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Eating patterns and common mental disorders in adults and older adults

Padrões alimentares e transtornos mentais comuns em adultos e idosos

Hábitos alimentarios y trastornos mentales comunes en adultos y personas mayores

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ABSTRACT

Objective: To investigate the association between dietary patterns and common mental disorders (CMDs) in adults and older adults. **Methods:** This is a population-based, household-based cross-sectional study conducted with 488 individuals aged ≥20 years. The Self-Rating Questionnaire-20 (SRQ-20) was used to identify the presence of CMDs. Dietary patterns were obtained using Principal Component Analysis based on a 24-hour dietary recall. Prevalence ratios and their respective 95% confidence intervals were estimated using Poisson regression models with robust variance. **Results:** CMDs were more prevalent among women and individuals with lower levels of education and income. Higher consumption (3rd tertile) of the traditional dietary pattern was associated with a 34% lower prevalence of CMDs (unadjusted model). In contrast, the ultra-processed diet pattern (2nd tertile) was associated with a higher prevalence of CMDs by 51% (unadjusted) and 48% (adjusted). **Conclusion:** The findings underscore the importance of investigating the consumption of ultra-processed foods as a factor associated with CMDs, especially given the association observed in the second tertile.

Keywords: Diet, Mental disorders, Processed food, Mental health.

RESUMO

Objetivo: Investigar a associação entre padrões alimentares e transtornos mentais comuns (TMCs) em adultos e idosos. **Métodos:** Trata-se de um estudo transversal de base populacional e domiciliar, realizado com 488 indivíduos com idade ≥20 anos. O Questionário de Autoavaliação-20 (SRQ-20) foi utilizado para identificar a presença de TMCs. Os padrões alimentares foram obtidos por meio da Análise de Componentes Principais, com base em um recordatório alimentar de 24 horas. As razões de prevalência e seus respectivos intervalos de confiança de 95% foram estimadas utilizando modelos de regressão de Poisson com variância robusta. **Resultados:** Os TMCs foram mais prevalentes entre mulheres e indivíduos com níveis mais baixos de escolaridade e renda. O maior consumo (3º tercil) do padrão alimentar tradicional foi associado a uma prevalência 34% menor de TMCs (modelo não ajustado). Em contrapartida, o padrão alimentar ultraprocessado (2º tercil) foi associado a uma prevalência 51% maior (não ajustado) e 48% maior (ajustado) de TMCs. **Conclusão:** Os achados reforçam a importância de investigar o consumo de ultraprocessados como fator associado aos TMCs, especialmente diante da associação observada no segundo tercil.

Palavras-chave: Dieta, Transtornos mentais, Alimento processado, Saúde mental.

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RESUMEN

Objetivo: Investigar la asociación entre los hábitos alimentarios y los trastornos mentales comunes (TMC) en adultos y personas mayores. **Métodos:** Se trata de un estudio transversal de base poblacional y domiciliario, realizado con 488 personas de 20 años o más. Se utilizó el Cuestionario de Autoevaluación-20 (SRQ-20) para identificar la presencia de TMC. Los patrones alimentarios se obtuvieron mediante el Análisis de Componentes Principales, a partir de un registro alimentario de 24 horas. Las razones de prevalencia y sus respectivos intervalos de confianza del 95 % se estimaron utilizando modelos de regresión de Poisson con varianza robusta. **Resultados:** Los TMC fueron más frecuentes entre las mujeres y las personas con menores niveles de escolaridad e ingresos. El mayor consumo (tercil 3) del patrón alimentario tradicional se asoció a una prevalencia un 34 % menor de TMC (modelo no ajustado). Por el contrario, el patrón alimentario ultraprocesado (tercil 2) se asoció a una prevalencia un 51 % mayor (no ajustado) y un 48 % mayor (ajustado) de TMC. **Conclusión:** Los resultados refuerzan la importancia de investigar el consumo de alimentos ultraprocesados como factor asociado a los TMC, especialmente a la vista de la asociación observada en el segundo tercil.

Palabras clave: Dieta, Trastornos mentales, Alimentos procesados, Salud mental.

INTRODUCTION

Common mental disorders (CMDs), also known as minor (nonpsychotic) mental disorders, are a category that includes symptoms such as fatigue, irritability, forgetfulness, difficulty concentrating, insomnia, and somatic symptoms, which do not meet the established criteria for a diagnosis of depression and/or anxiety but constitute a significant portion of the global disease burden. They have a considerable impact on morbidity, mortality, and reduced quality of life among individuals of all ages, and are particularly harmful to older adults, resulting in a socioeconomic burden for both patients and society (GBD 2019 MENTAL DISORDERS COLLABORATORS, 2022; VALENÇA NETO PF, et al., 2023).

Data from the World Health Organization reveal that 1 in 7 people worldwide lives with a mental disorder, which corresponds to 970 million people; these disorders can severely affect daily life and cause long-term suffering if they are not properly identified and treated (WORLD HEALTH ORGANIZATION, 2025). In Brazil, approximately 40 million people have been diagnosed with a mental disorder (GBD 2019 MENTAL DISORDERS COLLABORATORS, 2022), making it the country with the second-highest rate of disability-adjusted life years (DALYs) due to mental disorders in the Americas (PAN AMERICAN HEALTH ORGANIZATION: PAHO/WHO, 2021).

Epidemiological studies show that the prevalence of mental disorders is higher among older adults, women, individuals with health-risk behaviors (associated with tobacco use and alcohol consumption), those who are physically inactive, those with pre-existing chronic conditions, and those with lower educational attainment and lower income; these disorders have multifactorial and complex origins, influenced by biological, psychological, and social factors (COUTINHO LMS, et al., 2014; VALENÇA NETO PF, et al., 2023).

Furthermore, evidence suggests that current dietary patterns may influence this condition, characterizing a nutritional transition observed primarily in Western countries, marked by increased consumption of highly processed foods, saturated fats, sugars, and red meat, and declining intake of fiber, vegetables, fruits, and polyunsaturated fatty acids (HECHT EM, et al., 2022; MONTEIRO CA, et al., 2019; POPKIN B, 2020).

Hecht EM, et al. (2022), in a study of adults, found that those who consumed ultra-processed foods (UPFs) had more mental health-related symptoms. The physiological mechanisms remain inconclusive, but additives used for preservation, flavoring, and coloring may alter neuronal mitochondrial function, contributing to inflammation, nutrient and neurotransmitter deficiencies, demyelination, and gut-brain axis alterations affecting neurotransmitter production. Studies also point to associations between a traditional diet and a reduction in depressive symptoms, while pro-inflammatory foods, such as sweets, pastries, butter, refined flours, fatty foods, red meat, and UPFs, are associated with an exacerbation of these symptoms (CHEN H, et al., 2023; LJUNGBERG T, et al., 2020; POPKIN B, 2020).

Although the relationship between diet and mental health is significant, there are gaps in our understanding of the impact of dietary intake on mental disorders in the Brazilian population. Investigating this issue is urgent due to the growing consumption of UPFs, a modifiable risk factor. This study aims to analyze the association between dietary patterns and CMDs in adults and older adults in a capital city in the Northeast, taking into account socioeconomic and lifestyle factors, with the goal of informing health promotion strategies.

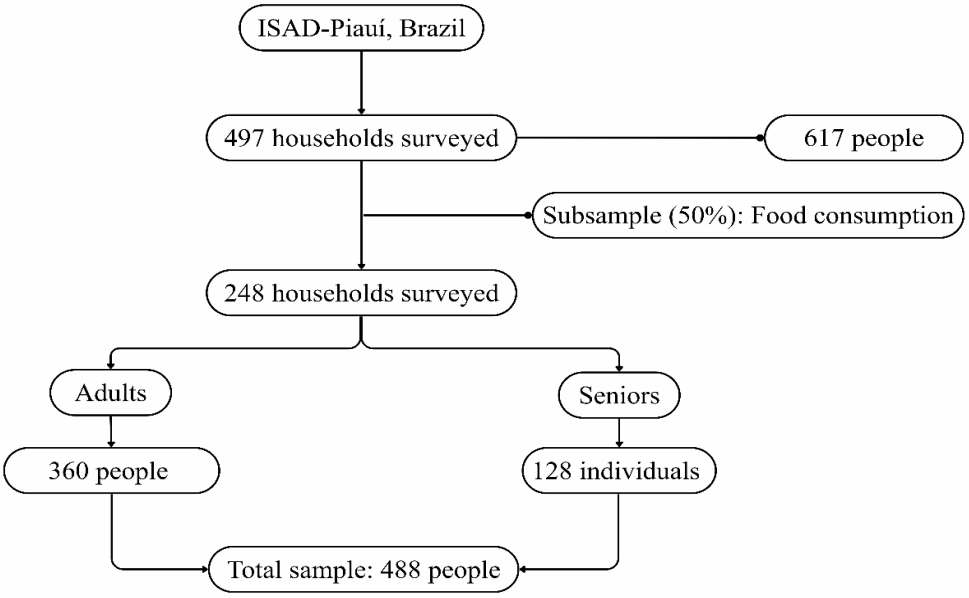
METHODS

Study Design and Sample

This is a population-based, household-based cross-sectional study that used data from the Piauí Household Health Survey (ISAD-PI, 2018–2020). The study assessed the general living conditions and health profile of the population. The analytical sample comprises a representative sample of adults (ages 20–59) and older adults (≥ 60 years) residing in private households in the municipality of Teresina, Piauí, Brazil.

The sampling method was a complex probability cluster sample, involving two stages: the census tract (Primary Sampling Units—PSUs) and the household, based on 2010 census data from the Instituto Brasileiro de Geografia e Estatística (IBGE) (2010). To ensure the sample's representativeness, it was decided that 30 PSUs in the capital would be selected with equal probability. Taking into account potential losses that may occur for various reasons during data collection and assuming a 90% response rate, the sample size was set at 497 households. Of the total households visited, only 50% were invited to report their food intake using a 24-hour recall, resulting in a sample of 617 individuals, of whom 488 completed all questionnaires for this study, as shown in **Figure 1**. Further details on the sampling plan for this study are presented by Rodrigues LARL, et al. (2021).

Figure 1 - Flowchart of the sample selection process.



Source: Araujo AM, et al., 2026.

Eligibility criteria

Individuals aged 20 years or older, of both sexes, who were permanent residents of private households in the urban area of Teresina, Piauí, Brazil, were eligible for this study. Inclusion was contingent upon formal agreement through the signing of the Informed Consent Form (ICF). Exclusion criteria included: (a) residents of group housing; (b) residents of households that remained closed after three consecutive attempts to visit; and (c) individuals with cognitive or physical disabilities or limitations that would prevent them from completing the questionnaires or undergoing anthropometric assessment.

Data collection

Data collection took place from September 2018 to February 2020, using the IBGE's digital grids (IBGE, 2021). Streets and/or blocks were always traversed in a clockwise direction to count and identify the randomly selected households.

Data collected included demographic information (age and sex), socioeconomic information (income, education level, marital status), lifestyle information (alcohol consumption, smoking, and physical activity), anthropometric measurements, dietary intake (using a 24-hour recall), and screening for common mental disorders (Self-Reporting Questionnaire 20). To collect this data, structured questionnaires were used, adapted from surveys previously employed in Brazilian studies such as "ISA 2008: Health Surveys in the City of São Paulo (CESAR CLG, et al., 2009)," as well as those used in the National Health Survey conducted by the IBGE (2014).

Physical activity levels were measured using the International Physical Activity Questionnaire (IPAQ) (CRAIG CL, et al., 2003), the long version for adults and the short version for older adults. All questionnaires were administered by previously trained researchers using the Epicollect 5® app (Imperial College London) on mobile devices (https://five.epicollect.net/project/isad).

Dietary pattern data

The 24-hour dietary recall (R24h) was administered to the pre-selected subsample (corresponding to 50% of the households initially listed), following the five steps of the Multiple Pass Method (MOSHFEGH AJ, et al., 2008); subsequently, the reported foods were quantified, and the portions measured using household units were standardized in grams or milliliters with the aid of specialized food composition tables (PINHEIRO ABV, 2009). To estimate usual food intake and minimize the effect of intrapersonal variability, the R24h was reapplied after two months in approximately 40% of this subsample, and the data from the two measurements were combined using the Multiple Source Method (MSM). The estimates of usual intake obtained using the MSM were subsequently used to construct dietary patterns via principal component analysis (PCA).

Derivation of dietary patterns

The analyses were based on reported food intake and the identification of food groups mentioned in the 24-hour recall. More than 800 food items consumed were identified and grouped into 21 subgroups, taking into account frequency of consumption, similarity in nutritional composition, modes of consumption, and their interrelationships.

To identify dietary patterns, the a posteriori method was used, with Principal Component Analysis (PCA) performed on the 21 dietary subgroups. To verify the applicability criteria for factor analysis, the Kaiser-Meyer-Olkin (KMO) test was used, with KMO values > 0.5 considered acceptable. In this study, the KMO test yielded a value of 0.512; although this value is close to the recommended minimum threshold, it indicates borderline suitability of the sample for factor analysis (KAISER HF and RICE J, 1974).

To determine the number of factors to be retained, the scree plot, a graphical representation of the eigenvalues (eigenvalues > 1.45), and the interpretability of the factors were analyzed; factor loadings with values ≥ 0.25 were considered components of the factor. The criteria of eigenvalue (>1.45) and factor loading (≥0.25) adopted to define and retain dietary patterns followed established recommendations for exploratory factor analysis (MATTAR JB, et al., 2025).

The dietary patterns were named based on the foods with the highest factor loadings and in accordance with cultural aspects, categorizing them as "traditional," "bakery," and "ultra-processed." Varimax orthogonal rotation was used to facilitate data interpretation.

Anthropometric data

Body Mass Index (BMI) was calculated as the ratio of body weight (kg) to the square of height (m), with nutritional status classified according to the World Health Organization (2000) criteria for adults and Lipschitz's references for older adults (≥60 years) (LIPSCHITZ DA, 1994). Waist circumference (WC) was measured according to the World Health Organization (1995) protocol.

Common mental disorders

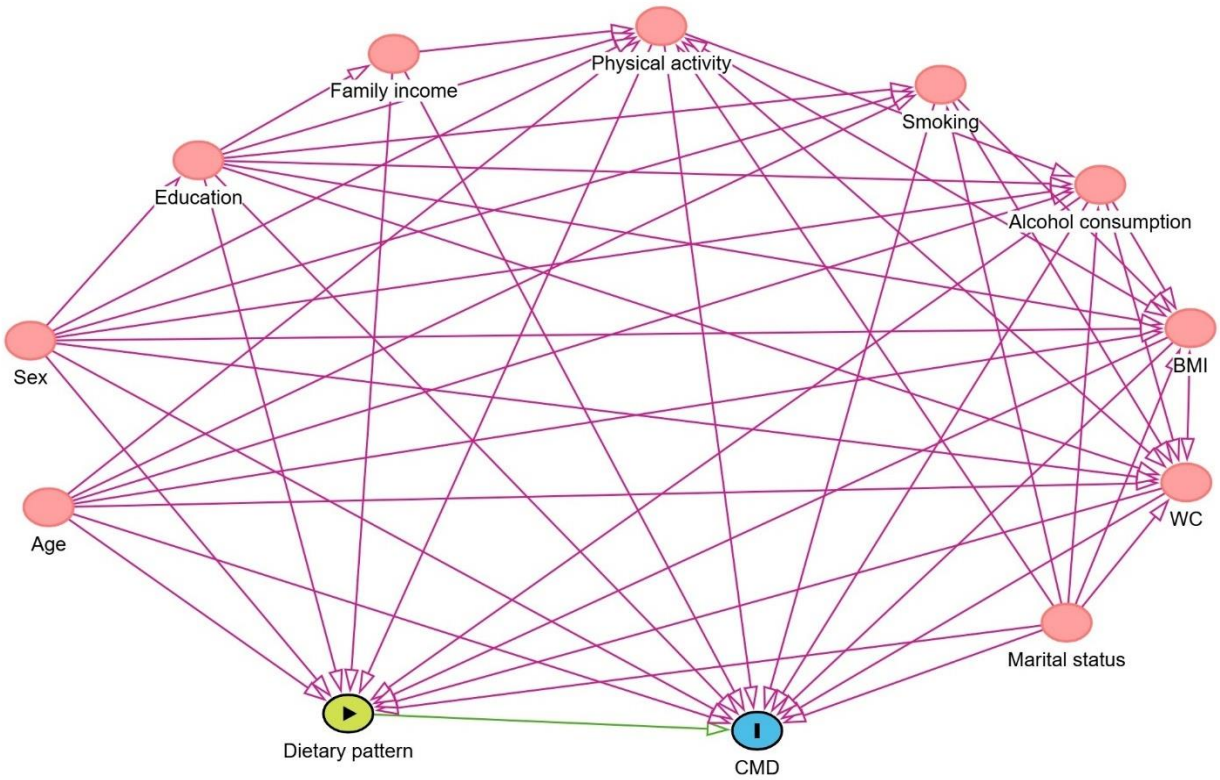
The Self-Reporting Questionnaire 20 (SRQ-20) (HARDING TW, et al., 1980) was adopted as the screening tool. It consists of 20 yes/no questions related to mental health status over the past 30 days, of which 4 questions concern physical symptoms and 16 concern psychoemotional disorders. Each “yes” response is worth 1 point, with a cutoff score of 7 or 8 for both sexes in this study (GONÇALVES DM, et al., 2008). The SRQ-20 is an instrument recommended by the World Health Organization (BEUSENBERG M, et al., 1994) for population-based studies focused on emotional health and is a screening scale used in primary care settings to assess indicators of common mental disorders (CMDs); although it is not effective as a diagnostic tool, it has proven to be an efficient predictor of the risk of mental health problems (SILVEIRA LB, et al., 2022).

Statistical analysis

All analyses were performed using Stata (version 13), with the survey module to account for the sampling design. A significance level of 5% and 95% confidence intervals (95% CI) were adopted. Initially, a descriptive analysis of the variables was conducted using absolute and relative frequencies. Next, Pearson’s chi-square test was used to assess the association between CMDs and sociodemographic, economic, lifestyle, and nutritional status variables, as well as to analyze the relationship between the independent variables and the consumption tertiles of the previously identified dietary patterns.

The association between dietary patterns and the prevalence of CMDs was investigated using Poisson regression models with robust variance, estimating prevalence ratios (PR) and their respective 95% CI. The adjustment variables for the multivariate model were selected by constructing a Directed Acyclic Graph (DAG) using the DAGitty software (version 3.0) (**Figure 2**). Based on the backdoor criterion, the minimum set of confounding factors necessary for the adjustment was determined: age, sex, educational level, BMI, physical activity, alcohol consumption, and smoking.

Figure 2 - Directed Acyclic Graph showing the association between dietary patterns and common mental disorders.



Caption: The green circle with a triangle represents exposure (dietary pattern), the blue circle with an “I” represents the outcome (CMDs), and the pink circles represent potential confounders/covariates. The green arrow indicates the causal pathway of interest, while the pink arrows represent pathways of bias.
Source: Araujo AM, et al., 2026.

Ethical considerations

This study was approved by the Research Ethics Committee of the Federal University of Piauí, under opinion No. 2,552.426 (CAAE 84527418.7.0000.5214), in accordance with the legislation on research ethics involving human subjects, Resolution 466/12. The study also received authorization from the Municipal Health Foundation of Teresina, Piauí, Brazil.

RESULTS

As shown in **Table 1**, the sample was predominantly female (66.8%) and consisted of adults (73.8%). The majority of participants reported living with a partner (58.4%), having completed high school (41.0%), and having a household income of up to two minimum wages (76.4%). Regarding lifestyle habits and anthropometric profile, the population was predominantly non-smokers (78.1%), non-drinkers (59.8%), and physically active (80.3%), although most were overweight (57.8%) and had cardiometabolic risk based on waist circumference (65.6%). The prevalence of CMDs was significantly associated with sex, being higher among women (35.3%), as well as with lower levels of education and household income.

Table 2 shows a significant association between sex and the traditional dietary pattern, with a higher proportion of men classified in the highest consumption tertile (44.4%). Regarding the ultra-processed dietary pattern, the third consumption tertile was significantly more common among adults (38.0%). Higher educational attainment was associated with greater adherence (tertile 3) to the bakery and ultra-processed dietary patterns. In contrast, participants with a household income above two minimum wages were more frequently classified in the first tertile (lowest consumption) of the ultra-processed dietary pattern (40.9%). Individuals who reported alcohol consumption showed greater adherence to the ultra-processed food pattern, with 39.3% classified in the third tertile. Finally, participants without cardiometabolic risk showed greater adherence to the traditional pattern, with 44.0% in the highest tertile.

Table 3 shows that individuals classified in the third tertile of the traditional dietary pattern had a 34% lower prevalence of CMDs in the crude analysis compared with those in the first tertile (PR = 0.66; 95% CI 0.47-0.92; p = 0.02); however, this association was attenuated and no longer statistically significant after adjustment for confounders (APR = 0.78; 95% CI 0.55-1.09; p = 0.14). Regarding the ultra-processed dietary pattern, individuals in the second tertile presented a 51% and 48% higher prevalence of CMDs in the unadjusted and adjusted models, respectively (APR = 1.48; 95% CI 1.02-2.16; p = 0.04); no significant association was observed for the third tertile (APR = 1.34; 95% CI 0.88-2.03; p = 0.16), indicating the absence of a consistent dose-response gradient.

Table 1 - Characteristics of the study sample, n=488.

Variables	Total n (%)	No CMDs n (%)	With CMDs n (%)	p*
Sex				
Male	162 (33.2)	138 (85.2)	24 (14.8)	**< 0.001**
Female	326 (66.8)	211 (64.7)	115 (35.3)	
Age				
Adults (≥20 to ≤59 years)	360 (73.8)	266 (73.9)	94 (26.1)	0.06
Seniors (≥ 60 years)	128 (26.2)	83 (64.8)	45 (35.2)	
Marital status				
With a partner	285 (58.4)	200 (70.2)	85 (29.8)	0.42
Without a partner	203 (41.6)	149 (73.4)	54 (26.6)	
Education				
Illiterate	29 (5.9)	15 (51.7)	14 (48.3)	
Elementary School	148 (30.3)	101 (68.2)	47 (31.8)	**0.01**
High School	200 (41.0)	144 (72.0)	56 (28.0)	
Higher Education	111 (22.8)	89 (80.2)	22 (19.8)	
Family income				
≤ 2 minimum wages[1]	373 (76.4)	254 (68.1)	119 (31.9)	**0.006**
> 2 minimum wages[1]	115 (23.6)	95 (82.6)	20 (17.4)	
Smoking				
No	381 (78.1)	274 (71.9)	107 (28.1)	0.64
Yes	107 (21.9)	75 (70.1)	32 (29.9)	
Physical activity				
Not active enough	96 (19.7)	65 (67.7)	31 (32.3)	0.28
Active	392 (80.3)	284 (72.4)	108 (27.6)	
Alcohol				
No	292 (59.8)	200 (68.5)	92 (31.5)	**0.05**
Yes	196 (40.2)	149 (76.0)	47 (24.0)	
Nutritional Status				
Not overweight	206 (42.2)	155 (75.2)	51 (24.8)	0.12
Overweight	282 (57.8)	194 (68.8)	88 (31.2)	
Waist circumference				
Risk-free	168 (34.4)	129 (76.8)	39 (23.2)	0.19
At risk	320 (65.6)	220 (68.8)	100 (31.2)	

Caption: *Pearson's chi-square test adjusted for the study's complex sampling design. [1]Minimum Wage: During the study period (September 2018–February 2020), 1 Minimum Wage ranged from BRL 954.00 to BRL 1,045.00 (~USD 240.00 to USD 250.00).
Source: Araujo AM, et al., 2026.

Table 2 - Characterization of dietary patterns according to sociodemographic, economic, lifestyle, and nutritional status variables among adults and older adults, n=488.

Variables	Traditional dietary pattern			p*	Bakery dietary pattern			p*	Dietary pattern of UPFs			p*
	Tertile 1 n (%)	Tertile 2 n (%)	Tertile 3 n (%)		Tertile 1 n (%)	Tertile 2 n (%)	Tertile 3 n (%)		Tertile 1 n (%)	Tertile 2 n (%)	Tertile 3 n (%)	
Sex												
Male	43 (26.6)	47 (29.0)	72 (44.4)		54 (33.3)	53 (32.7)	55 (34.0)		47 (29.0)	53 (32.7)	62 (38.3)	
Female	120 (36.8)	117 (35.9)	89 (27.3)	**0.002**	109 (33.4)	108 (33.2)	109 (33.4)	1.00	116 (35.6)	109 (33.4)	101 (31.0)	0.20
Age												
Adults	123 (34.2)	116 (32.2)	121 (33.6)		116 (32.2)	113 (31.4)	131 (36.4)		110 (30.6)	113 (31.4)	137 (38.0)	
Seniors	40 (31.3)	48 (37.5)	40 (31.2)	0.53	47 (36.7)	48 (37.5)	33 (25.8)	0.09	53 (41.4)	49 (38.3)	26 (20.3)	**0.006**
Marital status												
With a partner	99 (34.7)	94 (33.0)	92 (32.3)		97 (34.0)	91 (32.0)	97 (34.0)		97 (34.0)	98 (34.4)	90 (31.6)	
Without a partner	64 (31.5)	70 (34.5)	69 (34.0)	0.76	66 (32.5)	70 (34.5)	67 (33.0)	0.81	66 (32.5)	64 (31.5)	73 (36.0)	0.60
Education												
Illiterate	11 (37.9)	10 (34.5)	8 (27.6)		16 (55.2)	10 (34.5)	3 (10.3)		8 (27.6)	17 (58.6)	4 (13.8)	
Elementary School	45 (30.4)	50 (33.8)	53 (35.8)		43 (29.1)	61 (41.2)	44 (29.7)		51 (34.5)	57 (38.5)	40 (27.0)	
High School	73 (36.5)	64 (32.0)	63(31.5)	0.83	64 (32.0)	67 (33.5)	69 (34.5)	**<0.001**	67 (33.5)	62 (31.0)	71 (35.5)	**0.006**
Higher Education	34 (30.7)	40 (36.0)	37 (33.3)		40 (36.1)	23 (20.7)	48 (43.2)		37 (33.3)	26 (23.4)	48 (43.3)	
Family income												
≤2 minimum wages[1]	120 (32.2)	129 (34.6)	124 (33.2)		126 (33.8)	123 (33.0)	124 (33.2)		116 (31.1)	134 (35.9)	123 (33.0)	
> 2 minimum wages[1]	43 (37.4)	35 (30.4)	37 (32.2)	0.58	37 (32.2)	38 (33.0)	40 (34.8)	0.90	47 (40.9)	28 (25.3)	40 (34.8)	**0.03**
Smoking												
No	131 (34.4)	123 (32.3)	127 (33.3)		124 (32.5)	124 (32.5)	133 (35.0)		129 (33.9)	122 (32.0)	130 (34.1)	
Yes	32 (29.9)	41 (38.3)	34 (31.8)	0.47	39 (36.4)	37 (34.6)	31 (29.0)	0.34	34 (31.8)	40 (37.4)	33 (30.8)	0.53
Physical activity												
Not active enough	37 (38.5)	34 (35.4)	25 (26.1)		30 (31.3)	34 (35.4)	32 (33.3)		35 (36.5)	39 (40.6)	22 (22.9)	
Active	126 (32.1)	130 (33.2)	136 (34.7)	0.21	133 (33.9)	127 (32.4)	132 (33.7)	0.77	128 (32.6)	123 (31.4)	141 (36.0)	0.06
Alcohol												
No	101 (34.6)	88 (30.1)	103 (35.3)		97 (33.2)	94 (32.2)	101 (34.6)		103 (35.3)	103 (35.3)	86 (29.4)	
Yes	62 (31.6)	76 (38.8)	58 (29.6)	0.05	66 (33.7)	67 (34.2)	63 (32.1)	0.80	60 (30.6)	59 (30.1)	77 (39.3)	**0.04**
Nutritional Status												
Not overweight	56 (27.2)	79 (38.3)	71 (34.5)		62 (30.1)	76 (36.9)	68 (33.0)		70 (34.0)	64 (31.1)	72 (34.9)	
Overweight	107 (38.0)	85 (30.1)	90 (31.9)	0.07	101 (35.8)	85 (30.1)	96 (34.1)	0.20	93 (33.0)	98 (34.7)	91 (32.3)	0.70
Waist circumference												
Risk-free	42 (25.0)	52 (31.0)	74 (44.0)		58 (34.5)	52 (31.0)	58 (34.5)		51 (30.4)	48 (28.6)	69 (41.0)	
At risk	121 (37.8)	112 (35.0)	87 (27.2)	**< 0.001**	105 (32.8)	109 (34.1)	106 (33.1)	0.77	112 (35.0)	114 (35.6)	94 (29.4)	0.07

Caption: *Pearson's chi-square test adjusted for the study's complex sampling design. [1]Minimum Wage. During the study period (September 2018–February 2020), 1 Minimum Wage ranged from BRL 954.00 to BRL 1,045.00 (~USD 240.00 to USD 250.00). UPFs: ultra-processed foods.
Source: Araujo AM, et al., 2026.

Table 3 - Association between Common Mental Disorders and dietary patterns in adults and older adults, n=488.

Dietary patterns	% (95% CI)	CMDs PR (95% CI)	p*	APR (95% CI)	p*
Traditional dietary pattern					
Tertile 1	38.6 (29.8-48.2)	Ref.		Ref.	
Tertile 2	35.7 (27.7-44.6)	0.93 (0.64-1.34)	0.67	0.97 (0.69-1.36)	0.85
Tertile 3	25.7 (19.2-33.5)	0.66 (0.47-0.92)	**0.02**	0.78 (0.55-1.09)	0.14
Bakery dietary pattern					
Tertile 1	34.3 (27.9-41.3)	Ref.		Ref.	
Tertile 2	32.9 (25.4-41.3)	0.95 (0.69-1.31)	0.74	0.96 (0.73-1.28)	0.79
Tertile 3	32.9 (25.5-41.1)	0.95 (0.71-1.27)	0.70	1.06 (0.78-1.45)	0.70
Dietary pattern of UPFs					
Tertile 1	27.9 (21.2-35.7)	Ref.		Ref.	
Tertile 2	41.4 (34.5-48.7)	1.51 (1.05-2.13)	**0.03**	1.48 (1.02-2.16)	**0.04**
Tertile 3	30.7 (25.1-36.9)	1.11 (0.75-1.63)	0.59	1.34 (0.88-2.03)	0.16

Caption: *Poisson Regression; CMDs: Common Mental Disorders. PR: Prevalence Ratio. APR: Adjusted Prevalence Ratio. UPFs: ultra-processed foods. 95% CI: 95% confidence interval. **Source:** Araujo AM, et al., 2026.

DISCUSSION

Given the cross-sectional design of the study, all relationships described below should be interpreted as associations, without any inference regarding temporality or causality. The highest prevalence of CMDs was observed among women (**Table 1**), a finding that has been attributed to biological factors, such as hormonal changes, and to psychosocial vulnerabilities, such as the double workday and income disparities (ALMEIDA M and FLETCHER SJ, 2022). Previous studies have reported that CMDs are more frequent among women, low-income individuals, those with low educational attainment, black individuals, the unemployed, those with chronic diseases, and those with poorer self-rated health (MORAES RSM, et al., 2017).

The prevalence found here among women (**Table 1**) exceeded that reported in the study by McGrath JJ, et al. (2023); however, this comparison should be interpreted with caution, since McGrath et al. assessed the cumulative lifetime prevalence of any clinically diagnosed mental disorder across 29 countries, whereas the present study used the SRQ-20 to screen for indicative symptoms of CMDs over the preceding 30 days, conceptually and methodologically distinct outcomes. Comparisons with studies employing similar screening-based measures, such as those by Coutinho LMS, et al. (2014) and Valença Neto PF, et al. (2023), may be more appropriate.

It is essential to consider that women are more likely to face mental health issues, exhibiting a higher overall prevalence of depression, with an even more pronounced disparity in the Brazilian population (14.7% among women versus 5.1% among men); depression is also more prevalent among individuals with no schooling or who have not completed elementary school (BRITO VCA, et al., 2022). As shown in **Table 1**, low educational attainment and a lack of financial resources are associated with CMDs. These factors may restrict access to consumer goods, quality health care, and leisure activities. Chronic stress related to financial insecurity has been proposed as one of the mechanisms underlying this association (LI Z, et al., 2025).

Alcohol consumption was associated with CMDs at the threshold of statistical significance adopted (**Table 1**; $p = 0.05$), a finding that should be interpreted with caution given its borderline nature (**Table 1**). According to the meta-analysis conducted by Puddephatt JA, et al. (2022), individuals with mental health disorders (CMDs) are twice as likely to have an alcohol use disorder compared to those without such disorders. These findings suggest the importance of addressing harmful alcohol use as a critical component in the assessment, prevention, and treatment of CMDs in the adult population.

Although the health variables in **Table 1**, such as smoking, physical activity, nutritional status, and waist circumference, did not show statistical significance, the association between CMDs and socioeconomic status reinforces the need to assess how these factors interact in complex ways with dietary patterns, given that social vulnerability has been associated with both dietary quality and mental health.

From this perspective, diet may represent a modifiable factor associated with mental health, since diet is an environmental factor. Adherence to non-traditional dietary patterns, such as those high in UPFs, sugars, and saturated fats, and low in fruits and vegetables, has been associated with a higher prevalence of CMDs, as reported by Simplício APM, et al. (2024). The traditional dietary pattern was significantly associated with sex and WC (**Table 2**). Differences in dietary intake between men and women have been described in the literature and may be related to cultural, social, and gender-related factors (FERACO A, et al., 2024).

It should be noted that adherence to traditional dietary patterns varies by country, age, and context, and does not necessarily indicate healthier habits, particularly given the frequent consumption of meat and saturated fats that characterizes this pattern. Although the traditional dietary pattern was associated with a lower crude prevalence of CMDs (PR = 0.66; 95% CI 0.47-0.92; $p = 0.02$) (**Table 3**), this association was attenuated and no longer statistically significant after adjustment for age, sex, educational attainment, BMI, physical activity, alcohol consumption, and smoking (APR = 0.78; 95% CI 0.55-1.09; $p = 0.14$) (**Table 3**), the covariate set defined a priori through the DAG. This attenuation suggests that part of the crude association may be explained by these sociodemographic and behavioral characteristics rather than reflecting an independent protective effect of the traditional pattern, and should not be interpreted as a definitive protective finding. The foods that made up the largest portion of the traditional diet were rice, beans, fruits, vegetables,

fresh juices, meats (red and white), and dairy products (milk and yogurt). The crude, directional pattern observed here, is consistent with Simplício APM, et al. (2024), who reported that traditional dietary patterns composed of fresh and minimally processed foods have been linked to favorable biomarkers and mental health indicators, as well as with broader evidence associating healthy diets, such as the Mediterranean diet or traditional patterns rich in fresh foods, with a lower prevalence of depression (SOUSA TM, et al., 2024). Given the loss of statistical significance after adjustment in the present study, this convergence with the literature should be read as directional support rather than confirmatory evidence of an independent protective effect.

In this study, adherence to the bakery dietary pattern was associated with educational attainment (**Table 2**), which may be related to socioeconomic factors characteristic of urbanization, such as greater purchasing power, easier access to a variety of foods, and greater awareness of dietary options. UPF consumption was significantly higher among adults compared to older adults (**Table 2**), consistent with the findings of Dicken SJ and Batterham RL (2024). In turn, the study highlighted that age is a sociodemographic determinant of ultra-processed food consumption, showing that younger individuals tend to consume more of these foods than older adults. This pattern suggests behavioral and cultural trends associated with more urban and modern lifestyles among adults, which may support public policies focused on more vulnerable age groups to reduce health-related risks (DICKEN SJ and BATTERHAM RL, 2024).

In this regard, individuals who consume alcoholic beverages were found to have a higher intake of UPFs, suggesting a co-occurrence of these health-risk behaviors. The findings suggest a divergent pattern regarding the socioeconomic determinants of UPFs consumption (**Table 2**). While the highest tertile of UPFs consumption was observed among individuals with a college education (43.3%), those with a household income exceeding two minimum wages were more frequently classified in the lowest consumption tertile (40.9%). Greater urbanization and socioeconomic development, characterized by higher levels of education and income, have been associated with dietary shifts toward UPFs, which has been attributed to their convenience and market accessibility (DICKEN SJ, et al., 2024).

However, this divergence suggests a more complex dynamic: higher education may reflect fast-paced urban lifestyles that prioritize convenience despite nutritional awareness (MATTAR JB, et al., 2022). This highlights that education and income, although related, may be associated in distinct ways with the nutritional transition of adult populations. In contrast to the dose-response gradient reported by Hecht EM, et al. (2022), the association between the ultra-processed dietary pattern and CMDs observed in the present study was restricted to the second tertile of consumption, with no significant association found for the third, highest-consumption tertile. This non-linear behavior indicates the absence of a consistent dose-response gradient and cautions against interpreting the findings as evidence that higher UPF consumption necessarily corresponds to a higher prevalence of CMDs. Several non-mutually exclusive factors may contribute to this pattern, including variability inherent to the R24h method, the heterogeneous food composition captured within a single ultra-processed dietary pattern, the relatively smaller number of individuals within each tertile, residual confounding despite DAG-based adjustment, and the possibility of reverse causality, since individuals experiencing CMDs symptoms may shift their eating behavior toward more accessible or convenient foods. Rather than pointing to a single definitive explanation, this non-linear behavior underscores the complexity of the diet-mental health relationship and highlights the need for longitudinal studies with repeated dietary assessments to test dose-response hypotheses more robustly.

It is worth noting that, as described by Sousa TM, et al. (2024), depressive symptoms may affect self-care and adherence to well-planned diets; in this context, UPFs may represent a practical and accessible option, in addition to being highly palatable, which can provide immediate pleasure and even be stimulating.

Although not evaluated in the present study, this relationship may be underpinned by mechanisms described in the literature, including pathways in the oxidative and antioxidant defense systems, brain plasticity, the microbiota-gut-brain axis, mitochondrial function, tryptophan-kynurenine metabolism, neurogenesis, and epigenetics. These may constitute biologically plausible mechanisms linking diet and CMDs described in the literature, rather than mechanisms directly demonstrated by the present data (MARX W, et al., 2021).

Key strengths include the representativeness of the sample and the use of a DAG to define, a priori, the minimum sufficient set of adjustment variables for the multivariate models, an approach that helps reduce the risk of over-adjustment; nonetheless, a DAG does not eliminate confounding, and residual confounding by unmeasured or imprecisely measured variables cannot be ruled out. On the other hand, the cross-sectional design of the study limits the establishment of causal or temporal relationships between CMDs, dietary patterns, and metabolic risk. Thus, reverse causality cannot be ruled out, since individuals with CMDs may exhibit changes in appetite and self-care practices, leading to high consumption of UPFs, which are often associated with high palatability and convenience. Furthermore, the collection of dietary data via self-report introduces the possibility of recall bias and social desirability bias, a limitation that is particularly relevant for interpreting the association with UPFs, given the potential for misclassification of processing level based on self-reported intake. Additional limitations include the borderline adequacy of the factor analysis (KMO = 0.512), the use of the SRQ-20 as a screening instrument indicative of CMDs rather than a diagnostic tool, the possibility of dietary measurement error inherent to the R24h method, and the absence of a consistent dose-response relationship for the ultra-processed dietary pattern.

CONCLUSION

The study identified an association between dietary patterns, socioeconomic conditions, and CMDs in adults and older adults. The second tertile of the dietary pattern characterized by UPFs showed a higher prevalence of CMDs even after adjusting for potential confounding factors. Although higher consumption of the traditional dietary pattern was associated with a lower prevalence of CMDs in the unadjusted analysis, this association was no longer significant in the adjusted model. The absence of a consistent gradient among the tertiles of UPFs consumption and the cross-sectional study design call for caution in interpreting the findings causally. Longitudinal studies are needed to clarify the temporal relationship and the mechanisms involved in the association between dietary patterns and mental health.

AUTHOR CONTRIBUTIONS

Conceptualization and design, or data analysis and interpretation: AMA, KMGF, VNV, BGMR, ARSM, JMC, FBBVP and JMS. Writing an article or a critical review of intellectual content: AMA and KMGF. Final approval of the version to be published: AMA, KMGF, VNV, BGMR, ARSM, JMC, FBBVP and JMS.

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