

The burden of disease among Brazilian older adults and the challenge for health policies: results of the Global Burden of Disease Study 2017



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Abstract

Background: Brazil is the world's fifth most populous nation, and is currently experimenting a fast demographic aging process in a context of scarce resources and social inequalities. To understand the health profile of older adults in Brazil is fundamental for planning public policies.

Methods: The estimates were derived from data obtained through the collaboration between the Brazilian Ministry of Health and the Institute of Health Metrics and Evaluation of the University of Washington. The Brazilian Institute of Geography and Statistics provided the population estimates. Data on causes of death came from the Mortality Information System. To calculate morbidity, population-based studies on the prevalence of diseases in Brazil were comprehensively searched, in addition to information obtained from national databases such as the Hospital Information System, the Outpatient Information System, and the Injury Information System. We presented the Global Burden of Disease (GBD) 2017 estimates among Brazilian older adults (60+ years old) for life expectancy at birth (LE), healthy life expectancy (HALE), cause-specific mortality, years of life lost (YLLs), years lived with disability (YLDs), and disability-adjusted life years (DALYs), from 2000 to 2017.

Results: LE at birth significantly increased from 71.3 years (95% UI to 70.9-71.8) to 75.2 years (95% UI 74.7-75.7). There was a trend of increasing HALE, from 62.2 years (95% UI 59.54-64.5) to 65.5 years (95% UI 62.6-68.0). The proportion of DALYs among older adults increased from 7.3 to 10.3%. Chronic noncommunicable diseases are the leading cause of death among middle aged and older adults, while Alzheimer's disease is a leading cause only among older adults. Mood disorders, musculoskeletal pain, and hearing or vision losses are among the leading causes of disability.

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Horizonte, Brazil

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Conclusions: The increase in LE and the decrease of the DALYs rates are probably results of the improvement of social conditions and health policies. However, the smaller increase of HALE than LE means that despite living more, people spend a substantial time of their old age with disability and illness. Preventable or potentially controllable diseases are responsible for most of the burden of disease among Brazilian older adults. Health investments are necessary to obtain longevity with quality of life in Brazil.

Keywords: Older adults, Burden of disease, Life expectancy, Mortality, DALY, Brazil

Background

Brazil is the world's fifth most populous nation, and is currently experimenting a fast demographic aging process in a context of scarce resources and great social inequalities. Since 1950, the shifting age structure showed marked regional differences [1]. While the Southeast, South, and Midwest regions presented a clear demographic transition toward aging, the North and Northeast regions presented elevated mortality and fertility rates and a higher percentage of young people [1]. Along with aging, the concomitant epidemiologic transition increased the incidence of non-communicable diseases (NCDs). Since NCDs are more frequent among older adults, their health tends to be substantially worse, particularly among the poorest populations [2].

While it took a century for the proportion of older adults to increase from 7 to 14% in the population of the developed countries, like France, this same demographic charge is expected to occur in Brazil between 2011 and 2031. This fast aging process increases the financial pressure on health and welfare [3]. By 2020, the excess of economically active population in relation to the dependent population will represent a demographic bonus, due to the greater availability of human resources in the workforce in the last decades. On the other hand, if there is no economic growth, the proportion of the unemployed could jeopardize these demographic opportunities [4]. In the near future, we are about to enter another demographic context, with a larger number of dependent older adults. The amount of health expenditures will depend essentially on the burden of disease, which can be reduced by investments in the prevention and treatment of people throughout their lives, not only in late life [3, 4].

The current Brazilian Constitution has built the basis for public health financing in Brazil. Since 1988, investments in health promotion and prevention, as well in primary care, increased substantially [5]. From 1990 to 2016, Brazil experienced a marked decrease in total mortality and under-five mortality, as well as a reduction in mortality due to communicable diseases and a significant reduction in preventable causes of death. Nevertheless, these improvements were insufficient to eliminate health inequities. States in South and Southeast regions have advanced to later stages of the epidemiological transition toward noncommunicable diseases, compared with states in the North and Northeast regions that continue to face a double burden of communicable and non-communicable diseases, alongside a growing burden due to injuries across the country [6]. The continuance of health achievements and the remediation of inequalities depends on adequate and continuous investment. The Constitutional Amendment No. 95 of May 2017, which prevents an increase in investments in health and education for the next 20 years, may affect the public health system of the country [7].

For the establishment of investment priorities, it is fundamental to understand the health estimates for older adults in the different scenarios of the country. The Global Burden of Disease (GBD) study represents a new paradigm in the evaluation of health trends among the countries. The standardized methodology allows the comparison between localities, and in time [6, 8]. In addition to assessing mortality, it is possible to measure the burden of disability linked to diseases, a fundamental aspect of health, especially among older adults. This article aims to describe the burden of disease for the Brazilian older adults from 2000 to 2017, for the country and states of the Federation.

Methods

This paper describes the burden of disease for the Brazilian older adults, those aged 60 years or more. In 2010, Brazil had about 207.7 million inhabitants, living in five regions, 26 states, and the Federal District. The number of people aged 60 or more years was estimated in 20, 590,597, about 10% of the total population [8]. In order to express the diversity among the five regions of the country, we presented the health metrics of the states with the most numerous elderly population within each region. These are São Paulo (4.771.822 older adults, 11.6% of population) in the Southeast (SE) region, Bahia (1.450.007 older adults, 8.2%) in the Northeast (NE) region, Rio Grande do Sul (1.461.480 older adults, 13.7%) in the South (S) region, Pará (534.461 older adults, 7.1%) in the North (N) region, and Goiás (560.451 older adults, 9.4%) in the Central-West (CW) region. Some states have a higher proportion of older adults, such as Rio de Janeiro (SE, 13%), Paraíba (NE, 12%), and Mato Grosso disease being a su do Sul (CW, 9.8%), but with a lower absolute number [14]. In this study,

[**9**]. All estimates, as well as the figures and graphics, were obtained from the Global Burden of Disease 2017, available on the public website of the Institute of Health Metrics and Evaluation (IHME) of the University of Washington. Data points were obtained through the collaboration of the Brazil Ministry of Health and IHME [8]. The graphics and figures were extracted from the IHME site, with the elderly designated as in developed countries, 65+ years old. Since Brazilian legislation classifies as elderly those with 60+ years old, we decided to show the data considering this age range. The Brazilian Institute of Geography and Statistics (IBGE) provided the population estimates based on projections from the 2010 census [9]. Data on causes of death came from the Mortality Information System (SIM) of the Ministry of Health. In order to calculate the disease prevalence and injury incidence, population-based studies on the prevalence of diseases in Brazil were comprehensively searched, in addition to information obtained from national databases of morbidity, such as the Hospital Information System (SIH), the Outpatient Information System (SIA), and the Injury Information System (SINAN) [6, 10].

Mortality estimates were corrected for underreporting and garbage codes. In addition to absolute numbers of deaths and age-standardized mortality, the rates of years of life lost (YLLs) expressed the effect of premature deaths by age, sex, year, and place. YLLs were obtained by multiplying the number of deaths caused by a disease, in each age group, by the remaining life expectancy at this age, regardless of gender [11, 12]. The estimates on mortality, age-standardized mortality rates, and causes of death are available at https://vizhub.healthdata.org/cod/ [13].

The methods to obtain LE (life expectancy) at birth or any age have been previously reported [11]. Healthy life expectancy (HALE) summarizes overall population health, accounting for length of life, and level of health loss by age using years of life lived with disability (YLDs) estimates and the GBD life tables, as previously described [12].

The metric YLDs represents morbidity by multiplying the prevalence of each disease-related sequelae by its disability weight [14, 15]. A specific software, DisMod-MR, was used for data processing on Bayesian metaregression models to generate consistent estimates of incidence, prevalence, duration of disease remission, and excess risk of death for each disease [14, 15]. The sources of data used are available at: https://ghdx.healthdata.org/gbd-2017/data-input-sources [16].

Estimates of disability-adjusted life years (DALYs) lost were obtained by adding YLLs and YLDs, the burden of

disease being a sum of lethal and non-lethal diseases [14]. In this study, the distributions of mortality by the main causes of death and the distribution by DALYs were very similar, given the greater impact of YLLs in this age group (data not shown). Therefore, we will present the main causes of death and the YLDs by place, sex, and age groups: 60-64, 65-69, 70-74, 75-79, and 80+ years.

All estimates were drawn 1000 times, and the 95% uncertainty limits value were defined by 2.5° and 97.5° of the estimated values. The 95% uncertainty intervals (95% UI) include uncertainties of all sources and modeling steps, such as sample size variability of the various sources of data, adjustments to general mortality sources, parameter uncertainty in model estimation, specification of uncertainty for models of causes of death, and different data availability by age, sex, year, and location [10].

The analysis of causes of death or disability comprises different degrees of disaggregation. Level 1 divides diseases into three broad groups (1-communicable diseases, maternal, and nutritional diseases, 2-noncommunicable diseases, and 3-injuries). Level 2 contains 21 groups of diseases, such as cardiovascular diseases, cancers, and traffic accidents. Level 3 shows separate causes for 168 diseases, such as chronic renal failure. Level 4, on the other hand, breaks down diseases into further 289, for example, chronic renal failure due to diabetes, and level 5 describes diseases with degrees of severity (879 diseases and their sequelae) [10]. In this study, we use level 1 to compare the metrics between the older adults and the younger population. The burden of diseases was shown at level 4, since more aggregated levels did not express well the differences in disease burden between 2000 and 2017 (data not shown).

The socio-demographic index (SDI) is a composite measure that aggregates the total fertility rate under the age of 25 years, the lag distributed income per capita, and the average educational attainment of each location [11]. The scores range from zero to one, that is, the lowest income, lowest education, and highest fertility, to the highest income, highest education, and lowest fecundity. According to the value of the SDI, the sites are classified as high, medium high, medium, medium low, or low SDI. Overall, Brazil ranked in the medium SDI category in 2015 [6, 10].

Results

In Brazil, between 2000 and 2017, for both sexes, life expectancy at birth increased approximately 4 years, from 71.4 years (95% to 71.1-71.7) to 75.5 years (95% UI 75.3-75.7). HALE increased from 61.7 years (95% UI 59.0-64.1) to 65.4 years (95% UI 62.6-68.0). These estimates

were very similar among the states, taking into account the 95% UI values (Table 1).

The national LE at age 60 increased less than 2 years, from 20.6 years (95% UI 20.6-20.6) to 22.1 years (95% UI 22.1-22.2) between 2000 and 2017. It is noteworthy that about one quarter of this time will be lost to disability, HALE equal to 15.7 years (95% UI 14.4-16.9) in 2000 and 17.0 years (95% II 15.6-18.3) in 2017 (Table 1).

Age-standardized DALYs for all causes decreased from 35,723.86 (95% UI 32,900.92-39,077.70) in 2000 to 27, 894.03 (95% UI 25,164.67-31,031.81) in 2017. In the same period, we noticed a prominent increase not only in the absolute number but also in the proportion of DALYs among the older adults. The burden of disease to all ages and causes was equal to 55,742,743 and 60, 487,378 DALYs in 2000 and 2017, with older adults representing 20.9% and 31.2% of the total DALYs for all ages in the period. Although there was a decrease in age-standardized rates, the distribution of the burden of the disease to the population up to 60 years, and the older adults, revealed a higher proportion of all metrics by noncommunicable diseases among the older adults, especially for YLL distribution (Fig. 1).

Mortality

Between 2000 and 2017, despite small changes, most of the ten leading causes of death remained the same among the elderly of both sexes, such as ischemic heart disease, stroke, chronic obstructive pulmonary disease, and diabetes. Breast and colon cancers are important leading cancer causes among women, while prostate and lung cancer predominating among men. Alzheimer's disease and other dementias emerged as an important cause of death among the elderly (Fig. 2).

External causes of death, such as road injuries and interpersonal violence, remain as leading causes of mortality among the middle aged during the period, especially for men. In 2017, mortality by falls increased for both sexes with aging, being the 13th and 16th causes of death among female and male elderlies, respectively (Fig. 2).

Figure 3 shows the increase of both incidence and mortality with aging for ischemic heart disease, stroke, Alzheimer's disease, and neoplasms, especially among the oldest old, those with age of 80 or more years old.

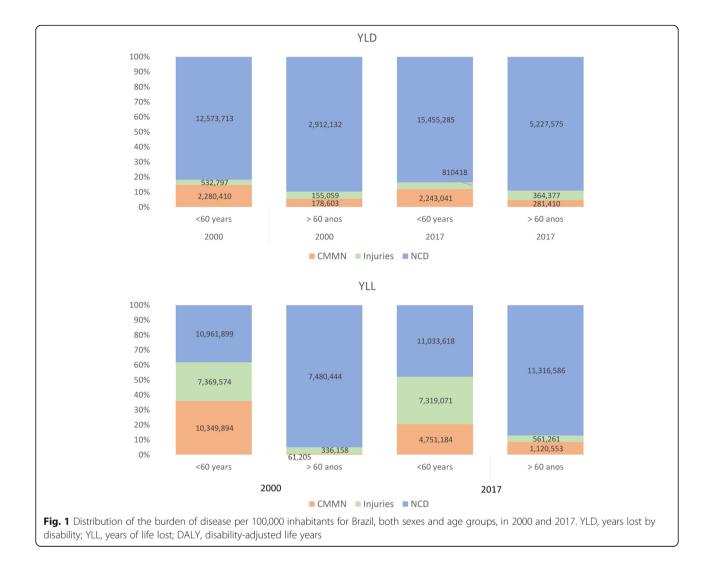
In Brazil, ischemic heart disease was the leading cause of death between 2000 and 2017 for both sexes, although there was a decrease in mortality rates from 31.8% for the youngest (60-64 years) to 24.9% for the oldest elderlies (80+ years). There was a clear gradient of increasing mortality with aging, the mortality rate ranging from 299.5/100,000 inhabitants (95% UI 291.8-308.0) and 204.4/100,000 inhabitants (95% UI 196.1-211.3) among those with 60 to 64 years old to 1923.9/100,000 inhabitants (95% UI 1890.4-1970.2) and 1444.7/100,000 inhabitants (95% UI 1403.3-1485.4) among those with 75 to 79 years old, in 2000 and 2017, respectively (Table 2). When we observed the mortality rates in the states, there is a greater amplitude of the 95% UI for the states of Bahia (NE) and Goiás (CW), in the majority of the age groups, in both years. The State of Pará (N) presented the lowest rates of mortality by age in the period, as well as the lowest percentages of decrease. The states of São Paulo (SE) and Rio Grande do Sul (S) presented the highest risk of death due to ischemic heart disease,

Table 1 Life expectancy (LE) and healthy life expectancy (HALE) to population of Brazil and selected states, in 2000 and 2017.

 Estimates from GBD study 2017

Local	Social demographic index	LE at birth (95% UI)	HALE at birth (<i>N</i> (95% UI))	LE at 60 years old (N (95% UI))	HALE at 60 years old (<i>N</i> (95% UI))
2000					
Brazil	0.562	71.4 (71.1-71.7)	61.7 (64.1-59)	20.6 (20.6-20.6)	15.7 (16.9-14.4)
São Paulo (SE)	0.603	71 (70.9-71.1)	61.5 (63.8-58.8)	19.6 (19.5-19.6)	15 (16.1-13.7)
Rio Grande do Sul (S)	0.630	72.4 (72.3-72.6)	62.3 (64.8-59.6)	19.7 (19.7-19.8)	15 (16.1-13.7)
Pará (N)	0.473	73.1 (72.5-73.8)	62.9 (65.5-60)	22.2 (22-22.5)	17 (18.3-15.5)
Bahia (NE)	0.475	71.7 (70.9-72.6)	61.9 (64.4-59)	22.2 (21.8-22.6)	17 (18.3-15.5)
Goiás (CW)	0.538	73.1 (73-73.3)	63.2 (65.6-60.3)	20.6 (20.5-20.6)	15.7 (16.9-14.4)
2017					
Brazil	0.663	75.5 (75.3-75.7)	65.4 (67.8-62.5)	22.1 (22.1-22.2)	17 (18.3-15.6)
São Paulo (SE)	0.693	76.1 (75.8-76.3)	65.9 (68.3-63)	21.8 (21.7-22)	16.7 (18-15.3)
Rio Grande do Sul (S)	0.720	75.4 (75.1-75.6)	65 (67.5-62.1)	21.7 (21.5-21.8)	16.6 (17.8-15.2)
Pará (N)	0.579	75.5 (75.2-75.9)	65.4 (67.9-62.6)	22.5 (22.3-22.7)	17.3 (18.6-15.9)
Bahia (NE)	0.591	75.5 (75-76)	65.3 (67.8-62.3)	23 (22.8-23.2)	17.7 (19-16.2)
Goiás (CW)	0.650	75.5 (75.1-75.8)	65.3 (67.7-62.3)	23 (22.8-23.2)	17.2 (18.5-15.7)

SE southeast region, S south region, N north region, NE northeast region, CW central-west region



but also with the highest decreases in the period, around 40% (Table 2).

Ischemic stroke was the second leading cause of death among older adults, also presenting a decrease in all age groups. There is a clear aging gradient in both years, the rates among the oldest old adults being almost 18 times greater than the youngest ones. The states from the most developing regions, São Paulo and Rio Grande do Sul, presented the higher mortality rates (Table 2).

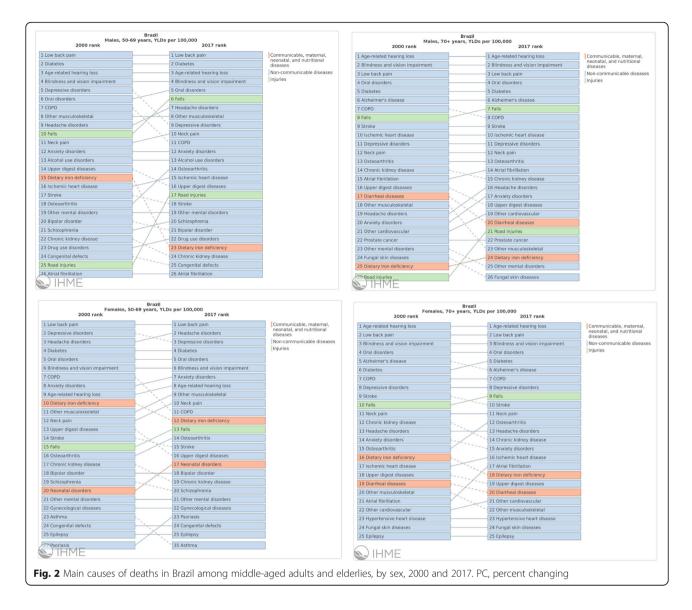
Mortality due to diabetes remained relatively stable in the period for both sexes (Fig. 1). We noticed that death rates for all age groups decreased in São Paulo (SE), whereas there was an increase of death rates among the 75+ years old in the states of Rio Grande do Sul (S), Bahia (NE), and Goiás (CW). In Pará (N), the risk of dying due to diabetes increased to all age groups in this period (Table 2). In this period, we noticed a decrease in trend of deaths by COPD while deaths by lower respiratory infections increased pari passu. The rates of mortality by breast cancer decreased all over the country while deaths by prostate cancer are still increasing in the less developing states of Bahia and Pará (Table 2).

Disability

From 2000 to 2017, for both middle aged and the elderly, most of the leading causes of incapacity (YLD) remained the same, with minor changes in the rank within the age strata. Low-back pain is the first or second cause of disability among both sexes and all over the period. Among younger women, diseases related to stress are prominent: depressive disorders, headache, and anxiety disorders are among the four leading causes of YLD. Among older adults, for both sexes, low-back pain, age-related hearing loss, blindness, and oral



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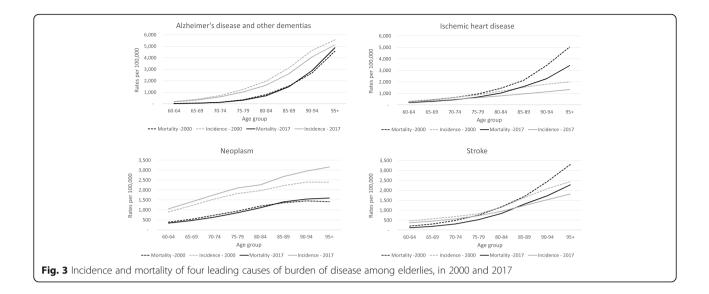
disorders and diabetes are the top five causes of disability. Dietary iron deficiency and diarrheal diseases are declining in the period for both age strata. On the other hand, disability by Alzheimer's disease and falls increased among the elderly from 2000 to 2017 (Fig. 4).

The burden of disability increases with aging, with the oldest elderly presenting two to three times more YLD for visual and oral disorders, COPD, ischemic heart disease, and falls than 60-64 years olds. The YLD rates for depressive disorders, neck, and low back pain are relatively the same among the age groups, while migraine is the only cause of YLD that decreases with aging.

Between 2000 and 2017, comparing the youngest and oldest old, there was an increase in the national burden due to falls increased from 13.3 to 34.6%. This burden was higher in the developed states of Rio Grande do Sul (20.6-44.6%) and São Paulo (31.4-47.7%) and smaller in the less developed states of Pará (-17.6-10.1%). In the period, we can also notice the decreasing trends for depressive and oral disorders, ischemic heart disease, ischemic stroke, and diabetes mellitus in all the states. The burden for migraine and low back pain are relatively stable in time (Table 3).

Discussion

In Brazil, there is a consistent decrease in agestandardized DALY rates, as already described [6]. These results, as well as the increase in life expectancy, are probably the results of improving social conditions, broader access to health care aside to the priority given to prevention and basic care [6, 17]. However, the increase in the number and proportion of DALYs among



elderlies suggests this age group presents a higher burden of disease. In addition, premature death is the main component of the burden of disease for Brazilian older adults, leading to a 10-year gap between life expectancy in Brazil and the high-income countries [10]. Regional inequality persists; the states with lower SDI from the Northeast and North regions still present higher mortality rates.

The smaller increase of HALE than life expectancy in the last 16 years means that, despite living more, people spend a substantial time of their old age with disability and illness. This burden of disease may imply a restriction on the ability to contribute to the labor force at old age. This subject is a crucial aspect currently under discussion, with the Congress intent to extend the age bracket for retirement and pension receiving [18].

The higher proportion of NCDs as a cause of death and disability among the older adults is expected, as well as the increase of the burden of disease with aging. However, it is noteworthy that the leading causes of death are mostly preventable NCDs: ischemic heart disease, ischemic and hemorrhagic stroke, chronic obstructive pulmonary disease, diabetes, and breast, lung, and stomach cancers. The social inequality may be responsible for the increasing trends of prostate cancer in Northeast and North regions and the increase of death by diabetes in the North region, the older adults with lower access to health prevention [17].

Many of these preventable causes of death require an approach of risk factors prevention and management throughout the life course to lower their rates. It is thus fundamental to strengthen the national health promotion policy implemented in 2006, and to articulate the various public actions to stimulate healthy eating and regular practice of physical activity, to prevent and control smoking, and to reduce morbidity and mortality due to alcohol and other drug abuse [19]. In order to guarantee a good control of the NCD in a socially deprived country, it is advisable for Brazil to maintain the investments on primary health care and the free access to medications for hypertension, diabetes, and smoking cessation implemented in the country since 1998 [20].

We hypothesized the decrease in COPD and the corresponding increase in lower respiratory infections; mortality rates may represent a shift in the way doctors fill out the death certificates, the underlying cause of death being more poorly specified among older adults, the age group that usually concentrates the highest rates of garbage codes [21].

The burden for years lived with disability reveals important causes of personal and family suffering, such as vision and hearing impairments, musculoskeletal pain, and mood disorders. A recent study showed that lower back pain is a disabling condition, associated with psychological factors, lower education, and income level in Brazil [22]. Musculoskeletal diseases are four of the top 10 leading causes of disability, suggesting the need for investments in the areas of prevention and rehabilitation.

Depressive disorders generally present a minor burden to older adults than to the younger ones [23]. Social determinants may explain the higher burden of depression among Brazilian older adult women. Current Brazilian elderly are composed predominantly of women with low education and unpaid work during adulthood, and who experience greater chances of widowhood and disadvantageous socioeconomic status. Nevertheless, if the policies of universalization of social security persist, with the guarantee of pensions for housewives, they tend to become heads of families and providers, with greater participation in extra-community activities and socialization than men [24].

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Table 2 Distribution of death rates per 100,000 inhabitants for Brazil and selected states, both sexes and by age groups, 2000 and 2017

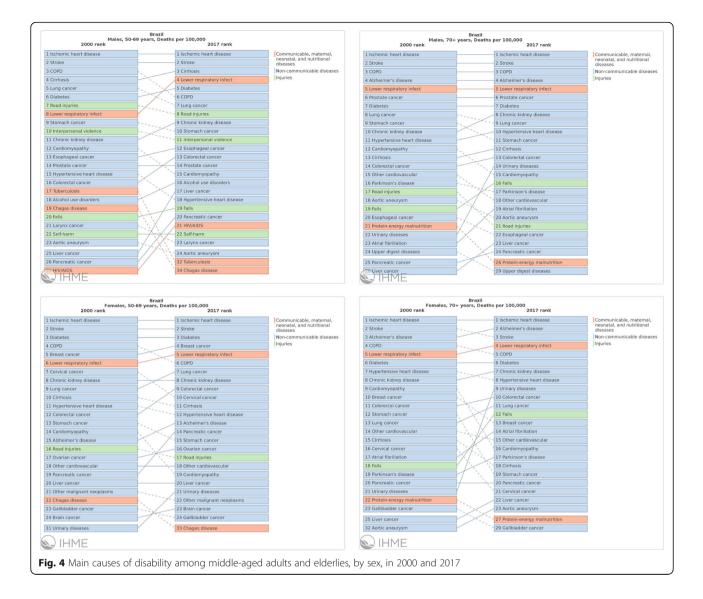
The aging of the population accounts for much of the increased diabetes burden in Brazil, and efforts to control the epidemic of obesity and physical inactivity must continue [25, 26].

Accidental falls significantly increase the risk of disability, and the present study supports this fact. Aside from physical damage, a fall can lead to psychological consequences, such as fear of falling. Fear of falls is associated with several health problems, such as restriction or limitation of activities, loss of muscle strength and postural control, a negative perception of health, depression, and social isolation [27].

The increase in the burden of Alzheimer's disease and other dementias imposes an important public health issue regarding investments in social and medical care [28]. Although age-standardized mortality did not increase, the prevalence increased five times in the world, mainly because of aging population. With limited scope for prevention and the absence of an effective disease-modifying treatment, the burden on family, caregivers, and health care system will continue to increase rapidly [29].

Strength and limitations

The GBD study has by strength to correct the mortality data and the standardization of metrics, allowing a subnational analysis in Brazil. In addition, the IHME website provides all metrics by gender and age, in addition to



age-standardized rates. All sources of information and analyses are available on the IHME website as well in the appendix of the published papers.

However, a lack of primary data and problems in data quality on the subnational level may limit its analysis, the estimates from the most developed regions being more reliable. The higher life expectancy at birth and at 60 years in the states with the lowest SDI may represent the poorer quality of data in the less developed North and Northeast regions, as well as the occurrence of problems in the IBGE estimates of the elderly population. A lack of information for non-fatal diseases may explain the large 95% UI for YLD estimates.

Conclusions

The burden of disease is shifting toward the elderly in Brazil. Greater longevity is moving the population to a condition of increased morbidity and disability. Diseases that are sensitive to prevention and control throughout the lifespan comprise most of the burden of disease among the older Brazilian adults, in an ambient of social health inequalities. Health policies must face these challenges so the Brazilian elderly may achieve longevity with quality of life.

Abbreviations

CW region: Central-West region; DALY: Disability-adjusted life year; GBD: Global Burden of Disease; HALE: Healthy life expectancy; SIH: Hospital Information System; SINAN: Injury Information System; IBGE: Institute of Geography and Statistics; IHME: Institute of Health Metrics and Evaluation; LE: Life expectancy at birth; SIM: Mortality Information System; NCD: Noncommunicable diseases; N region: North region; NE region: Northeast region; SIA: Outpatient Information System; SDI: Socio-demographic index; S region: South region; SE region: Southeast region; YLD: Years lived with disability; YLL: Years of life lost; 95% UI: 95% uncertainty intervals

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	200	2000			2017			Δ%	2000			2017		⊲	∆ % 	2000			2017			Δ%
		Rate	95% U.I.		Rate	95% U.I.			Rate	95% U.I.		Rate 9	95% U.I.		ä	Rate 9!	95% U.I.		Rate	95% U.I.		
Blindness	60 to 64	1004.3	661.5	1509.3	1 009.9	654.6	1532.1	0.6	1058.0	685.5	1601.1	1050.3 6	. 2.699	1598.0 -0	-0.7 98	983.8 6	641.4 1	1474.0	989.3	639.9	1508.1	0.6
and vision impairment	65 to 69	1275.7	859.0	1881.7	1279.7	854.3	1898.1	0.3	1347.9	908.0	1 992.7	1328.4 8	874.6	2000.3 -1	-1.4	1248.9 8⁄	840.5 1	1839.2	1252.1	826.6	1852.5	0.3
	70 to 74	1651.6	1131.6	2367.2	1647.9	1127.8	2387.2	-0.2	1743.2	1191.2	2504.8	1709.2	1155.6	2466.2 -2	-2.0 16	1615.7 1	1111.6 2	2320.2	1602.0	1096.4	2321.2	-0.8
	75 to 79	2147.5	1494.8	2944.4	2129.4	1472.6	2979.7	-0.8	2254.6	1556.1	3118.0	2199.8 1	1535.7	3068.5 -2	-2.4 2(2098.8 14	1465.3 2	2938.9	2060.8	1413.3	2856.6	-1.8
	80 plus	3239.4	2324.9	4236.6	3210.2	2302.9	4229.6	-0.9	3468.5	2493.5	4589.3	3388.8 2	2408.5 4	4472.3 -2	-2.3 3(3079.1 2	2173.7 4	4058.1	3099.5	2216.4	4061.9	0.7
Chronic	60 to 64	3527.8	3315.1	3750.1	2189.5	2031.4	2359.7	-37.9	2776.5	2458.9	3082.4	2008.9 1	1760.2	2285.2 -2	-27.6 53	5387.6 49	4909.8	5907.6	2910.0	2558.3	3265.1	-46.0
obstructive pulmonary	65 to 69	4912.5	4666.9	5181.5	3120.5	2920.0	3341.7	-36.5	3686.9	3292.2	4095.3	2827.3 2	2512.0	3186.4 -2	-23.3 75	7375.5 6	6735.8 8	8040.2	4244.5	3803.1	4707.1	-42.5
disease	70 to 74	6546.6	6257.1	6837.8	4271.2	4017.5	4512.1	-34.8	4786.9	4299.3	5311.8	3683.2 3	3267.9 4	4125.7 -2	-23.1 94	9465.9 8	8717.3 1	10271.9	5955.9	5367.9	6544.5	-37.1
	75 to 79	7798.3	7461.6	8141.2	5432.1	5154.6	5729.1	-30.3	5926.8	5303.0	6629.0	4583.4 4	4093.7	5115.0 -2	-22.7 10	10828.7 99	9974.8 1	11674.2	7304.3	6620.2	8062.2	-32.5
	80 plus	9531.8	9172.2	9853.4	6877.6	6572.4	7217.0	-27.8	7193.3	6684.4	7720.5	5694.3 5	5288.4 (6129.7 -2	-20.8 13	13470.8 1.	12635.4 1	14257.3	0.6698	8093.5	9312.5	-35.4
Depressive	60 to 64	1188.5	815.5	1631.5	906.2	629.9	1249.4	-23.8	1029.8	680.4	1456.7	780.0 5	541.1	1084.7 -2	-24.3 14	1408.0 93	937.1 1	1964.6	1021.6	695.7	1437.5	-27.4
disorders	65 to 69	1126.9	787.5	1528.9	881.4	614.8	1195.3	-21.8	973.9	672.6	1356.1	761.6 5	529.9	1043.5 -2	-21.8 13	1338.8 90	907.4 1	1846.3	996.6	689.0	1372.0	-25.6
	70 to 74	1052.6	725.1	1424.7	854.3	594.4	1162.0	-18.8	901.6	614.8	1241.2	742.2 5	519.9	1010.4 -1	-17.7 12	1257.0 84	848.4 1	1715.5	977.7	664.2	1342.7	-22.2
	75 to 79	971.2	662.2	1347.9	816.6	559.9	1127.2	-15.9	824.6	553.9	1164.9	714.3 4	482.3	986.3 -1	-13.4 1	1167.7 7.	771.4 1	1626.6	938.0	626.3	1307.6	-19.7
	80 plus	927.5	632.7	1259.9	842.3	582.4	1132.8	-9.2	799.2	538.2	1120.5	738.9 5	506.0		-7.6 1	1104.3 7	733.2 1	1517.6	970.8	659.1	1319.7	-12.1
Diabetes	60 to 64	3446.5	3039.7	3939.3	2944.4	2551.2	3398.6	-14.6	3805.0	3241.5	4438.4	3700.6 3	3144.5 4	4359.2 -2	-2.7 27	2770.7 23	2346.0 3	3284.1	2563.2	2144.7	3053.7	-7.5
mellitus	65 to 69	4130.2	3682.7	4631.8	3649.2	3256.6	4130.5	-11.6	4421.1	3798.8	5094.5	4597.8 3	3921.0	5417.1 4	4.0 33	3321.3 2.	2789.6 3	3896.3	3220.8	2683.1	3797.4	-3.0
	70 to 74	4801.2	4323.8	5321.0	4310.2	3847.0	4845.1	-10.2	5067.2	4334.4	5858.4	5463.9 4	4674.2 (6319.6 7	7.8 39	3959.5 33	3393.9 2	4570.0	3868.3	3299.8	4551.2	-2.3
	75 to 79	5079.9	4587.6	5632.6	4885.7	4392.7	5419.1	-3.8	5408.5	4644.3	6259.7	6012.9 5	5207.8	7044.8 1	11.2 47	4159.1 35	3547.3 4	4788.7	4353.0	3644.2	5065.4	4.7
	80 plus	4684.3	4212.8	5189.4	4856.1	4393.6	5386.1	3.7	4614.9	4056.3	5235.3	5560.0 4	4887.2 (6288.7 2	20.5 4(4086.2 35	3563.7 4	4668.8	4392.5	3823.3	4988.9	7.5
Edentulism	60 to 64	867.0	548.1	1261.4	827.5	525.1	1205.4	-4.6	823.0	517.8	1 209.6	792.9 4	499.3	1177.5 -3	-3.7 78	781.1 49	493.1 1	1148.7	745.8	468.6	1105.9	-4.5
and severe tooth loss	65 to 69	1219.6	811.2	1733.4	1164.2	767.5	1657.4	-4.5	1170.4	771.5	1664.0	1122.5 7	730.3	1604.6	4.1	1117.2 7:	736.0 1	1589.2	1061.3	693.2	1528.2	-5.0
	70 to 74	1422.7	952.0	1985.8	1367.1	903.7	1931.9	-3.9	1367.4	910.5	1937.5	1323.5 8	878.5	1895.3 -3	-3.2 15	1318.5 86	862.1 1	1889.0	1262.0	830.4	1800.3	-4.3
	75 to 79	1467.3	985.6	2037.8	1420.1	947.8	1977.4	-3.2	1406.9	940.2	1 940.0	1374.2 9	916.0	1913.4 -2	-2.3 13	1370.1 90	909.4 1	1921.5	1314.6	862.7	1852.0	-4.1
	80 plus	1391.8	937.6	1898.5	1344.2	907.4	1838.9	-3.4	1318.5	882.8	1808.0	1283.4 8	858.4	1773.4 -2	-2.7 13	1308.6 8	874.8 1	1807.1	1249.7	834.0	1727.8	-4.5
Falls	60 to 64	792.8	658.7	955.3	898.1	729.5	1098.8	13.3	731.2	603.0	869.2	830.0 6	677.3	1007.4 1	13.5 67	675.7 53	531.4 8	833.7	815.2	643.3	1023.2	20.6
	65 to 69	893.6	729.2	1087.5	1058.7	851.7	1297.7	18.5	820.1	663.5	993.4	952.4 7	768.5	1167.2 1	16.1 73	739.2 51	574.8 9	926.9	969.3	758.7	1225.9	31.1
	70 to 74	1041.4	850.8	1271.0	1278.2	1034.8	1559.2	22.7	938.7	774.4	1138.3	1091.7 8	880.7	1337.1 1	16.3 86	867.0 68	680.2 1	1092.1	1186.8	941.3	1490.2	36.9
	75 to 79	1358.3	1135.4	1621.2	1742.2	1459.1	2079.7	28.3	1218.5	1005.8	1452.7	1403.9 1	1149.6	1699.1	15.2 1	1138.8 90	905.0	1392.1	1633.8	1333.6	1997.8	43.5
	80 plus	2064.2	1741.3	2438.6	2779.5	2357.0	3255.0	34.6	1727.0	1450.5	2058.5	2186.1 1.	1825.4	2580.7 2	26.6 18	1872.8 1!	1518.2 2	2246.4	2707.3	2235.5	3218.2	44.6
lschemic hood	60 to 64	8318.2	8075.9	8582.6	5744.2	5508.9	5952.6	-30.9	6767.8	6145.0	7369.6	5199.1 4	4699.6	5696.9 -2	-23.2 9(9007.8 8:	8344.7 9	9678.8	5300.5	4725.5	5830.3	-41.2
disease	65 to 69	10241.0	9962.3	10549.3	7192.3	6919.0	7443.5	-29.8	8207.6	7490.6	8977.6	6662.5 6	6059.0	7312.7 -1	-18.8 1(10938.6 10	10174.1 1	11665.2	6797.7	6120.8	7503.0	-37.9
	70 to 74	12340.2	1 2000.5	12694.4	8594.4	8249.4	8902.1	-30.4	9449.8	8579.0	10384.5	7812.4 7	7094.8	8561.5 -1	-17.3 13	13602.9 12	12683.3 1	14531.6	8589.8	7769.0	9350.4	-36.9
	75 to 79	13964.9	13563.7	14415.7	10180.4	9779.9	10560.9	-27.1	10792.4	9801.6	11891.6	8985.2 8	8209.5	9856.3 -1	-16.7 15	15896.1 14	14781.4 1	16908.5	10545.4	9513.7	11588.4	-33.7
	80 plus	16261.5	15887.4	16734.4	11781.6	11376.6	12153.7	-27.5	11531.9	10859.1	12355.2	9034.8 8	8465.2	9619.0 -2	-21.7 20	20828.9 19	19791.7 2	21858.0	12929.0	12143.9	13726.6	-37.9

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Table

s tis	Cause	Age	Brazil							Bahia							Rio Grande	e do Sul					
Re 9964 UI Index 9664 UI Res 9664 UI Res 9564 UI Res 9561 UI		group	2000			2017			Δ%	2000			2017			∆%	2000			2017			$\Delta\%$
60 0 (4) (580)			Rate	95% U.I.		Rate	95% U.I			Rate	95% U.I.		Rate	95% U.I.			Rate	95% U.I.		Rate	95% U.I.		
65 006 2013 1736 4479 1523 3086 6022 323 211 1014 1044 1084 1036 213 204 203 204 203 204	Ischemic	60 to 64	1688.2	1584.9	1792.1	1063.2	973.8	1159.5	-37.0		1334.0	1833.8	1087.3	912.2		-30.8	1543.5	1325.6	1777.1	1056.7	880.9	1250.5	-31.5
70 0.74 9219 7146 4150 58213 3403 3660 3024 3603	stroke	65 to 69	2301.2	2157.6	2447.9			1642.2	-33.8		1817.3	2461.4	1614.8	1366.4			2158.7	1855.2	2522.0	1574.5	1309.9	1836.3	-27.1
75 6 79 8036 4743 5643 5643 5646 4726 579 570 <		70 to 74	3921.9	3714.6	4155.0			2830.3	-32.9		3074.7	4080.5	2738.3	2342.4			3768.5	3291.2	4304.1	2850.1	2425.9	3319.5	-24.4
80 pic 813-4 78-33 849-32 619-3 53-33 61-33 53-33 51-33 51-30 61-43 71-23 89463 71-23 71-23 99463 71-23 72-23 72-23 72-23 72-23 72-23 72-23 72-23 72-23 <		75 to 79	5003.5	4743.6	5284.3		341	3908.3	-26.8		4024.2	5248.1	3681.6	3190.0		-20.1	5159.5	4530.7	5841.9	4068.6	3510.0	4670.0	-21.1
60 064 351 1375 3633 2293 1380 3475 2387 1469 55 2325 147 3469 65 253 2325 147 3469 65 2535 147 3469 15 2336 17 2365 17 17 2365 17 2365 17 2365 17 2365 17 17 2365		80 plus	8154.4	7852.8	8499.2	6191.5	587	6525.6	-24.1		6280.5	7427.6	5658.3	5170.0			9846.5	0.950	10647.5	7234.9	6608.5	7882.7	-26.5
65 065 2313 1479 3651 2325 1643 3513 5132 2443 175 34413 11 23865 75 05 7 2431 1462 3462 2323 1643 3513 5131 3501 5335 1413 11 23865 75 05 7 2443 1463 3171 2362 107 3365 713 3462 10 2313 60 048 2014 11241 7533 4910 1365 11421 2303 2311 2365 713 2365 713 2365 713 2365 713 2313 </td <td>Low back</td> <td>60 to 64</td> <td>2305.1</td> <td>1372.5</td> <td>3483.3</td> <td>2286.9</td> <td></td> <td>3473.4</td> <td>-0.8</td> <td>2293.1</td> <td>1388.0</td> <td>3472.5</td> <td>2282.7</td> <td>1364.3</td> <td></td> <td>-0.5</td> <td>2352.6</td> <td>1467.1</td> <td>3533.2</td> <td>2305.7</td> <td>1394.7</td> <td>3504.3</td> <td>-2.0</td>	Low back	60 to 64	2305.1	1372.5	3483.3	2286.9		3473.4	-0.8	2293.1	1388.0	3472.5	2282.7	1364.3		-0.5	2352.6	1467.1	3533.2	2305.7	1394.7	3504.3	-2.0
70 074 2301 14542 34621 16442 35121 00 2315 4451 35016 34413 11 23065 75 070 23463 14761 33892 23611 14866 3420 06 2315 4610 34760 3443 11 3462 11 24135 80 046 7256 4817 11241 7733 9910 11366 17 34962 1241 7733 9902 2315 2413 2462 2432 243 2402 243 70014 4617 3060 7324 4917 1141 7733 4912 1141 7733 4912 1141 7733 492 112 2750 233 2301 1314 246 4973 1314 7733 492 102 2413 103 1141 1773 4912 1141 7733 4912 1141 7750 2414 4967 1141 4967 1141 7793 4963<	pain	65 to 69	2331.3	1479.7	3459.1	2353.9		3529.2	1.0	2330.1	1465.9	3513.2	2345.4	1489.3		0.7	2368.6	1538.5	3507.9	2374.4	1495.5	3484.2	0.2
7 7		70 to 74	2330.1	1454.2	3482.7	2352.2		3512.1	0.9	2317.8	1434.1	3501.6	2342.4	1475.0	3441.3	1.1	2396.5	1514.5	3529.4	2397.2	1488.2	3512.9	0.0
0 0 2145 1497 2023 5017 3073 5073 4070 1366 1749 4077 1127 4077 1023 2175 4779 0422 02 2136 6 6 6 8 1 1 1 7 3 4010 1 366 6 1 7 749 4077 14017 7040 4010 1 200 2		75 to 79	2346.3	1476.1	3389.2	2361.1	1488.6	3429.0	0.6	2331.5	1451.0	3410.0	2355.5	1471.1	3436.2	1.0	2413.5	1554.9	3485.6	2405.3	1519.9	3528.6	-0.3
** 60 06 4 76.5 48.1 112.41 77.3 49.0 113.41 77.3 49.0 113.41 77.3 49.0 113.41 77.3 49.0 113.41 77.3 67.0 78.1 49.0 113.41 77.3 67.0 73.0 73.4 49.0 73.4 49.0 73.4 49.0 73.4 49.0 73.4 49.0 73.0 73.4 49.0 73.0 <td></td> <td>80 plus</td> <td>2214.5</td> <td>1495.7</td> <td>3111.7</td> <td>2202.3</td> <td></td> <td>3074.3</td> <td>-0.6</td> <td>2170.4</td> <td>1490.7</td> <td>3026.2</td> <td>2175.4</td> <td>1479.7</td> <td></td> <td>0.2</td> <td>2312.8</td> <td>1562.0</td> <td>3238.5</td> <td>2273.4</td> <td>1538.1</td> <td>3149.7</td> <td>-1.7</td>		80 plus	2214.5	1495.7	3111.7	2202.3		3074.3	-0.6	2170.4	1490.7	3026.2	2175.4	1479.7		0.2	2312.8	1562.0	3238.5	2273.4	1538.1	3149.7	-1.7
6 10 3961 3060 6324 4956 3715 536 394 525 03 520 70 10 74 4817 3060 7334 4868 3171 7332 11 4868 3917 7332 11 4868 3917 7332 12 7332 540 3904 2935 536 364 4916 3171 7306 08 411 900 12 4905 1713 4912 171 7305 08 4910 303 5517 303 5547 303 5171 730 491 713 241 905 517 303 5547 303 5171 704 90 517 303 5547 303 4113 713 713 713 713 713 713 714 910 714 910 714 910 714 910 714 910 713 713 713 713 713 713 713 713 <	Migraine	60 to 64	762.6	481.7	1124.1	775.3	491.0	1136.6	1.7	774.9	497.7	1142.1	784.1	496.7	1153.8	1.2	767.0	482.6	1118.6	777.0	489.5	1131.9	1.3
70 tr>70 tr>70 tr>70 tr>71 tr>70 tr>70 tr>71 tr>70 tr>71 tr> <th< td=""><td></td><td>65 to 69</td><td>618.0</td><td>396.1</td><td>906.9</td><td>623.6</td><td>395.6</td><td>907.1</td><td>0.9</td><td>628.1</td><td>401.5</td><td>915.7</td><td>629.6</td><td>398.4</td><td></td><td>0.3</td><td>626.0</td><td>402.3</td><td>905.7</td><td>626.7</td><td>395.7</td><td>917.4</td><td>0.1</td></th<>		65 to 69	618.0	396.1	906.9	623.6	395.6	907.1	0.9	628.1	401.5	915.7	629.6	398.4		0.3	626.0	402.3	905.7	626.7	395.7	917.4	0.1
75 (b)370553663764376770516371555693804237557152432280 (u)297118684464301318794448142446186344431473032856144192133360 (u)544233208286527133318800-13554733728561549833398374-09552961 (e)63 (e)383099776375679838339990076584404510333653540731034607656470 (u)6312389099776713385598200666533403910361653740371036365340391034607656470 (u)61 (a)18616793383345798866-21648404510361653740371036167363973480 (u)61 (a)186167937847182348921102865340371036165373953265 (u)81 (a)18616793383385038866-21886217391739373927393739365 (u)81 (a)1687911186167373911826731739273937393739365 (u)81 (a)1687911183179218337473 <t< td=""><td></td><td>70 to 74</td><td>481.7</td><td>306.0</td><td>723.4</td><td>486.8</td><td>312.7</td><td>733.2</td><td>1.1</td><td>486.8</td><td>309.1</td><td>728.0</td><td>490.6</td><td>317.1</td><td></td><td>0.8</td><td>491.0</td><td>316.9</td><td>716.5</td><td>494.2</td><td>322.5</td><td>736.9</td><td>0.7</td></t<>		70 to 74	481.7	306.0	723.4	486.8	312.7	733.2	1.1	486.8	309.1	728.0	490.6	317.1		0.8	491.0	316.9	716.5	494.2	322.5	736.9	0.7
B0 plus 2971 1868 4464 3013 1879 4449 14 2946 1863 4117 211 3008 1317 3009 1897 419 211 3088 in<		75 to 79	370.5	233.9	558.6	376.4	237.6	570.5	1.6	371.5	231.5	556.9	380.4	239.3		2.4	382.2	243.9	574.4	381.4	245.7	570.3	-0.2
in60 to 64534232608286527132318680-1355473332855163988374-09552965 to 696424389010074637638839890076684404510333653540731034607655470 to 74683543141065267984284104290571134492110287091445910803636375 to 7468153890997762713845985005657113449211028703363636036380 tu 83940997762813843384718327480986621653740371032663636380 tu 850409133602139471832748093374718327480937373380 tu 8204691367411833477228641007648339401977938455471371373380 tu 6112860411833477228641072284336911751733734380 tu 61128604659405940119228472341193264179379379380 tu 661213113119228472361110286433399119228472341793793793		80 plus	297.1	186.8	446.4	301.3	187.9	444.8	1.4	294.6	186.3	431.7	300.9	189.7	441.9	2.1	308.8	196.5	458.7	310.1	197.7	455.9	0.4
65 to 69 64.4 3890 107.4 638.3 989.0 -0.7 668.4 404.5 1033.3 663.5 40.7 1034.6 0.7 665.4 70 to 74 683.5 431.4 1065.2 6738 438.4 104.29 0.5 7113 449.2 1102.8 703.7 1033.6 0.3 55.1 70 to 74 683.5 314.0 1065.2 673 385.5 985.0 -0.6 55.3 403.9 1036.1 63.7 403.7 1032.6 0.7 65.41 70 to 74 681.0 1681 398.3 591.3 354.7 183.2 748.0 99.3 451.8 709.4 47.3 103.6 1.1 65.41 2 2 2 3 3 3 55.1 53.9 55.1 53.9 55.1 53.9 55.1 53.9 55.1 53.9 55.1 53.9 55.1 53.9 55.1 53.9 55.1 53.9 55.1 53.9 55.1	Neck pain	60 to 64	534.2	326.0	828.6	527.1	323.1	808.0	-1.3	554.7	337.2	856.1	549.8	338.9		-0.9	552.9	335.9	854.2	546.6	339.5	843.1	-1.1
70 to 74 6835 4314 10652 6798 4284 10429 -05 7113 4492 11028 7091 4459 10803 -0.3 7095 75 to 79 6312 3890 977 6271 3855 9850 -0.6 6553 4039 10361 6537 4037 10326 0.3 6501 80 plus 6148 3968 9183 6021 3947 8866 -2.1 6229 4128 9094 6156 4114 8905 -1.2 6399 65 to 69 4188 2041 1833 4779 1832 7480 933 4712 8193 455 4114 8905 -1.2 6399 65 to 69 488 2041 1833 4579 2351 1832 7493 806 90 91 713 8193 793 793 793 793 793 793 793 793 793 793 793 793 793		65 to 69	642.4	389.0	1007.4	637.6	388.3	989.0	-0.7	668.4	404.5	1033.3	663.5	407.3		-0.7	665.4	403.4	1023.9	661.0	396.0	1027.4	-0.7
75 to 79 631.2 3890 997.7 627.1 385.5 985.0 -06 655.3 403.9 1036.1 633.7 403.7 1032.6 -0.3 656.1 80 plus 614.8 398.8 918.3 602.1 394.7 886.6 -2.1 62.29 412.8 909.4 615.6 411.4 8905 -1.2 6399 hritis 60 to 64 341.0 1681 679.3 374.7 183.2 7480 99 412.8 909.4 615.6 411.4 8905 -1.2 6399 65 to 69 4188 204.1 833.3 457.9 286.4 197.7 793.8 435.4 107.4 805 79.2 630.9 70 423.4 713.0 713.0 714.3 645.4 790.7 739.8 500.7 514.4 505.5 79 505.5 500.7 514.4 501.4 701.4 505.5 509.7 514.4 501.4 501.4 501.4 501.4 501.4		70 to 74	683.5	431.4	1065.2	679.8	428.4	1042.9	-0.5	711.3	449.2	1102.8	709.1	445.9		-0.3	709.5	449.7	1105.6	707.6	451.6	1 091.8	-0.3
80 plus 614.8 398.8 918.3 60.1 34.7 886.6 -21 62.9 41.2 6304 615.6 411.4 8905 -1.2 6339 httis 60 to 64 34.10 168.1 679.3 3747 183.2 7480 99 3246 160.2 646.8 356.1 175.1 7130 97 3493 65 to 69 418.8 204.1 833.3 4579 225.7 908.4 93 197.7 793.8 455.4 214.1 860.6 90 428.8 75 to 79 548.6 277.9 109.6 594.0 311.2 1192.2 83 572.3 266.1 107.3 559.2 599.7 79 73.8 75 to 79 548.6 570.1 1192.2 83 572.3 266.1 1073.8 569.2 79 79 67.4 50.4 50.4 50.4 50.4 50.4 50.14 50.14 50.14 50.14 50.14 50.14 50		75 to 79	631.2	389.0	997.7	627.1	385.5	985.0	-0.6	655.3	403.9	1036.1	653.7	403.7		-0.3	656.1	409.4	1024.5	650.7	401.5	1022.4	-0.8
Indite 60 to 64 34.10 1681 679.3 374.7 183.2 7480 99 324.6 160.2 646.8 356.1 175.1 713.0 9.7 349.3 65 to 69 418.8 204.1 833.3 4579 225.7 908.4 9.3 399.6 197.7 793.8 435.4 214.1 860.6 9.0 428.8 70 to 74 490.8 246.4 984.5 532.7 266.8 1059.5 86 470.2 238.1 958.2 509.7 514.8 501.4 75 to 79 546.6 90.7 509.7 266.8 1072.2 83.5 573.2 266.1 1073.8 569.7 79 601.4 80 plus 611.1 311.3 12198 664.3 330.9 1325.6 85 550.7 569.7 560.5 79 601.4 80 plus 611.1 113.3 1192.2 85.3 575.2 569.7 569.7 786 712.2 563.5 <		80 plus	614.8	398.8	918.3	602.1	394.7	886.6	-2.1	622.9	412.8	909.4	615.6	411.4		-1.2	639.9	416.5	941.9	624.5	412.3	923.7	-2.4
65 to 69 418.8 204.1 833.3 457.9 225.7 908.4 9.3 395.6 197.7 793.8 435.4 214.1 860.6 9.0 428.8 70 to 74 490.8 246.4 984.5 532.7 266.8 1092.5 86 470.2 238.1 958.2 509.7 251.4 1025.0 84 501.4 75 to 79 548.6 277.9 11096 594.0 301.0 1192.2 83 577.3 266.1 1073.8 569.2 286.8 7.9 560.5 80 plus 611.1 3113 12198 664.3 339.9 1326.6 85 589.2 286.1 1073.8 569.2 736.8 739.5 560.5 60 to 64 112.8 664.3 339.9 1326.6 85 589.2 569.2 586.8 739.6 513.6 513.6 50.1 50.2 50.6 59.6 53.6 53.6 53.6 53.6 53.6 53.6 53.6 53.6	Osteoarthritis	60 to 64	341.0	168.1	679.3	374.7	183.2	748.0	9.9	324.6	160.2	646.8	356.1	175.1		9.7	349.3	171.9	698.6	377.2	184.2	758.5	8.0
70 to 74 490.8 246.4 984.5 532.7 266.8 1055 86 470.2 238.1 958.2 509.7 251.4 10250 84 501.4 75 to 79 548.6 2779 11096 594.0 301.0 11922 83 5273 266.1 1073.8 569.2 286.8 1154.5 7.9 560.5 80 plus 612.1 311.3 1219.8 664.3 339.9 1326.6 85 598.2 305.0 1214.3 645.4 308 1295.6 7.9 560.5 eff 610.4 11.8 70.5 166.2 94.8 532.6 106.7 151.4 107.8 56.0 7.9 56.05 7.9 56.05 eff 610.6 111.8 70.5 140.3 1327.6 106.2 245.5 159.8 159.8 150.6 130.9 120.5 160.2 7.9 56.05 eff 65 to 69 259.1 106.2 245.5 157.4		65 to 69	418.8	204.1	833.3	457.9	225.7	908.4	9.3	399.6	197.7	793.8	435.4	214.1		9.0	428.8	210.9	849.9	461.7	228.6	918.0	7.7
75 to 79 548.6 277.9 11096 594.0 301.0 1192.2 83 527.3 266.1 1073.8 569.2 286.8 1154.5 7.9 560.5 et's 61.1 311.3 1219.8 664.3 339.9 1326.6 85 598.2 305.0 1214.3 645.4 330.8 1295.6 7.9 563.8 et's 60 to 64 112.8 705 166.2 948 592 140.3 -160 106.2 657 163.3 870 330.8 1295.6 7.9 633.8 et' 65 to 69 259.1 166.2 948 592.1 140.3 -160.2 245.5 157.4 371.5 199.8 120.9 130.9 130.2 130.9 130.2 130.8 130.2 130.8 132.7 130.8 130.5 130.8 130.8 132.8 231.2 130.8 130.8 130.8 130.8 130.8 130.8 130.8 130.8 130.8 130.8		70 to 74	490.8	246.4	984.5	532.7	266.8	1059.5	8.6	470.2	238.1	958.2	509.7	251.4		8.4	501.4	249.0	1007.5	536.7	265.5	1065.4	7.0
80 plus 612.1 311.3 1219.8 664.3 339.9 1326.6 85 598.2 305.0 1214.3 645.4 330.8 1295.6 7.9 633.8 er's 60 to 64 112.8 70.5 166.2 94.8 592 140.3 -16.0 106.2 65.7 163.3 87.0 330.9 130.9 -18.0 112.2 er 65 to 69 259.1 166.4 388.9 217.0 141.1 327.3 -16.2 245.5 157.4 371.5 199.8 126.2 300.2 -18.0 62.12 ^{det} 65 to 69 259.1 168.4 388.9 217.0 141.1 327.3 -16.2 245.5 157.4 371.5 199.8 126.2 -186 261.2 ^{det} 65 to 67 4013 863.3 514.0 335.8 733.0 -15.7 587.1 386.3 847.2 475.8 314.4 637.1 -19.0 62.1 ⁷ 75 to 79		75 to 79	548.6	277.9	1109.6	594.0	301.0	1192.2	8.3	527.3	266.1	1073.8	569.2	286.8		7.9	560.5	283.0	1121.2	597.8	301.9	1192.9	6.6
er's 60 to 64 112.8 70.5 166.2 94.8 59.2 140.3 -16.0 106.2 65.7 163.3 87.0 53.0 130.9 -18.0 112.2		80 plus	612.1	311.3	1219.8		339.9	1326.6	8.5	598.2	305.0	1214.3	645.4	330.8		7.9	623.8	315.5	1251.1	669.4	346.0	1328.9	7.3
er 65 to 69 259.1 168.4 388.9 217.0 141.1 327.3 -16.2 245.5 157.4 371.5 199.8 126.2 300.2 -186 261.2 ^{as} 70 to 74 609.7 401.3 863.3 514.0 335.8 733.0 -15.7 587.1 386.3 847.2 475.8 314.4 687.1 -190 62.11 75 to 79 1108.6 745.1 1586.6 931.7 617.6 13277 -16.0 1076.3 714.3 1545.4 867.6 575.3 1232.8 -19.4 1140.4 75 to 79 1108.6 745.1 1586.6 931.7 617.6 13277 -16.0 1076.3 714.3 1545.4 867.6 575.3 1232.8 -19.4 1140.4 80 plus 2957.7 2037.3 4008.3 25583 1759.1 3466.8 -13.2 2119.2 418.65 2543.3 177.2 29495	Alzheimer's	60 to 64	112.8	70.5	166.2	94.8	59.2	140.3	-16.0		65.7	163.3	87.0	53.0		-18.0	112.2	68.1	170.0	94.9	58.3	142.2	-15.4
70 to 74 609.7 401.3 863.3 514.0 335.8 733.0 -15.7 587.1 386.3 847.2 475.8 314.4 687.1 -190 622.1 75 to 79 1108.6 745.1 1586.6 931.7 617.6 1327.7 -16.0 1076.3 714.3 1545.4 867.6 575.3 1232.8 -19.4 1140.4 80 plus 2957.7 2037.3 4008.3 2558.3 1759.1 3486.8 -135.2 2119.2 4186.5 2543.3 1735.9 3451.4 -17.2 29495	and other	65 to 69	259.1	168.4	388.9	217.0	141.1	327.3	-16.2		157.4	371.5	199.8	126.2		-18.6	261.2	161.1	397.9	217.6	137.2	331.9	-16.7
11086 745.1 1586.6 931.7 617.6 1327.7 -16.0 1076.3 714.3 1545.4 867.6 575.3 1232.8 -19.4 1140.4 2957.7 2037.3 4008.3 2558.3 1759.1 3486.8 -13.5 3072.2 2119.2 4186.5 2543.3 1735.9 3451.4 -17.2 2949.5	dementias	70 to 74	609.7	401.3	863.3	514.0	335.8	733.0	-15.7		386.3	847.2	475.8	314.4		-19.0	622.1	407.7	895.1	518.5	340.8	743.4	-16.7
plus 29577 20373 4008.3 2558.3 1759.1 3486.8 -13.5 3072.2 2119.2 4186.5 2543.3 1735.9 3451.4 -17.2 2949.5		75 to 79	1108.6	745.1	1586.6	931.7	617.6	1327.7	-16.0		714.3	1545.4	867.6	575.3		-19.4	1140.4	766.3	1657.1	944.9	625.9	1357.4	-17.1
		80 plus	2957.7	2037.3	4008.3	2558.3	175	3486.8	-13.5		2119.2	4186.5	2543.3	1735.9		-17.2	2949.5	2052.4	4012.7	2605.1	1802.6	3548.3	-11.7

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Cause	São Paulo		-		São Paulo			Goiás	Goiás				Pará			-					
	2000			2017			Δ%	2000			2017			Δ%	2000			2017			Δ%
	Rate	95% U.I.		Rate	95% U.I.			Rate	95% U.I.		Rate	95% U.I.			Rate	95% U.I.		Rate	95% U.I.		
Blindness	940.6	610.2	1422.2	982.9	642.7	1498.4	4.5	1024.7	661.6	1537.2	1018.5	660.7	1555.3	-0.6	1068.5	694.3	1618.2	1061.2	686.8	1625.4	-0.7
and vision impairment	1200.2	0.608	1787.5	1249.5	833.9	1848.9	4.1	1299.9	877.5	1930.1	1288.1	863.0	1904.0	-0.9	1348.9	913.3	1977.0	1339.8	885.4	1977.6	-0.7
	1554.3	1061.3	2216.0	1618.4	1113.6	2339.0	4.1	1675.3	1152.2	2414.7	1653.1	1134.2	2391.6	-1.3	1739.4	1208.0	2468.7	1716.2	1172.4	2490.9	-1.3
	2020.7	1401.8	2774.0	2101.7	1452.1	2935.3	4.0	2167.9	1491.0	2967.2	2133.7	1471.0	2952.4	-1.6	2249.5	1584.8	3063.3	2211.4	1502.6	3079.6	-1.7
	2996.5	2127.0	3971.4	3143.9	2250.3	4206.1	4.9	3097.0	2210.6	4085.4	3153.9	2239.1	4181.6	1.8	3420.1	2455.6	4544.2	3326.8	2356.9	4368.7	-2.7
Chronic	3574.0	3227.9	3969.6	2255.8	1983.2	2533.7	-36.9	3871.4	3470.8	4273.4	2480.4	2186.5	2776.3	-35.9	3018.3	2705.4	3336.2	1941.7	1683.9	2204.7	-35.7
obstructive pulmonary	4991.7	4589.0	5472.6	3150.8	2780.1	3523.0	-36.9	5698.0	5186.7	6218.4	3740.5	3321.9	4209.3	-34.4	4329.1	3867.3	4784.0	2874.2	2523.7	3262.1	-33.6
disease	6668.1	6070.0	7281.2	4159.9	3721.6	4624.7	-37.6	7997.4	7293.2	8711.9	5388.9	4856.9	5984.0	-32.6	6020.2	5436.5	6644.4	4042.9	3601.7	4527.3	-32.8
	8109.2	7411.0	8824.4	5305.9	4799.9	5870.5	-34.6	9684.9	8871.5	10544.6	6993.5	6334.8	7705.0	-27.8	7205.9	6493.8	7958.3	5428.8	4825.9	6028.8	-24.7
	10470.5	9758.6	11131.3	6834.5	6318.1	7328.5	-34.7	13864.6	13025.0	14788.3	9688.9	9074.9	10383.9	-30.1	8503.5	7946.7	9124.1	6398.8	5913.7	6920.0	-24.8
Depressive	1251.2	864.6	1696.9	909.1	614.3	1267.8	-27.3	1234.1	816.4	1732.5	944.2	635.4	1313.5	-23.5	1000.0	666.7	1428.1	706.0	476.0	1006.2	-29.4
disorders	1197.6	853.7	1614.7	885.1	612.1	1221.7	-26.1	1161.9	789.3	1588.9	919.2	625.3	1251.1	-20.9	946.3	654.3	1304.9	700.3	472.7	976.7	-26.0
	1131.2	789.1	1519.3	861.5	593.1	1181.7	-23.8	1067.1	721.5	1481.0	887.3	610.2	1216.0	-16.9	887.4	601.7	1231.7	691.3	471.9	950.7	-22.1
	1065.1	740.5	1456.5	823.4	562.0	1136.6	-22.7	978.9	656.1	1379.0	851.2	574.0	1191.0	-13.0	823.1	547.1	1160.1	678.2	448.3	970.8	-17.6
	1044.4	725.6	1398.6	875.9	596.8	1169.0	-16.1	913.2	622.4	1272.0	858.5	583.8	1184.5	-6.0	810.8	546.4	1116.3	699.2	472.3	968.1	-13.8
Diabetes	3198.2	2676.1	3774.4	2306.3	1887.5	2793.3	-27.9	2731.0	2297.0	3220.9	2524.2	2095.5	3005.5	-7.6	2904.6	2455.3	3397.7	3489.7	2958.3	4106.9	20.1
mellitus	3839.2	3217.0	4523.7	2831.4	2366.1	3325.8	-26.2	3291.6	2791.2	3886.8	3008.3	2558.9	3550.0	-8.6	3552.4	3043.8	4158.1	4216.0	3568.9	4895.7	18.7
	4409.5	3752.4	5113.7	3298.6	2807.6	3899.7	-25.2	3847.8	3272.9	4458.2	3415.4	2866.0	4011.9	-11.2	4022.4	3433.8	4637.6	5207.0	4396.5	6052.9	29.4
	4726.9	4051.7	5470.1	3734.9	3086.7	4414.9	-21.0	3913.8	3320.0	4536.0	3809.3	3179.9	4492.4	-2.7	4282.5	3603.4	4961.8	5885.6	5056.4	6750.0	37.4
	4753.8	4157.4	5456.2	4044.2	3497.0	4657.9	-14.9	3913.6	3371.2	4485.4	3864.8	3355.5	4442.5	-1.2	3619.4	3157.6	4126.3	5036.5	4443.9	5680.7	39.2
Edentulism	952.2	596.3	1389.3	902.0	563.1	1318.7	-5.3	871.4	553.9	1261.8	848.2	536.6	1244.5	-2.7	807.1	517.6	1175.2	779.2	495.3	1148.7	-3.5
and severe tooth loss	1324.0	881.1	1872.7	1257.5	820.9	1769.5	-5.0	1228.6	808.9	1740.7	1193.6	786.6	1709.1	-2.8	1146.5	760.9	1619.8	1106.3	725.8	1580.7	-3.5
	1530.8	1027.0	2145.8	1464.7	970.1	2061.3	-4.3	1425.0	955.7	1998.2	1397.6	932.1	1954.7	-1.9	1345.6	899.7	1892.8	1303.5	867.7	1849.1	-3.1
	1579.2	1061.6	2209.9	1516.7	1013.5	2117.9	-4.0	1469.6	992.1	2048.3	1449.0	972.5	2020.8	-1.4	1390.1	944.0	1930.1	1360.9	909.1	1899.7	-2.1
	1515.6	1023.0	2090.0	1442.8	965.8	1982.3	4.8	1394.9	946.5	1908.3	1369.1	914.8	1881.9	-1.8	1312.8	884.0	1798.9	1273.6	858.0	1763.5	-3.0
Falls	1001.0	814.8	1216.7	1042.4	837.7	1277.7	4.1	867.3	689.1	1066.4	1139.6	901.7	1440.9	31.4	824.0	652.4	1016.8	678.6	544.5	836.0	-17.6
	1109.5	898.2	1343.8	1244.5	995.2	1529.5	12.2	1023.0	804.6	1273.5	1394.2	1098.7	1734.3	36.3	892.5	707.6	1114.3	804.0	648.2	0.566	-9.9
	1251.0	998.1	1552.7	1504.7	1192.1	1839.9	20.3	1239.3	979.9	1526.1	1697.1	1356.6	2091.7	36.9	1039.1	818.2	1279.6	893.6	712.8	1108.7	-14.0
	1649.1	1358.4	2001.1	2067.3	1714.2	2493.8	25.4	1572.8	1259.5	1927.1	2315.9	1891.4	2798.9	47.2	1238.5	995.3	1516.6	1210.3	986.6	1466.6	-2.3
	2582.2	2148.5	3089.8	3339.7	2793.4	3940.4	29.3	2531.0	2092.2	3013.1	3737.5	3140.0	4386.3	47.7	1686.4	1362.4	2048.6	1856.5	1543.1	2196.7	10.1
Ischemic bood	9347.8	8714.9	9997.8	5938.8	5432.7	6465.3	-36.5	7382.4	6805.3	8003.5	5588.6	5108.4	6118.6	-24.3	5936.7	5403.1	6487.9	5309.6	4787.8	5869.8	-10.6
disease	11475.3	10695.6	12239.2	7337.9	6678.9	7963.1	-36.1	9172.8	8427.2	9925.9	6984.7	6355.8	7623.5	-23.9	7974.8	7233.3	8681.1	6796.3	6160.4	7479.1	-14.8
	13662.9	12798.7	14588.2	8638.0	7915.2	9391.3	-36.8	10881.2	10017.0	11776.7	8011.0	7316.6	8847.7	-26.4	10218.9	9262.1	11124.6	8398.4	7560.2	9262.1	-17.8
	15823.7	14756.9	16920.5	10224.9	9339.2	11056.0	-35.4	11886.2	10942.1	12900.4	9255.8	8435.1	10203.2	-22.1	11315.5	10385.0	12367.8	10266.6	9273.3	11279.6	-9.3
	20560.4	19577.2	21532.4	12654.6	11880.5	13428.4	-38.5	15331.9	14471.9	16288.6	10404.7	9721.6	11105.4	-32.1	12031.0	11250.2	12771.4	10215.6	9500.8	10952.9	-15.1

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Ischemic	1685.1	1444.3	1940.7	1059.9	889.5	1240.2	-37.1	1335.1	1137.7	1551.6	869.0	730.3	1046.7	-34.9	1675.8	1417.6	1939.0	1285.5	1089.3	1527.5	-23.3
SILOKE	2282.8	1966.1	2622.4	1495.5	1269.7	1749.6	-34.5	1851.8	1574.4	2142.0	1265.9	1061.1	1499.9	-31.6	2416.6	2081.7	2817.7	1844.0	1537.9	2177.5	-23.7
	3764.2	3262.8	4298.4	2468.9	2120.3	2865.8	-34.4	3363.9	2880.3	3871.1	2158.7	1839.4	2540.3	-35.8	4241.1	3646.7	4888.4	3323.6	2837.1	3824.1	-21.6
	4844.2	4263.5	5501.8	3367.1	2890.0	3860.2	-30.5	3990.4	3456.8	4575.6	2945.0	2541.0	3421.4	-26.2	5132.7	4541.4	5766.0	4724.8	4073.5	5390.0	-7.9
	8508.5	7873.4	9176.3	5808.6	5307.1	6344.6	-31.7	7375.7	6788.1	8034.4	5213.6	4749.2	5749.1	-29.3	7789.7	7193.2	8362.6	7170.1	6553.5	7790.0	-8.0
Low back	2323.2	1393.2	3505.4	2312.3	1392.7	3483.8	-0.5	2318.3	1402.3	3459.1	2301.2	1397.4	3539.2	-0.7	2273.5	1358.3	3439.8	2262.7	1353.0	3486.4	-0.5
pain	2350.8	1485.4	3514.2	2381.1	1499.9	3569.9	1.3	2342.3	1477.3	3467.0	2363.8	1484.9	3543.5	0.9	2293.9	1450.4	3439.0	2332.8	1469.2	3525.2	1.7
	2356.3	1443.9	3560.8	2383.1	1460.9	3598.1	1.1	2313.8	1426.7	3498.3	2356.0	1461.5	3551.2	1.8	2293.0	1425.1	3407.6	2321.4	1431.3	3475.5	1.2
	2379.4	1488.9	3420.6	2382.5	1500.6	3501.2	0.1	2331.4	1468.4	3405.2	2363.6	1503.8	3412.0	1.4	2309.8	1445.1	3349.1	2335.1	1457.4	3398.2	1.
	2271.3	1517.0	3206.1	2239.7	1517.9	3135.5	-1.4	2209.7	1472.0	3117.6	2200.6	1486.5	3104.0	-0.4	2153.1	1473.0	2986.0	2155.9	1466.4	2997.8	0.1
Migraine	725.5	452.4	1111.1	749.0	461.2	1139.9	3.2	757.4	484.7	1120.7	775.3	495.5	1136.9	2.4	755.2	477.0	1129.6	765.2	479.5	1121.8	1.3
	590.7	367.9	901.0	602.7	373.5	912.5	2.0	612.3	393.0	897.8	623.5	399.0	911.1	1.8	609.6	388.0	893.1	614.0	390.5	895.7	0.7
	462.3	287.0	727.5	472.8	294.9	737.0	2.3	473.5	298.3	706.6	483.2	312.2	716.2	2.0	474.9	302.6	709.6	477.8	299.1	715.3	0.6
	357.2	213.0	554.4	364.6	215.4	564.2	2.1	363.1	227.5	546.5	371.9	232.2	555.2	2.4	365.4	228.0	546.3	371.5	235.7	562.7	1.7
	291.1	176.1	449.3	296.0	180.9	456.5	1.7	291.2	183.2	431.3	296.6	185.2	442.3	1.9	294.4	187.3	435.7	296.5	184.6	440.4	0.7
Neck pain	465.5	273.0	725.4	458.2	268.5	707.0	-1.6	552.0	328.1	852.3	547.2	337.2	851.4	-0.9	552.1	333.9	851.2	545.8	336.4	839.9	-1.1
	561.8	322.6	896.0	555.7	315.3	882.3	-1.1	664.4	395.7	1030.5	661.6	400.8	1015.7	-0.4	662.7	407.9	1022.6	658.3	400.1	1010.5	-0.7
	599.3	359.0	955.6	587.0	349.8	935.2	-2.0	703.6	440.7	1087.6	704.6	439.5	1067.6	0.2	705.6	443.2	1093.7	702.7	443.8	1074.0	-0.4
	548.5	317.9	910.6	543.3	315.3	898.5	-1.0	650.3	407.0	1020.6	649.5	399.6	1019.5	-0.1	652.2	399.5	1014.6	650.5	396.4	1025.6	-0.3
	547.6	337.6	855.9	531.5	334.2	816.0	-2.9	637.7	413.3	956.1	622.9	409.9	912.5	-2.3	623.1	410.9	907.5	617.3	410.8	898.5	-0.9
Osteoarthritis	356.7	177.7	711.3	391.7	189.1	774.8	9.8	335.3	164.4	659.3	366.3	178.1	731.5	9.2	325.6	159.2	648.7	358.7	174.0	724.0	10.2
	437.6	211.3	863.5	477.2	236.2	947.3	9.0	411.6	202.7	825.0	448.6	216.0	900.2	9.0	400.0	197.7	798.6	438.8	215.3	887.2	9.7
	511.3	250.4	1030.8	554.3	273.7	1096.5	8.4	481.3	238.8	969.3	522.7	259.0	1065.9	8.6	470.0	234.9	954.1	512.2	258.5	1014.3	9.0
	571.8	285.5	1162.3	617.2	314.2	1224.3	7.9	539.2	269.6	1086.9	584.0	291.7	1169.9	8.3	527.9	269.3	1073.4	574.5	291.0	1164.5	8.8
	634.7	321.2	1257.1	687.5	348.8	1351.1	8.3	598.5	306.4	1187.0	650.9	331.8	1305.6	8.8	596.9	305.2	1184.5	646.0	333.3	1289.8	8.2
Alzheimer's	128.4	80.0	188.9	109.0	67.0	161.8	-15.1	107.3	62.9	164.0	88.8	54.2	134.5	-172	106.2	67.4	162.5	87.7	53.2	131.3	-17.4
and other	285.4	183.2	416.1	248.1	159.3	379.5	-13.1	249.1	157.8	376.1	205.0	130.2	310.5	-17.7	247.0	157.4	377.8	200.6	126.0	303.4	-18.8
dementias	643.4	429.5	894.8	579.5	382.7	831.8	-9.9	592.1	394.0	846.5	487.7	321.0	695.9	-17.6	587.9	386.8	843.5	479.8	317.5	687.3	-18.4
	1146.4	759.5	1592.4	1033.0	696.1	1464.7	-9.9	1083.0	717.4	1561.7	891.6	590.8	1268.5	-17.7	1075.1	706.4	1562.9	875.7	582.5	1272.3	-18.5
	2868.7	1989.2	3871.4	2663.3	1842.0	3610.7	-7.2	2711.2	1851.8	3696.3	2427.2	1670.1	3315.0	-10.5	3026.8	2084.3	4111.4	2486.6	1711.3	3382.6	-17.8

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Authors' contributions

Study design, analysis and interpretation of the data, drafting and critical review of the manuscript: VMAP, APC, RT, BBD, and FMS. Study design, data collection, analysis and interpretation of results, revision and approval of the final manuscript: MN. Critical review of the manuscript: MFFLC, RK, RV, BRN, AMN, MIS, and EC. All authors read and approved the final manuscript.

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Availability of data and materials

The data we used in this article are publicly available online on the official website of the Institute of Health Metrics and Evaluation (http://ghdx. healthdata.org/gbd-results-tool).

Ethics approval and consent to participate

The Institutional Review Board of the University of Washington approved the GBD study. There was no need to submit to this research to the local Institutional Review Boards, as the study was conducted in a public domain secondary database, without nominal identification, in accordance with Decree No. 7724, May 16, 2012, and Resolution 510, of April 7, 2016. The Institutional Review Board of the Universidade Federal de Minas Gerais approved the GBD Brazil study, under the protocol CAAE– 62803316.7.0000.5149. A consent to participate does not apply, as no individual patient data was collected.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests regarding this manuscript.

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