

Health inequalities by region and social group based on data from household surveys (Brazil, 1998-2013)

Francisco Viacava (<https://orcid.org/0000-0003-1486-2157>)¹

Silvia Marta Porto (<https://orcid.org/0000-0001-5550-6496>)²

Carolina de Campos Carvalho (<https://orcid.org/0000-0003-1605-4102>)¹

Jaime Gregório Bellido (<https://orcid.org/0000-0003-3807-0138>)¹

Abstract *This article discusses trends in health inequalities and access to health services across the regions of Brazil using data from household surveys conducted between 1998 and 2013. Social inequality was measured based on the ratio between the extremes of years of schooling considering two age groups (18 to 59 years and 60 years and over). The findings show a decline in health status and increase in prevalence of diabetes and hypertension in both age groups, which may be related to the expansion of primary healthcare. The findings regarding the percentage of people who had had a medical appointment in the last 12 months show that low levels of inequalities persist despite a general improvement in access. Despite an increase in the percentage of people with up to 3 years of schooling who had had a dental appointment in the last year, significant inequalities persist. The percentage of people who reported being admitted to hospital in the last 12 months was greater among people with up to 3 years of schooling throughout the study period. The hospitalization rate decreased in both age groups across almost all regions. The proportion of women aged between 50 and 69 years with up to 3 years of schooling who had had a mammogram increased, leading to a decrease in inequality. The findings show the need to ensure the continuity of household surveys to monitor inequalities in access to health care services by region and social group.*

Key words *Social inequalities, Access to health care services, Health survey*

¹ Instituto de Comunicação e Informação Científica e Tecnológica em Saúde, Fiocruz. Av. Brasil 4365, Manguinhos. 21040-900 Rio de Janeiro RJ Brasil. fviacava@gmail.com.

² Escola Nacional de Saúde Pública, Fiocruz. Rio de Janeiro RJ Brasil.

Introduction

Population surveys are key tools for tackling inequalities in health and in access to health services since they provide a deep understanding of health needs, demand for services, and socioeconomic conditions. Brazil's 1988 Constitution, which created the country's public health system (*Sistema Único de Saúde* - SUS), enshrines the right to universal and equal access to comprehensive health services¹. According to Travassos et al.², living conditions data from household surveys showed that there was only a slight reduction in inequalities between 1989 and 1997.

Based on this finding, additional surveys including population health data were suggested, leading to the development of three complementary health surveys as part of the National Household Sample Survey (*Pesquisa Nacional por Amostra de Domicílios* - PNAD) conducted by the IBGE in 1998, 2003, and 2008³⁻⁵. Given the size of the PNAD sample (around 150,000 households in 2013), in 2013 it was decided to create a separate health survey whose sample was limited to only 63,000 households, resulting in the National Health Survey (*Pesquisa Nacional de Saúde* - PNS) conducted by the IBGE in partnership with the Ministry of Health and Oswaldo Cruz Foundation (Fiocruz). The PNS provided continuity on questions raised by the previous surveys and gave valuable insights into inequalities in health and in access to health services in small towns and rural areas in Brazil's five regions^{6,7}. PNS data shows an overall improvement in access to and the use of health services across all regions. However, significant disparities remain between the north and northeast regions and other regions across all dimensions analyzed (health status, service provision, and health service use), despite higher coverage by public programs in these regions⁸. Szwarcwald and Macinko⁹ recently published a panorama of health inequalities in Brazil based on PNS data.

Analyses of trends in health inequalities over time show that Brazil saw an overall improvement in access to and the use of health services and reductions in inequalities in health service use among groups at the extremes of the income quartiles between 1998 and 2003. Data from the 2008 health survey shows that there was an improvement in health situation in comparison with 2003, albeit less pronounced than in the period 1998-2003¹⁰.

Each household surveys elected representative samples for each of Brazil's five regions, 26 states, and the Federal District, using years of

schooling as an indicator of socioeconomic status. Similarities between the data produced between 1998 and 2013 enable the monitoring and analysis of inequalities in health status and health service use by region and social group.

Methodology

Social and economic factors such as income and education are key determinants of health inequalities¹¹. Widely used measures of social inequalities in health status and health service use are quintiles of household per capita income and schooling^{2,9,10,12}. Data from the 2012 PNAD shows that years of schooling rose significantly with increasing income, from an average of 5.2 years in the first income quintile to 10.7 years in the last quintile¹³. Studies of inequality traditionally use education data in two ways: years of schooling or level of education. Years of schooling is usually used as a continuous or categorical variable to assess socioeconomic status¹², while level of education, which is a categorical variable, is used to understand the relationship between education and health¹⁴.

Since income data from the 2013 PNS was not published, the present study used data on level of education, which is also collected by the PNAD. Given that the two survey models adopted different concepts of level of education, for comparison purposes, the present study expresses education in years of schooling categorized into three classes (up to three years, four to ten years, and at least 11 years) and only considers people aged 18 years and over. For the 2013 PNS, the group with the lowest level of education (up to three years of schooling) consisted of people who reported that they were unable to read or write, those who did not go school or were currently attending school, and those who only studied up to the third grade or equivalent of primary education; while the group with the highest level of education (at least 11 years of schooling) comprised people who had at least completed secondary education.

Since health status and health service use may vary according to age, the sample was divided into two groups: 18 to 59 years and 60 years and over. The analysis of trends in *inequalities* in health status and health service use over time sought to identify socially unfair, undesirable, and avoidable differences¹⁵ by comparing population groups at the extremes, i.e. those with up to three years of schooling and those with at least 11 years of schooling.

According to the four surveys, *health conditions* can be measured using traditional indicators also used in other countries, including self-reported health status and self-reported chronic diseases.

In the present study, *health status* was assessed based on the percentage of respondents whose self-reported health status was “good” and “very good”. It is important to note that secondary respondents gave information on household members absent at the time of the survey. Although the PNS includes a subsample of people aged 18 years and over who self-reported their health status, to ensure a more accurate comparison with the PNAD, the data for all household members was considered, including that provided by secondary respondents.

PNAD data on *diabetes and hypertension* included information provided by secondary respondents. In the 1998 survey, the relevant question referred simply to “knowledge of the disease”, while in the 2003 and 2008 surveys the question stressed diagnosed by “a doctor or other health professional”. The data from the 2013 PNS is more precise because the questions were answered directly by the members of the subsample of people aged 18 years and over who reported that they had been diagnosed by a “doctor”.

Health service use was assessed using the following indicators: proportion of people who reported having had a medical appointment in the last 12 months; proportion of people who had had three or more medical appointments in the last 12 months; proportion of people who reported having had a dental appointment in the last 12 months; and proportion of people who reported being admitted to hospital in the last 12 months.

In addition to the above indicators, we used the proportion of women aged between 50 and 69 years who reported having a *mammogram* in the last two years, in accordance with Brazilian government guidelines. Comparable data for this indicator and years of schooling is only available from the 2008 PNAD and 2013 PNS. Although this theme was included in the 2003, the way the question was formulated prevents comparison.

Results

The results show that the proportion of the overall sample (people aged 18 years and over) with good or very good *health status* fell from around 72% in 1998 to approximately 65% in 2013. The same trend was observed in the 18 to 59 year age

group, with the rate dropping from 77% in 1998 to 70% in 2013. In contrast, the rate among the 60 years and over group increased between 1998 and 2003, leveling off at around 45% in 2013 (Table 1 and Figure 1).

The percentage of people aged between 18 and 59 years with good or very good health status in the north and northeast regions is lower than in the other regions throughout the entire study period (Table 2). Between 1998 and 2008, the percentage of people in this group with good or very good health status remains relatively stable and the wide differences between more and less economically developed regions persist. This rate then decreases between 2008 and 2013 across all regions, with a more pronounced decrease in the north and northeast regions.

The percentage of people in the 60 years and over age group with good or very good health status increased between 1998 and 2003 across all regions, leveling off in 2013. Regional inequalities are also evident in this age group throughout the study period, with 52% of older persons in the Southeast Region reporting good or very good health status in 2013, compared to only 36% in the Northeast Region.

The findings show that overall prevalence of *hypertension* increased throughout the study period across all regions and was highest among older persons, reaching around 50% among this group. Prevalence among the 18 to 59 year age group ranged between 11 and 17% and was lowest in the Northeast Region throughout the whole study period, where it was a little over 10%. There was a significant increase in prevalence among the 60 years and over age group between 1998 and 2008 across all regions, followed by a slight decrease between 2008 and 2013 across all regions, except the South Region, where the rate remained at practically the same level as 2008. Regional inequalities are evident, with the southeast and south regions showing higher prevalence rates throughout the whole period.

The overall prevalence of *diabetes* rose from 3.1% to 7.3% over the study period, almost doubling in both age groups across all regions (Table 1 and Figure 1). A very significant increase was observed in the 60 years and over age group (from 10.3% in 2008 to 18.2% in 2013). Particularly large increases were found in both age groups in the Center-West Region, with the rate reaching 21% in the 60 years and over age group, and the Northeast Region, where prevalence increased from 8.1% in 1998 to 18% in 2013 among the 60 years and over age group.

Table 1. Indicators (% and CI) of health status and health service use by age group.

Health status and health service use	Age group	1998	2003	2008	2013
Percentage of population who reported good or very good health status	18 years and over	71.6 (71.1-72.0)	72.4 (72.0-72.8)	71.3 (71.0-71.6)	65.3 (64.6-66)
	18 to 59 years	76.8 (76.4-77.3)	77.2 (76.8-77.7)	76.3 (75.9-76.6)	70.5 (69.7-71.2)
	60 years and over	39.3 (38.5-40.2)	43.6 (42.8-44.4)	45.0 (44.3-45.7)	45.5 (44.1-47.0)
Percentage of population who reported being diagnosed with hypertension	18 years and over	16.6 (16.3-16.8)	18.0 (17.8-18.3)	19.9 (19.7-20.1)	23.5 (22.9-24.1)
	18 to 59 years	12.1 (11.9-12.4)	12.9 (12.7-13.0)	13.6 (13.4-13.8)	16.1 (15.6-16.7)
	60 years and over	43.9 (43.1-44.6)	48.8 (48.1-49.5)	53.3 (52.7-53.9)	51.3 (49.7-52.9)
Percentage of population who reported being diagnosed with diabetes	18 years and over	3.1 (3.0-3.2)	3.8 (3.7-3.9)	5.1 (5.0-5.2)	7.3 (6.9-7.6)
	18 to 59 years	1.9 (1.8-2.0)	2.3 (2.2-2.4)	3.0 (2.9-3.1)	4.2 (3.9-4.5)
	60 years and over	10.3 (9.8-10.7)	13.0 (12.6-13.4)	16.1 (15.6-16.5)	18.2 (17.1-19.4)
Percentage of population who had had a medical appointment in the last 12 months	18 years and over	57.6 (57.1-58.0)	64.6 (64.2-65.0)	69.9 (69.5-70.2)	71.7 (71.2-72.3)
	18 to 59 years	55.2 (54.7-55.7)	62.3 (61.9-62.8)	67.7 (67.3-68.1)	69.1 (68.5-69.8)
	60 years and over	72.1 (71.4-72.8)	78.0 (77.4-78.6)	81.3 (80.8-81.8)	83.5 (82.8-84.2)
Percentage of population who had had 3 or more medical appointments in the last 12 months	18 years and over	28.8 (28.4-29.1)	33.5 (33.1-33.9)	37.4 (37.0-37.8)	36.5 (35.9-37.1)
	18 to 59 years	26.3 (25.9-26.6)	30.5 (30.2-30.9)	34.2 (33.9-34.6)	32.6 (32.0-33.2)
	60 years and over	44.3 (43.5-45.0)	51.0 (50.3-51.7)	54.0 (53.3-54.7)	54.0 (52.9-55.1)
Percentage of population who had had a dental appointment in the last 12 months	18 years and over	32.1 (31.6-32.5)	37.6 (37.2-38.0)	39.0 (38.6-39.4)	44.1 (43.4-44.8)
	18 to 59 years	35.1 (34.6-35.6)	41.0 (40.6-41.5)	42.6 (42.2-43.1)	47.5 (46.8-48.2)
	60 years and over	13.2 (12.6-13.8)	17.4 (16.8-18.0)	19.8 (19.3-20.4)	28.9 (27.7-30.0)
Percentage of women who had had a mammogram in the last 12 months	50 to 69 years	-	46.1 (45.3-46.9)*	54.2 (53.5-55)	60.0 (58.8-61.3)
Percentage of population who reported being admitted to hospital in the last 12 months	18 years and over	8.4 (8.3-8.6)	8.1 (7.9-8.2)	8.0 (7.9-8.2)	6.6 (6.4-6.9)
	18 to 59 years	7.6 (7.4-7.8)	7.3 (7.1-7.4)	7.2 (7.1-7.4)	5.8 (5.6-6)
	60 years and over	13.6 (13.1-14.1)	12.7 (12.3-13.2)	12.3 (11.9-12.7)	10.2 (9.6-10.9)

*last 3 years

Source: PNAD 1998, PNAD 2003, PNAD 2008, and PNS 2013.

With regard to *social inequalities in health status*, Table 2 shows that there was a slight increase in the *inequality ratio* among the 18 to 59 year age group between 2003 and 2013, due to the decrease in the percentage of people with good

or very good health status in the group with up to three years of schooling. This increase in inequality in health status can also be observed in the northeast and southeast regions. In the South Region the ratio increases from 1998 to 2008 and

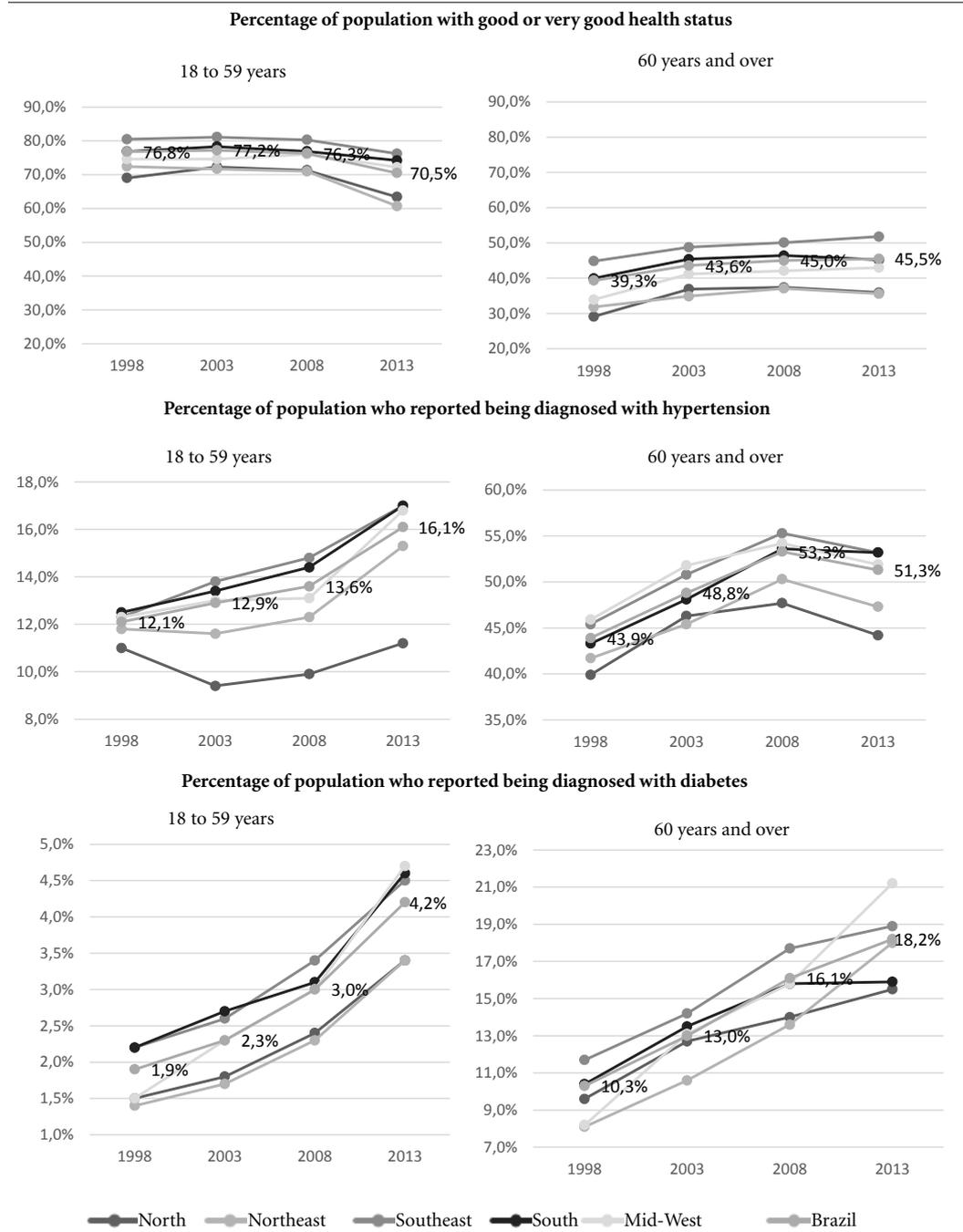


Figure 1. Indicators of health status by age group - Brazil and Regions.

Source: PNAD 1998, PNAD 2003, PNAD 2008, and PNS 2013.

dips in 2013 returning to the 1998 level of 1.5, while in the Center-West Region the ratio remains stable between 2003 and 2013 at 1.6.

The percentage of people in the 60 years and over age group (Table 1) with good or very good health status showed only a slight increase over

the study period, from 40 to 45%. However, the percentage of people with at least 11 years of schooling in this age group with good or very good health status is around double that of those with up to three years of schooling throughout the study period. The inequality ratio remained

around 2 throughout the study period across all regions, except in the Northeast Region, where it decreased from 2.1 in 1998 to 1.6 in 2013, due to a decrease in the percentage of people with good or very good health status in the group with at least 11 years of schooling.

The prevalence of *hypertension* in the 18 to 59 year age group was consistently higher among people with up to three years of schooling between 1998 and 2008, with inequality ratios ranging between 0.3 and 0.4 in the southeast, south, and center-west regions and around 0.5 to 0.6 in the northeast and north regions in almost all the surveys. In 2013, the inequality ratio varied between 0.5 and 0.6 across all regions, except in the south, where it was 0.4 (Table 2). Inequalities in the prevalence of hypertension are much less pronounced in the 60 years and over age group than in the 18 to 59 year age group across all regions.

In the 18 to 59 year age group, there was an increase in prevalence of *diabetes* in the group with up to three years of schooling throughout the study period, reaching 6.5% in 2013. Prevalence increased at the same rate in both education groups throughout the study period, meaning that the inequality ratio remained stable in this age group throughout the study period at around 0.4. In the Center-West Region, 9.6% of the respondents in this age group with up to three years of schooling reported having been medically diagnosed with diabetes in 2013. It is interesting to note that the prevalence of diabetes in the 60 years and over age group in the Northeast Region between 1998 and 2008 was higher among people with at least 11 years of schooling. However, this trend was reversed in 2013, with a ratio of 0.7 in favor of the group with at least 11 years of schooling compared to 1.1 in favor of the group with up to three years of schooling in 2008.

With respect to *health service use*, the proportion of the overall sample (people aged 18 years and over) who had had at least one *medical appointment* in the 12 months prior to the interview increased from 58% to 72% between 1998 and 2013. This proportion was 83.5% in the 60 years and over age group in 2013 (Table 1 and Figure 2). The increase was most pronounced in 2008 in both groups. Table 1 shows that the overall proportion of people who reported having three or more appointments in the last 12 months increased gradually between 1998 and 2008 (from 29% to 37%) and remained relatively stable in 2013 (36%). A similar trend was observed in the 60 years and over age group, where

the rate increased from 44% to 54% between 1998 and 2008, leveling off at this figure in 2013.

The inequality ratio in relation to health service use was relatively low and stable across all regions. From 2003, the percentage of people from the 60 years and over age group with at least 11 years of schooling who reported having at least one medical appointment in the last 12 months was over 80% across all regions. The lowest percentage for this indicator was among people with up to three years of schooling in the north and northeast regions. The inequality ratio among the 60 years and over age group varied only slightly throughout the study period, from 1 to 1.3.

Although there was an increase in the percentage of people who had had a *dental appointment in the last year* between 1998 and 2013, it is important to highlight that the rate was low, even in the 18 to 59 year age group, where it ranged from 35.1% to 47.5%. The rate increased sharply between 2008 and 2013 across all regions and there was a general reduction in the inequality ratio over the study period. However, despite this reduction, inequality ratios remained very high at the end of the study period (2 in the 18 to 59 year age group and between 3 and 4 in the 60 years and over age group).

The overall proportion of *people admitted to hospital* in the last 12 months decreased from around 8% in 1998 to 6.6% in 2013. The rate per 100 population was consistently higher in people from the 60 years and over age group and among people with up to three years of schooling in both age groups. There was a general decrease in the hospitalization rate in both age groups and education groups across all regions except the South Region, where the rate increased among the 60 years and over age group in both education groups between 2008 and 2013. Inequality in the 60 years and over age group was lowest in the Northeast Region throughout the study period.

The overall proportion of women aged between 50 and 69 years who had had a *mammogram* in the last two years increased from 54% in 2008 to 60% in 2013. This increase was more pronounced among women with up to three years of schooling (35% in 2008 compared to 43% in 2013), while among women with at least 11 years of schooling the rate remained relatively stable (77% in 2008 compared to 76% in 2013). The overall inequality ratio decreased from 2.2 in 2008 to 1.7 in 2013. Regional inequalities among women with up to three years of schooling are particularly striking in 2013, with only 25.2%

Table 2. Indicators of health status (% CI and ratio) by age group and years of schooling – Brazil and Regions.

Year	18 to 59 years age group											
	1998		2003		2008		2013					
Years of schooling	up to 3 years	at least 11 years	R	up to 3 years	at least 11 years	R	up to 3 years	at least 11 years	R			
Percentage of population who reported good or very good health status												
Brazil	63.2 (62.3-64.1)	88.5 (88.1-88.9)	1.4	61.4 (60.3-62.4)	88.3 (87.9-88.6)	1.4	57.1 (56.4-57.9)	86.8 (86.5-87.1)	1.5	50.2 (48.3-52.1)	81.1 (80.2-81.9)	1.6
North	56.0 (52.9-59.0)	81.8 (79.9-83.6)	1.5	56.2 (53.4-58.9)	83.6 (82.4-84.8)	1.5	55.9 (52.8-59.0)	82.3 (81.2-83.4)	1.5	50.3 (46.3-54.3)	72.7 (70.4-75.0)	1.4
Northeast	65.1 (63.4-66.8)	82.6 (81.5-83.6)	1.3	63.0 (61.0-64.9)	81.8 (81.0-82.6)	1.3	57.8 (56.7-59.0)	81.7 (81.0-82.4)	1.4	45.5 (42.8-48.2)	71.6 (69.9-73.2)	1.6
Southeast	64.2 (62.8-65.5)	90.5 (90.0-91.0)	1.4	62.6 (61.2-63.8)	90.6 (90.2-91.1)	1.4	58.6 (57.1-60.0)	89.2 (88.7-89.6)	1.5	53.8 (49.4-58.1)	85.4 (84.0-86.7)	1.6
South	59.3 (57.4-61.2)	91.1 (90.3-91.8)	1.5	57.3 (55.3-59.4)	90.3 (89.5-91.0)	1.6	52.8 (50.4-55.3)	88.2 (87.5-88.9)	1.7	57.3 (51.6-62.9)	84.5 (82.7-86.1)	1.5
Center-west	58.2 (56.3-60.0)	88.2 (87.2-89.2)	1.5	55.9 (54.1-57.8)	86.9 (86.0-87.8)	1.6	54.5 (52.6-56.4)	86.7 (85.9-87.4)	1.6	52.2 (47.6-56.8)	81.5 (79.7-83.1)	1.6
Percentage of population who reported being diagnosed with hypertension												
Brazil	18.2 (17.7-18.7)	7.9 (7.6-8.2)	0.4	20.0 (19.5-20.6)	8.3 (8.1-8.5)	0.4	21.7 (21.2-22.3)	9.5 (9.3-9.7)	0.4	22.7 (21.1-24.3)	12.6 (11.9-13.3)	0.6
North	16.2 (14.3-18.3)	8.3 (7.3-9.4)	0.5	15.5 (14.3-16.9)	6.8 (6.2-7.5)	0.4	15.2 (13.6-17.0)	7.4 (6.8-8.0)	0.5	16.8 (14.4-19.5)	9.4 (8.1-10.9)	0.6
Northeast	14.8 (14.0-15.6)	9.3 (8.7-10)	0.6	15.2 (14.5-16.0)	9.0 (8.5-9.5)	0.6	17.4 (16.7-18.1)	9.5 (9.0-9.9)	0.5	20.5 (18.6-22.6)	12.6 (11.0-14.5)	0.6
Southeast	21.5 (20.7-22.3)	7.5 (7.0-7.9)	0.3	25.7 (24.9-26.6)	8.3 (7.9-8.7)	0.3	27.9 (26.9-29.0)	9.9 (9.5-10.2)	0.4	25 (21.4-29.0)	13 (11.9-14.2)	0.5
South	21.4 (20.3-22.6)	7.3 (6.7-7.9)	0.3	23.6 (22.3-25.1)	7.8 (7.3-8.3)	0.3	27.0 (25.4-28.6)	9.4 (8.8-9.9)	0.3	28.4 (23.3-34.0)	12.3 (10.8-14.0)	0.4
Center-west	19.7 (18.4-21.1)	8.1 (7.4-8.8)	0.4	22.8 (21.3-24.4)	8.4 (7.8-9.1)	0.4	23.1 (21.5-24.8)	9.2 (8.6-9.7)	0.4	24.3 (21.1-27.7)	13 (11.6-14.6)	0.5
Percentage of population who reported being diagnosed with diabetes												
Brazil	2.7 (2.5-2.8)	1.2 (1.1-1.4)	0.4	3.7 (3.5-4.0)	1.6 (1.5-1.7)	0.4	4.8 (4.6-5.1)	2.1 (2-2.2)	0.4	6.5 (5.6-7.6)	2.9 (2.6-3.4)	0.4
North	2.1 (1.7-2.8)	1.3 (0.9-1.8)	0.6	2.8 (2.4-3.3)	1.4 (1.1-1.7)	0.5	4.0 (3.4-4.7)	1.8 (1.5-2.1)	0.5	5.9 (4.1-8.6)	2.4 (1.8-3.2)	0.4
Northeast	1.5 (1.4-1.7)	1.1 (0.9-1.3)	0.7	2.3 (2.0-2.6)	1.4 (1.2-1.6)	0.6	3.4 (3.1-3.7)	1.6 (1.5-1.8)	0.5	5.7 (4.6-7.1)	2.2 (1.8-2.8)	0.4
Southeast	3.8 (3.5-4.2)	1.3 (1.2-1.5)	0.3	5.2 (4.8-5.7)	1.6 (1.5-1.8)	0.3	6.5 (5.9-7.2)	2.3 (2.1-2.5)	0.4	7.4 (5.4-9.9)	3.2 (2.6-4.0)	0.4
South	3.9 (3.4-4.4)	1.2 (1.0-1.5)	0.3	5.5 (4.9-6.3)	1.7 (1.5-1.9)	0.3	6.4 (5.6-7.3)	2.0 (1.8-2.3)	0.3	5.8 (3.3-9.9)	3.1 (2.2-4.3)	0.5
Center-west	2.5 (2.1-2.9)	1.2 (0.9-1.5)	0.5	4.3 (3.7-5.1)	1.4 (1.2-1.7)	0.3	5.5 (4.7-6.3)	2.0 (1.8-2.3)	0.4	9.6 (7.3-12.4)	3.1 (2.5-4.0)	0.3
60 years and over age group												
Percentage of population who reported good or very good health status												
Brazil	31.8 (30.7-32.8)	69.0 (66.8-71.1)	2.2	34.9 (33.9-35.9)	70.6 (68.9-72.3)	2.0	35.6 (34.9-36.4)	68.4 (67.0-69.8)	1.9	34.3 (32.3-36.3)	69.6 (66.7-72.3)	2.0
North	23.9 (20.9-27.2)	51.9 (42.5-61.1)	2.2	30.8 (27.5-34.3)	62.2 (55.6-68.5)	2.0	32.7 (30.2-35.3)	59.1 (53.4-64.6)	1.8	29.9 (25.3-35.0)	54.3 (45.2-63.1)	1.8
Northeast	28.8 (26.9-30.7)	60.6 (55.7-65.2)	2.1	31.9 (29.9-34.0)	62.0 (58.1-65.8)	1.9	33.0 (31.7-34.3)	58.1 (55.1-61.1)	1.8	32.5 (29.7-35.4)	51.6 (46.1-57.1)	1.6
Southeast	35.8 (34.1-37.4)	70.9 (67.9-73.8)	2.0	37.5 (36.1-38.9)	72.3 (69.9-74.6)	1.9	38.6 (37.2-40.0)	71.0 (68.9-72.9)	1.8	37.0 (33.1-41.0)	74.1 (70.1-77.8)	2.0
South	32.0 (29.7-34.4)	72.7 (67.8-77.2)	2.3	36.6 (34.0-39.3)	73.6 (70.0-76.9)	2.0	36.3 (34.3-38.4)	72.1 (69.2-74.9)	2.0	34.0 (29.4-39.1)	72.3 (65.6-78.2)	2.1
Center-west	26.4 (24.0-28.9)	68.0 (61.1-74.2)	2.6	33.9 (31.5-36.4)	71.2 (66.0-75.9)	2.1	33.7 (31.6-35.8)	68.6 (64.2-72.7)	2.0	32.1 (28.1-36.3)	69.2 (62.0-75.6)	2.2

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Table 2. Indicators of health status (%), CI and ratio) by age group and years of schooling – Brazil and Regions.

Years of schooling	1998			2003			2008			2013		
	up to 3 years	at least 11 years	R	up to 3 years	at least 11 years	R	up to 3 years	at least 11 years	R	up to 3 years	at least 11 years	R
Percentage of population who reported being diagnosed with hypertension												
Brazil	45.9 (45.0-46.8)	35.7 (33.7-37.7)	0.8	50.5 (49.6-51.4)	39.9 (38.2-41.6)	0.8	55 (54.2-55.8)	45.5 (44.0-47.0)	0.8	53.3 (51.0-55.7)	43.9 (41.0-47.0)	0.8
North	43.0 (39.2-46.9)	30.9 (23.3-39.8)	0.7	49.1 (46.3-51.9)	35.3 (29.4-41.7)	0.7	48.0 (45.2-50.9)	46.4 (40.9-52.0)	1	46.2 (41.1-51.4)	33.1 (25.8-41.2)	0.7
Northeast	41.6 (40.1-43.2)	40.4 (36.0-44.9)	1.0	45.2 (43.4-46.9)	39.9 (36.5-43.4)	0.9	49.6 (48.5-50.8)	47.5 (44.8-50.2)	1	47.0 (43.7-50.4)	42.6 (37.4-48.0)	0.9
Southeast	49.8 (48.3-51.3)	34.8 (32.1-37.6)	0.7	55.2 (53.9-56.5)	39.6 (37.2-42.0)	0.7	60.0 (58.6-61.3)	45.0 (42.9-47.1)	0.8	59.2 (54.5-63.7)	45.1 (41.0-49.4)	0.8
South	44.9 (42.6-47.2)	34.6 (30.1-39.5)	0.8	49.6 (47.4-51.7)	40.8 (37.3-44.5)	0.8	57.4 (55.2-59.6)	44.5 (40.9-48.2)	0.8	54.7 (49.4-59.9)	41.1 (33.5-49.3)	0.8
Center-west	48.9 (45.8-52.1)	36.8 (30.6-43.6)	0.8	54.4 (52.3-56.4)	43.0 (38.0-48.1)	0.8	55.8 (53.8-57.9)	46.5 (42.4-50.8)	0.8	55.4 (50.4-60.2)	47.3 (40.6-54.1)	0.9
Percentage of population who reported being diagnosed with diabetes												
Brazil	10 (9.5-10.6)	8.3 (7.1-9.6)	0.8	13.1 (12.5-13.7)	11.6 (10.5-12.8)	0.9	16.2 (15.6-16.8)	14.0 (13.0-15.0)	0.9	19.8 (18.1-21.6)	13.7 (11.7-16.0)	0.7
North	9.2 (7.6-11.2)	9.2 (4.6-17.4)	1	13.0 (11.3-14.8)	14.8 (10.3-20.8)	1.1	14.0 (12.3-15.8)	12.6 (9.4-16.7)	0.9	18.5 (14.8-22.9)	13.3 (8.5-20.0)	0.7
Northeast	7.5 (6.9-8.3)	8.1 (6.1-10.7)	1.1	10.1 (9.4-11.0)	11.1 (9.1-13.4)	1.1	13.0 (12.3-13.9)	14.5 (12.6-16.6)	1.1	18.8 (16.1-21.8)	13.7 (10.6-17.6)	0.7
Southeast	12.2 (11.3-13.2)	8.7 (7.1-10.7)	0.7	15.1 (14.1-16.2)	11.0 (9.5-12.7)	0.7	19.1 (18.0-20.2)	14.0 (12.6-15.5)	0.7	21.8 (18.7-25.3)	14.0 (11.1-17.5)	0.6
South	11.3 (10.0-12.7)	5.4 (3.6-7.8)	0.5	14.8 (13.5-16.3)	13.3 (11.1-15.8)	0.9	17.7 (16.3-19.2)	13.0 (11.0-15.3)	0.7	14.7 (11.5-18.6)	11.0 (7.7-15.6)	0.7
Center-west	7.2 (5.9-8.7)	11.3 (7.6-16.5)	1.6	13.4 (11.6-15.5)	13.3 (9.9-17.7)	1	15.2 (13.7-16.9)	16.1 (13.3-19.3)	1.1	24.5 (20.3-29.2)	18.3 (13.1-25.0)	0.7

Source: PNAD 1998, PNAD 2003, PNAD 2008, and PNS 2013.

of women having done the examination in the North Region, compared to 53.1% in the Southeast Region.

The above picture was confirmed by regression analysis (Table 4), where the influence of schooling on health status and service use was controlled by age group and year of survey.

Discussion

The decrease in the percentage of people in the 18 to 59 year age group with good or very good health status, particularly in the up to three years of schooling group and in the north and northeast regions, does not reflect the investment in primary healthcare made by the SUS over the study period. On the other hand, this finding may also be due to a greater knowledge of health status promoted by primary care programs and improved access to health information. This is corroborated by the increase in prevalence of hypertension and diabetes^{16,17}, which are priority areas of government health policy and programs such as the Family Health Strategy. In other words, the increase in the diagnosis of chronic diseases as a result of the expansion of primary health programs means that self-assessment of health is likely to be poorer. In this respect, studies have shown an association between assessment of health status and self-reported morbidity^{18,19}.

However, this is not the case in the 60 years and over age group, where the increase in the diagnosis of hypertension and diabetes in both education groups is not accompanied by a reduction in health status. In this respect, studies have shown that perceived health status among older persons tends to be more influenced by level of functional capacity than diagnosis of chronic diseases^{20,21}. In contrast to the 18 to 59 year age group, the percentage of people with at least 11 years of schooling with good or very good health status is generally twice that of people with up to three years of schooling among this age group across all regions throughout the study period.

A number of international studies have shown a relationship between schooling and chronic diseases. According to a study of 26 European countries conducted by the Organization for Economic Cooperation and Development in 2014, the average prevalence of diabetes in the population aged 15 years and over was 7.0, ranging between 4.4 (Lithuania) and 10% (France). Average prevalence among people with a low level of schooling was 10.8%, compared to 4.2% in

Table 3. Indicators of health service use (%; CI and ratio) by age group and years of schooling – Brazil and Regions.

Year	18 to 59 years age group											
	1998		2003		2008		2013					
Years of schooling	up to 3 years	at least 11 years	R	up to 3 years	at least 11 years	R	up to 3 years	at least 11 years	R			
Percentage of population who had had a medical appointment in the last 12 months												
Brazil	51.7 (50.9-52.5)	62.8 (62-63.5)	1.2	58 (57.2-58.8)	68.4 (67.8-68.9)	1.2	63.4 (62.6-64.1)	71.8 (71.3-72.2)	1.1	63.7 (62.5-65)	72.8 (72.1-73.6)	1.1
North	49.7 (46.9-52.4)	58.9 (56.3-61.4)	1.2	58.4 (56.1-60.6)	66.2 (64.7-67.6)	1.1	56.9 (53.9-59.9)	67.2 (65.7-68.8)	1.3	52.4 (49-55.6)	65.8 (64.3-67.3)	1.3
Northeast	47.1 (45.6-48.5)	66.3 (65-67.6)	1.4	51.9 (50.4-53.4)	69.5 (68.5-70.5)	1.3	59.7 (58.6-60.9)	71.2 (70.3-72.1)	1.2	59.4 (57.6-61.2)	69.2 (67.8-70.5)	1.2
Southeast	56.3 (55.1-57.4)	61.6 (60.4-62.7)	1.1	64.6 (63.3-65.8)	68.1 (67.2-68.9)	1.1	68.8 (67.5-70.1)	72.7 (72-73.3)	1.1	69.5 (66.5-72.4)	75.4 (74.1-76.7)	1.1
South	55.1 (53.2-57)	63.1 (61.5-64.6)	1.1	61.2 (59.3-63.1)	68.4 (67.2-69.6)	1.1	68 (65.9-70)	72.2 (71.1-73.2)	1.1	72.5 (69.5-75.4)	74.4 (72.5-76.2)	1.0
Center-west	54.8 (52.7-56.9)	63.7 (62-65.5)	1.2	61.4 (59.8-62.9)	69.2 (68-70.3)	1.1	64.8 (62.9-66.6)	70.6 (69.5-71.6)	1.1	67.5 (64.4-70.5)	71 (69.6-72.4)	1.1
Percentage of population who had had 3 or more medical appointments in the last 12 months												
Brazil	25.2 (24.7-25.8)	29.6 (29-30.2)	1.2	29.9 (29.2-30.6)	33.1 (32.6-33.7)	1.1	33.7 (33-34.5)	35.8 (35.3-36.3)	1.1	33 (31.8-34.2)	33.2 (32.4-34.1)	1.0
North	19 (17.2-20.8)	25.3 (23.4-27.3)	1.3	26.9 (25.3-28.6)	28.9 (27.5-30.4)	1.1	27.9 (26-29.9)	31.9 (30.7-33.2)	1.1	22.4 (20.2-24.8)	26.6 (25.3-28)	1.2
Northeast	21.2 (20.3-22.1)	32 (30.9-33.2)	1.5	24.8 (23.7-25.9)	34.7 (33.6-35.7)	1.4	29.7 (28.6-30.9)	35.1 (34.2-36.1)	1.2	30.8 (29.1-32.6)	31.8 (30.5-33.1)	1.0
Southeast	30.1 (29.2-31.1)	29.4 (28.5-30.3)	1.0	36.6 (35.5-37.7)	34 (33.1-34.8)	0.9	39.8 (38.5-41.2)	37.3 (36.6-38)	0.9	36.6 (33.9-39.4)	35.3 (33.8-36.7)	1.0
South	29.4 (27.9-31)	29.2 (28.1-30.4)	1.0	33.2 (31.6-34.9)	31.4 (30.4-32.5)	0.9	38.9 (36.7-41.1)	34.2 (33-35.4)	0.9	40.2 (36.9-43.7)	33 (30.9-35.2)	0.8
Center-west	24.4 (23-25.9)	27.6 (26.3-29)	1.1	29.2 (27.8-30.7)	30.3 (29.1-31.5)	1.0	32.9 (31.2-34.7)	34.3 (33.1-35.4)	1.0	34.3 (31.5-37.2)	31.3 (29.9-32.7)	0.9
Percentage of population who had had a dental appointment in the last 12 months												
Brazil	17.2 (16.6-17.7)	56.3 (55.6-57.1)	3.3	21.3 (20.8-21.8)	58.9 (58.3-59.5)	2.8	23.7 (23.1-24.3)	55.5 (54.9-56)	2.3	28.4 (27.3-29.6)	58.2 (57.3-59.2)	2.0
North	17.2 (15.5-19)	47.8 (45.2-50.4)	2.8	19.7 (17.8-21.7)	49.4 (47.8-51)	2.5	19 (16.5-21.9)	46.3 (44.7-48)	2.4	22.5 (20.1-25)	48.5 (46.5-50.4)	2.2
Northeast	15.7 (14.8-16.6)	51.7 (50.3-53.2)	3.3	19.3 (18.5-20.1)	55.6 (54.3-56.8)	2.9	22.4 (21.6-23.2)	54.2 (53.1-55.3)	2.4	25.4 (24.1-26.8)	54.2 (52.6-55.7)	2.1
Southeast	17.7 (16.8-18.7)	56.2 (55.1-57.3)	3.2	22.9 (21.9-23.9)	58.9 (58-59.8)	2.6	25.9 (24.8-27)	54.8 (53.9-55.6)	2.1	32.5 (29.7-35.3)	59.4 (57.8-61)	1.8
South	19.6 (18.2-21.1)	64.5 (63.1-65.8)	3.3	24.2 (22.8-25.7)	65.8 (64.2-67.4)	2.7	26.4 (24.8-28.1)	63.3 (62-64.6)	2.4	34.6 (31.2-38.1)	66 (64-68)	1.9
Center-west	20 (18.7-21.4)	57.2 (55.3-59)	2.9	23.7 (22.1-25.4)	59.3 (57.8-60.8)	2.5	25.3 (23.9-26.9)	55.6 (54.2-56.9)	2.2	27.2 (24.8-29.8)	57 (55.3-58.8)	2.1
Percentage of population who reported being admitted to hospital in the last 12 months												
Brazil	8.5 (8.2-8.8)	6.6 (6.4-6.9)	0.8	8.1 (7.8-8.4)	6.6 (6.3-6.8)	0.8	8.1 (7.7-8.4)	6.5 (6.3-6.7)	0.8	6.3 (5.8-6.9)	5.6 (5.3-6)	0.9
North	9.6 (8.5-10.9)	6.9 (6-7.9)	0.7	10.4 (8.9-12)	7 (6.5-7.6)	0.7	9.1 (7.9-10.6)	7.3 (6.7-8)	0.8	6.1 (5-7.3)	5.8 (5.2-6.4)	1.0
Northeast	8.2 (7.7-8.7)	7.2 (6.6-7.7)	0.9	7.9 (7.4-8.3)	6.9 (6.5-7.4)	0.9	7.8 (7.3-8.4)	6.3 (5.9-6.7)	0.8	6.1 (5.3-6.9)	5.4 (4.9-5.9)	0.9
Southeast	7.8 (7.2-8.3)	6 (5.7-6.4)	0.8	7.2 (6.7-7.8)	6.1 (5.8-6.5)	0.8	7.1 (6.6-7.8)	6 (5.7-6.3)	0.8	6.1 (4.9-7.5)	5.1 (4.6-5.7)	0.8
South	10.5 (9.6-11.5)	7.2 (6.6-7.9)	0.7	9 (8-10)	6.8 (6.4-7.3)	0.8	9.7 (8.7-10.9)	7.1 (6.7-7.6)	0.7	7.5 (6-9.3)	6.8 (6.1-7.7)	0.9
Center-west	10.5 (9.7-11.4)	8.1 (7.4-8.8)	0.8	10.5 (9.6-11.5)	7.9 (7.3-8.5)	0.8	9.9 (9-10.9)	8.4 (7.8-9)	0.8	8.1 (6.7-9.8)	6.9 (6.2-7.6)	0.9

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Table 3. Indicators of health service use (%; CI and ratio) by age group and years of schooling – Brazil and Regions.

Years of schooling	2008			2013		
	up to 3 years	at least 11 years	R	up to 3 years	at least 11 years	R
60 years and over age group						
Percentage of population who had had a medical appointment in the last 12 months						
Brazil	70 (69.1-70.9)	78.3 (76.4-80.1)	1.1	78.9 (78.2-79.5)	85.5 (84.5-86.5)	1.1
North	65.3 (61.6-68.8)	79.9 (70.7-86.7)	1.2	72.9 (70.6-75.2)	82.3 (77.9-86)	1.1
Northeast	62.8 (61.1-64.3)	78.8 (74.6-82.4)	1.3	74.3 (73.1-75.4)	84.8 (82.5-86.9)	1.1
Southeast	76.3 (75-77.5)	78.1 (75.4-77.4)	1.0	83.4 (82.2-84.5)	85.9 (84.4-87.2)	1.0
South	70.3 (67.9-72.6)	78.1 (74.1-81.6)	1.1	80.5 (79-81.9)	85.3 (82.5-87.7)	1.1
Center-west	72.7 (70.5-74.8)	80 (73.4-85.2)	1.1	79.2 (77.3-80.9)	86.6 (83.6-89.2)	1.1
Percentage of population who had had 3 or more medical appointments in the last 12 months						
Brazil	42 (41.1-43)	48.6 (46.2-51)	1.2	52.5 (51.6-53.5)	54.8 (53.3-56.2)	1.0
North	33.8 (30.4-37.5)	40.5 (32.3-49.2)	1.2	45.8 (43.1-48.6)	51.9 (46.2-57.5)	1.1
Northeast	32.9 (31.5-34.4)	46.4 (41.6-51.3)	1.4	46 (44.3-47.7)	56.8 (53.9-59.6)	1.2
Southeast	50.5 (49-52.1)	51 (47.7-54.3)	1.0	60.1 (58.4-61.7)	55.7 (53.7-57.7)	0.9
South	42.9 (40.9-45)	43 (38.3-47.8)	1.0	51.6 (49.4-53.8)	49.2 (45.6-52.8)	1.0
Center-west	41.3 (38.3-44.3)	44.7 (38-51.6)	1.1	52 (49.5-54.4)	54.5 (50.3-58.6)	1.0
Percentage of population who had had a dental appointment in the last 12 months						
Brazil	6.9 (6.5-7.4)	43 (40.5-45.5)	6.2	10.8 (10.3-11.3)	46.5 (44.9-48.1)	4.3
North	6.3 (4.6-8.5)	33.6 (23.8-44.9)	5.3	7.6 (6.1-9.3)	27.9 (23.2-33.2)	3.7
Northeast	5.8 (5.2-6.4)	38.3 (33.9-42.9)	6.6	8.7 (8-9.5)	38.7 (35.8-41.6)	4.4
Southeast	7.2 (6.4-8)	43.3 (39.8-46.9)	6.0	11.8 (10.9-12.8)	47 (44.7-49.4)	4.0
South	8.5 (7.4-9.8)	48 (42.9-53.1)	5.6	14.2 (13-15.6)	56.5 (52.7-60.1)	4.0
Center-west	8.8 (7.5-10.3)	43.2 (35.7-51.1)	4.9	11.8 (10.4-13.3)	50.3 (46-54.6)	4.3
Percentage of population who reported being admitted to hospital in the last 12 months						
Brazil	14.1 (13.5-14.8)	12.1 (10.7-13.6)	0.9	13.3 (12.7-13.8)	10.6 (9.8-11.5)	0.8
North	15.1 (13-17.6)	11.8 (7.2-18.6)	0.8	14.7 (12.6-17.1)	11.8 (8.6-16)	0.8
Northeast	12.8 (11.8-13.9)	12.5 (9.8-15.7)	1.0	11.7 (10.9-12.6)	10.5 (8.9-12.3)	0.9
Southeast	13.5 (12.5-14.5)	11.8 (10-13.9)	0.9	12.9 (12-13.9)	11.1 (9.9-12.3)	0.9
South	17.3 (15.7-19)	12.4 (9.5-16)	0.7	15.7 (14.4-17.2)	8.8 (7.1-10.9)	0.6
Center-west	18.9 (17.2-20.7)	13.1 (9.3-18)	0.7	17 (15.3-18.8)	10.5 (8-13.5)	0.6

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Table 3. Indicators of health service use (%; CI and ratio) by age group and years of schooling – Brazil and Regions.

Years of schooling	60 years and over age group											
	1998			2003			2008			2013		
	up to 3 years	at least 11 years	R	up to 3 years	at least 11 years	R	up to 3 years	at least 11 years	R	up to 3 years	at least 11 years	R
Percentage of women aged between 50 and 69 years who had had a mammogram in the last 2 years												
Brazil	-	-	-	-	-	-	35.2 (34.1-36.3)	77.2 (76.2-78.2)	2.2	43.4 (41.3-45.5)	75.7 (73.9-77.3)	1.7
North	-	-	-	-	-	-	19.4 (16.8-22.4)	64.8 (60.1-69.2)	3.3	25.2 (21.5-29.3)	64.3 (59.9-68.4)	2.6
Northeast	-	-	-	-	-	-	24.3 (22.8-25.8)	73 (70.4-75.4)	3	35.5 (32.3-38.8)	69.5 (66.2-72.6)	2.0
Southeast	-	-	-	-	-	-	47.5 (45.5-49.5)	79.8 (78.3-81.2)	1.7	53.1 (48.9-57.2)	78.4 (75.6-80.9)	1.5
South	-	-	-	-	-	-	37.2 (34.4-40.1)	77.4 (75-79.6)	2.1	49.4 (43.9-55)	78.8 (75-82.2)	1.6
Center-west	-	-	-	-	-	-	35.4 (32.2-38.8)	77.5 (74.4-80.2)	2.2	41.7 (37.2-46.3)	72.1 (67.9-76)	1.7

Source: PNAD 1998, PNAD 2003, PNAD 2008, and PNS 2013.

people with a high level of schooling. This difference is due to the association between low levels of schooling, overweight, and eating habits²².

The prevalence of hypertension remains relatively stable over the study period in both age groups and is consistently higher among the group with up to three years of schooling. It is important to highlight that the social gradient is more pronounced in the 18 to 59 year age group. The overall prevalence rate in 2013 (23.5%) is similar to that identified by an international literature review, which observed a global prevalence rate of 26.4% in 2000²³, while studies conducted in Brazil have reported rates between 24.8 and 44.4%²⁴.

The findings show a sharp rise in the proportion of people diagnosed with diabetes over the study period in both age groups. Policies to prevent diabetes appear to have a significant impact on regional trends in prevalence of self-reported diabetes in the 60 years and over age group. In the north, center-west, and northeast regions, the inequality ratios reflect a more pronounced increase in prevalence in the group with at least 11 years of schooling between 1998 and 2008. This trend is reversed in 2013. In the other regions, the inequality ratio is consistently under 1, reflecting the higher prevalence of diabetes in the group with up to three years of schooling. It is also interesting to note that the prevalence of diabetes by education group among the 60 years and over age group is higher in the Center-West Region than in other regions in 2013. Furthermore, 30% of people with up to three years of schooling reported having diabetes in 2013, compared to 14% in 2008 in the State of Goiás. The high prevalence of diabetes among older persons in the Center-West Region may be due to changes in the sampling plan.

The findings show that there was an increase in the proportion of people who had had a medical appointment in the last 12 months of the study period in both age groups and that the rate was consistently greater among the group with at least 11 years of schooling. The increase in the proportion of people who had had three or more medical appointments in the last 12 months in the 18 to 59 year age group was more pronounced among people with at least 11 years of schooling. It is worth noting that studies have shown that having a health insurance plan is one of the factors influencing health service use among population groups with a higher level of income and education^{24,25}.

Studies in Brazil have shown an inverse rela-

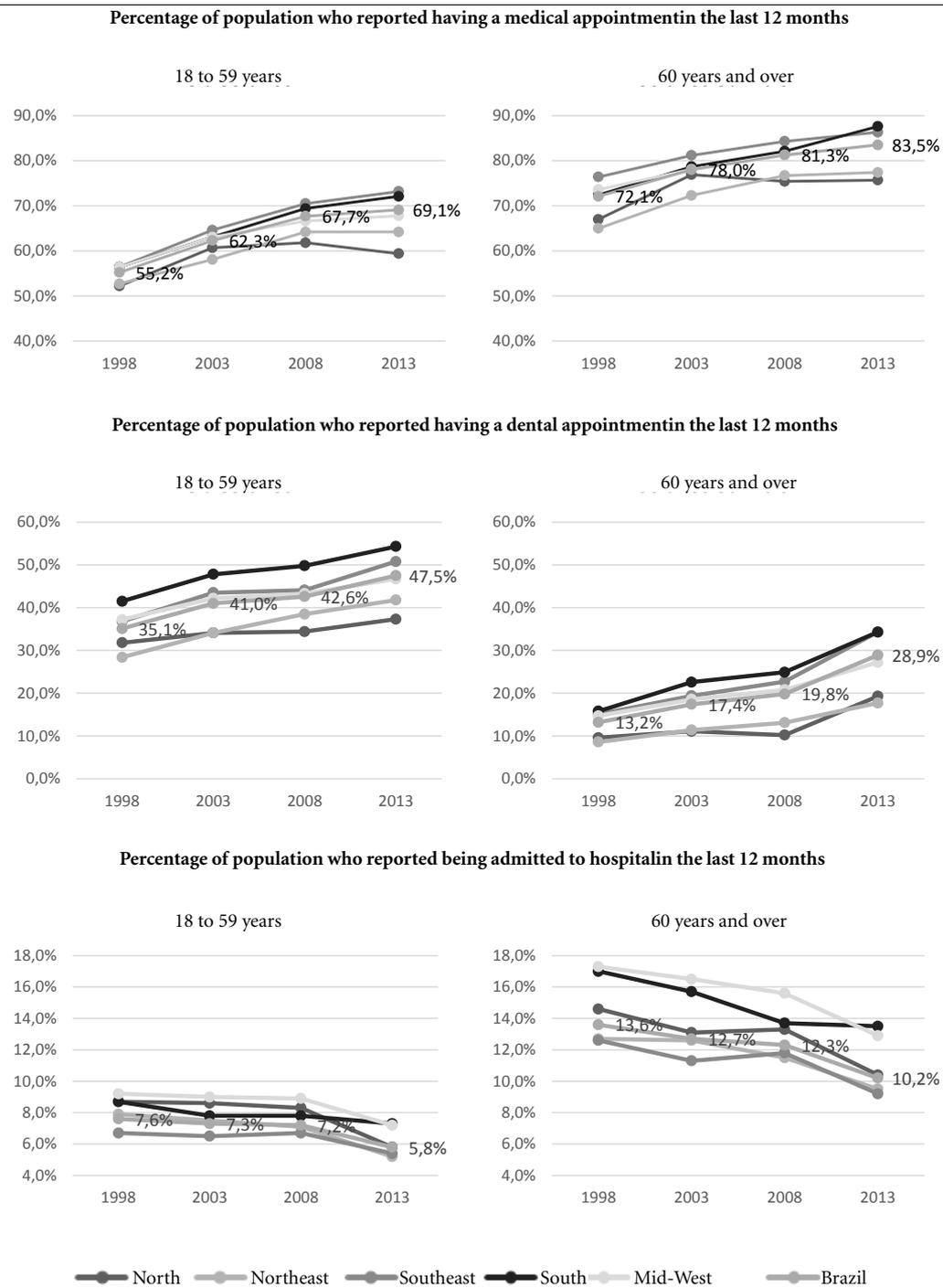


Figure 2 . Indicators of health service use by age group – Brazil and Regions.

Source: PNAD 1998, PNAD 2003, PNAD 2008, and PNS 2013.

tionship between health needs based on self-reported health status and the use of medical appointments. The present study shows that in-

equalities persisted throughout the study period. Data from the World Health Survey conducted in 2003 showed that health status and health service

Table 4. Results of logistic regression analysis of indicators of health status and health service use by years of schooling and year of household survey.

Ag group	Health service use												Health status									
	Medical appointment			Dental appointment			3 or more medical appointments			Hospitalization			Health statusGood/ Very good			Hypertension			Diabetes			
	18 to 59 years	60 years	+	18 to 59 years	60 years	+	18 to 59 years	60 years	+	18 to 59 years	60 years	+	18 to 59 years	60 years	+	18 to 59 years	60 years	+	18 to 59 years	60 years	+	
Years of schooling																						
0 to 3 years	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
4 to 10 years	1.08	1.28	2.17	2.49	0.97	1.18	1.18	0.91	0.84	0.84	2.05	1.81	0.63	0.95	0.68	0.68	0.95	0.68	0.68	1.01	1.01	
at least 11 years	1.53	1.52	5.02	8.26	1.16	1.16	1.16	0.78	0.81	0.81	4.79	4.27	0.39	0.67	0.44	0.44	0.67	0.44	0.44	0.83	0.83	
Year																						
1998	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
2003	1.30	1.35	1.16	1.29	1.22	1.30	1.30	0.97*	0.94	0.94	0.92	1.14	1.14	1.24	1.29	1.24	1.24	1.29	1.29	1.31	1.31	
2008	1.60	1.62	1.12	1.37	1.42	1.46	1.46	0.98*	0.91	0.91	0.78	1.13	1.30	1.50	1.77	1.50	1.50	1.77	1.77	1.69	1.69	
2013	1.66	1.84	1.27	2.05	1.30	1.44	1.44	0.79	0.75	0.75	0.53	1.04*	1.53	1.39	2.81	1.39	1.39	2.81	2.81	2.19	2.19	

p < 0.05* p > 0.05.

Source: PNAD 1998, PNAD 2003, PNAD 2008, and PNS 2013.

use was poorer among people with a lower level of education, showing social gradients in different directions²⁶.

In contrast, hospitalizations are more frequent among people with up to three years of schooling in both age groups. This may be due to a greater rate of hospitalization for chronic diseases among this group because the economic status of people with a higher level of education generally enables them to manage chronic diseases more effectively.

The largest reduction in inequality ratios was found in oral health. The increase in access to services among the population with up to three years of schooling between 1998 and 2003 was probably due to the incorporation of dental services into the Family Health Strategy. Between 2002 and 2008, the number of oral health teams in the country jumped from 4,261 to 17,349 and population coverage increased from 15% to 45%, exceeding 85 million people²⁷. Despite this, the proportion of people who had been to the dentist in the last 12 months remained stable between 2003 and 2008 in both age and education groups. The impact of the creation of dental health teams is clearly shown by the proportion of appointments paid by the SUS in 2008, which was much higher among people with a low level of education, especially in the north and northeast regions²⁸.

Finally, the results show that there was a significant increase in the proportion of women with up to three years of schooling who had had a *mammogram* in the last two years between 2008 and 2013 and a reduction in inequality in access to these services. This appears to be related to the provision of mammograms by the SUS as a result of the government's national early detection policy, which received widespread media coverage. It is worth noting that a study of breast screening coverage in Brazil's 438 health regions revealed low coverage in some regions despite the adequate provision of screening services²⁹.

Final considerations

The findings show a general reduction in health status among the 18 to 59 year age group, suggesting that the expansion of primary health care services has led to improved self-knowledge of health status among this population. This hypothesis is supported by the increase in prevalence of self-reported hypertension and diabetes and increased health service use.

With regard to health service use, the findings show that inequalities persist despite a reduction in disparities between regions and social groups. The north and northeast regions showed the worst indicators throughout the study period. Although there have been significant reductions in social inequalities in access to oral health and breast screening services, the social gradient continued to be most pronounced in these areas in 2013.

The findings presented here underscore the importance household surveys for monitoring inequalities in health service use between regions and social groups and for providing vital information for health policy planning and management. Ensuring the continuity of these surveys is undoubtedly a priority. In this respect, it is necessary to update the questionnaires to reflect new

practices in the care system and changing health needs. Similar data was collected by each survey, resulting in data consistency, particularly in the period 1998 to 2008.

Differences in the sampling plan and data collection instruments used for the PNS in 2013 may have influenced some of the trends and findings. Although the trends observed by the previous surveys were maintained, as mentioned above, PNS data on chronic diseases is more reliable because it is self-reported.

Finally, one of the main limitations of the surveys is the fact that the data is not representative for smaller areas, preventing comparisons with municipalities and health regions. In this respect, the sample size required for this purpose would make the surveys economically infeasible.

Collaborations

F Viacava and SM Porto participated in study conception, data analysis and interpretation, and the drafting of this article. CC Carvalho participated in the drafting of this article and review of the version to be published. JG Bellido participated in statistical analysis and data tabulation.

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Article submitted 01/06/2017

Approved 13/12/2017

Final version submitted 15/12/2017