JHGD
Journal of Human Growth and Development

www. jhgd.com.br

ORIGINAL ARTICLE

Multimorbidity: associated factors and use of emergency services, in the city of Vitória, Brazil

Camila Rocha Ataide Quaresma[a], Ana Paula Santana Coelho Almeida[b], Leonardo Ferreira Fontenelle[c], Welington Serra Lazarini[d], Thiago Dias Sarti[e]

Open acess

[a] Núcleo de Estudos em Atenção Primária à Saúde, Programa de Pós-graduação em Saúde Coletiva, Universidade Federal do Espírito Santo, Vitória, ES, Brasil;

[b] Núcleo de Estudos em Atenção Primária à Saúde, Programa de Pós-graduação em Saúde Coletiva, Universidade Federal do Espírito Santo, Vitória, ES, Brasil;

[c] Departamento de Saúde Coletiva, Centro de Ciências da Saúde, Universidade Federal do Espírito Santo, Vitória, ES, Brasil;

[d] Departamento de Enfermagem, Centro de Ciências da Saúde, Universidade Federal do Espírito Santo, Vitória, ES, Brasil;

[e] Núcleo de Estudos em Atenção Primária à Saúde, Programa de Pós-graduação em Saúde Coletiva, Universidade Federal do Espírito Santo, Vitória, ES, Brasil;

Corresponding author
tdsarti@gmail.com

Manuscript received: may 2025
Manuscript accepted: july 2025
Version of record online: august 2025

ORCID authors:
[a] ORCID: 0000-0002-0928-1940;
[b] ORCID: 0000-0001-5808-5818;
[c] ORCID: 0000-0003-4064-433X;
[d] ORCID: 0000-0003-2798-7223;
[e] ORCID: 0000-0002-1545-6276;

Abstract

Introduction: most studies on multimorbidity prevalence are conducted in community settings or within primary care in high-income countries. Research in emergency services, particularly in low- and middle-income countries, is scarce.

Objective: analyze multimorbidity in patients treated at an emergency care unit in the municipality of Vitória, Espírito Santo, Brazil, in the year 2019.

Methods: this cross-sectional study involved 1,177 individuals aged 18 years or older who were treated at an emergency care unit in Vitória, Espírito Santo, Brazil. Participants were randomly selected over a 30-day period in 2019. Structured interviews were conducted, and statistical analyzes included descriptive statistics, bivariate analyses, and Poisson regression.

Results: multimorbidity prevalence was 45.5% (≥2 chronic conditions), significantly associated with sex (Prevalence Ratio [PR] in male = 0.6; 95% CI: 0.5–0.7; p < 0.001), age (PR in ≥60 years = 2.4; 95% CI: 1.9–3.0; p < 0.001), and self-rated health (PR in “good/excellent” = 0.7; 95% CI: 0.6–0.8; Over 80% of participants used emergency services in the previous year. Multimorbidity was significantly associated with any use of emergency services (PR = 1.3; 95% CI: 1.1–1.5; p = 0.007) and frequent use (≥5 visits per year) (PR = 1.5; 95% CI: 1.2–1.8; p < 0.001) in the last year.

Conclusion: among users of emergency services, the prevalence of multimorbidity and previous use of this type of service is high. These findings reinforce the idea that disease burden is a key factor in understanding how people use health services.

Keywords: multimorbidity, emergency services, health services accessibility, public health services, cross-sectional study.

Suggested citation: Quaresma CRA, Almeida APSC, Fontenelle LF, Lazarini WS, Sarti TD. Multimorbidity: associated factors and use of emergency services, in the city of Vitória, Brazil. *J Hum Growth Dev. 2025; 35(2):333-345.* DOI: http://doi.org/10.36311/jhgd.v35. 17362

Authors summary

Why was this study done?
Multimorbidity is a serious public health problem. Despite all the efforts undertaken in recent decades, the prevalence of multimorbidity is increasing globally . Estimates of multimorbidity prevalence vary greatly depending on the methodological choices made by researchers. Most often, multimorbidity prevalence studies have been conducted in community settings or primary care settings in high-income countries. Studies conducted in emergency departments are scarce, especially in low- and middle-income countries, although these studies are important for guiding improvements in care delivery.

What did the researchers do and find?
The researchers conducted a cross-sectional study in an emergency care (ER) department in the municipality of Vitória, Espírito Santo, with individuals aged 18 or older who used the service within a 30-day period. A total of 1,177 people were interviewed using a structured and standardized questionnaire. Descriptive and bivariate statistical analyses, as well as Poisson regression, were used. A high prevalence of multimorbidity was found (45.5% with ≥2 chronic conditions), which was significantly associated, after multivariate analysis, with sex (higher in women), age group (increasing with age), and negative self-rated health. Furthermore, high use of emergency services was identified among the study participants (more than 80% of whom had used an ER in the last year). Multimorbidity is an important factor related not only to the use, but also to the frequent use of emergency services.

What do these findings mean?
The finding that, among emergency service users, the prevalence of multimorbidity and prior use of this type of service is high reinforces the idea that disease burden is a fundamental factor in understanding how people use health services. The results of this study should alert managers and other stakeholders responsible for organizing and providing health services to the need to improve Primary Health Care, establish effective care coordination mechanisms within the care network, and equip emergency services with the capacity to adequately manage a population with a high prevalence of multimorbidity .

INTRODUCTION

Population aging and the gradual increase in the prevalence of chronic noncom-municable diseases, including mental disorders, are challenges faced globally[1]. One of the most relevant consequences of this scenario for the field of global public health is multimorbidity, defined as the coexistence of two or more chronic health problems[2]. Despite all the efforts undertaken in recent decades, the prevalence of multimorbidity continues to rise globally, with different rates between countries, and is particularly significant in low- and middle-income nations, such as Brazil[2-5].

Multimorbidity is associated with several negative outcomes that affect people's quality of life and health systems and services[2,4]. People with multimorbidity are more likely to experience a decline in physical and mental functioning, engage in polypharmacy, and increase the use of health services (including emergency and ur-gent care services) with consequent hospitalizations, resulting in increased health care costs and premature mortality[2,4].

However, health services, especially in developing countries, remain unprepared to deal with this condition, offering fragmented, non-comprehensive care focused on acute conditions or chronic diseases treated in isolation[2,4,6]. This situation is even more critical among people in situations of greater social vulnerability, which leads to worse health outcomes for the poorest and least educated[4].

Low- and middle-income countries, such as Brazil, face a significant impact on their health systems due to multimorbidity. However, studies on this condition in these countries remain scarce compared to those conducted in high-income countries[2,4,7]. This gap also extends to research on the profile of people with multimorbidity who use health services, including emergency services. Studies estimating the prevalence of multimorbidity and its associated factors in this care context are scarce.

Estimates of the prevalence of multimorbidity vary considerably, depending on the methodological decisions adopted by researchers, the definition of multimorbidity used, the methodology applied, the data source, the observation time and the setting analyzed (e.g., general population, primary health care - PHC, among others)[7,8].

In general, previous studies show that multimorbidity is more common in older people, women, people with lower levels of education, and those living in areas with greater degrees of social deprivation[9-11]. However, most of these studies were con-ducted in community settings or in primary care settings in high-income countries[11].

Studies carried out with people seeking emergency services[8-10], either to assess the prevalence of multimorbidity in this population or to identify the factors associat-ed with this condition, are scarce and, in general, aimed at very specific population groups, such as homeless people[12], or elderly people undergoing surgical emergencies[13].

Studies carried out with general users of emergency services are important, among other reasons, to gain insight into the daily care offered by emergency services and to outline comprehensive care interventions aimed at these people[14,15].

These interventions may include professional training, structural and organiza-tional adaptations, development or adaptations of clinical protocols and health care models, and creation of risk stratification tools based on clinical data capable of sup-porting decision-making[7].

Thus, this study aims to analyze multimorbidity in users treated at an emergency care unit in the city of Vitoria, Espírito Santo, Brazil, in 2019.

METHODS

Study design and context

This is a cross-sectional study conducted at the Praia do Suá Emergency Room (ER), a strategic unit of the emergency care network of Vitória, Espírito Santo. This service was selected because it is: (a) the main ER in the municipality, responsible for the largest volume of patients; (b) located in a central area with high geographic accessibility, a characteristic that favors the capture of a

heterogeneous sample (including different socioeconomic and age profiles). Data collection took place between November 17 and December 18, 2019, and included all patients ≥18 years of age treated during this period.

Study scenario

The municipality of Vitória-ES is located in the Southeast region of Brazil, has 322,869 inhabitants (IBGE data from 2022)[16], Human Development Index of 0.845 (highest in the state and 4th highest in the country, according to IBGE data from 2010) and infant mortality rate of 10.88 deaths per thousand live births (IBGE data from 2022)[16].

The local public health system offers a wide range of basic and specialized services, including two emergency units, and is fully computerized. One of the units, which served as the research setting, is managed by the municipality itself, serves an average of 10,000 people per month, operates 24 hours a day, is part of the state regulatory system, organizes its work processes based on patient clinical risk stratification, and serves as a gateway for adult and pediatric clinical care, low-complexity medical and surgical care, and emergency dental care.

Sampling

Through random randomization, individuals aged 18 years or older who underwent the clinical risk stratification process in the ER were included during all emergency room shifts included in the study. Data collection took place during the 30 days of the research.

The sample size calculation was based on the 24.2% prevalence of inappropriate emergency room use reported by Carret *et al.,*[17], who applied the same criteria for inappropriate emergency room use used in this study. The definition of a 30-day data collection period follows methodological recommendations for studies on emergency service use[17], as it allows capturing the variability in use patterns across different days of the week and shifts (such as business days vs. weekends and daytime vs. nighttime), essential for the temporal representativeness of the sample. Data collection was conducted stratified over the 30 days, ensuring that the minimum sample size was reached regardless of the study duration.

The sample calculation parameters were ±2.5 percentage points of estimate error, 95% confidence level, 80% power, exposed/unexposed ratio of 0.2, percentage of the outcome in unexposed individuals of 20%, minimum prevalence ratio of 1.5 and an increase of 10% for losses and/or refusals, requiring 1,219 individuals (1,285 for the study of the proposed associations).

Data collection

The research subjects were interviewed privately in the ER itself, immediately after their initial consultation in the risk stratification sector, by selected and trained interviewees over 18 years of age with a degree in healthcare. Interviewer training included mastery of the survey instrument, knowledge of the ER's structure and organization, and pilot testing of the questionnaire with five patients treated in the same ER as the research setting. The selection, training, and organization of the interviewers' work logistics were supervised by the study's principal investigators (APSCA, WSL, and TDS). Interviewers were organized into 12-hour shifts, working in pairs, covering the 24-hour daily operation of the service during the 30 days of fieldwork.

Research participants were invited to answer a structured questionnaire, developed by the research team, containing sociodemographic questions, details of the reason that resulted in the current search for the ER, therapeutic itinerary, previous use of health services, self-perception of health and reported comorbidities.

Data analysis

In the analysis of factors associated with multimorbidity, the dependent variable was measured by the following question: "At some point in your life, has a doctor ever told you that you have: (list of 26 morbidities)". Three definitions of multimorbidity were used in this study: presence of two or more chronic diseases in the same individual; three or more; and four or more 2 .

The list includes the following morbidities : asthma or bronchitis ; osteoporosis or weak bones , arthritis, osteoarthritis or rheumatism ; hypertension (high blood pressure) ; diabetes (low blood sugar) ; heart problems such as heart failure, weak heart, or enlarged heart; emphysema or COPD ; Parkinson's disease ; loss of kidney function ; prostate disease (for men); thyroid problems such as hypothyroidism or hyperthyroidism; glaucoma ; cataract ; Alzheimer's ; urinary or fecal incontinence ; angina ; stroke or stroke ; high cholesterol or fat in the blood ; epileptic seizures or convulsions ; depression ; stomach ulcer ; urinary tract infection ; flu or cold; and pneumonia .

The independent variables were: sex (male and female), self-reported skin color/ethnicity (White, Black, Mixed Race, Asian, and Indigenous), age (18–24, 25–34, 35–44, 45–54, 55–59, and ≥60 years), marital status (married, single, separated/divorced, and widowed), education in completed years of study (none, 1–4, 5–8, 9–11, and ≥11), economic classification according to the methodology of the Brazilian Association of Research Companies (A and B, C, D, and E) 18 , self-rated health (very poor/bad, fair, and good/excellent), smoking (yes and no), alcohol consumption (never, monthly or less than once a month, twice or more times a month), and affiliation with a health service ("There is a doctor/nurse you usually go to when you are sick or need advice about your own health?").

In the analysis of the association between multimorbidity and previous use of EDs, this was measured by the number of times the individual reported having used an emergency room in the 12 months prior to the interview. Previous use of EDs was treated dichotomously (yes = 'once or more' and no = 'none') and in four categories (None, 1–2, 3–4, and ≥ 5).

A descriptive analysis was performed, calculating prevalence rates and their respective confidence intervals. The chi- square test was used for bivariate analysis, and the chi- square test for linear trend was used for ordinal independent variables. Poisson regression was used in the analyses to obtain crude and adjusted prevalence ratios and their respective p -values, with multimorbidity

as the outcome defined as the presence of two or more morbidities.

To assess factors associated with multimorbidity (two or more), the model was adjusted for all variables simultaneously (sex, age, skin color/ethnicity, marital status, education, economic class, and self-rated health). The analysis between multimorbidity and prior use of BP was adjusted for the following variables: sex, age, skin color, marital status, and economic class, in order to eliminate the effect of potential confounding variables.

The p-values of the variables in the adjusted analyses were obtained using the Wald test. Associations with $p < 0.05$ were considered statistically significant. The analyses were performed using Stata software. version 12.1 (Stata Corp LLC, College Station, TX, US).

Ethical and legal aspects of research

The project was approved by the Research Ethics Committee of the Health Sciences Center of the Federal University of Espírito Santo (Opinion No. 3,433,979). Informed consent was obtained from all participants interviewed.

RESULTS

A total of 1,177 individuals were included in the study, and there were 8.4% losses and refusals. Most were female (n =732; 62.4%), brown (n =642; 55%), aged between 25 and 34 years (n =303; 25.7%), married (n =565; 48.2%), with nine to eleven years of education (n =562; 49.5%), and socioeconomic class C (n =665; 58.8%) (Table 1). The median age was 38.8 years (interquartile range: 18–87).

Table 1: Socioeconomic characteristics

Variable	n	%
Sex (n = 1.174)		
Masculine	442	37.6
Feminine	732	62.4
Skin color/ethnicity (n = 1.168)		
White	256	21.9
Black	244	20.9
Brown	642	55.0
Indigenous	11	0.9
Yellow	15	1.3
Age in complete years (n = 1.177)		
18–24	266	22.6
25–34	303	25.7
35–44	230	19.6
45–54	146	12.4
55–59	66	5.6
≥60	166	14.1
Marital status (n = 1.173)		
Married	565	48.2
Single	439	37.4
Separated/divorced	119	10.1
Widower	50	4.3
Education in complete years (n = 1.151)		
0–4	85	7.5
5–8	213	18.8
9–11	562	49.5
≥12	275	24.2
Economic classification (Abep) (n =1.132)		
A/B	327	28.9
W	665	58.7
OF	140	12.4

Note: Abep is the acronym for the Brazilian Association of Research Companies.

When asked how they rated their health, 522 (44.5%) rated it as good or excellent. Regarding the presence of multimorbidity's, 529 (45.5%) reported that at some point they had been diagnosed with two or more comorbidities. On the other hand, 35.4% (n = 416) reported being smokers, while 49.6% (n = 580) said they drink alcohol. And only 27.3% (n = 321) reported being linked to a doctor or nurse (Table 2).

Regarding emergency room care in the 12 months prior to the survey, 950 (82.3%) people reported having used this type of service. Among these, the majority used it once or twice (n = 418; 36.2%), highlighting the fact that almost a quarter of the sample had used it five or more times (Table 2).

Table 2: Self-assessment of health, reported multimorbidity's and consultations with the ER

Variable	n	%
Self-rated health (n = 1,172)		
Terrible/Bad	237	20.2
Regular	413	35.2
Good/Great	522	44.6
Chronic health problems (n = 1,162)		
0–1	633	54.5
≥2	529	45.5
≥3	302	26.0
≥4	178	15.3
Consultations in PA (n = 1,155)		
No record of PA consultations in the last 12 months	205	17.7
PA consultation record in the last 12 months	950	82.3
Number of ER consultations in the last year (n = 1,155)		
None	205	17.8
1–2	418	36.2
3–4	265	22.9
≥5	267	23.1

Note: PA is an abbreviation for emergency room.

In total, the subjects reported 21 diseases or comorbidities (Table 1). The most frequently reported were hypertension (n =284; 24.2%), asthma/bronchitis (n =261; 22.3%), high cholesterol (n =188; 16%), depression (n =171; 14.6%) and arthritis/arthrosis/rheumatism (n =133; 11.3%).

In the bivariate analysis of factors associated with multimorbidity , the following were statistically significant: sex (women have an almost three times higher prevalence of multimorbidity , considering four or more diseases), age group (a significant increase in the prevalence of multimorbidity is observed with increasing age), marital status (widowed people have a more than twice higher prevalence of multimorbidity , considering four or more diseases), education (a significant increase in the prevalence of multimorbidity is observed with the reduction in the number of years of study), social class (where classes C, D and E , which are more vulnerable from a social point of view, stand out with a higher prevalence of multimorbidity) and self-rated health status (in which the prevalence of multimorbidity is higher among those who evaluate their health status negatively) (Table 3).

Regarding the association between BP use in the last 12 months and the presence of multimorbidity, it was observed that among service users in the last year, 47.4% had at least two comorbidities, 26.7% had three or more comorbidities, and 16.3% reported four or more. Regarding the burden of BP use, a high prevalence of multimorbidity was observed even among those who did not use it, with a prevalence gradient in which the greater the BP use, the greater the prevalence of multimorbidity, reaching 53.3% of people with two or more comorbidities using the BP five or more times in one year (Table 3).

In the adjusted multivariate analysis between multimorbidity and associated factors, the associations with sex (> in women), age group (> with increasing age), and self-rated health status (< with better health status) remained significant (Table 4). Furthermore, in the adjusted multivariate analysis between multimorbidity and previous use of BP, we found that BP use in the last year and the intensity of use of this service are significantly associated with multimorbidity (Table 5).

Table 3: Factors associated with multimorbidity

Variable	2 or more		3 or more		4 or more	
	Prevalence (95% CI)	p -value	Prevalence (95% CI)	p -value	Prevalence (95% CI)	p -value
Sex		<0.001		<0.001		<0.001
Masculine	31.4 (28.7–34.1)		15.9 (13.9–18.2)		7.1 (3.6–6.8)	
Feminine	54.3 (51.4–57.2)		32.2 (29.6–35.0)		20.4 (18.1–22.9)	
Skin color/ Ethnicity		0.351		0.313		0.427
White	45.5 (42.5–48.3)		27.3 (24.7–30.0)		17.0 (14.9–19.3)	
Black	40.4 (37.5–43.3)		21.3 (18.9–23.7)		12.1 (10.2–14.1)	
Brown	47.2 (44.2–50.1)		27.2 (24.7–29.9)		15.7 (13.6–17.9)	
Indigenous/ Yellow	48.0 (45.1–50.9)		24.0 (21.6–26.6)		12.0 (10.1–14.0)	
Age range		<0.001*		<0.001*		<0.001*
18–24	32.4 (29.8–35.2)		11.1 (9.4–13.1)		5.0 (3.8–6.4)	
25–34	32.7 (30.0–35.5)		12.7 (10.8–14.7)		5.0 (3.8–6.4)	
35–44	39.5 (36.7–42.4)		20.6 (18.3–23.0)		11.0 (9.2–12.9)	
45–54	52.4 (49.5–55.3)		32.4 (29.8–35.2)		17.2 (15.1–19.5)	
55–59	67.2 (64.4–69.9)		51.6 (48.6–54.5)		32.8 (30.1–35.6)	
≥60	84.1 (81.5–86.1)		66.3 (63.5–69.0)		48.5 (45.5–51.4)	
Current marital status		<0.001		<0.001		<0.001
Married	46.5 (43.7–49.5)		28.0 (25.5–30.7)		17.1 (14.9–19.4)	
Single	37.9 (35.0–40.7)		16.6 (14.5–18.9)		9.0 (7.5–10.9)	
Separated/ Divorced	51.7 (48.8–54.6)		36.2 (33.4–39.1)		17.2 (15.1–19.5)	
Widower	86.0 (83.9–88.0)		62.0 (59.1–64.8)		46.0 (43.1–49.0)	
Education in completed years		<0.001*		<0.001*		<0.001*
0–4	73.2 (70.5–75.8)		53.6 (50.7–56.6)		38.4 (35.3–41.0)	
5–8	48.1 (45.2–51.1)		30.2 (27.5–33.0)		20.8 (18.4–23.2)	
9–11	40.8 (38.0–43.8)		20.5 (18.2–22.9)		10.3 (8.6–12.2)	
12 or more	40.5 (37.6–43.4)		20.8 (18.5–23.3)		9.5 (7.8–11.3)	
Economic classification (Abep)		0.010*		0.011*		<0.001*
A/B	37.1 (34.4–39.9)		19.9 (17.7–22.3)		8.9 (7.3–10.7)	
W	49.8 (47.0–52.6)		28.4 (25.7–31.1)		17.1 (15.0–19.5)	
OF	45.0 (42.2–47.8)		28.6 (25.9–31.3)		22.1 (19.7–24.7)	
Health self-assessment		<0.001*		<0.001*		<0.001*
Terrible/Bad	55.6 (52.7–58.5)		40.1 (37.2–43.0)		25.0 (22.6–27.6)	
Regular	58.0 (55.0–60.8)		32.0 (29.4–34.8)		21.5 (19.2–24.0)	
Good/Great	31.1 (28.5–33.9)		15.1 (13.1–17.3)		6.2 (4.9–7.8)	
Previous use PA (12 months)	47.4 (44.4–50.3)	0.007	26.7 (24.2–29.4)	0.231	16.3 (14.2–18.6)	0.076

Continuation - Table 3: Factors associated with multimorbidity

Variable	2 or more		3 or more		4 or more	
	Prevalence (95% CI)	p -value	Prevalence (95% CI)	p -value	Prevalence (95% CI)	p -value
PA consultations last year		<0.001*		0.013*		0.006*
None	37.0 (34.1–39.8)		22.7 (20.3–25.2)		11.3 (9.5–13.3)	
1–2	42.6 (39.7–4.5)		23.1 (20.7–25.7)		13.2 (11.3–15.3)	
3–4	49.2 (46.3–52.6)		28.6 (26.0–31.4)		18.7 (16.5–21.1)	
≥5	53.3 (50.3–56.2)		30.7 (28.0–33.4)		18.7 (16.5–21.1)	

Note: * χ2 linear trend, bivariate analysis. PA is an abbreviation for emergency care and ABEP is an acronym for the Brazilian Association of Research Companies.

Table 4: Prevalence ratio of multimorbidities

Variable	Gross analysis		Adjusted analysis*	
	RP (95% CI)	p -value	RP (95% CI)	p -value
Sex		<0.001		<0.001
Feminine	1		1	
Masculine	0.6 (0.5–0.7)	<0.001	0.6 (0.5–0.7)	<0.001
Skin color/Ethnicity		0.379		0.745
White	1		1	
Black	0.9 (0.7–1.1)	0.260	0.9 (0.8–1.1)	0.573
Brown	1.0 (0.9–1.2)	0.646	1.0 (0.9–1.2)	0.896
Indigenous/Yellow	1.1 (0.7–1.6)	0.804	1.0 (0.7–1.5)	0.845
Age range		<0.001		<0.001
18–24	1		1	
25–34	1.0 (0.8–1.3)	0.955	1.0 (0.8–1.3)	0.958
35–44	1.2 (1.0–1.5)	0.106	1.3 (1.0–1.6)	0.128
45–54	1.6 (1.3–2.0)	<0.000	1.6 (1.3–2.1)	<0.001
55–59	2.1 (1.6–2.6)	<0.000	1.9 (1.5–2.5)	<0.001
≥60	2.6 (2.1–3.1)	<0.000	2.4 (1.9–3.0)	<0.001
Current marital status		<0.001		0.731
Married	1		1	
Single	0.9 (0.7–0.9)	0.007	1.0 (0.9–1.1)	0.529
Separated/Divorced	1.1 (0.9–1.4)	0.292	0.9 (0.8–1.1)	0.648
Widower	1.8 (1.6–2.1)	0.000	1.0 (0.9–1.2)	0.478
Education in completed years		<0.001		0.327
0–4	1		1	
5–8	0.7 (0.5–0.8)	<0.000	0.9 (0.7–1.1)	0.334
9–11	0.6 (0.5–0.7)	<0.000	0.9 (0.8–1.1)	0.752
≥12	0.6 (0.5–0.7)	<0.000	1.0 (0.9–1.2)	0.474
Economic classification (Abep)		0.002		0.075
OF	1		1	
W	1.1 (0.9–1.3)	0.747	1.2 (1.0–1.5)	0.224
A/B	0.8 (0.7–1.0)	0.027	1.0 (0.8–1.3)	0.835
Health self-assessment		<0.001		<0.001
Good/Great	1		1	
Regular	1.9 (1.6–2.2)	<0.000	1.7 (1.5-2.0)	<0.001
Terrible/Bad	1.8 (1.5–2.1)	<0.000	1.5 (1.3-1.8)	<0.001

Note: * Mutually adjusted for all variables. ABEP stands for Brazilian Association of Research Companies, PR stands for prevalence ratio, and CI stands for confidence interval.

Table 5: Prevalence ratio according to use of PA

Variable	Gross analysis		Adjusted analysis*	
	RP (95% CI)	p -value	RP (95% CI)	p -value
Previous use	1.3 (1.1–1.6)	0.007	1.3 (1.1–1.5)	0.005
Consultations in PA in the last year		0.002		<0.001
None	1.0		1.0	
1–2	1.2 (0.9–1.4)	0.191	1.1(0.9–1.4)	0.220
3–4	1.3 (1.1–1.7)	0.010	1.4 (1.1–1.7)	0.002
≥5	1.4 (1.2–1.8)	0.001	1.5 (1.2–1.8)	<0.001

Note: * adjusted for sex, age, marital status, socioeconomic status, and education. PR stands for prevalence ratio, CI for confidence interval, and PA for emergency care.

Table 6: Frequency of reported comorbidities

Comorbidity	n	%
Hypertension	284	24.2
Asthma/bronchitis	261	22.3
High cholesterol	188	16.0
Depression	171	14.6
Arthritis, osteoarthritis or rheumatism	133	11.3
Angina	116	9.9
Diabetes	96	8.2
Thyroid problems	81	6.9
Urinary or fecal incontinence	72	6.1
Cataract	68	5.8
Heart problem	66	5.6
Osteoporosis	54	4.6
Ulcer	42	3.4
Loss of kidney function	32	2.7
Glaucoma	28	2.4
Cancer	23	2.0
Stroke	16	1.4
Seizure	15	1.3
Prostate disease	14	1,2
Pulmonary emphysema/COPD	13	1.1
Alzheimer	1	0.1

Note: COPD is an acronym for Chronic Obstructive Pulmonary Disease.

DISCUSSION

of this study show a high prevalence of multimorbidity (45.5% with ≥ 2 chronic conditions) among users of an emergency care (ER) service in a Brazilian state capital, being significantly associated, after multivariate analysis, with sex (higher in women), age group (increase with age) and negative self-rated health.

Furthermore, high use of emergency services was identified among study participants (interviewed during a consultation at the ER, it should be noted), highlighting that more than 80.0% of them had already used ER in the last year, with a quarter of people having used it five or more times, indicating that a portion of the population has this type of service as a usual source of health care, which is in agreement with national and international literature[19,20] .

In this sense, this study identified multimorbidity as an important factor related not only to the use, but also to the frequent use of emergency services. A dose-response relationship was observed between the intensity of previous emergency service use and the presence of multimorbidity, reinforcing the finding that individuals with a higher burden of chronic diseases are frequent users of this type of service[20,21,22]. Illustratively, people who used emergency services five or more times in the last year were 50.0% more likely to have multimorbidity.

These results echo global evidence but also highlight specific challenges facing health systems in low- and middle-income countries, such as Brazil, where fragmented care and social inequalities increase the impacts of multimorbidity[2,23]. Lack of coordination between different professionals and health services compromises the continuity and effectiveness of care for people with

multimorbidity[24,25]. In Brazil, patients are often treated by multiple specialists without adequate integration, which can lead to inadequate or even harmful treatment plans, especially in cases involving mental health. Furthermore, the fragility of a person-centered care model coordinated by PHC contributes to system inefficiency, increasing the use of disorganized, costly, and unsafe services[23-26].

The higher prevalence of multimorbidity in women, observed even after adjustments, is in line with international and national studies[27,28]. Women tend to have longer survival rates, greater awareness of signs and symptoms of illness, and greater demand for health services, factors that may explain the higher prevalence of cumulative diagnoses[29,30]. Furthermore, social determinants of health, such as double work shifts and reduced access to economic resources, contribute to the burden of chronic diseases in this group.

The strong association with advanced age reflects Brazil's accelerated population aging, which occurs against a backdrop of insufficiently prepared health services for the management of complex chronic conditions[31]. While high-income countries are implementing integrated care models for older adults, Brazil still faces gaps in coordination between primary care and specialized services, exacerbating the use of emergency rooms by this population. The 84.1% prevalence of multimorbidity in older adults reinforces the urgency of policies aimed at improving the capacity of the health care network to care for older adults.

Negative self-rated health was strongly associated with multimorbidity (PR=0.7 for 'good/excellent'), corroborating studies that identify it as an independent predictor of adverse clinical outcomes[32,33]. Individuals who perceive their health as poor tend to experience greater psychosocial stress and less engagement in healthy behaviors, worsening the course of chronic diseases. This finding reinforces the importance of including subjective measures of health in clinical assessment, as they capture dimensions not measurable by biomedical indicators, such as resilience and social support.

The association between multimorbidity and prior use of emergency services suggests significant challenges in implementing an effective model of care for chronic conditions in Brazil[34,35]. Qualified integration between primary and specialized care can reduce inappropriate use of emergency services by patients with multimorbidity[24-26].

However, in Brazil, the fragmentation and focus on acute illness care that still prevails in the health system, combined with insufficient coverage, access difficulties, and low resolution rates in PHC, may significantly contribute to this undesirable pattern of health service utilization. The perception of quick access to care and testing in emergency units also contributes to this dynamic. Furthermore, the low proportion of patients linked to a referral professional, as identified in this study, is noteworthy, indicating problems in the organization of the care network aimed at promoting longitudinal care, overloading the health system[36,37].

This finding is particularly worrying considering that the Brazilian primary care model is recognized as one of the most comprehensive among middle-income countries, but still suffers from underfunding, high turnover of professionals, and discontinuity in health policies[38]. The weak connection with a professional and the longitudinality of care also compromises the surveillance of chronic conditions and the coordination of care, leading to a vicious cycle of lack of care and reactive use of emergency services[21].

The burden of emergency room use is also linked to clinical complexity[2]. Conditions such as hypertension (24.2%), asthma/bronchitis (22.3%), and diabetes (8.2%) are often exacerbated by preventable factors, such as discontinued treatment and lack of follow-up by healthcare teams. In fragmented systems, these exacerbations ultimately lead to patients being referred to emergency rooms[2,4,9]. Furthermore, the high prevalence of depression and alcoholism in the sample suggests that mental disorders, often inadequately addressed in PHC, contribute to multimorbidity and recurrent emergency room use.

It is important to highlight the neglected role of mental disorders in the burden of chronic disease in Brazil[39,40]. The integration between mental health and primary care needs to be strengthened[41]. Collaborative care strategies, such as the presence of multidisciplinary teams in the territories, face operational and political challenges. Thus, the presence of disorders such as depression and anxiety, which could be addressed early, ends up compounding physical comorbidities, complicating management and increasing the demand for emergency services.

This study has limitations inherent to its cross-sectional design, which impedes causal inferences. Furthermore, the sample was restricted to a municipality with a high Human Development Index (HDI=0.845), limiting generalizability to poorer contexts. Using self-reported morbidity diagnosis may underestimate conditions not recognized by participants, although this approach is common in epidemiological studies. Nevertheless, the robustness of the multivariate analysis and the representativeness of the sample strengthen the internal validity of the results.

On the other hand, the findings of this study allow for some recommendations for improving public policies and directing future research in this area. Among these, we highlight the necessary strengthening of PHC, including expanding its coverage with a focus on case management, close monitoring of families, and health education for vulnerable populations. The integration of services into an effective care network that supports people with complex health problems should also be increased and improved. This includes implementing effective referral and counter-referral systems, combined with interoperable electronic medical records, to ensure continuity of care. In turn, emergency services, focused on immediate care for acute problems, can include protocols and strategies for identifying people with multimorbidity and low PHC engagement, adopting procedures for linking the care network to improve coordination and longitudinality of care.

Future studies should adopt longitudinal designs to explore the temporal relationship between multimorbidity and service use, in addition to evaluating evidence-based interventions such as collaborative care models and

telemonitoring. It is also recommended to explore regional variations, considering that territorial inequalities in Brazil profoundly impact access to and quality of health care.

CONCLUSION

Among emergency service users, the prevalence of multimorbidity and prior use of this type of service is high. These findings reinforce the idea that disease burden is a fundamental factor in understanding how people use health services. The results of this research should alert managers and other stakeholders responsible for organizing and providing health services to the need to improve Primary Health Care, establish effective care coordination mechanisms within the care network, and equip emergency services with the capacity to adequately manage a population with a high prevalence of multimorbidity .

Authors' contributions

All authors contributed equally to the completion of the manuscript.

Funding

Funded by the Universal Call MCTIC/CNPq nº28/2018 of the National Council for Scientific and Technological Development.

Conflicts of Interest

The authors declare no conflicts of interest.

REFERENCES

1. Chang AY, Skirbekk VF, Tyrovolas S, Kassebaum NJ, Dieleman JL. Measuring population ageing: an analysis of the Global Burden of Disease Study 2017. Lancet Public Health [Internet]. 2019 Mar;4(3):e159–67. Available from: http://dx.doi.org/10.1016/S2468-2667(19)30019-2
2. Skou ST, Mair FS, Fortin M, Guthrie B, Nunes BP, Miranda JJ, et al. Multimorbidity. Nat Rev Dis Primers [Internet]. 2022 Jul 14;8(1):48. Available from: http://dx.doi.org/10.1038/s41572-022-00376-4
3. Blarikom E, Fudge N, Swinglehurst D. The emergence of multimorbidity as a matter of concern: a critical review. Biosocieties [Internet]. 2023 Sep;18(3):614–31. Available from: http://dx.doi.org/10.1057/s41292-022-00285-5
4. Basto-Abreu A, Barrientos-Gutierrez T, Wade AN, Oliveira de Melo D, Semeão de Souza AS, Nunes BP, et al. Multimorbidity matters in low and middle-income countries. J Multimorb Comorb [Internet]. 2022 Jan;12:26335565221106074. Available from: http://dx.doi.org/10.1177/26335565221106074
5. Nunes BP, Batista SRR, Andrade FB de, Souza Junior PRB de, Lima-Costa MF, Facchini LA. Multimorbidity: The Brazilian longitudinal study of aging (ELSI-Brazil). Rev Saude Publica [Internet]. 2018 Oct 25;52Suppl 2(Suppl 2):10s. Available from: http://dx.doi.org/10.11606/S1518-8787.2018052000637
6. Schiøtz ML, Høst D, Christensen MB, Domínguez H, Hamid Y, Almind M, et al. Quality of care for people with multimorbidity - a case series. BMC Health Serv Res [Internet]. 2017 Nov 18;17(1):745. Available from: http://dx.doi.org/10.1186/s12913-017-2724-z
7. Huaquía-Díaz AM, Chalán-Dávila TS, Carrillo-Larco RM, Bernabe-Ortiz A. Multimorbidity in Latin America and the Caribbean: a systematic review and meta-analysis. BMJ Open [Internet]. 2021 Jul 23 [cited 2025 Aug 22];11(7):e050409. Available from: https://bmjopen.bmj.com/content/11/7/e050409.abstract
8. Willadsen TG, Bebe A, Køster-Rasmussen R, Jarbøl DE, Guassora AD, Waldorff FB, et al. The role of diseases, risk factors and symptoms in the definition of multimorbidity - a systematic review. Scandinavian journal of primary health care [Internet]. 2016 Jun;34(2). Available from: http://dx.doi.org/10.3109/02813432.2016.1153242
9. Abebe F, Schneider M, Asrat B, Ambaw F. Multimorbidity of chronic non-communicable diseases in low- and middle-income countries: A scoping review. J Comorb [Internet]. 2020 Jan;10:2235042X20961919. Available from: http://dx.doi.org/10.1177/2235042X20961919
10. Xu X, Mishra GD, Jones M. Evidence on multimorbidity from definition to intervention: An overview of systematic reviews. Ageing Res Rev [Internet]. 2017 Aug;37:53–68. Available from: http://dx.doi.org/10.1016/j.arr.2017.05.003
11. Pathirana TI, Jackson CA. Socioeconomic status and multimorbidity: a systematic review and meta-analysis. Aust N Z J Public Health [Internet]. 2018 Feb 14;42(2):186–94. Available from: http://dx.doi.org/10.1111/1753-6405.12762
12. Bowen M, Marwick S, Marshall T, Saunders K, Burwood S, Yahyouche A, et al. Multimorbidity and emergency department visits by a homeless population: a database study in specialist general practice. Br J Gen Pract [Internet]. 2019 Aug;69(685):e515–25. Available from: http://dx.doi.org/10.3399/bjgp19X704609
13. Hewitt J, McCormack C, Tay HS, Greig M, Law J, Tay A, et al. Prevalence of multimorbidity and its association with outcomes in older emergency general surgical patients: an observational study. BMJ Open [Internet]. 2016 Mar 31;6(3):e010126. Available from: http://dx.doi.org/10.1136/bmjopen-2015-010126

14. Fortin M, Stewart M, Poitras ME, Almirall J, Maddocks H. A systematic review of prevalence studies on multimorbidity: toward a more uniform methodology. Ann Fam Med [Internet]. 2012 Mar;10(2):142–51. Available from: http://dx.doi.org/10.1370/afm.1337
15. McParland C, Cooper MA, Lowe DJ, Stanley B, Johnston B. Multimorbidity, disease count, mortality and emergency care use in persons attending the emergency department: a cross-sectional data-linkage study. J Multimorb Comorb [Internet]. 2022 Jan;12:26335565221147417. Available from: http://dx.doi.org/10.1177/26335565221147417
16. Instituto Brasileiro de Geografia e Estatística. Vitória, ES [Internet]. Rio de Janeiro: IBGE; [Internet]. [cited 2025 Jul 28]. Available from: https://www.ibge.gov.br/
17. Carret MLV, Fassa AG, Kawachi I. Demand for emergency health service: factors associated with inappropriate use. BMC Health Serv Res. 2007 Aug 18;7(1):131. Available from: http://dx.doi.org/10.1186/1472-6963-7-131
18. ABEP: Associação Brasileira de Empresas de Pesquisa. Critério de Classificação Econômica Brasil [Internet]. [cited 2025 Aug 22]. Available from: https://abep.org/wp-content/uploads/2024/09/01_cceb_2024.pdf
19. Rodrigues MM, Sarti TD, Almeida APSC, Fontenelle LF, Lazarini WS. Uso de serviço de emergência por motivos não urgentes: estudo qualitativo com usuários de um pronto atendimento, Vitória, ES, Brasil, 2019. Interface [Internet]. 2024;28:e230493. Available from: http://dx.doi.org/10.1590/interface.230493
20. Giannouchos TV, Kum HC, Foster MJ, Ohsfeldt RL. Characteristics and predictors of adult frequent emergency department users in the United States: A systematic literature review. J Eval Clin Pract [Internet]. 2019 Jun;25(3):420–33. Available from: http://dx.doi.org/10.1111/jep.13137
21. Lamonato LCXL, Sarti TD, Almeida APSC. Effect of primary health care on the association between multimorbidity and emergency service utilization: National Health Survey, 2019. Rev Bras Epidemiol [Internet]. 2024 Dec 16;27:e240062. Available from: http://dx.doi.org/10.1590/1980-549720240062
22. Fisher KA, Griffith LE, Gruneir A, Upshur R, Perez R, Favotto L, et al. Effect of socio-demographic and health factors on the association between multimorbidity and acute care service use: population-based survey linked to health administrative data. BMC Health Serv Res. 2021; 21(1):62. [Internet]. [cited 2025 Aug 22]Available from: https://www.researchgate.net/publication/348438139_Effect_of_socio-demographic_and_health_factors_on_the_association_between_multimorbidity_and_acute_care_service_use_population-based_survey_linked_to_health_administrative_data
23. Aguiar RG de, Monteiro CN, Castro SS de, Figueiredo TKF, Goldbaum M, Cesar CLG. Multimorbidade e utilização de serviços de saúde no município de São Paulo, Brasil: prevalência e fatores associados. Cien Saude Colet [Internet]. 2024 Sep;29(9):e15002022. Available from: http://dx.doi.org/10.1590/1413-81232024299.15002022
24. Prior A, Vestergaard CH, Vedsted P, Smith SM, Virgilsen LF, Rasmussen LA, et al. Healthcare fragmentation, multimorbidity, potentially inappropriate medication, and mortality: a Danish nationwide cohort study. BMC Med [Internet]. 2023 Aug 15;21(1):305. Available from: http://dx.doi.org/10.1186/s12916-023-03021-3
25. Endalamaw A, Zewdie A, Wolka E, Assefa Y. Care models for individuals with chronic multimorbidity: lessons for low- and middle-income countries. BMC Health Serv Res [Internet]. 2024 Aug 5;24(1):895. Available from: http://dx.doi.org/10.1186/s12913-024-11351-y
26. Zhang Y, Stokes J, Anselmi L, Bower P, Xu J. Can integrated care interventions strengthen primary care and improve outcomes for patients with chronic diseases? A systematic review and meta-analysis. Health Res Policy Syst [Internet]. 2025 Jan 6;23(1):5. Available from: http://dx.doi.org/10.1186/s12961-024-01260-1
27. 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 [Internet]. 2014 Jul 21;9(7):e102149. Available from: http://dx.doi.org/10.1371/journal.pone.0102149
28. Alexandrino A, Oliveira CBS de, Gomes SM, Nogueira MF, Mendes TC de O, Lima KC de. Prevalência e fatores associados à multimorbidade em pessoas idosas residentes na zona rural de um município do Nordeste brasileiro. Rev Bras Geriatr Gerontol [Internet]. 2023;26:e230105. Available from: http://dx.doi.org/10.1590/1981-22562023026.230105.pt
29. Levorato CD, de Mello LM, da Silva AS, Nunes AA. Fatores associados à procura por serviços de saúde numa perspectiva relacional de gênero. Cien Saude Colet [Internet]. 2014 Apr;19(4):1263–74. Available from: http://dx.doi.org/10.1590/1413-81232014194.01242013

30. Pinheiro RS, Viacava F, Travassos C, Brito A dos S. Gênero, morbidade, acesso e utilização de serviços de saúde no Brasil. Cien Saude Colet [Internet]. 2002;7(4):687–707. Available from: http://dx.doi.org/10.1590/S1413-81232002000400007
31. Mrejen M, Nunes L, Giacomin K. Envelhecimento populacional e saúde dos idosos: O Brasil está preparado? Estudo Institucional n. 10. São Paulo: Instituto de Estudos para Políticas de Saúde; 2023 [Internet]. [cited 2025 Aug 22]. Available from: https://ieps.org.br/wp-content/uploads/2023/01/Estudo_Institucional_IEPS_10.pdf
32. Cavalcanti G, Doring M, Portella MR, Bortoluzzi EC, Mascarelo A, Dellani MP. Multimorbidity associated with polypharmacy and negative self-perception of health. Rev Bras Geriatr Gerontol [Internet]. 2017 Oct;20(5):634–42. Available from: http://dx.doi.org/10.1590/1981-22562017020.170059
33. Usnayo REK, Monteiro GTR, Amaral C de A, Vasconcellos MTL de, Amaral TLM. Autoavaliação negativa da saúde em pessoas idosas associada a condições socioeconômicas e de saúde: inquérito populacional em Rio Branco, Acre. Rev Bras Geriatr Gerontol [Internet]. 2020;23(5):e200267. Available from: http://dx.doi.org/10.1590/1981-22562020023.200267
34. Souza ASS, Braga JU. Trends in the use of health services and their relationship with multimorbidity in Brazil, 1998-2013. BMC Health Serv Res [Internet]. 2020 Nov 25;20(1):1080. Available from: http://dx.doi.org/10.1186/s12913-020-05938-4
35. Delpino FM, Vieira YP, Duro SM, Nunes BP, Saes M de O. Multimorbidity and use of health services in a population diagnosed with COVID-19 in a municipality in the Southern Region of Brazil, 2020-2021: a cross-sectional study. Epidemiol Serv Saude [Internet]. 2024 Feb 23;33:e2023915. Available from: http://dx.doi.org/10.1590/S2237-96222024V33E2023915.EN
36. Coster JE, Turner JK, Bradbury D, Cantrell A. Why do people choose emergency and urgent care services? A rapid review utilizing a systematic literature search and narrative synthesis. Acad Emerg Med [Internet]. 2017 Sep;24(9):1137–49. Available from: http://dx.doi.org/10.1111/acem.13220
37. Morley C, Unwin M, Peterson GM, Stankovich J, Kinsman L. Emergency department crowding: A systematic review of causes, consequences and solutions. PLoS One [Internet]. 2018 Aug 30;13(8):e0203316. Available from: http://dx.doi.org/10.1371/journal.pone.0203316
38. Macinko J, Mendonça CS. Estratégia Saúde da Família, um forte modelo de Atenção Primária à Saúde que traz resultados. Saúde em Debate [Internet]. 2018 Sep;42(spe1):18–37. Available from: http://dx.doi.org/10.1590/0103-11042018S102
39. Batista SR, Sousa ALL, Nunes BP, Silva RR, Jardim PCBV, Brazilian Group of Studies on Multimorbidity (GBEM). Identifying multimorbidity clusters among Brazilian older adults using network analysis: Findings and perspectives. PLoS One [Internet]. 2022 Jul 20;17(7):e0271639. Available from: http://dx.doi.org/10.1371/journal.pone.0271639
40. Batista SRR, Sousa ALL, Nunes BP, Rodrigues RRD, Jardim PCBV. Regular source of primary care and health services utilisation among Brazilian elderly with mental-physical multimorbidity. BMC Geriatr [Internet]. 2024 May 15;24(1):430. Available from: http://dx.doi.org/10.1186/s12877-024-05048-4
41. Sampaio ML, Bispo Júnior JP. Rede de Atenção Psicossocial: avaliação da estrutura e do processo de articulação do cuidado em saúde mental. Cad Saude Publica [Internet]. 2021 Apr 7;37(3):e00042620. Available from: http://dx.doi.org/10.1590/0102-311X00042620

Resumo

Introdução: a maior parte dos estudos sobre prevalência de multimorbidade é realizada em contextos comunitários ou na atenção primária de países de alta renda. Há escassez de pesquisas em serviços de emergência, especialmente em países de baixa e média renda.

Objetivo: analisar a multimorbidade em usuários atendidos em uma unidade de pronto-atendimento do município de Vitoria, Espírito Santo, Brasil, no ano de 2019.

Método: estudo transversal com 1.177 adultos (≥18 anos) atendidos em um pronto-atendimento em Vitória-ES, selecionados aleatoriamente em 30 dias de 2019. Foram aplicados questionários estruturados. As análises incluíram estatística descritiva, bivariada e regressão de Poisson.

Resultado: encontrou-se elevada prevalência de multimorbidade (45,5% com ≥2 condições crônicas), sendo significativamente associada com sexo (RP em homens = 0,6; IC95%: 0,5–0,7, p<0,001), faixa etária (RP em maiores de 60 anos = 2,4; IC95%: 1,9–3,0, p<0,001) e autoavaliação negativa de saúde (RP em bom/ótimo = 0,7; IC95%: 0,6–0,8, p<0,001). Identificou-se alta utilização de serviços de emergência entre os participantes (mais de 80% utilizaram PA no último ano). Mais de 80% dos participantes usaram o serviço de emergência no último ano. A multimorbidade mostrou-se associada tanto ao uso (RP = 1,3; IC95%: 1,1–1,5; p = 0,007) quanto ao uso frequente (≥5 vezes ao ano) do serviço (RP = 1,5; IC95%: 1,2–1,8; p < 0,001) no último ano.

Conclusão: dentre usuários de serviços de emergência, são altas as prevalências de multimorbidade e uso prévio deste tipo de serviço. Tais achados reforçam a ideia de que carga de doença é fator fundamental para se compreender a forma como as pessoas utilizam os serviços de saúde.

Palavras-chave: multimorbidade, serviços médicos de emergência, acessibilidade aos serviços de saúde, serviços públicos de saúde, estudos transversais.