https://doi.org/10.53886/gga.e0000254_EN

ORIGINAL ARTICLE

Geriatrics, Gerontology and Aging

Socioeconomic context, individual characteristics, and multimorbidity among older adults: a nationwide cross-sectional study

João Vitor Rodrigues[a], Simone Farías-Antúnez[a], Claúdia Weber Corseuil[a], Maruí Weber Corseuil Giehl[a]

[a]Universidade Federal de Santa Catarina – Araranguá (SC), Brazil.

Correspondence data:
Maruí Weber Corseuil Giehl – Rua Governador Jorge Lacerda, 3201 – Jardim das Avenidas – CEP: 88906-072 – Araranguá (SC), Brazil. E-mail: mwcorseuil@gmail.com

Received on: Sep 30, 2024
Editor decisions on: Oct 10, 2024; Nov 14, 2024; Nov 27, 2024
Accepted on: Dec 8, 2024

Handling Editor: Patrick Alexander Wachholz

How to cite this article: Rodrigues JV, Farías-Antúnez S, Corseuil CW, Giehl MWC. Socioeconomic context, individual characteristics, and multimorbidity among older adults: a nationwide cross-sectional study. Geriatr Gerontol Aging. 2025;19:e0000254. https://doi.org/10.53886/gga.e0000254_EN

Abstract

Objectives: The study investigated the prevalence of multimorbidity among older adults and its association with socioeconomic context and individual characteristics.

Methods: This cross-sectional study was based on data from the 2019 National Health Survey. Multimorbidity was assessed using a list of 14 physical and mental morbidities, with the cut-off considered ≥ 2 simultaneous conditions. The Municipal Human Development Index represented the contextual factors. The association between multimorbidity, individual characteristics, and socioeconomic context was assessed through multilevel logistic regression with random intercepts.

Results: The overall prevalence of multimorbidity was 58.12% (95% CI 57.00–59.23). Individual factors associated with multimorbidity were: female sex, older age, divorced/single marital status, lower education level, physical inactivity, and non-smoking status. The likelihood of multimorbidity was 24% higher among residents of more developed areas (95% CI 1.07–1.44).

Conclusion: According to our results, over half of older Brazilians have multimorbidity. One noteworthy finding of this study is the association between multimorbidity and socioeconomic context, i.e., residents of states with a higher Municipal Human Development Index had higher odds of multimorbidity.

Keywords: older adult; multimorbidity; social environment; health surveys.

INTRODUCTION

In developing countries, population aging, which began around the 1960s, was driven by increased life expectancy and improved basic health conditions.[1] Nevertheless, significant inequalities persist across different geographic regions, particularly in environmental and socioeconomic contexts.[2]

The increased life expectancy observed in modern societies does not necessarily guarantee healthy aging or a lack of non-communicable chronic diseases (NCDs). Age is a crucial factor in this context, since health issues are positively associated with age and worsen over time. Multimorbidity, defined as ≥ 2 simultaneous NCDs, is also more prevalent in older age groups.[3]

The health of older adults is shaped by 3 key factors: individual intrinsic capacity (both mental and physical), environmental context, and their interaction.[4] The socioeconomic context is influenced by historical and social circumstances, which contribute to health inequalities and are related to health events, such as multimorbidity, regardless of individual characteristics.[5]

Concerning individual characteristics, prior research has demonstrated that women are more susceptible to multimorbidity than men, which may be due to inherent biological and hormonal disparities.[6] Furthermore, unhealthy lifestyle habits, such as obesity, physical inactivity, and excessive alcohol consumption, also increase risk of multimorbidity.[7]

Given the challenges posed by the demographic and epidemiological transitions, as well as the fact that health conditions and behaviors are not randomly distributed across regions and populations, an understanding of the occurrence and patterns of multimorbidity is relevant for financial and human resource management in the National Health System.

Thus, identifying and understanding both the socioeconomic context and individual disparities in multimorbidity prevalence is essential to enable policy makers to prioritize health initiatives and interventions that are relevant to multimorbidity management.[8] The aim of the present study was to investigate the prevalence of multimorbidity among older adults and its association with individual characteristics and socioeconomic context.

METHODS

This cross-sectional observational study, which followed the Strengthening the Reporting of Observational Studies in Epidemiology protocol, was based on data from the 2019 National Health Survey (*Pesquisa Nacional de Saúde* – PNS), which was conducted by *Instituto Brasileiro de Geografia e Estatística*. The PNS is a national population-based survey conducted by the Ministry of Health. The first and second editions took place in 2013 and 2019, respectively, to collect data on the determinants, conditioning factors, and health needs of the Brazilian population.[9]

The 2019 PNS sample was selected in 3 stages: first, as primary sampling units of individual census tracts or groups of census tracts; second, households within each census tract were drawn; third, simple random selection of a resident aged ≥ 15 years in each selected household.[9]

Special census tracts were excluded from the sample, namely: subnormal clusters, military bases, barracks, lodgings, boats, camps, indigenous villages, ships, penitentiaries, asylums, penal colonies, convents, prisons, jails, rural settlements, orphanages, and hospitals.

The total number of primary sampling units was 8036; the total number of households was 108 525, and the final sample was 94 114, with a 6.4% non-response rate. For the present analysis, only data from individuals aged ≥ 60 years who answered the individual questionnaire for the selected residence were used, so the final sample for this study was 22 728 individuals.[9] Further information on the methodology of the 2019 PNS is available elsewhere.[9]

The multimorbidity outcome was assessed through a list of 14 self-reported morbidities in the PNS. Of these, 11 morbidities were identified in "Module Q - Chronic Diseases" through the following question: "Has a doctor ever diagnosed you with...?" (each condition). The following morbidities were included: diabetes, high blood pressure, arthritis or rheumatism, asthma, hypercholesterolemia, work-related musculoskeletal disorders, heart problems, lung diseases, cerebrovascular accidents, cancer, and chronic kidney disease. Among women, episodes of diabetes and hypertension during pregnancy were excluded.

For depression or other mental morbidities, the question was: "Has a doctor or mental health professional (psychiatrist or psychologist) ever diagnosed you with…?" To identify spinal column problems, the question was: "Do you have any chronic spine problems, such as chronic back or neck pain, low back pain, sciatica, vertebrae, or disc problems?" The cut-off point to define multimorbidity was ≥ 2 chronic health conditions, according to World Health Organization recommendations.[10]

To analyze the associations between the outcome and individual exposure variables in the present study, studies[11,12] that identified the complexity of the variables associated with multimorbidity in older adults were considered. The most frequently associated variables were sociodemographic characteristics (age and sex), precarious socioeconomic conditions, unhealthy lifestyle, etc.

Therefore, the following variables were investigated in the present study: sociodemographic variables – sex; age range

(60 to 69, 70 to 79, and 80 years or older), race (White or Black/mixed); years of education (none or incomplete primary education [< 9 years], complete primary or incomplete secondary education [9 to 11 years], complete secondary or incomplete higher education [12 to 15 years, complete higher education (≥ 16 years); family income per capita, classified as multiples of the federal minimum wage, assuming the minimum wage to be approximately USD 253 in 2019 (≤ 1 minimum wage [USD 0–253], 1-3 x the minimum wage [USD 253–759], > 3 x the minimum wage [≥ USD 759]); and marital status (married, divorced/single, or widowed).

The selected health-related behaviors were: respondents with sufficient leisure-time physical activity (150 minutes per week of light or moderate activity, or 75 minutes per week of vigorous activity, regardless of the number of days per week) were considered active;[13] current smoking (yes or no); excessive alcohol consumption (defined as ≥ 15 alcoholic drinks per week for men and ≥ 8 for women).[14]

The Municipal Human Development Index (MHDI), provided by the Atlas of Human Development[15] was used to evaluate the respondents' socioeconomic context, aggregated by state. The data were incorporated into the PNS database to perform the analyses. States were chosen because they represent a minimum level of aggregation while preserving the entire sample.

The MHDI is a summary measure of long-term progress that considers 3 basic components related to human development (education, income, and longevity). Scores range from 0 to 1, with higher values indicating better human development in the municipality. This index is a methodological adaptation of the Human Development Index based on the same 3 dimensions (health, education, and income) but adapted to national indicators. The present study considered the 2021 MHDI — the latest available update of the index — for the included states. The MHDI was categorized according to tertiles (first = lowest; third = highest).

Descriptive statistics were calculated for individual and socioeconomic context variables. Multilevel logistic regression with random intercepts was used to examine the association between multimorbidity, individual characteristics, and socioeconomic context, with individuals as the first level and state of residence as the second level.

The empty model was tested (with random intercepts and without covariates) to estimate the proportion of the total variance of multimorbidity that can be attributed to the differences between state contexts (MHDI) (level 2). The effects of level 2 (state) on the outcome were determined by calculating the intraclass correlation. Mixed-effects multilevel models were then constructed. The variables were gradually included in multivariable regression models – 3 in total. First, unadjusted associations between multimorbidity and MHDI were tested (Model 1). Second, demographic variables (sex, age, and marital status) were included, followed by socioeconomic (education), and lifestyle and health status variables (leisure-time physical activity and smoking status) (Model 2) to analyze the association between individual characteristics and the outcome. Variables with $p > 0.20$ were excluded from the models (race and per capita family income).

The final adjusted model was then run to test the association between the outcome and socioeconomic context, controlling for individual variables (Model 3). All analyses were performed in Stata 14.0, and the sample weights and sampling design were accounted for in all analyses. The results are expressed as odds ratios (OR) and 95% confidence intervals (95% CI), with $p < 0.05$ considered statistically significant.

RESULTS

The final sample consisted of 22 728 participants. The overall multimorbidity prevalence in this population was 58.12% (95% CI 57.00–59.23). Table 1 shows the participants' individual characteristics and socioeconomic context according to sample weights. The majority of the sample was women (56.68%) and self-declared as White (51.45%). The mean age was 70.05 years (standard deviation [SD] = 8.08, range 60-112 completed years). About half of the respondents were married (50.65%). In terms of education, the majority of participants had no education or complete primary education (63.27%), while 11.30% had completed higher education. The most frequent per capita household income was 1–3 times the federal minimum wage (42.67%). Regarding healthy behaviors, about 4 out of 5 participants were considered physically inactive, 88.56% were not current smokers, and about half of the sample did not excessively consume alcohol.

The mean number of comorbidities was 3.13 (SD = 1.30). The most common morbidities were high blood pressure (56.42%), spinal problems (31.06%), and hypercholesterolemia (27.97%) (Table 2). Table 3 describes the prevalence of the outcome according to individual characteristics and socioeconomic context.

The results of the multilevel analysis are shown in Table 4. Significant variability in multimorbidity was found between states in the null model (Model 1); the outcome variation explained by state-to-state differences was approximately 1.0% (intraclass correlation = 0.007, $p < 0.001$). There was a positive association between multimorbidity and state MHDI. There was a reduction in intraclass correlation value when the socioeconomic context variable was entered into

TABLE 1. Sample sociodemographic, heath characteristics and socioeconomic context.

Characteristics	n	%	95% CI
Individual level			
Sex	22 728		
Male	10 193	43.32	42.25 – 44.39
Female	12 535	56.68	55.60 – 57.74
Age (years)	22 728		
60 – 69	12 555	56.30	55.21 – 57.39
70 – 79	7157	30.14	29.17 – 31.13
≥ 80	3016	13.56	18.82 – 14.33
Race	22 357		
White	9901	51.45	50.27 – 52.61
Brown/black	12 456	48.55	47.38 – 49.72
Marital status	22 728		
Married	9946	50.65	49.55 – 51.76
Divorced/single	6698	24.30	23.40 – 25.22
Widowed	6084	25.05	24.14 – 25.99
Education level (years)	22 728		
< 9	14 987	63.27	62.09 – 64.44
9 – 11	2011	9.53	8.88 – 10.21
12 – 15	3322	15.90	15.05 – 16.78
≥ 16	2408	11.30	10.52 – 12.13
Per capita family income*	22 725		
≤ 1 x the minimum wage	10 250	41.73	40.56 – 42,92
1 – 3 x the minimum wage	8904	42.67	41.55 – 43.79
≥ 3 x the minimum wage	3571	15.60	14.68 – 16,55
Leisure physical activity	22 728		
Insufficiently active	18 517	80.54	79.60 – 81.44
Physically active	4211	19.46	18.56 – 20.40
Current smoking	22 728		
Yes	2680	11.44	10.76 – 12.14
No	20 048	88.56	87.86 – 89.23
Alcohol consumption	3755		
Not excessive	3119	83.97	81.84 – 85.82
Excessive	636	16.03	14.18 – 18.06
Multimorbidity	21 725		
< 2 simultaneous NCDs	9682	41.88	40.77 – 43.00
≥ 2 simultaneous NCDs	12 043	58.12	57.00 – 59.23
Contextual level			
MHDI tertile	22 728		
1 (lower)	7703	23.91	23.15 – 24.69
2 (middle)	7359	26.89	26.10 – 27.70
3 (higher)	7666	49.20	48.18 – 50.22

*The Brazilian minimum wage = ~USD 253. CI: confidence interval; NCDs: Noncommunicable Diseases; MHDI: Municipal Human Development Index.

TABLE 2. Prevalence rates of morbidities among older adults (n = 21 725).

Noncommunicable disease	%	95% CI
High blood pressure	56.42	55.35 – 57.48
Spinal column problem	31.06	29.97 – 32.18
Hypercholesterolemia	27.97	26.92 – 29.04
Diabetes	20.84	19.95 – 21.75
Arthritis/rheumatism	18.17	17.24 – 19.12
Heart problem	13.15	12.41 – 13.92
Depression	11.82	11.10 – 15.57
Cancer	6.78	6.23 – 7.38
Cerebrovascular accident	5.60	5.14 – 6.10

Continue...

TABLE 2. Continuation.

Noncommunicable disease	%	95% CI
Other mental diseases	4.68	4.21 – 5.20
Asthma	4.56	4.10 – 5.06
Other lung diseases	2.90	2.50 – 3.36
Chronic kidney disease	2.55	2.23 – 2.92
Work-related muscle-skeletal disorder	2.21	1.83 – 2.66

95% CI: 95% confidence interval.

TABLE 3. Multimorbidity prevalence according to individual characteristics and socioeconomic context among older adults (n = 21 725).

Characteristics	Prevalence of multimorbidity % (95% CI)	p-value
Individual level		
Sex		
Male	49.06 (47.42 – 50.70)	0.0001
Female	64.86 (63.37 – 66.31)	
Age range (years)		
60–69	55.42 (53.91 – 56.92)	
70–79	61.66 (59.76 – 63.52)	0.0001
≥ 80	61.48 (58.57 – 64,31)	
Race		
White	58.00 (56.39 – 59.58)	0.9930
Black/mixed	57.99 (56.43 – 59.53)	
Marital status		
Married	56.72 (55.15 – 58.27)	
Divorced/single	55.66 (53.53 – 57.78)	0.0001
Widower	63.30 (61.19 – 65.35)	
Education level		
No education/incomplete primary education	60.15 (58.81 – 61.48)	0.0001
Complete primary/ incomplete secondary education	55.70 (52.20 – 59.15)	
Complete secondary/ incomplete higher education	55.72 (52.94 – 58.47)	
Complete higher education	52.47 (49.02 – 55.90)	
Per capita family income		
≤ 1	58.87 (57.19 – 60.53)	
1 – 3	58.71 (56.99 – 60.41)	0.0234
≥ 3	54.56 (51.68 – 57.41)	
Leisure activity		
Insufficiently active	59.07 (57.82 – 60.32)	0.0012
Physically active	54.25 (51.62 – 56.86)	
Current smoking		
Yes	49.59 (46.33 – 52.85)	0.0001
No	59.16 (57.99 – 60.33)	
Alcohol consumption		
Not excessive	49.88 (46.94 – 52.83)	0.5972
Excessive	47.84 (40.85 – 54.91)	
Contextual level		
MHDI tertile		
1 (lower)	54.85 (52.79 – 56.89)	
2 (middle)	55.79 (54.06 – 57.51)	0.0001
3 (higher)	60.93 (59.13 – 62.70)	

95% CI: 95% confidence interval; MHDI: Municipal Human Development Index.

TABLE 4. Multilevel logistic regression models for multimorbidity and individual and socioeconomic context (Municipal Human Development Index) characteristics among older adults (n = 21,725)

Characteristics	Empty model	Model 1* OR (95% CI)	Model 2† OR (95% CI)	Model 3‡ OR (95% CI)
Individual level				
Sex				
Male			1	1
Female			**2.04 (1.92 – 2.16)**	**2.01 (1.89 – 2.13)**
Age range (years)				
60–69			1	1
70–79			**1.24 (1.15 – 1.34)**	**1.25 (1.18 – 1.33)**
≥ 80			**1.40 (1.32 – 1.50)**	**1.14 (1.05 – 1.25)**
Marital status				
Married			1	1
Divorced/single			**0.83 (0.78 – 0.89)**	**0.85 (0.79 – 0.91)**
Widower			0.95 (0.88 – 1.03)	0.97 (0.90 – 1.05)
Education level				
No education/incomplete primary education			1	1
Complete primary/incomplete secondary education			**0.88 (0.80 – 0.97)**	**0.86 (0.78 – 0.95)**
Complete secondary/incomplete higher education			0.93 (0.86 – 1.01)	**0.91 (0.85 – 0.99)**
Complete higher education			**0.89 (0.81 – 0.98)**	**0.88 (0.81 – 0.97)**
Leisure physical activity				
Insufficiently active			1	1
Physically active			**0.93 (0.86 – 0.99)**	**0.92 (0.86 – 0.99)**
Current smoking				
No			1	1
Yes			**0.73 (0.67 – 0.80)**	**0.73 (0.66 – 0.80)**
Contextual level				
MHDI tertile				
1 (lower)		1		1
2 (middle)		1.07 (0.94 – 1.23)		1.08 (0.93 – 1.24)
3 (higher)		**1.23 (1.06 – 1.41)**		**1.24 (1.07 – 1.44)**
Variance components				
Level 2 variance (95% CI)	0.02	0.02	0.03	0.02
ICC%	0.007	0.005	0.008	0.006
AIC	29,781.1	29,778.2	28,997.29	28,994.35
BIC	29,797.1	29,810.15	29,093.13	29,106.16

*Model 1 includes only the socioeconomic context level variable; †Model 2 includes only the individual level variables (age range, race, marital status, and education level); ‡Model 3 includes both socioeconomic context and individual variables.
OR: odds ratio; 95% CI: confidence interval; MHDI: Municipal Human Development Index; ICC: Intraclass correlation; AIC: Akaike information criterion; BIC: Bayesian information criterion. Bold values represent statistically significant results.

the model. Minor changes occurred for individual variables (Model 2) and in the final model (Model 3), which included individual and socioeconomic variables.

In the final multilevel model (Model 3), individual variables associated with higher odds of multimorbidity were: female sex (OR 2.01, 95% CI 1.89–2.13) and older age (OR 1.25, 95% CI 1.18–1.33 and OR 1.14, 95% CI 1.05–1.25). However, the odds of multimorbidity were lower among individuals who were single or divorced (OR 0.85, 95% CI 0.79–0.91), those with higher education (OR 0.86, 95% CI 0.78–0.95; OR 0.91, 95% CI 0.85–0.99, and OR 0.88, 95% CI 0.81–0.97), those who were physically active (OR 0.92, 95% CI 0.86–0.99), and smokers (OR 0.73, 95% CI 0.66–0.80).

Regarding the association between socioeconomic context and multimorbidity, the odds of multimorbidity were 24% higher (95% CI 1.07–1.44) among those who lived in states in the upper MHDI tertiles than among those who lived in the lowest tertiles. Regarding model fit, there was a reduction in Akaike and Bayesian information criterion values after socioeconomic level was included, indicating better model fit.

DISCUSSION

Although the relationship between socioeconomic context and multimorbidity has not been extensively studied among older adults,[16,17] we identified individual and socioeconomic factors associated with multimorbidity among older adults in a middle income country. According to our results, higher state MHDI tertiles were associated with a higher prevalence of multimorbidity.

Our findings indicate that the prevalence of multimorbidity among older adults aligns with the global average observed in other low and middle-income countries,[16] with approximately 3 out of every 5 individuals in this demographic group affected by at least 1 chronic condition, which was a slight increase compared to 2013 data (56.5%).[18]

Regarding individual characteristics, there was a positive association between multimorbidity and female sex. The higher prevalence of multimorbidity among women suggests greater sensitivity to health status. This could be attributed to their greater use of health services, and thus a higher odds of being diagnosed with multiple chronic diseases.[19] As evidenced by prior research based on 2019 PNS data, 80.6% of the women had a medical appointment in the 12 months prior to the interview, compared to 66.6% of men.[20] Moreover, evidence suggests that men are more likely to die prematurely from NCDs, which consequently results in a higher prevalence of chronic diseases among women. This finding underscores the existence of potential sex disparities in health care use and disease burden.[21]

Single or divorced people were less likely to have multimorbidity than married people. Although the underlying mechanism remains poorly understood, it may involve cultural values and their impact on the development and diagnosis of NCDs. Another explanation could be that married older adults use health services more often due to their partner's encouragement, which could result in more frequent diagnoses.[22]

The prevalence of multimorbidity was also associated with increasing age, which is logical since aging leads to physical, cardiometabolic, and mental changes.[4] Other population-based studies have found similar findings regarding specific morbidities.[3,23]

Physical activity was associated with a lower odds of multimorbidity, which confirms its protective effects in the context of biological risk factors for NCDs, such as obesity, inflammation, sarcopenia, and reduced cardiorespiratory capacity.[24] However, contrary to expectations, smokers were less likely to have multimorbidity. Significant inverse associations between smoking and morbidity have also been reported in other studies of older adults.[25] The main explanation for this is the lower life expectancy of this subgroup, since active smoking is the main risk factor for NCD mortality.[26] Another partial explanation is the increased use of health services by people diagnosed with NCDs, who are often encouraged to quit smoking.[27]

Regarding individual-level socioeconomic characteristics, low education and low income have been linked to multiple chronic conditions. A meta-analysis by Pathirana & Jackson[28] found a 64% higher likelihood of multimorbidity among people with lower educational levels than those with higher levels. Better socioeconomic indicators are indicative of fewer challenges in identifying health needs, better access to medical services, care, and treatment, and greater availability of health-related information. Consequently, individuals with higher socioeconomic status are more likely to engage in healthy behaviors.[13]

Our multilevel analysis revealed a positive association between residing in a state in the highest MHDI tertile and a higher likelihood of multimorbidity, which is consistent the findings of previous studies on specific NCDs.[11,12] This provides further evidence of the relationship between socioeconomic context and multimorbidity, and the intricate nature of this relationship requires a comprehensive understanding of its underlying mechanisms. One explanation for this phenomenon could be survival bias. It is possible that residents of regions with a higher MHDI may have greater access to health care resources, resulting in more effective disease management and prolonged survival rates. Consequently, these individuals would have a greater likelihood of accumulating multiple chronic conditions over time, thereby contributing to a higher prevalence of multimorbidity in these regions.[11]

The multifaceted nature of multimorbidity should also be acknowledged. The development and progression of multiple chronic conditions are influenced by a variety of individual, social, and environmental factors. The socioeconomic context reflected in the MHDI, such as education, income, and living conditions, can shape health behaviors, health care access, and overall well-being. Thus, it is plausible that areas with higher MHDI scores are more likely to have a convergence of factors that increase longevity and, as previously mentioned, the odds of developing multiple chronic conditions.[3]

An important additional factor in the relationship between multimorbidity and MHDI is unequal access to diagnostic resources, due to the fact that morbidity diagnosis depends on adequate access to health care, especially primary care, and the comprehensive use of medical services.[23] Data from the 2013 PNS indicate that residents of the southeastern and southern regions of Brazil, which have significantly higher

MHDI, have better access to health care than residents of other regions.[29]

It is a significant challenge for health systems to provide appropriate care for older people with multimorbidity, particularly in middle-income countries undergoing rapid population aging. Although comprehensive care is a basic principle of Brazil's public health system and emphasis is placed on primary health care, the system's model tends to focus on medical diagnosis and treatment, rather than disease prevention and health promotion. This approach may contribute to the high prevalence of people affected by multimorbidity.[30] Some measures, such as monitoring areas with more susceptible populations, expanding primary care policies, and implementing morbidity prevention programs could positively impact quality of life and minimize functional limitations. They could also help reduce the costs associated with repeated hospitalizations and other complications resulting from multimorbidity.

It is important to consider the limitations of this study when interpreting its results. First, its cross-sectional design precludes determining a causal relationship between individual and socioeconomic variables and multimorbidity. However, it does allow estimation of the strength of the associations. Secondly, the use of self-reported measures could result in overestimation of the outcome prevalence. Additionally, the total multimorbidity variance was not substantially explained by the contextual level. However, it is important to note that there was a significant association between socioeconomic context and multimorbidity, even after controlling for individual characteristics.

Although the prevailing approach focuses on older adults with a single noncommunicable disease, which is reflected in the majority of Brazilian health care guidelines, our results highlight the national health system's prioritization of a care model focused on medical diagnosis and treatment rather than primary prevention and health promotion. In this country's diverse population, in which multimorbidity is prevalent, several types of interventions could positively affect quality of life and reduce functional limitations. These include prevention programs targeting specific morbidities, expanded primary care policies, and monitoring in regions with higher socioeconomic vulnerability.

CONCLUSIONS

This study revealed that over half of older Brazilians have multimorbidity. One noteworthy finding of this study was the association between multimorbidity and socioeconomic context, with higher odds of multimorbidity among older adults in states with higher MHDI. This suggests that while higher development indices may improve access to health care and diagnosis, they could also lead to higher detection of chronic conditions, thereby contributing to the observed disparities.

DECLARATIONS

Conflict of interest
The authors declare no conflicts of interest.

Funding
This study received no specific grants from funding agencies in the public, commercial, or non-profit sectors.

Author contributions
João Vitor Rodrigues: formal analysis, investigation, writing – original draft, writing – review & editing. Sim1 Farías-Antúnez: formal analysis, writing – original draft. Claúdia Weber Corseuil: formal analysis, methodology, writing – review & editing.
Maruí Weber Corseuil Giehl: conceptualization, formal analysis, investigation, methodology, supervision, writing – original draft.

Ethical approval and informed consent
The National Health Survey was approved by the National Research Ethics Commission (process 3.529.376, August 23, 2019). All respondents provided written informed consent prior to inclusion.

Data availability statement
The data that support the findings of this study are openly available on the NHS Homepage at https://www.pns.icict.fiocruz.br

Reporting standards guidelines
This cross-sectional observational study followed the Strengthening the Reporting of Observational Studies in Epidemiology protocol.

REFERENCES

1. Camargos MCS, Gonzaga MR, Costa JV, Bomfim WC. Disability-free life expectancy estimates for Brazil and Major Regions, 1998 and 2013. Cien Saude Colet. 2019;24(3):737-47. https://doi.org/10.1590/1413-81232018243.07612017
2. Ramos LR, Veras RP, Kalache A. Envelhecimento populacional: uma realidade brasileira. Rev Saúde Pública. 1987;21(3):211-24. https://doi.org/10.1590/S0034-89101987000300006
3. Szwarcwald CL, Almeida WS, Souza Júnior PRB, Rodrigues JM, Romero DE. Socio-spatial inequalities in healthy life expectancy in the elderly, Brazil, 2013 and 2019. Cad Saude Publica. 2022;38Suppl 1(Suppl 1):e00124421. https://doi.org/10.1590/0102-311X00124421
4. World Health Organization. World report on ageing and health [Internet]. Geneva: WHO; 2015 [cited 2022 Oct 31]. Available from: https://apps.who.int/iris/bitstream/handle/10665/186463/9789240694811_eng.pdf?sequence=1&isAllowed=y
5. Díaz-Perera G, Bacallao J, Alemañy E. Contextual and individual influences on diabetes and heart disease in Havana primary care catchment areas. MEDICC Rev. 2013;15(2):10-5. https://doi.org/10.37757/MR2013V15.N2.3
6. Violan C, Foguet-Boreu Q, Flores-Mateo G, Salisbury C, Blom J, Freitag M, et al. Prevalence, determinants and patterns of multimorbidity in primary care: a systematic review of observational studies. PLoS One. 2014;9(7):e102149. https://doi.org/10.1371/journal.p1.0102149
7. Mounce LTA, Campbell JL, Henley WE, Tejerina Arreal MC, Porter I, Valderas JM. Predicting incident multimorbidity. Ann Fam Med. 2018;16(4):322-9. https://doi.org/10.1370/afm.2271
8. Nunes BP, Chiavegatto Filho ADP, Pati S, Teixeira DSC, Flores TR, Camargo-Figuera FA, et al. Contextual and individual inequalities of multimorbidity in Brazilian adults: a cross-sectional national-based study. BMJ Open. 2017;7(6):e015885. https://doi.org/10.1136/bmjopen-2017-015885
9. Stopa SR, Szwarcwald CL, Oliveira MM, Gouvea ECDP, Vieira MLFP, Freitas MPS, et al. Pesquisa Nacional de Saúde 2019: histórico, métodos e perspectivas. Epidemiol Serv Saúde. 2020;29(5):e2020315. https://doi.org/10.1590/S1679-49742020000500004
10. World Health Organization. Multimorbidity: technical series on safer primary care [Internet]. Geneva: World Health Organization; 2016 [cited 2023 Feb 6]. Available from: https://apps.who.int/iris/handle/10665/252275
11. Bento IC, Mambrini JVM, Peixoto SV. Fatores contextuais e individuais associados à hipertensão arterial entre idosos brasileiros (Pesquisa Nacional de Saúde – 2013). Rev Bras Epidemiol. 2020;23:e200078. https://doi.org/10.1590/1980-549720200078
12. Francisco PMSB, Segri NJ, Borim FSA, Malta DC. Prevalência simultânea de hipertensão e diabetes em idosos brasileiros: desigualdades individuais e contextuais. Ciênc Saúde Colet. 2018;23(11):3829-40. https://doi.org/10.1590/1413-812320182311.29662016
13. Bull FC, Al-Ansari SS, Biddle S, Borodulin K, Buman MP, Cardon G, et al. World Health Organization 2020 guidelines on physical activity and sedentary behaviour. Br J Sports Med. 2020;54(24):1451-62. https://doi.org/10.1136/bjsports-2020-102955
14. Centers for Disease Control and Prevention. Preventing excessive alcohol use with proven strategies [Internet]. 2022 [cited 2023 Feb 22]. Available from: https://www.cdc.gov/alcohol/fact-sheets/prevention.htm
15. Atlas BR. Índice de Desenvolvimento Humano Municipal [Internet]. Atlas de desenvolvimento humano no Brasil. 2021 [cited 2023 Feb 8]. Available from: https://www.atlasbrasil.org.br/consulta/planilha
16. Romano E, Ma R, Vancampfort D, Firth J, Felez-Nobrega M, Haro JM, et al. Multimorbidity and obesity in older adults from six low- and middle-income countries. Prev Med. 2021;153:106816. https://doi.org/10.1016/j.ypmed.2021.106816
17. Nunes BP, Thumé E, Facchini LA. Multimorbidity in older adults: magnitude and challenges for the Brazilian health system. BMC Public Health. 2015;15:1172. https://doi.org/10.1186/s12889-015-2505-8
18. Andrade FB, Thumé E, Facchini LA, Torres JL, Nunes BP. Education and income-related inequalities in multimorbidity among older Brazilian adults. PLoS One. 2022;17(10):e0275985. https://doi.org/10.1371/journal.p1.0275985
19. Pache B, Vollenweider P, Waeber G, Marques-Vidal P. Prevalence of measured and reported multimorbidity in a representative sample of the Swiss population. BMC Public Health. 2015;15:164. https://doi.org/10.1186/s12889-015-1515-x
20. Palmeira NC, Moro JP, Getulino FA, Vieira YP, Soares Junior AO, Saes MO. Analysis of access to health services in Brazil according to sociodemographic profile: National Health Survey, 2019. Epidemiol Serv Saude. 2022;31(3):e2022966. https://doi.org/10.1590/S2237-96222022000300013
21. World Health Organization. Noncommunicable diseases progress monitor 2022 [Internet]. Geneva: World Health Organization; 2022 [cited 2023 May 9]. Available from: https://apps.who.int/iris/bitstream/handle/10665/353048/9789240047761-eng.pdf
22. Amiresmaili M, Yazdi-Feyzabadi V, Heidarijamebozorgi M. Health services utilization among slum dwellers: an experience from Iran. J Educ Health Promot. 2019;8:210. https://doi.org/10.4103/jehp.jehp_358_19
23. Guimarães RM, Andrade FCD. Healthy life-expectancy and multimorbidity among older adults: do inequality and poverty matter? Arch Gerontol Geriatr. 2020;90:104157. https://doi.org/10.1016/j.archger.2020.104157
24. Diez Roux AV. Residential environments and cardiovascular risk. J Urban Health. 2003;80(4):569-89. https://doi.org/10.1093/jurban/jtg065
25. Keomma K, Bousquat A, César CLG. Prevalence of multimorbidity in older adults in São Paulo, Brazil: a study with ISA-Capital. Rev Saude Publica. 2022;56:69. https://doi.org/10.11606/s1518-8787.2022056004252
26. Oberg M, Jaakkola MS, Woodward A, Peruga A, Prüss-Ustün A. Worldwide burden of disease from exposure to second-hand smoke: a retrospective analysis of data from 192 countries. Lancet. 2011;377(9760):139-46. https://doi.org/10.1016/S0140-6736(10)61388-8
27. Lima e Costa MFF, Peixoto SV, César CC, Malta DC, Moura EC. Health behaviors among older adults with hypertension, Brazil, 2006. Rev Saude Publica. 2009;43 Suppl 2:18-26. https://doi.org/10.1590/s0034-89102009000900004
28. Pathirana TI, Jackson CA. Socioeconomic status and multimorbidity: a systematic review and meta-analysis. Aust N Z J Public Health. 2018;42(2):186-94. https://doi.org/10.1111/1753-6405.12762
29. Stopa SR, Malta DC, Monteiro CN, Szwarcwald CL, Goldbaum M, Cesar CLG. Use of and access to health services in Brazil, 2013 National Health Survey. Rev Saude Publica. 2017;51(suppl 1):3s. https://doi.org/10.1590/S1518-8787.2017051000074
30. Rzewuska M, Azevedo-Marques JM, Coxon D, Zanetti ML, Zanetti ACG, Franco LJ, et al. Epidemiology of multimorbidity within the Brazilian adult general population: evidence from the 2013 National Health Survey (PNS 2013). PLoS One. 2017;12(2):e0171813. https://doi.org/10.1371/journal.p1.0171813