

Multimorbidity and Functional Disability in Older Brazilians: Contrasting Patterns in Basic and Instrumental Activities

Multimorbidade e Incapacidade Funcional em Idosos Brasileiros: Padrões Contrastantes nas Atividades Básicas e Instrumentais

Multimorbilidad y Discapacidad Funcional en Ancianos Brasileños: Patrones Contrastantes en Actividades Básicas e Instrumentales

RESUMO

Objetivo: Analisar a associação entre multimorbidade e incapacidade funcional em idosos brasileiros e sua evolução entre 2013 e 2019. **Métodos:** Estudo transversal com dados da Pesquisa Nacional de Saúde de 2013 e 2019, incluindo indivíduos com 60 anos ou mais. A incapacidade funcional em atividades básicas e instrumentais de vida diária foi analisada por regressão de Poisson com variância robusta, considerando o desenho amostral complexo. **Resultados:** Foram incluídos 33.905 idosos. A prevalência de multimorbidade foi de 57,9%. Entre 2013 e 2019, a incapacidade funcional aumentou para atividades básicas (15,5% para 20,6%) e atividades instrumentais (28,0% para 32,2%). A multimorbidade associou-se à incapacidade funcional, com maior magnitude para atividades básicas (RP=2,00; IC95%:1,66–2,42) do que para atividades instrumentais (RP=1,38; IC95%:1,22–1,55). **Conclusão:** A multimorbidade constitui importante determinante da incapacidade funcional entre idosos brasileiros, especialmente nas atividades básicas, enquanto fatores sociodemográficos apresentaram maior influência relativa sobre as atividades instrumentais de vida diária. **DESCRIPTORES:** Idoso; Multimorbidade; Deficiência; Atividades da Vida Diária; Pesquisas de Saúde.

ABSTRACT

Objective: To analyze the association between multimorbidity and functional disability among older Brazilian adults and its evolution between 2013 and 2019. **Methods:** Cross-sectional study using data from the 2013 and 2019 Brazilian National Health Survey, including individuals aged 60 years and older. Functional disability in basic and instrumental activities of daily living was analyzed using Poisson regression with robust variance, considering the complex survey design. **Results:** A total of 33,905 older adults were included. The prevalence of multimorbidity was 57.9%. Between 2013 and 2019, functional disability increased for basic activities (15.5% to 20.6%) and instrumental activities (28.0% to 32.2%). Multimorbidity was associated with functional disability, with a greater magnitude for basic activities (PR = 2.00; 95% CI: 1.66–2.42) than for instrumental activities (PR = 1.38; 95% CI: 1.22–1.55). **Conclusion:** Multimorbidity is an important determinant of functional disability among older Brazilian adults, particularly in basic activities, whereas sociodemographic factors showed a greater relative influence on instrumental activities of daily living. **DESCRIPTORS:** Aged; Multimorbidity; Disability; Activities of Daily Living; Health Surveys.

RESUMEN

Objetivo: Analizar la asociación entre la multimorbilidad y la discapacidad funcional en adultos mayores brasileños, así como su evolución entre 2013 y 2019. **Métodos:** Estudio transversal con datos de la Encuesta Nacional de Salud de Brasil de 2013 y 2019, que incluyó a personas de 60 años o más. La discapacidad funcional en las actividades básicas e instrumentales de la vida diaria se analizó mediante regresión de Poisson con varianza robusta, considerando el diseño muestral complejo. **Resultados:** Se incluyeron 33.905 adultos mayores. La prevalencia de multimorbilidad fue del 57,9%. Entre 2013 y 2019, la discapacidad funcional aumentó en las actividades básicas (15,5% a 20,6%) y en las actividades instrumentales (28,0% a 32,2%). La multimorbilidad se asoció con la discapacidad funcional, con mayor magnitud para las actividades básicas (RP = 2,00; IC95%: 1,66–2,42) que para las actividades instrumentales (RP = 1,38; IC95%: 1,22–1,55). **Conclusión:** La multimorbilidad constituye un importante determinante de la discapacidad funcional en los

adultos mayores brasileños, especialmente en las actividades básicas, mientras que los factores sociodemográficos mostraron una mayor influencia relativa sobre las actividades instrumentales de la vida diaria.

DESCRIPTORES: Adulto Mayor; Multimorbilidad; Discapacidad; Actividades de la Vida Diaria; Encuestas de Salud.

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INTRODUCTION

Population aging has become one of the main demographic transformations of the 21st century, with substantial implications for health systems, particularly in middle-income countries. It is estimated that by 2050 the global population aged 60 years or older will double, with more accelerated growth in contexts characterized by persistent social inequalities and still-developing health systems, such as Brazil.^{1,2} This process has been accompanied by changes in health and functional profiles, with increasing relevance of chronic conditions and functional disability as central determinants of healthy aging.³

The increase in life expectancy has been associated with a higher prevalence of non-communicable chronic diseases, resulting in a substantial burden of multimorbidity among older adults. Multimorbidity, defined as the coexistence of two or more chronic conditions, represents a growing

challenge for health systems, being associated with

increased care complexity, polypharmacy, and worse health outcomes.^{4,5} Recent evidence indicates that multimorbidity is not a homogeneous phenomenon, but rather involves different patterns of co-occurrence and trajectories over time, with heterogeneous impacts on functionality and quality of life.^{6,7}

Functional disability constitutes one of the main outcomes associated with aging and multimorbidity, reflecting the loss of independence in performing daily activities and being strongly related to institutionalization, mortality, and quality of life.⁸ Traditionally, functionality is assessed based on two complementary domains: basic activities of daily living (BADL), related to self-care, and instrumental activities of daily living (IADL), which involve more complex tasks necessary for independent living in the community.^{9,10} These domains represent different dimensions

of the functional disability process, with limitations in IADL often considered earlier manifestations, whereas limitations in BADL reflect more advanced stages of impairment.^{11,12}

International evidence indicates a consistent association between multimorbidity and functional disability, with an increased risk of functional decline as chronic conditions accumulate.^{13,14} However, important gaps remain in the literature, particularly regarding domain-specific analyses of functionality and the understanding of temporal trends in these outcomes in middle-income countries

In Brazil, population aging is occurring rapidly within a context of incomplete epidemiological transition and persistent socioeconomic inequalities. The expansion of access to health services in recent decades, particularly within the Brazilian Unified Health System, has contributed to increased diagnosis of chronic diseases, but has not necessarily translated into proportional improvements in func-

tional capacity.^{15,16} National studies, including data from ELSI-Brazil, have shown a high prevalence of multimorbidity and its association with adverse outcomes; however, analyses exploring differences between BADL and IADL or evaluating temporal trends remain limited.¹⁷

Furthermore, the distribution of functional disability is strongly associated with social determinants of health, such as education, income, and life-course conditions. International evidence indicates that socioeconomic inequalities substantially influence the risk of disability and mortality, underscoring the need of integrated approaches that bridge clinical and social dimensions.^{18,19}

Given this context, analyzing the association between multimorbidity and functional disability, considering different domains of functionality and their evolution over time, is essential to inform public policies aimed at promoting healthy aging. In this sense, the present study aimed to analyze the association between multimorbidity and functional disability in basic and instrumental activities of daily living among older Brazilian adults, as well as to evaluate its evolution between 2013 and 2019, using data from the National Health Survey.

METHODS

Study design and data source

This is an analytical study based on repeated cross-sectional surveys, using data from the 2013 and 2019 editions of the National Health Survey (Pesquisa Nacional de Saúde – PNS). The PNS is a nationwide household survey conducted by the Brazilian Institute of Geography and Statistics in partnership with the Ministry of Health, with the objective of producing representative estimates of the health conditions of the Brazilian population.

The sampling design is probabilistic, based on a three-stage cluster sampling process, involving the selection of primary sampling units, households, and, finally, one adult resident randomly selected. The sampling plan incorporates stratification and weighting, allowing inference for the population residing in private households in the country.

Study population and construction of the analytical dataset

Individuals aged 60 years or older at the time of the interview were included. The databases from both survey editions were harmonized regarding variable nomenclature and coding, with standardization of response categories and verification of comparability between data collection instruments.

After harmonization, the datasets were integrated into a single database, and an indicator variable for the survey year (2013 and 2019) was created. This strategy enabled a combined analysis under the framework of repeated cross-sectional surveys. Individuals with missing information on the main exposure or outcome variables were excluded from the analyses.

Variables

Functional disability was assessed based on self-reported limitations in activities of daily living, according to standardized PNS instruments. Both basic activities of daily living (BADL), related to self-care, and instrumental activities of daily living (IADL), which involve greater functional complexity, were considered.

Basic activities included eating, bathing, dressing, using the toilet, getting in or out of bed, and moving around within the household. Instrumental activities included shopping, managing finances, taking medications, attending medical appointments, and using transportation.

For each activity, participants re-

ported their level of difficulty in performing the task, with response options ranging from no difficulty to inability. Functional disability was defined as the presence of any degree of difficulty in at least one of the evaluated activities. Dichotomous variables were constructed for limitations in basic and instrumental activities.

Multimorbidity was defined as the presence of two or more self-reported non-communicable chronic diseases based on prior medical diagnosis. The following conditions were considered: arterial hypertension, diabetes mellitus, dyslipidemia, cardiovascular disease, stroke, asthma, chronic obstructive pulmonary disease, arthritis or rheumatism, spinal disorders, depression, cancer, and chronic kidney disease.

Analyses were adjusted for socio-demographic variables, including sex, age categorized into five-year groups (60–64, 65–69, 70–74, 75–79, and ≥80 years), education level (incomplete primary education, complete primary education, complete secondary education, and higher education), race/skin color (White, Brown, and Black), and marital status (with or without a partner).

Statistical analysis

All analyses accounted for the complex sampling design of the PNS, incorporating sampling weights, strata, and primary sampling units. For the combined analysis of the two survey editions, a specific stratum variable by year was constructed, preserving the independence between sampling designs. Variance estimation considered adjustment for strata with a single primary sampling unit using the centered method.

Initially, descriptive analyses were performed to characterize the population and estimate the prevalence of multimorbidity and functional disability in each period.

Subsequently, inferential analyses

were conducted to evaluate the association between multimorbidity and functional disability.

Associations were estimated using Poisson regression with robust variance, and results were expressed as prevalence ratios and their respective 95% confidence intervals. Adjusted models included sociodemographic variables, and effect modification over time was assessed by including an interaction term between multimorbidity and survey year.

Analyses were performed using Stata software (version 14.0), adopting a significance level of 5%.

Ethical aspects

The National Health Survey (PNS) was approved by the National Research Ethics Commission of the National Health Council under protocol numbers 328,159/2013 and 3,529,376/2019. All participants provided written informed consent. The present study used secondary data in the public domain, with no identification of participants.

RESULTS

Table 1 presents the distribution of sociodemographic characteristics, multimorbidity, and functional disability among the Brazilian older adult population, according to the 2013 and 2019 editions of the National Health Survey.

The combined sample included 33,905 individuals aged 60 years or older, with 11,177 in 2013 and 22,728 in 2019, representing approximately 60.8 million older adults in Brazil after weight for the complex sampling design.

A predominance of females was observed in both periods, accounting for 56.4% in 2013 and 56.7% in 2019, with no statistically significant differences between the years. The age distribution remained stable across surveys, with the highest concentration in the 60–64 age group (31.9% in 2013 and 31.1% in 2019), followed by the 65–69 and 70–74 age groups. The proportion of individuals aged 80 years or older remained constant (13.6% in both years). Regarding education, no statistically significant differences were observed between 2013 and 2019. The majority of older

adults had incomplete primary education, corresponding to 64.1% in 2013 and 63.3% in 2019. The proportions of individuals with complete secondary education and higher education remained relatively stable over time. Regarding race/skin color, a significant change in population distribution was observed, with a reduction in the proportion of individuals self-identifying as White (54.5% in 2013 to 51.4% in 2019) and a corresponding increase in the Brown (36.2% to 38.1%) and Black (9.4% to 10.5%) categories. Regarding marital status, a relevant change was observed between the periods analyzed, with an increase in the proportion of older adults without a partner, rising from 42.6% in 2013 to 49.3% in 2019 (Table 1).

Table 1. Sociodemographic characteristics, multimorbidity, and functional disability among Brazilian older adults. Brazil, 2013 and 2019.

Variables	2013 % (95% CI) n=11.177	2019 % (95% CI) n=22.728	p-value
Sex			
Male	43.6 (42.0–45.2)	43.3 (42.3–44.4)	0.767
Female	56.4 (54.8–58.0)	56.7 (55.6–57.7)	
Age group (years)			
60–64	31.9 (30.4–33.5)	31.1 (30.1–32.1)	0.835
65–69	24.5 (23.2–25.9)	25.2 (24.3–26.2)	
70–74	18.3 (17.1–19.6)	18.1 (17.3–18.9)	
75–79	11.7 (10.7–12.7)	12.0 (11.4–12.8)	
≥80	13.6 (12.6–14.8)	13.6 (12.8–14.3)	
Education			
Incomplete primary	64.1 (62.0–66.1)	63.3 (62.1–64.4)	0.511
Complete primary	9.9 (8.8–11.1)	9.5 (8.9–10.2)	
Complete secondary	14.6 (13.4–15.9)	15.9 (15.0–16.8)	
Higher education	11.5 (10.1–13.1)	11.3 (10.5–12.1)	

Race/skin color			
White	54.5 (52.7–56.2)	51.4 (50.3–52.6)	0.012
Brown	36.2 (34.6–37.8)	38.1 (37.0–39.2)	
Black	9.4 (8.4–10.4)	10.5 (9.8–11.2)	
Marital status			
Without partner	42.6 (41.1–44.2)	49.3 (48.2–50.5)	<0.001
With partner	57.4 (55.8–58.9)	50.7 (49.5–51.8)	
Multimorbidity			
No (0–1 disease)	43.1 (41.6–44.7)	41.3 (40.2–42.4)	0.052
Yes (≥ 2 diseases)	56.9 (55.3–58.4)	58.7 (57.6–59.8)	
Functional disability (BADL)			
	<0.001		
No	84.5 (83.4–85.6)	79.4 (78.5–80.3)	<0.001
Yes	15.5 (14.4–16.6)	20.6 (19.7–21.5)	
Functional disability (IADL)			
	<0.001		
No	72.0 (70.6–73.4)	67.8 (66.8–68.8)	<0.001
Yes	28.0 (26.6–29.4)	32.2 (31.2–33.2)	

95% CI: 95% confidence interval; BADL: Basic Activities of Daily Living; IADL: Instrumental Activities of Daily Living.

Note: Percentages based on the weighted sample.

Table 1 also presents the distribution of multimorbidity and functional disability across the two periods analyzed. The prevalence of multimorbidity was high in both years, reaching 56.9% in 2013 and 58.7% in 2019, with no statistically significant difference over time ($p=0.052$), although showing an increasing trend. Regarding functional disability, a significant increase was observed in

limitations in basic activities of daily living (BADL), rising from 15.5% in 2013 to 20.6% in 2019. Similarly, limitations in instrumental activities of daily living (IADL) increased from 28.0% to 32.2% over the same period.

The multivariable analysis shows that multimorbidity was associated with a higher prevalence of functional disability for both outcomes. For BADL, individuals with two or more chronic conditions had a prevalence ratio of 2.00 (95%CI: 1.66–2.42), whereas for IADL the prevalence

ratio was 1.38 (95%CI: 1.22–1.55) (Tables 2 and 3). Additionally, an increase in functional disability was observed in 2019 compared to 2013, independent of multimorbidity and the covariates included in the model. The prevalence ratio for BADL was 1.36 (95%CI: 1.15–1.63), while for IADL it was 1.17 (95%CI: 1.04–1.31) (Tables 2 and 3).

Table 2. Association between multimorbidity and disability in basic activities of daily living (BADL), Brazil, 2013 and 2019.

Variables	BADL PR	95% CI	p-value
Multimorbidity (≥ 2 diseases)	2.00	1.66–2.42	<0.001
Year (2019 vs 2013)	1.36	1.15–1.63	<0.001
Interaction (multimorbidity $\times$ year)	1.04	0.84–1.29	0.702
Sex (female)	1.09	1.00–1.18	0.049
Age group (years)			
65–69	1.15	1.01–1.31	0.039
70–74	1.44	1.25–1.64	<0.001
75–79	1.69	1.48–1.94	<0.001
≥ 80	2.73	2.42–3.07	<0.001
Education			
Complete primary	0.82	0.72–0.95	0.006

Complete secondary	0.62	0.54–0.71	<0.001
Higher education	0.49	0.41–0.58	<0.001
Race/skin color			
Brown	1.00	0.92–1.09	0.989
Black	1.00	0.89–1.14	0.966
Marital status (with partner)	0.86	0.79–0.94	<0.001

95% CI: 95% confidence interval; BADL: Basic Activities of Daily Living; IADL: Instrumental Activities of Daily Living.

Note: Percentages based on the weighted sample

Table 3. Association between multimorbidity and disability in instrumental activities of daily living (IADL). Brazil, 2013 and 2019.

Variable	IADL PR	95% CI	p-value
Multimorbidity (≥ 2 diseases)	1.38	1.22–1.55	<0.001
Year (2019 vs 2013)	1.17	1.04–1.31	0.009
Interaction (multimorbidity $\times$ year)	1.11	0.97–1.27	0.144
Sex (female)	1.24	1.16–1.32	<0.001
Age group (years)			
65–69	1.32	1.20–1.46	<0.001
70–74	1.84	1.67–2.03	<0.001
75–79	2.38	2.15–2.62	<0.001
≥ 80	3.56	3.27–3.87	<0.001
Education			
Complete primary	0.73	0.66–0.81	<0.001
Complete secondary	0.55	0.50–0.61	<0.001
Higher education	0.37	0.32–0.42	<0.001
Race/skin color			
Brown	1.05	0.99–1.11	0.133
Black	1.02	0.93–1.10	0.710
Marital status (with partner)	0.86	0.81–0.92	<0.001

95% CI: 95% confidence interval; PR: Prevalence Ratio adjusted; BADL: Basic Activities of Daily Living.

Note: Poisson regression model, accounting for the complex sampling design.

The inclusion of an interaction term between multimorbidity and survey year did not show a statistically significant modification of the association over time, for both BADL (PR=1.04; 95%CI: 0.84–1.29; $p=0.702$) and IADL (PR=1.11; 95%CI: 0.97–1.27; $p=0.144$) (Tables 2 and 3).

Regarding sociodemographic characteristics, a consistent age gradient was observed for both outcomes. Female sex was associated with a higher prevalence of functional disability,

with a more pronounced effect for IADL. By age group, individuals aged 80 years or older presented a prevalence ratio of 2.73 (95%CI: 2.42–3.07) for BADL, while for instrumental activities this association was more pronounced (PR=3.56; 95%CI: 3.27–3.87). Education showed an inverse association with functional disability, with greater magnitude for IADL, whereas having a partner was associated with a lower prevalence of disability for both outcomes (Tables 2 and 3).

To allow direct comparison between functional domains, the estimates from the final multivariable models for BADL and IADL are

presented jointly in Table 4. Overall, multimorbidity showed a consistent association with both outcomes, but with greater magnitude for limitations in basic activities of daily living. In contrast, sociodemographic factors, particularly age, sex, and education, showed more pronounced effects on limitations in instrumental activities, highlighting the greater sensitivity of this domain to social inequalities. Additionally, the temporal increase in functional disability was observed in both outcomes, with greater intensity for BADL, suggesting a relative worsening of more severe forms of functional limitation over the analyzed period.

Table 4. Comparison of adjusted models for BADL and IADL.

Variável	BADL PR (95% CI)	IADL PR (95% CI)
Multimorbidity	2.00 (1.66–2.42)	1.38 (1.22–1.55)
Year (2019)	1.36 (1.15–1.63)	1.17 (1.04–1.31)
Female sex	1.09 (1.00–1.18)	1.24 (1.16–1.32)
Age ≥80 years	2.73 (2.42–3.07)	3.56 (3.27–3.87)
Higher education	0.49 (0.41–0.58)	0.37 (0.32–0.42)

95% CI: 95% confidence interval; PR: Prevalence Ratio adjusted; BADL: Basic Activities of Daily Living; IADL: Instrumental Activities of Daily Living.

Note: Models adjusted for sex, age, education, race/skin color, and marital status, estimated using Poisson regression with robust variance, accounting for the complex sampling design of the National Health Survey.

DISCUSSION

This study, based on nationally representative data of the Brazilian older adult population, demonstrated a consistent association between multimorbidity and functional disability, with greater magnitude for basic activities of daily living (BADL) compared to instrumental activities of daily living (IADL). A significant increase in the prevalence of functional disability was also observed between 2013 and 2019, independent of multimorbidity, in addition to important sociodemographic inequalities associated with the outcomes.

The association between multimorbidity and functional disability is widely recognized in the contemporary literature and is considered one of the main challenges for healthy aging at the global level. Recent evidence indicates that multimorbidity not only increases the risk of functional decline but also accelerates progression to more advanced states of dependence through complex mechanisms, including systemic inflammation, frailty, reduced physiological reserve, and medication interactions.^{20,21} Furthermore, longitudinal studies have shown that different patterns and trajectories of multimorbidity exert heterogeneous

impacts on functionality, reinforcing the need for more integrated and person-centered approaches.^{6,7,22}

The greater magnitude of the association with BADL may be interpreted as indicative of more advanced stages of functional impairment, in which the accumulated burden of diseases exerts a more direct impact on autonomy. In contrast, IADL, due to their greater dependence on contextual and environmental factors, tend to be more sensitive to social determinants, which may explain the lower magnitude of the association with multimorbidity observed in this study.^{23,24}

The increase in the prevalence of functional disability observed between 2013 and 2019, independent of multimorbidity, suggests the influence of broader structural factors, including demographic changes, persistent social inequalities, and limitations in the capacity of health systems to respond to the demands of population aging. Global evidence indicates that although life expectancy has increased in recent decades, this gain is not always accompanied by proportional improvements in functional capacity, resulting in an expansion of time lived with disability.^{25,26} In the Brazilian context, recent studies point to the persistence of socioeconomic inequalities in health, with a direct impact on functionality and autonomy in older age.^{16,27,28}

The absence of a significant interaction between multimorbidity and survey year suggests stability in the magnitude of the association

over the analyzed period. This finding is consistent with longitudinal studies demonstrating that, although the prevalence of multimorbidity is increasing, its relative impact on functionality remains relatively constant.²⁹ Thus, the increase in functional disability may be more related to greater population exposure to risk factors and structural population aging than to changes in the strength of the association between multimorbidity and disability.

Our findings also highlight the importance of social determinants of health in the distribution of functional disability. The gradient observed according to age, sex, and education is consistent with the healthy aging model proposed by the World Health Organization,³⁰ which emphasizes the interaction between intrinsic capacity and the environment across the life course. The higher prevalence of disability among women, for example, has been attributed to greater longevity, a higher burden of non-fatal chronic diseases, and accumulated social inequalities over the life course.²⁴ Similarly, the inverse association between education and functional disability, particularly more pronounced for IADL, reinforces the role of socioeconomic factors in maintaining autonomy, especially in activities that require greater interaction with the environment.

The comparative analysis between BADL and IADL reinforces the need to consider functionality as a multidimensional construct. Recent evidence suggests that different functional domains may respond differently to clinical and social factors, which has direct implications for the planning of interventions and public policies.²³ In this context, strategies focused exclusively on the control of chronic diseases may be insufficient to preserve functionality, requiring the incorporation of intersectoral approaches that include rehabilitation,

social support, and the reduction of inequalities.

From a public policy perspective, the findings reinforce the need to strengthen integrated models of care centered on functionality rather than solely on the presence of diseases. Primary health care plays a fundamental role in this context, particularly in coordinating care for individuals with multimorbidity and implementing strategies to prevent functional decline. Additionally, policies aligned with the Decade of Healthy Ageing (2021–2030) emphasize the importance of interventions that promote environments conducive to maintaining autonomy and social participation among older adults.³¹

This study has limitations that should be considered. First, the cross-sectional design, although based on repeated national surveys, does not allow for the establishment of temporal or causal relationships between multimorbidity and func-

tional disability, limiting inferences to the identification of associations. Furthermore, the comparison between 2013 and 2019 does not involve longitudinal follow-up of the same individuals and may partly reflect changes in the sociodemographic composition of the older population over time. Second, information on chronic diseases and functional limitations is self-reported and subject to recall, diagnostic, and reporting bias, particularly among individuals with lower education levels or cognitive impairment. In addition, the definition of multimorbidity based on disease counts does not capture aspects such as severity, duration, or patterns of co-occurrence, which may differentially influence functionality. Potential survival bias should also be considered, as individuals with a higher burden of disease and more severe disability may be underrepresented in the sample. Nevertheless, the use of nationally representative

data, combined with appropriate analytical methods, provides robustness and high external validity to the findings.

CONCLUSION

Multimorbidity showed a consistent association with functional disability among Brazilian older adults, with greater magnitude for limitations in basic activities of daily living. The increase in the prevalence of functional disability between 2013 and 2019, independent of multimorbidity, suggests the contribution of additional contextual factors. The differences observed between BADL and IADL indicate that distinct dimensions of functionality are differentially associated with clinical and sociodemographic factors, reinforcing the complexity of the process of loss of autonomy in older age.

REFERENCES

1. World Health Organization. Ageing and health. Geneva: WHO; 2020
2. United Nations. World Population Ageing 2019. New York: UN; 2019.
3. Chatterji S, Byles J, Cutler D, Seeman T, Verdes E. Health, functioning, and disability in older adults--present status and future implications. *Lancet*. 2015;385(9967):563–575. [https://doi.org/10.1016/s0140-6736\(14\)61462-8](https://doi.org/10.1016/s0140-6736(14)61462-8)
4. Barnett K, Mercer SW, Norbury M, Watt G, Wyke S, Guthrie B. Epidemiology of multimorbidity and implications for health care, research, and medical education: a cross-sectional study. *Lancet*. 2012;380(9836):37–43. [https://doi.org/10.1016/s0140-6736\(12\)60240-2](https://doi.org/10.1016/s0140-6736(12)60240-2)
5. Calderón-Larrañaga A, Vetrano DL, Onder G, Gimeno-Feliu LA, Coscollar-Santaliestra C, Carfí A, et al. Assessing and Measuring Chronic Multimorbidity in the Older Population: A Proposal for Its Operationalization. *J Gerontol A Biol Sci Med Sci* 2017; 72(10):1417–1423. <https://doi.org/10.1093/geronaglw233>
6. Ho IS-S, Azcoaga-Lorenzo A, Akbari A, et al. Examining patterns of multimorbidity, polypharmacy and risk of adverse drug reactions in chronic obstructive pulmonary disease: a cross-sectional UK Biobank study. *BMJ Open*. 2018;14;8(1):e018404. <https://doi.org/10.1136/bmjopen-2017-018404>
7. Xu X, Mishra GD, Jones M. Evidence on multimorbidity from definition to intervention: An overview of systematic reviews. *Ageing Res Rev* 2017; 37:53–68. <https://doi.org/10.1016/j.arr.2017.05.003>
8. Crimmins EM, Beltrán-Sánchez H. Mortality and morbidity trends: is there compression of morbidity?. *J Gerontol B Psychol Sci Soc Sci* 2011;66(1):75–86. <https://doi.org/10.1093/geronb/gbq088>
9. Katz S, Ford AB, Moskowitz RW, et al. Studies of illness in the aged. The index of adl: a standardized measure of biological and psychosocial function. *JAMA*. 1963;185:914–919. <https://doi.org/10.1001/jama.1963.03060120024016>
10. Lawton MP, Brody EM. Assessment of older people: self-maintaining and instrumental activities of daily living.

Gerontologist. 1969;9(3):179–186. http://dx.doi.org/10.1093/geront/9.3_Part_1.179

11. Verbrugge LM, Jette AM. The disablement process. *Soc Sci Med*. 1994;38(1):1–14. [https://doi.org/10.1016/0277-9536\(94\)90294-1](https://doi.org/10.1016/0277-9536(94)90294-1)

12. Stuck AE, Walthert JM, Nikolaus T, Bula CJ, Hohmann C, Beck JC. Risk factors for functional status decline in community-living elderly people: a systematic literature review. *Soc Sci Med*. 1999;48(4):445–469. [https://doi.org/10.1016/S0277-9536\(98\)00370-0](https://doi.org/10.1016/S0277-9536(98)00370-0) Vetrano DL, Palmer K, Marengoni A, Marzetti E, Lattanzio F, Roller-Wirnsberger R, et al. Frailty and Multimorbidity: A Systematic Review and Meta-analysis. *J Gerontol A Biol Sci Med Sci* 2019; 74(5):659–666. <https://doi.org/10.1093/gerona/gly110>

13. 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>

14. Malta DC, Bernal RTI, Souza MFM, Szwarcwald CL, Lima MG, Barros MBA. Social inequalities in the prevalence of self-reported chronic non-communicable diseases in Brazil: national health survey 2013. *Int J Equity Health* 2016; 15(1):153. <https://doi.org/10.1186/s12939-016-0427-4>

15. Souza-Júnior PRB, Freitas MPS, Antonaci GA, Szwarcwald CL. Desenho da amostra da Pesquisa Nacional de Saúde 2013. *Epidemiol Serv Saude*. 2015;24(2):207–2016. <https://doi.org/10.5123/S1679-49742015000200003>

16. Nunes BP, Batista SRR, Andrade FB, et al. Multimorbidade em indivíduos com 50 anos ou mais de idade: ELSI-Brazil. *Rev Saude Publica*. 2018;52(Suppl 2):10s. <https://doi.org/10.11606/S1518-8787.2018052000637>

17. Stringhini S, Carmeli C, Jokela M, Avendaño M, Muennig P, Guida F, et al. Socioeconomic status and the 25 × 25 risk factors as determinants of premature mortality: a multicohort study and meta-analysis of 1·7 million men and women. *Lancet*. 2017;389(10075):1229–1237. [https://doi.org/10.1016/S0140-6736\(16\)32380-7](https://doi.org/10.1016/S0140-6736(16)32380-7)

18. 6736(16)32380-7

19. Beard JR, Officer A, de Carvalho IA, Sadana R, Pot AM, Michel JP, et al. The World report on ageing and health: a policy framework for healthy ageing. *Lancet*. 2016;387(10033):2145–2154. [https://doi.org/10.1016/S0140-6736\(15\)00516-4](https://doi.org/10.1016/S0140-6736(15)00516-4)

20. Nguyen H, Manolova G, Daskalopoulou C, Vitoratou S, Prince M, Prina AM. Prevalence of multimorbidity in community settings: A systematic review and meta-analysis of observational studies. *J Comorb* 2019;4(12):e627–e637. <https://doi.org/10.1177/2235042x19870934>

21. Stirland LE, González-Saavedra L, Mullin DS, et al. Measuring multimorbidity beyond counting diseases: systematic review of community and population studies and guide to index choice. *BMJ* 2020. <https://doi.org/10.1136/bmj.m160>

22. Wu Y, Niu X, Lv B, Li X, Wang W, Feng W, et al. The impacts of multimorbidity trajectories and patterns on functional limitations over time in middle-aged and older adults. *Archives of Gerontology and Geriatrics*. 2025;137:105919. <https://doi.org/10.1016/j.archger.2025.105919>

23. Fong JH, Feng J. Patterns of Functional Disability in the Oldest Adults in China. *J Am Geriatr Soc* 2016; 64(9):1890–4. <https://doi.org/10.1111/jgs.14264>

24. Cieza A, Causey K, Kamenov K, et al. Global estimates of the need for rehabilitation based on the Global Burden of Disease study 2019: a systematic analysis for the Global Burden of Disease Study 2019. *Lancet*. 2021; 396(10267):2006–2017. [https://doi.org/10.1016/S0140-6736\(20\)32340-0](https://doi.org/10.1016/S0140-6736(20)32340-0)

25. Naghavi M, Ong KL, Aali A, Ababneh HS, Abate YH, Abbafati C, et al. Global burden of 288 causes of death and life expectancy decomposition in 204 countries and territories and 811 subnational locations, 1990–2021: a systematic analysis for the Global Burden of Disease Study 2021. *Lancet* 2024;403(10440):2100. [https://doi.org/10.1016/S0140-6736\(24\)00367-2](https://doi.org/10.1016/S0140-6736(24)00367-2)

26. Vos T, Lim SS, Abbafati C, Abbas KM, Abbasi M, Abbasifard M, et al. Global burden of 369 diseases and injuries in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019. *Lancet*. 2020;396(10258):1204–1222. [https://doi.org/10.1016/S0140-6736\(20\)30925-9](https://doi.org/10.1016/S0140-6736(20)30925-9)

27. Lima-Costa MF, De Oliveira C, Macinko J, et al. Socioeconomic inequalities in health in older adults in Brazil and England. *Am J Public Health*. 2012;102(8):1535–1541. <https://doi.org/10.2105/AJPH.2012.300765>

28. Schmidt TP, Wagner KJP, Schneider IJC, Danielewicz AL. Multimorbidity patterns and functional disability in elderly Brazilians: a cross-sectional study with data from the Brazilian National Health Survey. *Cadernos de Saúde Pública*. 2020;36(11):e00241619. <https://doi.org/10.1590/0102-311x00241619>

29. Ryan A, Wallace E, O'Hara P, Smith SM. Multimorbidity and functional decline in community-dwelling adults: a systematic review. *Health Qual Life Outcomes* 2015;13:168. <https://doi.org/10.1186/s12955-015-0355-9>

30. World Health Organization. World report on ageing and health. Geneva: WHO; 2015.

31. World Health Organization. Decade of Healthy Ageing 2021–2030. Geneva: WHO; 2021.