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THE ELDERLY IN LATIN AMERICA AND THE CARIBBEAN

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ABSTRACT

Aging in Latin America and the Caribbean will proceed along paths that are distinct from those already followed by more developed countries. Several important features distinguish the aging process in the region. Among the most important feature is that the future health profile of the elderly population is less predictable due to factors associated with prevailing disease regimes and with the demographic past of these cohorts, a past that may haunt them for a long time and make them more vulnerable, even if economic and institutional conditions turn out to be better than what they are likely to be. This paper focuses on elderly health profiles and examines the conjecture that elderly health status has been significantly impacted by the evolution of mortality in countries of the region. We use SABE (Survey on Health and Well-Being of Elders), a cross-sectional representative sample of over 10,000 elderly aged 60 and above in private homes fielded in seven major cities in Latin America and the Caribbean. We examine the following health outcomes: self-reported health, functional limitations--Activities of Daily Living (ADL's) and Instrumental Activities of Daily Living (IADL's), obesity (ratio of weight in kilograms to the square of height in centimeters), and self reported chronic conditions (including diabetes). We examine patterns of self-reported health, self-reported chronic conditions, and disability. We also study relations between early childhood conditions and adult health. We examine evidence to suggest that our conjecture has some merit. In particular, we attempt to illustrate the idea that early childhood conditions and adult health are related, albeit weakly. The relations we observe are not sufficiently compelling to make a strong case. Nonetheless, we may have just examined the tip of the iceberg and there still exists the possibility that the new cohorts reaching old age in the next twenty years will be indeed more frail and vulnerable because of their demographic history and current ecology of disease.

I. BECOMING OLD IN LATIN AMERICA AND THE CARIBBEAN

We use a new and rich data set on elderly people in seven countries of Latin America and the Caribbean to document salient properties of the health status profile of elderly in the region and to answer a set of four questions regarding its nature and determinants. In doing so we identify what appear to be singularities in an otherwise standard landscape of aging. These are potentially important for, even if verified only partially, they may engender the need for policies that are vastly different from those undertaken elsewhere.

Speed of aging

The speed of demographic aging in Latin America and the Caribbean will be unprecedented. The time it will take a typical country in Latin America and the Caribbean to attain a substantial fraction of people above age 60, say around 15 percent, from current levels of around 8 percent is less than two fifths the length of time it took the US, and between one fifth and two fifths of the time it took an average Western European country to attain similar levels (Palloni, Pinto and Pelaez, 2002; Kinsella and Velkoff, 2001). The annualized rate of increase of the population older than 60 is approaching values as high as .045 implying doubling times of the order of 5 years for the next three to five decades. Barring unexpected demographic upheavals we should expect that for the next three to five decades the speed of aging in the region will continue on a singularly fast course, a result of the momentum of demographic forces set in motion long ago.

Dislocation between aging and standards of living

Fast and demographically premature aging takes place in countries that have not had the time, the fortune, or wherewithal to generate sustained high standards of living. Comparisons between the wealthiest countries in Latin America, on the one hand, and the US, Sweden or Japan, on the other, are revealing. First, even optimistic projections of growth in GNP per capita imply that when the fraction of elderly people begins to exceed 10 percent, countries of the region will attain no more than a small fraction (one tenth or thereabouts) of the levels of GNP per capita enjoyed *by developed countries when they were reaching similar levels of aging*.

Second, adopting an admittedly optimistic forecast with a fairly agile process of economic growth, driven by annual rates of increase in GNP per capita of about .030 (about 15 percent higher than the average in the region during the last fifty years!) does not help much. Indeed, even in this rosy scenario, no appreciable fraction of time during which the countries of the region are aging rapidly will be characterized by a GNP per capita exceeding $10,000, an admittedly modest amount. By comparison, Sweden spent about 77 percent of the time during which rapid aging was occurring enjoying higher standards of living; the US spent 95 percent of the time, and Japan 100 percent of the time. Barring unprecedented economic conjunctures, the fate of countries in Latin America and the Caribbean will be dominated by rapid aging paired with precarious standards of living. The comparisons are, of course, even more disheartening had we chosen as reference not the wealthiest but the poorest countries in the region.

Socio-political context and aging: institutional volatility

An even more startling and generalized reality in the Latin American and Caribbean region has to do with the relation between speed and magnitude of aging, on the one hand, and the social and political contexts within which the process is taking place, on the other. First, a traditional order whereby elderly well-being rests on the shoulders of the younger generation is being gradually subverted by shifts in norms regulating living arrangements and by rapid fertility declines (Devos, 1990; Devos and Palloni,` 2002; Palloni, 2001). Admittedly, traditional living arrangements crumbled in North America and Western Europe as well, but the phenomenon occurred well before the onslaught of rapid aging (Palloni, 2001; Ruggles, 1996). In countries in the Latin American and Caribbean region the safety net articulated around families and kin relations is being dismantled **concurrently** with rapid aging. This leaves little room for error and no time to seek adequate substitutes.

Second, aging is occurring in a fragile institutional environment, one where the bulk of sources guaranteeing a safety net or minimum levels of social and economic support for the elderly are being reformulated, reformed, and in most cases, eliminated. A good example of this is the sustained and widespread drive toward reform of social security systems (Mesa-Lago, 1994; Barrientos, 1997; Klinsberger, 2000). In all cases the reforms are designed to replace pay-as-you go systems that operated uninterruptedly in many of these countries since World War I, with privatization schemes. New plans will supplant a system that, though flawed, was successful in reducing inequalities and protecting the most vulnerable segments of the elderly population. Income receipts of those retiring from the labor force during the first ten years of the XX1st century will depend on clauses to stop-gap a prolonged transition to the instauration of the new system. An important fraction of these cohorts, but especially older women, received minimal earnings throughout their occupational careers and could not possibly accumulate sufficient wealth to secure safe standards of living. The combination of sheer growth of the elderly population and even an expected burden of disease among the elderly (see below) will result in an increase in the demand for health services precisely during a time when access to health care shrinks and becomes more expensive under the onslaught of privatization schemes.

In summary: no country in the Latin American and Caribbean region is blessed with institutional contexts designed to cope with changed demands from a growing elderly population. In almost all cases a highly compressed aging process will take place in the midst of weak economic performance, tense intergenerational relations, fragile institutional contexts, and shrinking access to medical and health care services.

Health status

Birth cohorts who reach age 60 and above after 1990 in this region are unique in that they are largely the product of medical interventions that increased childhood survival largely in the absence of significant improvements in standards of living. It is estimated that between 50 to 70 percent of the mortality decline that took place after 1945 was associated with medical interventions (Preston, 1976; Palloni and Wyrick 1981). The remaining decline was probably associated with better standards of living, increased knowledge about exposure and resistance to illnesses, and assorted other factors. Furthermore, a large fraction of these gains were concentrated early in the life of individuals, between birth and age 5 or 10.

Implications of past mortality decline

The pattern of mortality decline just described has an important and not well-known or, at least, well noted, implication. This is that the revolution that produced unprecedented gains in life expectancy half a century ago is a powerful driver of the current growth of the older population and will remain so for a time to come. To understand this we need a detour.

Just as the natural rate of increase expresses the proportionate change in the size of a population between two points in time, so age-specific rates of increase express the proportionate change of the size of the population in an age group between two points in time, t and t+dt. A number of inferences can be derived from this elementary fact (Preston and Coale, 1982; Horiuchi and Preston, 1988; Preston et al., 1989). The most important regularities can be summarized thus:

$$R(60+, t) = r_B(60, t) - I(60, t) - J(60, t) \quad (1)$$

and

$$RF(60+, t) = r(60+, t)-r(t) \quad (2)$$

Expression (1) is for the rate of increase of the population aged 60+, R(60+,t). The rate is a function of $r_B(60, t)$, the rate of growth of births for the cohorts of births born between years (t-x) and (t+dt-x), I(60,t), the sum of differences between the age specific mortality rates from age 0 to age x experienced by the two cohorts and, finally, J(60,t) the sum of differences between mortality rates **above** age 60 for the cohorts aged 60+ at time t and cohorts aged 60+ at time t+dt.

Expression (2) is for RF(60+, t), the rate of increase in the **fraction** of the population aged 60+ or C(t). It is simply defined by subtracting r(t), the rate of increase of the entire population.

The most important consequence of (1) is this: upward pressure on the absolute size of the population 60+ during the time interval (t, t+dt) will occur due to any combination of three factors: cohorts reaching age 60 at time t experience improved mortality **before** reaching their 60^{th} birthday (increases in the probability of surviving to age 60), do so thereafter (increases in life expectancy at age 60) or, alternatively, the size at birth of the cohort that reaches its 60th birthday between t and t+dt is larger than the preceding one. J(60,t) is entirely due to changes in mortality conditions at older ages whereas I(60,t) is determined by improvements in mortality in early childhood and, to a lesser extent, by improvements in mortality at adult ages. Finally, $r_B(60, t)$ is solely dependent on *past* fertility. Instead, expression (2) suggests that the rate of increase in the proportion of the population above age 60 also depends on the total rate of increase of the population.

The key inference from these expressions runs counter to popular beliefs: it is that the demographic dynamics of the current and future elderly population is mostly a function of past developments in mortality and fertility and depends only partially and to a much lesser extent on mortality conditions at older ages and on current fertility. It is only the rate of growth of the *fraction* of elderly population that depends on current demographic parameters. The rate of increase of the elderly population, on the other hand, is entirely determined by past mortality and fertility changes and only marginally by changes in survival at older ages[1]. More concretely, the trajectory of R(60+,t) during the period 1990-2025, for example, will depend on three determinants:

a. **Determinant 1**, ($r_B(60,t)$): changes in fertility during 1930-1965;
b. **Determinant 2**, (I(60,t)): changes in mortality before age 60 during 1930-1965;
c. **Determinant 3**, (J(60,t)): changes in mortality after age 60 during 1990 - 2025;

With a handful of exceptions, all countries in the region experienced high fertility levels (TFR above 5.0) on or before 1950, and large mortality declines beginning within the period 1930-1940, but particularly after 1950. Between 1950 and 1965-1970, and for reasons that are yet not altogether clear, some of these countries experienced moderate increases in fertility. Countries such as Argentina and Uruguay are oddities since they start out with relatively low levels of fertility (TFR's around 4). In Chile, Cuba and Costa Rica fertility begins to decline

[1] This statement is only accurate in societies that over the past 60 or so years have experienced drastic mortality changes at younger ages. It cannot hold for societies whose survival curve can only be modified by improving mortality at old ages.

slowly between 1930 and 1940 but the onset of large and massive drops in fertility in these countries occurs only after 1950 and after 1975 in the remaining countries of the region.

Two consequences of these trends for the aging process are worth noting. **First**, cohorts attaining their 60th birthday between 2000 and 2025 are inflated by the mild but ubiquitous surge of fertility of the years 1950-1970. Thus the rate of increase of the age group 60+ will increase in part because of these transient spikes in fertility levels (determinant 1). **Second**, and most importantly, cohorts that attain their 60th birthday between 2000 and 2025 **are beneficiaries of unusually large improvements in survival, particularly during early childhood**. Thus, for example, individuals born in 1960 experienced lower levels of early child mortality than those born in 1955. This will increase the relative size of the cohort attaining age 60 in 2020 relative to cohorts that reach age 60 in the year 2015 (determinant 2).

Based on adjusted historical series of birth rates and life tables, we estimate the magnitude of the component of growth of the population aged 60 and above associated with past mortality decline. Figure 1 displays the total rate of growth of the population over 60 and the amount of that attributable to cumulated changes in mortality before age 60 for cohorts that will attain age 60 during the interval 1950-2050. We estimate these quantities for Puerto Rico and Guatemala, two countries that exemplify extremes in the demographic transition: the former experiences early mortality and fertility decline while the latter experiences late declines in mortality and fertility. Similar results obtain if we examine patterns in other countries (Palloni et al., 2002)

Since the bulk of mortality decline, particularly during early childhood, occurs during the Post World War II years, the peak of rates of growth as well as of the contribution of cumulated mortality changes before age 60 are attained by cohorts born anywhere between 1940 and 1960, or those who begin to reach age 60 on or after 2000. The aftermath of the mortality decline will begin to be washed away only after 2010 in Puerto Rico and more than a decade later in Guatemala. Note that the contribution of mortality changes to the growth of the population older than 60 is substantial and exceeds 50 percent for several years after 2000. Other countries in the Latin American and Caribbean region will experience population dynamics that fall within the range set by Puerto Rico and Guatemala.

[Figure 1 about here]

The main idea conveyed by Figures 1a and 1b is this: **a substantial fraction of future increases in R(60+,t) and, therefore, of the aging reflected in changes in the proportion of the population over 60 is attributable to mortality changes experienced during the period 1930-1990.** As shown elsewhere (Palloni and Lu, 1995), about 70 percent of this change is due to changes in mortality associated with parasitic and infectious diseases in the first ten years of life. This is a revealing statistic: **it suggests that the relatively compressed schedule of aging in the region can, in part at least, be traced to the medical and public health revolution that triggered the mortality decline nearly half a century ago**. This legacy of the past has implications for the health and disability status of the elderly after the year 2000.

The "stickiness" of early health status

So far we established two facts. First, that the aging process that countries in Latin American and the Caribbean region will undergo during the period 1990-2050 owes significantly to the contribution of the mortality decline experienced during the period following 1930. Second, that the bulk of these mortality changes were due to the implementation and deployment of an assortment of medical innovations and public health interventions rather than, as was indeed the case among most developed countries (McKeown, 1976; Fogel, 1994; Fogel, 2003) to increases in standards of living or to improvements in levels of nutrition.

As a rule when mortality falls the surviving members of cohorts experiencing changes are of higher average frailty (Vaupel et al., 1979; Alter and Riley, 1989). This is purely an artifact of the changing composition by frailty and will tend to happen regardless of the origin of the mortality decline. However, the lives saved by the mortality decline in the region were certainly not random relative to conditions affecting health status. Indeed, they are more likely to have been drawn from populations exposed to higher risks, those whose morbidity and mortality experiences were dominated by parasitic and infectious diseases and lack of adequate early nutrition. Whenever the root origin of mortality improvements triggers increases in survival among those whose nutritional status and experiences with illness is worse than average the frailty composition of the corresponding cohorts will become less favorable than under a regime of survival gains that induces evenly spread mortality reductions.

Under conditions described above, most childhood morbidity responsible for higher mortality *before* the interventions continued to affect children, albeit with reduced lethality. Their effects were shared by a growing proportion of survivors drawn from high mortality subpopulations. This has important implications *if early childhood conditions exert an impact on adult health and mortality*.

Now, suppose that conjectures 'a la Barker', those connecting early life conditions and late adult health status, are at least partially valid. According to these conjectures, detrimental conditions, including nutritional status and experiences with illnesses and faltering growth, some of which take place *in utero* whereas others occur around birth and during early childhood, increase the susceptibility to certain chronic diseases during adulthood and old age. Although evidence that early childhood conditions affect adult health is far from water-tight, it is clearly mounting fast and cannot be ignored. Empirical data as well as theoretical arguments (Elo and Preston, 1992; Schaffer, 2000) implicate a very broad array of mechanisms, from those involving latent effects (Barker, 1998) to those requiring circuitous pathways (Hertzman, 1994), critical periods (Barker, 1998; Cynader, 1994; Hertzman, 1994; Schaffer, 2000) or accumulation effects (Barker, 1998; Elo and Preston 1992; Hertzman, 1994). The first mechanism is closely associated with the work of Barker and concentrates on the *sequelae* of processes that may start *in utero* or develop shortly before and/or around birth ("fetal origin hypothesis"). In general, these effects develop as a result of either fixed traits that individuals are born with or, most interestingly, of stresses and uneven development of physiological systems that follow periods of moderate and severe deprivation and that remain latent until late in life. Thus, unless one has markers of early deprivation, there is little that can be done to falsify the conjecture. Some of these markers have already been used (birth weight, placental weight, length of gestation, length of recently born etc…). None of these markers is available to us in the data we will use in this paper. Instead we rely on indirect measures of early nutritional status, including height (adjusted for age), knee height (a proxy for leg length), and the ratio of hip to waist circumference. These measures have already been used with some success by nutritionists as surrogate measures among adults.

A second mechanism identified in the literature focuses on episodes of illnesses in early childhood and their influence on the late onset of some chronic diseases (Elo & Preston, 1992; Wadsworth, 1986; Wadsworth & Kuh, 1997; Kuh et al., 2004; Davey Smith & Lynch, 2004; Blackwell et al., 2001). The best known example of this is the relation between rheumatic heart fever—a common infectious disease in developing countries at least prior to the massive mortality decline that took place after World War II, —and the onset of heart disease. Because all the data we use here contain information on retrospectively recalled childhood diseases, we can at least attempt to assess the size of the effects. The strategy is by no means optimal since not only we must deal with faulty recall but there is a serious selection problem we cannot address since individuals with the most serious cases of rheumatic fever may not have survived to be in our sample.

Finally, some research focuses on broader mechanisms and attempts to find associations between socioeconomic conditions experienced in early childhood and adult health status (Wadsworth, 1986; Hertzman, 1994; Wadsworth & Kuh, 1997; Rahkonen et al., 1997; Kuh & Ben-Shlomo, 2004; Davey Smith & Lynch, 2004; Lundberg, 1991; Warner & Hayward, 2003; Haywood & Gorman, 2004). This type of work is a roundabout way to find some of the connections due to the two mechanisms mentioned before. Thus, finding an association between SES early in life and health status among the elderly may simply reflect the relation between current or recent SES and health. For the most part this work aims at finding *net effects of early SES on adult or health, that is, those that remain after appropriately controlling for current or recent SES*. The interpretation of the net effects conventionally invokes either the existence of Barker-effects or the influence of early illnesses. All the data sources we will use enable us to test for this as they contain retrospective evaluation of markers of early childhood poverty, deprivation and SES.

If any of these mechanisms turns out to have more than modest effects, increases in frailty among elderly whose earlier experiences fits the description provided above, are likely to be pronounced[2]. This means that the health status composition of elderly in Latin America and the Caribbean, should be worse relative to what would have been had the growth of the more recent and forthcoming cohorts of elderly been associated, as was the case in more developed countries, with improving standards of living. Our understanding of the relations between early childhood exposures and adult health status is still too primitive to enable us to establish precise predictions regarding the nature of expected health impairments. But this conjecture can at least be used as a guiding torch to explore the evidence available to us.

[2] The argument holds, of course, if we assume that the effects of mortality selection are only mild and if the effects of changes in behavioral profiles and medical technology (exogenous or not) are only weak.

Health status in a new disease environment

There is an important albeit neglected set of conditions that may influence elderly health status in the region. It is neither a mystery nor a novelty that the regimes of morbidity and mortality experienced by elderly people in developing countries are unusual. First, as one would expect (Omran, 1982) there is an expansion of chronic conditions, such as heart and lung disease, cancers, diabetes, and arthritis, and elderly people continue to be assaulted by significant levels of parasitic and infectious diseases (Frenk et al**.,** 1991). We simply do not know what the health effects of exposure to highly interactive environments like these are. What should one expect, for example, under conditions where elderly people are simultaneously weakened by malaria and exposed to higher risks of congestive heart disease? Or, where increases in diabetes due to the adoption of a westernized diet (Popkin, 1993; Albala et al., 2000) are combined with recurrent intestinal infections and high prevalence of respiratory TB? What are the implications of a mixed mode of exposure for comorbidities, disability and impairments among the elderly? What are the implications for treatment? What effects does it have on demands for health care?

Admittedly this mixed mode of exposure is more prevalent in countries with a late demographic transition (such as Guatemala, Honduras, Bolivia, Peru, Ecuador) than in the more advanced countries of the region. Even though such regime is certainly not absent in the latter, it is likely to be less influential.

Summary: conjecture and questions about elderly health status

This paper is an attempt to review empirical evidence to examine the conjecture that the past evolution of mortality in countries of the region may have important implications for the health status of those entering older age brackets now and in the next twenty to thirty years. Given the nature of the mortality decrease in the Latin America and the Caribbean region one would then expect that the health status of a substantial fraction of those who will attain their 60^{th} birthday after 1990 will be powerfully influenced by early life conditions, thus creating a pool of individuals more favorable to the expression of Barker-type of mechanisms and effects. In theory, the new cohorts of elderly will be of higher frailty than preceding cohorts whose early childhood experience is characterized by more severe mortality regimes. In addition, if there are strong connections between infant and child levels of malnutrition, experience with poverty and exposure to (and escape from) childhood illnesses, the new cohorts could be marked by higher than average exposure to some chronic conditions with late adult onset. If we are able to capture well socioeconomic conditions during early childhood, we should find large disparities by socioeconomic status. Finally, there should a strong relation between adult prevalence and indicators of early childhood conditions, particularly those associated with nutrition, growth and development and exposure to disease.

The strength of evidence supporting the existence of the aforementioned features of the aging process in the Latin American and Caribbean region is heterogeneous. There is considerably more data supporting the hypotheses about the demographic speed of aging than there is for the conjecture regarding the special conditions potentially influencing elderly' health status. Up to now very little was known about adult health in the region and, therefore, virtually no conjecture or hypothesis could be thoroughly investigated. We can now use a unique, newly released data set on elderly people living in seven major cities in countries of Latin America and the Caribbean to examine the conjecture regarding elderly health status by answering the following questions:

- What is the characteristic health profile of the elderly in the region?
- How does this profile compare with other known profiles, such as the one in the US?
- Is there any evidence of deteriorated health and functional status, as expected if some of the conjectures proposed before are on the mark? And, finally,
- Are there indications of relations between early childhood conditions and adult health status?

II. DESCRIPTION OF DATA SETS

While our objective is to focus only on countries of Latin America and the Caribbean, we also wish to contrast observed patterns with a benchmark to yield comparisons carrying some weight to address issues such as those of the relative standing of elderly health status in these populations. For practical reasons we choose as benchmark the Health and Retirement Survey in the US.

SABE

SABE (SABE, 2003) is a data collection project anchored in seven major cities (six of them capital cities) of the region: Buenos Aires (Argentina), Bridgetown (Barbados), San Paulo (Brazil), Santiago (Chile), Havana (Cuba), Mexico City (Mexico) and Montevideo (Uruguay). All seven surveys were administered to representative samples of populations aged 60 and above in each city and were strictly comparable though translated to three different languages (Spanish, Portuguese and English). In some cases, interviewers selected a target older person and his/her surviving spouse. All sample frames were drawn either from recent population censuses or from nationally representative surveys carried out periodically in the capital cities of the region[3]. The fieldwork took place between June 1999 and June 2000 and a preliminary final report was completed in December of 2002. An important feature of the survey is that, with one exception (Buenos Aires), the rates of response were significantly higher than those in similar surveys in other countries. Table 1 displays basic information on sample sizes, rates of response, as well selected dimensions of the demographic profile (composition by age, sex, marital status, race) and of the socioeconomic composition of the samples (by education). Table 2 displays information on a few health-related characteristics that will be the object of study in this paper, namely, self reported health status, Activities of Daily Living (ADL), Instrumental Activities of Daily Living (IADL), chronic conditions, and anthropometric measures[4].

[3] See more information on the nature of the samples (Palloni and Pelaez, 2002).
[4] The definition of ADL, IADL, and self-reported conditions selected for study in this paper appears in the Appendix. They are strictly comparable to those used in other surveys of elderly, particularly the Health and Retirement Survey (HRS) (2000).

[Tables 1 and 2 about here]

HRS

The University of Michigan Health and Retirement Study (HRS) (2000) surveys more than 22,000 Americans over the age of 50 every two years. The study paints an emerging portrait of an aging America's physical and mental health, insurance coverage, financial status, family support systems, labor market status, and retirement planning. The sample we use in this paper included 12,527 target respondents (no spouses) aged 60 and above.

III. SELF-REPORTED HEALTH

We begin with an assessment of self-reported health status. There is good evidence suggesting that self-reported health is an indicator of general health with good construct validity (Smith, 1994; Manton, Stallard and Corder, 1997; Wallace, 1995; Soldo and Hill, 1995), and is a respectably powerful predictor of mortality risks (Idle and Benyamini, 1997; Idler and Kasl; 1991), disability (Idler and Kasl, 1995) and morbidity (Schechter, Beatty and Willis, 1998; Beckett, Weinstein, Goldman and Yu-Hsuan, 2000), though these properties vary somewhat with national or cultural contexts (Idler and Benyamini, 1997). Less is known, however, about whether and to what degree self-reported health status is contaminated by cultural idiosyncrasies, heterogeneous conceptualization of disease and ill health, and differential assessment of gradations of ill health. Even less is known about the impact of these distortions on the validity of direct cross-cultural comparisons of self reports (Sen, 2002).

a. How robust are comparisons?

The questionnaires used in SABE were strictly comparable. In particular, the questions eliciting self-reported health status were the same across countries. By the same token, with the exception of Barbados, all countries represented in the study belong to closely related cultural pools and this makes it more likely that, if any, the influence of cultural idiosyncrasies will be attenuated. However, these conditions offer only weak assurances for the validity of the cross-country comparability we are about to undertake. In order to verify its robustness we first assess the degree of concordance of self-reported health and self reported conditions. In particular, we demonstrate that there is a moderate degree of consistency between self-reported health, ADL, IADL and chronic conditions. Figure 2a displays the proportion of respondents with at least one ADL and with at least one IADL by self-reported health status. Figure 2b displays the mean number of self-reported chronic conditions by self reported health status. Finally, Figure 2c shows the relation between self-reported health status and self reported diabetes. The relations portrayed in these graphs are by no means perfect but reveal a high degree of concordance which is satisfying for our purposes[5]. This is confirmed with simple descriptive models relating selected

[5] To simplify analyses we focus on a single indicator for the presence of ADL and IADL, namely, whether or not individuals declare at least one of them. We could have used the entire frequency distribution and worked instead with the “number of ADL” or the “number of IADL”. But this complicates the analyses unnecessarily since these are discrete, bounded variables and their distribution can only be mimicked by a handful of discrete distributions. Treating them as categories leads to unwieldly results. Finally, because the number of possible ADL (6) and IADL(6) is relatively few, the proportion of individuals declaring 0 turns out to be an excellent predictor of the

health outcomes to self reported health (Palloni and McEniry, 2004). Regardless of country, the proportion of individuals declaring themselves in bad health is the first or second best predictor of the proportion with at least one ADL, at least one IADL, the mean number of chronic conditions and self reported diabetes when age, sex and country are controlled for. Exactly the same results hold for the US population in the HRS sample.

This evidence suggests that in each country the proportion self reporting in bad health reflects underlying medical conditions and functional limitations identified by respondents. Although it is certainly not sufficient for an unbiased cross-national comparison, it signals that we have a relatively robust basis for interpretation of intercountry heterogeneity of self reports.

[Figures 2a, 2b, 2c about here]

b. Heterogeneity of self reported health

Figure 3 displays the proportions reporting their health as “bad “(“mala”) by age groups for all seven cities separately by gender. As a contrast we have included quantities for elderly aged 60 and over who are participants in the Health and Retirement Survey (HRS). The **first** feature of the graph is the massive intercountry heterogeneity which completely overwhelms the effects of gender and age. The cities with the highest proportions of individuals in bad health are found in Santiago (21 percent), Mexico City (20 percent) and Havana (13 percent) whereas those with the lowest are Buenos Aires, Bridgetown, and Montevideo (5 to 7 percent). The latter three cities are located in countries that, perhaps not coincidentally, are those which until the beginning of the XX1st century enjoyed highest standards of living (as measured by GNP per capita). They are also those with the most modern demographic regime, with near replacement fertility and life expectancies at birth exceeding 75 years.

[Figure 3 about here]

The **second** feature is the age and sex patterns of self reports. By and large we observe increasing proportions in bad health with age. The only exception to this regularity is in Mexico City, where the age pattern is flat. The sharpest increase always occurs after age 70 and is particularly pronounced except perhaps in Chile and Mexico. Females do worst than males everywhere, a recurrent finding with this type of data.

A **third** feature is that elderly living in the cities with the best standing (Buenos Aires, Bridgetown and Montevideo) are equally or less prone than those in the US to report their health as bad, while elderly living in Santiago, Havana and Mexico City are considerable more likely to do so. Elderly in the US are in an intermediate position between these two extremes.

These visual regularities are confirmed in multivariate analyses of the proportion self reporting in bad health. We use individuals within countries as units of observations and the logit of the probability of self reporting in bad health as a dependent variable. As predictors we use dummy variables to represent cities, age groups and sex (see definitions in Table 1). The results

shape of the entire distribution. Inferences drawn with the simplified indicator chosen here do not change if the dependent variables are fine-tuned (Palloni and McEniry, 2004). The same applies for self reported health status.

from the most complete model are presented in Table 3 (Panel a). Panel b of Table 3 displays results from a model with no country effects (country effects are constrained to be 0). The fit of this model relative to the one in Panel a is much worse, thus indicating that there is substantial intercountry heterogeneity (log likelihood ratio test between models leads to a chi –square statistic equal to 116.1 with 6 degrees of freedom). Gender differentials exert a respectable influence whereas those of age are more irregular. In model I only the effects of age groups 75-79 and 85+ are significantly different from 0 but they are not significantly different from each other[6]. This indicates that there is no firm basis to infer the existence of an age gradient in the proportion of individuals reporting in bad health. Not unlike the pattern found in HRS, where age effects are significantly different from zero but not from each other.

Model III (Panel c of Table 3) seeks to verify whether or not there are relevant differences between the US and the seven cities in Latin America and the Caribbean. In order to do this we treat the data from the seven cities in Latin America and the Caribbean as if they belonged to the same population and contrast it with the data from HRS. We first estimate a model including age and sex as variables to establish an average age-sex pattern. We then introduce a dummy variable to distinguish the HRS data from the rest. The results suggest that visual impressions can be misleading as elderly people in the US report themselves in somewhat better health status than the *average* of the seven cities in Latin America and the Caribbean. The odds of reporting in bad health among elderly in the US is only about .73 as large as among the pooled sample and the implied effect on the log odds of self reporting in bad health (-.31) is significantly different from 0 (t = -.6.82; p>.000).[7]

[Insert Table 3 about here]

IV. FUNCTIONAL LIMITATIONS

Self reported limitations in Activities of Daily Living (ADL's) or Instrumental Activities of Daily Living (IADL's) are a mainstay of population-based information on disability. They are arguably better gauges to assess the extent of physical impairment in population-based studies and are widely used in national surveys such as the HRS, NHANES, NHIS and LSOA as well as in a number of surveys in countries other than the US. ADL's reflects impairments associated with underlying conditions that induce physiological limitations and deterioration and provide a useful benchmark to calibrate demand for care, assistance, and support. IADL's are less tied to morbidity *per se* as they are sensitive to more generalized impairments and limitations in unassisted and independent living. ADL's are good probes of physical functioning, particularly lower body functionality (Smith, Branch and Scherr, 1990), and reflect impairment created by chronic conditions as well as cognitive and affective functioning (Stump, Clark, Johnson and Wolinsky, 1977; Wray, Herzog and Park, 1996; Wary and Lynch, 1998). As before, we focus

[6] This statement is established by estimating a model where the age effects are constrained to be the same.
[7] Simple analyses of variance (Palloni and McEniry, 2004), reveal that the residual variance explained by country heterogeneity is significant whereas the residual variance explained by age and sex is not.

only on the proportion of elderly with at least one ADL, or at least one IADL, and examine patterns of relations with the aid of straightforward and parsimonious models[8].

The age patterns of the proportions with at least one ADL and at least one IADL are displayed in Figures 4a and 4b. There are strong age gradients, important gender differences, but virtually no intercity heterogeneity. The HRS sample stands out: females experience higher proportions with at least one ADL but much lower proportions with at least one IADL. This regularity does not apply to males.

[Insert Figures 4a and 4b about here]

ADL and IADL patterns can be studied better with the same tools deployed before for the study of self reported health. We focus on a logit transformation of the individual probabilities of reporting at least one ADL (IADL) and dummy variables for sex, age categories and countries as predictors. Table 4a (panels a, b and c) displays results for ADL and Table 4b (panels a, b and c) does so for IADL. For ADL age and sex patterns are very salient, more so than intercountry heterogeneity[9]. Indeed, as revealed by Model II (panel b, constrained model), intercountry heterogeneity is trivial, as can be seen by comparing the measure of fit of the model in Panel b with that of Panel a: Model I does not add significantly to the fit (relative to Model II). Instead for IADL, intercountry differences are very powerful (compare fit of model in Panel b of Table 4b and the fit of model in Panel a). A curious feature is that the city with one of the lowest proportion of elderly reporting themselves in poor health has one of the highest proportions with at least one ADL or IADL (Montevideo)[10].

[Insert Tables 4a and 4b]

The contrasts between ADL and IADL patterns in SABE cities and HRS (see Panels c in Tables 4a and 4b) are quite strong. An individual in the HRS population is about 1.11 times as likely to experience at least one ADL as an individual in the pooled SABE sample. In fact, the estimated effect on the log odds is equal to .10 and is significantly different form zero (t=2.93, p>.01). By contrast, the HRS population is less than a third as likely (log odds equal to .29) to declare at least one IADL as they are in the pooled sample. The associated effects on the log odds (-1.25) is again significantly different from 0 (-1.25; t=-33.30; p>.000). This is an interesting pattern that could result from heavier mortality selection among elderly with compromising morbid conditions or, alternatively, from cultural idiosyncrasies in the interpretation of limitations in the SABE cities.

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[8] See footnote 5.

[9] Analyses of variance (Palloni and McEniry, 2004) suggest that the fraction of total variance explained by country variability is statistically insignificant.

[10] Montevideo is also the only city in the SABE sample where institutionalization of the elderly is more than trivial. The peculiar relation between self reported health and ADL and IADL in Montevideo might be a result of heavy selection among elderly who remain independent instead of becoming institutionalized.

V. CHRONIC CONDITIONS

Figure 5 displays the mean number of chronic conditions by age and gender and shows that, as was the case for ADL and IADL, the age patterns slope upwards and females exhibit a more unfavorable profile than males. By the same token, a simple regression analysis reveals that intercountry heterogeneity in the number of chronic conditions is quite low and that the strongest effects are those of age and sex (not shown). A comparison with HRS reveals that the elderly population of HRS exhibits a higher average number of chronic conditions than *any* of the countries in the SABE sample (except perhaps Cuban females). This, again, is a pattern that could be expected under heavier mortality selection in or, alternatively, due to underreporting of chronic conditions SABE countries[11].

[Insert Figure 5 about here]

Of all chronic conditions highlighted in Table 2 and those included in the mean number of chronic conditions in Figure 5, arthritis, heart disease, obesity and diabetes are the most salient[12]. Of these, the latter two are of particular interest to us. First, other research reports that developing countries, particularly Latin America and the Caribbean, are in the midst of a diabetes (and obesity) epidemic, in part the result of a unfavorable shift toward “Western” diet, rich in saturated fats, simple carbohydrates and sugar and a marked trend toward sedentarism (Popkin, 1993; and Albala, Kain, Burrows and Diaz, 2000). But never before has this been documented on a large scale for countries of the region and for elderly populations. Second, diabetes and coronary heart disease have been linked to unfavorable early childhood conditions that express themselves either in unfavorable nutritional status or as results of contraction of infectious diseases (Barker, 1998; Kuh and Ben-Shlomo, 2004). The case of diabetes is of special interest for it appears to be related to indicators of early childhood malnutrition (Palloni et al., 2004; Barker, 1998; Hales and Barker, 1992; Hales et al., 1991; Lithell et al., 1996).

Figure 6 displays the proportion of individuals by age groups who self-report diabetes for all SABE samples and HRS, separately by gender[13]. The pattern by age is very distinct and quite similar across countries, concave downward with a peak around 70-74[14]. Males are less likely to report diabetes than females. For the most part, the population in HRS is as likely as the average individual in the pooled SABE sample to report diabetes. In regression models not shown here we find several regularities. First, within the SABE sample there is important heterogeneity. Cuba, closely followed by Argentina and Uruguay, exhibit the lowest levels of self-reported diabetes (almost 17 percent at the peak age group for women), whereas Barbados, Mexico and Brazil, experience the highest levels (about 29 percent at the peak age for women). Second, in the HRS sample prevalence of self reported diabetes is slightly higher than the weighted average in SABE: the predicted probability at the peak age for women is .22. But the difference between this level and the prevalence in the SABE sample is statistically insignificant, as the effect of

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[11] See Appendix for definition of chronic conditions.

[12] In this paper we reserve the term diabetes to refer to a mixture of diabetes 1 and diabetes mellitus or type 2. However, for the most part those individuals self reporting diabetes are afflicted by diabetes type 2

[13] Self-reports of diabetes are not perfect. We know that it underestimates true prevalence. But it is quite accurate as it has very high specificity but lower sensitivity in very different cultural contexts (Palloni, Soldo and Wong, 2003; Goldman, Weinstein and Y-Hsung, 2002).

[14] The declining pattern with age is probably a result of the heavier attrition of diabetics as age increases.

being in the HRS sample on the log odds of self-reporting diabetes is only .10 (with t=.73, p>.470).

[Insert Figure 6 about here]

The fact that Cuba exhibits very low levels of self-reported diabetes specially among males, is undoubtedly due, in part at least, to the fact that the adoption of a Western life style has simply not been an option in this country and, therefore, the risk factors associated with a new diet and sedentary life styles are simply absent. But to explain the very high levels in Barbados, Brazil and Mexico one probably needs to explore the role of population composition by early nutritional status and/or the influence of ethnic composition as well as diet and physical activity patterns. In fact, Barbados and Brazil have a hefty component of population with African descent whereas Mexico has the highest percentage of indigenous and mestizo population. Whether the fetal origin explanation, the one resting on ethnic-related genetic endowments, the more conventional one invoking a western diet pattern and sedentary life style or a combination of all of them explain the distinctive patterns in these countries must remain a conjecture until we are able to test directly the influence exerted by each factor[15].

VI. THE CONNECTION BETWEEN EARLY CHILDHOOD AND ADULT HEALTH STATUS

We use diabetes to examine the connection between early childhood and adult health status. We choose diabetes because the assessment presented earlier identifies diabetes as one of the key chronic conditions whose prevalence is salient among elderly adults in the SABE cities. We also know that diabetes is one of the diseases that appears to be responsive to early childhood conditions (Barker, 1998; Aboderin et al., 2002). Is there any evidence in countries of the region that current diabetes status is related to early childhood conditions and development?

A simple way to identify the direction and magnitude of effects is to estimate for each city the relation between indicators of early health status and the probability of self reporting diabetes. This is a blunt tool for a number of reasons. First, focusing on current diabetes status constrains the universe of study to those who were able to survive with the disease. It is likely that those in worst health had a lower chance of surviving and of being interviewed. Second, although self reported diabetes is generally quite accurate (Palloni et al., 2003; Goldman et al., 2002), even mild measurement errors can lead to powerful attenuation of estimated effects. Third, indicators of early child conditions--anthropometry and retrospective questions--are retrieved in a population-based study, carried via person-to-person interview, not in a clinical setting. As a consequence, the anthropometry may be subject to random errors with the consequent distorting effects on estimates of association between variables.

Table 5a displays the estimated effects of three alternative anthropometric measures on the log odds of reporting diabetes. Table 5b displays the effects associated with indicators from retrospective histories[16]. The estimated models by city included controls for gender, sex, race, education and obesity with the exception of Mexico where there was no data on race available. Pooled samples of cities controlled for gender, sex and education and obesity. A control for

[15] See Palloni and McEniry, 2004. Since most of the Barbados population if of African descent, a similar test cannot be applied there.
[16] See Appendix for definition of anthropometry and indicators.

obesity is required since the tenor of the conjecture is emphasis on the direct effects of early childhood conditions, not the gross effects. Since part of the latter operate via increased predisposition to develop obesity, it is important to control for it.

[Insert Tables 5a and 5b about here]

The results based on anthropometry are mixed. Unlike findings obtained by other authors for the US (Fogel, 1994; Costa, 2002; Kim, 1993) we find little support fort the idea that height per se has any relation to the probability of diabetes once the effects of *current* nutritional status (as reflected in BMI) are controlled for.

Knee height is not only a good predictor of current height in populations whose skeletal mass is compressed by age-related processes (Chumlea et al., 1998; Palloni & Guend 2005) but it, as well as leg length, is a marker of early malnutrition. Yet, there is little evidence that early malnutrition as reflected in knee height is related to current diabetes status. In contrast, waist-to-hip ratio (WHR) is a powerful predictor of current diabetes status in four of the seven countries. This finding is interesting but admits two very different interpretations. On the one hand, evidence for poor populations suggests that WHR is affected by early malnutrition (Schroeder et al., 1999; Martorell et al., 2001). If so, the estimated effects shown in the table could reflect the impact of early malnutrition on propensity to develop diabetes as an adult[17]. On the other hand, however, WHR is a measure of central adiposity and could also reflect hormonal and metabolic disorders produced, for example, by sustained stress (Adler et al., 2000; Ostrove et al., 2001). If so, the estimated effects shown in the table are only indicative of the relation between stress in the recent past, metabolic imbalances, and diabetes. This mechanism may implicate in no way early malnutrition.

Turning to the relation between retrospective indicators of early conditions and current diabetes status, we see that the results are mostly negative. When we pool the data we find that the estimated effect for health is properly signed but only marginally statistically significant. In all other cases the modest indicators of early childhood conditions do not reveal any relation of interest.

To summarize: the evidence for connections between early childhood conditions and current diabetes status is largely negative, irrespective of whether one uses anthropometry or direct (retrospective) assessments. In only one case (measure of WHR) the estimated effects are sufficiently large and properly signed. In the remaining cases, the data reveal no relations of importance.[18]

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[17] Note that in the SABE data there is evidence demonstrating this connection between early nutrition and WHR (Palloni and McEniry, 2004). In fact, results not shown here indicate that in SABE countries being in the lowest quintile of knee height strongly affects the odds of being in the upper quintile of WHR. Indeed the effects on the log odds of being in the upper quintile of WHR is about .32 ($p<.000$) and is highly significant. This means that the ratio of the odds of being in the upper quintile of WHR for a person in the lowest quintile of knee heights is of the order of 1.4. In contrast, neither the retrospective measure of health status nor the one on childhood socioeconomic status are related to WHR.

[18] We are currently exploring relations involving (1) anthropometry and indicators of early childhood conditions, and (2) other markers of health status. The results are also mixed and resemble those obtained for diabetes.

VII. CAN WE MAKE INFERENCES ABOUT MORTALITY?

In this section we venture into uncharted territory and attempt to infer expected relative mortality risks for individuals who experience (do not experience) two health outcomes: obesity and diabetes. No sample included in the SABE study provides information on actual mortality and, therefore we cannot estimate directly levels of mortality risks for any particular subgroup. There is, however, an indirect way of doing so using those samples for which information on anthropometric measures is available. Argentina is the only country which did not collect this information and for this reason we exclude it from this analysis.

The idea is to estimate the relationships between height, weight and relative mortality risk using so-called Waaler surfaces. These surfaces emanate from the work of Waaler (1984) and others (Fogel, 2003; Kim, 1993; Costa 2002) and we are now examining their applicability in Latin American and Caribbean (LAC) countries (Palloni & McEniry, 2005). Assuming that Norwegian relative mortality risks associated with height-weight combinations apply to countries in SABE and assuming that Norwegians in general were, most likely, exposed to better living conditions than individuals in our samples of elderly, Waaler surfaces identify lower bounds for the relative risks associated with height-weight combinations (i.e. less risk than might actually be the case). Conversely, it is likely that U.S. elderly are in better health than were Norwegians. In this case Waaler surfaces identify an upper bound of relative mortality risks for U.S. elderly (higher relative risk than might actually be the case).

For any health status indicator, such as obesity or diabetes, that leads to a partition of the sample into classes or groups (obese and non obsess, with and without diabetes; with and without heart diseases), we can approximately identify relative mortality risks for each class or group by calculating their mean weight and height and locating the corresponding point in a Waaler surface. In order to do so we proceed as follows. First, using Waaler's original data (Waaler, 1984) we estimate Waaler-type surfaces for (the log of) relative mortality risks as quadratic functions of height (cm) and weight (kg) plus interaction terms[19]. We then identify **optimal lines**—the locus of points yielding a weight that minimizes the mortality risk for a given height—and, finally, we draw **severe obesity lines** defined as the locus of points where the height-weight combination yields a body-mass index of 35. Second, we use SABE and HRS data to obtain **average** height-weight for obese and non-obese 60-74 years old respondents and plot these points on the surfaces[20]. Under the assumptions stated before, the location of these points in the surfaces identifies a minimum mortality risk among obese (and non-obese) individuals in SABE countries and a maximum mortality risk for obese (and non obese) HRS respondents.

Figures 7a and 7b display curves of the log of the relative mortality risks for various combinations of height and weight among Norwegian males and females respectively. The figures also display the points corresponding to the average height-weight combination among

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[19] The relative mortality risk is defined as the ratio of the mortality rate for a particular weight-height combination to the average mortality rate in the population

[20] We limit the sample to those younger then 75 to include the elderly population to whom the conjecture is most likely to apply, namely, those born after the period 1925-1930

obese and non-obese males and females in our data sets. The highest relative mortality risk is found in the lower right hand corner of the graphs. These are cases of short height and high weight. Relative mortality risk increases as height decreases and, as weight increases for a particular height, there is a set of optimal points where mortality risk is minimized ("optimal line"). A particular weight-height combination always yields higher mortality risks for males than for females (compare iso-mortality risk curves across graphs)**, a feature inherent in the Norwegian data and likely to apply to other societies.**

Two patterns deserve attention. First, non-obese elderly (represented with points bearing the symbol '(N)') can be located in an area of lower mortality risks than obese elderly (represented with points bearing the symbol '(Y)'). Indeed, the latter are always to the right and almost always below the level of the former (lower height). This is evidence of a clear mortality divide between obese and non-obese males as the former are always located in *loci* closer to the curve representing higher mortality risks whereas the latter cluster very close to the optimal line. This is a feature characterizing **all data sets** under examination and is also present among females (Figure 7b), albeit in a more attenuated fashion. The fact that the observed mortality divide between obese and non obese is in the expected direction, gives us some confidence for using the Waaler surfaces to produce stronger inferences

The second pattern we observe is this: elderly in the SABE countries are in a disadvantageous position relative to elderly in the US and the ranking of their ranking of their relative mortality is somewhat related at least to the type of demographic regimes they experienced in the past. Thus, Barbados, Cuba and Uruguay, all of which experience very early mortality decline (mostly associated with eradication of infectious diseases), appear to have a more advantageous relative risk profile, regardless of obesity status or gender. Indeed, note that the loci occupied by the points (N) and (Y) for these countries are always below (lower height) than the loci occupied by points corresponding to the US but above all the others.

Figure 8a and 8b display Waaler surfaces analogous to those in figure 7a and 7b but for a different health outcome, diabetes. The results in this case produce no clear finding at all. Indeed, the ordering of the relative mortality risks is inconsistent both according to the outcome (diabetic vs non diabetic) and according to countries. Because obesity is such an important predictor of self-reported diabetes, we were expecting a display as transparent as what was observed in Figures 7a and 7b. This may not have occurred for a number of reasons. First, even a low fraction of underreporting of diabetes may produce noise and distort patterns. Second, among those who are diabetic a fairly high fraction could be in compliance with treatment and this should result in changes in physical proportions. Third, there might be heavier mortality selection among diabetics, thus altering the mortality risk pool and reflecting a more favorable profile among diabetics than among non-diabetics.

Admittedly, Waaler surfaces are a blunt tool to examine mortality risks in the absence of real data. However, they allow us to state that, at least with respect to the obese vs non obese contrast elderly in the SABE samples are characterized by an anthropometric profile that places them at a disadvantage in terms of mortality risks relative to elderly in countries that are either wealthier (US) or where the growth of the elderly population is produced by a different array of demographic forces.

[Insert Figure 7a, 7b, 8a and 8b about here]

VIII. DISCUSSION

In this review of preliminary findings from SABE, we set out to examine a conjecture regarding elderly health status in the region by answering questions about elderly health profiles, deterioration of health and functional status, and relations between early childhood conditions and adult health status. Our review reveals well-known patterns and confirms routine expectations. It simultaneously presents us with regularities that do not agree with *a priori* expectations or with conjectures formulated at the beginning of the paper. A full examination of the conjecture on elderly health status requires data on a cohort of individuals. However, with the cross-sectional data from SABE we can obtain a certain amount of insight. Using SABE we find that there is some evidence, albeit weak, to suggest that our conjecture regarding elderly health status has some merit. The regional elderly health profile shows a high prevalence of chronic disease and disability, suggesting more frail elderly. In some cases, elderly health profiles are worse than elderly health profiles in the US. There is some evidence of a relation between early childhood conditions and diabetes, one of the more salient chronic diseases in the region. But the evidence is weak at best.

We now know a few things we did not know before that adds to the richness of our understanding of elderly health status in the region. Self reported health status shows large intercountry variability and more muted heterogeneity due to gender and age. Women and the very old are more likely to declare themselves in bad health. On average, countries in the region display patterns by age and sex that are very similar to those found elsewhere. The proportion with at least one ADL or IADL is strongly related to age and gender and displays remarkable intercountry invariance. Self reported health, on the one hand, and ADL and IADL, on the other, are moderately related to each other. The mean number of self reported chronic conditions increases with age and is higher for females than it is for males.

Of all chronic conditions three that stand out: arthritis, cardiovascular disease and diabetes. We chose the latter as a focus of our analysis because of its significant increase in the region and because of its potential connection with early experiences. Females are specially affected by this condition. Obesity, a risk factor of diabetes, is also high among elderly in the region, particularly among females. There is large intercountry variance in both diabetes and obesity. In some countries (such as Argentina) who are highly modernized and westernized, the prevalence of diabetes is fairly low and in others, such as Mexico and Barbados, with high percentages of population of African descent or mestizo, the prevalence is very high.

We attempted to evaluate the relative standing of health status in the region relative to other countries. In this paper we chose the US as a benchmark not because it is uniquely suited to be so, but because the data were available to us. We find that the health profile of elderly in the Latin America and Caribbean is better in some respects and worse in others. Patterns of self-reported health are comparable whereas the prevalence of at least one ADL is much higher in the US than in SABE, at least among females. The opposite occurs with IADL's. Similary, the US population exhibits a much larger mean number of chronic conditions at all ages and particularly among males. The most interesting feature is that, on the whole, SABE countries, on average, display levels of self-reported diabetes (and obesity) that are as high if not higher than those found in the US.

We also posed a question that concerned the existence of indications of relations between early childhood conditions and adult health status. As argued at the outset of the paper, this is uniquely relevant in the region where demographic aging has proceeded via a singular path and where the cohorts of individuals who will become 60 and over during the next two decades or so were the beneficiaries of a unique mortality decline that took place staring at the end of the second quarter of the century. Our inquiry on connections between early childhood conditions and adult health status met with limited success and we do not have a definitive answer, only ambiguous signals. First we confined our attention to examination of diabetes and limited the analyses by examining the relation between anthropometric indicators and retrospective measures. We are able to document only the strong relation between diabetes and WHR even after controlling for the effects of obesity. We interpret this relation as a partial reflection of early malnutrition and propensity to develop adult diabetes. However, another interpretation is possible and our data are not powerful enough to permit us discriminate between the two.

Finally, our use of Waaler surfaces to construct expected relative risks profiles met with mixed success and we were able to observe evidence as expected in only one of the two health outcomes we used.

Of all the characteristics of health status we reviewed, the high prevalence of diabetes and obesity is perhaps the most worrisome. It is known that the health costs implications of diabetes are staggering even if the disease presents itself with a normal, expected profile of associated comorbidities. If lack of compliance with treatment or the mixture of diseases to which the population is exposed complicates the clinical status of individual with diabetes, the costs could escalate even more. Regardless of whether or not the origin of the large prevalence is in the adoption of a Westernized life style or, as we argued here, in the type of early exposure, a continued increase on diabetes prevalence will pose severe constrains in the health system. What seem most obvious is that educational campaigns are cost-effective means to both reduce incidence and keep the disease negative spillovers at bay. In the next fifty years, perhaps the most important health policy initiatives regarding the elderly will have to be related to prevention of obesity and diabetes.

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TABLE 1. BASIC SAMPLE INFORMATION

Condition/ Variable	*Overall (n=10,902)*	*Argentina (n=1043)*	*Barbados (n=1808)*	*Brazil (n=2143)*	*Chile (n=1306)*	*Cuba (n=1905)*	*Mexico (n=1247)*	*Uruguay (n=1450)*
Response Rate		0.60	0.85	0.85	0.84	0.95	0.85	0.66
Age	72 (8)	71 (7)	72 (8)	73 (8)	72 (8)	72 (9)	70 (8)	71 (7)
60-64	23%	23%	19%	20%	22%	25%	31%	22%
65-69	23%	24%	23%	18%	25%	21%	25%	25%
70-74	19%	24%	21%	16%	19%	18%	18%	23%
75-79	17%	15%	17%	22%	16%	13%	13%	17%
80-84	11%	8%	11%	14%	10%	11%	8%	9%
85+	8%	5%	9%	10%	8%	11%	6%	5%
Gender								
Females	62%	63%	60%	59%	66%	63%	59%	63%
Education								
Primary	71%	71%	77%	85%	68%	57%	74%	65%
Secondary	20%	23%	18%	5%	24%	37%	11%	21%
Higher	9%	6%	5%	10%	9%	7%	15%	14%
Race								
White	55%	---	5%	71%	43%	63%	---	90%
Black	34%	---	93%	16%	1%	36%	---	4%
Mestizo	6%	---	0.84%	8%	30%		---	6%
Other	4%	---	1%	5%	26%	0.58%	---	0.07%
Marital Status								
Never married	7%	6%	18%	5%	7%	3%	4%	4%
Married/union	46%	43%	45%	52%	44%	37%	54%	49%
Separated	9%	9%	9%	6%	13%	13%	9%	6%
Widowed	34%	42%	24%	35%	36%	35%	32%	37%
Divorced	4%	0.96%	5%	1%	0.39%	11%	1%	5%

Source: SABE data, respondents ages 60 and above. Numbers in parentheses are standard deviations where appropriate. Numbers rounded to nearest whole number. For race: the category Black includes blacks and mulattos and the category Other includes indigenous, Asian and all other. Information on race is not available for Mexico or Argentina.

TABLE 2: HEALTH AND OTHER ATTRIBUTES OF SAMPLE

Condition/ Variable	*Overall (n=10,902)*	*Argentina (n=1043)*	*Barbados (n=1808)*	*Brazil (n=2143)*	*Chile (n=1306)*	*Cuba (n=1905)*	*Mexico (n=1247)*	*Uruguay (n=1450)*
Diabetes	17%	13%	22%	18%	14%	15%	22%	13%
Medicine	68%	64%	78%	64%	70%	60%	82%	52%
Insulin	12%	10%	15%	14%	6%	15%	9%	11%
Cancer	4%	5%	4%	4%	5%	3%	2%	6%
Respiratory	10%	8%	4%	13%	13%	13%	10%	9%
Heart	21%	20%	12%	21%	34%	24%	10%	23%
Stroke	7%	5%	6%	8%	7%	10%	5%	4%
Arthritis	42%	53%	47%	33%	32%	58%	25%	47%
Obesity	24%	------	24%	20%	30%	14%	30%	34%
Poor health	11%	5%	5%	9%	21%	13%	20%	7%
ADL	20%	19%	14%	24%	26%	21%	19%	17%
IADL	29%	29%	23%	40%	32%	28%	29%	17%
Height (cm)	158 (10)	------	163 (10)	157 (9)	155 (10)	158(10)	154 (9)	160 (9)
Knee height (cm)	50 (5)	------	53 (5)	50 (3)	48 (3.3)	50 (5)	49 (4)	48 (6)
Weight (kg)	67 (16)	------	72 (20)	64 (13)	67 (14)	61 (14)	66 (12)	72 (15)
BMI (w/h^2)	27 (6)	------	27 (8)	26 (5)	28 (5)	25 (5)	28 (5)	28 (7)

Source: SABE data. Numbers rounded to nearest whole number. Poor health 1=Poor, 0=All other. ADL=at least 1 ADL. IADL=at least 1 IADL. No height and weight measurements were taken in Argentina.

TABLE 3: RELATION BETWEEN SELF REPORTED HEALTH AND AGE, GENDER AND COUNTRY

	Panel A		*Panel B*		*Panel C*	
	Effect	*SE*	*Effect*	*SE*	*Effect*	*SE*
Constant	-3.00	(0.13) ***	-2.36	(0.08) ***	-2.41	(0.06) ***
Female	0.35	(0.07) ***	0.36	(0.07) ***	0.33	(0.05) ***
65-69 years	0.07	(0.09)	0.03	(0.09)	0.05	(0.06)
70-74 years	0.03	(0.10)	-0.07	(0.10)	-0.04	(0.07)
75-79 years	0.29	(0.10) **	0.18	(0.10)	0.30	(0.07) ***
80-84 years	0.20	(0.12)	0.11	(0.11)	0.25	(0.08) **
85+	0.34	(0.13) **	0.26	(0.12) *	0.42	(0.09) ***
Argentina	-0.25	(0.18)				
Barbados	-0.22	(0.15)				
Brazil	0.36	(0.13) **				
Chile	1.35	(0.13) ***				
Cuba	0.77	(0.13) ***				
Mexico	1.28	(0.13) ***				
HRS					-0.31	(0.04) ***
n	10,679		10,679		23,200	
Log likelihood	-3533		-3711		-7290 155	
LR chi square	399		42.09			
Degrees of freedom	12		6		7	

Numbers in parentheses are standard errors. Significance: * p<.05 ** p<.01 ***p<.001.

TABLE 4A. RELATION BETWEEN ADLS AND AGE, GENDER AND COUNTRY

	Panel A		***Panel B***		***Panel C***	
	Effect	***SE***	***Effect***	***SE***	***Effect***	*SE*
Constant	-2.37	(0.10) ***	-2.23	(0.07) ***	-2.17	(0.05) ***
Female	0.45	(0.05) ***	0.45	(0.05)***	0.44	(0.04) ***
65-69 years	0.16	(0.08)	0.15	(0.08)	0.11	(0.06)
70-74 years	0.28	(0.09) ***	0.25	(0.09)**	0.30	(0.06) ***
75-79 years	0.76	(0.08) ***	0.75	(0.08)***	0.63	(0.06) ***
80-84 years	1.15	(0.09) ***	1.14	(0.09)***	1.04	(0.06) ***
85+	1.74	(0.09) ***	1.71	(0.09)***	1.59	(0.06) ***
Argentina	0.14	(0.11)				
Barbados	-0.36	(0.10) ***				
Brazil	0.27	(0.09) **				
Chile	0.48	(0.10) ***				
Cuba	0.13	(0.09)				
Mexico	0.23	(0.10) *				
HRS					0.10	(0.03) **
n	10,824		10,824		21,322	
Log likelihood	-5041		-5087		-10,272	
LR chi square (12 d.f.)	706		614		1082	
Degress of freedom	12		6		7	

Numbers in parentheses are standard errors. Significance: * p<.05 ** p<.01 ***p<.001.

TABLE 4B. RELATION BETWEEN IADLS AND AGE, GENDER AND COUNTRY

	Panel A		*Panel B*		*Panel C*	
	Effect	*SE*	*Effect*	*SD*	*Effect*	*SE*
Constant	-3.04	(0.10) ***	-2.32	(0.07)***	-1.97	(0.05) ***
Female	0.88	(0.05) ***	0.85	(0.05)***	0.62	(0.04) ***
65-69 years	0.31	(0.08) ***	0.28	(0.08)***	0.18	(0.06) **
70-74 years	0.65	(0.08) ***	0.60	(0.07)***	0.41	(0.06) ***
75-79 years	1.18	(0.08) ***	1.18	(0.08)***	0.93	(0.06) ***
80-84 years	1.69	(0.08) ***	1.68	(0.08)***	1.40	(0.06) ***
85+	2.60	(0.10) ***	2.58	(0.09)***	2.07	(0.07) ***
Argentina	0.77	(0.10) ***				
Barbados	0.33	(0.10) ***				
Brazil	1.14	(0.09) ***				
Chile	0.82	(0.10) ***				
Cuba	0.55	(0.09) ***				
Mexico	0.86	(0.10) ***				
HRS					-1.25	(0.04) ***
n	10,778		10,778		23,283	
Log likelihood	-5572		-5691		-9903	
LR chi square	1789		1550		2975	
Degrees of freedom	12		6		7	

Numbers in parentheses are standard errors. Significance: * p<.05 ** p<.01 ***p<.001.

TABLE 5A. ANTHROPOMETRY EFFECTS ON DIABETES

Country	*n*	*Effect*	*SE*	*d.f.*	*Chi-Square*	*p-value*
Height						
Barbados	1665	0.05	0.16	14	59.38	0.0000
Brazil	1765	-0.03	0.17	14	18.89	0.1693
Chile	733	-0.04	0.29	14	10.92	0.6920
Cuba	1669	0.07	0.17	13	52.21	0.0000
Mexico	1022	0.27	0.21	11	28.22	0.0030
Uruguay	1282	-0.21	0.23	14	28.06	0.0140
Pooled SABE	8668	-0.05	0.08	13	125.06	0.0000
Knee Height						
Barbados	1660	-0.15	(0.15)	14	59.38	0.0000
Brazil	1763	0.05	(0.16)	14	18.49	0.1852
Chile	729	0.12	(0.27)	14	11.01	0.6854
Cuba	1668	-0.09	(0.17)	13	54.02	0.0000
Mexico	1022	0.32	(0.19)	11	29.29	0.0020
Uruguay	1243	-0.21	(0.21)	14	27.37	0.0172
Pooled SABE	8617	-0.07	(0.08)	13	126.97	0.0000
Waist/Hip Ratio						
Barbados	1651	0.88 ***	(0.15)	14	90.86	0.0000
Brazil	1752	0.63 ***	(0.15)	14	35.76	0.0011
Chile	733	0.59	(0.31)	14	14.55	0.4097
Cuba	1664	0.29	(0.20)	13	53.85	0.0000
Mexico	1019	0.18	(0.20)	11	28.13	0.0031
Uruguay	1229	0.71 **	(0.23)	14	37.02	0.0007
Pooled SABE	8577	0.47***	(0.08)	13	161.07	0.0000

Height and knee height: 1=lowest 20% of distribution. Waist/hip ratio: 1=top 20% of distribution. Significance: * p<.05 ** p<.01 ***p<.001. No data on anthropometric measures for Argentina. All models controlled for gender, age, education, race and obesity except for Mexico where there were no data on race. Lower sample size for Chile primarily due to missing values for race. Pooled SABE also includes country-specific dummy variables and does not include race so as to include Mexico. The sample size for pooled SABE is larger than the sum of the individual country sample sizes because excluding race increased the sample size for Chile.

TABLE 5B. EARLY CHILDHOOD CONDITIONS EFFECTS ON DIABETES

Country	*n*	*Effect*	*SE*	*d.f.*	*Chi-Square*	*p-value*
Barbados						
-Economic	1636	-0.005	(0.16)	15	56.56	0.0000
-Health		-0.37	(0.55)			
Brazil						
-Economic	1740	0.04	(0.14)	15	20.95	0.1384
-Health		0.40	(0.25)			
Chile						
-Economic	726	-0.17	(0.23)	15	12.15	0.6680
-Health		0.49	(0.41)			
Cuba						
-Economic	1657	-0.08	(0.16)	14	52.4	0.0000
-Health		0.29	(0.32)			
Mexico						
-Economic	1018	0.27	(0.20)	12	30.13	0.0027
-Health		0.42	(0.33)			
Uruguay						
-Economic	1270	-0.11	(0.18)	15	28.93	0.0160
-Health		0.30	(0.41)			
Pooled SABE						
-Economic	8566	0.02	(0.07)	14	122.54	0.0000
-Health		0.26	(0.14)			

Early childhood economic situation: 1=fair/poor, 0=good. Early childhood health: 1=poor, 0=excellent/good. Significance: * p<.05 ** p<.01 ***p<.001. No data on anthropometric measures for Argentina. All models controlled for gender, age, education, obesity and race except for Mexico where there were no data on race. Lower sample size for Chile primarily due to missing values for race. Pooled SABE also includes country-specific dummy variables and does not include race so as to include Mexico. The sample size for pooled SABE is larger than the sum of the individual country sample sizes because excluding race increased the sample size for Chile.

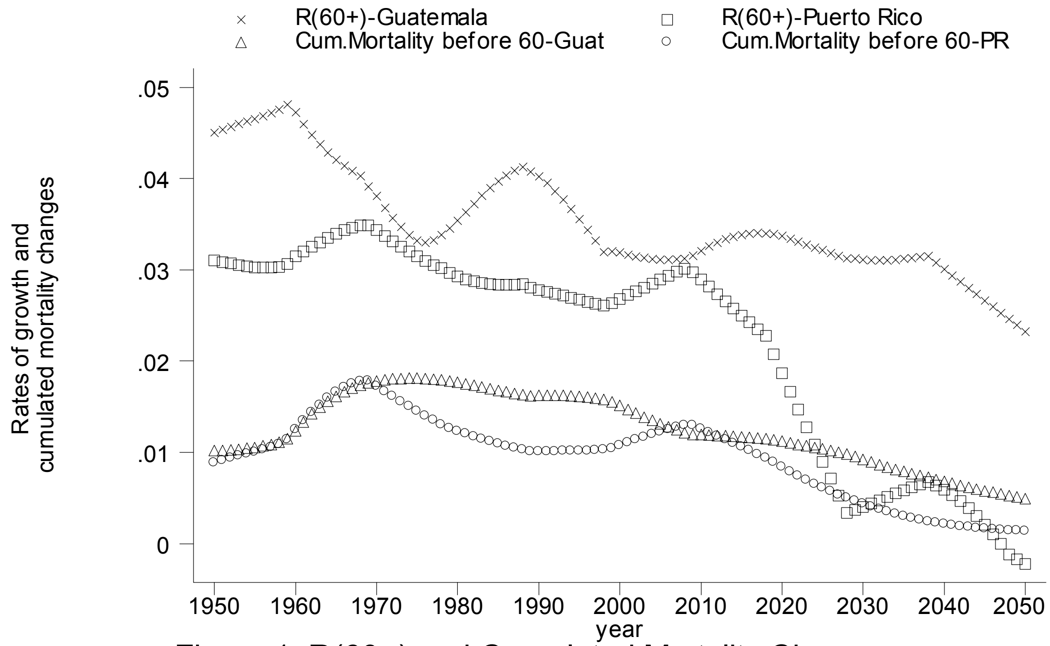


Figure 1: R(60+) and Cumulated Mortality Changes

Figure 2A: Relation Self-Report and ADL/IADL

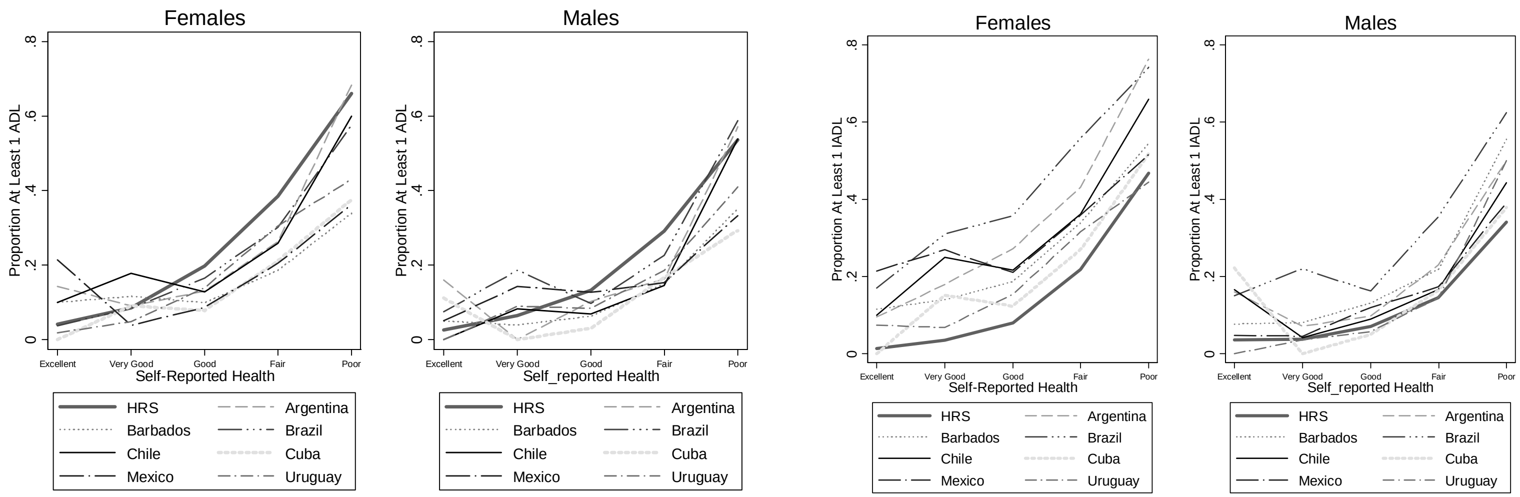


Figure 2B: Relation Self-Report and # Chronic Conditions

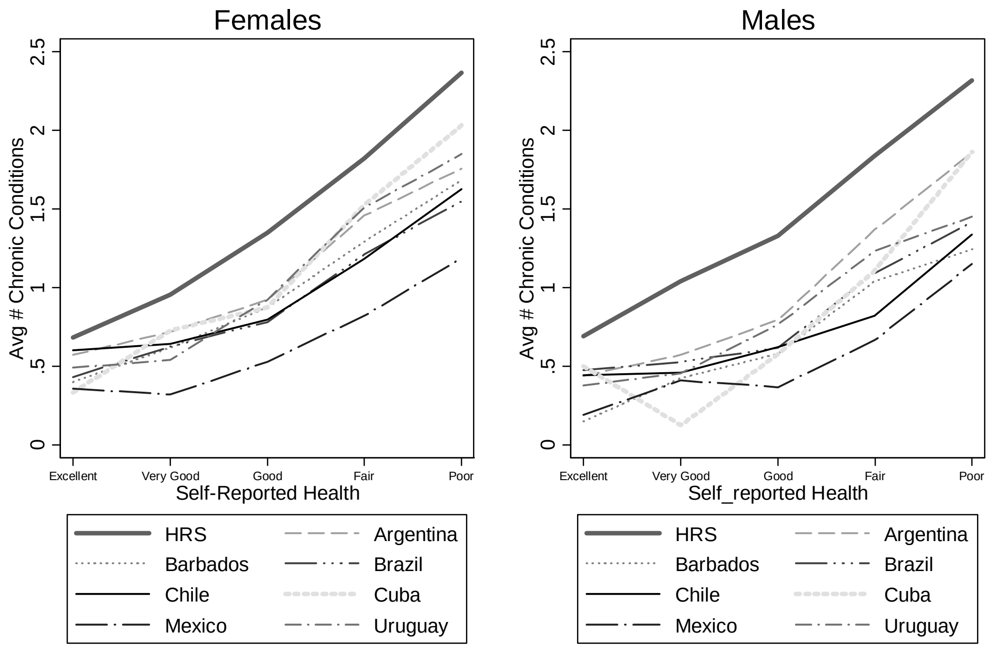


Figure 2C: Relation Self-Report and Diabetes

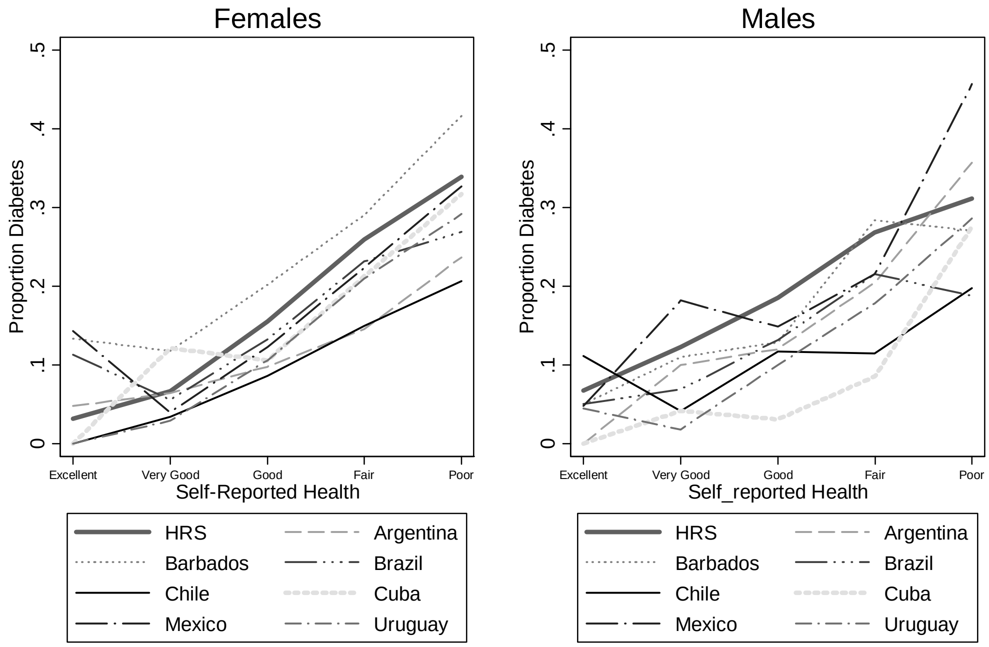


Figure 3: Proportion Bad Health by Age/Sex

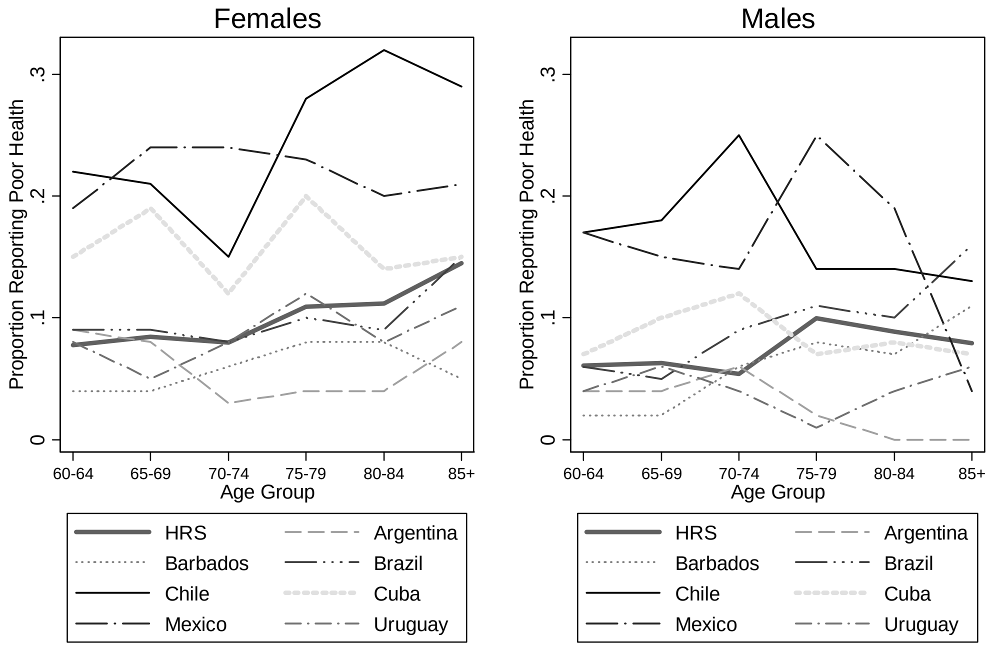


Figure 4a: Proportion ADL by Age/Sex

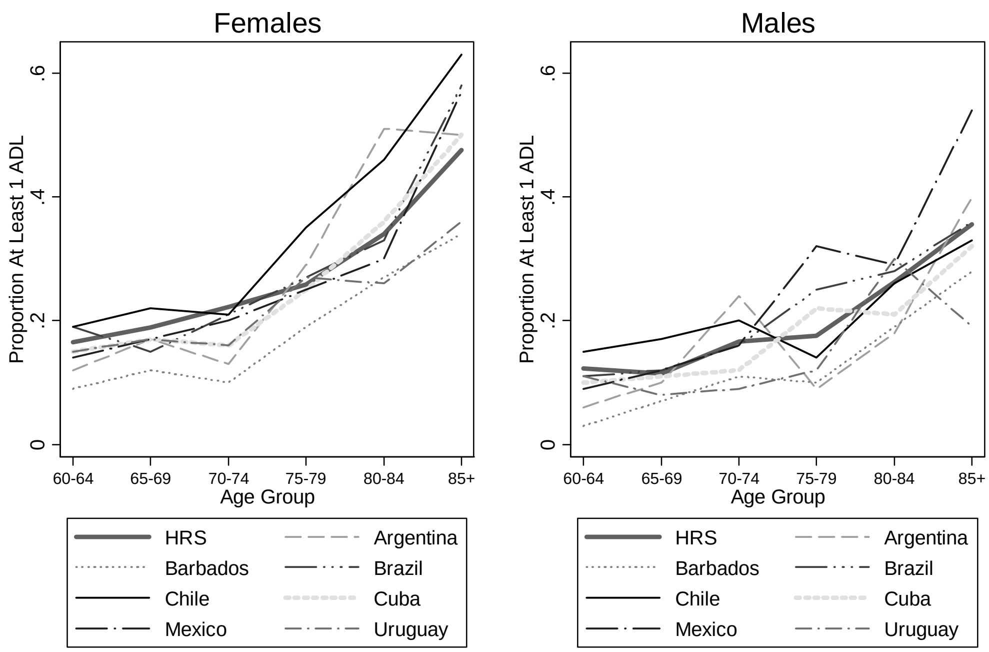


Figure 4b: Proportion IADL by Age/Sex

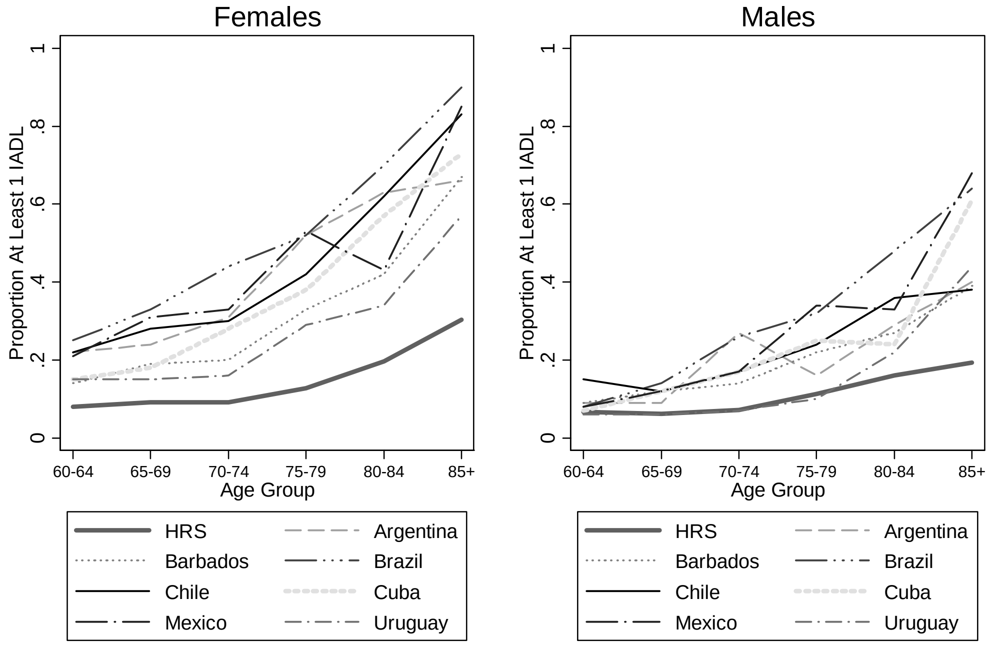


Figure 5: # Chronic Conditions by Age/Sex

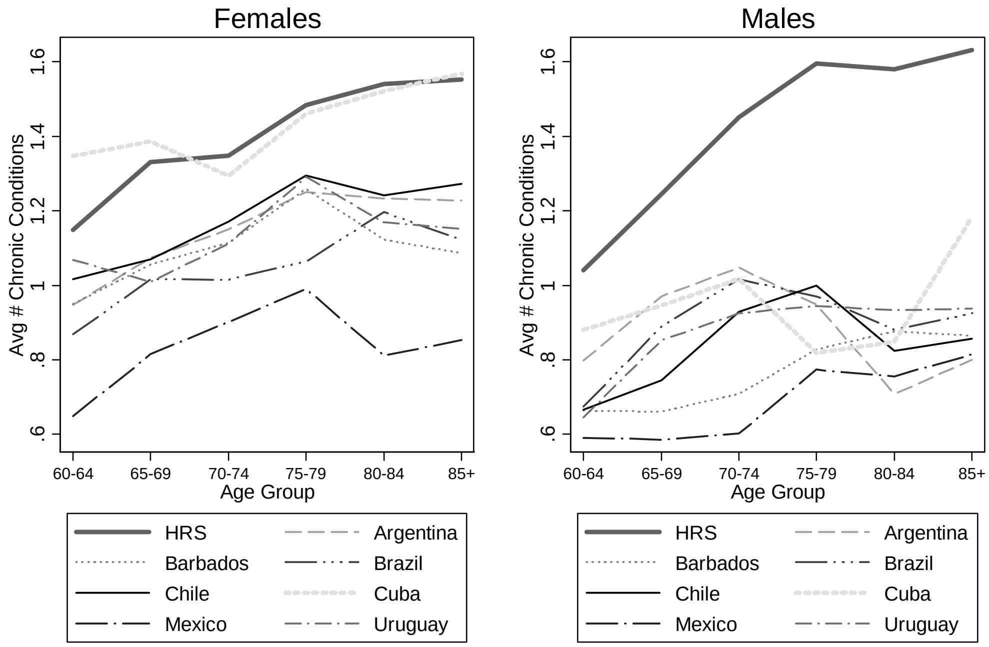


Figure 6: Proportion Diabetes by Age/Sex

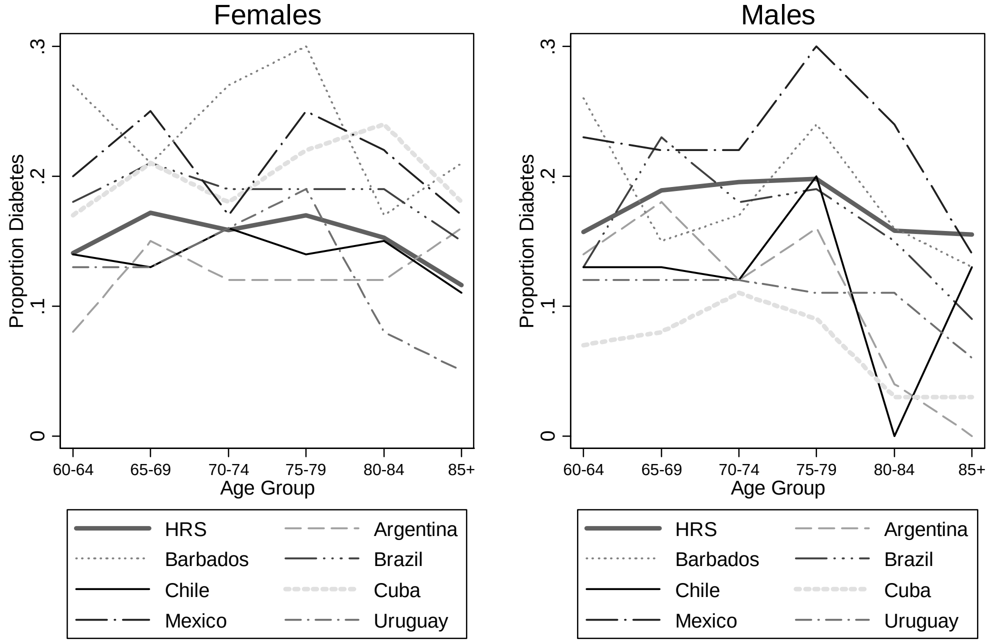


Figure 7a: Waaler Mortality Surface with Obese & Non-Obese Males 60-74

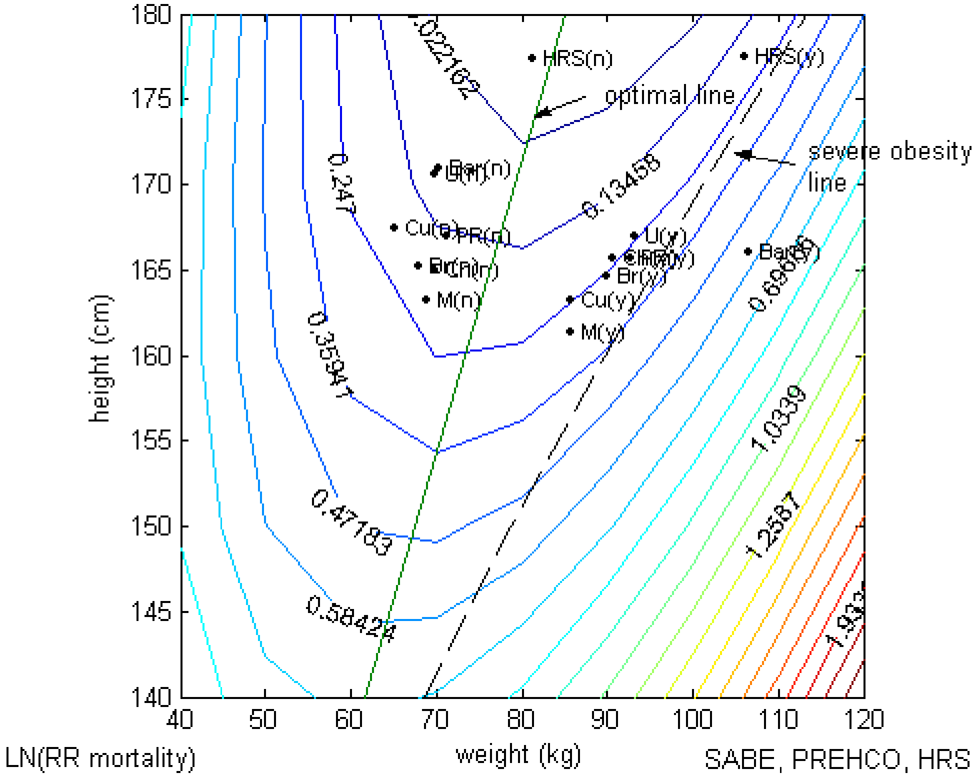


Figure 7b: Waaler Mortality Surface with Obese & Non-Obese Females 60-74

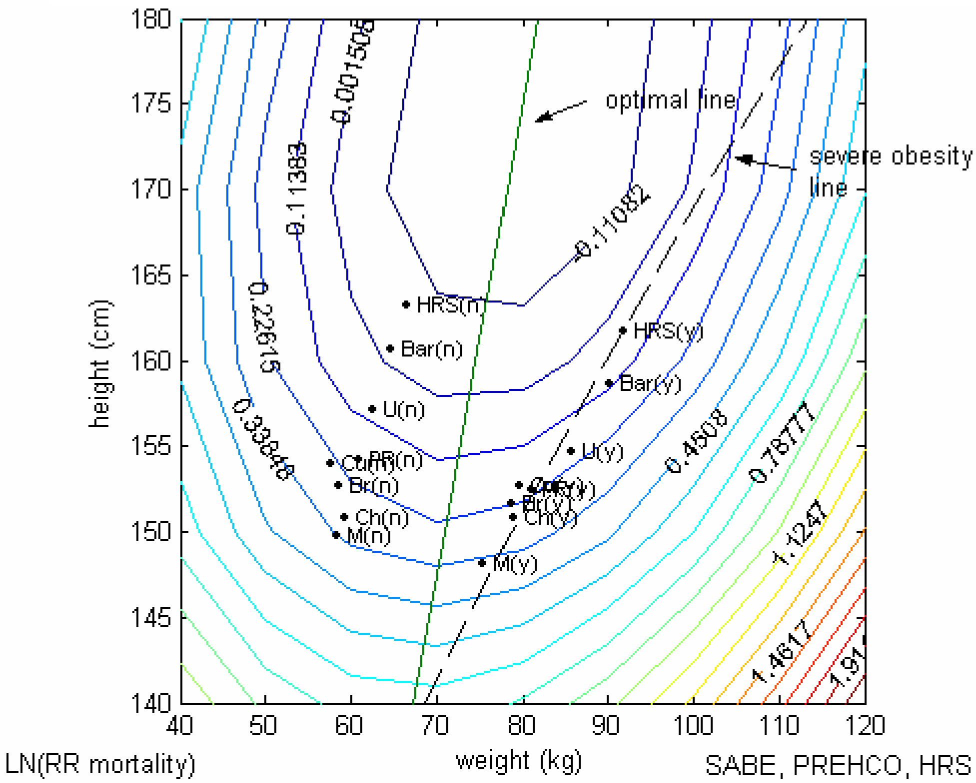


Figure 8a: Waaler Mortality Surface for Diabetic & Non-Diabetic Males 60-74

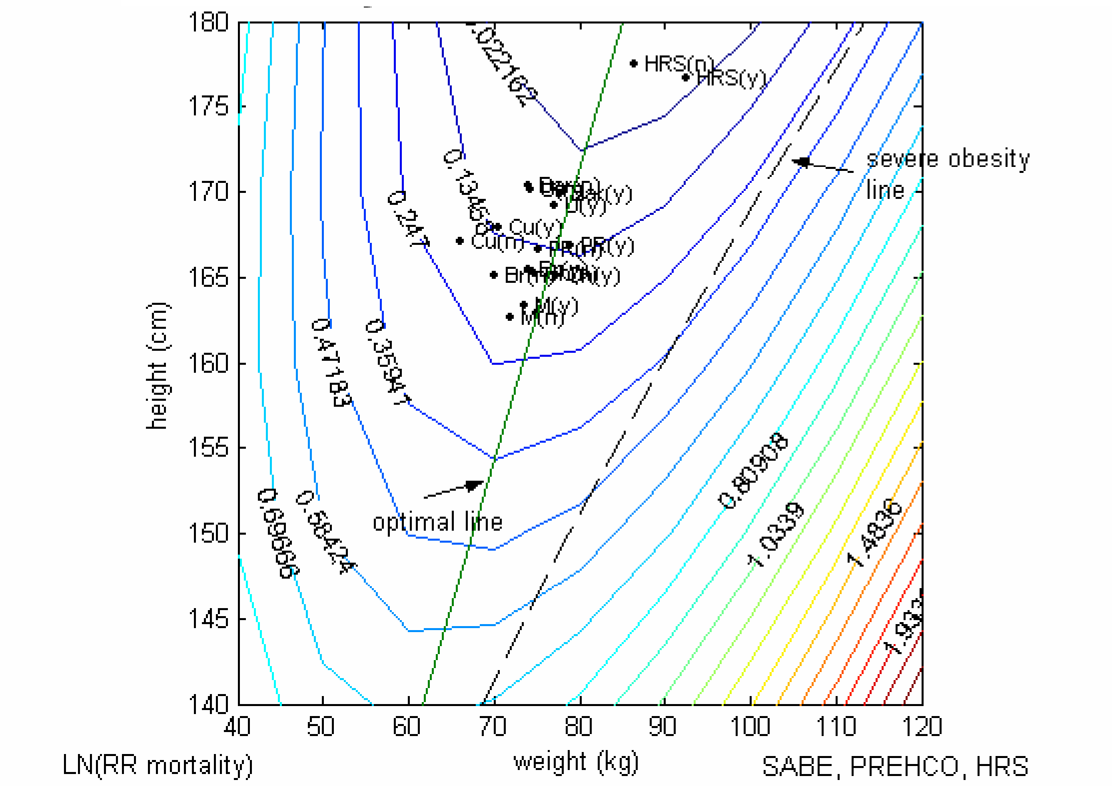
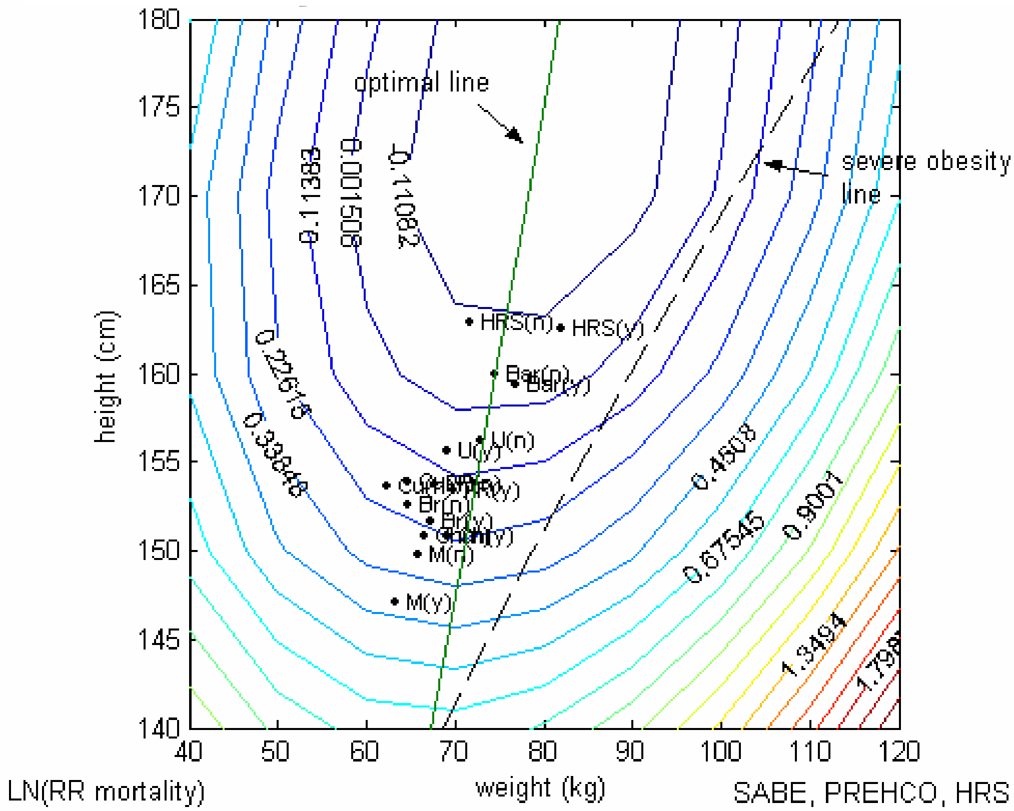


Figure 8b: Waaler Mortality Surface for Diabetic & Non-Diabetic Females 60-74



Appendix: definitions and operationalization of variables in SABE

1. ADL and IADL

1.1. ADL's:

-Walking across the room

-Dressing

-Bathing

-Eating

-Getting in and out of bed

-Using bathroom

1.2 . IADL's

-Preparing meals

-Managing money

-Difficulty with getting to places (only in SABE)

-Buying food or clothing

-Using the phone (in SABE only for those with a phone)

-Doing heavy housework

-Taking medicine(s)

2. Chronic conditions

Arthritis

Cancer

Diabetes

Respiratory Illness

Heart Disease

Stroke

3. Targets, spouses and proxies

In three countries (Argentina, Chile, and Uruguay) only one individual per household was interviewed. In two countries, Brazil and Mexico, interviewers proceeded to interview all individuals 60 and older found in selected household. In virtually all these cases, the additional interviews corresponded to spouses (one per household). In Cuba interviewers selected a target individual and a spouse.

In our analyses we include all individuals interviewed. This has the advantage of maximizing observation at the expenses of introducing dependence of observations in the countries where more than one individual per household was interviewed. In order to protect our inferences we repeated some of the analyses using clustering procedures to adjust for lack of independence but since the inferences remain unchanged we have chosen to present results based on the larger samples.

4. Sampling weights

Only the sample from Santiago is self-weighted. All others require weights to expand the sample population to the city population. Since in two countries no sample weights have been calculated we chose to ignore them in all the others. However, to ensure that none of our conclusions was sensitive to this choice, we proceeded to re-estimate models using sampling weights for those countries that had them available. None of the inferences changed, and it is highly unlikely that they will even in the countries where there were no weights available.