Revista Latinoamericana de Población
E-ISSN: 2393-6401
alap.revista@alapop.org
Asociación Latinoamericana de Población
Organismo Internacional

Campos de Lima, Everton Emanuel; Tomás, Maria Carolina; Lanza Queiroz, Bernardo
The sandwich generation in Brazil: demographic determinants and implications
Revista Latinoamericana de Población, vol. 9, núm. 16, enero-junio, 2015, pp. 59-73
Asociación Latinoamericana de Población
Buenos Aires, Organismo Internacional

The sandwich generation in Brazil: demographic determinants and implications

Everton Emanuel Campos de Lima
Instituto de Filosofia e Ciências Humanas, Universidade Estadual de Campinas
Maria Carolina Tomás
Departamento de Sociologia, Pontifícia Universidade Católica de Minas Gerais
Bernardo Lanza Queiroz
Faculdade de Ciências Econômicas, Universidade Federal de Minas Gerais

Abstract

The paper analyzes the demographic determinants and implications of the 'sandwich generation' in Brazil. This generation is characterized by women who are likely to devote a significant amount of time to caring for both young children and elderly parents. In the past few decades, Brazil has been facing a rapid fertility and mortality decline, but the average fertility age has changed very little. The combination of these elements has had socioeconomic consequences on women and families. More specifically, we investigate: (i) what is the probability of a woman having a young child (less than one year of age) and a living parent; (ii) what is the average time that women spend within the sandwich generation and how has this duration changed over time; and (iii) what is the average age when children experience a grandparent's death. We use a SOCSIM microsimulation to analyze these three questions.

Key words: Sandwich Generation. Intergenerational Relations. SOCSIM. Brazil.

Resumo

El artículo analiza las determinantes demográficas y las implicaciones de la «generación sándwich» en Brasil. Esta generación se caracteriza por incluir mujeres que dedican una cantidad significativa de tiempo al cuidado de niños pequeños y padres ancianos. En las últimas décadas Brasil ha enfrentado una rápida disminución de la fecundidad y de la mortalidad, pero la edad promedio de fecundidad ha cambiado muy poco. La combinación de estos elementos ha tenido consecuencias socioeconómicas para las mujeres y las familias. Específicamente, en este trabajo se investiga: 1) cuál es la probabilidad de una mujer de tener un niño pequeño (de menos de un año de edad) y al menos un progenitor vivo; 2) cuál es el promedio de tiempo que las mujeres permanecen en la generación sándwich y cómo se ha modificado a lo largo del tiempo; y 3) cuál es el promedio de edad a la que los niños experimentan la muerte de un abuelo. Para responder estas interrogantes utilizamos una microsimulación SOCSIM.

Palavras-clave: Generación sándwich. Relaciones intergeneracionales. SOCSIM. Brasil

Recibido: 2/05/2015
Aceptado: 20/07/2015

Introduction

The increasing delay in fertility and mortality has not only changed the population age structure, but also the family dynamic because of the increased probability of middle-aged women having elderly parents while also caring for young children. This process is called the sandwich generation and has drawn the attention of researchers and policy makers in recent years (Goldstein, Mason and Zagheni, 2011; Mason and Zagheni, 2014; Dukhovnov and Zagheni, 2015). In the Brazilian context, especially due to rapid changes in fertility (Martine, 1996) and mortality levels (Carvalho and Wong, 2008) and the more recent process of a slight increasing in mean childbearing age in some parts of the country (Lima and Myrskylä, 2014), it is important to estimate and analyze the sandwich generation and to discuss this groups determinants and possible implications. In addition, low fertility may decrease the amount of time women spend caring for young children. Thus, it is important to consider how average women allocate their time in this situation.

The aging process results in a verticalization of family structure in the same way that it effects the verticalization of the age structure in a population. This means that people are sharing the time of their lives with individuals of different age groups for a longer period. This process reinforces the importance of considering multigenerational bonds within a family (Bengtson, 2001; Mare, 2011; Medeiros and Osório, 2000). This is the case for women in the sandwich generation, since at least three generations might be alive at the same time, and women are traditionally responsible for or devote more time caring for children and the elderly.

Different measures have been used to estimate the burden of care and economic resources related to the aging process, such as dependence ratios. These techniques assume the demographic life cycle context (Lee, 2003; Lee and Mason, 2011) in which children and the elderly are considered dependents because they usually consume more than they produce, while adults are able to produce more than they consume. This enables them to support the dependent members of the population. However, this aggregate measure does not show whose burden of care may be increasing. Investigating the sandwich generation is another way to analyze the effect of the demographic transition by also considering family dynamics and not only an economic perspective (Wachter, 1997; Goldstein, Mason and Zagheni, 2011; Mason and Zagheni, 2014).

The sandwich generation is defined by simultaneous responsibilities toward both younger and older generations. However, there is no unique definition of the sandwich generation and different authors adopt varying perspectives based on their objectives. For instance, some authors include only middle-aged women in their analyses, because they are more likely to provide care for both dependent generations (Craig and Mullan, 2011; Grundy and Henretta, 2006). Most authors use an age range between 45 to 54 years old, as the age range for children, assuming that the age of parents has more variation. Soldo (1996) considered parents over the age of 75 years old as being the typical age in need of care. For Mason and Zagheni (2014), a sandwich generation involves a coexistence with children under the age of five and one or more parent being less than five years away from the average age at death. Watkins, Menken, and Bongaarts (1987) consider parents aged 65 and over and children aged 18 or younger in their macro-simulation. Dukhonov and Zagheni (2015) define the sandwich individual as one who provided care for a child and an elderly person in the course of one day. In this paper, we follow the guidelines proposed by Mason and Zagheni (2014) and instead of using a specific age group; we define the study

group as those with children under the age of five and parents within five years of the average age of death.

Most of the literature on this topic focuses on the United States or has a global perspective that compares different regions (Mason and Zagheni, 2014; Grundy and Henretta, 2006). However, Mason and Zagheni (2014) only consider the mortality age schedule and fertility rates in their analysis. They do not separate their findings by marital status, as they did not have marriage information for all of the countries they considered. In this paper, we focus on Brazil, which is an interesting case to analyze because of its rapid decrease in fertility rates and late onset of fertility postponement. In addition, Brazil is marked by significant public transfers to the elderly, but also has a tradition of family support (Turra, Queiroz and Rios-Neto, 2011). Given these characteristics, results may greatly differ from what is observed in the United States and other more developed economies, since the time mothers spend with small children tends to decrease (due to fertility decline) and they are less likely to be part of the sandwich generation because of a younger fertility schedule. In this sense, the sandwich generation becomes a rare case of middle-aged women in Brazil, who are more likely to have adult children (some may be in need of care and even live in the same household) at the same time as elderly parents (who may not be very old because of younger fertility). With the slightly increasing delay in fertility in more recent years, we may start to observe some effects, especially on how long women spend as part of the sandwich generation.

Finally, it is worth highlighting that the concept of the sandwich generation is based on a need for care; however, the amount of time middle age women dedicate is unknown because there are no data on time-use transfers in Brazil in order to perform an analysis similar to Zagheni and Zannella (2013). To our knowledge, only Corrêa, Queiroz and Fazito (2011) and Saad (1999) try to incorporate a more qualified measure of support across family members for Brazil. In this paper, we used the SOCSIM microsimulation program in order to assess the possibilities of exploring the intergenerational relationships in Brazil in the last century in order to forecast trends. Macro and micro simulations are common methods for analyzing this phenomenon due to the lack of data about family members that live outside the household. In the case of Brazil, it is particularly important to have information on parents who live in a different household, because care may not be limited to co-residence.

Dependency and demographic changes

Dependency is defined by life periods during which an individual needs to be cared for by others. Infancy and elderly ages are the stages in life when people do not produce enough to consume, thus they are totally or partially supported by adults (a population that usually produces more than it consumes). The most common measure is the dependency ratio, defined by the number of people under age 14 and above age 65 in relation to the number of individuals between 15 and 64 years of age. More specific measures can also be determined by classifying dependency ratios of the young population as only people under age 15 and dependency ratios of the older population as those above age 65.

Dependency ratios are very limited since everyone, regardless of whether they have a child or not (or a living elderly parent), is equally considered in this estimate (Soldo, 1996; Mason and Zagheni, 2014). More detailed measures, which take into account

consumption and labor income profiles, also failed to incorporate time allocation and other standards of support. Like others, we argue that sandwich generation ratios might be a more informative measure of familial dependency. On the other hand, the actual time devoted to care is unknown, meaning that all middle-age women with a living child and at least one parent are treated the same. Therefore, some problems remain for this perspective.

The sandwich generation is usually defined as the middle-aged population, especially women, who have a dependent child (under 18 years old) and a living parent (over age over age 65 who may need assistance). It is assumed that both of these groups would compete for care and pressure the sandwich generation. The decline and delay in fertility, as well as an increase in longevity, play an important role in defining the duration and strength of the sandwich period. Longer lives indicate that people spend more time as parents and this increases the chance of having a living parent and grandparent. The decline in fertility may reduce the amount of time people spend raising young children, however the delay in fertility may postpone this period. This is more likely to happen concurrently with people having an elderly parent who requires care. Today in general, the elderly are healthier and the overlap may not occur as expected – since they might demand less care than before. Therefore, finding middle-aged people with young adult children (who may still need some support) and elderly parents who may or may not need support might be more common. One additional point to consider is the possible downward transfer from the elderly generation to the middle-aged and young generations. This could be a monetary or service related transfer and would reduce the impact on the sandwich generation. Watkins, Menken and Bongaarts (1987) attempted to verify whether longer life means that cohorts spend more years in different statuses – child, spouse, or parent, for example. Their main result is that despite declining fertility and higher divorce rates, women in the 1960 and 1980 cohorts spent more years being married and parents than earlier generations. They also spent more time as children of elderly parents. However, much of the potential offered by a longer life span has not yet been achieved.

Soldo (1996) found that three-generation families are common and actually serve as the model for middle-aged adults up to age 60. Therefore, considering a mean childbearing age of 26 years old, since 1960 there has been very little generational overlap at a point when both the elderly parents and offspring of middle-aged adults are likely to need care. Rather, the timing of parent care is more likely to coincide with the time when individuals have young-adult children. Moreover, at a point in the life cycle of middle-aged adult children when elderly parents or in-laws are at the greatest risk (typically after age 75), the middle-aged generation is more likely to be juggling care commitments to grandchildren than to their own very young children (Soldo, 1996).

Mason and Zagheni (2014) used United Nations' projections and a micro-simulation (SOCSIM) to investigate a worldwide perspective of the sandwich generation trend. Instead of defining a specific age group, they used formal demographic relations to specify how each individual (woman) could be sandwiched between children and elderly parents. Equation 1 is based on the formal demographic relation presented by Goldstein, Mason and Zagheni (2011) and Mason and Zagheni (2014). It estimates the chance of a mother being sandwiched by two generations:

$$S(a) = \sum_{x=1}^{5} f(a-x) \; . \; M_1(a) \; . (1 - \frac{M_1\,(a+5)}{M_1\,(a)}) \qquad (1)$$

Where, the first element determines the risk of having a child five years before the current period, the second element indicates the chance the individual having a living mother and the third element is the probability that the mother will die within five years. Equation 1, as is noted by Goldstein, Mason and Zagheni (2011) and Mason and Zagheni (2014), indicates how fertility and mortality functions impact the sandwich generation. For example, higher fertility levels are related to a higher probability of being sandwiched because the woman would spend a longer time having children. Delaying fertility would mean that both the mother and grandmother are older. In this case, the grandmother would be closer to death (more frail) compared to a scenario of younger fertility schedules.

The main result is a global downward trend in the simultaneous responsibilities of parents towards younger and older generations. Thus, the expectation is that grandparents are increasingly squeezed between young grandchildren and their own elderly parents. These results also suggest that grandparents could expect to play an important role in providing care and support for their grandchildren. Another outcome is the possible rise in the overlap of people living at the same time as their grandparents (Mason and Zagheni, 2014).

Sandwich generation: generation, gender, and care

The main discussion about the sandwich generation focuses on the need for caregiving during two intensive periods in life and most discussions have concentrated on the role of women. This is because women usually commit their time to taking care of family members (Mcgarry and Schoeni, 1997; Grundy and Henretta, 2006; Cheng *et al.*, 2013; Corrêa, Queiroz and Fazito, 2011). However, caregiving can be either permanent or temporary and take different forms, like time (or services), financial assistance, and the provision of space (co-residence).

Hogan, Eggebeen and Clogg (1993) highlighted that having a daughter is key to receiving assistance in old age. Nevertheless, sons are more likely to give financial or household assistance to their parents. Therefore, without qualifying the type of care that is provided, it is difficult to conclude which child's gender is more beneficial. In addition, it is worth highlighting that there is wide variation across countries on who is responsible for the care of elderly parents. For example, in China the son takes care of the parents. Generally, an only child provides this service, followed by the eldest child if there are multiple. The youngest sons provide the least care (Zuo and Li, 2013). In the United States and Brazil, different studies concluded that women, even in-laws, play an important role in providing care for the elderly (Corrêa, Queiroz and Fazito, 2011; Bianchi, 2011). Researchers have also found that there is little financial transfer from children to parents. Indeed, elderly parents appear far more likely to give financial support to their children and grandchildren than to receive it in return (Soldo and Hill, 1993).

Hogan, Eggebeen and Clogg (1993) highlighted the fact that one-half of Americans do not routinely engage in any kind of giving or receiving relationships with their parents and only about one in 10 is engaged in an extensive exchange relationship. Parents more often receive assistance in situations of poor health and obtain more care when they have young children. Assistance in times of need is not uniform and is rarely extensive. Intergenerational assistance is constrained by family structure, as well as the needs and

resources of each generation. African-Americans are consistently less likely than whites to be involved in intergenerational assistance.

In relation to gender, the authors found that men receive as much altruistic support as women; higher levels of giving and receiving among American women are in exchange for their greater involvement.

Another important aspect of caregiving is the possibility of sharing this task among siblings. Most middle-aged children have siblings, thus the care can be divided and not become a burden to one individual child (Soldo, 1996; Henretta, Soldo and Voorhis, 2011). In this sense, Soldo (1996) claims that the image of middle-aged adults balancing parental care duties with childcare duties is clearly an inappropriate rendering of mid-life. The author argues that a full account of the cross pressures at mid-life requires data and analyses that recognize alternative transfer currencies, siblings as potential substitute helpers, and obligations to one's own kin and kin by marriage. Henretta, Soldo and Voorhis (2011) also show that family characteristics and profiles of the elderly are important variables in explaining variations across families on how care is allocated. Because there is a natural life-cycle rhythm to giving and receiving transfers, panel data are needed to evaluate how reciprocities (either bequests from parents or assistance from their own children later in life) offset the sheer volume of claims on mid-life resources (McGarry, 1998).

Moreover, the provided support is part of an exchange system, in which parents and children provide and receive care (Hogan, Eggebeen and Clogg 1993; McGarry, 1998). It is a much more active process than a static and passive method. Hogan, Eggebeen and Clogg (1993) also argue that the most appropriate research focus on intergenerational support is on lineages that contain grandchildren. Soldo (1996); Mason and Zagheni (2014) reach a similar conclusion: the role of grandmothers caring for grandchildren may be more important than the sandwich generation, especially in developing economies. This is fundamental in our analysis of Brazil.

Data and methods

This analysis uses the SOCSIM (social simulation) demographic microsimulation model, originally developed by Gilbert and Hammel (1966) and further developed by Hammel, Wachter and Laslett (1978; Hammel, Mason and Wachter, 1990; Zhao, 2006).[1]

The SOCSIM simulation defines an initial population of individuals that have some desired sex/age distribution, for example, a stable population structure from any standard model life table. It is a closed model (Wachter, 1987; Wachter, Blackwell and Hammel, 1997; Zagheni, 2015), which means that partners have to be found within the existing simulated population (Murphy, 2004). With a closed model, a full set of kinship links is constructed over time as individuals marry and procreate. Thus, any kinship relationship through blood or marriage can be traced through living and/or deceased kin.

In our model, the initial population is a synthetic population that is subject to a series of demographic rates – fertility, mortality, and marriage –, which is consistent with the Brazilian population during the first steps of the simulation (Zagheni, 2015). In this case, kinship ties can be projected for the future, thus allowing us to investigate the effects of the demographic rates on the sandwich generation. SOCSIM simulates at the individual

1 Documentation about SOCSIM is available at lab.demog.berkeley.edu/socsim.

level, that is, each person in the population is subject to the demographic rates given their personal characteristics. In each period, each individual is subject to the risks of having a child, dying and getting married (Zagheni, 2011; 2015). Appendix Table 1 summarizes the main input demographic rates and data sources.

We simulate population conditions, sandwich generation trends, and implications from 1900 to 2020. The choice of this starting period is justified by the onset of a fertility decline between the periods from 1965-75 and 1975-80. In these periods, socioeconomic modernization variables are likely to explain a great deal of the fertility differences (Martine, 1996). Before, the country presented a quasi-stable population structure with significant mortality decline between the period of 1940-60 and fertility schedules were constant at very high levels (Carvalho and Wong, 2008). We also simulate the population over 35 years, from 1980 to 2015 (results not shown). The results presented here are based on a series of rates from 1980 to 2010 only, and they are kept constant for the periods before (1900 to 1980) and after (2010 to 2020).

We also compare three different scenarios to analyze the situation in Brazil:

1. Based on Brazilian fertility and mortality rates from 1980-2010 and marriage rates from 2000 indirectly calculated using Brazilian Census Data;
2. Based on Brazilian fertility and mortality rates from 1980-2010 and U.S. marriage rates from 1980-90 (Stockmayer, 2004);
3. Based on Brazilian fertility rates held constant at 1980 levels, mortality rates from 1980-2010, and marriage rates from 2000, indirectly calculated using Brazilian Census Data.

The comparison between scenarios 1) and 2) measures the impact of the marriage market on child-mother-grandparent relations, while 1) and 3) analyze the effect of fertility changes in the sandwich generation. The effects on mortality change are absent in this study, since we do not have mortality information available for years before 1980 (but we are working on constructing a series from 1920 onward).

Results

We first investigate the average age of a mother at childbirth and the expected years of life remaining for an individual at the birth of a grandchild. This estimate is similar to the mean age of childbearing. Because in our simulated data we have individual records, thus we have estimated a summarized indicator of motherhood.

This first step aims to study how changes in fertility and mortality affect the variation in these age profiles over time in Brazil. We estimate the average ages ignoring changes in life-table rates overtime and the distribution of maternal age at birth. From our simulated population, we need to identify, for each month of the simulation, the data when the mother had a child and link her information to her parents to identify when they became grandparents. We tabulate all children aged less than 10 years who had a maternal grandmother five or fewer years from death in each year.

Figure 1
Average age of mother, grandmother, and grandfather at birth of average child. Brazil, 1900 -2020 (based on three scenarios).
Figure 1a. Mean age of mother, grandmother, and grandfather at birth of average child. Brazil

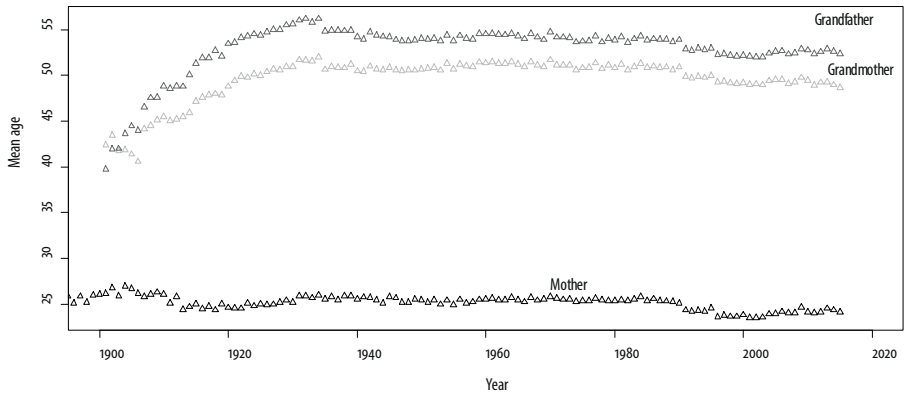
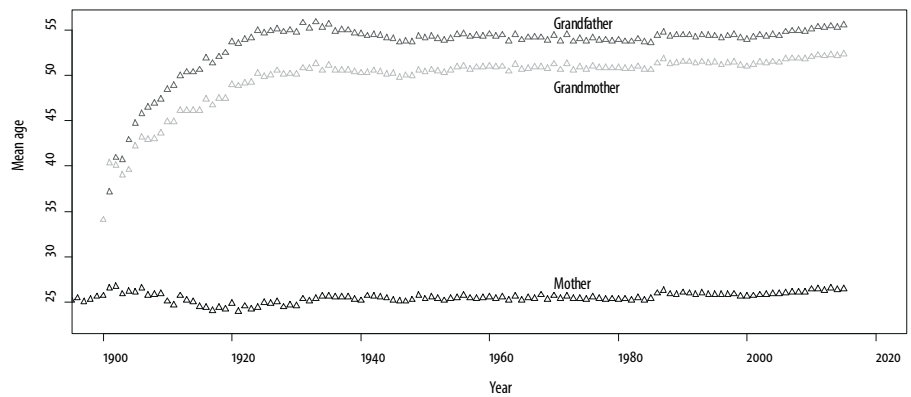


Figure 1b. Mean age of mother, grandmother, and grandfather at birth of average child. Brazil, using U.S. marriage rates

Figure 1c. Mean age of mother, grandmother, and grandfather at birth of average child. Brazil, Fertility Constant at 1980 Levels



Source: 2000 Brazilian Demographic Census, HFC, LAHMD and Stockmayer (2004). SOCSIM microsimulations.

Figure 1 shows the average age of motherhood and the mean age in which individuals became grandmothers and grandparents for each of the three scenarios. The results indicate that the mean childbearing age has not changed much over time in Brazil. We estimate an age ranging from 25 to 30 years old from 1900 to 2015. In the third scenario, with fertility rates constant at 1980 levels, we observe a slight rise in the average childbearing age for recent periods.

In the first two scenarios, that include declining rates of fertility in Brazil, we observed a small decline in the average age of motherhood and an increase in the age of becoming a grandparent. In this sense, the age difference between mothers and grandmothers has increased. The average age takes into account all births, since Brazilian women in the past tended to have several children until very late one could expect ages greater than in more recent periods, when women have been giving birth to fewer children, but at younger ages.

The age when an individual becomes a grandparent increases rapidly from 1900 to 1940 and then stays almost constant until 2000. In the most recent periods, we estimate an increase in the average age, probably due to mortality decreasing at older ages. In any scenario, the average age to become a grandparent is about five years greater than becoming a grandmother, which reflects the age difference at wedlock.

Figure 2 shows the expected years of life remaining for a grandparent at the birth of a grandchild, estimated as the average age of a woman when they became a mother and experienced the death of their grandparent. The average time spent as a grandmother was high in the past and declined until 1920. After this period, the length of time as grandmother stayed almost constant. In more recent years (after 1980), the average time spent as a grandparent reduced to 20 years for females and 10 years for males. These results indicate changes in both the level and shape of the fertility curve. Women having fewer children, by probably starting postponing the age of their first births (Lima and Myrskylä, 2014), results in their mothers becoming grandmothers at a later age and spending, on average, less time in three-generational families. Mortality differentials by sex explained the difference between time as grandparent for males and females.

In Figure 3, we show the sandwich generation from the perspective of the child. We follow Mason and Zagheni's example (2014) and use the time until death (five or fewer years) as a measure of health conditions and proxy for grandmothers in need of care from their adult children. We then estimated the proportion of sandwiched mothers, in each year, by taking into account all living women, 18 years of age and above in January of that year, who are or will be mothers, and are younger than 60 years of age.

Trends in the proportion of sandwiched mothers in Brazil follow a pattern very close to the demographic transition. As mortality declines and fertility stays high (1920 to 1960), the proportion of sandwiched women increases and remains very high. In this period, women were still having numerous children over the course of their life cycle, while changes in mortality imply that the probability of surviving to older ages was increasing. As fertility declines, and for the more recent cohorts showing signs of delay (Lima and Myrskylä, 2014), combined with continuous changes in the mortality age profile, the percentage of women taking care of young children with parents in need of care declines. The observed reduction in this time squeeze of mothers in Brazil is similar to the estimates provided by Mason and Zagheni (2014).

Everton Emanuel Campos de Lima

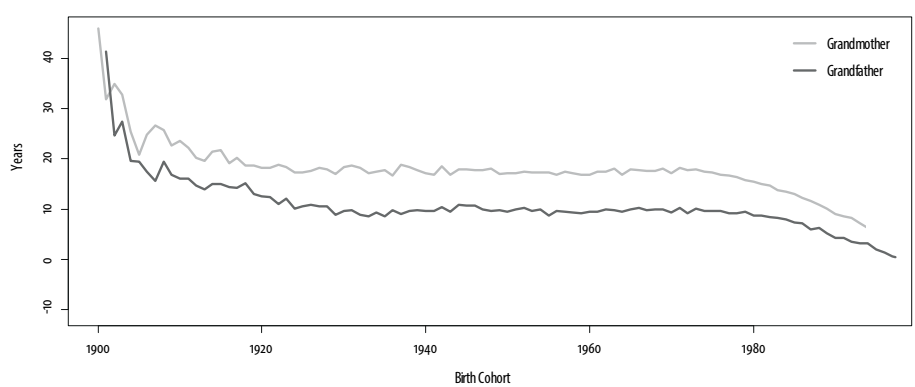
Maria Carolina Tomás

Bernardo Lanza Queiroz

Figure 2
Expected years of life remaining at birth of grandchild. Brazil, 1900-2000 (based on three scenarios)
Figure 2a. Mean years of life remaining for grandmother and grandfather after birth of average child. Brazil.

Figure 2b. Mean years of life remaining for grandmother and grandfather after birth of average child. Brazil using U.S. marriage rates

Figure 2c. Mean years of life remaining for grandmother and grandfather after birth of average child. Brazil Fertility Constant at 1980 Levels.



Source: 2000 Brazilian Demographic Census, HFC, LAHMD and Stockmayer (2004). SOCSIM microsimulations.

Figure 3
Proportion of mothers sandwiched in calendar year. Brazil, 1900-2000 (based on three scenarios).
Measured as women with children less than 10 years of age and mother within five or fewer years of death in a particular year

Figure 3a. Proportion of mothers sandwiched in calendar year. Brazil

Figure 3b. Proportion of mothers sandwiched in calendar year. Brazil using U.S. marriage rates

Figure 3c. Proportion of mothers sandwiched in calendar year. Brazil Fertility Constant at 1980 Levels

Source: 2000 Brazilian Demographic Census, HFC, LAHMD and Stockmayer (2004). SOCSIM microsimulations.

Everton Emanuel Campos de Lima

Maria Carolina Tomás

Bernardo Lanza Queiroz

Discussion and conclusion

Population aging in Brazil raises concerns about caring for the elderly, who are, in general, more dependent on aid from other individuals. At the same time, a vast amount of literature has brought attention to the allocation of women's time to their children and elderly parents. Rapid demographic change in developing countries combined with a less developed social support system, has brought attention to how this situation could affect family relations and economic outcomes.

We show that the average time women spent sandwiched between elderly parents and young children has been declining over time in Brazil. In fact, this indicates the significance of investigating the possible impacts of demographic change to grandmothers, who might serve as important resources to young children (their grandchild) and their own parents, who might still be living. Therefore, instead of a sandwich generation of mothers, we might be observing a sandwich generation of grandmothers and grandparents. These results are in line with intergenerational transfer studies (Lee and Mason, 2011) showing that elderly individuals make net transfers to younger individuals in a series of countries.

Our results show that the decline and changes in fertility and mortality seem to be producing a situation where the mothers of young children in Brazil are far less burdened by their own parents than previous cohorts. Although, despite the fact the Brazil has shown recent small sings of fertility delay (Lima and Myrskylä, 2014), the postponement effect on the sandwiched generation is not identified in our simulations, as verified in many developed countries.

This paper contributes to a better understanding of family relations in Brazil and the weight of care provided by women and other individuals. More studies in this area are of great importance because they can be a source of positive or negative externalities in order to redistribute resources and react to policies. Families can also be the criteria that focus policies and influence, or they can be influenced by the policies implemented. In this work, we take care to contribute to a better understanding of this reality.

The analysis presented in this paper is limited by the available data. Thus, it is important to work with a longer mortality and fertility time series, instead of assuming constant rates for a long period. In addition, it is important to invest in more studies on nuptiality trends over time in Brazil and other Latin America countries. Future work might also consider analyzing the sandwich generation of grandmothers, as they could help to provide care for their grandchildren and surviving parents.

Acknowledgments

This work started in a workshop held at UFMG-Belo Horizonte in August 2013. We would like to thank Carl Mason at UC Berkeley for all the help, assistance and tips with SOCSIM. We would like to acknowledge Adriane Reams for editing this paper. Everton E. C. Lima is grateful for the financial support from São Paulo Research Foundation (FAPESP), grant 2014/05129-4.

References

Bengston, V. (2001), "Beyond the nuclear family: the increasing importance of multigenerational bonds". *Journal of Marriage and Family*, us, Vol. 63, N. 1, p. 1-16.

Bianchi, S. M (2011), "Family change and time allocation in American families". *The Annals of the American Academy of Political and Social Science*, Los Angeles - Washington, Vol. 638, N. 1, p. 21-44.

Carvalho, J. A. M. and Wong, L. L. (2008), "A transição da estrutura etária da população brasileira na primeira metade do século xxi". *Cadernos de Saúde Pública*, Rio de Janeiro, Vol. 24, N. 3, p. 597-605.

Cheng, Y. P. *et al.* (2013), "Young adults' provision of support to middle-aged parents", *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences,* Washington, D.C..

Corrêa, C. S.; Queiroz, B. L. and Fazito, D. (2011), "Uma investigação sobre as motivações às ajudas entre idosos e seus familiares e amigos em São Paulo, 2000". *Oikos - Revista Brasileira de Economia Doméstica,* Viçosa, mg, Vol. 22, N. 1, p. 64-83.

Craig, L. and Mullan, K. (2011), "How mothers and fathers share childcare a cross-national time-use comparison". *American Sociological Review,* us, Vol. 76, N. 6, p. 834-861.

Dukhovnov, D. and Zagheni, E. (2015), "Who Takes Care of Whom in the United States? Time Transfers by Age and Sex". *Population and Development Review*, 41 (2), 183-206.

Gilbert, J. P. and Hammel, E. A. (1966), "Computer simulation and analysis of problems in kinship and social structure". *American Anthropologist,* us, Vol. 68, N. 1.

Goldstein, J.; Mason, C. and Zagheni, E. (2011), "Can grandma help with the kids? A demographic analysis of the sandwich generation," paper presented at the *Annual Meeting of the Population Association of America*, Washington D.C.

Grundy, E. and Henretta, J. C. (2006), "Between elderly parents and adult children: a new look at the intergenerational care provided by the 'sandwich generation'". *Ageing and Society,* Vol. 26, N. 5, p. 707-722.

Hammel, E. A.; Mason, C. and Wachter, K. W. (1990), "socsim ii, a sociodemographic microsimulation program, rev. 1.0, operating manual: Graduate Group in Demography". *Working Paper,* N. 29, Berkeley, California (Program in Population Research).

Henretta, J. C.; Soldo, B. J. and Voorhis, M. F. V. (2011), "Why do families differ? Children's care for an unmarried mother". *Journal of Marriage and Family,* Vol. 73, N. 2, p. 383-395.

Hogan, D. P.; Eggebeen, D. J. and Clogg, C. C. (1993), "The structure of intergenerational exchanges in American families". *American Journal of Sociology,* Chicago, Vol. 98, N. 6, p. 1428-1458.

Hutchinson, D. W. *et al.* (1976), *The socsim demographic-sociological microsimulation program: operating manual.* Berkeley: Institute of International Studies, University of California.

Lee, R. (2003), "The demographic transition: three centuries of fundamental change", *The Journal of Economic Perspectives,* us, v. 17, n. 4, p. 167-190.

———— and Mason, A. (Eds.) (2011), *Population aging and the generational economy: a global perspective*, Northampton: Edward Elgar Publishing.

Lima, E. E. C. and Myrskylä, M. (2014), "Fertility transition in Brazil: a cohort analysis of fertility anticipation, postponement and recuperation", paper presented to *Vienna Institute of Demography – Colloquim*, 3 July.

Mare, R. D. (2011), "A multigenerational view of inequality". *Demography,* Chicago, Vol. 48, N. 1, p. 1-23.

Martine, G. (1996), "Brazil's fertility decline, 1965-95: a fresh look at key factors". *Population and Development Review,* New York, Vol. 22, N. 1, p. 47-75.

Mason, C. and Zagheni, E. (2014), "The sandwich generation: demographic determinants of global trends", *Annual Meeting of the Population Association of America*-paa, Boston. *Anais…* Washington, D.C.: paa.

McGarry, K. M. (1998), "Caring for the elderly: the role of adult children". In: Wise, D. A. (Ed.), *Inquiries in the economics of aging,* Chicago: University of Chicago Press.

———— and Schoeni, R. F. (1997), "Transfer behavior within the family: Results from the asset and health dynamics study". *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences,* Washington, D.C., Vol. 52, N. Special, p. 82-92.

Medeiros, M. and Osório, R. G. (2000), "Mudanças na composição dos arranjos domiciliares no Brasil - 1978 a 1998". *Revista Brasileira de Estudos de População,* São Paulo, Vol. 17, N. 1/2, Jan./Dez, p. 67-85.

Murphy, M. J. (2004), "Tracing very long-term kinship networks using socsim". *Demographic Research,* Vol. 10, N. 7, p. 171-196.

Nichols, L. and Junk, V. (1997). "The sandwich generation: Dependency, proximity, and task assistance needs of parents". *Journal of Family and Economic Issues*, Vol. 18, N. 3, p. 299–326.

Pierret, C. R. (2006), "Sandwich generation: women caring for parents and children". *Monthly Labor Review,* Washington, D.C., Vol. 129, p. 3-9.

Saad, P. (1999), "Transferência de apoio entre gerações no Brasil: um estudo para São Paulo e Fortaleza". In: *Muito além dos 60: os novos idosos brasileiros* (pp. 251-80). San Pablo: Instituto de Pesquisa Econômica Aplicada.

Soldo, B. J. (1996), "Cross pressures on middle-aged adults: A broader view". *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences,* Washington, D.C., Vol. 51, N. 6, p. S271-S273.

———— and Hill, M. S. (1993), "Intergeneration transfers: economic, demographic and social perspectives". *Annual Review of Gerontology and Geriatrics,* New York, Vol. 13, N. 1, p. 187-216.

Stockmayer, G. (2004), *The demographic foundations of change in us households in the twentieth century*, Dissertação (Mestrado), Berkeley: University of California.

Turra, C.; Queiroz, B. and Rios-Neto, E. L. (2011), "Idiosyncrasies of intergenerational transfers in Brazil". In: Lee, R. D. and Mason, A. (Eds.) *Population aging and the generational economy: A global perspective*. Northampton: Edward Elgar Publishing.

Wachter, K. W. (1987), "Microsimulation of household cycles". In: Bongaarts, J.; Burch, T. and Wachter, K. W. (Eds.) *Family demography: methods and their application.* Oxford: Clarendon Press.

———— (1997), "Kinship resources for the elderly". *Philosophical Transactions of the Royal Society of London. Series B: Biological Sciences,* Washington, D.C., Vol. 352, N. 1363, p. 1811-1817.

———— Hammel, E. A. and Laslett, P. (1978), *Statistical studies of historical social structure.* New York: Academic Press.

Wachter, K. W.; Blackwell, D. and Hammel, E. (1997), "Testing the Validity of Kinship Microsimulation". *Journal of Mathematical and Computer Modeling*, N. 26, p. 89-104.

Watkins, S. C.; Menken, J. A. and Bongaarts, J. (1987), "Demographic foundations of family change". *American Sociological Review*, us, Vol. 52, N. 3, p. 346-358.

Zagheni, E. (2011), "The impact of the hiv/aids epidemic on kinship resources for orphans in Zimbabwe". *Population and Development Review,* New York, Vol. 37, N. 4, p. 761-783.

———— (2015), "Microsimulation in Demographic Research". In *International Encyclopedia of Social and Behavioral Sciences*, 2nd Edition, Demography section, edited by A. Foster and I. Elo: Elsevier.

Zagheni, E. and Zannella, M. (2013), "The life cycle dimension of time transfers in Europe". *Demographic Research*, Vol. 29, N. 35, p. 937-948.

Zhao, Z. (2006), "Computer Microsimulation and Historical Study of Social Structure: A Comparative Review of socsim and camsim". *Revista de Demografia Histórica*, Vol. xxiv, N. ii, p. 59-88

Zuo, D. and LI, S. (2013), "Sons and daughters: adult children's care for elderly parents at the end of life in rural China", paper presented at the *IUSSP Meeting*, Busan, Korea.

Appendix

Table 1
Description of the main input parameters and demographic rates for the microsimulation, and the respective data sources

Descritpion	Data Source
Age-specific mortality rates for each year	Latin America Human Mortality Database, 1980-2010 (http://www.lamortalidad.org)
Age-specific fertility rates for each year	Human Fertility Collection, 1980-2010 (http://www.fertilitydata.org)
Age and sex specific marriage rates for Brazil	Brazilian Census Data 2000
Age and sex specific marriage rates for the United States	Stockmayer, 2004

Everton Emanuel Campos de Lima

Maria Carolina Tomás

Bernardo Lanza Queiroz