Early Poverty and Future Life Expectancy with Disability among the Elderly in Argentina

Pobreza temprana y esperanza de vida futura con discapacidad entre los adultos mayores de Argentina

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Abstract

Two aspects of the aging process in Latin America should be specially taken into account in order to evaluate future perspectives of morbidity among the elderly in the region: 1) Cohorts who will compose the bulk of the elderly population in the 21st century in Latin America survived to old age largely because of improvements in medicine and to a much lesser extent to amelioration of living standards, as it is the case in high income countries, and 2) a high proportion of the Latin American population still live in poor economic conditions and even these vulnerable individuals continue to experience gains in (adult and older adult) survival. We aim to evaluate to what an extent recent levels of poverty and indigence among young children

in Argentina could impact future levels of disability and demands for long-term care of older people. Our results show that given the levels of poverty and indigence in childhood observed between 1988 and 1994, the relationship between poor early conditions, and the risk of being disabled among the elderly in Argentina, life expectancy with disability at age 60 years old would increase substantially between 2000 and 2040, both in absolute and relative terms.

Resumen

Son dos los aspectos del proceso de envejecimiento en América Latina que deben tenerse especialmente en cuenta para evaluar las perspectivas futuras de morbilidad entre los adultos mayores de la región: 1) las cohortes que compondrán la mayor parte de la población de edad avanzada en el siglo XXI en América Latina sobrevivieron a la vejez en gran medida debido a las mejoras en la medicina y, en menor medida, a las mejoras del nivel de vida, como es el caso de los países de ingresos altos, y 2) una alta proporción de la población latinoamericana todavía vive en malas condiciones económicas, e incluso estas personas vulnerables siguen experimentando ganancias en la supervivencia (adultos y adultos mayores). Nuestro objetivo es evaluar hasta qué punto los niveles recientes de pobreza e indigencia entre los niños pequeños en Argentina podrían afectar los niveles futuros de discapacidad y las demandas de atención a largo plazo de las personas mayores. Nuestros resultados muestran que, dados los niveles de pobreza e indigencia en la infancia observados entre 1988 y 1994, la relación entre las malas condiciones tempranas y el riesgo de ser discapacitado entre los adultos mayores en Argentina, la esperanza de vida con discapacidad a los 60 años de edad aumentaría sustancialmente entre 2000 y 2040, tanto en términos absolutos como relativos.

Introduction

Argentina, like most Latin American countries, is undergoing an accelerated population aging process. The growth rate of the number of older people in the region is occurring at an unprecedented rate (Palloni, Pinto, & Pelaez, 2002). Chackiel (1999) points out that while in Europe the process of aging took between 150 and 200 years, in Latin America (LA) the same phenomenon developed in about 40 to 60 years. Unlike Europe, Latin American population aging is occurring in impoverished societies, with serious inequalities in income distribution and with a demographic history that may compound the burden of disease and disability of future elderly (Palloni et al., 2002). If this is so, the demographic and health consequences of aging in low to middle income countries in Latin America is likely to be qualitatively different than in high income societies. In particular, it is possible that both the burden of illness and disability to be experienced in the future could be much higher than in high income countries with similar levels of mortality.

The World Report on Ageing and Health (WHO [World Health Organization], 2015) shows significant differences in the prevalence of disabilities in basic Activities of the Daily Living (ADL) of the elderly, among different countries of the world and a strong inverse relationship between income levels and such prevalence. The prevalence in ADL ranges from less than 5% of the population aged 65-74 in Switzerland to over 50% of the same age group in countries such as India, Ghana or the Russian Federation.

While it is possible that current levels of poverty or illness are an important determinant of levels of disability in general and ADL in particular, we conjecture that other very different mechanisms will play a role. Because ADL prevalence reflects both the burden of chronic illnesses and demands for long term care, knowing the nature of mechanisms that determine trajectories of prevalence is essential to promote efficacious policies to achieve a healthier aging in the populations of the region.

Two characteristics of unique future of demographic aging in Latin America may conspire to create conditions for a process that will be driven by the rapid expansion of adult morbidity and high prevalence of long-term care needs (LTCN). First, the main engines of the demographic aging are somewhat different from those that drive aging in high income countries. In fact, the absolute size and the rate of growth of the population that will attain ages 60 and above after 1980 or 1990 will survive to old age largely as a result of gains in survival at younger ages that took place due to improvements in medicine and to a much lesser extent to improvements in living standards (Palloni & Wyrick, 1981; Preston, 1980). Second, these same cohorts experience throughout their life course high prevalence of poor economic conditions, even though they continue to benefit from gains in survival at adult ages.

According to our own estimates computed from the micro data of the Permanent Household Survey (INDEC [Instituto Nacional de Estadística y Censos], 2019a), the percentage of the total population in Argentina under the poverty line in 2016 reached a level of 31% and was of the order of 47% among children under 15, with sharp regional differences. Thus, the provinces of Northern Argentina, especially Chaco and Misiones, experience the highest levels of poverty, while Santa Cruz (Patagonia) and the Autonomous City of Buenos Aires (the capital) have the lowest levels.

Historical series dating back to the late 1980s (1988 Buenos Aires and 2001 for the country's total urban agglomerations) reveal that, albeit subject to small scale fluctuations, poverty levels have been stubbornly high and steady. In 1988 the percentage of the total population under the poverty line was 31% (it is the average of the levels observed in May and October, when the data collection was done), a figure close to the values observed in 2016 (INDEC, 2003). The exception to this was a very short period of time between 1993 and 1994, when the lowest levels of around 17% -18% were reached (INDEC, 2003).

The last great economic crisis (in 2001) that affected the country led to unprecedented levels of poverty that reached 52% in 2002. Although high prevalence of poverty and indigence are characteristic of the last 40 years it never was part of the historical record and if judged over the long run, it is a phenomenon that characterizes the tail end of the 20th century. Arakaki (2011) shows that up until the early 1970s, poverty existed in Argentina only in marginal pockets of the population and was of relatively moderate magnitude. The prevalence of poverty began to expand in earnest only in the last third of the 20th century. This increase prompted official statistics authorities to begin tracking more precisely the trajectory and nature of the phenomenon. Systematic measurements were initiated in the 1980s, on the basis of information provided by the Permanent Household Survey (EPH).

Although the relationship between economic conditions and health is strong at all stages of the life cycle, it is especially important early in life as there is increasing evidence that adversity and poverty in early childhood have a long reach and can have powerful impacts on adult and older adult health, somewhat independently of the socioeconomic status experienced after early childhood. Recent research in epidemiology points to the existence of a strong link between health/nutrition in early childhood and health in adult life. The conjectures posed by Barker (1998) in *Mothers, Babies and Health Later in Life*, usually referred to as the *foetal origins*, *Barker's hypothesis* or *foetal programming effect*, suggests that poor foetal health (malnutrition specifically) is related to, or rather programs, the risks of diseases in adulthood, in particular, heart disease (coronary disorders) and Type II diabetes.

Recently findings for Latin American populations suggest that early health and early socioeconomic experiences have a powerful effect on the probability of being disabled later in life (Monteverde, Noronha, & Palloni, 2009).

The population of Argentina is one of the oldest in Latin America and estimates for 2012 show that the prevalence of disability in Activities of Daily Living (ADL) and Instrumental Activities of Daily Living (IADL) among people over 64 is about 26%, representing 1.1 million people with long-term care needs (Monteverde, Tomas, Acosta, & Garay, 2016).

The population older than 60 in 2000 or so are survivors of the cohorts born between 1930 and 1950, one of the periods of fastest economic growth that Argentina ever experienced, ignoring the 1929-1931 Grand Depression (Coremberg, 2014). The economic deterioration and the recurrent crises that the country begins to experience in the late 1970s, harmed these groups with particular force, but only at adult ages.

In contrast, the population that will reach 60 years of age or older in 2040 will be survivors of cohorts born on or after 1980, who were fully exposed from an early age to much worse adverse socioeconomic conditions than their predecessors. The period after 1980 was characterized not only by increases in poverty and indigence but also by massive impoverishment of the middle classes that became engulfed in rapidly deteriorating economic conditions, exposed to periods of inflation and hyperinflation with a near 40% loss of real value of wages only between 1989-1990, and massive unemployment and underemployment (Kessler & Di Virgilio, 2008). The "lost decade" of the 1980s (Minujin & López, 1994) was a uniquely intense and protracted period of economic recession aggravated by the international financial crises (the 1995-1996 'Tequila effect') and the global recession that started at the end of 1998. The economic crisis reached a peak with the end of the fixed-rate currency convertibility in 2001-2002 that induced a GDP drop of about 10.8% (Arklems+Land, 2014) and pushed poverty levels to their historical maximum to more than 50% of the total population.

Thus, the bulk of adult survivors of cohorts born after 1980 are in all likelihood uniquely scarred by exceptionally deprived conditions during infancy and childhood, adolescence and young adulthood and will enter their last stages of the life course experiencing unprecedented levels of poverty and indigence. Given the rapid rate of growth of future elderly population, the high and sustained levels of poverty experienced by the new cohorts of elderly, and the evidence connecting exposure to poor economic and nutritional conditions during prenatal and childhood development and the consequences on health in adulthood, it is pertinent to ask about what will be the levels and patterns of morbidity, disability and long-term care needs of future elderly, particularly those that experienced the brunt of economic disruptions throughout their lives.

The main goal of this research is to assess the effect of poverty levels and indigence recently observed among Argentina's children after 1980 on the prevalence and the duration of disability status (life expectancy with ADL disabilities) that they are likely to experience when they reach older ages after 2030.

Methods and data

Our objective is to assess the effect that the recent high levels of poverty and indigence known to have been experienced by cohorts aged 0-14 between the years 1988-1994 will have on their healthy life expectancy after age 60. We begin with a hypothetical population that at age 0 is composed of two subpopulations, one that experiences poverty and indigence levels observed in 1988-1994 and the other that does not. Denote each of these P_{1x} and P_{2x} respectively. The relative size of these two subpopulations should mirror observed prevalence of indigence and poverty circa 1988-1994. To survive these subpopulations, we must compute survival probabilities that will be experienced by those who were born in poverty and indigence and those who escaped such fate. Let $\{S_{1x}\}$ and $\{S_{2x}\}$ be the set of cumulated survival probabilities for each of these subpopulations respectively. Finally, we must compute the probabilities of experiencing disability at ages 60 and above in each of these subpopulations. Let these be D_{1x} and D_{2x} for $x \geq 60$. The population that will experience disability at some age $y \geq 60$ in populations 1 and 2 will be given by $PD_{1y}=P_{10}*S_{1y}*D_{1y}$ and $PD_{2y}=P_{20}*S_{2y}*D_{2y}$ respectively. Finally, we apply survival probabilities embedded in the life tables of 2008-2010 and in the projected life table to 2040 to compute healthy life expectancy using Sullivan procedure. In what follows we describe simple methods to obtain the key quantities above and disclose the most important assumptions.

Scenario of poverty and indigence among children in 1988-1994

The historical series of poverty and indigence from EPH publicly available start in 1988 and refer to the urban areas of Gran Buenos Aires (see Historical Series from INDEC, 2003). This series is available for the total population but not for age group. On the other hand, we have the EPH microdata from 2003 on that contains indigence and poverty variables for the total urban population of Argentina, thus allowing us to calculate prevalence of poverty and indigence by age groups and geographical areas. From this information, we select estimates for 2003-2006 and 2016.[1] Based on the dataset from 2003-2006 and 2016 we estimate both the total population and the population of children under 15 years old who live in poverty and indigence in all urban areas and in Gran Buenos Aires.

We observed two regularities: first, levels of poverty and indigence in Gran Buenos Aires are very close to those observed in urban areas, for example: in 2003 (second semester) the poverty rate in Gran Buenos Aires was 46 and 48% in total urban areas of Argentina; in 2004 those rates were 38% y 40%, respectively. Similar differences are observed for the whole series (INDEC, 2003). Second, according to our own estimations using EPH microdata (INDEC, 2019a), the proportion of children in poverty and indigence is tightly related to economic cycles: during recessionary periods and through crises children poverty rises and, simultaneously, the poverty gap between age groups diminishes during recessionary periods, *e.g.*, in 2003 (second semester) poverty rate was 48% for all ages groups, and 64% among children 15 years or younger, that is, a relationship between both rates of 1.33. In contrast, during periods of economic growth child poverty diminishes, but the age gap in poverty prevalence increases: in 2006 (second

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1   We ignore the information for the period 2007-2015 since it is known to underestimate the population affected by poverty due to faulty inflation adjustments (INDEC, 2019c).

semester) poverty rate was 27% for all ages groups and 41% among children 15 years or younger, that is, a relationship between both rates of 1.52. Similarly, in 2016 poverty rate was 30% for all ages groups and 46% among children 15 years or younger, that is, a relationship between both rates of 1.54.

We use these two facts to estimate the levels of child poverty and indigence during the years for which the information is only available for the total population (from 1988 to 1994). For example, since for the whole population the level of poverty and indigence in 1988 is similar than from 2016, to approximate the rate of poverty among children in 1988 (we only know that for the whole population) we apply the observed proportion (between children and all ages) in 2016. Finally, we use the simple average of the proportions of children under the poverty and indigence approximated between 1988 and 1994 at ages below 15 and use these as our baseline prevalence figures.[2]

Also, the poverty and indigence indicators utilized by EPH closely resemble those used in the survey from which we estimate the correlation of poor early conditions and disability later in life (see below section "c"). According to the official definitions, an individual is classified as poor or indigent if he or she lives in a household with total family incomes under a threshold measured by the value of a total budget (poverty), and food budget (indigence). The threshold (budget values) depends on the characteristics of the family (age and sex of the members) and on the consumption of calories estimated according to those characteristics (INDEC, 2016).

Estimation of the sequences S_{1x} and S_{2x}

There are no official Argentinian life tables by poverty status. In order to estimate the quantities of interest, we follow two alternative procedures. The first is to assign to the subpopulation that experienced poverty and indigence the life tables corresponding to one of the provinces that shows the highest percentages of indigent and poor population (Chaco), according to the historical series of indigence and poverty by urban areas in Argentina (INDEC, 2019b). In turn, the subpopulation that does not experience poverty and indigence is assigned the life table of the better off area, namely, the Autonomous City of Buenos Aires, capital of the country. The second procedure is to estimate the relation between the survival curves in each province and their prevalence of poverty and indigence. The simplest relation we estimate is as follows:

$$Logit\ S_{ix} = c + a^* Logit\ S_{sx} + b^*Sex + d^*Poor\_EC_i\ (I)$$

where S_{ix} is the probability of survival to age x in province i; S_{sx} is the probability of surviving to age x in a suitable chosen standard life table age; Sex is a dummy variable for gender and $Poor\_EC_i$ is the rate of poverty and indigence for the population younger than 14 years.[3]

Model (I) is estimated from a data set containing 1,012 observations for the sex specific S_{ix} values from the official life tables for the Argentinean provinces and estimated rates of poverty and indigence in each province from the EPH. In all cases we use the (gender specific) life tables for Argentina as the standard.

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2   Note that the population 14-year-old in 1994 will reach their 60th birthday in 2040 (the last year for official mortality projections).

3   The survival probabilities were obtained from official Argentinian life tables (INDEC, 2013b).

Once the parameters in (I) are estimated we can generate predicted values for the extremes of the range spawn by the variable Poor_EC$_i$ in the sample and use the resulting life tables as the ones that apply to populations with and without poverty and indigence.

Estimation of the sequences D$_{1x}$ and D$_{2x}$

To estimate probabilities of disabilities according to early childhood experiences of poverty and indigence, we used SABE-Argentina (Survey on Health, Well-being and Aging in Latin America and the Caribbean) (Pelaez et al., 2003). SABE is a cross-sectional study of people aged 60 years and over carried out in seven cities of Latin America and the Caribbean (Bridgetown, Barbados; Gran Buenos Aires, Argentina; Havana, Cuba; Mexico City, Mexico; Montevideo, Uruguay; Santiago, Chile; São Paulo, Brazil), in 1999-2000. Our analysis uses the data set for Gran Buenos Aires (Ciudad de Buenos Aires and the localities around it belonging to the Province of Buenos Aires). The sample comprises 1,043 individuals. The SABE questionnaire is very broad and includes sections on demographic characteristics and family composition, cognitive assessments, health status, retrospective questions on early conditions (health, economic and nutritional status during the first 15 years of life), functional status (including basic and instrumental activities of daily living), drug prescription and consumption, uses and accessibility of health services, family and social networks, intergenerational transfers, labor history and income sources, and anthropometric measures (for all cities except for Buenos Aires). To measure poor early conditions, we use two indicators contained in SABE: (a) Early poor socioeconomic status (EC_SES), *i.e.*, having lived in a household with bad economic conditions during the first 15 years of life; (b) Early poor nutritional status (EC_NS), *i.e.*, having not eaten enough or having gone hungry, during the first 15 years of life. Note that these two indicators are quite consistent with the indicators used by INDEC in the EPH.

To assess the relationship between individuals' poor socioeconomic conditions at early ages (14 years or younger) and their risk of reporting disabilities at age 60 or older we use the following logistic model:

$$Logit\ ADL\_Disab_x = c + a^* Sex + b^*x + d^* Smoke + e^* Low\_Educ + f_1 * Poor\_EC1_x + f_2 * Poor\_EC2_x\ (II)$$

where ADL_Disab$_x$ is the probability of having difficulties performing any ADL (eating, bathing, dressing, crossing a room, getting up and going to bed, using the toilet). The remaining are dummy variables de fined as follows: (a) Sex equals 0 for males; (b) Smoke equals 1 for individuals who currently smokes or have ever smoked; (c) Low_Educ equals 1 if years of formal education are less than 7 (equivalent to incomplete primary education or less); (d) Poor_EC1 equals 1 if elderly reports bad economic conditions of their family of origin during the first 15 years of life, and (e) Poor_EC2 equals 1 if elderly reports having not eaten enough or having gone hungry, during the first 15 years of life.

Once the parameters of model II are estimated we compute predicted of prevalence of disability using the age-sex specific distribution of elderly people with and without early conditions estimated before. These rates are then combined with the Argentinean projected life tables for 2040 (by sex) and Sullivan's method is applied to compute life expectancy with disability by gender.

The counterfactual of interest to us is the following: what would healthy life expectancy at age 60 be in 2040 if the prevalence of disability remains at the levels observed in SABE-Argentina around the year 2000 and what will they be if the prevalence of disability among the elderly is estimated conditional on their experience of childhood poverty in the period 1988-1994?

Results

The effects of poor early conditions and ADL disabilities later in life

Table 1 shows estimates of parameters of the Logit models for the relation between poor socioeconomic or nutritional conditions during childhood, "Poor_EC_SES" or "Poor_EC_Nutri", respectively, and the probability of reporting disability in any Activity of Daily Living (ADL) at 60 years of age or more. There is a strong association between poverty during childhood and the probability of reporting disability in some basic Activity of Daily Life (ADL) at age 60 and above. The association remains after controlling for age, gender, education and smoking. This association is a measure of the total effect on disability and includes the effect mediated by chronic diseases.

The estimated effect of this variable that captures nutritional deficiencies during childhood is even larger perhaps because the variable captures more severe cases of poverty during childhood than a simple measure of family's poor socioeconomic status. Examination of the odds ratio (not shown) suggests that the chance of reporting ADL disability is 94% higher among the elderly who reported to have experienced bad socioeconomic conditions during childhood and 154% higher among those who report to have gone hungry or not having eaten enough early in life.

Table 1

Logit model of ADL probability among the elderly (60+) and poor socioeconomic and nutritional conditions early in life. Buenos Aires, 2000

ADL_Disability	Coef.	P>z	ADL_Disability	Coef.	P>z
Age	0.085	0.000	Age	0.084	0.000
Sex	0.403	0.074	Sex	0.430	0.066
Smoke_smoked	-0.088	0.687	Smoke_smoked	-0.044	0.844
Low education	0.574	0.003	Low education	0.642	0.001
Poor_EC_SES	0.663	0.003	Poor_EC_Nutri	0.934	0.000
_cons	-8.330	0.000	_cons	-8.368	0.000

Note: Low education refers to incomplete primary or less; Poor_EC_SES refers to self-reported poor socioeconomic status at 15 years old or younger; poor_EC_Nutri refers to self-reported poor nutritional status at 15 years old or younger. All estimates and standard errors computed using sampling weights.
Source: Own calculations based on SABE, 2000.

Survival to older ages according to socioeconomic conditions

About 17% of elderly in the SABE 2000 reported to have lived in households in poor socioeconomic conditions during the first fifteen years of their life whereas 11% reported to having gone hungry or not eaten enough, during childhood. In contrast, the proportion of children 15 years old or younger who were below the poverty line in

Argentina between 1988 and 1994 was on average 38% and attained a maximum of 53% in 1990. Furthermore, the average 1988-1994 prevalence of indigence was of the order of 11% and attained a maximum of 20% in 1989.

On first brush this suggests that by the year 2040, the prevalence of poor early conditions during the first fifteen years of life among elderly who attain their 60th birthday should be about 38%[4] or more than a doubling of the figure retrieved by SABE in the year 2000. This estimate rests on the assumption that there is no mortality or migration between 1980 and 2040. While to account for migration is difficult, it is possible to correct the approximation using estimates of the survival probabilities to older ages. To do this we estimate the probabilities of surviving that a cohort born in 1980 would experience throughout their life using two procedures. First, and related with scenario 1 of the results of *Disability Life Expectancy* below, official life tables of Chaco province are applied to the population under age 15 that in 1988-1994 lived under conditions of poverty and whereas the City of Buenos Aires life table was applied to the population under age 15 that did not live in poverty in the period 1988-1994. Second, and related with scenario 2 and 3 of the results of *Disability Life Expectancy* below, we used the model (I) described in the method section above, and we set the independent variable to be equal one to estimate the survival function of poor/indigent individuals and zero for the non-poor/non-indigent ones. In both cases, the survival probabilities correspond to conditions of mortality experienced during 2010 approximately and do not reflect gains in survival that may accrue after 2010. The effect of this omission depends on whose survival improves more: if the survival gains are larger in populations with lower life expectancies in 2010 the prevalence of experiences with poor early conditions in the future will be underestimated. The opposite will happen if gains in survival are larger in populations already exposed to lower mortality levels.

Table 2
Logit model probability of survival and poverty – indigence.
Provinces of Argentina and City of Buenos Aires, 2006-2010

Survival S(x)	Coef.	P>t	Survival S(x)	Coef.	P>t
Logit S(x)_Standard	1.002	0.000	Logit S(x)_Standard	1.003	0.000
Sex	-0.013	0.232	Sex	-0.011	0.309
Poverty	-0.004	0.000	Indigence	-0.010	0.000
_cons	0.092	0.000	_cons	0.070	0.000

Note: S(x)_Standard is from life expectancy table for Argentina (the whole country).
Source: Own calculations based on the abbreviated age and mortality by sex tables 2008-2010 (INDEC, 2013b). Encuesta Permanente de Hogares 2006 (INDEC, 2019a).

Table 2 displays estimate of the parameters of model (I). As expected, the regression coefficient for the standard is close to 1, males experienced higher mortality than females and poverty and indigence increase mortality levels. To provide a sense of magnitude note that differences between the Chaco province and the City of Buenos Aires in life expectancy at age 60 range between 1.1 to 2.3 years, according to age and sex.[5]

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4   To simplify we assume that estimates of prevalence of poverty in 1988-1994 are centered in 1990 and that the average age of those aged 0-15 in that year is about 10 and were born in 1980.

5   According to estimates by Palloni & Souza (2013), the over-mortality of the elderly who have experienced poverty during childhood is approximately 1.5 and 2.5, in countries such as Mexico, Puerto Rico and Costa Rica.

Prevalence of ADL disabilities among the elderly

According to results from the 2000 SABE-Buenos Aires survey, the prevalence of disability due to ADL at age 60 and over was of the order of 11% for men and 17% for women. After surviving forward the population that experienced poverty before age 15 in the period 1988-1994 using the two extreme life tables estimated before (Table 2) and applying predicted probabilities of disability (from Table 1), we find that the prevalence of disability when the cohorts aged 0-15 in 1988-1994 reach older ages should increase to 13% and 19% among males and females respectively. The expected prevalence of indigence should be 11% for males and 16% for females.

Disability life expectancy among the elderly

Figures 1 to 4 show the effects on life expectancy with disability for men (Figures 1 and 2), and women (Figures 3 and 4), due to expected changes in the prevalence of ADL disabilities that result from the experiences of poverty and indigence in childhood verified in Argentina between 1988 and 1994. Figures 1 (men) and 3 (women) show years of life with disability according to different levels of prevalence of disability and poverty. Figures 2 and 4 do the same but using experiences of indigence instead of poverty. Finally, Figures 5 and 6 show the effects (by sex) as proportion of years of life expectancy with disability, compared to the total residual life expectancy at 60 years and over.

The baseline scenarios correspond to life expectancies with disability that result assuming disability prevalence at levels observed in 2000 and survival probabilities in the 2000 life table and in the official projected life table for 2040. Scenarios 1 and 2 correspond to projected prevalence of disabilities that result from poverty levels among those younger than 15 that were observed between 1988 and 1994 and the two approximations of the worst and best probabilities of survival. Scenario 3 is analogous but uses instead 1988-1994 observed indigence prevalence.

Figure 1 shows that the years of life with disability among men aged 60 would increase from 2.3 years in 2000 to 3.8 years in 2040 (65%). Of the total increase (1.5 years) almost 30% is attributable exclusively to the increase in poverty levels experienced during early childhood and its effects on disability prevalence. The remaining 70% of the increase is a consequence of the rise in residual life expectancy.

Figure 2 shows the effects when we use prevalence of indigence. Because the 1988-1994 levels of indigence do not imply increases in the prevalence of disabilities compared to that observed in 2000, the growth in the expected duration of the disability is entirely due to the increase in the (officially) projected residual life expectancy, exclusively.

Figure 3 shows that life expectancy with disability at age 60 among women would increase from 5.2 to 7.3 years (40%). Of the total increase of 1.4 years, 30% is due to increases in experiences of early poverty and 70% to increases in projected residual life expectancy between 2000 and 2040. Figure 4 uses indigence instead of poverty and shows that expected years of life in disability would increase from 5.1 to 6.5 at age 60 but that the overall increase is due to projected life expectancy increases not to the early experiences of indigence.

Finally, Figures 5 and 6 show that poverty and indigence will be responsible for more than trivial *relative* increases of disability.

Figure 1
Disability life expectancy 60+, poverty scenarios
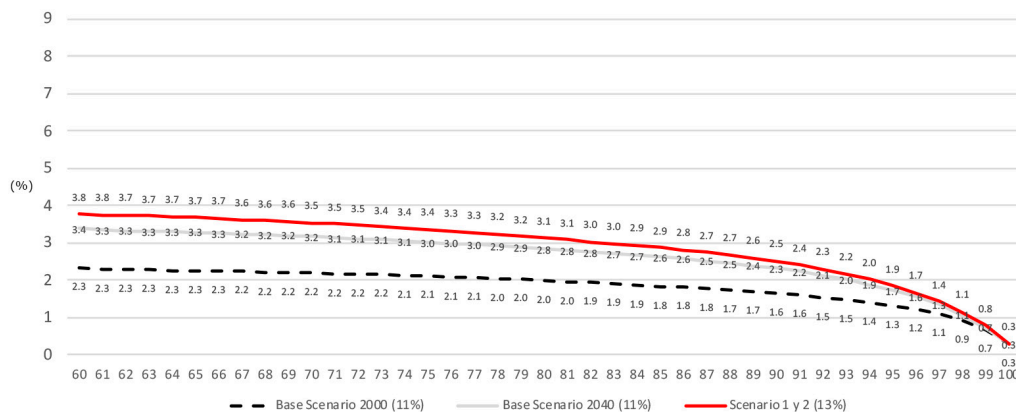*Argentina 2040, males*

Figure 2
Disability life expectancy 60+, indigence scenarios
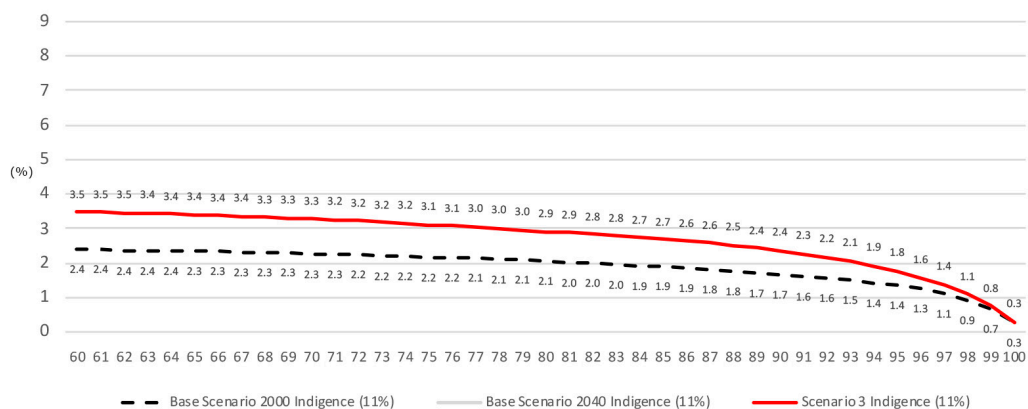*Argentina 2000-2040, males*

Figure 3
*Disability life expectancy 60+, poverty scenarios
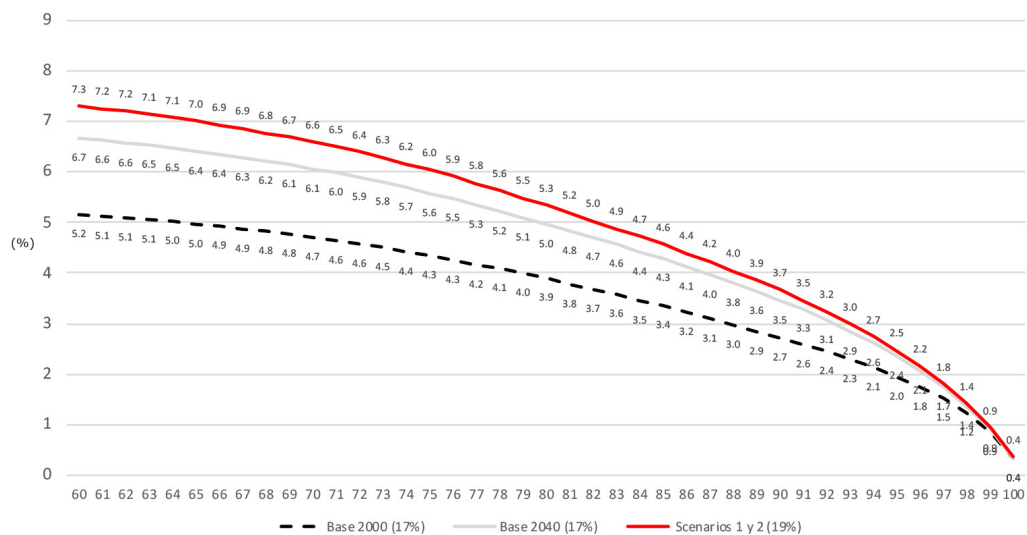Argentina 2040, females*

Figure 4
*Disability life expectancy 60+, indigence scenarios
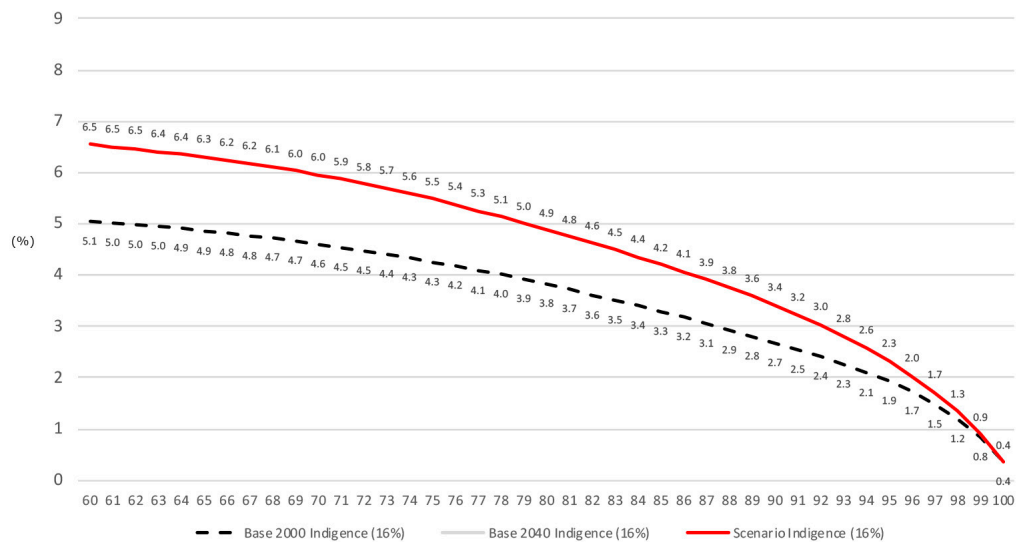Argentina 2000-2040, females*

Figure 5
Disability life expectancy 60+ / Total life expectancy 60+
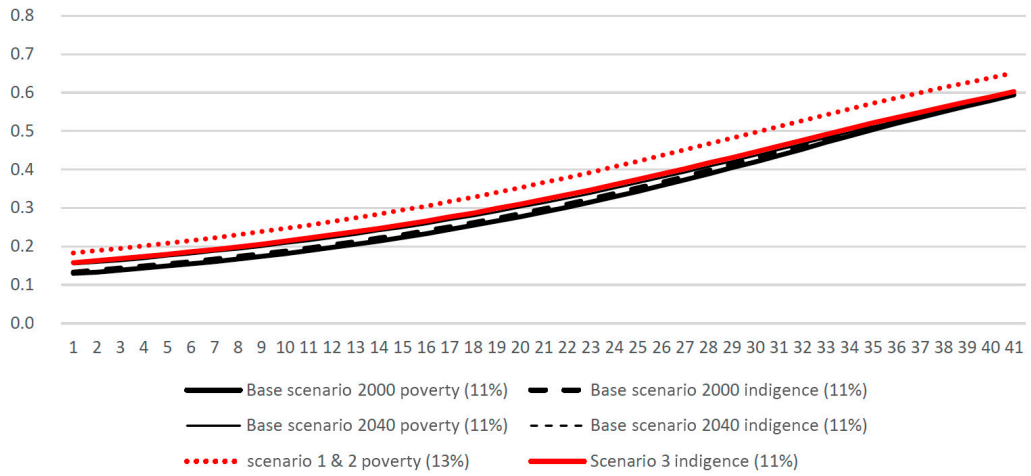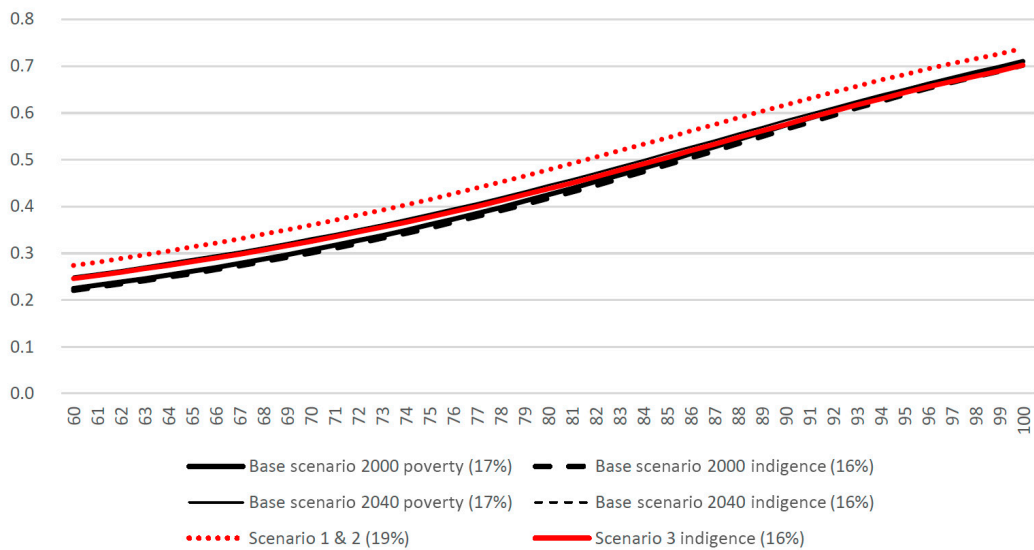*All early condition scenarios, Argentina 2000-2040, males*

Figure 6
Disability life expectancy 60+ / Total life expectancy 60+
All early condition scenarios, Argentina 2000-2040, females

Conclusions

Economic instability is the main characteristic of the Argentinian economy since the late 1970s and has had massive effects on levels and trends of poverty and indigence among the population in general and among children in particular. The effects of these trends are pervasive in many birth cohorts that will attain older ages after having been scarred by adverse early experiences.

While people's health and functional status depend on the influence of multiple factors throughout their life cycle, a growing body of literature shows evidence of the important role that economic, nutritional, and health conditions at early ages play in the long-term. These effects seem to persist even if conditions improve later. What could then be the consequence of these relations for those birth cohorts in Argentina that experienced the brunt of a protracted and severe economic depression and stagnation? In this paper we sought to estimate the extent to which the high levels of poverty and extreme poverty (indigence) in childhood experienced since the late 1980s and early 1990s in Argentina can influence the future profile health and disability of the elderly. We use a standard approach and assess the functional status of the elderly with a battery of Activities of Daily Living that reveal the extent of elderly dependency long-term care needs of the elderly.

Our results show unfavorable future scenarios for the cohorts that will reach advanced ages in the next 20 to 30 years. We assumed that the observed relation between conditions of poverty and indigence in childhood and the probability of reporting disabilities in adult ages remains steady over time. In addition, we approximated future survival for cohorts of children who were exposed to poor early conditions. The resulting estimated levels of life expectancy in disability suggest that Argentina will experience an aging population under conditions of expansion of morbidity, *i.e.,* with a significant proportion of years of life expectancy lived in poor functional status.

According to official projections (INDEC, 2013a), total life expectancy at age 60 between 2000 and 2040 will increase from 18 to 22 years for men and from 23 to almost 27 years for women. Of the total years of life gained, a large proportion will be years of life with some disability in ADL and this implies an increase in the duration of the years of life in poor functional status as well as in the fraction of residual life expectancy with poor health.

This study has several limitations. First, the relationship between early conditions and functional status at older ages depends on self-reported information. Information on early conditions comes from a module of the SABE survey containing retrospective information elicited from people aged 60 years and older. Similarly, indicators of older-age functional conditions are retrieved from respondent's answers to a standard battery of questions. While the self-reported nature of conditions may involve some biases, it is not clear in what direction they may go and how they could affect the high degree of association found between the two conditions. A systematic bias that would overplay the role of disability in the future could result if respondents who tend to be more disabled also provide negative assessment of economic and nutritional conditions they experienced in childhood. To rule out this possibility we assessed the consistency of self-reported information by examining the disease profile of the individuals that self-reported functional difficulties. Information on chronic illnesses is retrieved from questions of the type "Has a doctor ever told you..." and any biases that may affect responses to these must be of a different nature than those that affect responses to the battery on disability. It turns out that people with ADL difficulties experience systematically higher prevalence of chronic diseases,

lower levels of education, and are more likely to be female and experience increasing prevalence with age. These patterns are in line with expectations and suggest that functional difficulties reports follow an expected demographic and health profiles and are less likely to be systematically biased.

In addition, a limitation related to the source of information is the fact that the SABE survey is based on a representative sample of the adult population in Great Buenos Aires (Autonomous City of Buenos Aires and 24 highly populated municipalities in the Province of Buenos Aires), which represents 35% of the population aged 60 or above in the whole country (INDEC, 2010b).

That source of information is used for the two fundamental addressed in this study. Namely, (a) to estimate the relationship between poverty in childhood ages and the risk of having disabilities in the adulthood or older ages and (b) to estimate the prevalence of disabilities in elderly men and women in the base year (2000) and, subsequently, to estimate life expectancies with disabilities.

Regarding the first aspect, the implicit assumption is that the relationship between the two conditions (childhood poverty and disability at later ages) is constant and, accordingly, the results of Great Buenos Aires can be extrapolated to the whole country. Moreover, we note that in a previous study we also found that the relationship between poverty in childhood and disabilities in adulthood and old age is quite similar in different population even if we consider other countries in the region (Monteverde et al., 2009).

Regarding the second aspect, the prevalence of disabilities referred to in point (b), we find that when the prevalence of "Permanent Difficulties or Limitations" (closely related to the condition of disability) for populations aged 60 or above is estimated, and even more, when using the most recent population Census 2010 (INDEC, 2010a), the prevalence for the population in Great Buenos Aires is similar to the prevalence in the whole country, with values around 34% (for Great Buenos Aires) and 37% (for the whole country). This suggests that our assumption is reasonable, or even a slightly conservative.

An additional fact is that our work is based on models that assume that the observed relationships at one time point are stable along time and this could not be true as far as, for instance, medical advances might influence the evolution of the analyzed links between childhood conditions and adulthood or older age disabilities. In the particular case analyzed in this study, inference is based on the existence of those fundamental relationships in the future behavior of the prevalence of disabilities and a measure (constant over time) is established to capture the effect of early conditions on the probability of suffering disabilities at advanced ages. Knowing to what extent medical advances will impact the effect of early conditions is not at all clear. This question is clearly linked to the discussion on the compression or the expansion of morbidity/disability related to the aging process of populations in different regions and countries in the world (Jagger et al., 2006).

Another limitation is rooted in the estimates of survival probabilities. The official life tables for Argentina do not provide information disaggregated by economic conditions and differentials by experience of early poverty had to be approximated using aggregate relations between mortality levels in provinces and their aggregate levels of poverty. These relations may not translate precisely the effects of individual or group experiences of poverty on individual or group survival. However, it is unlikely that relations at the individual or group level are too distant from the aggregate relations we estimated. Furthermore, because or projections ignores mortality

improvements that could be experienced after 2000, the most likely outcome is that we are underestimating the future prevalence of early poverty experiences among the future elderly.

Finally, the quantification of poverty in Argentina is of recent origin and may contain flaws. Thus, initial assessments from EPH between 1988 and 2000, refer to Greater Buenos Aires only, an area that includes the Autonomous City of Buenos Aires and a group of municipalities that surround it. Starting in 2001 the data refer to urban agglomerations. Comparing poverty and indigence rates of the total urban agglomeration and those of the Greater Buenos Aires after 2001 reveals similarities and we are confident that the time series after 1988 that we used by piecing together two segments retrieved from different populations does not pose a serious problem.

Despite the above shortcomings, our results are online with initial expectations that future Argentinian elderly may experience expansion of disability (and morbidity) as a result of potentially harmful early childhood conditions. The Argentinian case is a special one as its long lasting and severe economic crisis, unusual even in a continent where recurrent economic crises are a rule, led to increasing poverty and indigence among a very large population of children, exceeding several times the standard levels of poverty that Argentina or any other middle income country normally experience.

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