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ORIGINAL ARTICLE

Longitudinal evaluation of clinical-functional vulnerability of community older adults

Avaliação longitudinal da vulnerabilidade clínico-funcional de pessoas idosas da comunidade

Evaluación longitudinal de la vulnerabilidad clínico-funcional de las personas mayores de la comunidad

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Abstract

Objective: To compare the clinical-functional vulnerability of older adults before and during the COVID-19 pandemic and analyze the factors associated with changes and maintenance of the classification. **Methods:** Longitudinal and quantitative study, with 109 community older adults from Três Lagoas-MS. Characterization data was collected and the Functional Clinical Vulnerability Index (IVCF-20) was applied in 2018/2019 and reapplied in 2021. **Results:** 10.1% of participants became non-vulnerable, 16.5% became vulnerable, 28.4% remained non-vulnerable and 45.0% remained vulnerable. Smoking and getting fewer hours of sleep per night were risk factors for becoming non-vulnerable. Women had a lower risk of remaining non-vulnerable, and those who consumed alcohol and more meals per day had a higher risk of remaining non-vulnerable. There was an association between remaining vulnerable and self-reported social isolation. **Conclusion:** The majority of older adults evaluated remained in the same IVCF-20 classification.

Descriptors: Primary Health Care; Geriatric Nursing; Aged; Health Vulnerability.

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Resumo

Objetivo: Comparar a vulnerabilidade clínico-funcional de pessoas idosas antes e durante a pandemia da COVID-19 e analisar os fatores associados às mudanças e manutenção da classificação. **Métodos:** Estudo longitudinal e quantitativo, com 109 pessoas idosas da comunidade, em Três Lagoas-MS. Foram coletados dados de caracterização e aplicado o Índice de Vulnerabilidade Clínico Funcional (IVCF-20) em 2018/2019 e reaplicado em 2021. **Resultados:** 10,1% dos participantes se tornaram não vulneráveis, 16,5% tornaram-se vulneráveis, 28,4% permaneceram não vulneráveis e 45,0% permaneceram vulneráveis. O tabagismo e dormir menos horas de sono por noite estiveram associados à tornar-se não vulnerável. As mulheres tiveram menor risco de se manterem não vulneráveis, e os que faziam uso de álcool e mais refeições por dia tiveram maior risco de manterem-se não vulneráveis. Houve associação entre manter-se vulnerável e isolamento social autorreferido. **Conclusão:** A maioria das pessoas idosas avaliadas manteve-se na mesma classificação do IVCF-20.

Descritores: Atenção Primária à Saúde; Enfermagem Geriátrica; Idoso; Vulnerabilidade em Saúde.

Resumen

Objetivo: Comparar la vulnerabilidad clínico-funcional de las personas mayores antes y durante la pandemia de COVID-19 y analizar los factores asociados a cambios y mantenimiento de la clasificación. **Métodos:** Estudio longitudinal y cuantitativo, con 109 ancianos de la comunidad, en Três Lagoas-MS. Se recopilaron datos de caracterización y se aplicó el Índice de Vulnerabilidad Clínica Funcional (IVCF-20) en 2018/2019 y se volvió a aplicar en 2021. **Resultados**: el 10,1% de los participantes se volvieron no vulnerables, el 16,5% se volvieron vulnerables, el 28,4% permaneció no vulnerable y el 45,0% seguía siendo vulnerable. Fumar y dormir menos horas por noche eran factores de riesgo para volverse no vulnerable. Las mujeres tenían un menor riesgo de no ser vulnerables, y aquelles que consumían alcohol y más comidas al día tenían un mayor riesgo de no ser vulnerables. Hubo una asociación entre permanecer vulnerable y el aislamiento social autoinformado. **Conclusión:** La mayoría de los ancianos evaluados permanecieron en la misma clasificación IVCF-20.

Descriptores: Atención Primaria de Salud; Enfermería Geriátrica; Anciano; Vulnerabilidad en Salud

INTRODUCTION

Aging is a phenomenon of global magnitude intrinsic to all human beings.[1] Functional capacity refers to an individual's ability to perform daily activities that allow them to exercise autonomy and independence. Due to morphological, functional, biological, and psychological changes that occur in the body, this capacity can decline over the years.[2] In addition to reduced functional capacity, elderly people have a greater risk of vulnerability and a higher incidence of diseases, especially chronic non-communicable diseases (NCDs).[3] In this scenario, Primary Health Care (PHC) is primarily responsible for developing health promotion and disease prevention strategies, as well as tracking potentially harmful conditions, such as frailty.[4]

Frailty is a multidimensional syndrome characterized by a decrease in homeostatic reserve and/or the ability to adjust to biopsychosocial problems, which lead to greater functional decline. Several conditions can lead to frailty and adverse

outcomes, both clinical-functional and socio-familial.[2] However, some older adults are more vulnerable than others, and while chronological age is useful for characterizing this group and aiding in the development of public policies, it alone is not the best indicator for highlighting an individual's health status. Therefore, it is important to identify older adults who are more vulnerable to adverse outcomes such as falls, hospitalizations, institutionalization, and death.[2]

There are several instruments developed to assess the frailty of elderly people in PHC, one of which is specifically aimed at the conception of frailty according to the greatest vulnerability to functional decline, the Clinical-Functional Vulnerability Index-20 (IVCF-20).[2] This instrument was recommended by the Ministry of Health during the COVID-19 pandemic, aiming to facilitate risk stratification and management of elderly people in PHC[4]; and has been used in several studies in Brazilian territory[3.5,6]; however, none of them used the instrument in a longitudinal study.

Previous research using other instruments indicates that frailty trajectories can be influenced by sociodemographic aspects, social support, physical activity, and brain diseases.[7] Sociodemographic factors (increasing age, female sex, education), physical factors (low weight/malnutrition), lifestyle factors (low levels of physical activity, smoking, alcohol consumption, poor sleep), social factors (living alone), and health factors (polypharmacy) were also identified as risk factors for frailty in another systematic review.[8]

However, the conceptualization of frailty and the measurement instrument vary between studies, highlighting the need for investigations with different instruments and more longitudinal studies to identify the risk factors for frailty trajectories, helping in the prevention of the syndrome and its treatment.[7] These studies should focus especially on low- and middle-income countries, where they are scarce.[9] The assessment of variables that may be related to frailty should include relevant data related to health, but which are not directly assessed by the IVCF-20.[5]

Considering that the IVCF-20 is a simple and quick instrument to be applied in PHC, which has been used in research in Brazil, and that its use is recommended in longitudinal studies, to monitor vulnerability[1,2]; this study aimed to compare the clinical-functional vulnerability of older adults treated in PHC before and during the COVID-19 pandemic and to analyze the factors associated with changes (becoming vulnerable and non-vulnerable) and maintenance (remaining vulnerable and non-vulnerable) of the

classification, in order to support interventions and prevention programs.

METHOD

This is a longitudinal, quantitative study with a two-year follow-up assessment conducted at Family Health Units (FHUs) in the municipality of Três Lagoas, Mato Grosso do Sul, Mato Grosso do Sul, Brazil. According to the 2010 census, the city had 101,791 inhabitants, 10 of whom 9.9% were elderly (≥60 years). In 2018, there were nine FHUs in the city (41.1% coverage).

The inclusion criteria for the sample were being 60 years of age or older, registered with one of the nine USFs in the municipality, and being able to answer the interview questions (as assessed by the interviewer's perception). Participants were randomly selected from a list of all individuals over 60 provided by the health teams.

The baseline assessment took place between November 2018 and June 2019. To calculate the sample size, the proportion estimation formula for a finite population was used, with a significance level of alpha 5% (alpha = 0.05), a sampling error of 5% (e = 0.05), an estimate of 50% (p = 0.50), and a finite population of N = 200. The minimum sample size was 132 older adults, to which an additional 10% was added to mitigate possible losses, resulting in 145 participants. It was established that at least 16 participants would be evaluated in each USF in the municipality. However, during the data collection, 153 individuals were interviewed.

The follow-up assessment was carried out between February and December 2021. All participants in the baseline assessment were contacted to participate in the reassessment, and after exclusions due to death (n=10), refusal (n=8), not being found at home after three attempts at alternate times (n=12), address not found due to outdated registration (n=5) and change of address (n=9), 109 participants were reassessed (71.2% of the total baseline sample).

The assessments were conducted by trained evaluators in the elderly individuals' homes or at the USF facilities and lasted approximately 40 minutes each. Follow-up assessments occurred, on average, 2.4 years after the baseline assessment.

The dependent variable was clinical-functional vulnerability, assessed by the IVCF-20, which was administered in both the baseline and follow-up assessments. The IVCF-20 covers multidimensional aspects of older adults' health status. It contains 20 questions that assess age, self-perceived health, functional disabilities, cognition, mood, mobility, communication, and multiple comorbidities. The score ranges from 0 to 40 points, with higher scores indicating a greater risk of clinical-

functional vulnerability. The cutoff point used was that suggested in the article that proposed the instrument: 0-6 points, representing a non-vulnerable/non-frail older adult, and ≥7 points, representing a vulnerable/frail older adult.[2] Participants were divided into four groups of older adults: (1) were vulnerable and became non-vulnerable; (2) were not vulnerable and became vulnerable; (3) were not vulnerable and remained non-vulnerable; and (4) were vulnerable and remained vulnerable.

The variables collected in the baseline assessment were:

- Sociodemographic data: sex (male/female), education (0-4 years/>4 years), marital status (with and without partner), family income (up to two minimum wages/>2 minimum wages/no information).

- Social assessment: number of people living in the house of the elderly person (continuous), participation in social groups (yes/no), participation in leisure activities (yes/no) and self-reported social isolation (yes/no).

- Lifestyle habits: smoking (yes/no), alcohol use (yes/no), physical activity (active)elderly people who practiced at least 150 minutes of moderate physical activity or 75 minutes of vigorous activity per week, according to the International Physical Activity Questionnaire - IPAQ short version), number of meals per day (continuous), average number of hours of sleep per night (continuous).

The age of the participants was also collected for characterization purposes, as this is data contained in the IVCF-20 instrument.

Data were entered into Microsoft Office Excel™ using double entry, followed by validation and verification. Descriptive and exploratory data analyses were performed. Next, vulnerability, as assessed by the IVCF-20 in 2021, was compared with the assessment conducted in 2018/19. The paired-sample t-test was used for continuous data and Bowker's symmetry test for categorical data. Robust variance Poisson regression models were then estimated for each independent variable and the outcomes categorized as becoming vulnerable, becoming non-vulnerable, remaining non-vulnerable, and remaining vulnerable. Based on the regression model coefficients, crude relative risks for each variable were estimated, with their respective 95% confidence intervals. Variables with $p<0.20$ in the individual analyses were analyzed in a robust variance Poisson multiple regression model. Variables with $p<0.05$ in the multiple model were retained in the final models. Model fit was assessed using AIC (Akaike Information Criterion). All analyses were performed using the Statistical Package for

the Social Sciences (SPSS) program and a significance level of 5%.

The work was approved by the Human Research Ethics Committee of the Federal University of Mato Grosso do Sul (reports no. 2,596,194 and 4,467,405). All participants read and signed the Informed Consent Form (ICF) before the two interviews.

RESULTS

Table 1 shows the characterization data for the general sample and according to changes in vulnerability. The majority of the sample was female, with up to four years of schooling, without a partner, and with a family income of up to two minimum wages.

The mean age of participants at the baseline assessment was 69.9±7.5 years and at the follow-up assessment 72.3±7.6. The mean IVCF-20 score at the first assessment was 9.54±7.31 and at the second, 10.20±7.11, with no significant difference (p=0.306).

Table 1. Sociodemographic and health characterization of older adults and elderly people assessed (n=109) according to changes in clinical-functional vulnerability.

Variable n (%) or mean (standard deviation)	Category	Total (n=109)	Clinical-functional vulnerability			
			Becoming non-vulnerable (n=11)	Becoming vulnerable (n=18)	Remaining non-vulnerable (n=31)	Staying vulnerable (n=49)
Gender	Masculine	46(42.2)	3(6.5)	8(17.4)	19(41.3)	16(34.8)
	Feminine	63(57.8)	8(12.7)	10(15.9)	12(19.0)	33(52.4)
Education (years)	0-4	72(66.1)	6(8.3)	13(18.1)	18(25.0)	35(48.6)
	More than 4	37(33.9)	5(13.5)	5(13.5)	13(35.1)	14(37.8)
Marital status	With partner	53(48.6)	4(7.5)	7(13.2)	18(34.0)	24(45.3)
	No partner	56(51.4)	7(12.5)	11(19.6)	13(23.2)	25(44.6)
Family income	>2 SM	27(24.8)	2(7.4)	5(18.5)	11(40.7)	9(33.3)
	Up to 2SM	57(52.3)	6(10.5)	10(17.5)	16(28.1)	25(43.9)
	NI	25(22.9)	3(12.0)	3(12.0)	4(16.0)	15(60.0)
Nº people/house	-	2.9(1.7)	3.3(2.1)	3.2(1.9)	2.8(1.5)	2.9(1.8)
Social groups	Yes	68(62.4)	5(7.4)	12(17.6)	17(25.0)	34(50.0)
Leisure activities	Yes	44(40.4)	3(6,8)	8(18.2)	16(36.4)	17(38.6)
Social isolation	Yes	25(22.9)	2(8.0)	2(8.0)	3(12.0)	18(72.0)
Smoking	Yes	17(15.6)	4(23.5)	1(5.9)	6(35.3)	6(35.3)
Alcohol use	Yes	24(22.0)	2(8,3)	2(8,3)	12(50.0)	8(33.3)
Physical inactivity	Yes	65(59.6)	6(54.5)	9(50.0)	18(27.7)	32(49.2)
Meals/day	-	3.1(1.0)	2.8(0.8)	3.3(0.8)	3.5(1.1)	2.9(1.1)
Hours of sleep/night	-	6.6(1.9)	5.4(1.8)	7.0(1.8)	6.7(1.6)	6.7(2.1)

SM: minimum wage. NI: Not provided.

Table 2 shows the comparison of the clinical-functional vulnerability of the participants between the two assessments, which showed that the majority of participants (45.0%) remained in the vulnerable category. The changes were not significant.

Table 2. Analysis of variation in clinical-functional vulnerability from 2018/2019 to 2021 (n=109).

2018/2019 Assessment	2021 Assessment	
	Not vulnerable	Vulnerable
	Frequency (1%)	
Not vulnerable	31 (28.4%)	18 (16.5%)
Vulnerable	11 (10.1%)	49 (45.0%)

[1]Percentages in relation to the total sample. p=0.265

Table 3 presents the regression analyses of the factors associated with becoming non-vulnerable and becoming vulnerable; and Table 4 presents the regression analyses of the factors associated with becoming non-vulnerable and becoming vulnerable.

Older adults who smoke have an increased risk of becoming non-vulnerable, just as each additional hour an older adult sleeps per night reduces their risk of becoming non-vulnerable. No variables were associated with becoming vulnerable.

For elderly people who remained non-vulnerable, there was an association between the sex variables, with women having a lower risk of remaining non-vulnerable, elderly people who consume alcohol having an increased risk, as well as elderly people who eat more meals per day.

Furthermore, those who considered themselves socially isolated are at greater risk of remaining vulnerable.

Table 3. Analysis of the associations between becoming vulnerable and not vulnerable according to the clinical-functional assessment (n=109).

Variable	Category	Become non-vulnerable				Become vulnerable			
		Crude RR (95% CI)	p-value	Final RR (95% CI)	p-value	Crude RR (95% CI)	p-value	Final RR (95% CI)	p-value
Gender	Masculine	Ref				Ref			
	Feminine	1.95 (0.55-6.94)	0.30	-	-	0.91 (0.39-2.13)	0.83	-	-
Education (years)	0-4	Ref				Ref			
	More than 4	0.91 (0.28-2.93)	0.88	-	-	0.80 (0.32-1.96)	0.62	-	-
Marital status	With partner	Ref				Ref			
	No partner	1.66 (0.51-5.33)	0.39	-	-	1.49 (0.62-3.55)	0.37	-	-
Family income	Up to 2SM	Ref				Ref			
	>2 SM	0.70 (0.15-3.26)	0.65	-	-	1.06 (0.40-2.79)	0.91	-	-
	No information	-		-	-	-	-		
Number of people in the house	-	1.11 (0.82-1.50)	0.51	-	-	1.07 (0.86-1.35)	0.52	-	-
Social groups	Yes	0.50 (0.16-1.54)	0.23			1.20 (0.49-2.97)	0.68	-	-
	No	Ref		-	-	Ref			
Leisure activities	Yes	0.55 (0.16-1.97)	0.36	-	-	1.18 (0.51-2.76)	0.70	-	-
	No	Ref				Ref			
Social isolation	Yes	0.75 (0.17-3.23)	0.70	-	-	1.42 (0.10-1.70)	0.23	-	-
	No	Ref				Ref			
Smoking	Yes	3.09 (1.01-9.42)	0.04	2.96 (1.02-8.62)	**0.04**	0.32 (0.05-2.24)	0.25	-	-
	No	Ref		Ref		Ref			
Alcohol use	Yes	0.79 (0.18-3.40)	0.75	-	-	0.44 (0.11-1.79)	0.25	-	-
	No	Ref				Ref			
Physical inactivity	Yes	1.23 (0.40-3.79)	0.72	-	-	1.48 (0.64-3.43)	0.36	-	-
	No	Ref				Ref			
Meals/day		0.73 (0.45-1.18)	0.20	-	-	1.21 (0.90-1.63)	0.21	-	-

Variable	Category	Become non-vulnerable				Become vulnerable			
		Crude RR (95% CI)	p-value	Final RR (95% CI)	p-value	Crude RR (95% CI)	p-value	Final RR (95% CI)	p-value
Hours of sleep/night		0.64 (0.42-0.99)	0.04	0.66 (0.44-0.99)	**0.04**	1.10 (0.92-1.33)	0.29	-	-

Ref: Reference category for the independent variables. RR: Relative risk. CI: Confidence interval. AIC (empty model – becoming vulnerable)=81.35; AIC (final model – becoming vulnerable)=70.50.

Table 4. Analysis of associations with the maintenance of frailty and non-frailty according to the clinical-functional assessment (n=109).

Variable	Category	Keep yourself from being vulnerable				Stay vulnerable			
		Crude RR (95% CI)	p-value	Final RR (95% CI)	p-value	Crude RR (95% CI)	p-value	Final RR (95% CI)	p-value
Gender	Masculine	Ref		Ref		Ref			
	Feminine	0.46 (0.25-0.85)	0.01	0.55 (0.32-0.98)	**0.04**	1.50 (0.95-2.39)	0.08	1.24 (0.77-2.01)	0.38
Education (years)	0-4	Ref		Ref		Ref			
	More than 4	1.50 (0.83-2.7)	0.18	1.58 (0.94-2.66)	0.09	0.85 (0.54-1.32)	0.47	-	-
Marital status	With partner	Ref				Ref			
	No partner	0.68 (0.37-1.25)	0.22	-	-	0.99 (0.65-1.49)	0.95	-	-
Family income	Up to 2SM	Ref				Ref			
	>2 SM	1.45 (0.78-2.69)	0.24	-	-	0.76 (0.41-1.40)	0.38	-	-
	No information	-		-	-	-	-		
Number of people in the house	-	0.95 (0.80-1.13)	0.54	-	-	0.98 (0.86-1.11)	0.72	-	-
Social groups	Yes	0.73 (0.41-1.32)	0.30	-	-	1.37 (0.86-2.18)	0.19	1.25 (0.82-1.91)	0.31
	No	Ref				Ref		Ref	
Leisure activities	Yes	1.58 (0.87-2.85)	0.13	0.55 (0.90-2.65)	0.11	0.79 (0.50-1.23)	0.29	-	-
	No	Ref		Ref		Ref			
Social isolation	Yes	0.36 (0.12-1.09)	0.07	0.66 (0.22-2.00)	0.46	1.95 (1.35-2.83)	<0.01	1.74 (1.13-2.69)	**0.01**
	No	Ref		Ref		Ref			
Smoking	Yes	1.30 (0.63-2.68)	0.48	-	-	0.76 (0.38-1.49)	0.42	-	-

Variable	Category	Keep yourself from being vulnerable				Stay vulnerable			
		Crude RR (95% CI)	p-value	Final RR (95% CI)	p-value	Crude RR (95% CI)	p-value	Final RR (95% CI)	p-value
Alcohol use	No	Ref				Ref			
	Yes	2.24 (1.27-3.93)	<0.01	1.92 (1.14-3.24)	**0.01**	0.69 (0.38-1.27)	0.23	-	-
Physical inactivity	No	Ref		Ref		Ref			
	Yes	1.07 (0.58-1.95)	0.83	-	-	0.78 (0.50-1.23)	0.28	-	-
Meals/day	-	1.37 (1.07-1.75)	0.01	1.29 (1.06-1.59)	**0.01**	0.78 (0.62-0.98)	0.04	0.84 (0.67-1.06)	0.14
Hours of sleep/night	-	1.03 (0.90-1.19)	0.65	-	-	1.02 (0.92-1.14)	0.73	-	-

Ref: Reference category for the independent variables. RR: Relative risk. CI: Confidence interval. AIC (empty model - remain non-vulnerable)=165.28; AIC (final model - remain non-vulnerable)=140.55. AIC (empty model - remain vulnerable)=197.05; AIC (final model - remain vulnerable)=179.17.

DISCUSSION

This study assessed factors related to changes and maintenance in frailty classification categories, as assessed by the IVCF-20. The majority of the sample remained in the vulnerable category, followed by those who remained in the non-vulnerable category.

The sample of this study is similar to that of other studies that applied the IVCF-20 in Brazil, with the majority being female, young, and with low income and education levels[3,5,6], which reflects the situation of older adults in Brazil. The IVCF-20 score is also similar to that of other studies, between nine and ten points.[3,5] Other variables such as low prevalence of smoking and alcohol consumption, the presence of physical inactivity, and reports of social isolation and/or small-group living arrangements were also identified.[3,5,6] It is recommended that future studies seek to reach groups that have been understudied, such as men, older individuals, those using supplementary health insurance, among others, aiming to broaden the understanding of frailty trajectories in Brazil.

Older people who smoked were at greater risk of becoming non-vulnerable. The relationship between vulnerability and smoking has already been described in the literature. A study of 2,542 older people in England found that those who smoked were twice as likely to develop frailty compared to those who did not.[11] A systematic review found that smoking at baseline was associated with the development and worsening of frailty at follow-up.[12] And another systematic review found that current smokers had a higher risk of frailty, but this was not true for former smokers[13], indicating that smoking cessation may be beneficial for preventing frailty. Because the evidence is robust and the data diverge from those found in the current investigation, we suggest further research be conducted with older adults in this region of Brazil to determine whether the result was found by chance or if another variable could explain the relationship.

Regarding sleep, older adults who slept more hours per night were less likely to become non-vulnerable, indicating that sleeping less may be beneficial for reversing frailty. A cross-sectional study using the IVCF-20 found that difficulty sleeping is related to clinical-functional vulnerability.[5] Poor quality sleep is one of the risk factors for frailty.[8] Previous studies point to the result that sleeping few hours, that is, less time than recommended, is related to an increased risk of having and developing frailty.[14,15] However, studies also indicate that long sleep, that is, sleeping many hours per night, can lead to the development of the syndrome, due to damage to the immune system and reduced levels of daily physical activity.[14,15] This

result corroborates that of the present study and highlights the importance of health professionals' approach to sleep (i.e., number of hours of sleep per night and assessment of sleep quality) to prevent frailty syndrome. It is important for individuals to maintain the recommended number of hours of sleep (7-8 hours)[14], and this guidance should be provided by a health professional.

Women had a lower risk of remaining in the non-vulnerable category. A systematic review found that women have higher frailty scores across all age categories compared to men.[16] Other reviews indicate that being female increases the risk of frailty.[7,8] However, national studies that used the IVCF-20 and evaluated the relationship between vulnerability and sex are inconclusive. While some point to a higher prevalence of frailty in women[5,6], another did not identify significant results for this variable.[3] The importance of screening and assessing frailty is highlighted, especially in women, who should be the main target of interventions to prevent and treat the syndrome.

Alcohol use was associated with a higher chance of participants remaining non-vulnerable. A systematic review evaluated four studies and found, in three of them, that alcohol consumption was significantly associated with a reduced risk of incident frailty.[17] Another review found similar results, and alcohol consumption was negatively associated with frailty.[18] Other investigations that used the IVCF-20 identified that alcohol consumption is not associated with clinical-functional vulnerability.[3.5] Alcohol consumption among older adults may be associated with greater participation and the creation of social bonds, reducing isolation and preserving their dynamism, which may help prevent frailty. However, it is noteworthy that other studies have shown that alcohol use can be a risk factor for frailty.[8] It is recommended that, in addition to assessing alcohol use, the amount consumed (e.g., weekly) be assessed to clarify the relationship between alcohol and frailty. Despite the controversial results, health professionals have an important role in providing guidance on the harms of alcohol, especially when consumed in large quantities.

Older adults who ate more meals per day also had a higher risk of remaining non-vulnerable. A systematic review found that older adults who ate a healthy diet, scored higher on the diet assessment, and consumed more fruits and vegetables were less likely to be frail.[18] Another review showed that participants with low weight and malnutrition have a higher risk of developing frailty.[8] A study that evaluated the factors associated with the risk of clinical-functional vulnerability using the

IVCF-20 included the variable number of meals per day, but found no significant results.[5] No studies have been identified that evaluated the longitudinal relationship between frailty and the number of meals per day. However, it is known that the habit of eating at least three main meals a day (breakfast, lunch, and dinner) is associated with a healthy diet. Furthermore, beyond the number of meals, their quality is also important for promoting healthy aging.

Finally, there was a significant association between remaining vulnerable and self-reported social isolation. A study using the IVCF-20 found that older adults who reported social isolation were more likely to be vulnerable.[5] The feeling of social isolation may be related to the perception of feeling alone (loneliness) and also to the lack of social contacts and activities[19], which may reflect marital status, number of friends, group membership, among others. Previous systematic reviews have shown that there is a significant relationship between living alone and frailty.[8,20] High levels of loneliness and social isolation are associated with an increased risk of worsening frailty status, and high levels of loneliness may impede the reversal of frailty to non-frailty.[18] A study conducted in Japan during the pandemic observed a 16% incidence of frailty in older people who were not frail, showing that isolation and social distancing and low rates of physical activity resulting from the pandemic contributed to increased frailty.[21] Loneliness and social isolation should not be considered acceptable and need to be evaluated even when the individual does not have other health problems.[19] Therefore, the need to develop and apply interventions aimed at these aspects is highlighted.

CONCLUSION

When administering the IVCF-20 after 2.4 years to community-dwelling older adults, it was observed that most participants remained in the same assessment category. Some of the sample became non-vulnerable, reverting to their previous vulnerable condition; and some became vulnerable, meaning their condition worsened. Factors associated with becoming non-vulnerable were smoking and fewer hours of sleep per night. Being female was associated with a lower risk of remaining non-vulnerable, and alcohol use and eating more meals per day increased the risk of remaining non-vulnerable. Self-reported social isolation was associated with a higher risk of remaining vulnerable.

The results of this study should be analyzed considering some limitations. Despite efforts to maintain the sample size in the follow-up assessment, sample loss was significant. The data cannot be generalized because it is a small sample

from a single Brazilian municipality. The dependent variable was the assessment with the IVCF-20, an instrument with high validity and reliability. However, other variables were assessed with self-reported questions that are subject to participant recall bias. Data collection for the follow-up assessment took place during 2021, when we were still experiencing peak COVID-19 outbreaks, which may have influenced participant responses. The concept of frailty/vulnerability used to create the IVCF-20 instrument was one, but we acknowledge that writing the manuscript with data from studies that used other instruments and, consequently, other concepts, may be a limitation. It is also noteworthy that we found no variables significantly associated with the development of frailty over the two-year period, which could inform prevention of the syndrome. Despite the limitations, the results of this study point to the need for early recognition of elderly people in vulnerable conditions and, because they are longitudinal data, they allow the assessment of cause and consequence, which strengthens the study.

Clinical-functional vulnerability in older adults, according to the multidimensional concept addressed by the IVCF-20, remains understudied in developing countries like Brazil, especially in the state of Mato Grosso do Sul. In this sense, the high prevalence of clinical-functional vulnerability is related to unfavorable conditions in the aging process, such as economic, psychological, social, and health care deficiencies. The results of this study can help guide care for older adults in PHC, fostering improvements in clinical practice and multidisciplinary care, providing support for the multidisciplinary team to establish specific intervention strategies. Older adults who are not vulnerable should receive health promotion interventions, focusing on women and those who eat few meals per day. Alcohol consumption was also a positive result; however, this data should be interpreted with caution. Furthermore, treatment and rehabilitation interventions should be targeted at older adults in social isolation, as they are at greatest risk of remaining vulnerable. Other data, such as smoking and fewer hours of sleep per night, although appearing in our results, are inconclusive.

These actions implemented within the scope of PHC can contribute to integrated care and active aging of the population, as well as the reduction of adverse outcomes, such as hospitalization, institutionalization and morbidity and mortality rates.

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