertility in the region's countries would converge near replacement level, or if the decline would exceed that of European countries and Cuba in the twentieth century (Cabella; Pardo, 2014). Data from the World Population Prospect (2022) indicate that, since 2004, more countries have achieved replacement level fertility without significant further decline. Despite the

diversity of trends, they suggest that the region is experiencing a shift to a low fertility regime (Lima *et al.*, 2018). This, combined with the impact of the COVID-19 pandemic, has raised concerns about the accuracy of inertial forecasts for population growth.

This underscores the limitations in the predictive capacity of this paradigm for instance, regarding household growth projections, in scenarios of low fertility and global interdependence. In such scenarios, national and local population growth heavily depend on migratory flows, which are not included in the theory of DT (Bongaarts, 2009; Guzmán, 2003). Due to its variability, those flows are difficult to predict in terms of trends (Bongaarts, 2009; Engbersen, 2012; Guzmán, 2003). Consequently, there is a growing recognition of the need to analyze the relationship between temporal evolution and demographic transformations in a more nuanced manner, moving beyond a simplistic unidirectional path of progress along the development process.

Household growth and age structural transitions

However, as Canales (2003) points out, the hitherto high predictable population growth in Latin America will no longer be the primary source of household growth. In the future, age structure will become a prominent source as it affects the proportion of the population concentrated in age groups with higher or lower propensity for household formation. The advancements in the DT have resulted in Age Structural Transitions (AST), as ages structures, specifically cohort sizes, are increasingly susceptible to changes in fertility and mortality. In the early stages of the DT, with sustained high fertility levels, the reduction in mortality acts as a determining factor for the significant presence of young ages. Subsequently, the decline in fertility influences mainly age structures, leading to a prevalence of working ages. Finally, the advancement in life expectancy at older ages results in higher proportions of this age group (Pool; Wong; Vilquin, 2006).

Comprehending the AST requires not only to examine the age distribution as a result of the DT, but also to incorporate a generational perspective (Adioetomo *et al.*, 2005). The phenomenon of larger cohorts arising from periods of elevated fertility resulting in large child cohorts has been illustrated. This can occur despite a reduction in fertility rates, maintaining the size of the replacement generation.

In fact, incorporating a generational perspective into the relationship between age structures and DT has at least two implications for explaining household growth. On one hand, it enables the comprehension of the flow of "population waves" that produce peak pressure on needs and services (Adioetomo *et al.*, 2005). On the other hand, the generational perspective in the AST implies that many demographic and social changes that affect the size of generations in post-transitional populations are not entirely monotonic and systematic, but disordered (Pool; Wong; Vilquin, 2006). In this instance, this disorder presents an obstacle for traditional linear predictions of household growth and the corresponding demand for goods and services.

In the case of Latin American countries, the AST scenario varies according to the progress of the demographic transition. In numerous situations, AST are easily foreseeable because countries find themselves in either earlier or advanced stages of the "demographic window" (Berganza *et al.*, 2020; Bloom; Canning; Sevilla, 2003), which indicates a high population of individuals at the age to form households, but requires contextual conditions to make it possible. In fewer cases, there is a significant advancement of the aging process typical of the more advanced stages of the transition (Ham-Chande; Nava-Bolaños, 2019), where the dissolution or end of households is traditionally identified (Burch; Matthews, 1987).

Dynamics of household formation

Headship rates represent the proportions of reference persons (or heads) of household within a population (often disaggregated by sex and age). They point out the dynamic propensity to form households according to specific patterns. In the long run, these are influenced by demographic changes and profound and enduring sociocultural transformations, related to residential independence, and household formation and dissolution.

DT progression impinges on the formation of the household stock by decreasing the number of children and changing the timing of fertility, as well as increasing longevity. Such changes result in both qualitative and quantitative shifts in the features of households, driven by increased survival of couples and households in general, and higher intergenerational density of kinship networks (Lee, 2003). Moreover, the theoretical framework of the second demographic transition (Lesthaeghe, 2010; Van de Kaa, 2001) explains the intense changes associated with the formation, dissolution, and reconstitution of families during the advanced stages of DT. Focused on most developed countries, this theoretical framework aims to explain the trend towards below replacement fertility observed, increasing proportion of non-marital births, low levels of legal unions, a high incidence of union dissolution, and an increase in second marriages (Cabella; Peri; Street, 2004; Lesthaeghe, 2020). These changes have influenced the timing of household formation, delaying it and increasingly dissociating it from couple formation and fertility (Ciganda; Pardo, 2014; López; Spijker; Esteve, 2011). This has led to flows of household formation and dissolution occurring at intermediate adult ages due to separation, divorce, and second unions (García; Rojas, 2002; Quilodrán, 2011). Additionally, it has extended the duration of households as older individuals maintain their residential independence (Garay; Redondo; Montes de Oca, 2012).

Latin America researchers have highlighted a dual trend after discussing the applicability of the concept "second demographic transition". While compatible changes have been observed among the most advantaged socioeconomic groups, certain behavior categories have been longstanding and persistent among the most vulnerable groups in the region. Such behavior can be linked to exclusion or even traditionalism, as evidenced by the prevalence of consensual unions, marital abandonment, and extramarital fertility

(Cabella; Peri; Street, 2004; Esteve; García-Román; Lesthaeghe, 2012; Flórez; Sánchez, 2010). This suggests that in the region, such behaviors affecting household formation are not characterized by stability and add dynamism to household growth.

Additionally, various forms of residential arrangements persist in the region that arise as deeply rooted cultural responses to contextual challenges, primarily of an economic nature. While nuclearization has been observed globally, alongside the proliferation of single-person households, leading to an increased pace of household stock growth, Latin America presents an intriguing twist as the trend to small households coexists with the continued presence of multigenerational domestic groups (Esteve; Castro-Martín; Castro Torres, 2022). These arrangements take the form of complex unitary households (known as "allegamiento interno" in Spanish) or cohabiting households ("allegamiento externo" in Spanish) (Marcos; García-García; Módenes, 2022b).

In addition to demographic and cultural factors, economic conditions also affect household formation and impact the size of the household stock. Economic factors can undergo short-term fluctuations due to global or local crises and cyclical changes (Klasen; Woolard, 2008; Soler; Torres-Tellez, 2022), which, for instance, impact the labor market and access to housing (Paciorek, 2016).

The coexistence of all these factors makes modeling the headship rates challenging (Leiwen; O'Neill, 2004). These rates are essential inputs and have lent their name to the traditional household projection methodology, which applies them to projected populations to estimate the number of households in future years (United Nations, 1973). In other words, classical household forecasts combine the challenges of the conventional approach to population projections by components (Alho, 1998; Keilman, 2003; Lee, 1998) with the uncertainty of short and long-term variations in the propensity to form households (Leiwen; O'Neill, 2004).

The incidence of household growth: application in the field of housing

Household growth is a fundamental input for the formulation of public policies, related to the provision of goods and services that lack individual-level demand, as is the case of water, energy and housing (Casimir; Tobi, 2011). That last sector exemplifies this concept well, as the main element to consider in demand projection is the increased number of households resulting from demographic dynamics, which requires producing new housing (Givisiez; Oliveira, 2005). The other two elements to consider, despite carrying less weight, are the units required to replace obsolete housing stock and the additional demand for second homes and tourist accommodations (Belsky; Drew; Mccue, 2007).

In Latin America, housing provision policies have traditionally taken a reactive approach, involving the calculation of accumulated deficit. However, population studies have the potential to transform this into a proactive and forward-thinking approach, allowing for the establishment of suitable and sustainable projection scenarios to provide accommodation for future households (Marcos; Módenes Cabrerizo, 2019). This planning process depends

on a profound comprehension of the dynamics of household growth and its underlying determinants, which are subject to uncertainty and temporal variability.

The overview presented so far acknowledges the intricacy of the factors influencing household growth uncertainty. In this challenging context, we question whether the DT still provides an adequate framework for the pace at which households multiply and the demographic drivers that shape this growth, as the conditions that have compelled uncertainty in modelling approaches (Guzmán, 2003) extend to household as well.

Methodology

The analytical strategy involved using census data to calculate household growth rates and subsequently decomposing this growth according to the specific contributions of three immediate demographic determinants: population growth, changes in age structure, and changes in the propensity to form households at each age. Additionally, an effort was made to relate the pace of household growth and the underlying determinants to the DT by determining the stage each country was in during the study period. Finally, to illustrate the significance of a behavioral determinant such as the propensity to form households, we conducted simulations using data from countries with contrasting experiences.

Data

Data on the number of households and the immediate demographic determinants influencing their growth were sourced from the most recent population censuses conducted in each country with available information. For most countries, the standardized microdata from the IPUMS International database (Minnesota Population Center, 2020) was used. In cases where more recent censuses were not available in IPUMS International, microdata databases or publications from the respective national statistical institutes were consulted. Despite these efforts, most of the available information pertains to the intercensal period between the 2000 and 2010 rounds (Table 1). This is due to delays in the 2020 census operations caused by the COVID-19 pandemic, as well as the typical time lag between conducting a population census and publishing its definitive results.

Census dates were also necessary and were mostly obtained from the Economic Commission for Latin America and the Caribbean (CEPAL, 2020) website. Missing dates were sourced from national statistics institutes. In cases where the census reference was a period rather than an exact date, the midpoint date was used as census reference dates are typically not January 1. To ensure comparability between countries, we homogenized the length of intercensal periods by conducting interpolations to make them ten years in duration.

TABLE 1
Censuses years used and data sources
Latin American and Caribbean countries, Spain, and Portugal

Region/ country	Census 1	Census 2
Latin America		
Argentina	2001	2010
Bolivia	2001	2012
Brazil	2000	2010
Chile	2002	2017
Colombia	2005	2018
Costa Rica	2000	2011
Cuba	2002	2012
Dominican Republic	2002	2010
Ecuador	2001	2010
El Salvador	1992	2007
Guatemala	2002	2018
Honduras	2001	2013
Mexico	2005	2015
Nicaragua	1995	2005
Panama	2000	2010
Paraguay	2002	2012
Peru	2007	2017
Uruguay	2006	2011
Venezuela	2001	2011a
Caribbean		
Puerto Rico	2005	2010
Suriname	2004	2012
Trinidad and Tobago	2000	2011
Europe		
Spain	2001	2011
Portugal	2001	2011

Source: IPUMS International; National Statistics Institute; Centre d'Estudis Demogràfics.

Data for classifying countries according to their DT stage (weighted dependency rates for children and the elderly, and total fertility rate) were sourced from the World Population Prospects 2022 (United Nations, 2022).

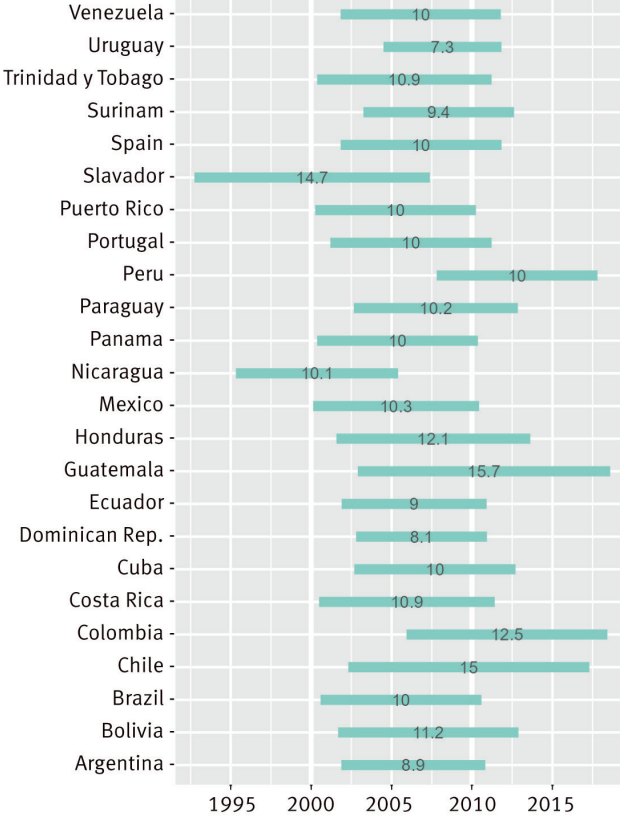
We ensured the temporal alignment between census data and United Nations estimates by selecting United Nations estimates corresponding to the midpoint of each country's census period. However, when analyzing the results, it is important to note that observed household growth and its association with population growth primarily involve the adult population. In this regard, it is crucial not to overlook that the stock of adult population is the result of recent (not current) demographic dynamics. As a final consideration regarding the data used, it is important to recognize that there may be methodological differences within and between countries. For example, there are different census modalities ('de facto', 'de jure', with implementation of sampling methods, based on links between population records and administrative registered data), and definitions of "household" and "reference person" are not uniform. In response, both IPUMS International and the United Nations typically make significant efforts to standardize the

data; however, it should be acknowledged that some differences are insurmountable and may affect the results. Therefore, it is essential to consider the implications of this issue.

Universe

The initial geographic scope encompasses Latin American countries, as well as Spain and Portugal for comparative purposes. However, not all the Latin American countries with available data have been included in the research. Only those with data from recent intercensal periods (Figure 1) and able to provide reliable results were considered. In accordance with these criteria, two countries that did not conduct censuses in the 2010s (Nicaragua and El Salvador) and the Caribbean countries (Puerto Rico, Suriname, and Trinidad and Tobago) were excluded due to potential extreme values. The final universe consists of nineteen countries, including seventeen from Latin America (Argentina, Bolivia, Brazil, Chile, Costa Rica, Cuba, Colombia, Dominican Republic, Ecuador, Guatemala, Honduras, Mexico, Panama, Paraguay, Peru, Uruguay, and Venezuela), as well as Spain and Portugal.

FIGURE 1
Latest intercensal period available: start, end, and duration (years)
Latin American countries, Spain, and Portugal



Source: Census data.

Methods

Household growth was calculated using a geometric function. Furthermore, the absolute growth of households was disaggregated in accordance with the methodology developed by Beaujot (1977) who adapted Calot's standardization procedures, as modified by Kitagawa. This disaggregation process took into consideration the immediate demographic components of household change, including the growth of the adult population, the transformation of its age structure, and the behavioral changes related to household formation (headship rate). Two types of decomposition measures were employed: 1) an additive result, expressed in absolute values, which provides insights into the number of households that have been formed or that ceased to exist due to each immediate demographic determinant; and 2) a multiplicative result, expressed in terms of units of change, facilitating cross-country comparisons (Beaujot; Bland, 1978): obtaining the number of households ten years later by multiplying the number of households in the first census by the values of each index. The size effect reflects the influence of the population size change on the change in the number of households, assuming an average household headship rate and age structure between the beginning and end of the period. The age effect measures the influence of the change in the age structure of the population, assuming an average of the age-specific rates for the period, while discounting the influence of population growth. The headship rate effect measures the influence of the change in specific headship rates, assuming they apply to the average of the initial and final populations of the period, and that the age structure does not experience changes.

The nineteen countries included in the study were classified according to their stages in the DT using the framework proposed by Turra and Fernándes (2021), which consists of eleven stages, determined by weighted dependency rates for children and the elderly. The total fertility rate was employed for operations or analyses requiring a continuous quantitative measure. It should be noted that the classification does not always correspond to the same point in time for all countries, but rather to the moment for which census data was available for each country.

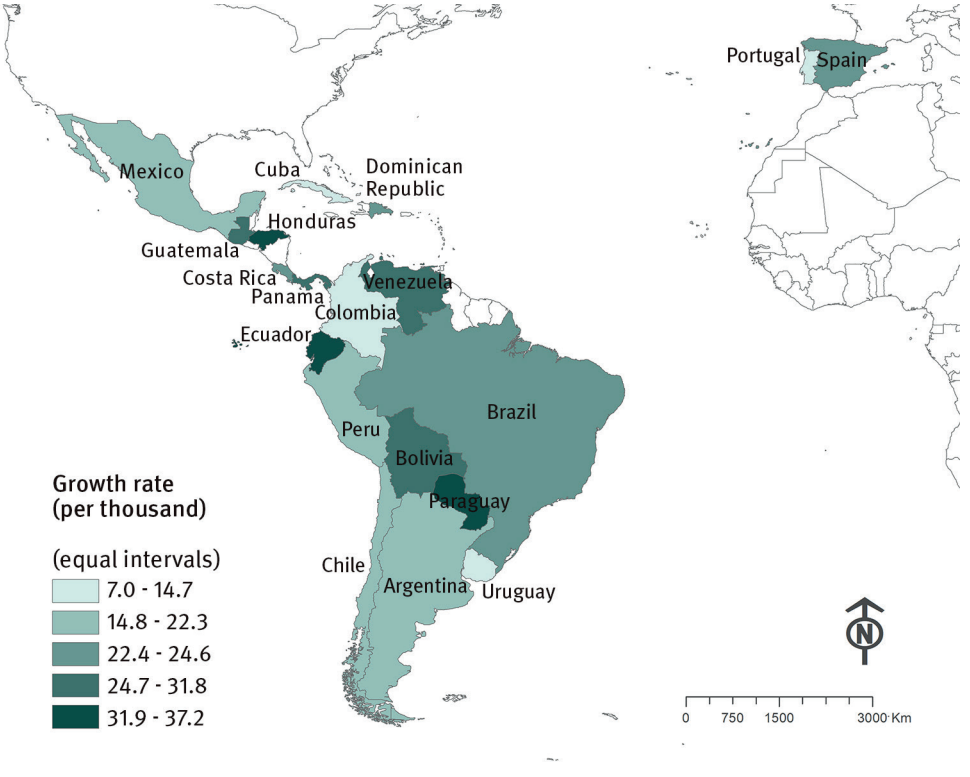
To illustrate the variation in household formation rates in the region and its impact on the size of the household stock, the number and percentage of households that would have been added or subtracted over the decade were calculated applying the average of the three highest and lowest headship rate indexes observed in Latin America.

Results

In the intercensal period between the 2000 and 2010 rounds, the rate of household growth varied significantly among the analyzed countries: while the average annual growth rate was 23.3‰ and the median was close (24.4‰), the coefficient of variation was 35.6%.

Certain countries exhibited household growth rates that were five times higher than those in countries with the lowest rates (Figure 2 and Table 2).

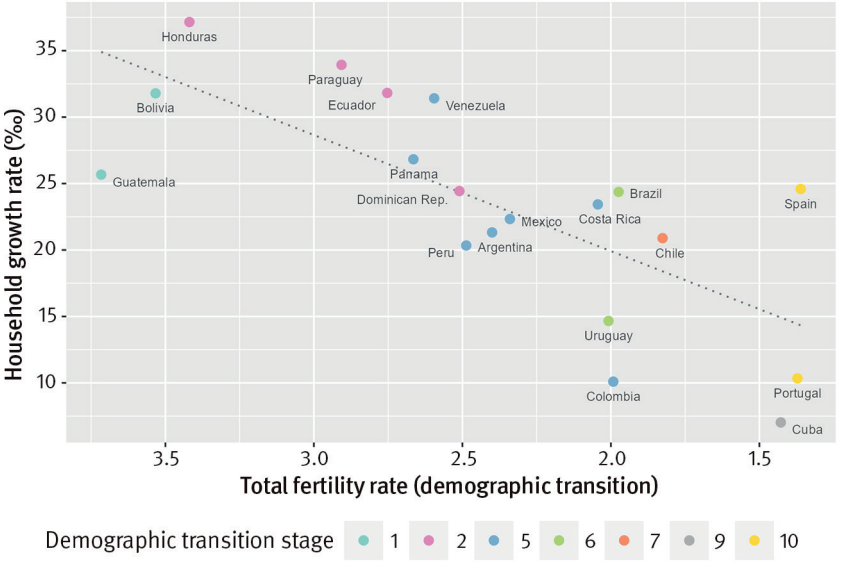
FIGURE 2
Household growth rate
Latin American countries, Spain, and Portugal



Source: Minnesota Population Center 2020 and selected national population censuses.

As shown in Figure 3, the diversity in the rate of household growth correlates with the region's diversity in terms of DT at the time of the analyzed census for each country. Thus, countries classified in the initial stages of DT exhibited the highest rates of household growth. Honduras, for example, had the highest growth in the region. In contrast, countries in the advanced stages, like Cuba and Portugal, showed the lowest household growth. However, some cases from all stages of DT deviate from this general pattern. Guatemala and Dominican Republic, which were in the early stages of DT, showed smaller rates of household growth compared to other countries in the same stage. Similarly, Colombia and Uruguay, in the middle stages of the DT, also exhibited slower household growth rates than their peers. In contrast, Spain reported higher household rates than countries in post-transitional stages.

FIGURE 3
Household growth rates according to total fertility rate and DT stage
Latin American countries, Spain, and Portugal



Source: Minnesota Population Center 2020, selected national population censuses and World Population Prospects, 2022.

National household growth in the various countries over the analyzed period was decomposed into the contribution of the separate changes in growth of population size, age structure, and headship rates (Table 2).

The relative weight of the three components varied according to each country's stage of DT (Table 2 and Figure 4). In high-fertility countries, the growth of population size explained almost all the household growth, while in low-fertility countries size, age structure and headship had similar weights in explaining household growth. As shown in the first graph in Figure 4, the population size index varied significantly among the countries in the region. The lower the fertility level and the more advanced the DT, the lower the population size index.

The weight of the age structure index (as shown in the second graph in Figure 4) tended to increase slightly with the progression of DT as population pyramids mature and change. This means the impact of this component is more pronounced in countries like Peru, Brazil, and Spain. However, there is a divergent case: in Uruguay, the changes in age composition had a negative effect on household growth. Meanwhile, in high fertility countries this component has a lesser impact on explaining the growth of their household stock, as their population pyramids are less dynamic, and characterized by a larger proportion of children and teenagers who are unlikely to form households.

On the other hand, the contribution of changes in headship rates to household growth (as shown in the third graph in Figure 4) exhibits considerable variability and a weak association with DT. In fact, in seven of the nineteen countries examined, the effect of this

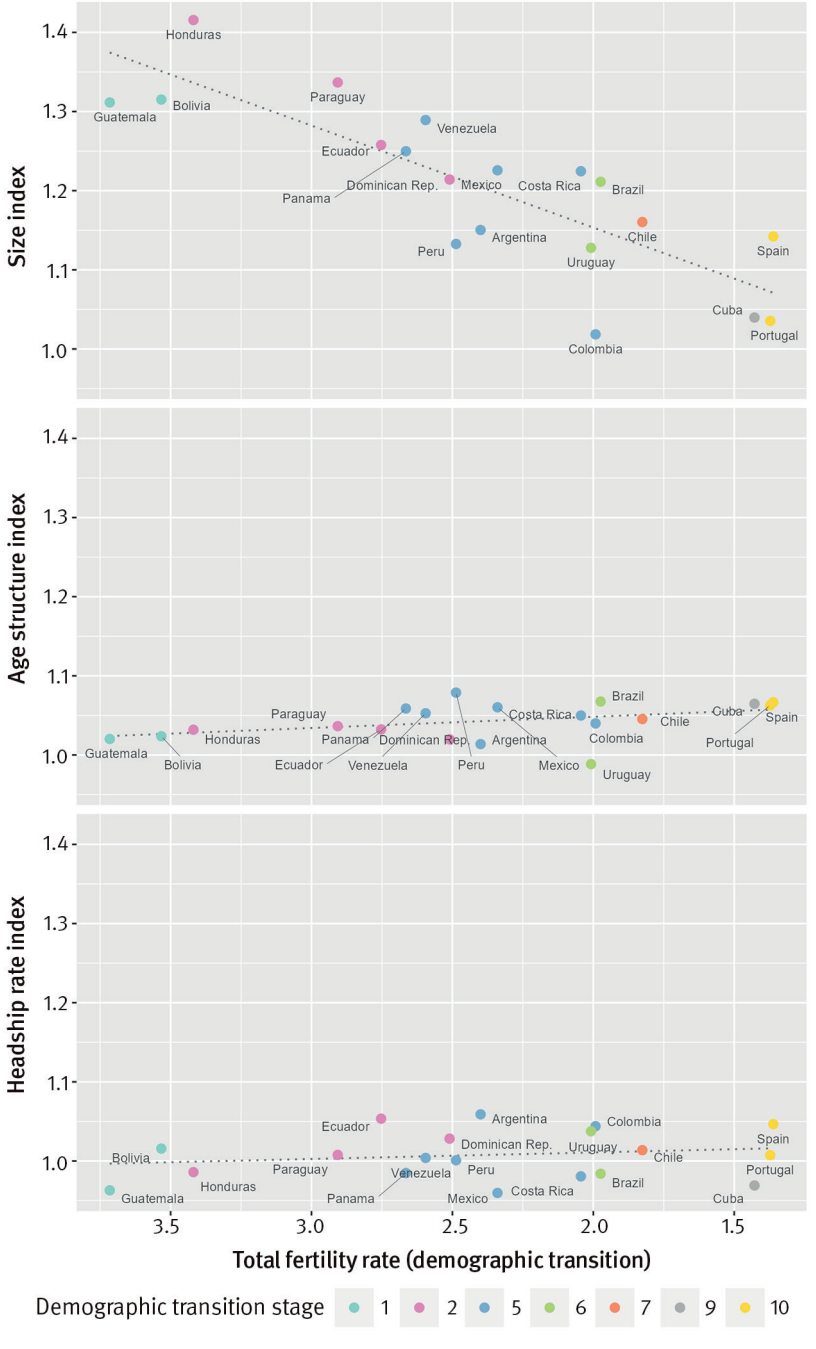
index was less than one, indicating inhibition of household formation. In the remaining countries, changes in the propensity to form households resulted in an increase in the number of households. Countries with diverse demographic behaviors are found in both scenarios. These different results would support the hypothesis that changes in household formation behavior contribute to high uncertainty in future household growth.

TABLE 2
DT stage, total fertility rate, household growth, and demographic components of change Latin American countries, Spain, and Portugal

Countries	Period	DT (1)		Number of households		Growth (‰) (3)	Component of change (index)		
		Stage (2)	TFR	Initial	Final		Size	Age	h. rate
Guatemala	2002-2012	1	3.72	2,200,050	2,834,696	25.7	1.31	1.02	0.96
Bolivia	2001-2011	1	3.53	1,961,510	2,682,230	31.8	1.32	1.02	1.02
Honduras	2001-2011	2	3.42	1,211,660	1,745,079	37.2	1.42	1.03	0.99
Paraguay	2002-2012	2	2.91	1,117,024	1,559,498	33.9	1.34	1.04	1.01
Ecuador	2001-2011	2	2.75	2,869,700	3,925,249	31.8	1.26	1.03	1.05
Dominican Rep.	2002-2012	2	2.51	2,192,840	2,791,558	24.4	1.21	1.02	1.03
Panama	2000-2010	5	2.67	702,130	914,925	26.8	1.25	1.06	0.98
Venezuela	2001-2011	5	2.60	5,262,580	7,170,011	31.4	1.29	1.05	1.00
Peru	2007-2017	5	2.49	6,741,000	8,244,575	20.3	1.13	1.08	1.00
Argentina	2001-2011	5	2.40	10,074,040	12,440,443	21.3	1.15	1.01	1.06
Mexico	2005-2015	5	2.34	25,421,500	31,704,136	22.3	1.23	1.06	0.96
Costa Rica	2000-2010	5	2.04	961,290	1,211,837	23.4	1.22	1.05	0.98
Colombia	2005-2015	5	1.99	10,582,193	11,700,187	10.1	1.02	1.04	1.04
Uruguay	2006-2016	6	2.01	1,032,853	1,194,639	14.7	1.13	0.99	1.04
Brazil	2000-2010	6	1.97	45,060,511	57,328,603	24.4	1.21	1.07	0.98
Chile	2002-2012	7	1.83	4,144,900	5,096,874	20.9	1.16	1.05	1.01
Cuba	2002-2012	9	1.43	3,531,950	3,788,780	7.0	1.04	1.06	0.97
Portugal	2001-2011	10	1.37	3,651,520	4,048,420	10.3	1.04	1.06	1.01
Spain	2001-2011	10	1.36	14,184,000	18,083,692	24.6	1.14	1.07	1.05
Descriptive statistics									
Mean			2.39			23.29	1.20	1.04	1.01
Median			2.40			24.37	1.21	1.05	1.01
Standard deviation			0.69			8.30	0.11	0.02	0.03
Coeff. of variation			28.98			35.63	8.95	2.21	3.06

Source: Minnesota Population Center 2020, selected national population censuses and World Population Prospects, 2022.
(1) At mid-reference period (first census to first census + ten years).
(2) DT stage according to Turra and Fernandes (2021).
(3) Annual geometric growth rate.

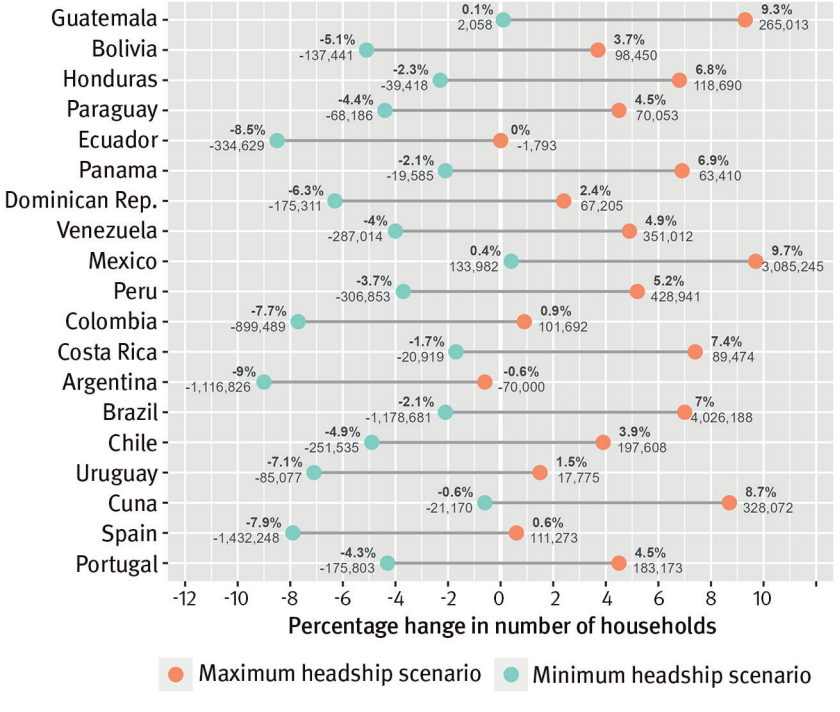
FIGURE 4
Demographic components of change (indices) according to total fertility rate and DT stage
Latin American countries, Spain, and Portugal



Source: Minnesota Population Center 2020, selected national population censuses and World Population Prospects 2022.

Fluctuations in the behavioral factor (represented by the dynamics of headship rates) can have a significant impact on the number of households to be formed. To illustrate this, we conducted a simple simulation. Figure 5 presents the number and percentage of households that would have been added or subtracted from the initial census household stock, using the highest and lowest observed intercensal headship rate indexes for the analyzed period in Latin America. The results demonstrate a wide range of variability, with Mexico showing a substantial 9.7% increase in the number of households, while Argentina would face a 9% reduction. In absolute terms, this equates to an addition of 3,085,245 households for Mexico and a reduction of 1,116,826 households for Argentina. In large countries like Brazil, the simulated variations in household growth due to headship rate fluctuations lead to highly divergent scenarios. On the positive side, 4,026,188 households (7%) would be added, when considering the highest headship rates. On the negative side, 1,178,681 households (-2.1%) would be subtracted.

FIGURE 5
Percentage and number of households that would be added or subtracted from the initial stock of the period by applying the highest or lowest headship rate index
Latin American countries, Spain, and Portugal



Source: Minnesota Population Center 2020 and selected national population censuses.

Discussion

Determinants of household growth over demographic transition

The key finding of this study is that the trends of household growth and its determining factors during the intercensal period between the 2000 and 2010 rounds showed a relatively convergent pattern in the early and intermediate stages of DT, where household growth was closely related to population growth. This behavior, associated with the momentum of demographic dynamics, undergoes transformation as the DT stages progress, wherein the pace of household growth slows down and the explanatory weight of population growth diminishes. As DT continues, age structure transformation gains importance as an explanatory factor, as larger generations reach ages of higher household formation. Finally, in countries with low fertility and aging populations, population size –the most predictable and inertial component of household growth– stops being the primary explanatory factor. Instead, variation in headship rates and the impact of international migration movements, which are highly fluctuating, become more significant.

This latter scenario, previously described by Paciorek (2016) when studying the U.S. case over the last thirty years, can be explained within the paradigm of DT. However, data showed that the behavior of household growth in Latin America is not fully described by stages of the DT. Some countries at all stages of the DT behaved as outliers. This highlights the heterogeneity of trajectories and factors influencing the process of demographic change (Canales, 2013), emphasizing the need to incorporate contextual factors into analysis at both national and subnational levels.

This raises the question of whether it is possible to anticipate Latin American global evolution by applying the patterns observed recently in low-fertility countries of the region to the rest of countries. Or will these divergences become more pronounced as the fertility decline observed throughout the region —albeit at different rates and intensities— continues?

To address that question and for optimal comprehension of household growth in post-transitional stages, it is imperative to delve into the transformations of the other two factors into which growth has been decomposed: age structure and headship rates.

Implications for the study of household growth

In the future, age structure dynamics may not evolve linearly as they did in the progress of DT (Pool; Wong; Vilquin, 2006), because they are influenced by the effects of migration and the demographic and social conditions specific to each generation. This poses challenges for predicting the contribution of major changes in age distribution to household growth. In the case of Latin America, these changes mainly refer to the advancement of the "demographic window" and the diverse yet rapidly progressing aging process (Berganza *et al.*, 2020). However, this issue becomes particularly sensitive in post-transitional stages (Adioetomo, *et al.*, 2005), as observed in European countries such as Spain. There, persistent low fertility and rapidly aging populations have meant that household growth is now less influenced

by the size and age structure of the native population and more connected to changes in headship rates, as demonstrated in this paper, and to migratory flows (Módenes; López-Colás, 2014).

Modeling the headship rate presents an even greater challenge. This component exhibited variable effects across the studied countries according to the stages of DT. Yet, its significant impact on the change in household stock has been demonstrated, underscoring the necessity for its accurate incorporation into the understanding of household growth. Over the long term, household formation patterns have been reconfiguring alongside models of family life cycles, with changes in old age particularly affecting household stock (Paciorek, 2016). For Latin America, optimal modeling of household formation propensity requires incorporating empirical findings regarding the social heterogeneity of family changes (Esteve; Castro-Martín; Castro Torres, 2022) and the persistence of co-residence forms (Marcos; García-García; Módenes, 2022b). Additionally, findings from studies on the living arrangements of the elderly population in Latin American countries should be considered (Jaramillo, 2018; Redondo; Garay; Montes de Oca, 2015), given their crucial relevance amid the anticipated population aging scenario.

However, changes in household headship rates are particularly sensitive to short-term contextual conditions (Paciorek, 2016), often associated with economic crises prevalent in the region and cyclical economic variations. Methodologically, it will be necessary to reassess modelling techniques for household growth by strengthening the utilization of tools that incorporate change and cycles, departing from methods overly reliant on linear and inertial trends. In this regard, it is crucial to consider various methodologies to elucidate the impact of changes in the labor market on headship rates within the Latin American context, drawing from studies such as those conducted by Smith *et al.* (1984) and Paciorek (2016). Equally important is the integration of territorial and socioeconomic heterogeneity into the modeling tools, as these factors have been shown to be determinant in demographic trajectories across various scales of analysis within Latin American countries (Zavala de Cosío, 2023)

Methodologically, it is also important to underline the crucial need for reliable, up-to-date and comparable data series. These are essential for tracking demographic trends and improving the quality of temporal and cross-national comparisons, as conducted in this article. In this case, as in other studies, various datasets were used for the comparative analysis, which might lead to different estimations of household growth levels and changes in its components (Belsky; Drew; McCue, 2007). The availability of data for different countries and its comparability presents an initial difficulty that may limit the inclusion of countries of particular interest or current phenomena that are non-inertial and affect household growth. This is exemplified by recent trends in fertility, migration or the economic crisis caused by COVID-19, which could affect these factors and the tendency to form households.

Additionally, data can be affected by methodological changes within statistical sources, methods of information capture, and even definitions of a household. Some systems define a household based on the dwelling, considering all individuals residing in a dwelling as part of the same household. Other systems employ the housekeeping criterion, which identifies as many households as there are groups of co-residence and shared consumption within a dwelling, which results in a larger number of households (United Nations, 2017). Even more divergent is the definition of the household reference person, which serves as the initial step in reconstructing kinship relations within the household, estimating the propensity of individuals with specific characteristics to form household, and analyzing the household as a whole, such as in relation to social class structure (Torrado, 1998). Countries employ various methods to identify the reference person, including recognition by household members or the selection of the primary breadwinner based on income contribution to the household. However, these criteria are greatly influenced by cultural shifts pertaining to gender and age relations (Liu; Esteve; Treviño, 2017). In this context, expert handling of microdata and the adoption of standardized methodologies to determine the reference person within a household are emerging as viable solutions. An illustration of this is the approach employed by authors like (Módenes; Marcos; García-García, 2024; Yi; Vaupel; Zhenglian, 1997).

Implications for housing public policy

The transformations of household growth determinants carry significant implications for the intricate relationship between demographics and the supply and demand for goods and services, particularly in the housing sector. Housing policy strives to adapt to changes in demographic housing demand, serving as a primary driver of demand fluctuations. The empirical results of this study suggest that short- to medium-term housing policies need to be sensitive to the distinctive demographic situation of each country and its anticipated evolution.

In countries with high fertility rates or in earlier stages of transition to lower fertility levels, household stocks will experience significant growth. The inertial effect of previous high fertility rates will persist even after their decline (Arriagada, 2003). Demographic housing demand forecasting in these countries is relatively straightforward and primarily involves tracking the predictable arrival at the age of household formation of those born two or three decades earlier. In these countries, the main political challenge will be to meet the high demand by constructing enough new houses of acceptable quality standards. Conversely, in countries where fertility has reached or dropped below replacement levels, especially those that entered this stage several decades ago, cohorts of household formation ages are increasingly smaller. Even in such cases, it is possible that the growth of household stock may not decrease. This situation was empirically observed in the case of Spain, where recent household growth is higher than that of countries at the same stage of DT, because of young immigration waves (Módenes; López-Colás, 2014). In these instances, it is estimated

that migration flows will reinforce the cyclical sensitivity of post-transitional stages, gaining greater significance compared to the endogenous flow of new households, or even surpassing it (Harris; Webb; Smith, 2018). In terms of housing, this would entail managing the residential stock to ensure the accessibility of younger households to dwellings vacated by those completing their life course, in addition to implementing specific policies for the residential access of migrants.

When DT reaches completion, and the estimation of housing needs is highly dependent on the comprehension of behavior of household formation and migration flows, Latin-American housing policies will need to rely on estimations that encompass various pathways for change and different scenarios for ultimate outcomes. That exercise should no longer be exclusively reliant on inertial and linear methods but should integrate the analysis of cycles and consider the incorporation of breakpoints in trends (critical junctures) (Choi *et al.*, 2019; Norris, 2014), as may have been evident in the case of the COVID-19 pandemic. In the region, long-term analyses of the repercussions of disruptive events have been applied, for instance, in the examination of political transformations (Roberts, 2017). Furthermore, modeling household growth should be underpinned by methodologies facilitating periodic reassessment of outcomes, enabling the establishment of quantifiable and adaptable targets for housing construction or management.

Conclusions

Latin American countries appear to be moving toward a decrease in net household growth and a shift in the relative contribution of the demographic components explaining it. This trend is largely explained by the changes associated with the DT model, which has demonstrated its overall validity for demographic research in Latin America (Zavala de Cosío, 2023). We have been able to confirm that this paradigm enables us to understand temporal changes in total household growth and its different demographic components for the Latin American region.

However, the possibility of anticipation offered by DT regarding the household growth diminishes in the later stages, as the demographic factors shaping it lose weight (such as population growth) and predictability (age structure). Consequently, behavioral components of household growth, like household formation patterns, become more influential. Such anticipation does not fully cover all countries in the region, as not all have followed the same path of DT progress. Therefore, to find convergences and divergences, it is necessary to combine regional analyses using comparable data with national and subnational case studies.

These findings suggest that analyzing both changes in age structure across generations and shifts in household formation throughout the life course will become increasingly important for modeling household stock. Integrating empirical findings regarding changes in residential arrangements for the elderly will necessitate methodological endeavors. Additionally, efforts

will be required to incorporate the dynamics introduced by economic crises into household formation, which may not consistently follow a linear trajectory as in the traditional demographic approach. To accomplish this, it is crucial to tackle methodological challenges associated with identifying, measuring, and comparing household formation rates.

A further challenge is incorporating migration flows to explain household growth because migration, a crucial demographic component, is not accounted for in the traditional DT paradigm. Consequently, in post-transitional scenarios, migration analysis will be increasingly significant for household growth forecasting, thereby adding another layer of uncertainty to the equation.

These findings have great significance for forecasting goods and services whose unit of demand is the household, particularly in the case of housing, as its market interacts bidirectionally with the way the population organizes into co-residence groups. In this regard, public housing policies need to adapt to the challenges posed by scenarios characterized by low fertility rates, reduction and irregularity in household growth, and the ensuing difficulties in forecasting the demographic demand for housing as a regular, stable trend. Short and medium-term cyclical variability in the flow of new households due to temporary circumstances should be incorporated into policy instruments that quantify demographic housing needs. The inertial and forward-looking approach cannot fully explain the relationship that will develop between demography and housing demand once the DT is completed.

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Juan Antonio Módenes: conceptualization; acquisition of funding; methodology; writing – original draft; writing – review and editing.
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Resumo

O crescimento dos domicílios e a transição demográfica na América Latina: implicações para a análise das necessidades habitacionais

O avanço da transição demográfica traz consigo mudanças imediatas que moldam o crescimento dos domicílios. Este artigo examina a evolução desse processo na América Latina e suas implicações para a política habitacional. Utilizando dados censitários de 17 países da região, bem como de Espanha e Portugal, este estudo emprega um método de decomposição para analisar os fatores demográficos que influenciam o crescimento recente dos domicílios. Os resultados destacam o impacto decrescente do crescimento populacional nesse processo e enfatizam o papel cada vez mais influente da estrutura etária e dos fatores comportamentais na formação dos domicílios. Este último determinante introduz elementos de incerteza, uma vez que é menos previsível e está intimamente relacionado às conjunturas socioeconômicas. Como resultado, o artigo conclui que é essencial melhorar os métodos para incorporar esses componentes e suas trajetórias cíclicas e incertas na modelagem do crescimento dos domicílios. Também é destacada a necessidade de adotar estratégias de planejamento da política habitacional para o futuro pós-transicional, em que predominarão as incertezas.

Palavras-chave: América Latina. Crescimento dos domicílios. Determinantes demográficos. Transição demográfica. Necessidades habitacionais.

Resumen

El crecimiento de los hogares y la transición demográfica en América Latina: implicaciones para el análisis de las necesidades de vivienda

El avance de la transición demográfica conlleva cambios inmediatos que moldean el crecimiento de los hogares. Este artículo examina la evolución de este proceso en América Latina y sus implicaciones para la política de vivienda. Utilizando datos censales de diecisiete países de la región, así como de España y Portugal, este estudio emplea un método de descomposición para analizar los factores demográficos que influyen en el crecimiento reciente de los hogares. Los hallazgos resaltan el impacto cada vez menor del crecimiento poblacional en este proceso. Además, subrayan que la estructura de edad y los factores comportamentales de la formación de hogares aumentan su influencia. Dado que es menos predecible y que está estrechamente relacionado con coyunturas socioeconómicas, este último determinante introduce elementos de incertidumbre. Como resultado, se concluye que es esencial mejorar los métodos para incorporar estos componentes y sus trayectorias cíclicas e inciertas en la modelización del crecimiento de los hogares. También se enfatiza en la necesidad de adoptar estrategias de planificación de política residencial para el futuro postransicional, cuando predominarán las incertidumbres.

Palabras clave: América Latina. Crecimiento de hogares. Determinantes demográficos. Transición demográfica. Necesidades habitacionales.

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