A NEW CONCEPTUAL FRAMEWORK FOR SOCIOECONOMIC CONDITIONS DURING THE LIFE CYCLE AS DETERMINANTS OF HEALTH OF ELDERLY

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ABSTRACT

Throughout the twentieth century, the demographic dynamics established significant changes leading towards a fast population aging process ever seen in modern times. This process, on turn, has brought about socioeconomic consequences at both individual and collective level. Comprehension of the association between this process and health conditions is then crucial.

First objective of this thesis is to propose an analytical framework in order to provide an overview of such association. The second objective is to examine the relationships between socioeconomic conditions over the life cycle of the elderly and three different dimensions of health measurement: chronic diseases, disability and health self-assessment. Data used are from the SABE project for the municipality of Sao Paulo and modeling was made using Poisson Regression and Ordered Logistic Regression.

Results showed that cognitive impairment, high medicine consumption at middle age, smoking and lack of physical activity are the main determinants of adverse health conditions whatever the health measurement type used. Despite the communality, there are also specific determinants for each dimension of health that appear in all life cycles. Thus, policies towards reducing social and economic inequalities in childhood, adultness or at late age stages will have different impacts depending on the dimension used to measure health. For example, preventive attitudes such as immunization against infectious diseases during childhood -given the correlations found- could promote reduction in prevalence of chronic diseases and functional impairment at later ages. Similarly, investments in education and access to good health care services can assure a more positive self health assessment among the elderly.

The conceptual frame proposed provides a kind of roadmap helpful for a better understanding of the mechanisms behind past and current socioeconomic and health conditions of the elderly people and the way they evolve throughout life. Also, this framework defines the set of information to be collected in order to built a better understanding of wellbeing and health determinants for the elderly population.

Keywords: *Elderly, Health, Socioeconomic Determinants.*

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1 INTRODUCTION

One of the most important demographic events during the XX century in the developing world has been the sustained fertility decline and consequently the process of aging population derived from this phenomenon. Furthermore, in the same period, expressive mortality declines have been observed in advanced age groups implying longevity increments (Kannisto et al. 1994, Vaupel, 1986).

Both phenomena bring consequences. From an individual point of view, aging increases health conditions that limit autonomy and wealth. From a social point of view, aging has impacts in all social systems, particularly in health care systems, as those conditions usually require complex and expensive interventions (Kalache et al. 1987). Consequences may be of greater magnitude in less developed countries (LDC) where the aging process is happening faster (Palloni & Peláez, 2003).

Thus, understanding the socioeconomic mechanism that determines the health conditions among the elderly is crucial to elaborate policies that could minimize the impacts on individuals and society. This is a complex issue, as morbidity conditions of the elderly are known to be correlated in multiple aspects. Even with many studies about it, mechanisms that relate socioeconomic conditions and health are not yet clear. Particularly for LDC, where lack of information makes the understanding of those relations a great challenge (Abodering *et al*., 2002).

This proposal aims to draw a conceptual framework on the interaction of socioeconomic conditions over the lifetime of individuals for understanding how the health of the elderly is assembled. In the light of this framework, statistical modeling of associations between socioeconomic variables and three different dimensions of health of the elderly are developed. The application is made for the city of Sao Paulo using Project SABE (available for 2000).

2. A NEW CONCEPTUAL FRAMEWORK FOR LIFETIME SOCIOECONOMIC BACKGROUND AS HEALTH DETERMINANTS OF THE AGED

To develop a conceptual framework of mechanisms that determine the health of the aged the perspective of the life cycle has to be considered because different health conditions are not necessarily a result from the same socioeconomic process (Abodering et al, 2002). There are many studies and examples about this theme Dahlgren & Whitehead (1991), Mackenbach et al. (1994), Marmot & Wilkinson (1999), Diderichsen, Evans & Whitehead (2001), Crimmins & Seeman (2004), Graham & Power (2004) e CSDH (2005a). Although most of these articles do not focus specifically in population of the elderly, all of them contribute to the comprehension of this theme. Nevertheless, the comprehension of mechanisms that determine the health of the elderly is not clear yet.

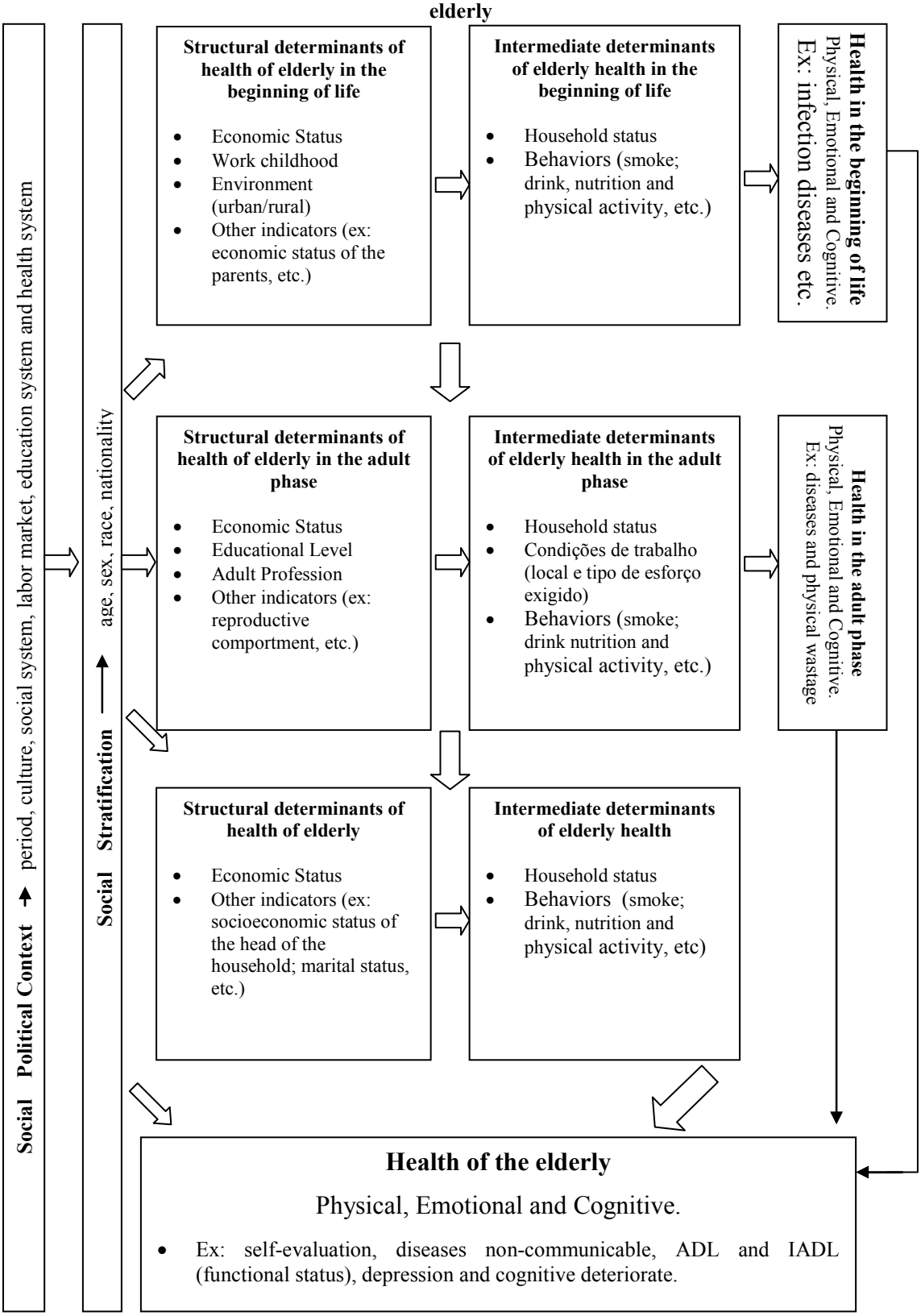
According to CSDH (2005), to define a conceptual framework the researcher should: a) clarify the mechanism of the determinants that generate health inequality; b) demonstrate how the principal determinants interact among themselves; c) identify which determinants are more important; and d) establish the specific levels of intervention among those determinants.

Based on CSDH's recommendations, considering main points of the available frameworks (Abodering et al, 2002; Crimmins & Seeman, 2004; Graham & Power, 2004; CSDH, 2005) and seeking additional evidence, this section proposes an alternative conceptual framework.

The conceptual framework proposed considers four principal aspects (FIG. 1 allows a better comprehension of the proposal). The first one refers to macro level conditions, where socioeconomic, political, cultural, environmental dimensions and health services are manifested at the individual level, resulting in social stratifications in all phases of life and at different risks of morbidity among the elderly (left side of FIG. 1). The second is about socioeconomic and health conditions at the beginning of life, influencing the socioeconomic and health aspects in the following phases (upper part of FIG 1). The third aspect refers to the adult phase, in which dimensions like income, occupation, education and exposure to infectious diseases lead to different socioeconomic and morbidity conditions in the elderly phase (middle part of FIG.1). The fourth aspect is about conditions at older age, acting like direct determinants of health condition (bottom part of FIG.1).

It is important to point out that conditions at the beginning of life and in the adult and aged phase have also structural and intermediate determinants of health. It is necessary to clarify such subdivision due to the different perspectives of public policy interventions in each one of these spheres.

FIGURE 1 - Framework theory on socioeconomic conditions throughout life as determinants of health of elderly



Reference: Based on conceptual frameworks by Abodering et al (2002), Crimmins & Seeman (2004), Graham & Power (2004) and *CSDH* (2005).

3 METHODOLOGY

3.1 Data source - SABE

Data are from the project Health, Wealth and Aging in Latin America and the Caribbean - SABE developed by the Pan American Health Organization (2000).

3.2 The conceptual framework and the available information in SABE

The possible interactions between the socioeconomic conditions during the life cycle and health of aged mentioned before were tested using the SABE Survey. We have two challenges. Firstly, to select the most adequate available indicators from a survey that was not designed for the purpose of this framework. Secondly, to evaluate the statistical models concerning objective analysis. The indicators and relationships are on section 4.

3.3 Proposed models based on the conceptual framework

As we are interested in the elderly health, the first step was to define the dependent variables. Three were selected: number of diseases, functional incapacity and self-rated health status, which represents the principal dimensions of health detached by Blaxter, (1989).

The second step was the hierarchical organization of the independent variables. So for each dependent variable it was proposed four multivariate models. The first one takes into account the variables related to the individuals (age, sex, race, nationality, cognitive impairment) which have strong influence from the political context. In the second we add information related to the beginning of the life cycle. In the third model we consider the information about the adult phase and in the fourth model we add the socioeconomic conditions of the elderly.

4 RESULTS

The models at TAB. 1 show that the elderly women aged 70 and over, with cognitive problems, that experienced higher charge of diseases in childhood and higher consumption of drugs in adult phase, have a considerably higher expected number of diseases. Nevertheless, elderly living in little households, with private health insurance, married, smoked & stopped and did not do physical activity are also exposed to a higher number of diseases.

The models at TAB. 2 show that the functional incapacity is higher in elderly aged 70 and over, with cognitive problems, females, and white. The hazard is also higher to aged elderly that experienced hunger, higher charge of diseases in childhood and higher consumption of drugs in adult phase. Finally, those that have low income, smoked & stopped, did not do physical activity and were not well-nourished also show a higher level of functional incapacities.

TABLE 1 - Estimated Coefficients from the models of Poisson Regression for the number of diseases

Independent Variables	Sao Paulo			
	Model 1	Model 2	Model 3	Model 4
Individual Characteristics				
nationality (ref. natural)	0,03	0,07	0,06	0,06
age				
70-79 years (ref. 60-69 years)	0,10***	0,10***	0,16***	0,14***
80 + (ref. 60-69 years)	0,07	0,08*	0,14***	0,10*
informant (ref. other informant)	-0,14***	-0,14***	-0,15***	-0,11**
women (ref. men)	0,29***	0,30***	0,25***	0,30***
race				
black (ref. white)	-0,03	-0,05	-0,04	-0,05
others (ref. white)	-0,07	-0,09	-0,07	-0,08
Conditions in the beginning of life				
rural residence at birth (ref. urban residence at birth)		0,04	0,05	0,04
worked in childhood (ref. didn't worked in childhood)		0,02	0,03	0,01
hungry in childhood (ref. not hungry in childhood)		0,07	0,06	0,05
number of diseases in childhood		0,06***	0,06***	0,05***
Conditions in the adult phase				
education				
1 to 8 years of education (ref. 9 years of education)			-0,02	-0,06
0 years of education (ref. 9 years of education)			0,01	-0,05
occupactional status				
profession ativ. pred. mental (ref. profession ativ. physical predominance)			0,05	0,06
other situation (ref. profession ativ. physical predominance)			0,07	0,05
consumption of drugs in adulthood phase			0,12	0,11***
Conditions in the elderly phase				
income/wages				
>3 and < 5 mw (ref. > 5 mw)				-0,02
> 1 and < 3 mw (ref. > 5 mw)				0,07
< 1 mw (ref. > 5 mw)				0,12**
without wages (ref. > than 5 mw)				-0,05
number of people in the household				-0,02*
marital status				
widow (ref. married)				-0,06
divorced; single (ref.married)				-0,21***
without private health insurance(ref.private health insurance)				-0,07*
smoke				
smoked and stopped (ref. smoke)				0,18***
never smoked (ref. smoke)				0,08
not well-nourished (ref. well-nourished)				0,06
no regular physical activity (ref. regular physical activity)				0,23***
sample size	*1940*	*1940*	*1940*	*1940*
log likelihood	-3.063,7	-3.053,6	-3.007,5	-2.976,3
pseudo R2	*0,0129*	*0,0162*	*0,0310*	*0,0410*

Data base: SABE - Sao Paulo - 2000

***p < 0,01; **p < 0,05; p*< 0,1

TABLE 2 - Estimated Coefficients from the models of Logistic Regression Ordered for functional incapacity

Independent Variables	Sao Paulo			
	Model 1	Model 2	Model 3	Model 4
Individual Characteristics				
nationality (ref. natural)	-0,22	-0,13	-0,16	-0,14
age				
70-79 years (ref. 60-69 years)	0,59***	0,61***	0,67***	0,65***
80 + (ref. 60-69 years)	1,28***	1,34***	1,37***	1,26***
informant (ref. other informant)	-1,37***	-1,38***	-1,31***	-1,20***
women (ref. men)	0,75***	0,80***	0,65***	0,61***
race				
black (ref. white)	-0,08	-0,19	-0,24*	-0,30**
others (ref. white)	-0,11	-0,18	-0,19	-0,21
Conditions in the beginning of life				
rural residence at birth (ref. urban residence at birth)		0,19*	0,08	0,04
worked in childhood (ref. didn't worked in childhood)		0,14	0,07	0,04
hungry in childhood (ref. not hungry in childhood)		0,32***	0,28**	0,28**
number of diseases in childhood		0,10***	0,11***	0,12***
Conditions in the adult phase				
education				
1 to 8 years of education (ref. 9 years of education)			0,31	0,11
0 years of education (ref. 9 years of education)			0,50**	0,13
occupactional status				
profession ativ. pred. mental (ref. profession ativ. physical predominance)			-0,30	-0,22
other situation (ref. profession ativ. physical predominance)			0,09	0,06
consumption of drugs in adulthood phase			0,22***	0,18***
Conditions in the elderly phase				
income/wages				
>3 and < 5 mw (ref. > 5 mw)				0,55***
> 1 and < 3 mw (ref. > 5 mw)				0,51***
< 1 mw (ref. > 5 mw)				0,61***
without wages (ref. > than 5 mw)				0,69***
number of people in the household				0,04
marital status				
widow (ref. married)				0,07
divorced; single (ref.married)				0,00
without private health insurance(ref.private health insurance)				-0,12
smoke				
smoked and stopped (ref. smoke)				0,29*
never smoked (ref. smoke)				0,02
not well-nourished (ref. well-nourished)				0,52***
no regular physical activity (ref. regular physical activity)				1,31***
sample size	*1940*	*1940*	*1940*	*1940*
log likelihood	-1694,9	-1683,7	-1661,5	-1594,0
pseudo R2	0,0914	0,0974	0,1093	0,1455

Data base: SABE - Sao Paulo - 2000
***p < 0,01; **p < 0,05; p*< 0,1

Models in Table 3 present that there is a bigger chance of negative health evaluation among foreign elderly who have cognitive problems, are black and lived in rural areas during their childhood. There are also some higher probabilities to negatively evaluate the elderly health that own lower instruction levels and had a higher medication consume in the adult phase.

Besides that, elderly who live in bigger households are married, do not have a health insurance, smoked & stopped, and do not practice physical activities regularly are also susceptible to evaluate their state of health more negatively.

TABLE 3 - Estimated Coefficients from the models of Logistic Regression Ordered for self-rated of health

Independent Variables	Sao Paulo			
	Modelo 1	Modelo 2	Modelo 3	Modelo 4
Individual Characteristics				
nationality (ref. natural)	0,06	0,13	0,12	0,26*
age				
70-79 years (ref. 60-69 years)	0,11	0,12	0,16	0,14
80 + (ref. 60-69 years)	0,02	0,02	0,02	-0,00
informant (ref. other informant)	-0,70***	-0,66***	-0,59***	-0,48***
women (ref. men)	0,09	0,20**	0,00	0,06
race				
black (ref. white)	0,55***	0,37***	0,31***	0,24*
others (ref. white)	0,10	-0,08	-0,06	-0,13
Conditions in the beginning of life				
rural residence at birth (ref. urban residence at birth)		0,61***	0,48***	0,41***
worked in childhood (ref. didn't worked in childhood)		0,13	-0,01	-0,02
hungry in childhood (ref. not hungry in childhood)		0,26***	0,19*	0,12
number of diseases in childhood		0,05	0,05	0,05
Conditions in the adult phase				
education				
1 to 8 years of education (ref. 9 years of education)			0,69***	0,49***
0 years of education (ref. 9 years of education)			0,81***	0,42**
occupactional status				
profession ativ. pred. mental (ref. profession ativ. physical predominance)			-0,21	-0,12
other situation (ref. profession ativ. physical predominance)			-0,11	-0,14
consumption of drugs in adulthood phase			0,27***	0,25***
Conditions in the elderly phase				
income/wages				
>3 and < 5 mw (ref. > 5 mw)				0,32**
> 1 and < 3 mw (ref. > 5 mw)				0,37***
< 1 mw (ref. > 5 mw)				0,58***
without wages (ref. > than 5 mw)				0,57***
number of people in the household				0,05**
marital status				
widow (ref. married)				-0,21*
divorced; single (ref.married)				-0,16
without private health insurance(ref.private health insurance)				0,22**
smoke				
smoked and stopped (ref. smoke)				0,29**
never smoked (ref. smoke)				-0,08
not well-nourished (ref. well-nourished)				1,27***
no regular physical activity (ref. regular physical activity)				0,59***
sample size	*1940*	*1940*	*1940*	*1940*
log likelihood	-2395,9	-2367,5	-2323,0	-2254,5
pseudo R2	0,0114	0,0232	0,0415	0,0698

Data base: SABE - Sao Paulo - 2000

***p < 0,01; **p < 0,05; p*< 0,1

TAB. 4 shows, for each of the three dependent variables, the results of the models that consider all groups of health determinants (model 4 as cited in the paragraph above).

Firstly, related to the variables informant, consumption of drugs in adulthood, smoking and practice of physical activities (light darkness gray color), the coefficients are significant in all dimensions of health analyzed. In general we verify that the elderly that required other people to help answering the questionnaire - very often, a caretaker –, consumed more medication in the adult phase, have smoked and don't practice exercises, present negative results in the three dimensions of health.

Secondly, it calls attention, in brightness gray, in one hand the age, sex, number of diseases in childhood, profession (related to physical effort required) variables. The coefficients of those variables are significant for the dimension number of diseases and functional incapacity, but they are not for the health self-rated dimension. It is important to point out that those variables, according to the conceptual framework, have direct relation with the health of the elderly, especially those classified as intermediate determinants.

On the other hand, also in brightness gray, variables like race, nationality, life in rural areas, years of study, income and safe access to private health security show significant coefficients only for the self-rated health dimension. It is important to emphasize that all those variables represent structural determinants in health and are showing that unfavorable conditions in society induce to a worse perception of health.

TABLE 4 - Estimated Coefficients from the models of Logistic Regression Ordered (for self-rated of health and functional incapacity) and from the Poisson Regression models (for the number of diseases)

Independent Variables	Number of diseases Model 4	Funcional Status Model 4	Self-evaluation of the health Model 4
Individual Characteristics			
nationality (ref. natural)	0,06	-0,14	0,26*
age			
70-79 years (ref. 60-69 years)	0,14***	0,65***	0,14
80 + (ref. 60-69 years)	0,10*	1,26***	-0,00
informant (ref. other informant)	-0,11**	-1,20***	-0,48***
women (ref. men)	0,30***	0,61***	0,06
race			
black (ref. white)	-0,05	-0,30**	0,24*
others (ref. white)	-0,08	-0,21	-0,13
Conditions in the beginning of life			
rural residence at birth (ref. urban residence at birth)	0,04	0,04	0,41***
worked in childhood (ref. didn't worked in childhood)	0,01	0,04	-0,02
hungry in childhood (ref. not hungry in childhood)	0,05	0,28**	0,12
number of diseases in childhood	0,05***	0,12***	0,05
Conditions in the adult phase			
education			
1 to 8 years of education (ref. 9 years of education)	-0,06	0,11	0,49***
0 years of education (ref. 9 years of education)	-0,05	0,13	0,42**
occupactional status			
profession ativ. pred. mental (ref. profession ativ. physical predominance)	0,06	-0,22	-0,12
other situation (ref. profession ativ. physical predominance)	0,05	0,06	-0,14
consumption of drugs in adulthood phase	0,11***	0,18***	0,25***
Conditions in the elderly phase			
income/wages			
>3 and < 5 mw (ref. > 5 mw)	-0,02	0,55***	0,32**
> 1 and < 3 mw (ref. > 5 mw)	0,07	0,51***	0,37***
< 1 mw (ref. > 5 mw)	0,12**	0,61***	0,58***
without wages (ref. > than 5 mw)	-0,05	0,69***	0,57***
without private health insurance(ref.private health insurance)	-0,07*	-0,12	0,22**
number of people in the household	-0,02*	0,04	0,05**
marital status			
widow (ref. married)	-0,06	0,07	-0,21*
divorced; single (ref.married)	-0,21***	0,00	-0,16
smoke			
smoked and stopped (ref. smoke)	0,18***	0,29*	0,29**
never smoked (ref. smoke)	0,08	0,02	-0,08
not well-nourished (ref. well-nourished)	0,06	0,52***	1,27***
no regular physical activity (ref. regular physical activity)	0,23***	1,31***	0,59***
sample size	1940	1940	1940
log likelihood	-2.976,3	-2.976,3	-2254,5

Data base: SABE - Sao Paulo - 2000
***p < 0,01; **p < 0,05; p*< 0,1

5 CONCLUSIONS

The conceptual framework proposed about socioeconomic conditions during the life cycle as determinants of the health of the elderly has brought some useful insights. Firstly the proposed systematization (FIG.1) allowed to visualize the indicators, helping in the variable selection among all variables available at SABE. The conceptual framework has also helped in the process of statistical elaboration since it allows to organize the independent variables in hierarchical groups of health determinants. Furthermore, it is important for the results interpretation and in the inferences brought by them.

Results showed that cognitive impairment, high medicine consumption at middle age, smoking and lack of physical activity are the main determinants of adverse health conditions whatever the health measurement type used. Despite the communality, there are also specific determinants for each dimension of health that appear in all life cycles. Thus, policies towards reducing social and economic inequalities in childhood, adultness or at late age stages will have different impacts depending on the dimension used to measure health. For example, preventive attitudes such as immunization against infectious diseases during childhood -given the correlations found- could promote reduction in prevalence of chronic diseases and functional impairment at later ages. Similarly, investments in education and access to good health care services can assure a more positive self health assessment among the elderly.

We also believe that a new conceptual framework could help future researchers to develop and interpret other statistical models that would cover, for example, specific diseases like diabetes and cancer. Finally, we hope that the referred framework helps to elaborate and structure surveys in which the information are obtained in household interviews.

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