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SOCIAL INEQUALITIES IN THE PREVALENCE OF CHRONIC DISEASES AND DAILY ACTIVITIES LIMITATIONS: AN ANALYSIS OF 62,202 BRAZILIAN PEOPLE

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ABSTRACT

Objective: To evaluate the association between education and prevalence of chronic diseases and limitations of daily activities.

Methods: Data were analyzed from the National Health Survey, conducted in 2013 in a representative sample of the brazilian population. The studied conditions were hypertension, diabetes mellitus, heart disease, stroke, asthma, chronic obstructive pulmonary disease and cancer. Multivariate logistic regression was performed to test the associations of outcomes with education, adjusting for sex, age, marital status and medical and hospital consultation.

Results: lower education was associated with higher chances of hypertension, diabetes mellitus, heart disease and stroke (OR of stroke 2.76 , 95% CI 1.90 to 4.00). People with less education had also more limitation on daily activities in all studied diseases. People with less education also presented more limitation of daily activities in all diseases studied.

Conclusion: The study found that not only the prevalence of chronic diseases is higher among those with less education, but there are clear positive association of socioeconomic status with the limitations of daily activities that cause diseases.

KEYWORDS : Chronic Diseases; Socioeconomic Factors; Poverty; Activities of Daily Living.

Introduction

Chronic diseases (CD) represent, at the beginning of the 21st century, one of the most serious challenges for governments and societies around the world (WHO, 2015). By the year 2012 it is estimated that nearly 38 million deaths, or 67% of all deaths worldwide, occurred because of a CD (WHO, 2012). For the same year, it is believed that DCs were responsible for more than a trillion and a half years of life lost due to disabilities (WHO, 2014). In Brazil, approximately 72 out of 100 deaths occur due to a chronic disease (Schmidt et al., 2011) and it is estimated that between 2006 and 2015 the country lost around US $ 4.2 billion due to the direct and indirect impact of diabetes, heart diseases and stroke (Abegunde et al., 2007).

Simultaneously with the finding that chronic diseases represent an important public health problem due to its magnitude, there has been a literature growth indicating the existence of relevant social inequalities in the occurrence of these diseases and in the deaths caused by them. In Brazil, population-based studies have repeatedly described a higher prevalence and mortality of chronic diseases among blacks, indigenous people and the population with lower levels of schooling (Barros, 2006; Barros, 2011).

International studies have also indicated that the economically most disadvantaged groups not only accumulate a greater burden of chronic disease but also suffer more severe impact from them in their lives. The activities of daily living are basically tasks that the person needs to perform to take care of themselves, such as dressing up, bathing alone, going to the bathroom and eating without the help of others (Costa et al., 2006). Through them it is possible to measure the autonomy of individuals and the repercussion of some diseases on the health of individuals in general (Costa et al. 2006; OPAS, 2012). Thus, measuring the inequalities in the limitations of daily activities that chronic diseases cause in people's lives is necessary to subsidize public policies and guide individual care for people with CD. However, to the best of our knowledge no study has analyzed the impact of each chronic disease on people's lives.

The present study aims to test the association between socioeconomic conditions and the limitations in daily activities caused by chronic diseases in Brazil.

Methods

A national cross-sectional population-based survey was carried out in Brazil in 2013 by the Brazilian Institute of Geography and Statistics (IBGE). A three stage cluster sampling process was performed. The census tracts formed the primary sampling units; the households the secondary ones; and resident residents who were 18 years old or more corresponded to the tertiary units.

In each household, by simple random sample, an adult was chosen to respond to the complete study questionnaire. The research, named National Health Survey, selected 81,767 individuals (one per household), obtaining a response rate of 78% (62,986) (Brasil, 2014). In the present study we analyzed the population aged 18 years and over who answered to the questions analyzed (n=62,602).

The outcome was the limitation of daily activities due to the chronic diseases listed in the "Strategic Action Plan to Tackle Noncommunicable diseases in Brazil, 2011-2022" (Brasil, 2011): systemic arterial hypertension, diabetes mellitus, heart disease (infarction, angina and heart failure), stroke , asthma, chronic obstructive pulmonary disease (chronic bronchitis and emphysema), and cancer. Each chronic disease was considered an outcome and the question asked to obtain this information was: "In general, to what degree [the disease] or some complication [of the disease] limits your usual activities (such as working, studying, doing household chores , etc.)?". The response options, in the form of likert scale, were: do not limit, limit a little, moderately limit, severely limit, and limit very intensively. We decided to dichotomize this outcome in two groups: it does not limit / limit little (those who answered that CD do not limit their usual activities, limit a little, or moderately limits) and limit a lot (in which the responses were grouped of intense or very intense limitation of usual activities). The socioeconomic level was evaluated through the respondents' educational level. It was categorized into illiterate, incomplete/complete elementary school, incomplete/complete high school, and incomplete/complete higher education. The following variables were used as adjustment: sex (male, female), age

(as continuous variable) and marital status (married, separated, divorced, widowed and single).

In order to test the association of the outcomes with schooling, logistic regression was perfomed using Stata version 12.0. In a first model the crude odds ratios were obtained. Then multiple regression models were calculated adjusting the estimates by the confounding variables. A 95% confidence interval was used.

The National Health Survey was approved by the National Commission for Research Ethics (CONEP) of the National Health Council (CNS) in July 2013.

Results

The majority of the sample was female (52.9%), 40-59 years old (34.2%), married (44.3%) and had studied until high school (68.8%) (Table 1). The most frequent chronic disease was hypertension (21.4%), followed by diabetes mellitus (6.2%) and asthma (4.4%).

Table 1 – Sample distributions according to socioeconomic variables. Brazil, 2013.

Variable	Sample	
	n	%*
Sex		
Men	25.920	47,1
Women	34.282	52,9
Age	**42,9**	**(42,6-43,20)**

Civi status		
Married	23.741	44,3
Divorced/widow	9.435	13,2
Single	27.026	42,5
Educational level		
Illiterate	9.434	13,7
Incomple/complete elementary school	20.537	35,2
Incomplete/complete high school	19.438	33,6
Incomplete/complete college	10.793	17,5
Chronic disease		
Hypertension	12.500	21,4
Diabetes mellitus	3.636	6,2
Heart disease	2.233	4,2
Stroke	966	1,5
Asthma	2.620	4,4
Chronic obstructive pulmonary disease	934	1,8
Cancer	1023	1,8
Total	**62.202**	**100,0**

*: according to sample weights

All chronic diseases were more prevalent among people with lower levels of education, except for cancer and asthma (Table 2). Stroke was five times more frequent (2.9%) and diabetes was almost three times more prevalent (10.7%) among people with lower educational level.

Table 2 – Proportion of people that reported intense limitation in daily activities due to chronic diseases. Brazil, 2013.

Disease	All		Illiterate	Incomple/complete elementary school	Incomplete/complete high school	Incomplete/complete college
	n	%	% (CI95%)	% (CI95%)	% (CI95%)	% (CI95%)
Hypertension	575	4,7	9,0(7,5-10,8)	4,4(3,6-5,4)	3,4(2,4-4,8)	0,8 (0,5-1,2)
Diabetes mellitus	250	7,0	8,8(7,1-10,9)	8,3(6,4-10,5)	4,6(2,4-8,6)	1,7 (0,8-3,6)
Heart disease	285	13,5	16,0 (11,6-21,7)	18,1(14,2-22,7)	6,2 (4,3-8,9)	3,9(2,8-5,5)
Stroke	223	25,5	25,2 (20,6-30,4)	30,9 (25,6-36,8)	14,7 (12,0-17,8)	13,3(10,7-16,4)
Asthma	144	15,7	27,5(25,1-30,2)	18,0(15,2-21,2)	17,9(11,4-27,2)	2,7 (2,3-3,1)
Chronic obstructive pulmonary disease	98	10,0	21,7 (18,3-25,6)	8,3 (7,0-9,7)	9,5 (7,6-11,8)	2,6(1,4-4,9)
Cancer	107	10,3	16,0(14,2-18,1)	9,2 (7,2-11,7)	12,6(9,2-17,1)	6,2(3,3-9,5)

Ci95%: Confidence Interval 95%.

The difference across the educational strata was even greater when the limitations of daily activities caused by chronic diseases were analyzed (Table 3). People with lower education reported a higher prevalence of severe limitation for all diseases studied. Higher level of limitation was ten times more frequent among hypertensive illiterate patients and four times more frequent among illiterate diabetics individuals (9.0% and 8.8%, respectively).

In the crude model, lower education was associated with the presence of four diseases studied. The chance was markedly greater for the development of stroke (OR: 6.11, 95% CI 4.29-8.70). In the adjusted model, the absence of education remained associated with a greater chance of reporting hypertension, diabetes mellitus, heart disease and stroke. The illiterate population had a 2.76-fold higher chance (95% CI 1.90-4.00) of reporting stroke when compared to those that went to college. The probability of reporting diabetes mellitus was 68% higher in the population with lower education, when compared to the population with the highest level of education.

It was also observed that illiterate individuals were more likely to present severe limitation due to chronic diseases in all comorbidities studied. The inequalities between socioeconomic goups were even greater than the differences observed in the occurrence of the diseases (Table 5). The highest associations were observed between the absence of education and the limitations resulting from asthma (OR 12.49, 95% CI, 4.83-32, 30) and chronic obstructive pulmonary disease (OR 7.74, 95% CI 2.45-24.50).

Table 3 – Crude and adjusted analyses of the association between daily limitation and chronic diseases. Brazil, 2013

Diseases	Odds ratio (crude model)				Odds ratio (adjusted model)			
	Incomplete/ complete college	Incomplete/ complete high school	Incomple/ complete elementary school	Illiterate	Incomplete/ complete college	Incomplete/ complete high school	Incomple/ complete elementary school	Illiterate
	OR (CI95%)	OR (CI95%)	OR (CI95%)	OR (CI95%)	OR (CI95%)	OR (CI95%)	OR (CI95%)	OR (CI95%)
Hypertension	1,00	4,61 (2,32-9,18)	6,12 (3,30-11,33)	13,01 (6,96-24,32)	1,00	4,42 (2,21-8,84)	6,04 (3,22-11,31)	12,89 (6,73-24,67)
Diabetes mellitus	1,00	2,88 (0,99-8,34)	5,33 (2,18-13,04)	5,72 (2,31-14,16)	1,00	2,75 (0,97-7,78)	5,35 (2,14-13,37)	5,69 (2,26-14,34)
Heart disease	1,00	1,62 (0,68-3,90)	5,38 (2,53-11,42)	4,64 (2,03-10,61)	1,00	1,68 (0,70-4,03)	6,35 (2,89-13,97)	5,67 (2,37-13,54)
Stroke	1,00	1,12 (0,43-2,96)	2,92 (1,30-6,54)	2,20 (0,97-4,99)	1,00	1,20 (0,44-3,29)	2,78 (1,25-6,21)	1,98 (0,87-4,52)

Asthma	1,00	7,91 (3,50-17,86)	7,94 (4,15-15,18)	13,75 (6,56-28,85)	1,00	7,81 (3,58-17,03)	6,95 (3,58-13,50)	11,30 (5,27-24,21)
Chronic obstructive pulmonary disease	1,00	3,85 (1,19-12,50)	3,32 (1,19-9,22)	10,10 (3,86-26,88)	1,00	4,03 (1,30-12,43)	2,64 (0,83-8,39)	6,84 (2,56-18,26)
Cancer	1,00	2,20 (0,92-5,24)	1,54 (0,73-3,26)	2,91 (1,28-6,63)	1,00	2,21 (0,92-5,32)	1,80 (0,85-3,80)	3,70 (1,67-8,25)

Discussion

The present study identified an association between low schooling and higher prevalence of the vast majority of chronic diseases, revealing the role of social inequalities in illness. These data corroborate previous data from Brazil (Barros, 2011) and from other countries (Schiller et al., 2012; Grotto et al., 2008; Fateh et al., 2014; Espelt et al., 2008; Vincens et al., 2015).

In the same way, but with even greater magnitude, educational level was associated with the limitation of usual activities in patients with chronic diseases for all diseases studied. Few previous studies have evaluated the limitation of usual activities in individuals previously suffering from chronic diseases and their relation to socioeconomic status (Martinho et al., 2013; Mielck et al., 2014; Brown et al., 2013).

The prevalence of the diseases among the interviewees in the present study was close to that found by Brazilian previous studies. The prevalence of self-reported hypertension in our sample was in line with the values found in national studies (Passos et al., 2006; Moraes et al., 2010; Goldenberg et al., 2003). Likewise, the prevalence of diabetes wasslightly lower than that found in most national studies (previous studies found prevalences between 7.6% and 15.0%, with a tendency to increase in the proportion of cases in recent years) (Moraes et al., 2010; Goldenberg et al., 2003). There are few studies on the prevalence of stroke in the country. A recent study analyzing medical records pointed to a higher prevalence of the disease (2.9%), but considered only the elderly population. Other different studies have indicated prevalence in the elderly ranging from 4.6% to 7.3% (Feigin et al., 2003; Pereira et al., 2009).

The association between schooling and chronic diseases was tested for all seven diseases studied. In the adjusted model, the absence of education was associated with hypertension, diabetes, heart disease and stroke, corroborating the fact that many chronic diseases present a social gradient that grows in the direction of most vulnerable social groups (Shiller et al. 2010; Grotto et al., 2008; Fateh et al., 2014).

The reasons that support the findings are the greater exposure of the poorest groups of society to risk factors for chronic diseases, such as sedentary lifestyle, obesity, smoking and the intake of fatty foods. The association between schooling and cancer showed opposite results, with a greater chance of the disease among the more schooled, which may be related to the survival bias and / or by greater exposure to risk factors of higher prevalent tumors. Regarding to cancer cases and socioeconomic factors, international literature has shown conflicting results, which should be individualized for each neoplasia. For asthma and chronic obstructive pulmonary disease, the association was not significant either. The information bias can likewise justify the findings. In the adjusted model, the illiteracy was associated with a greater limitation of the daily activities in chronic diseases in all diseases studied.

The major limitation in assessing the association between outcomes and schooling is the fact that demographic data and diseases studied by this national survey are self-reported. Validation studies of this type of information reveal that the degree of accuracy of the findings differs according to the disease studied and the social/demographic characteristics of the population studied (Cricelli et al., 2003; Skinner et al., 2005). Most of the studies, however, has analyzed the validity of the personal reference of measures such as weight, height, and lifestyle. There are few national and international studies that have addressed chronic diseases (Thomaz et al., 2013). A survey conducted in São Paulo with

535 people showed that the sensitivity of self-reported hypertension weas greater than 80%. Another limitation lies in the fact that cross-sectional studies do not allow inferences of causal relationships.

The findings of the present study shed new light on the relationship between social inequalities and illness. The study is the largest to evaluate, from the perspective of chronic diseases, the relationship between educational level and the limitation of daily activities. The greater limitation of the daily activities observed among the unpreviligied ones points the necessity of more studies on the subject.

The national literature reproduces the data of international studies that indicate greater access to information and greater possibility of performing the healthiest behaviors among the most educated. People with better schooling also have better income and greater access to goods that guarantee a healthy life (Claro et al., 2010), as well as to consultations and treatment (Van Doorslaer, 2006), leading to lower limitations of daily living activity due to chronic diseases.

The findings of this study point to health needs that go beyond the simple idea of offering more services to the most vulnerable. The burden of the limitations of chronic diseases among the underprivileged points to the need for other strategies that seek to alleviate differences in a country so marked by inequalities. They highlight the injustices existing in different societies and point to the need for policies that seek to promote health and equity.

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