# Kinship Transitions among the Oldest Old in Latin America

## Introduction

The rapid increase in the elderly population in Latin America and the Caribbean has raised concerns among researchers and policymakers regarding the provision of care for the oldest old. As this group grows and life expectancy increases, there is an expected rise in the demand for assistance with daily activities such as eating, dressing, shopping, and meal preparation. This is largely due to the prevalence of chronic and degenerative diseases, which may require long-term personal care.

Latin America is expected to experience the fastest population aging compared to other regions in the first half of the 21st century. This is mainly due to a significant reduction in fertility over a relatively short period. The population aged 80 or older is expected to increase by 2.3 times in just 27 years, rising from 11.9 million in 2023 to 37.0 million by 2050 (United Nations, 2024). It is crucial to recognize that population aging in Latin America is occurring under uniquely challenging circumstances, unlike those faced by high-income countries. These countries began to age after achieving high living standards, which better prepared them to deal with the demands of an older society. In contrast, Latin American countries are experiencing aging amidst fragile economies, high levels of poverty, and social inequality, posing significant challenges (Palloni, Pinto-Aguirre and Pelaez, 2002; Wong and Palloni, 2009).

Caring for the oldest in Latin America falls on blood relatives due to cultural factors and the lack of a welfare state capable of providing such services. Thus, it is essential to estimate and analyze the availability of relatives for this older segment of the population to assess the potential supply of informal care for future generations, that is, how many relatives will, on average, be available for this type of care. This analysis becomes even more important given the accelerated population aging in this region.

This study aims to estimate the number of relatives for individuals aged 80 in selected Latin American countries from 1950 to 2100. The oldest old are generally defined as individuals aged 80 or older in studies on gerontology and the biodemography of aging. These studies indicate that senility, also known as the fourth age, generally begins between the ages of 75 and 85. During this life stage, there is a higher prevalence

of chronic and degenerative diseases, and consequently, a greater need for care (Baltes and Smith, 2003; Vaupel, 2010).

The results of this work focus on women aged 80 in Argentina, Brazil, and Bolivia. These countries were selected as they represent three distinct stages of the demographic transition in Latin America. Bolivia lags furthest behind in the demographic transition, with relatively high fertility and mortality rates. Brazil represents an intermediate case, with declining mortality and fertility rates but still marked by strong demographic inertia. Lastly, Argentina represents a case of advanced demographic transition, which began at the end of the 19th century and has maintained low mortality and fertility rates for an extended period.

Thus, this study seeks to understand the size and structure of kinship networks and how they may inform the provision of informal care for older adults, potentially influencing future policies and practices. Due to its long-term scope (1950–2100), this study also offers a comprehensive analysis of the relationship between demographic transitions and the underlying kinship transitions in Latin American countries.

**The Kinship Transition**

It is widely accepted that the demographic transition also entails an underlying kinship transition, given the strong connection between key demographic variables and the number of relatives. Changes in fertility and mortality rates have a lasting impact on the size and age structure of families during the demographic transition. A reduction in fertility decreases the number of new relatives, while a reduction in mortality results in fewer relatives being lost over time (Verdery, 2015; Pullum, 1982).

Research has demonstrated how demographic changes can affect kinship networks, including the trend toward smaller and more multigenerational families. As people live longer, the coexistence of three or more generations becomes more common, increasing the importance of intergenerational relationships (family verticalization). This extended coexistence strengthens support networks, as different generations can provide mutual care throughout life (Hagestad, 1992; Bengtson, 2001; Bengtson, 2011; Wajnman, 2012; Guerra et al., 2016; Alburez-Gutierrez et al., 2023).

Another crucial aspect to consider is the continuity of support within families across generations, involving the sharing of time, emotions, and financial resources. From

an evolutionary biology perspective, behaviors such as recognizing and protecting relatives are deeply rooted in natural selection and species survival. These family ties foster a strong sense of belonging, strengthening emotional bonds and social solidarity among family members (Bengtson and Roberts, 1991; Sapolsky, 2017; Furstenberg, 2020). Within these relationships, informal care for older relatives with disabilities and care needs is frequently provided.

**Data and Methods**

This study applies a two-sex time-variant kinship model to estimate the number of biological relatives of women aged 80 in selected Latin American countries from 1950 to 2100. The research builds upon the work of Alburez-Gutierrez et al. (2023) but adopts different assumptions regarding male fertility and projection methods.

The model assumes stable populations prior to 1950 and closed populations (without migration) throughout the period analyzed (Caswell and Song, 2021; Caswell, 2022). We used age-specific female fertility rates and survival probabilities estimated by the United Nations for the period between 1950 and 2023, as well as UN projections based on the medium variant for the years 2024 to 2100. Male fertility rates were estimated by shifting female fertility rates by five years (Shoumaker, 2019). All age-specific information was obtained from the World Population Prospects Review (UNDESA, 2024). Analyses were conducted in R using the DemoKin package (Williams et al., 2023).

The dynamics of each type of relative $k$ in a population with fertility and mortality rates can be represented by the following equation:

$$\widetilde{\boldsymbol{k}}\,(x,t) = \left(\frac{\boldsymbol{k}_f}{\boldsymbol{k}_m}\right)(x,t)$$

where $x$ is the focal age (x = 80) and $t$ is the year (t ∈ [1950, 2100]). The tilde denotes block-structured vectors and matrices composed of female and male components. The time-varying block-structured matrices are:

$$\widetilde{\boldsymbol{U}_t} = \left(\begin{array}{c|c} \boldsymbol{U}_f(t) & \boldsymbol{0} \\ \hline \boldsymbol{0} & \boldsymbol{U}_m(t) \end{array}\right) \qquad \widetilde{\boldsymbol{F}_t} = \left(\begin{array}{c|c} \bar{\alpha}\boldsymbol{F}_f(t) & \bar{\alpha}\boldsymbol{F}_m(t) \\ \hline \alpha\boldsymbol{F}_f(t) & \bar{\alpha}\boldsymbol{F}_m(t) \end{array}\right) \qquad \widetilde{\boldsymbol{F}_t^*} = \left(\begin{array}{c|c} \bar{\alpha}\boldsymbol{F}_f(t) & \boldsymbol{0} \\ \hline \alpha\boldsymbol{F}_f(t) & \boldsymbol{0} \end{array}\right)$$

in which $\boldsymbol{U}_f(t)$ and $\boldsymbol{U}_m(t)$ refer to the female and male survival matrices at time *t*; $\boldsymbol{F}_f(t)$ and $\boldsymbol{F}_m(t)$ are the female and male fertility matrices at time *t*; $\alpha$ represents the proportion of males among the offspring, and $\bar{\alpha}$ is equivalent to $1-\alpha$.

The dynamics $\widetilde{\boldsymbol{k}}(x,t)$ are given by

$$\widetilde{\boldsymbol{k}}(x+1,t+1) = \widetilde{\boldsymbol{U}_t}\,\widetilde{\boldsymbol{k}}(x,t) + \widetilde{\boldsymbol{\beta}}\,(x,t)$$

The first term of the equation represents the survival of relatives over one year, and the second term $\widetilde{\boldsymbol{\beta}}\,(x,t)$ describes the arrival of new relatives.

**Results**

Table 1 presents selected demographic indicators for Argentina, Bolivia, and Brazil in the years 1950, 2023, and 2100, aiming to contextualize the stage of demographic transition in each country and facilitate the interpretation of the results discussed throughout this work. The data reveal distinct trajectories among the countries, highlighting different stages in the demographic transition process.

Argentina already showed signs of a more advanced demographic transition in 1950. The country had a total fertility rate (TFR) of 3.2 children per woman, nearly half the rates observed in Bolivia (6.2) and Brazil (6.1). In addition, life expectancy in Argentina had already reached 61.3 years, contrasting sharply with 40.7 years in Bolivia and 48.5 years in Brazil, reinforcing the country's earlier decline in mortality and rise in longevity.

This early advantage in Argentina's demographic transition is also reflected in its current age structure and future projections. In 2023, the proportion of individuals aged 80 or older reached 2.8% of Argentina's population, higher than Bolivia's 1.0% and Brazil's 1.9%, confirming the more advanced aging of the Argentine population. This trend is expected to intensify by 2100, when 16.7% of Argentinians will be aged 80 or older, compared to 14.7% in Brazil and 6.1% in Bolivia.

Brazil, in turn, presents an intermediate trajectory in the demographic transition. Its fertility and longevity indicators in 1950 were very similar to those of Bolivia, but over the decades, the country advanced more rapidly, reflected in both the significant reduction in fertility (TFR of 1.6 in 2023) and the increase in life expectancy (75.8 years in 2023).

Bolivia, on the other hand, maintains a slower pace in the demographic transition. Although the country has experienced important improvements, such as increased life expectancy to 68.6 years in 2023 and reduced fertility to 2.5 children per woman, Bolivia remains at a less advanced stage in the process, resulting in a younger age structure and a lower proportion of individuals aged 80 or older.

These contrasts reflect different moments and rhythms in the demographic transition across the region, with direct impacts on the size and composition of kinship networks and, consequently, on the potential for intergenerational support in the three countries.

Table 1 – Demographic indicators for Argentina, Bolivia and Brazil – 1950, 2023 and 2100

| Country | Life Expectancy | | | Total Fertility Rate | | | Total Population (thousands) | | | Population aged 80 + (%) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1950 | 2023 | 2100 | 1950 | 2023 | 2100 | 1950 | 2023 | 2100 | 1950 | 2023 | 2100 |
| Argentina | 61.3 | 77.4 | 87.7 | 3.2 | 1.5 | 1.6 | 17,018 | 45,538 | 38,256 | 0.4 | 2.8 | 16.7 |
| Bolivia | 40.7 | 68.6 | 79.6 | 6.2 | 2.5 | 1.8 | 3,090 | 12,244 | 17,761 | 1.1 | 1.0 | 6.1 |
| Brazil | 48.5 | 75.8 | 86.8 | 6.1 | 1.6 | 1.6 | 53,409 | 211,141 | 163,364 | 0.3 | 1.9 | 14.7 |

Source: United Nations, Department of Economic and Social Affairs, Population Division (2024). *World Population Prospects 2024, Online Edition.*

Figure 1 shows the estimated average number of relatives and family composition of a woman aged 80 in Argentina, Bolivia, and Brazil from 1950 to 2100. The estimated kinship network includes great-grandparents, grandparents, parents, children, grandchildren, great-grandchildren, uncles/aunts, niblings, siblings, and cousins. The projection results reveal a significant reduction in the total number of living relatives in the three countries, converging by the end of the period toward families with approximately twenty members.

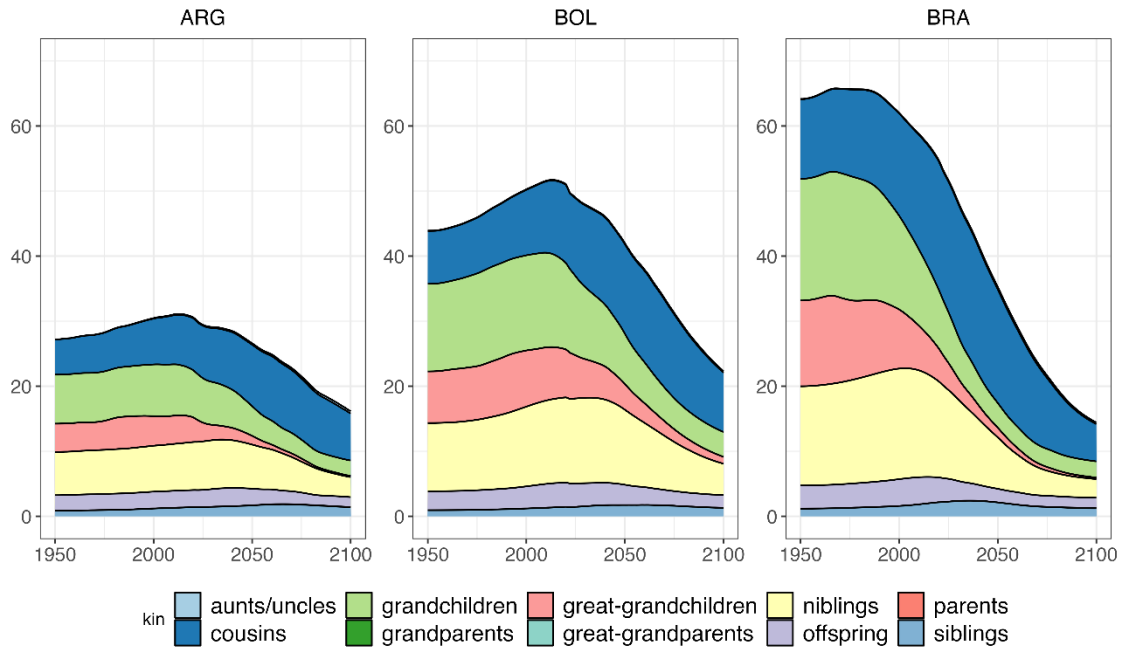


Figure 1 – Family Composition for an 80-Year-Old Woman in Argentina (ARG), Bolivia (BOL), and Brazil (BRA) - 1950 to 2100

Argentina showed the smallest variation in family size between 1950 and 2100 due to a slower and more gradual demographic transition. In 1950, the country already had smaller families, the result of an advanced demographic transition compared to other Latin American countries. Factors such as socioeconomic conditions, cultural influences, urbanization, and foreign immigration played a significant role in this demographic transformation (Elizaga, 1973; Lattes, 1973).

Bolivia, on the other hand, remains one of the Latin American countries still transitioning from higher fertility and mortality levels. This means that although the population continues to grow, there are also more deaths compared to countries with a more advanced transition, such as Brazil. As a result, Bolivia presents more relatives, but also experiences higher losses compared to the other countries.

Brazil experienced a significant increase in family size between 1960 and 1990, contributing to a peak in the number of relatives during this period. The decline in fertility began during this period but remained relatively high until the 1990s. Additionally, the country presents strong demographic inertia due to the high fertility of previous generations. Improvements in survival rates also played an important role in increasing the number of family members. High fertility particularly affected the number of

grandchildren, great-grandchildren, and niblings, while greater longevity mainly benefited collateral relatives, such as cousins and siblings, who are usually older.

The kinship transition follows a window of opportunity similar to that of the demographic transition. This window occurs at different moments in each country, depending on the speed and intensity of fertility and mortality transitions. The peaks in the curves indicate periods of greater availability of family support for individuals aged 80 or older. The total number of relatives peaked in Argentina in 2012 with 31.11 relatives; in Bolivia, the peak occurred in 2013 with 51.7 relatives; and in Brazil, in 1968 with 65.78 relatives. The results also indicate that family size for the oldest old will decrease significantly in the coming years. This is expected in the final phase of the demographic transition, characterized by low fertility and mortality levels. With fewer relatives being born and dying over time, family size will shrink, and variation between countries will diminish. Given the reduction of family resources and the accelerated demographic transition, Latin American countries must plan public policies to ensure adequate care for the oldest old (Baltes and Smith, 2003).

Considering the objective of assessing how demographic changes affect support networks in old age, this study goes beyond analyzing the number of relatives to also incorporate the age composition of these individuals. Additionally, the analysis focused on three types of relatives closest to the focal individual, recognized in the literature as having the greatest potential to provide support across different areas of life, including emotional, physical, financial, and social dimensions. The selected relatives were siblings, children, and grandchildren.

Siblings are often among the closest relatives throughout life, sharing generational, social, and economic experiences (White, 2001). In old age, these bonds acquire particular relevance in the realm of emotional support, given the mutual knowledge of each other's life trajectory (Wolf, Freedman and Soldo, 1997; Eriksen snd Gerstel, 2002). In contexts of increasing longevity, the coexistence of elderly siblings tends to extend, enhancing this role.

Children have traditionally represented the primary source of support in old age, both emotionally and in the provision of practical and financial assistance (Roberts et al., 2023). In Latin America, family-based care plays a central role in supporting older adults, with women playing a particularly prominent role (Sunkel, 2006). Analyzing the age

composition of children provides insight into their stage in the life course and, consequently, their availability and capacity to provide support.

Although grandchildren are generally not direct caregivers, they play an important role in strengthening intergenerational ties and providing emotional support to grandparents. Furthermore, the age of grandchildren serves as an indicator of the stage of the family life cycle, contributing to the understanding of family dynamics and their evolution over time.

Figure 2 shows the increase in the average age of children between 1950 and 2023, followed by a decline between 2023 and 2100 for Argentina and Brazil, while Bolivia shows consistent growth throughout the period analyzed. Due to its earlier demographic transition, Argentina shows a higher age concentration and more pronounced aging of the family network until 2023. In contrast, by 2100, Argentina and Brazil display similar patterns. Bolivia, with a slower transition, maintains greater variability in the age of children, reflecting more traditional reproductive patterns.

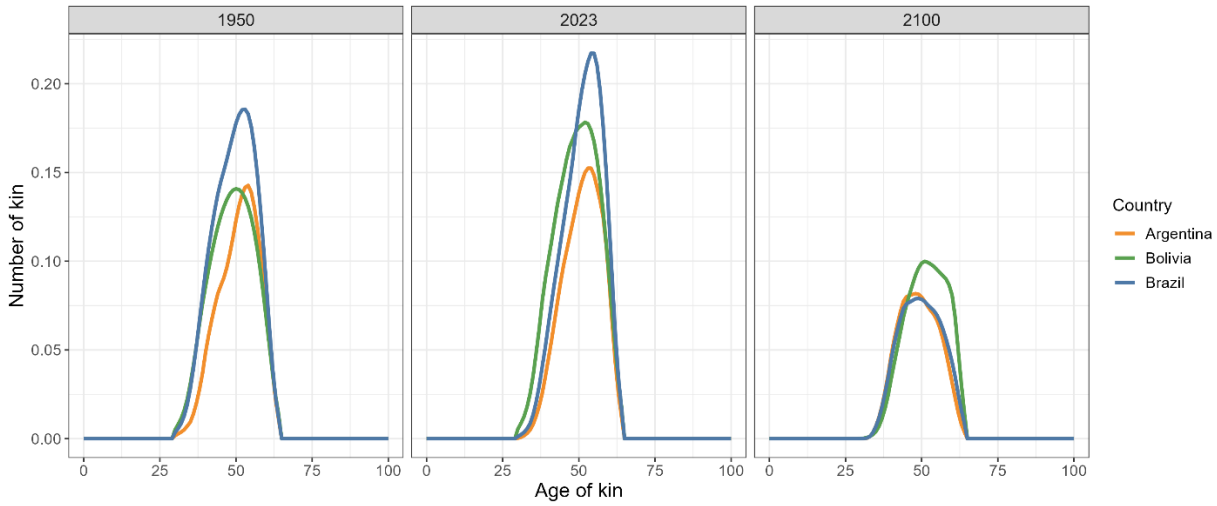


Figure 2 – Age Distribution of the Children of an 80-Year-Old Woman in Argentina, Bolivia, and Brazil (1950, 2023 e 2100)

Figure 3 illustrates the age distribution of siblings of a woman aged 80, highlighting structural changes associated with the demographic transition in the three countries. As fertility rates decline and longevity increases, there is a progressive reduction in the number of siblings and a marked aging of these individuals over time. However, the pace and magnitude of these changes vary according to each country's stage in the demographic transition.

In Argentina, the most advanced in the demographic transition, the number of siblings of the oldest old is already significantly reduced, and those who remain alive are themselves at very advanced ages, with lower age variability. This pattern reflects both the early decline in fertility and the consolidated increase in survival, resulting in smaller and more age-homogeneous family networks.

Brazil, at an intermediate stage of the transition, shows similar trends but in a less pronounced manner. Although the number of siblings is also declining and their average age is progressively increasing, greater age variability among siblings persists, indicating the coexistence of different reproductive calendars and an ongoing demographic transition. In 2023, Brazil stands out for having a higher availability of siblings than the other countries.

Bolivia, at a more recent and less advanced stage of the demographic transition, shows fewer evident effects of these changes. The average age of siblings is lower, and age variability is more pronounced. This scenario is consistent with still relatively high fertility levels and mortality patterns that, while changing, have not yet reached the level of maturity seen in the other countries.

These results illustrate how different stages of the demographic transition unevenly affect family support networks, particularly regarding the availability and age profile of siblings. In contexts of advanced population aging, such as in Argentina, support among siblings tends to be more limited and marked by the simultaneous aging of these individuals. In countries at earlier or intermediate stages of the transition, such as Bolivia and Brazil, sibling networks still present greater quantitative potential and age variability, but they are likely to follow the same trajectory of reduction and aging as the transition consolidates.

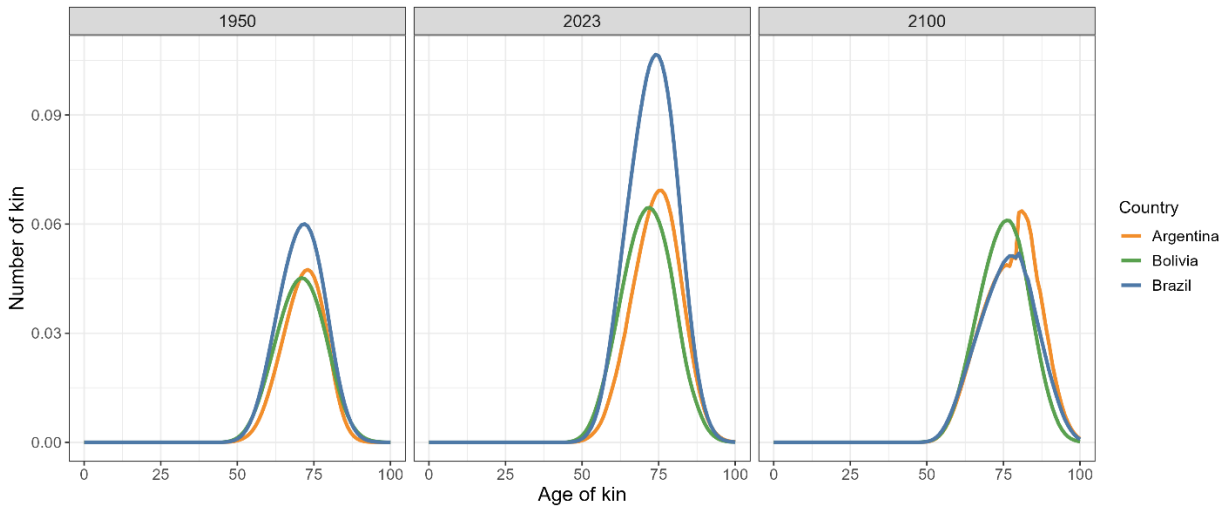


Figure 3 – Age Distribution of the Siblings of an 80-Year-Old Woman in Argentina, Bolivia, and Brazil (1950, 2023 e 2100)

Figure 4 illustrates the age distribution of grandchildren of a woman aged 80, revealing significant changes associated with the demographic transition, particularly concerning the number and age composition of these descendants. Between 1950 and 2023, the average age of grandchildren increased, directly reflecting the decline in fertility, the postponement of parenthood, and increased longevity across two generations. However, the most notable finding during this period, and especially in the projections for 2100, is the sharp reduction in the average number of grandchildren, a phenomenon expected in contexts of very low fertility.

The deepening of the demographic transition in the coming decades, characterized by persistently low fertility and increased longevity, exacerbates the reduction in the number of grandchildren. With fewer children and grandchildren, kinship networks become considerably smaller. Nevertheless, increased life expectancy and delayed childbearing favor the coexistence of very young grandchildren with very old grandparents, contributing to the reduction in the average age of grandchildren observed in 2100.

This trend varies across the countries analyzed, depending on their stage in the demographic transition. In 1950, the average age of grandchildren was relatively low in all countries, reflecting high fertility and early parenthood patterns: 20.6 years in Argentina, 18.6 years in Brazil, and 17.9 years in Bolivia. This scenario reflects large kinship networks concentrated in younger generations.

Between 1950 and 2023, the average age of grandchildren increased, reaching 21.8 years in Argentina, 23.4 years in Brazil, and 20.4 years in Bolivia, following the demographic transition, with greater intensity in countries where the process is more advanced, such as Argentina and Brazil. This increase in the average age of grandchildren reflects declining fertility and rising longevity, favoring the presence of adult grandchildren in family networks.

However, between 2023 and 2100, there is a significant reduction in the average age of grandchildren in all countries, especially in Argentina (15.8 years) and Brazil (16.7 years), while Bolivia maintains a relatively stable value (20.3 years). This reversal is associated with the deepening of the demographic transition, with very low fertility and significantly reduced kinship networks. In this scenario, the coexistence of very old grandparents with very young grandchildren becomes more common, while the total number of grandchildren decreases dramatically.

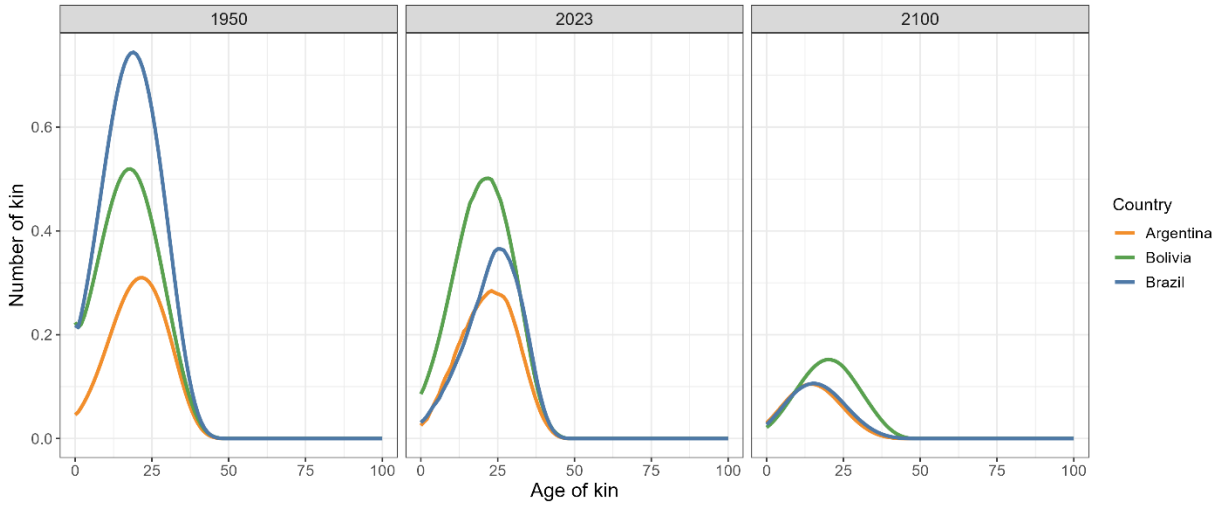


Figure 4 – Age Distribution of the Grandchildren of an 80-Year-Old Woman in Argentina, Bolivia, and Brazil (1950, 2023 e 2100)

## Conclusions

This study aimed to understand how demographic changes affect the structure of kinship networks and, consequently, the potential supply of informal support for the oldest old in Latin America. Using a kinship projection model for women aged 80 in Argentina, Bolivia, and Brazil between 1950 and 2100, the results reveal contrasting trajectories, directly linked to the different rhythms and stages of the demographic transition in these countries.

In Argentina, the demographic transition began earlier, resulting in smaller kinship networks compared to the other countries. Bolivia, in contrast, remains at a less advanced stage, characterized by larger families and more extensive kinship networks, but also more vulnerable to losses resulting from still-high mortality rates. Brazil presents an intermediate pattern, initially marked by a large number of relatives until the 2000s, followed by a sharp decline in the availability of relatives.

Regardless of each country's stage, the results converge toward a general trend of shrinking kinship networks and aging among relatives. The sharp decline in fertility and the increase in longevity lead to a progressive reduction in family size and a greater presence of relatives at advanced ages, posing growing challenges for the provision of informal care.

In addition, there has been a significant reduction in the number of grandchildren available, especially in the coming decades. This phenomenon points to the emergence of smaller, intergenerationally asymmetric families, in which the coexistence of generations persists, but with significantly fewer descendants, undermining the traditional potential for family support.

Finally, it is worth noting that this study estimates the potential availability of relatives, not their actual availability, since factors such as co-residence, geographic proximity, and emotional bonds were not considered. Even so, the results contribute to the debate on the impact of the demographic transition on kinship networks and reinforce the urgent need for public policies that consider shrinking kinship networks and the growing limitations of informal care in the region.

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