Prevalence of multimorbidity and associated factors among older people in rural Northeast Brazil

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Abstract

Objective: to identify the prevalence of multimorbidity in elderly people living in rural areas and associated sociodemographic, behavioral and clinical-therapeutic factors. *Method*: cross-sectional study, conducted with randomly selected elderly residents in the rural area of Araçagi, Paraíba, Brazil, linked to the Family Health Strategy. The dependent variable of the study was multimorbidity, understood as the presence of two or more chronic conditions in a single individual. Data were collected through a sociodemographic questionnaire and a form about self-reported health problems, addressing 32 conditions. Univariate and bivariate statistics and Poisson regression were used in the data analysis, considering significant when p-value <0.05. *Results*: 360 elderly subjects participated in the study, with a 54.2% (95%CI: 49,0–59,3) prevalence of multimorbidity. After regression, it was identified that female gender (PR=1,16; 95%CI: 1,09–1,25), age ≥70 years (PR=1,08; 95%CI: 1,01–1,15), overweight (PR=1,19; 95%CI: 1,10–1,29), access to treated and piped water (PR=1,09; 95%CI: 1,00–1,18), smoking history (PR=1,10; 95%CI: 1,03–1,17), not using alcohol (PR=1,13; 95%CI: 1,05–1,22), chronic pain (PR=1,18; 95%CI: 1,10–1,26), hospital as first choice of health service (PR=1,12; 95%CI: 1,03–1,21) and medical consultation in the last year (PR=1,19; 95%CI: 1,11–1,27) were factors associated with multimorbidity. *Conclusion*: the study revealed a high prevalence of multimorbidity and its associated factors. Finally, it becomes feasible to plan measures that improve the health condition of these individuals and think of possibilities to promote healthy aging.

Keywords: Multimorbidity. Chronic Disease. Aged. Health of the Elderly. Rural Areas. Epidemiology.

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INTRODUCTION

The aging process can be accompanied by the coexistence of two or more chronic diseases in the same individual, designated multimorbidity[1]. This condition can lead to a decline in functional capacity, reduced quality of life, higher expenditure with medical and healthcare services[1], occurrence of drug-induced adverse events[2], poor mental health[3] and higher mortality rates[1].

The emergence of multimorbidity is associated with increased life expectancy and improved sociodemographic conditions, changes in life style, advances in diagnostic ability, as well as in health services and aging, leading to an accumulation of health problems over time[4].

The prevalence of multimorbidity varies among the population, particularly in older individuals. The results of the National Health Survey (PNS) revealed that the prevalence of multimorbidity in older Brazilians was 53.1%[5]. In another study, involving rural workers from the state of Espírito Santo, the overall prevalence of multimorbidity in the local population, irrespective of age, was 41.5%, rising to 57.8% in the ≥40 years age group[6].

Given the knowledge that multimorbidity is associated with increased age, it follows that the older population is the most affected by this entity. Moreover, this scenario is even more challenging for older individuals living in rural environments because of their complex health needs[7]. The rural older population, for example, face greater difficulty accessing health services compared to their urban counterparts. This difficulty stems from the geographic remoteness and low quality of services available, with the result that these individuals delay in seeking health services[8].

Evidence shows that locale of residence constitutes a risk factor for the occurrence of multimorbidity and is exacerbated by the epidemiological and demographic transition[9]. Similarly, national epidemiological surveys have difficulties reaching more remote areas, introducing an urban bias into national surveys.

Against this backdrop, the present study is justified by the need to investigate multimorbidity in older adults in a rural setting. Thus, prevalence estimates can help track the process of the epidemiological transition in environments not well explored by national surveys. The results are fundamental to inform the development of public policies for promoting access to and utilization of health services with equality and equity[10].

Therefore, the objective of the present study was to determine the prevalence of multimorbidity in rural older adults and the associated sociodemographic, behavioral and clinical-therapeutic factors.

METHOD

A cross-sectional quantitative epidemiological study was conducted. The study was carried out in the city of Araçagi, Paraíba state, Brazil, and was based on the 6 Basic Health Units (UBS) in the rural area, providing 66.7% of the Primary Care coverage of the city.

According to the Brazilian Institute of Geography and Statistics (IBGE), Araçagi city has a rural population 10,420 individuals (around 60% of total population). Of this total, 1,901 are older individuals (≈ 75.0% of the city´s older population)[11]. The sample size was calculated based on the premise of representativeness, using the formula $n = [EDFF*Np(1-p)]/[(d^2/Z^2_{1-\alpha/2}*(N-1)+p*(1-p)]$, on the Open Epi platform. The parameters employed were a 95% confidence level, maximum sampling error of 5% and multimorbidity prevalence in older individuals of 53.1%[12], yielding an initial sample size of 319 individuals.

However, the sample calculation took into account variables known to influence multimorbidity of older Brazilians[5], namely: female gender, oldest-old, widowed, separated or married marital status, holding a private health plan, no alcohol or tobacco use at time of survey and lower educational level. To factor in these variables, a comparison of proportions among these variables was performed to identify the ideal sample size, giving 384 adults, based on the proportionality of each UBS and randomly selecting participants. Lastly, after allowing for

potential losses and refusals, a further 20% was added to the estimated sample, giving a total size of 461 older adults.

The dependent variable was multimorbidity, defined as the presence of ≥2 chronic conditions in the same person[1]. For this study, self-reported clinically-diagnosed chronic health conditions was used[6], without considering complex multimorbidity. All other variables were considered independent.

Data collection was carried out between October 2021 and February 2022. For study inclusion, subjects had to be aged ≥60 years and registered users at the city´s rural UBS. Eligibility of participants was on the basis of the principle of accessibility to the first older adult at each unit assessed[13].

The data collection process entailed application of two instruments: a questionnaire gathering sociodemographic and behavioral information; and a form collecting clinical-therapeutic data. Sociodemographic data included sex, age group, color/race, marital status, religion, family income, functional literacy, employment status and receipt of retirement pension.

For functional literacy, the respondent stated the number of years of formal education received and whether they could write sentences and perform simple calculus, such as the mathematics operations of adding and subtracting. Regarding family income, the respondent gave the sum of income received by all residents sharing the household.

Behavioral variables included body mass index (BMI), engagement in physical activity, access to treated mains water, and history of tobacco and/or alcohol use. BMI was calculated by collecting anthropometric data such as weight and height.

The clinical-therapeutic variables probed were history of falls, chronic pain, access to health services, transport to health services, first choice of health service, need for companion, most recent medical consultation, and hospitalization in past year.

The semi-structured questionnaire on Self-reported Health Problems was devised based on the 2 stages of the study by the Brazilian Group of Studies on Multimorbidity (GBEM) covering 32 health problems[14,15]. In the event of mental disorders affecting the participant, a family member, guardian/caregiver or other person living with the respondent was recruited as informant to confirm the self-reported diagnosis of these conditions.

After pooling information, descriptive analysis was performed with results expressed as simple measures of absolute and relative frequency and measures of central tendency, such as mean and standard deviation.

Bivariate analysis using the chi-square test was then carried out, with a level of significance set for a p-value <0.05. Multivariate analysis using Poisson regression with robust variance was then performed. Variables attaining a p-value <0.20 on the chi-squared test were entered in the model. This procedure was done using the Backward stepwise selection model approach. Variables yielding results with p-value <0.05 were retained in the final model.

Multicollinearity was assessed using the variable inflation factor (VIF), with a cut-off point of 10. For analysis of model fit, the parameters Deviance, Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) were employed.

Data collection commenced after approval by the Research Ethics Committee of the Onofre Lopes University Hospital under permit no. 4.952.314. The investigation was carried out by the lead researcher after explaining the study to participants, each of whom then signed the Free and Informed Consent Form in duplicate. Physical contact was minimized by use of social distancing measures, face masks and cleansing gel. The study complied with the recommendations of Resolution no. 466/2012 of the National Board of Health governing ethics in research involving human subjects[16].

RESULTS

The final sample comprised 360 older individuals. Of the initial 461 participants, 23 were not found, 8 refused to take part, 11 died and 59 were situated in areas without a community health worker available at the time of the study.

Regarding sociodemographic characteristics, study participants were predominantly female (54.4%), aged 60-69 years (39.7%) with a mean age of 72.81 years, were black (brown or black)(65.0%), married or had *de facto* partnership (64.7%), lived with partner (31.7%), self-declared as Catholic (91.1%), had low literacy (around 2.18 years of education), were not working (63.6%), retired (92.2%) and had mean family income of R$ 2,047.77 (US$ 429.01).

For behavioral aspects, most participants were overweight (40.8%) or normal weight (40.8%), did not engage in physical activity (62.8%), prepared at least 3 meals a day (95.3%), had no access to treated mains water (81.4%), were non-smokers (82.5%), former smokers (51.4%), did not use alcohol (84.7%) and had no history of alcohol-use disorder (60.3%).

Regarding clinical-therapeutic profile, most participants reported use of medications (73.3%), had sustained no falls in past year (78.3%), had no chronic pain (75.8%), had access to health services (99.7%), had used some type of health service in past 6 months (59.2%), had not accessed transport to visit health service (71.9%), used the basic health unit as first choice of health service (80.3%), held no private health plan (99.4%), had attended a medical consultation in the past year (80.3%), were not hospitalized in past year (97.2%) and presented some health problem (81.4%).

The prevalence of multimorbidity was 54.2% (95%CI: 49.0-59.3). Participants had an average of 2 chronic conditions (±1.398). The relationship between multimorbidity and associated factors is shown in the tables below.

The data presented in Table 1 shows that women had an 84% higher probability of reporting multimorbidity than men. In addition, individuals aged ≥70 years had a 56% higher probability of reporting multimorbidity than their younger counterparts Also, individuals who were not working had a 91% greater probability of reporting multimorbidity than those who were working.

The results in Table 2 reveal that overweight and normal-weight individuals had a 124% and 109% greater probability of having multimorbidity, respectively, compared with underweight individuals. Current non-smokers had a 109% higher probability of reporting multimorbidity than current smokers. Former smokers had a 28% higher probability of multimorbidity than those who had never smoked. Lastly, individuals reporting no current alcohol abuse had a 234% higher probability of reporting multimorbidity than those reporting alcohol use disorder.

The results in Table 3 show that individuals with chronic pain had a 57% higher probability of having multimorbidity then those experiencing no pain. Participants that had sought health services in the past 6 months had a 67% higher probability of having multimorbidity compared to those who had not utilized these services. Individuals that sought the hospital as the first choice of health service had a 34% probability of having multimorbidity compared to those choosing other types of service.

Of the 32 morbidities listed in the form on self-reported health problems, 27 were reported by participants. Among the 360 respondents, the most reported conditions were: Systemic Arterial Hypertension (60.3%), Diabetes Mellitus (21.7%), Inflammatory Arthropathies (18.3%), Osteoporosis (11.9%), Dyslipidemias (11.7%), Urinary Incontinence (8.9%), Depression and Mood Problems (7.5%), Ischemic Heart Disease (6.9%), Dementia (6.1%) and Peripheral Vascular Disease (6.1%). The relationship between self-reported morbidities and multimorbidity is depicted in the figure below.

The relationship between the most self-reported morbidities and multimorbidity is portrayed in Figure 1. Notably, the rate of each disease represents only those reporting having the disease, irrespective of presenting multimorbidity. In this case, the dark-colored bars represent individuals that had the morbidity shown and also presented multimorbidity. The light-colored bar shows the participants that had the disease indicated but not multimorbidity.

Table 1. Association between sociodemographic variables and multimorbidity in rural older users of the Family Health Strategy (Primary Care) (n=360). Araçagi, Paraíba state, 2022.

Independent variables	Multimorbidity		PR (CI)¨	*p*-value¨
	Yes	No		
	n (%)			
Sex				
Female	134 (68.4)	62 (31.6)	1.84 (1.47 – 2.29)	<0.001*
Male	61 (37.2)	103 (62.8)		
Age group				
≥70 years	137 (63.1)	80 (36.9)	1.56 (1.24 – 1.94)	<0.001*
60-69 years	58 (40.6)	85 (59.4)		
Color/Race				
White	74 (60.2)	49 (39.8)	1.18 (0.98 – 1.43)	0.118
Black	119 (50.9)	115 (49.1)		
Marital status				
Single/Separated/Divorced/Widowed	74 (58.3)	53 (41.7)	1.12 (0.93 – 1.36)	0.297
Married/de facto partnership	121 (51.9)	112 (48.1)		
Religion				
Catholic	178 (54.3)	150 (45.7)	1.05 (0.72 – 1.53)	0.967
Evangelist/Protestant	14 (51.9)	13 (48.1)		
Functional literacy				
Yes	63 (55.8)	50 (44.2)	1.04 (0.78 – 1.17)	0.768
No	132 (53.4)	115 (46.6)		
Working				
No	150 (65.5)	79 (34.5)	1.91 (1.48 – 2.46)	<0.001*
Yes	45 (34.4)	86 (65.6)		
Receives retirement pension				
Yes	184 (55.3)	149 (44.7)	1.36 (0.85 – 2.16)	0.209
No	11 (40.7)	16 (59.3)		

Source: Data from study, 2022. PR = Prevalence Ratio; CI – Confidence Interval; ¨ Pearson´s chi-square test; *Statistical significance (*p*-value < 0.05).

Table 2. Association between behavioral variables and multimorbidity in rural older users of Family Health Strategy (Primary Care) (n=360). Araçagi, Paraíba state, 2022.

Independent variables	Multimorbidity		PR (CI)¨	*p-value*¨
	Yes	No		
	n (%)			
BMI				
>27.0 – Overweight	86 (58.5)	61 (41.5)	2.24 (1.35 – 3.72)	<0.001*
22.0-27.0 – Normal weight	80 (54.4)	67 (45.6)	2.09 (1.25 – 3.47)	0.001*
<22.0 – Underweight	12 (26.1)	34 (73.9)	1.0	
Engages in Physical Activity				
No	126 (55.8)	100 (44.2)	1.08 (0.88 – 1.32)	0.500
Yes	69 (51.5)	65 (48.5)		

to be continued

Continuation of Table 2

Independent variables	Multimorbidity		PR (CI)¨	*p-value*¨
	Yes	No		
	n (%)			
Access to treated mains water				
Yes	42 (62.7)	25 (37.3)	1.20 (0.97 – 1.49)	0.157
No	153 (52.2)	140 (47.8)		
Current smoker				
No	177 (59.6)	120 (40.4)	2.09 (1.40 – 3.12)	<0.001*
Yes	18 (28.6)	45 (71.4)		
Former smoker				
Yes	112 (60.5)	73 (39.5)	1.28 (1.05 – 1.55)	0.017*
No	83 (47.4)	92 (52.6)		
Current alcohol use				
No	185 (60.7)	120 (39.3)	3.34 (1.89 – 5.89)	<0.001*
Yes	10 (18.2)	45 (81.8)		
Former alcohol use				
Yes	81 (56.6)	62 (43.4)	1.08 (0.89 – 1.30)	0.511
No	114 (52.5)	103 (47.5)		

Source: Data from study, 2022; BMI = Body Mass Index; PR = Prevalence Ratio; CI = Confidence Interval; ¨ Pearson´s chi-square test; *Statistical significance (*p*-value < 0.05).

Table 3. Association between clinical-therapeutic variables and multimorbidity in rural older users of Family Health Strategy (Primary Care) (n=360). Araçagi, Paraíba state, 2022.

Independent variables	Multimorbidity		PR (CI)¨	*p-value*¨
	Yes	No		
	n (%)			
Sustained fall in past year				
Yes	47 (60.3)	31 (39.7)	1.15 (0.93 – 1.42)	0.275
No	148 (52.5)	134 (47.5)		
Chronic pain for ≥3 months				
Yes	65 (74.7)	22 (25.3)	1.57 (1.32 – 1.87)	<0.001*
No	130 (47.6)	143 (52.4)		
Accessed health services in past 6 months				
Yes	138 (64.8)	75 (35.2)	1.67 (1.33 – 2.09)	<0.001*
No	57 (38.8)	90 (61.2)		
Has transport to health service				
No	143 (55.2)	116 (44.8)	1.07 (1.33 – 2.09)	0.603
Yes	52 (51.5)	49 (48.5)		
Type of health service used as 1st choice				
Hospital	47 (68.1)	22 (31.9)	1.34 (1.10 – 1.63)	0.014*
Basic Health Unit	147 (50.9)	142 (49.1)		
Need for companion				
Yes	156 (61.2)	99 (38.8)	1.65 (1.26 – 2.15)	<0.001*
No	39 (37.1)	66 (62.9)		

to be continued

Continuation of Table 3

Independent variables	Multimorbidity		PR (CI)¨	*p-value*¨
	Yes	No		
	n (%)			
Last medication consultation attended				
≤ 1 year	182 (63.0)	107 (37.0)	3.20 (1.95 – 5.24)	<0.001*
> 1 year	13 (19.7)	53 (80.3)		
Hospitalization in past year				
Yes	07 (70.0)	03 (30.0)	1.30 (0.86 – 1.98)	0.486
No	188 (53.7)	162 (46.3)		

Source: Data from study, 2022; PR = Prevalence Ratio; CI – Confidence Interval; ¨ Pearson´s chi-square test; *Statistical significance (*p*-value < 0.05).

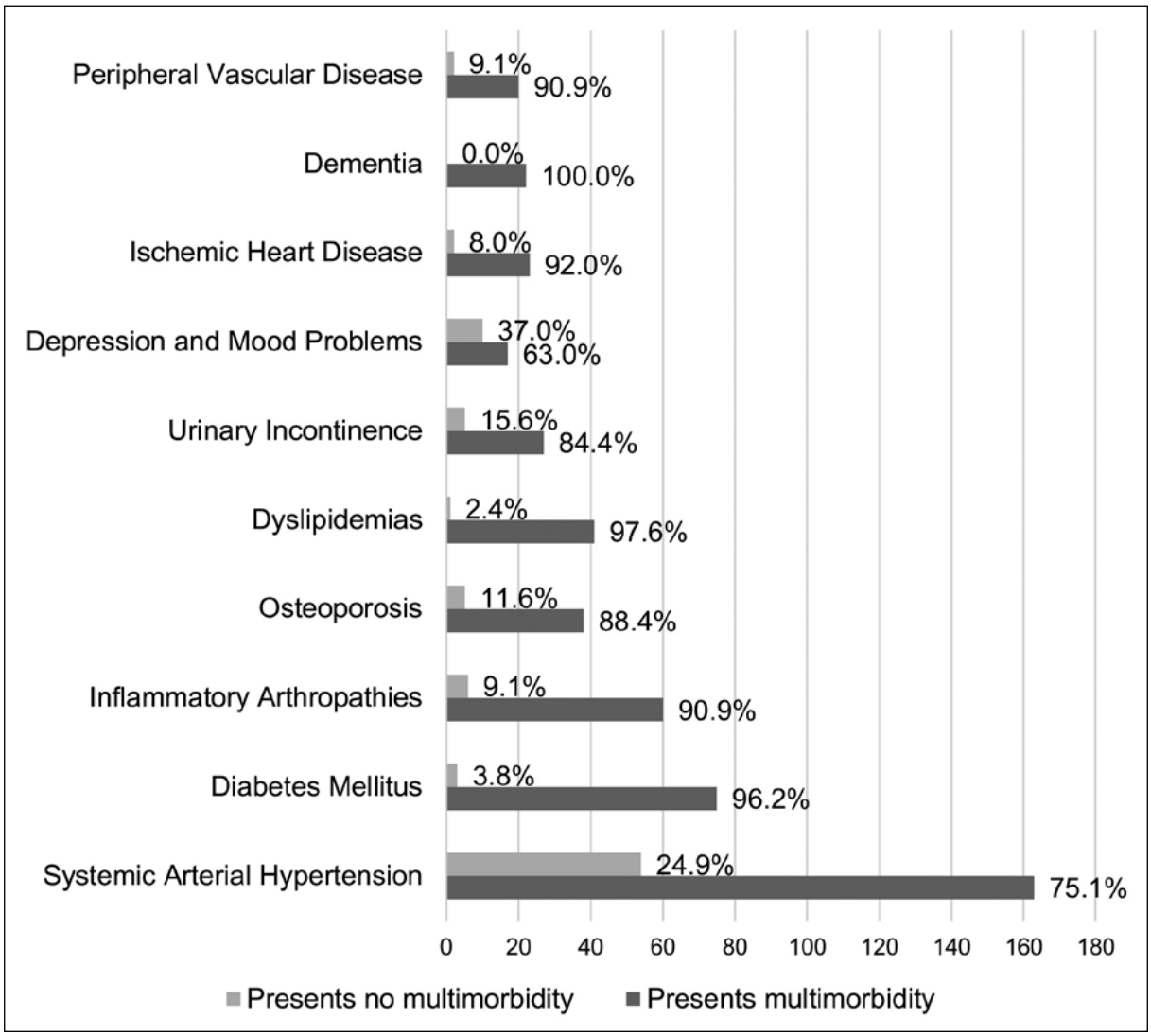

Figure 1. Relationship between self-reported morbidities and multimorbidity in rural older users of the Family Health Strategy (Primary Care) (n=360). Araçagi, Paraíba state, 2022.

Source: Data from study, 2022

Table 4. Multivariate analysis of sociodemographic, behavioral, clinical-therapeutic variables and multimorbidity in rural older users of the Family Health Strategy (Primary Care) (n=360). Araçagi, Paraíba state, 2022.

Independent variables	Multimorbidity		PR (CI) (adj)#	*p*-value (adj)#
	Yes	No		
	n (%)			
Sex				
Female	134 (68.4)	62 (31.6)	1.16 (1.09 – 1.25)	<0.001*
Male	61 (37.2)	103 (62.8)		
Age group				
≥70 years	137 (63.1)	80 (36.9)	1.08 (1.01 – 1.15)	0.018*
60-69 years	58 (40.6)	85 (59.4)		
BMI				
>27.0 – Overweight	86 (58.5)	61 (41.5)	1.19 (1.10 – 1.29)	<0.001*
22.0-27.0 – Normal weight	80 (54.4)	67 (45.6)	0.99 (0.93 – 1.06)	0.861
<22.0 – Underweight	12 (26.1)	34 (73.9)	1.0	
Access to treated mains water				
Yes	42 (62.7)	25 (37.3)	1.09 (1.00 – 1.18)	0.041*
No	153 (52.2)	140 (47.8)		
Former smoker				
Yes	112 (60.5)	73 (39.5)	1.10 (1.03 – 1.17)	0.002*
No	83 (47.4)	92 (52.6)		
Current alcohol use				
No	185 (60.7)	120 (39.3)	1.13 (1.05 – 1.22)	0.001*
Yes	10 (18.2)	45 (81.8)		
Chronic pain for >3 months				
Yes	65 (74.7)	22 (25.3)	1.18 (1.10 – 1.26)	<0.001*
No	130 (47.6)	143 (52.4)		
Type of health service used as 1st choice				
Hospital	47 (68.1)	22 (31.9)	1.12 (1.03 – 1.21)	0.005*
Basic Health Unit	147 (50.9)	142 (49.1)		
Last medical consultation attended				
≤ 1 year	182 (63.0)	107 (37.0)	1.19 (1.11 – 1.27)	<0.001*
> 1 year	13 (19.7)	53 (80.3)		

Source: Data from study, 2022; BMI = Body Mass Index; PR (adj) = adjusted Prevalence Ratio; CI (adj) = adjusted Confidence Interval; #Robust Poisson regression; *Statistical significance (*p*-value < 0.05).

The data presented in Table 4 show that women had a 16% higher probability of reporting multimorbidity than men. Participants aged ≥70 years had an 8% higher probability of having multimorbidity than individuals aged 60-69 years. Subjects that were overweight had a 19% greater probability of reporting multimorbidity than underweight individuals. Also, participants with access to treated mains water had a 9% greater probability of reporting multimorbidity than individuals who had no access.

The results also reveal that former smokers had a 10% higher probability of multimorbidity than those who had never smoked. Participants that reported not using alcohol had a 13% greater probability of having multimorbidity than those reporting alcohol

use. Individuals with chronic pain had an 18% higher probability of reporting multimorbidity than those experiencing no pain.

Lastly, participants that sought the hospital as the first choice of health service had a 12% greater probability of having multimorbidity compared to those choosing other types of service. Participants who had attended a medical consultation within the last year had a 19% greater probability of having multimorbidity than those who had a consultation over 1 year ago.

DISCUSSION

The present study found a high prevalence of multimorbidity in older rural participants and that the factors sex, age, BMI, access to treated mains water, history of tobacco use, not currently using alcohol, presenting chronic pain, use of hospital as first choice of health service, and having had a medical consultation within the past year were associated with multimorbidity in this population. To the best of our knowledge, this study is the first of its kind investigating the factors associated with multimorbidity in older individuals specifically from the rural area of the Northeast region of the country.

A previous study by Melo et al.[5] investigating multimorbidity identified a national prevalence of 53.1% in older adults based on data from the National Health Survey (PNS), consistent with the rate detected in the present study. However, although these data appear similar, it is important to bear in mind the influence of survival bias, given that those individuals with more health problems will have died, i.e. are not represented in this analysis[17].

Another explanation may lie in the fact that individuals who might have otherwise been included in the study sample for their health status, needed to move to the urban area because they needed better resources and access to health services, leisure and communication, again resulting in the non-inclusion of this group[18]. In addition, the issue of self-reporting of the information obtained should be taken into account, potentially leading to under-reporting or memory bias[6].

Similar results were found in studies of rural older adults in other countries, with the majority of participants presenting multimorbidity, such as China[19] (83.8%), India[20] (57.0%) and older American Indians[21] (57.0%). Several factors reported in the literature were found to contribute to this outcome: female gender[22,23], advanced age[20,22], better economic situation[22], low educational level[23], not smoking[23] and not engaging in physical activity[23].

A cross-sectional study of 2,400 older adults from Vietnam, of which 1,200 lived in the urban area, found that respondents with multimorbidity were predominantly female[24]. Another study involving community-dwelling older adults also reported similar results, attributing this difference to biological aspects, given that post-menopause, the female body promotes a decrease in estrogen levels, rendering these women more vulnerable to chronic non-communicable diseases (NCD)[25].

In addition, women have a longer life expectancy, more readily seek health services, and have lower exposure to occupational risks and mortality from external causes [26,27], while also exhibit a poorer health status compared to older men[24].

The results of the present analysis confirmed that the occurrence of multimorbidity is associated with age, particularly among the oldest-old. These findings corroborate the study by Nunes et al.[28], showing that multimorbidity increased with age, i.e. oldest-old individuals exhibited more multimorbidity than young-old, explained by the fact they have been exposed to stressor events for longer over the life course.

In line with the present study, an investigation involving an older rural population from India showed that most respondents were either normal weight or overweight and presented a higher level of multimorbidity compared to low-weight individuals[29], where excess weight is a factor predisposing to the development of chronic diseases[30].

Alcohol and tobacco use is one of the most important risk factors for poor mental and physical health and, consequently, for multimorbidity, especially among vulnerable populations. Supporting the findings, a previous study of older

Brazilians showed that former smokers had higher levels of multimorbidity than active smokers. This phenomenon is explained by the fact that former smokers develop diseases earlier due to their life history. Another explanation for this result is survival bias[28].

Tobacco and alcohol disorders are modifiable conditions that constitute a major cause of morbimortality and are collectively responsible for around 5 million deaths annually worldwide[31]. Consistent with this evidence, a previous study revealed that consuming alcoholic beverages in moderation was associated with a lower number of chronic conditions. Although the cited study was cross-sectional, precluding any inferences regarding cause and effect, this relationship might reflect reverse causality bias, given that those with fewer chronic conditions tend to have greater autonomy for consuming alcohol or, conversely, that users of alcohol have fewer diseases[28].

With regard to chronic pain reported, the current study findings corroborate a previous study in Germany revealing an association between chronic pain and high prevalence of multimorbidity[32]. Since pain is associated with a high burden of diseases, this group may exhibit distress with deleterious effects on health and quality of life[33].

Concerning the use or seeking of health service, participants exhibiting multimorbidity made greater use of health services within a shorter time frame compared to individuals without multimorbidity, where follow-up consultations were the most cited reason for this utilization. These findings are supported by an earlier study of data from the National Household Sample Survey (PNAD) and the National Health Survey (PNS) exploring the topic, which found similar rates of health service utilization by older people. The majority of respondents sought health services and exhibited multimorbidity, revealing an upward trend for both variables[34].

Moreover, a study of older adults in rural Australia reported an association between multimorbidity and greater health service utilization, revealing that multimorbid individuals had double the chance of needing medical and hospital services or hospitalization[6]. Thus, individuals living with multimorbidity appear to be significantly more prone to using health services[24].

Regarding the last medical consultation variable, a study of older Brazilians from Minas Gerais state identified an association between multimorbidity and medical consultations in the past 12 months, i.e. individuals with multimorbidity had more medical consultations in the past year than subjects without the condition[25]. This correlation might be explained by the fact that individuals with multiple diseases have greater needs for health care and, hence, make frequent visits and constant health service utilization[25].

For access to treated mains water, in contrast with the current study, a similar investigation of older adults from the interior of Bahia state, Brazil, showed that those without access to treated mains water had a higher prevalence of multimorbidity. This disparity might be explained by low socioeconomic level, since individuals with less purchasing power have poorer access to health services compared to more economically-advantaged groups. This higher-income group generally has greater, better access to health services, allowing them to seek care that can ultimately extend life expectancy[35].

The present study has some limitations, including the difficulty locating some participants due to poor road conditions and a lack of availability of professionals to help locate the participants. Another issue was the self-reporting of diseases, introducing potential risk of memory bias or under-reporting. Lastly, the COVID-19 pandemic hampered data collection and led to losses and refusals. However, the sample losses were minor and did not significantly impact results.

CONCLUSION

This study found a high prevalence and its associated factors multimorbidity in the older individuals investigated. The results also revealed that the participants faced barriers which make it difficult for them to achieve successful aging. The study also highlighted the apparent paucity of

health services and scientific studies aimed at this population, as well as the unpreparedness of health professionals in dealing with the aging process. Moreover, many older individuals seek hospitals instead of primary care units, demonstrating a lack of knowledge about the patient journey within the health services, underscoring the need to strengthen primary care in the rural setting.

Comparison of the profile of the rural participants versus their urban counterparts showed that the people from rural areas had greater difficulties concerning transport and accessing health services, lower educational level, poorer access to treated mains water and fewer holders of private health plans.

Thus, these results can contribute by helping inform the development of public policy to serve this population, and also to sensitize managers, health professionals, other services, the aging population, and older citizens to the opportunities for promoting active healthy aging.

Understanding the factors which lead to multimorbidity reveals the need for new approaches to monitoring, preventing and managing this condition in the older population, and to empower health professionals for delivering care to this older group in an effort to improve their health status. Lastly, the study highlights the need for further investigations, given the current lack of studies involving the rural older population.

AUTHORSHIP

- Alexandrino A – study conception, data analysis and interpretation, and writing and approval of version for publication.
- Oliveira CBS – data analysis and interpretation, and writing and approval of version for publication.
- Gomes SM – data analysis and interpretation, and writing and approval of version for publication.
- Nogueira MF – data analysis and interpretation, and writing and approval of version for publication.
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REFERENCES

1. Vargese SS, Mathew E, Johny V, Kurian N, Gayathri AV, Aarya SR. Prevalence and pattern of multimorbidity among adults in a primary care rural setting. Clin Epidemiol Global Health. 2020;8(2):482-485. Available from: 10.1016/j.cegh.2019.10.014
2. Jin H, Wang Z, Shi L, Chen C, Huo Y, Huang W, et al. Multimorbid Patient Experiences With Primary Care at Community Health Centers in Shanghai, China. Front. Public Health. 2021;9:606188. Available from: 10.3389/fpubh.2021.606188
3. Jiao D, Watanabe K, Sawada Y, Tanaka E, Watanabe T, Tomisaki E, et al. Multimorbidity and functional limitation: the role of social relationships. Arch Gerontol Geriatr. 2021;92:104249. Available from: 10.1016/j.archger.2020.104249
4. Araujo MEA, Silva MT, Galvão TF, Nunes BP, Pereira MG. Prevalence and patterns of multimorbidity in Amazon Region of Brazil and associated determinants: a cross-sectional study. BMJ Open. 2018;8(11):e023398. Available from: 10.1136/bmjopen-2018-023398
5. Melo LA, Braga LC, Leite FPP, Bittar BF, Oséas JMF, Lima KC. Prevalência e fatores associados a multimorbidades em idosos brasileiros. Cien Saúde Coletiva. 2020;25(10):3869-3877. Available from: 10.1590/1413-812320202510.34492018
6. Petarli GB, Cattafesta M, Sant'Anna MM, Bezerra OMPA, Zandonade E, Salaroli LB. Multimorbidity and complex multimorbidity in Brazilian rural workers. PLoS One. 2019;14(11):e0225416. Available from: 10.1371/journal.pone.0225416

7. Asante D, Rio J, Stanaway F, Worley P, Isaac V. Psychological distress, multimorbidity and health services among older adults in rural South Australia. J Affect Disord. 2022;309:453-460. Available from: 10.1016/j.jad.2022.04.140

8. Ferreira LS, Moreira LR, Paludo SS, Meucci RD. Acesso à Atenção Primária à Saúde para idosos residentes na zona rural no Sul do Brasil. Rev Saude Publica. 2020;54:149. Available from: 10.11606/s1518-8787.2020054002316

9. Chauhan S, Srivastava S, Kumar P, Patel R. Decomposing urban-rural diferences in multimorbidity among older adults in India: a study based on LASI data. BMC Public Health. 2022;22(502). Available from: 10.1186/s12889-022-12878-7

10. Leão OAA, Knuth AG, Meucci RD. Comportamento sedentário em idosos residentes de zona rural no extremo Sul do Brasil. Rev Bras Epidemiol. 2020;23:e200008. Available from: 10.1590/1980-549720200008

11. Instituto Brasileiro de Geografia e Estatística (IBGE). Sinopse do Censo demográfico 2010. Rio de janeiro: IBGE; 2010. Available from: https://cidades.ibge.gov.br/brasil/pb/aracagi/panorama

12. Melo LA, Braga LC, Leite FPP, Bittar BF, Oséas JMF, Lima KC. Factors associated with multimorbidity in the elderly: an integrative literature review. Rev Bras Geriatr Gerontol. 2019;22(1). Available from: 10.1590/1981-22562019022.180154

13. Gil AC. Métodos e técnicas de pesquisa social. 6ª ed. São Paulo: Atlas; 2008.

14. GBEM: Grupo Brasileiro de Estudos sobre Multimorbidade. 1ª fase da pesquisa online para construção da Lista Brasileira de Multimorbidade utilizando a técnica Delphi. São Paulo, SP: GBEM; 2019. Available from: https://wp.ufpel.edu.br/gbem/files/2020/08/Relat%C3%B3rio-da-1%C2%AA-rodada-do-question%C3%A1rio_para-o-site__.pdf

15. GBEM: Grupo Brasileiro de Estudos sobre Multimorbidade. –2ª fase da pesquisa online para construção da Lista Brasileira de Multimorbidade utilizando a técnica Delphi. São Paulo, SP: GBEM; 2021. Available from: https://wp.ufpel.edu.br/gbem/files/2021/02/Relatorio-da-2a-rodada-do-questionario_para-o-site_.pdf

16. Brasil. Resolução nº466, de 12 de dezembro de 2012. Aprova diretrizes e normas regulamentadoras de pesquisa envolvendo seres humanos. Ministério da Saúde: Saúde Legis; 2012. Available from: http://bvsms.saude.gov.br/bvs/saudelegis/cns/2013/res0466_12_12_2012.html

17. Pereira BP, Bortolotto CC, Tomasi E, Gonzalez MC, Gomes AP, Gonçalvez H, et al. Consumo alimentar e multimorbidade entre idosos não institucionalizados de Pelotas, 2014: estudo transversal. Epidemiol Serv Saude. 2020;29(3):e2019050. Available from: http://dx.doi.org/10.5123/S1679-49742020000300015

18. Campos GL, Fernandes FAS, Tomaz KC, Araújo MCS, Gomes VC, Sousa AD, et al. A diferença na qualidade de vida entre idosos da zona urbana e rural: uma revisão integrativa da literatura. REAS. 2020;54:e04139. Available from: https://doi.org/10.25248/reas.e4139.2020

19. She R, Yan Z, Jiang H, Vetrano DL, Lau JT, Qiu C. Multimorbidity and health-related quality of life in old age: role of functional dependence and depressive symptoms. JAMDA. 2019;20(9):1143-9. Available from: https://doi.org/10.1016/j.jamda.2019.02.024

20. Banjare P, Pradhan J. Socio-economic inequalities in the prevalence of multi-morbidity among the rural elderly in bargarh district of Odisha (India). PLoS One. 2014;9(6):e97832. Available from: https://doi.org/10.1371/journal.pone.0097832

21. John R, Kerby DS, Hennessy CH. Patterns and impacto f comorbidity and multimorbidity among community-resident american indian elders. The Gerontologist. 2003;43(5):649-60. Available from: https://doi.org/10.1093/geront/43.5.649

22. Odland ML, Payne C, Witham MD, Siedner MJ, Bärnighausen T, Bountogo M, et al. Epidemiology of multimorbidity in conditions of extreme poverty: a population- based study of older adults in rural Burkina Faso. BMJ Global Health. 2020;5:e002096. Available from: https://doi.org/10.1136/bmjgh-2019-002096

23. Melo LA, Lima KC. Fatores associados às multimorbidades mais frequentes em idosos brasileiros. Cienc Saúde Coletiva. 2020;25(10):3879-88. Available from: https://doi.org/10.1590/1413-812320202510.35632018

24. Há NT, Le NH, Khanal V, Moorin R. Multimorbidy and its social determinants among older people in Southern provinces, Vietnam. Int J Equity Health. 2015;14(1):1-7. Available from: https://doi.org/10.1186/s12939-015-0177-8

25. Gusmão MSF, Cunha PO, Santos BG, Costa FM, Caldeira AP, Carneiro JA. Multimorbidade em idosos comunitários: prevalência e fatores associados. Rev Bras Geriatr Gerontol. 2022;25(1):e220115. Available from: http://dx.doi.org/10.1590/1981-22562022025.220115.pt

26. Cavalcanti Junior EO, Araújo EQX, Evangelista DR, Rezende FAC, Silva Netto LS, Osório NB, et al. Relação das condições de vida e saúde sobre a idosos em idosos. Rev Humanid Inov. 2019;6(11):76-87. Available from: https://revista.unitins.br/index.php/humanidadeseinovacao/article/view/1574/1074

27. Jesus ITM, Orlandi AAS, Zazzetta MS. Fragilidade e apoio social e familiar de idosos em contextos de vulnerabilidade. Rev Rene. 2018;19:e32670. Available from: 10.15253/2175-6783.20181932670

28. Nunes BP, Batista SRR, Andrade FB, Souza Junior RB, Lima-Costa MF, Fachini LA. Multimorbidade em indivíduos com 50 anos ou mais de idade: ELSI-Brasil. Rev Saude Publica. 2018;52:10. Available from: https://doi.org/10.11606/S1518-8787.201805200063

29. Kshatri JS, Palo SK, Bhoi T, Barik SR, Pati S. Associations of multimorbidity on frailty and dependence among an elderly rural population: Findings from the AHSETS study. Mech Ageing Dev. 2020;192:111384. Available from: https://doi.org/10.1016/j.mad.2020.111384

30. Leite BC, Oliveira-Figueiredo DST, Rocha FL, Nogueira MF. Multimorbidade por doenças crônicas não transmissíveis em idosos: estudo de base populacional. Rev Bras Geriatr Gerontol. 2019;22(6):e19025. Available from: http://dx.doi.org/10.1590/1981-22562019022.190253

31. Maclean RR, Sofuoglu M, Rosenheck R. Tobacco and alcohol use disorders: evaluating multimorbidity. Addict Behav. 2018;78:59-66. Available from: http://dx.doi.org/10.1016/j.addbeh.2017.11.006

32. Schneider J, Algharably EA, Budnick A, Wenzel A, Drager D, Kreutz R. High prevalence of multimorbidity and polypharmacy in elderly patients with chronic pain receiving home care are associated with multiple medication-related problems. Front Farmacol. 2021;12(686990). Available from: 10.3389/fphar.2021.686990

33. Ferretti F, Silva MR, Pegoraro F, Baldo JE, Sá CAD. Chronic pain in the elderly, associated factors and relation with the level and volume of physical activity. BrJP. 2019;2(1):3-7. Available from: https://doi.org/10.5935/2595-0118.20190002

34. Cesário VAC, Santos MM, Mendes TCO, Souza Júnior PRB, Lima KC. Tendências de acesso e utilização dos serviços de saúde na APS entre idosos no Brasil nos anos 2008, 2013 e 2019. Cienc Saude Coletiva. 2021;26(09):4033-44. Available from: https://doi.org/10.1590/1413-81232021269.08962021

35. Barreto-Santos L, Vasconcelos-Rocha S, Souza-Lessa R, Alves-Vilela AB. Multimorbidade em idosos de um município do nordeste brasileiro: prevalência e fatores associados. Rev Salud Publica. 2019;21(5):519-25. Available from: https://doi.org/10.15446/rsap.V21n5.77775