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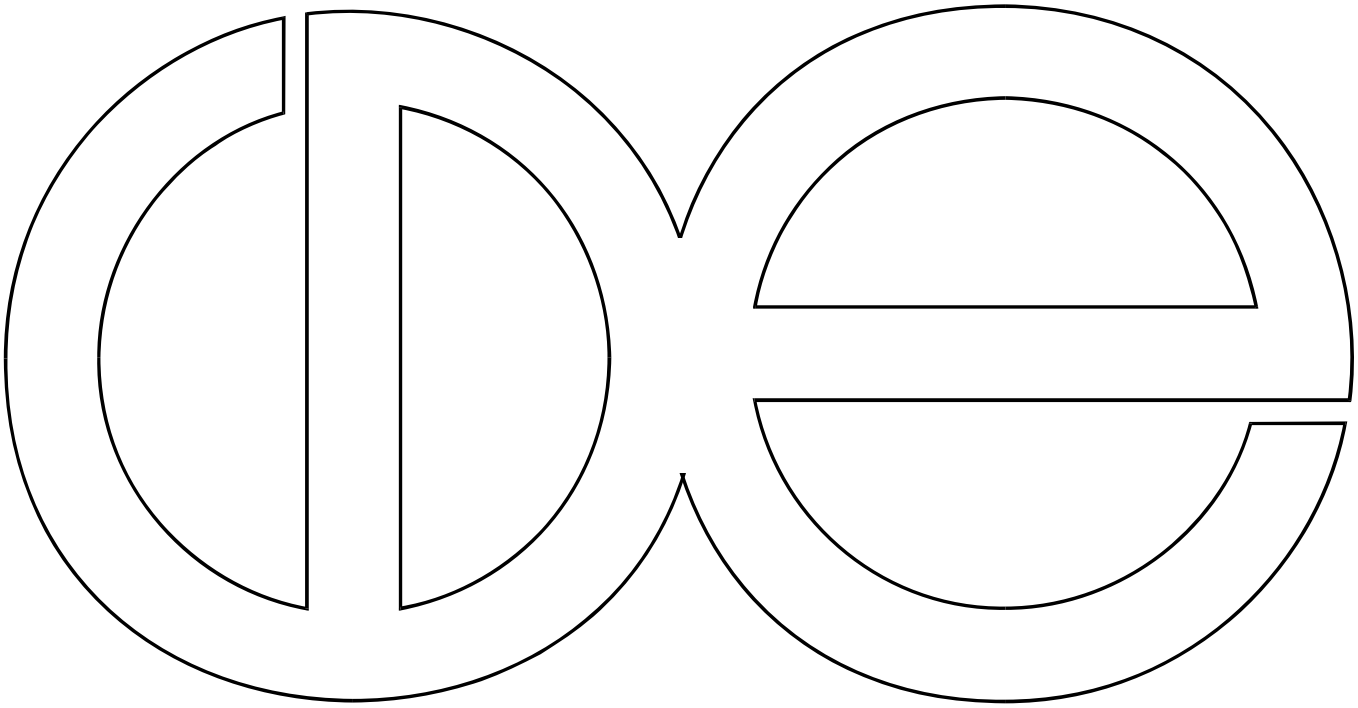

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Effect of Early Conditions on Disability among Elderly in Latin America and the Caribbean

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SHORT TITLE: Effect of Early Conditions on Disability

ABSTRACT

Poor early conditions have been associated with increasing risks of some non-communicable diseases such as diabetes, hypertension and cardiovascular disease during adulthood. On the other hand, these morbidity conditions are known as important risk factors for experiencing disabilities. This suggests that there must be at least indirect connections between early conditions and the risk of being disabled at older ages. The aim of the present study is to assess differentials in the risk of being disabled according to early conditions experienced by elderly populations in Latin America and the Caribbean (LAC), and to identify the underlying mechanisms related to non-communicable diseases. We find that poor early conditions have a strong effect on disability later in life. A significant proportion of these effects are attributable to higher probabilities of suffering chronic conditions, especially vascular diseases and vascular diseases associated with diabetes.

Key words: early conditions; chronic diseases; disabilities; aging; decomposition analysis

I. Introduction

Current cohorts of elderly people in Latin America and the Caribbean (LAC) are unique since their survival to old ages is due largely to medical interventions and to a lesser extent, to ameliorations in standards of living (Preston 1976; Palloni and Wyrick 1981). This means that most childhood morbidity responsible for the high levels of mortality preceding the deployment of medical improvements continued to affect these cohorts, albeit with substantially reduced lethality (Palloni et al. 2006). This historical regularity offers a target group of people among which the effect of poor early conditions can be captured at older ages because the selection phenomenon due to mortality must be significantly reduced. According to new data available for LAC countries, between 20%-40% of people over 60 years old report having suffered bad economic conditions prior to age 15 and around 20% report having gone hungry before the same age (SABE 2000; PREHCO 2000).

Early conditions refers to factors that affect growth and individual development such as nutritional status, exposure to and contraction of infectious diseases, exposure to stress and, more generally, experiences associated with family socioeconomic conditions which directly or indirectly modify the environments of early life. New empirical findings have increased our awareness of the effects of early conditions on later health. In recent studies, there is evidence suggesting that early malnutrition correlates strongly with risk of self-reporting diabetes among elderly people and that the experience of some diseases (e.g., rheumatic heart fever) is a strong predictor of adult heart disease (Palloni et al. 2006). Other studies show that exposure to systemic infections increases the risk of vascular diseases, Alzheimer's disease, ischemic heart disease and also accelerate the aging process (Elo and Preston 1992; Finch and Vaupel 2001). Rheumatic fever (RF) is a bacterial infection usually acquired around ages 6-15 and more likely

in poor households, which has effects later in life via the onset of rheumatic heart disease (RHD). Lower respiratory tract infections (most of which are produced by the streptococcus bacteria) are also correlated with higher risk of suffering obstructive lung diseases (such as chronic bronchitis, heart disease with underlying lung deficiency, asthma and emphysema) in adulthood (Elo and Preston 1992). There is also evidence that *Helicobacter Pylori* infection, a very common chronic bacterial infection prevalent among children living in crowded conditions in developing coutries, is strongly associated with increased risks of gastric cancer later in life (Blaser, Chyou and Nomura 1995; Go 2002).

There is also a growing body of research supporting the hypothesis that chronic diseases are among the main causes of disability and that the risk of being disabled increases almost exponentially with chronic conditions (Verbrugge et al. 1989; Fried et al. 1999). Also the severity of disability is associated with the number of illnesses, and there is evidence for the existence of mechanisms whereby interactions between specific diseases are the root cause of functional limitations (Fried et al. 1999).

The main goal of this study is to assess the effect of early conditions on the probability of being disabled among elderly in Latin America and the Caribbean (LAC) countries. If adverse early conditions do indeed increase the risk of chronic conditions and if these are the main cause of disability, it follows *per force* that there must be an **indirect** relation between early conditions and adult and old age disability. We estimate the magnitude of the total effects of early conditions on disability and partition them into direct and indirect (working through chronic conditions) components.

II. Data, Model Methods and Measurements

Nature of Database

We use data from the Puerto Rican Elderly: Health Conditions survey - PREHCO I, 2000 - (PREHCO, 2000) and from the survey of Salud, Bienestar y Envejecimiento en América Latina y El Caribe - SABE, 2000 (Peláez et al. 2003). The PREHCO study is a panel of a nationally representative sample of Puerto Rican adults over 60 years old. We use the first wave of the PREHCO study with a sample size of 4,293 individuals.

The SABE survey is a cross-sectional study of people aged 60 years and over which was carried out in 7 cities of Latin America and the Caribbean (Bridgetown, Barbados; Buenos Aires, Argentina; La Havana, Cuba; Mexico City, Mexico; Montevideo, Uruguay; Santiago de Chile, Chile; Sao Paulo, Brazil), in 1999-2000. Our analysis pools the seven cities but we include dummy variables for each city in the estimated models. The pooled SABE sample size is 10,602 individuals.

Model

Figure 1 displays the hypothesized relationships between early conditions and later disability status. Early conditions influence functional performance later in life **directly** (path EC-DS), because physical limitations experienced as adults could originate at birth or during early childhood. By the same token, early conditions have an **indirect** effect on the ability to perform daily activities (EC-LH-DS) by increasing the risk of experiencing diseases later life among whose secondary effects are disabilities.

FIGURE 1 ABOUT HERE

The role played by each component in the total effect of experienced poor early conditions is algebraically defined in the simple expression below:

$$pr_{x(d/pec)} = [\, pr_{x\,(d/pec,\,\tilde{I}i\,)} * pr_{x(\tilde{I}i/pec)}] + \Sigma_i\, [\, pr_{x\,(d/pec,\,Ii)} * pr_{x(Ii/pec)}] \qquad (1)$$

where:

$pr_{x(d/pec)}$ = *probability of being disabled (d) at age x, conditional on having experienced poor early conditions (pec);*

$pr_{x(d/pec,Ii)}$ = *probability of being disabled (d) at age x, conditional on having experienced poor early conditions (pec) and disability-related diseases (Ii);*

$pr_{x(Ii/pec,)}$ = *probability of experiencing disease(Ii) at age x, conditional on having experienced poor early conditions (pec);*

$pr_{x\,(d/pec,\tilde{I}i)}$ = *probability of being disabled (d) at age x, conditional on having experienced poor early conditions (pec) but with no experience of current disability-related diseases ($\tilde{Ii}$); and*

$pr_{x(\tilde{I}i/pec)}$ = *probability of not experiencing any disease ($\tilde{Ii}$) at age x conditional on having experienced poor early conditions (pec).*

Since the first product ($pr_{x\,(d/pec,\,\tilde{I}i\,)} * pr_{x(\tilde{I}i/pec)}$) is the probability of being disabled among those who experienced poor early conditions but who did not experience any of the disability-related chronic diseases at older ages, we label this component the "direct effect" of poor early conditions on the risk of being disabled and is a measure of γ (see Figure 1).

Similarly, the probability of being disabled for those who did not experience poor early

conditions can be decomposed as follows:

$$pr_{x\,(d/pe\tilde{c})} = [\, pr_{x\,(d/pe\tilde{c},\, \tilde{I}i\,)} * pr_{x(\tilde{I}i/pe\tilde{c})}] + \Sigma_i\, [pr_{x\ (d/pe\tilde{c},\, Ii)} * pr_{x\,(Ii\,/pe\tilde{c})}] \qquad (2)$$

where $pe\tilde{c}$ stands for good early conditions.

The total difference in the probability of being disabled between those who experience poor and good early conditions is algebraically defined in expression (3) below:

$$pr_{x(d/pec)} - pr_{x\,(d/pe\tilde{c})} = \Sigma_i\, [[\alpha^o_i - \alpha^n_i)] * \tfrac{1}{2}\, [\beta^o_i + \beta^n_i)] + [\beta^o_i - \beta^n_i] * \tfrac{1}{2}[\alpha^o_i + \alpha^n_i]] \qquad (3)$$

where the term α^o refers to $pr_{x\,(d/pec,\,Ii),\,,}$ α^n to $pr_{x\ (d/pe\tilde{c},\,Ii)\,,}$ β^o to $pr_{x(Ii/pec)\,,}$ and β^n to $pr_{x\,(Ii\,/pe\tilde{c}).}$ Note that the expression (3) also includes the group "$\tilde{I}i$" or individuals without chronic diseases (direct effect).

The first product in (3), $([\alpha^o_i - \alpha^n_i)] * \tfrac{1}{2}\, [\beta^o_i + \beta^n_i)])$, measures the contribution of the "disability component" to the total difference in the probabilities of being disabled between those who suffered poor and good early conditions. The second product, $([\beta^o_i - \beta^n_i] * \tfrac{1}{2}[\alpha^o_i + \alpha^n_i])$, is an estimate of the contribution of the "chronic disease component" to the total difference. The sum of these two components (by disease) is an estimate of the contribution of disease (i) to the total difference.

The conditional probabilities are estimated by means of two groups of regressions. The first group of regressions (logistic models) estimates the probabilities of being disabled conditional on suffering each chronic disease and on having experienced poor or good early conditions. The dependent variable is a dummy variable that equals 1 if the individual is disabled. The second

group of regressions (Multinomial Logistic Regressions) estimates the probabilities of experiencing each chronic disease conditional on early conditions. Both groups of regressions are adjusted for confounding effects that include current socio-economic status (income and level of education), behavioral variables (smoking) and, in addition, the standard demographic variables age and sex.

The dependent variable in the model for diseases is constructed through the interaction of the variables indicating if the individual suffers from each chronic disease and all their possible combinations. We consider chronic diseases purportedly related to both poor early conditions and disability status. Among these we include diabetes, vascular diseases (such as stroke, coronary disease, and hypertension), mental (psychological problems), respiratory diseases and, finally, rheumatism and arthritis (diseases of joints). The chronic diseases were interacted with each other in order to consider co-morbidities. Since some of the thirty two possible combinations of chronic diseases are very rare, we reclassify them in order to get empirically meaningfully groups. These are as follows: 1) individuals who experience only diseases of joints (rheumatism and arthritis); 2) those with only mental problems; 3) those with mental problems and diseases of joints; 4) those with diabetes only; 5) those with diabetes and mental problems and/or diseases of joints; 6) those with vascular diseases without diabetes; 7) those with vascular diseases and diabetes; 8) those with only respiratory diseases.

Measures of Disability and Early Conditions

We classify as disabled all individuals who self-report having at least one limitation in Activities of Daily Life (ADL) or Instrumental Activities of Daily Life (IADL). The ADLs considered are the standard ones, namely, going across the room, dressing oneself, taking a

shower, eating, getting up and laying down on bed, and going to the bathroom. The IADLs are preparing food, handling one's own money, going out, buying food and clothes, using telephone, accomplishing light home tasks, accomplishing heavy home tasks, and taking medications.

According to these definitions, the proportion of people 60 years and older with a limitation in at least one ADL or IADL (disabled individuals) is higher in Puerto Rico than in SABE cities (42% vs. 34%) and is higher among women in both samples. In addition, in both databases we find higher prevalence of disability among those who experienced poor early conditions (health and socio-economic) than among who did not.

Table 1 displays the variables used to assess various dimensions of early conditions. The variables were chosen according to their availability and their importance in the literature as markers of conditions with hypothetical influence on health status in later life (Bisno 1985; Barker et al. 1989; Elo and Preston 1992; Finch and Vaupel 2001; Factor-Litvak and Susser 2004; Palloni et al. 2006). We consider self-reports of both general conditions (including nutritional and socio economic status) as well as self-reports of experience with key illnesses during the first 15 years of life.

TABLE 1 ABOUT HERE

To use a parsimonious representation and to reduce the multidimensionality of the problem, we employ cluster analysis to identify groups of individuals who are homogeneous with respect to early experiences. Since we are identifying profiles (instead of identifying specific characteristics of early conditions for each individual) we reduce the problems associated with omitted variables of early conditions (for example some specific infectious diseases) that are

highly correlated with factors included in our models.

Different specifications were tried in order to achieve pure early conditions profiles for each database. In the PREHCO database, the early health condition variables are comprised of indicators for illnesses and health status during childhood, such as self reports of general health conditions, how often individuals experienced illness, and responses to questions eliciting experience with the specific diseases. Application of cluster analysis leads to the identification of two clusters classifying the sample into good and poor health status during childhood. Finally, to assess socio-economic conditions during early childhood we use self-reported household economic conditions before 15 years old.[1]

The cluster analysis carried out for the SABE database jointly considers SES, nutritional intake and the variables related to health conditions before age 15. We found three clearly distinct clusters. The first is characterized by people who mainly suffered the early diseases but with a non-well defined SES profile. The second cluster includes individuals with poor SES and poor nutritional intake. The third cluster is comprised of individuals who are healthy and with good socio-economic and nutritional status (before 15 years of age).

The proportion of individuals who experienced poor early conditions is higher among Puerto Rican elderly than in SABE cities. In Puerto Rico, 48% and 33% of individuals over 60 years old had experienced poor early health conditions and poor early socioeconomic conditions, respectively, whereas among SABE cities those percentages are around 20% (poor health status)

[1] We also applied cluster analysis considering all early socioeconomic variables available in PREHCO. However, the SES cluster has a high percentage of missing values (around 15%). We select only the variable "household economic situations before 15 years" since missing values amount to less than 1%. The results, however, are virtually identical to a model estimated with the cluster of early socioeconomic conditions.

and 14% (poor socioeconomic and nutritional status). We observed higher prevalence of poor early conditions among men for both databases but only when we evaluate socioeconomic status.

III. Results

Table 2 displays estimates for the logistic regressions where the dependent variable is disability. Since in the PREHCO database individuals who needed proxies to answer the questionnaire did not answer the section about early conditions, we estimated the models excluding those cases. They represent about 11% of the SABE sample and 13% of the PREHCO sample. In SABE cities it was possible to estimate the models with and without individuals who needed proxies but the results of the two models are very similar. In order to obtain comparable results between SABE cities and Puerto Rico, we only show results excluding individuals in need of proxies.

All effects on the probability of being disabled are as expected. The odds of having a functional limitation are higher among women, people who smoke, and individuals belonging to a lower socioeconomic class. Similarly, the odds of having functional limitations are highest among individuals who experience some illness, especially co-morbidities such as vascular diseases associated with diabetes or mental problems associated with diseases of the joints. Remarkably, the parameters of the variables proxying for poor early conditions are highly significant and properly signed for all countries, even after controlling for both confounding effects and the aforementioned diseases. This result suggests the existence of a direct effect of poor early conditions on functional status. The caveat is obvious: to the extent that we omit chronic conditions promoting disability (and related to early conditions) we will overestimate the direct effects on functional limitations. However, as observed in Figures 4a and 4b, the

probability of being "healthy" (in the absence of any of the aforementioned diseases) among those who experienced poor early conditions is lower than among those who did not. This suggests that in the group of "healthy" there are no chronic diseases affected by poor early conditions that were omitted or, at least, that their effects are of trifling importance.

TABLE 2 ABOUT HERE

The effects of early conditions on the risk of suffering from disability-related diseases are shown in Tables 3a,b (Puerto Rico) and 4a,b (SABE cities). In both Puerto Rico and SABE cities, poor early conditions increase the probability of experiencing each group of diseases, even after controlling for current socio-economic status, level of education, age and gender. This increase is more noticeable when we compare the effect of early health status with the effect of early socioeconomic conditions. For example, having experienced poor health status early in life increases the probability of suffering vascular diseases in Puerto Rico by 68%, whereas having experienced poor socioeconomic conditions early in life increases this probability by 51%. Among SABE cities these percentages are 67% and 30%, respectively.

Despite the fact that measures of early conditions are not strictly comparable between the two samples analyzed here, their effects on the probability of suffering chronic diseases are very similar. For both samples, poor early conditions have larger effects on the probabilities of experiencing mental and problems of the joints (together) and mental diseases alone. In SABE cities, respiratory disease is also strongly affected by poor early conditions mainly through early health status. We also verify that poor early conditions increase the probability of experiencing diabetes if it is associated with vascular diseases. Among individuals who experience only

diabetes, the effect of early conditions is non-significant (for both PREHCO and SABE). Since people who experience diabetes and are affected by poor early conditions are only those who also suffered diabetes-related complications, this result suggests an important regularity: poor early conditions affect the risk of experiencing diabetes with higher severity or experiencing the onset of diabetes at earlier ages, with increased accumulated consequences.

TABLE 3A ABOUT HERE

TABLE 3B ABOUT HERE

TABLE 4A ABOUT HERE

TABLE 4B ABOUT HERE

Decomposing the total difference in the probability of being disabled

Figure 2 displays the average probability of being disabled for all causes among those who have suffered from poor and good early conditions in Puerto Rico and SABE cities. We verify that in Puerto Rico the probability of being disabled among those who experience poor early conditions is about 64% higher than among those who did not. In SABE this percentage is about 28%. Note that the higher effect estimated for Puerto Rico occurs simultaneously with a higher proportion of people who experienced poor early conditions and are disabled.

FIGURE 2 ABOUT HERE

Figure 3 displays the contribution of each chronic disease to the total difference in the probability of being disabled between those who suffered poor early conditions and those who

did not. According to this analysis, vascular diseases explain around 50% of the total difference in the probability of being disabled in both SABE cities and Puerto Rico. Therefore, this group of diseases is the main mechanism through which poor early conditions affect disability. The second mechanism is vascular diseases associated with diabetes: this set of conditions explains 22% of the difference observed in SABE cities and 29% in Puerto Rico. Problems of the joints accounts for 14% of the difference estimated for SABE cities and almost 6% for Puerto Rico. Finally, mental problems explain 6% for SABE cities and 4% for Puerto Rico when they are considered together with diseases of the joints.

FIGURE 3 ABOUT HERE

Figures 4a and 4b display the disability component (black bars) and the chronic disease component (gray bars). For both countries, the "disability component" explains more than 80% of the total difference in the probability of being disabled (84% among SABE cities and 81% in Puerto Rico against 14% and 19% of "chronic disease component", respectively). We also observe that the larger impact of "vascular diseases" and "vascular diseases and diabetes" verified before is due to the higher importance of their disability component (black bars). The disability component related to vascular diseases explains around 40% of the total difference in the probability of being disabled in SABE and Puerto Rico (against 8% and 14% associated with the chronic disease component in both samples). For "vascular diseases and diabetes" this contribution is equal to 14% in SABE cities and 19% in Puerto Rico (against 9% and 11% for chronic disease component in both samples, respectively).

FIGURE 4A ABOUT HERE

FIGURE 4B ABOUT HERE

Table 5 summarizes the results of the decomposition analysis discussed in this section.

TABLE 5 ABOUT HERE

IV. Discussion

Our results suggest that having experienced some infectious diseases, poor socioeconomic status or malnutrition before the 15th birthday increases the probability of being disabled at older ages. These findings are consistent with conjectures about the nature and characteristics of elderly populations in Latin America and Caribbean countries. Current cohorts of elderly people in these countries have survived to old ages due largely to improvements in medical interventions and, to a much lesser extent, to ameliorations in standards of living. They represent a large proportion of individuals whose birth and development were significantly marked by poor early conditions, including precarious nutrition and exposure to infectious diseases such as tuberculosis, rheumatic fever, typhus fever, polio, and malaria among others. Therefore, it is among these cohorts where poor early conditions have a greater potential to express themselves and to induce direct and indirect effects on functional limitations later in life.

We find that the chronic diseases with stronger effects on the probability of being disabled are vascular diseases, mental problems together with diseases of the joints, and diabetes jointly with vascular diseases. This finding is consistent with the literature. Verbrugge and colleagues (1989) tested the impact of 13 chronic conditions and found that cerebrovascular disease (CVD)

is the (chronic) condition with the highest disability impact. Another study also found that heart disease and neurological disorders (e.g., stroke and Alzheimer's disease) have large effects on disability outcomes (Fried, et al. 1999).

In Puerto Rico the probability of being disabled among those who experience poor early conditions is about 63% higher than among those who do not. In SABE this percentage is about 22%. The main pathway through which poor early conditions affect functional status later in life involve vascular diseases, diabetes associated with vascular diseases, arthritis and rheumatism, and mental problems. There is evidence suggesting that diabetes and heart diseases (Barker 1998), joint problems (Blackwell, Hayward and Crimmins 2001) and neuropsychiatric problems (Factor-Litvak and Susser 2004) are affected by malnutrition and infectious diseases early in life. Exposure to systemic infections has been found to increase the risk of vascular diseases and ischemic heart disease and to accelerate the aging process (Finch and Vaupel 2001). We found that experiencing health problems early in life is the most significant early condition for most of the chronic diseases during adulthood and it overwhelms the effects of early socio-economic conditions.

Some caveats are in order. First, we are not testing the existence of a "critical period" linking early conditions with health and disability later in life. According to Barker's hypothesis (Barker 1998), adverse early conditions associated with very early growth and development trigger programming mechanisms that increase the risk of a number of chronic conditions later in life. Life style habits and compensating exposure and/or purposeful treatment after the "critical period" can only partially mitigate (enhance) the consequences of the initial process but cannot reverse the overall effects. In the present study, we are simply trying to identify profiles of early health, nutritional and SES status that increase the probability of being disabled later in life, not

necessarily because they occurred during critical periods. Even though our variables reflect well the conditions during a very important period (first 15 years of life) for the physical and cognitive development of the individual, we cannot identify separately what part of the effects are attributable to incidents and events that occurred during selected critical periods. Neither are we able to follow up the entire trajectory of the individuals who we study. Since we are controlling for current characteristics which are, in part at least, consequences of these trajectories, we are, to some extent, isolating the effects before age 15. Second, although our findings seem to be highly consistent with the literature about early conditions and morbidity profiles of disabled people, they are admittedly fragile since errors in self reports and recall errors could impart substantial biases. As is well known, the main problem with self reports of childhood events is that they are subject to recall bias which, in most cases, will induce attenuation of estimated effects. Accurate recall of illnesses that affected the individual during early life will be more likely to the extent that typical symptomatology is more acute and visible and/or was the origin of traumatic experiences for the individual and his family. Thus, for example, biases in self reported experiences with polio or rheumatic fever are less likely than self-reports of more recurrent disorders and ailments such as digestive illnesses, influenza or dysentery. Self-reported conditions (health status and illnesses) are also distorted by perceptions as well as by lack of information (in many cases these are the result of conditions that predispose individuals to higher risk of the diseases).

Even though our contribution is restricted to early conditions that we can actually measure with data available to us, we believe we are breaking new ground. To our knowledge there are no studies investigating the effect of early conditions on the probability of experiencing difficulties performing ADLs or IADLs and the importance of the disability-related chronic diseases.

Furthermore, our study focuses on countries of the Latin American and Caribbean region, where extant research on adult health and elderly conditions is, to say the least, scarce. In this sense this study informs the literature on early conditions by producing a body of evidence for a region of the world that up to now has been only superficially investigated.

Acknowledgments

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Table 1.

Variables of Early Conditions Included in the Model of

Physical Limitation and Each Chronic Disease

Variable	*PREHCO*	*SABE*
1. NUTRITIONAL STATUS		
Was there a time in which you did not eat enough and that you were hungry?	-	Dummy Variable equal to 1 if individual did not eat enough
2. HEALTH STATUS		
2.1. GENERAL HEALTH		
How would you say was your health when you were child or adolescent?	Excellent, Very good, Good, Regular, Bad	Dummy Variable equal to 1 if health status is poor and equal to zero if it is excellent or good
During the first 15 years of your life, were you confined to a bed for a month or more because of a health problem?	-	Dummy Variable equal 1 if individual was confined to a bed.
When you were a child or adolescent did you stop doing something that a child of your age used to do because of health problems?	Often, Sometimes, Never	-
When you were a child or adolescent did you skip classes or work because health problems?	Never, Once, Sometimes, Never	-
2.2. INFECCIOUS DISEASES		
Nephritis (kidney diseases)	-	Dummy Variable
Dengue	Dummy Variable	-
Pneumonia	Dummy Variable	-
Asthma	Dummy Variable	Dummy Variable
Bronchitis	Dummy Variable	Dummy Variable
Rheumatic fever	Dummy Variable	Dummy Variable
Malaria	Dummy Variable	-
Hepatitis	Dummy Variable	Dummy Variable
Typhus fever	Dummy Variable	-
Polio	Dummy Variable	-
Tuberculosis	Dummy Variable	-
3. SOCIOECONOMIC STATUS		
Home economic situation before 15 years old	Good, Regular, Bad	Dummy variable equal to 1 if socioeconomic conditions before 15 years old were bad.

Table 2

Statistics of Adjusted Logistic Regression of Functionality

PUERTO RICO and SABE cities[ΨΨ]

Dependent Variable: Being Disabled[Ψ]	PREHCO		SABE	
	Coefficient		Coefficient	
Health Status (Early condition)	0.47	***	0.43	***
Nutritional and Socioeconomic Status (Early condition)			0.44	***
Socioeconomic Condition (Early condition)	0.20	**		
Sex (ref. Male)	0.50	***	0.78	***
Age	0.06	***	0.07	***
do not write (ref. write)	0.54	***		
Years of Education			-0.05	***
First quartile family income (per capita)	0.55	***		
Second quartile family income (per capita)	0.53	***		
Third quartile family income (per capita)	0.40	***		
Never smoked	-0.25	***	-0.22	***
Joints (without Vascular, Diabetes and Mental)	0.88	***	0.85	***
Mental (Without Vascular, Diabetes and Joints)	1.26	***	0.68	***
Mental and Joints (Without Vascular and Diabetes)	**1.76**	***	**1.07**	***
Diabetes (Without Join, Mental and Vascular)	0.50	ns	0.51	***
Diabetes and Mental and/or Joints (Without Vascular)	1.16	***	0.75	***
Vascular (Without Diabetes)	**1.31**	***	**1.05**	***
Vascular and Diabetes	**1.74**	***	**1.40**	***
Respiratory (Without Vascular, Diabetes, Mental and Joints)	0.73	*	0.51	**
Barbados (country of reference Argentina)			-0.37	***
Brazil (ref. Argentina)			0.00	ns
Chile (ref. Argentina)			-0.07	ns
Cuba (ref. Argentina)			-0.22	**
Mexico (ref. Argentina)			-0.08	ns
Uruguay (ref. Argentina)			-0.42	***
Constant	-8.03	***	-7.08	***

* P-value < 0.10 ** p-value < .05 *** p-value < 0.01 NS non-significant

[Ψ] Disabled individuals are who are deficient in at least one ADL of IADL.

[ΨΨ] Excludes individuals with cognitive problems.

Table 3a

Statistics of Adjusted Multinomial Logistic Regression

Chronic Diseases, Puerto Rico[ΨΨ]

Independent Variables	Joints		Mental		Mental+Joints		Diabetes	
Health Status (EC)	0.17	ns	0.78	***	1.03	***	-0.08	ns
Socioeconomic Status (EC)	0.21	ns	0.31	ns	0.69	**	0.01	ns
Do not write	0.14	ns	-0.23	ns	0.09	ns	0.48	ns
First quartile family income (per capita)	0.10	ns	0.89	**	1.07	**	-0.55	ns
Second quartile family income (per capita)	0.55	***	0.94	**	0.89	*	0.15	ns
Third quartile family income (per capita)	0.28	ns	1.08	***	0.89	**	0.03	ns
Sex	0.93	***	-0.11	ns	1.76	***	-0.22	ns
Age	0.04	***	-0.09	***	0.00	ns	0.00	ns
Never Smoked	0.00	ns	-0.47	*	-0.13	ns	0.09	ns
Constant	-4.91	***	3.87	**	-6.25	***	-1.62	ns

* p-value < 0.10 ** p-value < .05 *** p-value < 0.01 NS non-significant

[ΨΨ] Excludes individuals with cognitive problems.

Source: PREHCO, 2003.

Table 3b

Statistics of Adjusted Multinomial Logistic Regression

Chronic Diseases, Puerto Rico[ΨΨ]

Independent Variables	Diabetes + Mental and/or Joints		Vascular		Vascular + Diabetes		Respiratory (only)	
Health Status (EC)	0.46	**	0.52	***	0.64	***	0.53	*
Socioeconomic Status (EC)	0.22	ns	0.41	***	0.35	**	0.13	ns
Do not write	0.54	ns	0.09	ns	0.14	ns	0.24	ns
First quartile family income (per capita)	0.95	***	0.33	**	0.27	ns	-0.59	ns
Second quartile family income (per capita)	0.99	***	0.38	**	0.29	ns	-0.04	ns
Third quartile family income (per capita)	0.63	*	0.29	**	0.11	ns	-0.48	ns
Sex	0.82	***	0.76	***	0.79	***	0.63	**
Age	-0.01	ns	0.02	***	0.01	ns	-0.02	ns
Never Smoked	-0.23	ns	-0.11	ns	-0.02	ns	-0.78	**
Constant	-3.53	**	-2.31	***	-2.20	***	-1.80	ns

* p-value < 0.10 ** p-value < .05 *** p-value < 0.01 NS non-significant

[ΨΨ] Excludes individuals with cognitive problems.

Source: PREHCO, 2003.

Table 4a

Statistics of Adjusted Multinomial Logistic Regression

Chronic Diseases, SABE cities[ΨΨ]

Independent Variables	Joints		Mental		Mental +Joints		Diabetes	
Health Status (EC)	0.48	***	1.07	***	0.62	***	-0.39	*
Nutritional and Socioeconomic Status (EC)	0.46	***	0.68	***	0.40	ns	-0.14	ns
Years of schooling	-0.01	Ns	0.01	ns	0.00	ns	-0.04	**
Sex	0.81	***	0.29	*	1.70	***	-0.14	ns
Age	0.02	***	-0.02	ns	-0.03	**	-0.01	ns
Never smoked	-0.11	Ns	-0.07	ns	-0.60	***	0.24	ns
Barbados (country of reference Argentina)	-0.51	***	-0.34	ns	-1.46	***	0.07	ns
Brazil (ref. Argentina)	-1.13	***	0.58	ns	-0.58	*	-0.24	ns
Chile (ref. Argentina)	-1.09	***	1.03	**	-0.60	*	0.23	ns
Cuba (ref. Argentina)	-0.13	Ns	0.44	ns	0.36	ns	0.00	ns
Mexico (ref. Argentina)	-1.32	***	-0.11	ns	-1.34	***	0.83	** *
Uruguay (ref. Argentina)	-0.42	***	0.41	ns	-0.57	*	-0.31	ns
Constant	-2.15	***	-1.89	**	-0.81	ns	-1.40	*

* p-value < 0.10 ** p-value < .05 *** p-value < 0.01 ns non-significant

[ΨΨ] Excludes individuals with cognitive problems.

Source: SABE, 2000.

Table 4b

Statistics of Adjusted Multinomial Logistic Regression

Chronic Diseases, SABE cities[ΨΨ]

Independent Variables	Diabetes + Joints or Mental		Vascular		Vascular + Diabetes		Respiratory (only)	
Health Status (EC)	0.42	**	0.51	***	0.60	***	1.14	***
Nutritional and Socioeconomic Status (EC)	0.16	ns	0.26	***	0.30	**	0.34	ns
Years of schooling	-0.04	**	0.00	ns	-0.04	***	-0.01	ns
Sex	1.07	***	0.72	***	0.87	***	-0.10	ns
Age	0.00	ns	0.01	***	0.00	ns	0.00	ns
Never smoked	-0.03	ns	-0.13	**	-0.08	ns	-0.36	*
Barbados (country of reference Argentina)	0.80	**	-0.45	***	0.18	ns	-0.51	ns
Brazil (ref. Argentina)	-0.20	ns	-0.24	**	0.10	ns	0.87	**
Chile (ref. Argentina)	-0.40	ns	0.12	ns	-0.03	ns	0.79	*
Cuba (ref. Argentina)	0.86	**	-0.15	ns	0.15	ns	0.18	ns
Mexico (ref. Argentina)	-0.11	ns	-0.77	***	-0.33	*	0.15	ns
Uruguay (ref. Argentina)	0.23	ns	-0.31	***	-0.21	ns	0.40	ns
Constant	-3.19	***	-0.21	ns	-1.12	***	-2.73	***

* p-value < 0.10 ** p-value < .05 *** p-value < 0.01 ns non-significant

[ΨΨ] Excludes individuals with cognitive problems.

Source: SABE, 2000.

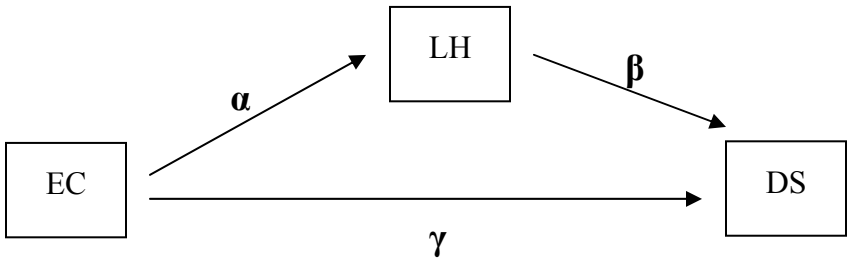
Table 5

The Importance of Direct and Indirect Effects to Explain the Total Difference in Disability between Individuals who Experienced Poor and Good Early Conditions

Components	SABE			PREHCO		
	Chronic Disease Component	**Disability Component**	**Total**	**Chronic Disease Component**	**Disability Component**	**Total**
TOTAL (Direct + Indirect)	**16%**	**84%**	**100%**	**19%**	**81%**	**100%**
DIRECT effects	**-11%**	**10%**	**-1%**	**-6%**	**7%**	**1%**
INDIRECT effects of EC attributable to:	**27%**	**74%**	**101%**	**25%**	**74%**	**99%**
Joints	3%	10%	14%	-2%	8%	6%
Mental	5%	2%	6%	0%	2%	2%
Mental + Joints	2%	2%	4%	4%	1%	4%
Diabetes	-3%	1%	-2%	-2%	2%	0%
Diabetes + (Mental and/or Joints)	0%	2%	2%	0%	3%	3%
Vascular	8%	43%	51%	14%	39%	53%
Vascular + Diabetes	9%	14%	22%	11%	19%	29%
Respiratory	3%	1%	4%	0%	1%	1%

Figure 1

Diagram of the Relation between Early Conditions and Later Functional Status



EC: early conditions

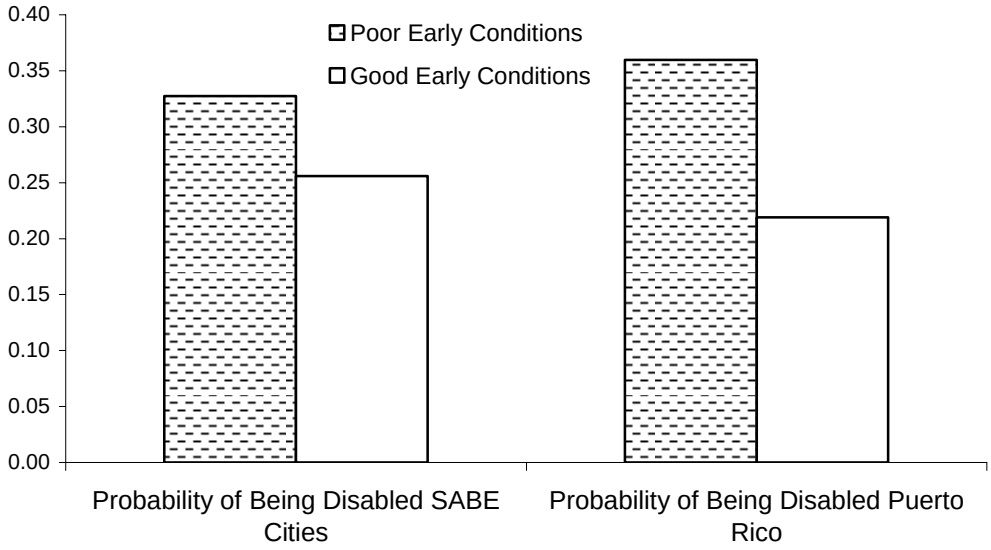
LH: Later health (in adulthood and old ages)

DS: Disability status (disabled or active in adulthood and old ages)

Figure 2

Probability of Being Disabled Conditional on Early Conditions

Puerto Rico and SABE cities[ΨΨ]

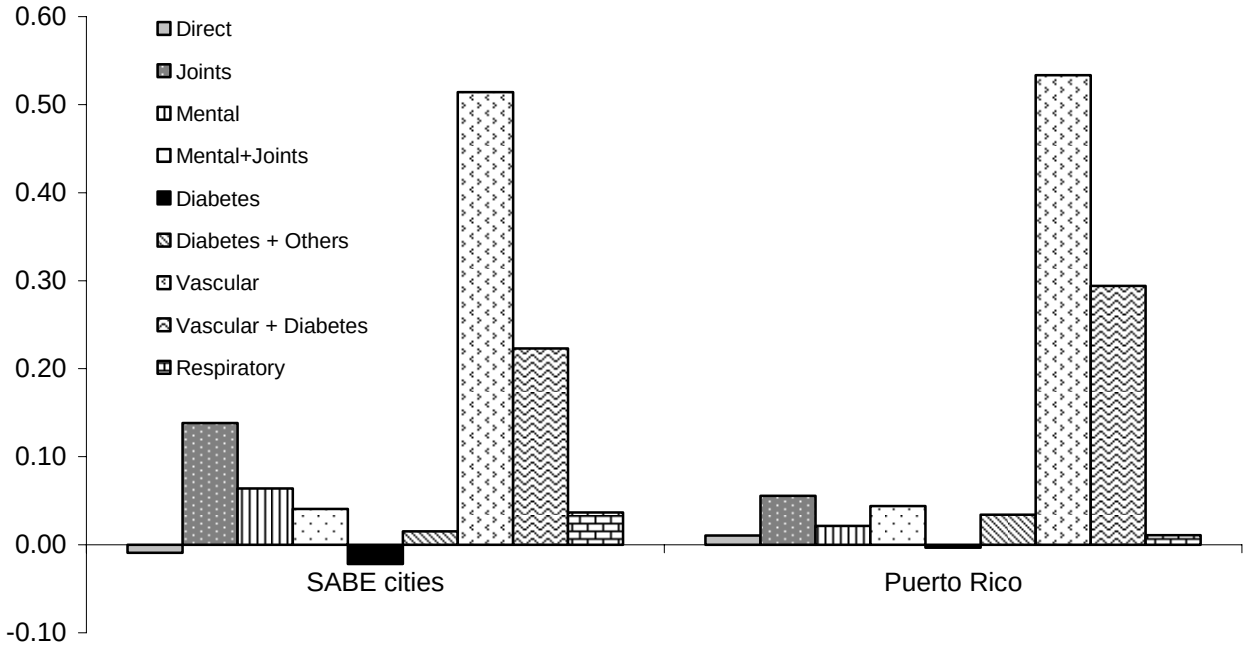


Source: PREHCO, 2003 and SABE 2000.

[ΨΨ] Excludes individuals with cognitive problems.

Figure 3

Contribution of Each Chronic Disease to the Total Difference in the Probabilities of being Disabled between those with Poor and Good Early Conditions[ΨΨ]

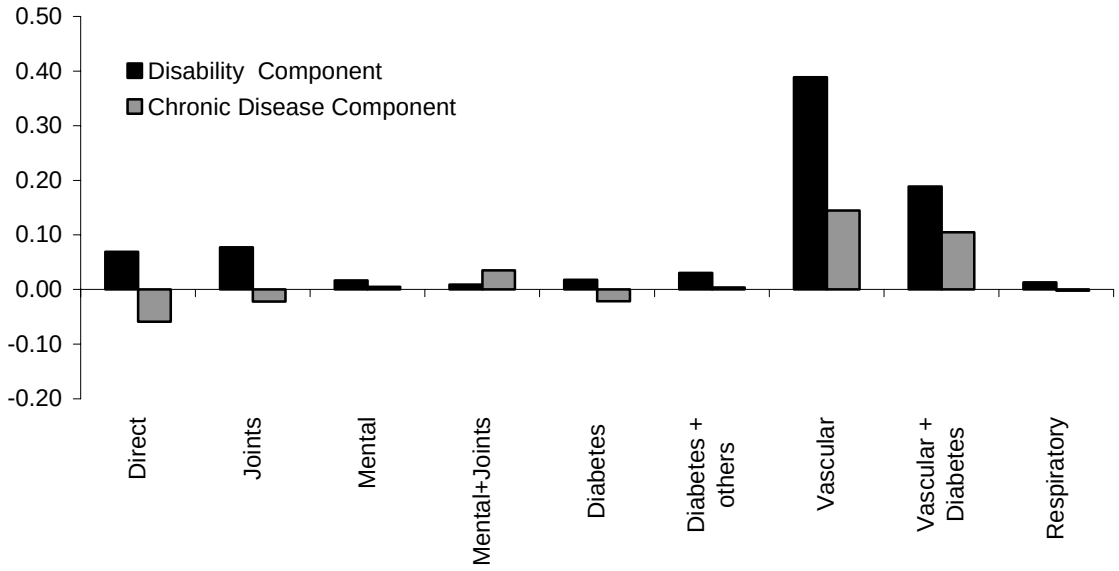


Source: PREHCO, 2003 and SABE 2000.

[ΨΨ] Excludes individuals with cognitive problems.

Figure 4a

Decomposition of Differences in Probabilities of Being Disabled between those with Poor and Good Early Conditions by Disease - Puerto Rico[ΨΨ]

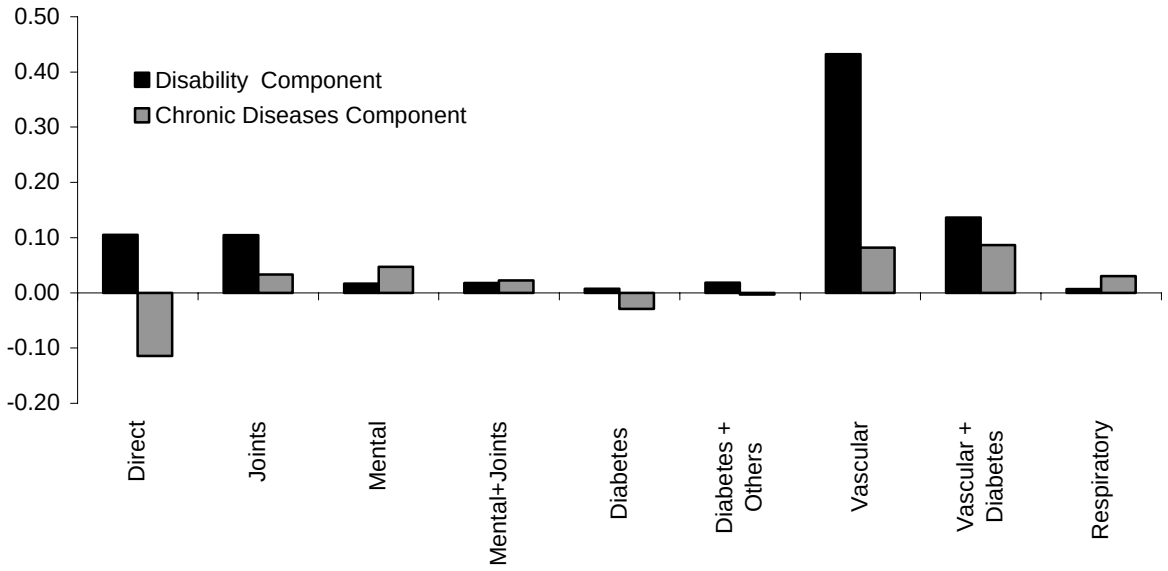


Source: PREHCO, 2003.

[ΨΨ] Excludes individuals with cognitive problems.

Figure 4b

Decomposition of Total Relative Probability of Being Disabled Due to Poor Early Conditions by Disease - SABE Cities[ΨΨ]



Source: SABE, 2000.

[ΨΨ] Excludes individuals with cognitive problems.

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