Social inequalities in limitations caused by chronic diseases and disabilities in Brazil: the 2013 National Health Survey

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Abstract *This paper aims to evaluate the association between social inequalities and self-reported limitations for the performance of daily activities caused by chronic diseases or disabilities. The 2013 National Health Survey evaluated a sample of Brazilians with 18+ years. The outcome was that individuals reported that their daily activities were moderately, severely or very severely limited (LIMIT) by one or more chronic diseases, or mental, physical, hearing or motor impairment. The main exposure was the economy class, classified into five categories, ranging from A (richest) to E (poorest). We estimated a logistic regression model adjusted for economy class and confounding variables, considering the complex sample design and alpha = 5%. Around 15.5% of individuals reported having Limit. Comparing social classes, 19.5%, 21.9%, 16.1%, 11.1%, and 7.7% individuals belonging to class E, D, C, B and A reported the outcome. The adjusted model showed greater odds of individuals in class D + E, and D, reporting LIMIT than individuals of class A + B (reference). Public policies for health care and social welfare for people with disabilities should focus on social classes E and D.*

Key words *People with disabilities, Daily activities , Self-report, Epidemiological surveys, Health inequities*

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Introduction

Brazil has shown a change in the composition and health profile of its population over the last fifty years. The demographic transition process became especially noticeable after the 1970s, with declining birth and death rates, which led to population aging. Concomitantly, changes in the illness patterns characterized the epidemiological transition, which, according to Frederiksen[1] and Omran[2], encompasses three basic changes: transition from a high mortality to a low mortality situation, decreasing rates of transmissible diseases and increasing rates of chronic-degenerative diseases, and higher morbimortality burden shifting from the younger groups to the older groups.

These authors also point out that the definition of epidemiological transition should be an integral part of a broader health transition concept, which can be summarized in two main aspects: the transition of health conditions (changes in the frequency, magnitude and distribution of health conditions, expressed through deaths, diseases and disabilities) and the transition of health care, which is implemented through health care systems[1,2].

The concept of health transition shared by contemporary authors[3,4] emphasizes that policies must be transformed to meet the new needs imposed by changes in health conditions. Not only health-care policies alone, but public policies in general have to address the challenges of population aging, and in particular, the increasing number of people living with reduced levels of functionality as a result of aging, modern living and technological development.

One of the consequences of health transition is the need to develop indicators more appropriate to the unraveling of both people's health conditions and the capacity of organized social response to these conditions. For this reason, there has been a growing effort to construct measures and develop studies focused on morbidity, especially in chronic diseases, and on the effects of health conditions on the ability to perform daily activities , such as those related to the global burden of diseases[3,5-10,11]. The Disability-Adjusted Life Year (DALY) indicator is an example, since it is designed to measure the importance of diseases, accidents and risk factors that cause both premature death, disability, and health losses at the population level. In middle- and low-income countries, chronic diseases account for about 80% of the total mortality burden[12]. In Brazil,

69.9% of all DALYs in 2012 were due to chronic diseases, and this proportion increases with the age, reaching almost 90% of the entire DALY among the elderly aged 70 years or more[13].

There have been several debates about concepts such as disability, disability and functionality for the development of new indicators that incorporate the issue of the early loss of life or health. On the one hand, disability approaches have transcended biomedical models focused strictly on bodily changes. On the other, and no less importantly, efforts have been made to avoid the terms adopted to refer to disability, impregnated with pejorative and stigmatizing meanings in the Portuguese language.

Thus, this paper aims to evaluate the association between social inequalities and self-reported limitations for the performance of daily activities , caused by chronic diseases or disabilities in the population based on data from the 2013 National Health Survey (*Pesquisa Nacional de Saúde* PNS). In the context of population aging, the updating of the disability approach as a social issue, and the difficulty of having population measures and indicators, in a more advanced conception, the PNS provides elements to produce an overview of the population with reduced functionality in Brazil.

The results of this study might subsidize the planning of policies aimed to this segment, specifically the social welfare's continuous cash-transfer benefit (*Benefício de Prestação Continuada* -BPC) – aimed at people with disabilities and poor elderly – which, since 2009, employs a medical-social model to evaluate disability in order to provide access to the benefit.

Methodology

The National Health Survey (PNS) was a national cross-sectional household-based study conducted by the Oswaldo Cruz Foundation and the Ministry of Health, in partnership with the Brazilian Institute of Geography and Statistics, using a sub-sample of Brazilian Institute of Geography and Statistics (IBGE) master sample (Souza-Junior, 2016)[14]. A sample by clusters in three stages was selected: the primary unit was census tracts, households were chosen as secondary units and a resident with more than 18 years randomly selected in each household was the tertiary unit. Overall, 81,254 households were visited, of which 69,994 were occupied. There were 64,348 household interviews and 60,202 interviews with the

selected resident. Interviews were conducted between August 2013 and February 2014. Further details on the research are available in previous publications[14,15].

The prevalence of self-reported medical diagnosis of chronic diseases was initially obtained, with possible responses to one or more of the following diseases or conditions: systemic arterial hypertension (SAH), diabetes mellitus (DM), high cholesterol, cardiovascular diseases (CVD), cerebrovascular accident (CVA) or stroke, asthma or asthmatic bronchitis, arthritis or rheumatism, back pain, work-related musculoskeletal disorder (WMSD), depression, mental illness, schizophrenia, bipolar disorder, psychosis or Obsessive Compulsive Disorder (OCD), Chronic Obstructive Pulmonary Disease (COPD), cancer, Chronic Renal Failure (CRF) and other chronic, physical or mental diseases, or long-term disease (lasting more than 6 months). Self-reported prevalence of one or more disabilities were also obtained: intellectual, physical, hearing and visual.

Then, for those who answered they were diagnosed for chronic diseases, the level of limitation brought by the disease to individuals was reported, by asking them: "In general, to what extent does _____ or any complication of ___ limit your daily activities (such as working, studying, doing household chores, etc.)?", with a "Likert-type" response: "not limiting", "some"", "moderately", "severely" and "very severely". The same gradation of answers was obtained for those who reported disabilities, however, with the following question: "In general, to what extent does the disability _____ limit your daily activities (such as going to school, playing, working, etc.)?" The complex sample design and 95% confidence interval were considered to obtain the prevalence of chronic diseases and limitations.

Two outcomes deriving from self-reported limitations due to disease or disability were considered: the first outcome considered individuals who responded having "moderate", "severe" or "very severe" limitations of their daily activities (Limit_MOD+) due to one or more diseases; the second outcome gathered "severe" or "very severe" limitations only (Limit_INT +) in order to consider only the most severe limiting situations, excluding moderate ones.

The main exposition was the "*Critério Brasil*", an individual socioeconomic indicator proposed by the "Brazilian Association of Research Companies". This indicator is composed of the evaluation of the number and type of assets in the individual's residence, as well as the educational level of the head of the family and the presence of a domestic worker. This criterion categorizes individuals into five socioeconomic categories, ranging from A (richest) to E (poorest). Subsequently, for analysis purposes, these categories were grouped in A+ B (reference), C, and D+E[16].

The confounding variables considered for this study, their categories and reference category were as follows: gender: male (reference) and female; skin color / ethnicity self-reported as white, brown, black, yellow and indigenous, and later categorized as white (reference) and non-white; schooling, categorized as incomplete primary school, incomplete secondary school, secondary school completed and higher education or higher (reference); age group, categorized in 18-29 years (reference), followed by ten-year bracket age groups up to 60 years or more; and region of residence: North, Northeast, Southeast (reference), Midwest and South.

The next step of the study consisted of the estimation of crude and adjusted Odds Ratio for the two outcomes (Limit_MOD + and Limit_INT +) employing a logistic regression model with 95% confidence interval and considering the complex sample design.

Results

Table 1 shows the prevalence of self-reported medical diagnosis of chronic diseases and the ensuing limitations of usual activities. Arterial hypertension and back pain are the most prevalent diseases, and CVA, cancer and CRF were the least prevalent. The prevalence of one or more long-term diseases (more than 6 months) was almost 50%. Regarding the prevalence of limited usual activities, it was observed that the most moderately limiting diseases are asthma, back pain, arthritis, WMSD and other mental illnesses; the most severely limiting diseases are: CVA, asthma, back pain, arthritis, WMSD and other mental illness; on the other hand, diseases that very severely limit daily activities are CVA, other mental illnesses and other long-term chronic diseases.

Table 2 describes the prevalence of self-reported disability and the limitations of daily activities. The most prevalent disabilities are visual, hearing and category "one or more disabilities". Intellectual disability is the one that most moderately, severely and very severely limits daily activities followed by physical and hearing disability.

Table 3 shows the limitations of daily activities resulting from chronic diseases or disabili-

ties according to sociodemographic characteristics. Women had a higher prevalence of Limit_MOD+ limitation and Limit_INT+ limitation of the usual activities. Regarding schooling, it was observed that the lower the educational level, the greater the limitation Limit_MOD+ and Limit_INT+ in usual activities. Regarding the socioeconomic score, it was observed that the lower the score, the D+E classes, the higher the prevalence of Limit_MOD+ and Limit_INT+ activities limitation.

Regarding the age group, it was observed that Limit_MOD+ and Limit_INT+ limitation of daily activities are more prevalent among older

Table 1. Prevalence of self-reported medical diagnosis of chronic diseases and resulting limitations of daily activities[a]. Brazil, 2013.

Disease or condition	Prevalence		CI95%[d]	Limitation of daily activities (%)[e]				
	n[b]	%[c]		Not limiting	A little	Moderately	Severely	Very Severely
SAH[f]	12,500	21.4	(20.8-22.0)	69.3	18.6	7.4	3.9	0.8
DM[g]	3,636	6.2	(5.9-6.6)	66.5	17.5	9.0	5.1	2.0
CVD[h]	2,233	4.2	(3.9-4.5)	49.0	24.0	13.5	10.7	2.8
CVA[i]	966	1.5	(1.4-1.7)	41.9	19.5	13.1	16.0	9.5
Asthma[j]	2,620	4.4	(4.1-4.7)	37.9	26.6	19.7	13.4	2.4
Back pain	10,578	18.5	(17.8-19.1)	32.7	32.6	18.3	13.1	3.3
Arthritis[k]	3,976	6.4	(6.1-6.8)	36.3	28.8	17.8	13.3	3.8
WMSD[l]	1,149	2.4	(2.2-2.7)	41.8	27.9	14.6	13.1	2.6
Depression	4,235	7.6	(7.2-8.1)	57.9	19.0	11.3	8.7	3.2
Other mental[m]	552	0.9	(0.8-1.1)	27.4	17.0	17.9	25.1	12.6
COPD[n]	934	1.8	(1.6-2.0)	56.3	19.7	14.0	7.1	2.9
Cancer	1,023	1.8	(1.6-2.0)	66.0	14.5	9.2	7.7	2.7
CRF[o]	839	1.4	(1.3-1.6)	59.1	20.0	9.0	8.4	3.4
Other[p]	2,997	5.5	(5.1-5.9)	43.7	23.6	13.4	13.3	6.0
One or more diseases[q]	**29,097**	**49.8**	**(49.0-50.6)**					
Total	**62202**	**100,0**						

a. Self-reported medical diagnosis of disease or condition. b. n = Unweighted counting. c. Prevalence: taking into account the complex sample design. d. 95% CI: 95% confidence interval taking into account the complex sample design. e. Limitations in own daily activities , such as: working, studying, doing household chores, etc. f. SAH: Systemic Arterial Hypertension. g DM: Diabetes Mellitus. h. CVD: Cardiovascular Diseases. i. CVA: cerebral vascular accident or stroke. j. Asthma or asthmatic bronchitis. k. Arthritis or rheumatism. l. WMSD: work-related musculoskeletal disorders. m. Mental illnesses: schizophrenia, bipolar disorder, psychosis or Obsessive Compulsive Disorder. n. COPD: chronic obstructive pulmonary disease. o. CRF: chronic renal failure. p. Other: other chronic, physical or mental disease, or long-term disease (duration of more than 6 months). q. One or more diseases: report of one or more diseases or conditions.

Table 2. Prevalence of self-reported disability and resulting limitations of daily activities[a]. Brazil, 2013.

Disability	n[b]	Prevalence %[c]	CI95%[d]	Limitation of daily activities (%)[e]				
				Not limiting	A little	Moderately	Severely	Very Severely
Intellectual	339	0.6	(0.5-0.7)	7.4	10.1	24.2	33.0	25.2
Physical	1,068	1.7	(1.6-1.9)	12.1	16.9	22.4	32.1	16.5
Hearing	1,464	2.6	(2.3-2.8)	37.0	31.2	18.9	10.2	2.7
Visual	3,372	5.5	(5.1-5.9)	43.4	27.0	14.9	10.9	3.9
One or more disabilities[f]	5,524	9.2	(8.7-9.7)					
Total	60,202							

a. Prevalence of self-reported disability. b. n = Unweighted counting. c. Prevalence: taking into account the complex sample design. d. CI95%: 95% confidence interval taking into account the complex sample design. e. Limitations in own daily activities , such as: working, studying, doing household chores, etc. f. One or more disabilities: prevalence of individuals who reported of one or more disabilities.

Table 3. Limitations of daily activities resulting from chronic diseases or disabilities, according to population characteristics. Brazil, 2013.

| Variable | | | | Limitation of daily activities (%)[f] | | | | | |
| | | | | Moderate limitation+[b] | | | Severe limitation+[c] | | |
	n[a]	%[d]	CI95%[e]	n[a]	%[d]	CI95%[e]	n[a]	%[d]	CI95%[e]
Gender									
male	25,920	47.1	(46.4-47.9)	3,444	13.5	(12.7-14.2)	1,801	7.2	(6.7-7.8)
female	34,282	52.9	(52.1-53.6)	5,881	17.7	(17.0-18.5)	2,993	9.3	(8.8-9.9)
Skin color/ethnicity[g]									
white	24,106	47.5	(46.7-48.3)	3,816	15.8	(15.0-16.7)	1,939	8.1	(7.5-8.7)
non-white	36,096	52.5	(51.7-53.3)	5,509	15.6	(14.9-16.4)	2,855	8.6	(8.0-9.1)
Schooling[h]									
incomplete primary school	26,927	46.5	(45.6-47.4)	5,577	20.7	(19.8-21.7)	3,011	11.5	(10.9-12.3)
incomplete secondary school	8,562	14.0	(13.5-14.6)	1,150	13.8	(12.5-15.2)	575	7.3	(6.4-8.3)
secondary school completed	16,922	27.0	(26.3-27.7)	1,812	10.6	(9.8-11.4)	874	5.3	(4.7-5.9)
higher education	7,791	12.5	(11.8-13.2)	786	10.3	(9.0-11.7)	334	4.2	(3.4-5.0)
Socioeconomic score[i]									
D+E	18,173	24.6	(23.9-25.3)	3,765	21.6	(20.4-22.8)	2,057	12.3	(11.4-13.3)
C	25,818	43.0	(42.1-43.9)	3,890	16.1	(15.3-17.0)	1,991	8.7	(8.1-9.3)
A+B	16,211	32.4	(31.4-33.5)	1,670	10.7	(9.9-11.6)	746	4.9	(4.3-5.5)
Age group									
18 to 29 years	14,321	26.1	(25.4-26.7)	775	5.4	(4.8-6.1)	363	2.5	(2.1-3.0)
30 to 39 years	14,269	21.6	(21.0-22.2)	1,339	9.7	(8.8-10.7)	678	5.3	(4.7-6.1)
40 to 49 years	11,405	18.1	(17.5-18.6)	1,854	17.1	(15.8-18.4)	999	9.8	(8.8-10.9)
50 to 59 years	9,030	16.2	(15.7-16.7)	2,062	22.9	(21.3-24.6)	1,114	12.8	(11.6-14.1)
60 years and over	11,177	18.0	(17.5-18.7)	3,295	30.1	(28.5-31.6)	1,640	14.9	(13.7-16.1)
Region									
North	12,536	7.4	(7.2-7.6)	1,703	12.5	(11.4-13.8)	830	6.2	(5.4-7.0)
Northeast	18,305	26.6	(26.1-27.1)	3,060	16.6	(15.7-17.6)	1,615	9.0	(8.3-9.7)
Southeast	14,294	43.8	(43.1-44.4)	2,059	14.6	(13.6-15.7)	1,056	7.6	(6.9-8.4)
South	7,548	14.8	(14.4-15.2)	1,353	18.9	(17.4-20.6)	690	10.1	(9.1-11.2)
Midwest	7,519	7.4	(7.2-7.6)	1,150	15.9	(14.7-17.2)	603	8.9	(7.9-10.0)
TOTAL	**60,202**	**100.0**	**-**		**16.0**	**(15.1-16.3)**		**8.3**	**(7.9-8.8)**

a. n = Unweighted counting. b. Moderate limitation+: one or more moderate, severe or very severe limitations due to chronic diseases or disabilities reported. c. Severe limitation+: one or more severe or very severe limitations due to chronic diseases or disabilities reported. d. Prevalence%: taking into account the complex sample design. e. CI95%: 95% confidence interval taking into account the complex sample design. f. Limitations in own daily activities , such as: working, studying, doing household chores, etc. g. Skin color/ethnicity: obtained by self-classification according to IBGE categories; later categorized into white and non-white. h. Schooling: categorized as incomplete primary school (no schooling or incomplete primary school), incomplete secondary school (primary school completed and incomplete secondary school), secondary school completed (secondary school completed and incomplete higher education) and higher education (completed). i. Social score: classification proposed by the Brazilian Association of Population Studies (http://www.abep.org/criterio-brasil), where population is divided into five categories, ranging from A (richest) to E (poorest).

individuals, and it is possible to see the gradient with increasing age. Regarding the region of residence, it was observed that in the northern region, the prevalence of individuals with Limit_MOD+ and Limit_INT+ was the lowest when compared to the other regions, and the southern region was the one with the highest prevalence of Limit_MOD+ and Limit_INT+ limitations of usual activities.

Table 4 shows the factors associated with the limitations of daily activities due to chronic diseases or disabilities. The following were positively associated with the Limit_MOD+ and Limit_INT+ limitations: females, incomplete

primary educational level, increasing age group and Northeast and Southern Regions. Class D+E and C individuals were also positively associated with greater odds of reporting Limit_MOD+ and Limit_INT+ limitations of usual activities.

Discussion

In the 2013 National Health Survey, almost half of the Brazilian adult population reported having a diagnosis of chronic disease and about 20 million reported having one or more disabilities, causing moderate, severe or very severe limitation of daily activities of around 30 million citizens. The poorest population, with the lowest level of schooling, the elderly and women are those who suffer the most from the limitations of their activities due to chronic diseases or disabilities, indicating a social gradient that affects the most vulnerable population.

The prevalence of disabilities of around 10% found in this study, especially visual impairment, was higher than that found in the study by Malta et al.[17] (6.2%) using the same database: this is due to the disability categorization. While Malta et al used Brazilian Law[18] to categorize the types of disabilities, this study considered the individual's simple answer (Do you have a disability?), which results in a higher prevalence of self-reported disabilities. Other local studies found similar prevalence: a study carried out in the State of São Paulo in 2003 found a prevalence of 11.1% of disability, and the more frequent one was visual (6.2%), hearing (4.4%) and physical disabilities 1.3%). Despite the slightly higher prevalence, the limitations resulting from these disabilities, by order of prevalence, were due to physical (62%), visual (33.9%) and hearing (24.5%) disabilities[19].

The educational level had a relevant role in the limitations due to disabilities and chronic diseases in the Brazilian population, and the odds of individuals with a lower level of education was almost twice as high as those with higher schooling. Similar results were found in a European longitudinal study, where it was shown that individuals with high educational levels live longer and also have a better quality of life when compared with those with low educational level[20].

The main chronic diseases that most limited daily activities , in descending order of prevalence, were: mental illness (except depression), CVA, arthritis, back pain, chronic renal failure and depression. Non-communicable chronic diseases, besides causing limitations of daily

activities , are also associated with worse health self-evaluation in the Brazilian population[21]. The study by Theme Filha et al uses the same database as the 2013 National Health Survey and shows descriptive results similar to this study[21]. However, unlike Theme Filha et al[21] that addressed the limitations in a single category (moderate, severe and very severe), limitations resulting from chronic diseases in this study were analyzed into more categories and included limitations due to disabilities and their associations with the socioeconomic level and other confounding variables were also estimated.

The socioeconomic gradient seems to play a central role in determining disabilities and limitations, where the poorest populations are more likely to develop disabilities related to chronic diseases[22] and perceive greater barriers to accessing health services[23], including physical barriers found in many health facilities[24]. This gradient can be observed inter- and intra-country, and the prevalence of disabilities were higher in poorer countries, and higher among the poorest populations of all 49 countries with comparable data[25].

A meta-analysis with 160 studies conducted in developed countries concluded that low socioeconomic level were associated with a higher probability of developing some type of disability due to diseases or chronic conditions (OR=1.72; 95%CI = 1.48-2.01), including psychological disorders, intellectual disability, cerebral palsy, congenital malformations, epilepsy and sensory disabilities[26].

Hosseinpoor et al.[25] used representative data from 49 countries from all regions of the world, collected between 2002 and 2004 and comparable, totaling 218,737 individuals, and observed that countries with low or middle income had a higher adjusted prevalence of disabilities than rich countries, and in all countries the poorest population also had a higher prevalence of disabilities.

Physical disabilities related to chronic diseases can be aggravated as people with disabilities list some barriers to accessing health services, including lack of adequate transportation, unavailability of specialized services and equipment, and associated costs[23]. These barriers are more often reported among the poorest people, and the educational level only seems to reduce barriers insofar as higher educational levels might represent higher household income[23].

Although PNS questionnaires were not developed from the approach proposed by the International Classification of Functioning, Disability and Health (ICF)[27], published by the World Health Organization in 2001, the results

Table 4. Factors associated with the limitations of daily activities resulting from chronic diseases or disabilities[f]. Brazil, 2013.

Variable	Limitation of daily activities (%)							
	Moderate+[a]				Severe+[b]			
	OR[c]	CI95%[e]	AOR[d]	CI95%[e]	OR[c]	CI95%[e]	AOR[d]	CI95%[e]
Gender								
Male	1.00	-	1.00	-	1.00	-	1.00	-
Female	1.39	(1.28-1.50)	1.36	(1.25-1.47)	1.32	(1.20-1.46)	1.28	(1.16-1.42)
Skin color/ethnicity[g]								
White	1.00	-	1.00	-	1.00	-	1.00	-
non-white	1.01	(0.94-1.10)	0.98	(0.90-1.08)	0.94	(0.85-1.03)	1.02	(0.91-1.15)
Schooling[h]								
incomplete primary school	2.28	(1.96-2.66)	1.51	(1.25-1.82)	3.01	(2.45-3.69)	1.84	(1.43-2.37)
incomplete secondary school	1.40	(1.18-1.67)	1.29	(1.06-1.58)	1.82	(1.43-2.32)	1.54	(1.16-2.03)
secondary school completed	1.04	(0.88-1.22)	1.10	(0.92-1.31)	1.28	(1.02-1.61)	1.28	(1.01-1.63)
higher education	1.00	-	1.00	-	1.00	-	1.00	-
Socioeconomic score[i]								
D+E	2.30	(2.05-2.58)	1.67	(1.43-1.95)	2.74	(2.36-3.18)	1.89	(1.54-2.32)
C	1.60	(1.44-1.78)	1.40	(1.23-1.59)	1.86	(1.62-2.14)	1.52	(1.28-1.81)
A+B	1.00	-	1.00	-	1.00	-	1.00	-
Age group								
18 to 29 years	1.00	-	1.00	-	1.00	-	1.00	-
30 to 39 years	1.89	(1.61-2.23)	1.99	(1.69-2.34)	2.18	(1.75-2.70)	2.31	(1.86-2.87)
40 to 49 years	3.62	(3.10-4.22)	3.69	(3.15-4.31)	4.18	(3.38-5.18)	4.28	(3.45-5.31)
50 to 59 years	5.22	(4.50-6.06)	5.17	(4.44-6.02)	5.66	(4.61-6.94)	5.55	(4.51-6.83)
60 years or more	7.56	(6.54-8.73)	6.81	(5.84-7.93)	6.75	(5.53-8.23)	5.90	(4.81-7.24)
Region								
North	0.84	(0.73-0.96)	0.87	(0.75-1.02)	0.80	(0.67-0.96)	0.78	(0.65-0.94)
Northeast	1.17	(1.05-1.30)	1.09	(0.97-1.24)	1.20	(1.05-1.38)	1.06	(0.91-1.23)
Southeast	1.00	-	1.00	-	1.00	-	1.00	-
South	1.37	(1.20-1.56)	1.41	(1.22-1.62)	1.37	(1.17-1.60)	1.39	(1.18-1.63)
Midwest	1.11	(0.97-1.26)	1.17	(1.02-1.33)	1.19	(1.01-1.41)	1.21	(1.02-1.44)

a. Moderate limitation+ (outcome): one or more moderate. severe or very severe limitations due to chronic diseases or disabilities reported. b. Severe limitation+ (outcome): one or more severe or very severe limitations due to chronic diseases or disabilities reported. c. OR: Odds ratio, not adjusted, taking into account the complex sample design. d. AOR: Odds ratio, adjusted, obtained through logistic regression model. taking into account the complex sample design. e. CI95%: 95% confidence interval taking into account the complex sample design. f. Limitations in own daily activities, such as: working, studying, doing household chores. etc. g. Skin color/ethnicity: obtained by self-classification according to IBGE categories; later categorized into white and non-white (black. brown. yellow or indigenous). h. Schooling: categorized as incomplete primary school (no schooling or incomplete primary school), incomplete secondary school (primary school completed and incomplete secondary school). secondary school completed (secondary school completed and incomplete higher education) and higher education (completed). i. Socioeconomic score: classification proposed by the Brazilian Association of Population Studies (http://www.abep.org/criterio-brasil), where population is divided into five categories, ranging from A (richest) to E (poorest).

of this study may provide elements to approach this conception. In ICF, disability is understood as a "multidimensional phenomenon that re-sults from the interaction between people and their physical and social environment." Differ-ent grades of functionality or disability result

from the interaction between a health condition (disease, trauma and injury) and context factors (environmental and personal factors). To characterize this interaction, the ICF proposes a classification system that considers three components, namely: body functions and structures, activities and participation and environmental factors. It is worth emphasizing that, under ICF, disability is not restricted to persons with disabilities.

In 2007, the International Convention on the Rights of Persons with Disabilities[28] consolidated the biopsychosocial model of disability, establishing that persons with disabilities have physical, mental, intellectual or long-term sensory impairments, which in interaction with various barriers obstruct their full and effective participation in society on an equal basis with other people.

Thus, disability and functionality transcend bodily changes, focusing on what people can and cannot do with regard to basic day-to-day activities and the performance of socially expected roles. In other words, according to the biopsychosocial perspective, disability stems from specific social contexts and can be defined by the barriers faced by individuals in performing basic or more complex daily tasks necessary for independent living[28].

The main limitation of the study was related to the questionnaire structure, since the outcome was self-reported. The validity of self-reported responses may vary depending on the related disease: one study identified that self-reported information on diabetes, hypertension and heart disease were highly correlated with medical records and exams, while accuracy for stroke and pulmonary disease was intermediate, and in the reports of arthritis, accuracy were considered low[29].

In addition, there had an information bias, with a possible tendency to overestimate or un-derestimate the chronic self-report according to individual characteristics: men tend to underestimate self-reported chronic diseases, whereas women, individuals with poor self-reported health or with physical dysfunctions, tend to over-report these diseases. The elderly tend to be less accurate in their self-reported chronic diseases[29]. However, results shown are similar to those found in countries with varying degrees of economic development, where the poorest and most vulnerable populations reported a higher levels of limitation of their daily activities [22,23,26].

Conclusions

The challenges of developing and implementing a policy of inclusion and social protection for people with disabilities in a reality of about 30 million Brazilians who reported some limitation or restriction of their daily activities due to chronic diseases or disabilities requires a level of focus that at the same time make the use of available social resources more effectively and does not exclude citizens in need of governmental social protection. The Continuous Cash-Transfer Benefit (BPC) is an example of a policy that includes a biopsychosocial assessment associated with household income criteria, aiming and attending the poorest segments of the Brazilian population.

Knowledge of the condition of social vulnerability of the population is essential to effective public policies. The finding that people in unfavorable socioeconomic situations reported more limitations of daily activities reinforces the importance of policies such as BPC, which transcend the biomedical paradigm and include WHO biopsychosocial element.

Collaborations

PMM Boccolini and CS Boccolini participated in the design and outline, data analysis and interpretation, final wording and review. CMR Duarte participated in the design, writing and critical review and MA Marcelino participated in the design and critical review. All authors approved the final version of the manuscript.

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