Population Ageing and the Increased Need of Eldercare in Latin America: How Burdensome Is It Going to Be?
(draft paper in progress)

Luis Rosero-Bixby
Guido Pinto
University of Costa Rica

Short abstract

The increased needs for eldercare in the ageing Latin American populations and their burden to younger persons are estimated using survey information on help received by elderly individuals in activities of daily life (ADL) and on the providers' characteristics. We distinguish full-care provided to help with basic ADLs, such as bathing, from mild-care for instrumental ADLs, such as shopping. The demand for eldercare takes off after age 80. Caregivers are mostly spouses for married individuals and children for unmarried persons. The mean age of caregivers is 54 years. The demand for eldercare grew explosively at annual rates close to 5% in the last decades and will grow at about 4% in the coming decades. The expected number of months an average Latin American spends as full caregiver is 6 months in 2010 and it would be around 12 months in 2050 if the same family-centered pattern of care-giving persists

Introduction

Population ageing will certainly increase the need of eldercare in developing countries. However, little is known about the magnitude of this need and the burden that eldercare represents now and in the future for younger generations and for public institutions. The purpose of this paper is to estimate de needs of eldercare in Latin American countries and to determine the impact of population aging on it and its burden for younger cohorts. To achieve this objective we first identify, and later model, the determinants of the demand for eldercare, as well as some basic characteristics of caregivers, particularly their age. We estimate and project the demand for eldercare between 1960 and 2050 for the 20 Latin American countries and its burden for the population.

Data and materials

Data

We estimate the need of eldercare in Latin America with the information from three publicly available micro-datasets of population-based surveys on ageing in the region: The Health, Well-Being, and Aging Study (SABE), the Costa Rican Study on Longevity and Healthy Aging (CRELES), and the Mexican Health and Aging Study (MHAS.)

SABE is a series cross-sectional study carried by the Pan-American Health Organization made up of samples of individuals aged 60 years or older in seven representative cities in

the region. We use data from Buenos Aires, Montevideo, Santiago, and Sao Paulo (Southern Cone.) The sample size in these four cities is 1,043 in Buenos Aires, 1,450 in Montevideo, 1,301 in Santiago, and 2,143 in Sao Paolo. The SABE micro-data files are available at the University of Wisconsin-Madison's website (http://www.ssc.wisc.edu/sabe/home.html)

CRELES is a nationally representative sample of 2,827 Costa Rican born in 1945 or earlier; i.e. with approximately 60 or more years of age at the time of the baseline interview in 2005. This nationwide study, carried out by the University of Costa Rica, followed a panel design with three waves of interviews in 2004-2010. However, this paper uses data from the first wave, which took place mostly during 2005. The CRELES micro-data is publicly available at the National Archive of Computerized Data on Aging (NACDA) at the University of Michigan: (http://www.icpsr.umich.edu/icpsrweb/ICPSR/studies/26681)

MHAS is also a panel, two-wave study, tailored after the Health and Retirement Study (HRS) and carry out by the Universities of Maryland and Wisconsin-Madison. The original sample size is 15,230 persons aged 50 and over and their spouses. The sample is nationally representative of Mexico. This analysis uses data from the first wave of interviews conducted in 2002 and 2003 and only from target individuals aged 60 years or over, for a sample size of 5,092. MHAS micro-data files are available at: (http://www.mhas.pop.upenn.edu/english/documents_avdoc.htm)

Variables

We propose two measures of the demand for daily eldercare: (1) *full* or continuous care received as help in any of four basic activities of daily living (ADL) (bathing, toileting, bedding, and eating) and (2) *partial* or *mild* care consisting in help received in any of four instrumental ADLs (handling money, taking medicines, cooking, and shopping.)

The ageing surveys provide information on the probabilities of receiving these two types of eldercare by age, sex, marital status, number of children, education, and country. They also provide information about the eldercare providers, particularly their age, sex and kinship relation with the care receptor.

Age is a positive integer number measured in single years; age squared is included to capture nonlinear effects of age. Sex is a binary variable (1=male, 0= female). Education is also a dichotomous variable (1= 6 + years of education, 0= otherwise). Marital status is classified as married equal to 1 and other marital status equal to zero. The number of children is defines as various categorical variables, the categories are no children, 1-2 children (reference group), 3-4 children and 5+ children. Finally, the countries are categorical variable: Costa Rica, Mexico, and Southern Cone (Argentina, Brazil, Chile and Uruguay), which is also considered the reference group.

Modeling and projecting eldercare

We use logistic regression models to predict the probability of receiving full and partial care as a function of the older person's characteristics like age, sex, education or marital status.

We also assess the caregivers' characteristics (kinship, age and sex) in the surveys and model the age-distribution of care providers using OLS regression.

We estimate Latin American age-vectors of demand for full and partial eldercare as well as a matrix of the age distribution for care providers by age of care receivers. Assuming these vectors and matrix are constant across countries and overtime, we estimate the demand for, and the burden of, eldercare for 20 Latin American countries during the 1960 - 2050 period. To carry out this task we use United Nations population projections. Given that before 1990 these projections end at age group of 80 years and more, we opened it up assuming that the mortality probabilities implicit in the projection follow a Gompertz function.

We summarize the burden of eldercare with a cross-section life expectancy as eldercare provider in the ages 40 to 74. This life expectancy is estimated as the sum of the age-specific proportions of caregivers by single ages.

Results

The sample size for the pooled surveys is close to 14,000 people aged 60 years or more. The demand or prevalence of eldercare in this sample is 6% for full-care in basic-ADLs and an additional 9% for mild-care in instrumental-ADLs (table 1).

As shown in Figure 1, the demand for full care takes off by age 80. Before that age less than 10% receive any care and the proportion change very little with age. More than 20% receive full care by age 85 years and close to 40% by age 90 years. The age-profile of eldercare demand is strikingly similar in all three surveys; thus, a Latin American standard curve can be safely proposed, which is estimated using a logistic regression with age as the only explanatory variable (the lower panel of Table 2 shows the model's parameters.)

In contrast with full-care, the proportions receiving partial-care differ substantially across populations, especially after age 80 (Figure 1, right panel). The differences in partial-care may be genuine or may be just an artifact of how instrumental ADLs are elicited in the surveys or interpreted by respondents. Although we estimate a Latin American standard curve, its use in specific countries might be questionable.

The logistic regression models in Table 2 confirm that age is a strong predictor of the probability of being a care-receiver, especially for full-care. Education is also another strong predictor: the probability of receiving eldercare is substantially lower among more educated individuals. Males receive less care for instrumental ADLs, that is, the effect of

ageing on full-care is lower for males than for females. The demand for full-care seems independent of marital status, fertility and country, whereas the probability for partial-care is significantly higher among married individuals and larger families, especially in Costa Rica. The coefficients in the short model were used to estimate the Latin American standard curves shown in Figure 1.

Who are the daily eldercare providers? The sample size to answer this question is substantially smaller—about 2,300 care-receivers for the three-pooled surveys. About 80% of caregivers are women, although this percentage is lower among married individuals. Family members, mostly spouses and children, overwhelmingly, provide eldercare in Latin America. However, caregivers' kinship is substantially different depending on whether care receivers are married or not (Figure 2.) For married individuals, the care providers are mostly the spouse and few non-related individuals residing in other households. For unmarried receivers, in about two-third of the cases the caregiver is a child and in about 10% are non-related individuals residing in other households.

Our central interest is on population ageing and thus on assessing the providers' age composition, which depends upon the marital status and age of receivers as shown in Figure 3. Married individuals receive care from older providers (mostly spouses.) Younger individuals receive care from both spouses and children and thus age distribution is bi-modal. Given that the proportion of married people declines with age, the oldest-old persons receive care mostly from children but these children tend also to be older persons. These forces are mirrored in the results from the OLS regressions, where caregivers' age is the dependent variable and the characteristics of care receivers are explanatory variables (Table 3.) Older individuals, males, childless, and, especially, married ones receive care from significantly older caregivers.

For population projection purposes, we estimated a short model with only care-receiver's age and marital status as explanatory variables (Table 3.) We used the coefficients of this short model to estimate the expected mean age of caregivers and then we generated a montecarlo estimate of its age-distribution assuming a bell-shaped distribution around the mean age with standard deviations as those observed for each 5-year age group among care receivers. The modeled age-density distribution is shown in Figure 4 and compared to the observed distribution in the sample. Table 4 shows the vectors and the matrix used in the population projections. The mean age of caregivers in this sample is 54 years with a standard deviation of 16.

The age-profile in the prevalence of eldercare providers and receivers is not that obvious when compared to the age-distributions. Figure 5, exemplifies this for Mexico 2010. In particular, the age-specific prevalence of caregivers is strikingly low. It is also somehow surprising that the number of care-receivers declines after about age 80 despite of the almost exponential growth in the corresponding prevalence.

The number of eldercare receivers is growing rapidly in the region, mirroring the explosive growth in the number of elderly people. In our estimates, the (unweight)

median growth in full-eldercare in Latin American countries was 4.5% per year between 1960 and 2010, which ranges from 2.4% in Uruguay to 5.7% in Venezuela, and it will be 3.7% per year between 2010 and 2050, ranging from 1.7 in Uruguay to 4.1 in Honduras and Nicaragua. Growth rates are slightly lower for mild-eldercare.

This explosive growth did not have a counterpart in the burden of eldercare for the population since the pool of potential caregivers also is growing fast. Figure 6 illustrates the changes in the prevalence of care-giving for three selected countries: Uruguay, a forerunner country in population ageing in the region, Bolivia, a laggard country, and Mexico, an average country. The upward shift in the age curve in Bolivia and Mexico is minimal between 1960 an 2010. Moreover, the eldercare burden among elderly people (which is the highest in 1960) has diminished. In the following 40 years, there will be a small increase in Bolivia and a substantial increase in Mexico, especially at central ages. By the year 2050, the age curve for Mexico looks similar to that of Uruguay, country in which the upward shift has been more gradual since population ageing has also been more gradual. However, most Latin American countries resemble the change showed by Mexico. At peak ages (in the fifties), about 4% of Latin Americans might be involved in the provision of eldercare in 2050, which doubles the 2010 figure

In analogy to well-known demographic indicators like the Total Fertility Rate or the cross-sectional Life Expectancy at birth, we propose a summary indicator for eldercare burden in a population: the average months of life spent as caregiver in the age bracket 40 to 74 years. Full care-giving expectancy amounts to about six months of life in most Latin American countries in 2010, which is a couple of months higher than in 1960 (Figure 7); figures are a bit higher for Argentina and Uruguay, early adopters of population ageing, and for El Salvador, a country with large out-migration flows. According to the projection, most countries will have an eldercare burden from 12 to 18 months of life in 2050, which is about 6 months higher than in 2010. An outstanding case is Cuba with a huge increase from 9 months in 2010 to 26 months in 2050, reflecting its rapid pace of population ageing. All these figures correspond to what we have called full care. For partial-care, figures are somewhat higher.

Discussion

The age-specific proportions of older people receiving help in basic ADLs are strikingly similar across surveys and countries. This similarity means that the need for this type of eldercare, which we call it *full-care* can be safely estimated in different Latin American populations. Eldercare providers, in turn, are overwhelmingly family members and their age distribution can also be safely modeled.

The use of a single pattern for *partial-care* is, by contrast, questionable since the data show important differences across countries.

The late age distribution of care providers (mean at 54 years) suggests that eldercare is rarely provided at the same time as childcare by a sort of a sandwich generation.

The figure of about six months of life expectancy as eldercare provider, suggest that on average this is not a particularly burdensome duty for Latin American adults, at least not that burdensome as childcare, which may take about 6 years of full-care until a child go to school. It is important to note, however, that this is an average of a distribution with a likely long tail: for some individuals the burden of providing eldercare may take several years of their lifes while for others may take zero months of life. It is also an average of two quite different means by sex: about 10 months of eldercare-giving for women and two months for men.

The projection of the burden of eldercare in the future assumes that the family-centered pattern of care provision currently observed in Latin America will persist in the future. This may be a heroic assumption given the changes in family and gender relations that are taking place in the region. A probable scenario is that some of the increased needs of eldercare brought about by population ageing will be solved in the market with paid-care or in the public sector with government-subsidized services. In any event, this paper's projections may be useful to plan the supply of these services.

References

Doty, Pamela, Mary E Jackson, W. Crown (1998). The Impact of Female Caregivers' Employment Status on Patterns of Formal and Informal Eldercare. U.S. Department of Health and Human Services.

Smith, PR (2004). Elder Care, Gender, and Work: The Work-Family Issue of the 21st Century. University of California at Berkeley.

Walz, HS and TE Mitchell (2007). Adult children and their parents' expectations of future care needs. J. Aging Health.2007 Jun; 19(3):482-99

Wolf, Douglas (1999). The family as Provider of Long-Term Care: efficiency, equity, and. Externalities. J. Aging Health.1999 Aug; 11(3):360-82

Table 1. Percentage receiving eldercare by survey (Population aged 60+)

Received eldercare	South Cone SABE	Mexico MHAS	Costa Rica CRELES
N	5,930	5,092	2,824
Full care (bathing, bedding, toileting or eating)	4.8	7.1	6.1
Mild care (handling money, medicines, shopping or cooking)	7.3	10.1	9.1

Table 2. Logistic regressions on the probability of receiving care

Elder attributes	Full eldercare			Mild eldercare#		
	Odds Ratio	z-value	Sig.	Odds Ratio	z-value	Sig.
Age (years)	1.08	5.90	**	1.04	3.98	**
Age squared	1.00	4.52	**	1.00	4.28	**
Male	1.26	1.47		0.73	-2.58	**
Age-male interaction	0.96	-4.95	**	1.00	-0.47	
Married	0.96	-0.50		1.14	1.95	+
No children	0.94	-0.46		1.29	2.22	*
1-2 chidren	1.00	Reference		1.00	Reference	
3-4 children	1.14	1.26		1.13	1.35	
5+children	1.13	1.33		1.35	3.65	**
6+ yrs Education	0.65	-4.88	**	0.42	-10.90	**
South Cone	1.00	Reference		1.00	Reference	
Mexico	1.08	0.91		1.08	1.02	
Costa Rica	1.07	0.73		1.20	2.31	*
Short model	Coefficient			Coefficient		
Age (years-60)	0.0692	5.76	**	0.0512	4.79	**
Age squared	0.0012	4.00	**	0.0012	3.87	**
Constant	-3.9272	-35.10	**	-2.9983	-36.23	**

Conditional on not receiving full care

Table 3. OLS regressions on the age of caregivers

	Full model			Reduced model		
Variable	Coef.	t	Sig.	Coef.	t	Sig.
Age (years)	0.963	8.57	**	0.908	6.89	**
Age squared	-0.005	-2.07	*	-0.008	-2.38	*
Male	3.541	2.76	**			
Age-male interaction	-0.144	-2.48	*			
Married	20.736	14.58	**	16.076	12.47	**
Age-malrried interaction	-0.293	-4.12	**	-0.042	-0.57	
No children	6.632	5.58	**			
1-2 chidren						
3-4 children	-0.310	-0.35				
5+children	-1.902	-2.43	*			
6+ yrs Education	0.276	0.36				
South Cone						
Mexico	0.483	0.59				
Costa Rica	-3.458	-4.97	**			
Mild-care	1.803	3.14	**			
Constant	31.188	20.8	**	34.432	26.71	**
N=2299, Age was transformed to age -60						

Table 4. Matrix for projecting population's eldercare by age in Latin America

Givers	Receivers' age							
age	60	65	70	75	80	85	90	95
Full care	0.0225	0.0329	0.0504	0.0816	0.1346	0.226	0.3698	0.6237
Mild care	0.0518	0.0682	0.0931	0.1311	0.1828	0.2444	0.2897	0.2565
Total	*1.0000*	*1.0000*	*1.0000*	*1.0000*	*1.0000*	*1.0000*	*1.0000*	*1.0000*
15	0.0350	0.0269	0.0221	0.0177	0.0104	0.0054	0.0030	0.0005
20	0.0509	0.0423	0.0364	0.0292	0.0177	0.0123	0.0061	0.0027
25	0.0690	0.0568	0.0456	0.0444	0.0309	0.0228	0.0173	0.0073
30	0.0896	0.0799	0.0666	0.0589	0.0510	0.0372	0.0300	0.0182
35	0.0990	0.0982	0.0881	0.0778	0.0674	0.0589	0.0510	0.0354
40	0.1111	0.1061	0.0994	0.0931	0.0951	0.0910	0.0841	0.0702
45	0.1128	0.1142	0.1111	0.1055	0.1074	0.1042	0.1045	0.1049
50	0.1104	0.1142	0.1101	0.1074	0.1186	0.1329	0.1308	0.1416
55	0.0982	0.1003	0.1070	0.1080	0.1206	0.1277	0.1422	0.1569
60	0.0753	0.0852	0.0938	0.0956	0.1111	0.1161	0.1303	0.1477
65	0.0543	0.0605	0.0763	0.0793	0.0866	0.0951	0.1054	0.1188
70	0.0405	0.0477	0.0539	0.0653	0.0666	0.0754	0.0824	0.0896
75	0.0262	0.0330	0.0372	0.0498	0.0506	0.0530	0.0540	0.0538
80	0.0159	0.0200	0.0257	0.0324	0.0330	0.0350	0.0318	0.0303
85	0.0072	0.0098	0.0178	0.0233	0.0216	0.0211	0.0186	0.0155
90	0.0046	0.0050	0.0088	0.0124	0.0116	0.0119	0.0082	0.0065

Fig. 1. Proportion receiving eldercare by age

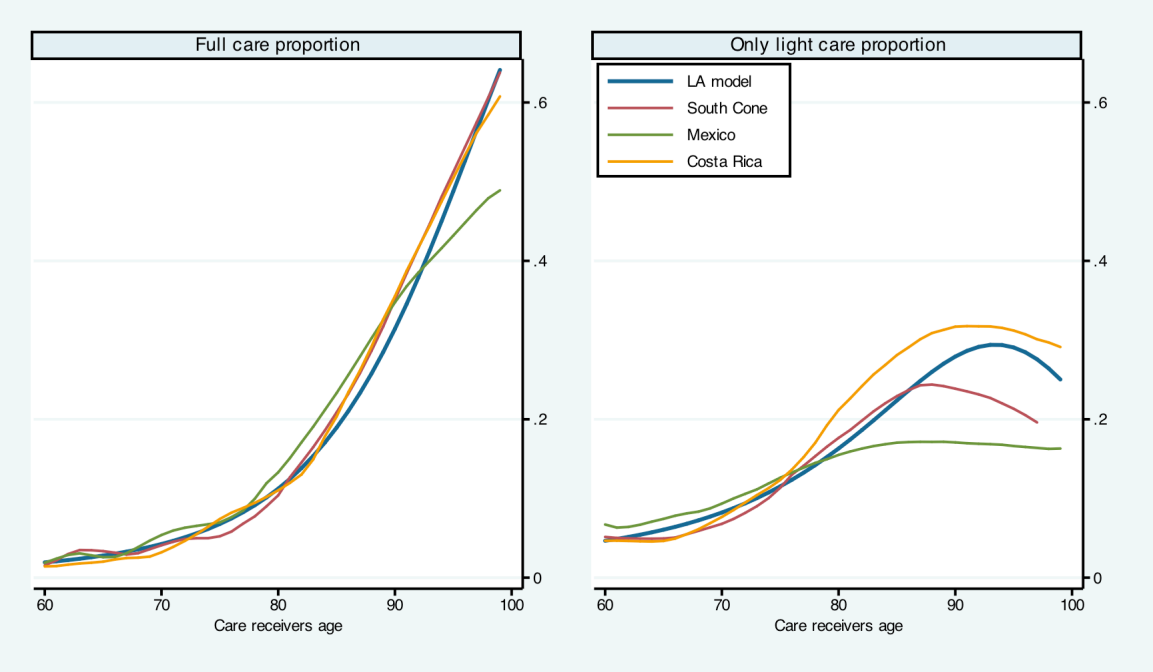

Fig. 2. Kinship of eldercare providers by marital status of the care-receiver

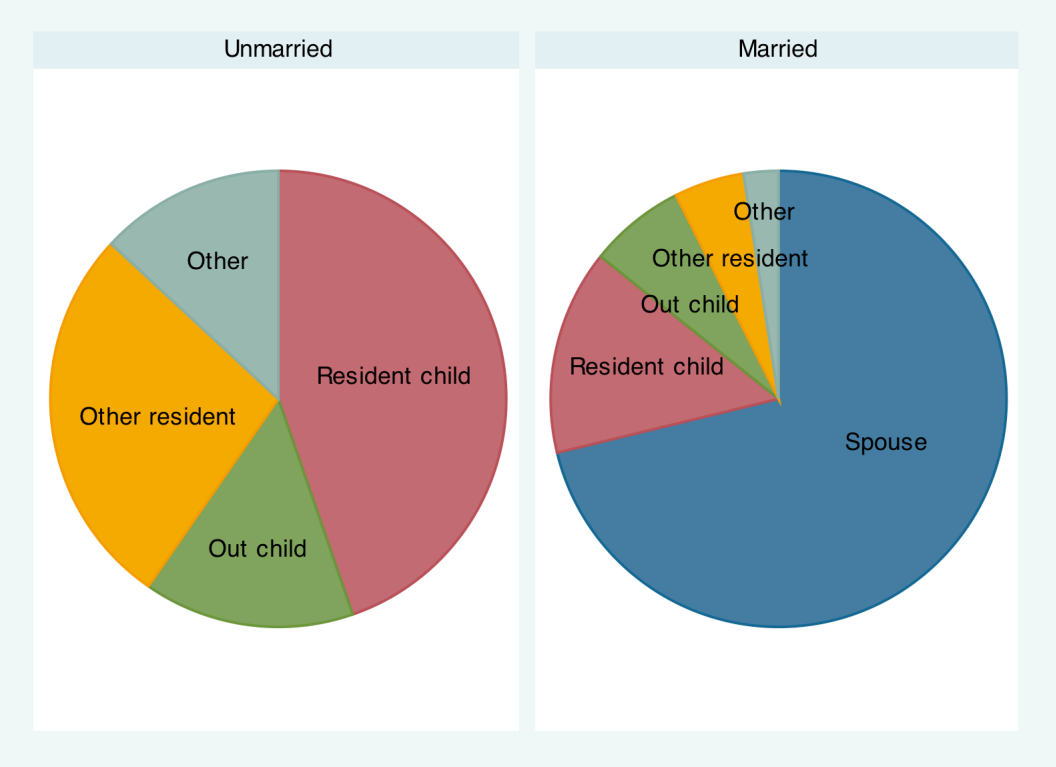

Fig. 3. Care-giving age density distribution by marital status and age of care-receivers

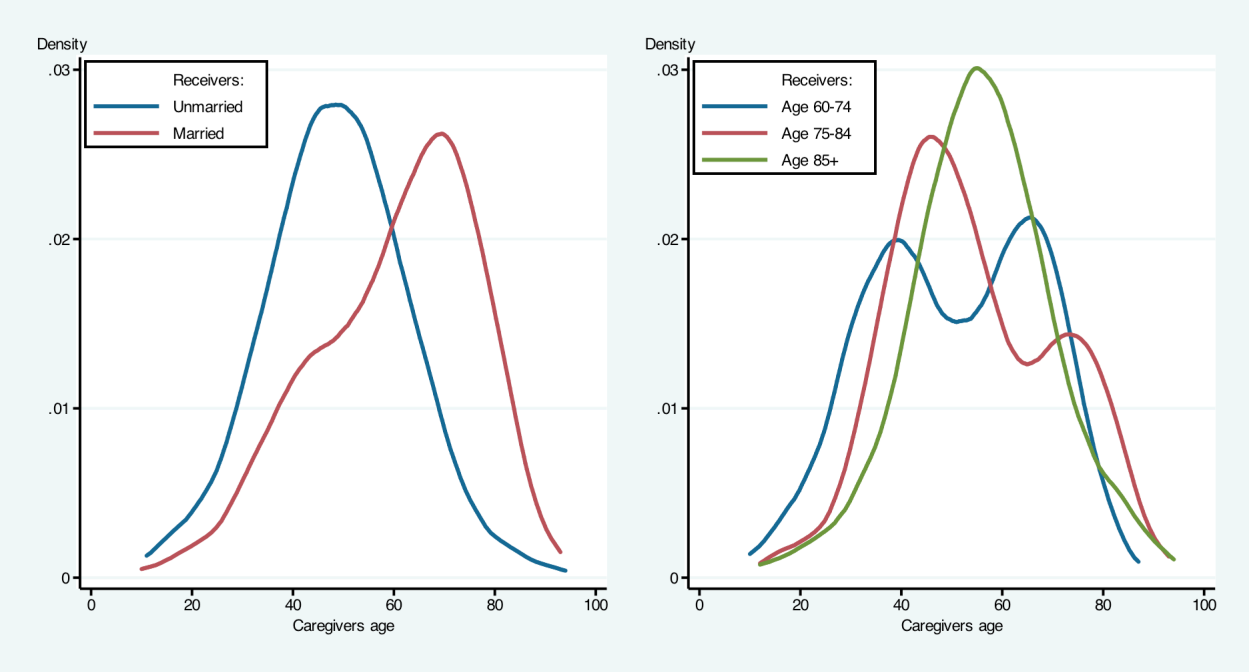

Fig. 4. Observed and modeled care-giving age density distribution

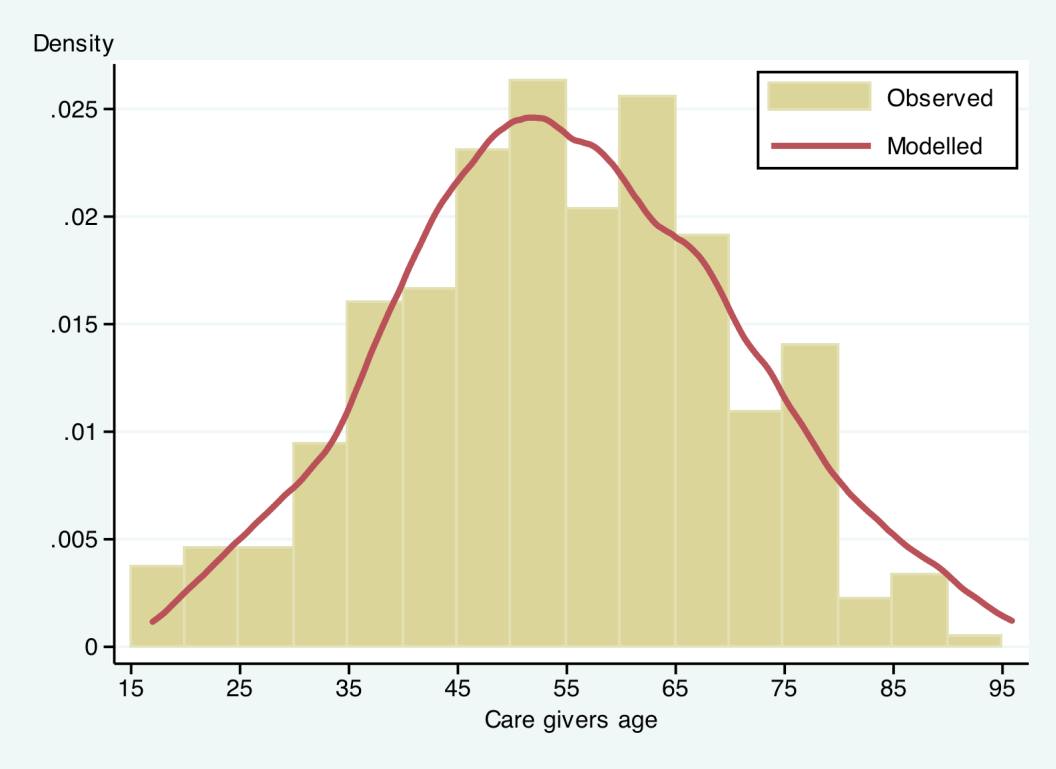

Fig. 5. Givers and receivers of eldercare by age and type of care. Mexico 2010

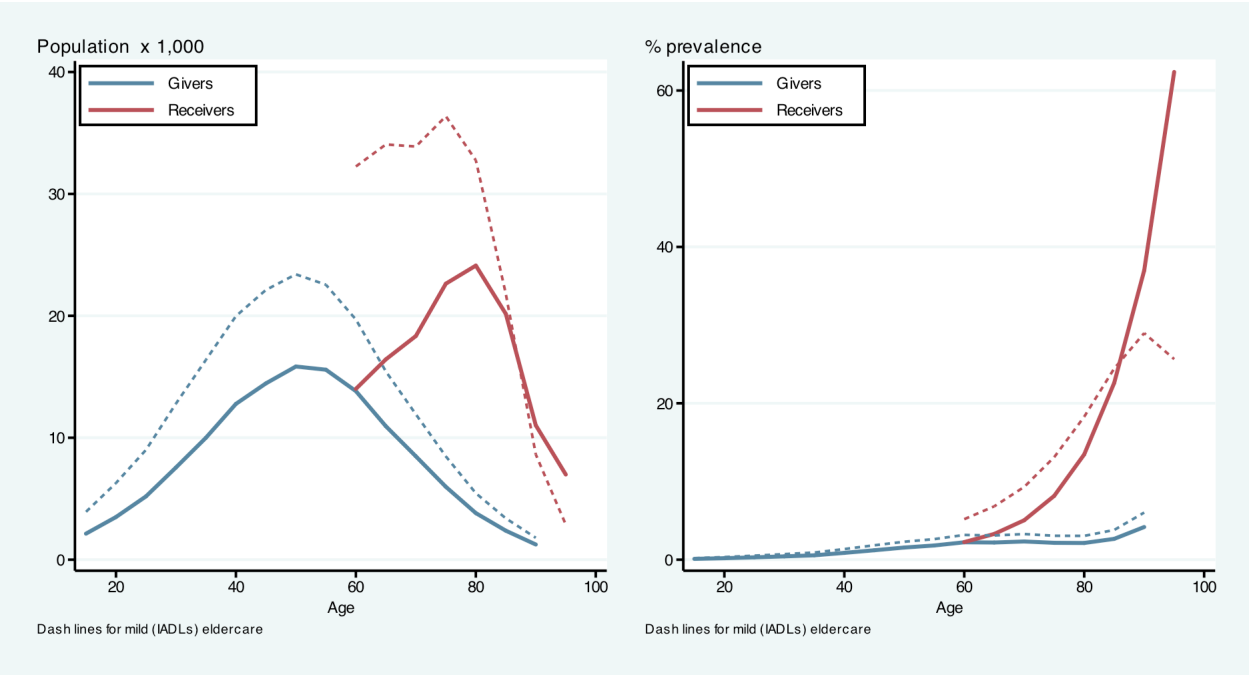

Fig. 6. Eldercare givers by age in three selected countries, 1960, 2010 and 2050

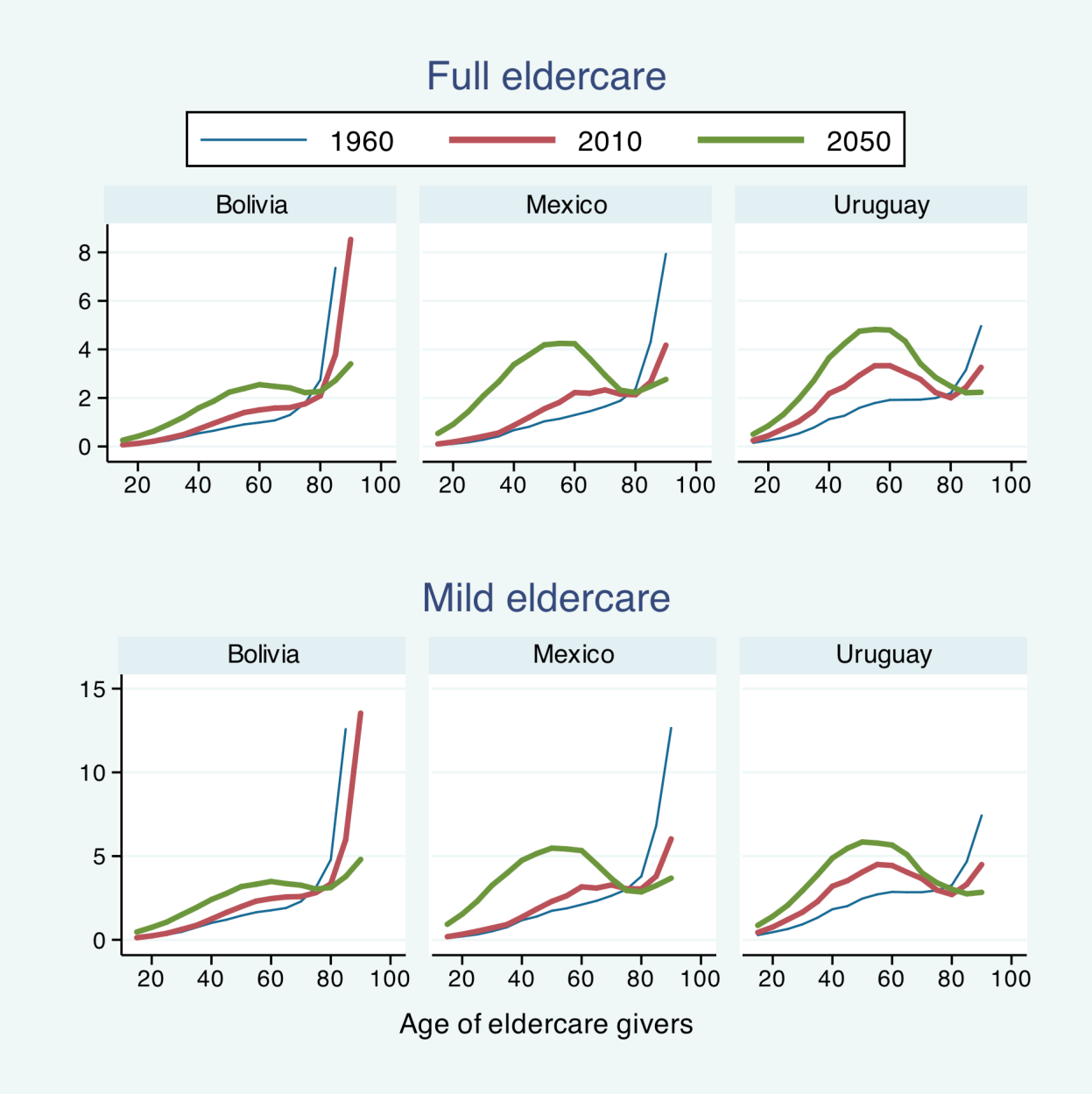

Fig. 7. Months of life expectancy as eldercare givers. Latin American countries 1960, 2010 and 2050