FOOD AND NUTRITION IN COLLECTIVE HEALTH

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Eating patterns among women of reproductive age: reality in the *Zona Mata*, Northeastern Brazil

Padrões alimentares de mulheres em idade reprodutiva: realidade na zona da mata nordestina

Abstract

Objective: To analyze eating patterns and associated factors in women of reproductive age. ***Methods:*** This is a cross-sectional study conducted with 322 women aged 12 to 49 years old, residing in Vitória de Santo Antão, Pernambuco's Zona da Mata, Brazil, through active household survey. Census sectors were drawn in a simple and random manner, covering the health units belonging to the Family Health Strategy. The Eating Frequency Questionnaire allowed identifying eating patterns, categorized into low consumption, 1st and 2nd terciles, and high consumption, higher tercile. The independent variables analyzed were sociodemographic, lifestyle and health. ***Results***: Within the studied group, 59.3% of the women were aged between 20 and 39 years old, and 60.9% had excessive weight. Three eating patterns were observed: Healthy, Brazilian-Typical Common, and *Fast-Food*. Women aged ≥ 40 years old consumed approximately three times more food of the Healthy pattern compared to those aged ≤ 19 years old. On the other hand, those aged ≥ 40 were less likely to consume foods of the *Fast-Food* pattern than the younger ones were (≤ 19 years old). Moreover, women with more than eight years of education were more likely to consume foods of the Fast-Food pattern compared to those with ≤ 4 years of education. ***Conclusions***: Younger and better educated women presented a high consumption of foods characterizing the *Fast-Food* eating pattern compared to older and less educated ones, respectively.

Keywords: Food consumption. Nutritional Status. Women's Health. Women.

Resumo

Objetivo: Verificar os padrões alimentares e os fatores associados de mulheres em idade reprodutiva. ***Métodos:*** Trata-se de estudo transversal realizado com 322 mulheres de 12 a 49 anos, residentes em Vitória de Santo Antão, Zona da Mata de Pernambuco, através de busca ativa nos domicílios. Os setores censitários foram sorteados de forma aleatória simples, abrangendo as unidades de saúde pertencentes à Estratégia de Saúde da Família. A partir do Questionário de Frequência Alimentar, identificaram-se os padrões alimentares, categorizados em baixo consumo, 1º e 2º tercil, e alto consumo, tercil superior. As variáveis independentes analisadas foram as sociodemográficas, de estilo de vida e de saúde. ***Resultados:*** Do grupo estudado, 59,3% tinham entre 20 e 39 anos e 60,9% apresentavam excesso de peso. Verificaram-se três padrões alimentares: Saudável, Comum Típico Brasileiro e *Fast-food*. As mulheres com idade ≥ 40 anos consumiam aproximadamente três vezes mais alimentos do padrão Saudável, quando comparadas àquelas com idade ≤ 19 anos. Em contraste, aquelas com idade ≥ 40 anos apresentaram menor probabilidade de consumir alimentos do padrão *Fast-food* do que as mais jovens (≤ 19 anos). Verificou-

se ainda que mulheres com escolaridade superior a oito anos tinham maior probabilidade de consumir alimentos do padrão *Fast-food* quando comparadas aquelas com ≤ 4 anos de estudo. *Conclusões*: As mulheres mais jovens e as de maior escolaridade apresentaram um consumo elevado do padrão alimentar *Fast-food*, em comparação às mais velhas e de menor escolaridade, respectivamente.

Palavras-chave: Consumo de alimentos. Estado Nutricional. Saúde da Mulher. Mulheres.

INTRODUCTION

Women of reproductive age suffer from several nutrition disorders, such as anemia and obesity. They represent one of the main vulnerable population subgroups when it comes to mother-child health and play an important role in determining food consumption in their household.[1-4] This situation is aggravated among low-income women and those living distant from large urban centers, as it is the case of the *Zona da Mata*, as they are at a greater risk of non-communicable chronic diseases (NCCDs). As a consequence, morbimortality in adulthood increases due to the socioeconomic, health and environmental inequalities of the region.[5-8]

Such condition can be explained by an inadequate food consumption pattern, characterized by low consumption of fruits and vegetables, and high consumption of processed food.[4] This eating pattern can be identified by means of statistical techniques *a posteriori*, based on correlations between diet-related variables obtained through food consumption inquiries, such as principal component or cluster analyses, without prior use of a "healthy" nutritional recommendation, since one does not know how data will behave in the analysis.[9-11]

Some studies have revealed different eating patterns worldwide, with highlight to those conducted among women.[12,13] In Brazil, Cunha et al.[14] identified three eating patterns among Rio de Janeiro's low-income women. The first pattern was the 'prudent', composed of healthy foods; the second one was the 'traditional', which included the foods that make up the market basket; and the third one was the 'mixed', characterized by both healthy and processed foods.

Another study, involving menopausal women in the South of Brazil, identified five eating patterns: healthy, characterized by consumption of 100% fruit juice, fish and vegetable soup; fruits and vegetables, consisting of watermelon, mango and broccoli; Brazilian, composed of milk, rice and beans; snacks, made up of cake and pizza; and regional, which included the region's typical foods, such as cassava.[15] In addition, the authors found significant associations of these patterns with older age and income, but not with the women's menopausal state.[15]

In recent years, there has been a growing interest on the part of researchers in the sense of investigating the determinants that may be associated with eating patterns, towards supporting the planning of more effective sanitary interventions.[12,16] In this context, studies have suggested that eating patterns may be associated with unfavorable socioeconomic, environmental and health conditions.[12,16,17] Among socioeconomic determinants, lower family income and low educational level stand out,[14,18] which may interfere with household food accessibility and availability in certain geographic regions of the country.[19] As for the environmental and health determinants, low physical activity level, excessive alcohol consumption, and tobacco smoking can be mentioned, which may lead to a risk of developing overweight, obesity and hypercholesterolemia in women.[7,20,21]

There is a lack of studies addressing the eating patterns of women in the Northeast of Brazil, especially in Pernambuco's Zona da Mata. At this reproductive age, food consumption can act as a risk or protective factor for several NCCDs.[17,22] In light of the foregoing, the objective of this study was to identify eating patterns and their association with sociodemographic, lifestyle and health factors in women of reproductive age in the municipality of Vitória de Santo Antão, Pernambuco state.

MATERIALS AND METHODS

This is a cross-sectional, household study conducted in 2013, whose target population consisted of women of reproductive age, from 12 to 49 years old, then residing in the municipality's urban area, located

in the Southern Zona da Mata of Pernambuco state. The women were identified by means of the local family registry, found at basic health units, and through active household survey. The investigation excluded women who, at the moment of data collection, were pregnant or breastfeeding, had any physical limitation that prevented them from being subjected to the anthropometric assessment, and those who had undergone hysterectomy surgery.

The sample size was defined by the prevalence of consumption of fruits (16.0%) and vegetables (16.0%) by Brazilian women older than 10, reported by the National Diet Inquiry [*Inquérito Nacional de Alimentação*] (INA). The latter made up a module in the 2008-2009 National Family Budget Survey developed by the Brazilian Institute of Geography and Statistics [*Instituto Brasileiro de Geografia e Estatística*] (IBGE).[23] Based on these data, an acceptable margin of error of 5% and a reliability of 95% were adopted; the minimum sample size stood at 206 women.

The sample was selected through a list of census sectors (102 total), established by the 2010 Demographic Census for the municipality of Vitória de Santo Antão, with the sampling unit being the household. The sampling plan was of the probabilistic type and stratified into two stages: the first one comprised the census sectors; the second one, the households.[24] Considering 10% of these census sectors, 10 units were selected to be surveyed. The sectors were drawn in a random and simple manner, covering the following units: Lídia Queiroz (02 sectors), Jardim Ipiranga, Bela Vista, Cajueiro, Livramento, Matriz, Santana, Água Branca and Caiçara, with around 32 women being assessed by sector. These sectors had health units belonging to the Family Health Strategy, at which the health community agents responsible for the drawn areas identified the households drawn in each census sector. If there was no women of reproductive age in the household, the latter was skipped, and the next house was surveyed. Before the data collection began, a pilot study was conducted, in November 2012. On the occasion, besides the data collection instrument being tested, the logistics of the field work was put into practice to have its feasibility verified.

The field work was carried out by a trained team composed of students from the Federal University of Pernambuco, through a previously validated questionnaire. The independent variables analyzed were sociodemographic (sex, skin color, age, education, per capita family income, and food and nutritional security condition), lifestyle (tobacco smoking, alcohol consumption, and engagement in vigorous physical activity) and health (serum ferritin, serum hemoglobin and excessive weight).

Food and nutritional security was assessed by the Brazilian Food Insecurity Scale.[25] Excessive weight was categorized by overweight and obesity values, according to the body mass index (BMI), for 20-year-old women, and BMI by age for adolescents, based on the cutoff points of the World Health Organization (WHO).[26-28] For the anthropometric measures, weight and height, to be obtained, the techniques recommended by the WHO were used.[26] Body weight was measured using an electronic digital portable scale with capacity for 150Kg, whereas height was measured with the aid of a portable stadiometer.[26] All measures were taken in duplicate.

As for physical activity measurement, engagement in at least 75 weekly minutes of vigorous physical activity was required.[29] Physical activity lasting less than 10 minutes was not considered in the daily-sum calculation.[29]

Anemia was diagnosed from hemoglobin concentrations, considering hemoglobin < 12g/dL for non-pregnant adult women,[30] measured through the cyanomethemoglobin method, using Micros 60 ABX-Horiba equipment. Iron reserve depletion was assessed by serum ferritin < 15 ng/ml,30 through chemiluminescence-automated assay method on a Centauro-Siemens device. Blood was collected through

peripheral venous puncture, with approximately 10 ml of venous blood being taken from the women by means of disposable syringes and needles, without need for fasting. The blood was collected into tubes labeled with each women's code and containing anticoagulant for the following tests to be run: complete blood count and serum ferritin.

The dependent variable was the eating pattern, assessed by qualitative questionnaire on eating frequency, composed of 114 items.[31] For the analyses, the consumption of food items was transformed into frequency of annual consumption. Afterwards, 27 food groups were formed from the 114 food items in the eating frequency questionnaire, considering nutritional value and consumption frequency. Foods consumed by less than 5% of the population were excluded from the analyses. From these groups, eating patterns were identified, categorized as low consumption, considering the 1st and 2nd terciles, and high consumption, considering higher terciles, by means of the Principal Component Analysis, as preconized by Olinto et al.[11]

Data were tabulated on program Epi-Info 6.04, using data entry control in order to reduce typos. To check typing consistency and validation, double data entry was employed. Statistical analyses were performed on program STATA, version 14, using descriptive statistics procedures, such as distribution of absolute and relative frequencies. For the bivariate analysis, Pearson's chi-squared test and the chi-squared test for trend was applied to verify, respectively, the prevalence of eating patterns according to the women's sociodemographic, lifestyle and health characteristics.

The principal component analysis was used for identifying the eating patterns. Orthogonal rotation was executed for examining the structure of the pattern. The number of factors to be extracted was defined by observing the results referring to the explained total variance and through Cattel's screen plot. Food items with absolute loads ≥ 0.3 were considered. After the eating patterns were obtained, their respective scores were divided into terciles, being categorized as low consumption, 1st and 2nd terciles, and high consumption, higher tertile.[11] To assess the pertinence of the analysis, the Kaiser-Meyer-Olkin coefficient ≥ 0.69 and Bartlett's sphericity test were applied, considering $p \leq 0.05$.

To verify possible associations between eating patterns and sociodemographic, behavioral and health factors, Poisson's regression test was run, with robust variance, for the calculation of prevalence ratios and their respective 95% confidence intervals.

The variables that presented significance levels lower than 20%, in the crude analysis, were included in the multivariate analysis that followed the hierarchical model, with the sociodemographic variables being at the first level. The second level contained the first-level variables that presented $p \leq 0.20$ and lifestyle variables; the third level included the second-level variables that presented $p \leq 0.20$ and health variables. Results were expressed by crude and adjusted prevalence ratios (PRs) with 95% confidence intervals (95%CI). In the final model, the variables with $p \leq 0.05$ were considered as having statistical significance.

The project was approved by the Ethics Committee belonging to the Federal University of Pernambuco's Health Sciences Center (legal opinion No 130.299). All guidelines established in Resolution No 466/2012 of the National Health Council were complied with in the design of this study. All women or the legal guardians of women younger than 18 years old signed an informed consent form.

RESULTS

Out of all 322 women, 90.4% were white and brown; 59.3% were aged between 20 and 39 years old; 61.4% had up to eight years of education; 53.7% had a per capita income lower than 0.25 MW; and approximately 20.0% were in a moderate to serious situation of food insecurity in the household.

After the principal components were analyzed, three eating patterns were verified, with their respective explained variances: Eating Pattern I or Healthy, composed of fruits, leaf vegetables, oils and oilseeds, roots, light, diet and whole-grain food, with explained variance of 10.253; Eating Pattern II, or Brazilian-Typical Common, composed of beans, pasta, bread, couscous, eggs, mayonnaises and butters, coffee and artificial juice, with explained variance of 6.826; and Eating Pattern III, or Fast-Food, characterized by snacks, candies and desserts, sausages and soda, with explained variance equal to 6.676, as displayed in Table 1.

Table 1. Load factor for the main eating patterns of women of reproductive age from Vitória de Santo Antão, PE, Brazil, 2013.

	Eating pattern		
Dietary Group	EP I Healthy/Prudent	EP II Brazilian-Typical Common	EP III *Westernized Fast-food*
OTHER VEGETABLES Onion; Cucumber; Chayote; Okra; Maxixe	0.747		
LEAF VEGETABLES Lettuce; Cabbage; Kale	0.729		
YELLOW VEGETABLES Carrot; Squash; Beet	0.712		
OTHER FRUITS Apple; Watermelon; Grape; Jackfruit; Pineapple; Papaya; Yellow Mombin; Pinecone; Pear; Strawberry; Breadfruit	0.636		
TOMATO	0.556		
LIGHT, DIET AND WHOLEGRAIN Oat; Sweetener; Whole wheat bread; Light Soda; Skimmed milk, Light cream cheese	0.417		
ORANGE	0.393	0.302	
OLIVE OIL AND OILSEEDS Olive oil; Chestnut	0.358		
ROOTS Yellow potato; Cassava; Sweet potato	0.354		
FISH Fish; Sardine; Codfish	0.338		
SUGAR		0.569	
BEANS		0.456	
EGGS		0.454	
ARTIFICIAL JUICE		0.424	
BANANAS Banana; Cooking banana	0.374	0.402	
PASTA		0.388	
COUSCOUS		0.3868	
TEAS AND COFFEES		0.376	
BREADS Baguette and Sweet bread		0.322	
MAYONNAISES AND BUTTERS		0.321	
SNACKS Savory snacks; Chips. Pizza; Burger; French fries			0.633
FULL-FAT DAIRY Full-fat milk; Cheeses; Yogurts; Cream; Cream cheese			0.593
CANDIES AND DESSERTS Bonbons; Chocolates; Desserts; *Rapadura*			0.561
RENNET CHEESE			0.501
BUTTER			0.490
SAUSAGE Hot dog sausage; Mortadella; Ham			0.425
SODA			0.417
Explained Variance (%)	10.253	6.82696	6.67695

EP I: Healthy/Prudent; EP II: Brazilian Typical Common; EP III: Westernized/Fast-food; KMO: 0.69; Food items with absolute loads ≥ 0.3 were shown.

Table 2 shows that the group of older women, aged ≥ 40 years old, presented a greater consumption of foods in the Healthy eating pattern compared to younger ones, aged < 20 years old. On the other hand,

younger women presented a high consumption of foods in the Fast-Food eating pattern compared to older ones.

Additionally, it is possible to observe that the lower the educational level (those with < 4 years of education), the higher the consumption frequency for foods in the Brazilian-Typical Common pattern. As for women with > 8 years of education, they presented a high consumption of foods in the Fast-Food pattern.

When it comes to lifestyle, 6.2% of the studied women were tobacco smokers, 19.9% drank alcoholic beverages, and only 7.1% performed vigorous physical activity. However, tobacco smoking, alcohol consumption and engagement in vigorous physical activity were not statistically associated with the different eating patterns.

Furthermore, 60.9% (95%CI: 55.3-66.2) of the women had excessive weight (overweight and obesity), with a prevalence of 33.9% (95%CI: 28.8-39-3) for overweight, and 27.9% (95%CI: 22.3-32.3) for obesity. Although more than half of the sample had excessive weight, no significant associations were found with the eating patterns, as shown in Table 2. Also, 18.6% of the women were anemic, as shown in the serum hemoglobin assessment, and 11.8% had low iron reserves, based on the serum ferritin assessment (Table 2).

Table 2. Sample characteristics and distribution of high consumption (higher tercile) as to the eating patterns, according to sociodemographic, behavioral and health variables of women of reproductive age from Vitória de Santo Antão, PE, Brazil, 2013.

		Eating Patterns – High Consumption		
Variable	N (%)	EP I (p-value) %	EP II (p-value) %	EP III (p-value) %
Age		(0.004)*	(0.905)	(<0.001)*
≤ 19 years old	54 (16.8)	13.0	31.5	57.4
20 to 39 years old	191 (59.3)	36.6	34.6	34.0
≥ 40 years old	77 (23.9)	39.0	31.2	14.3
Race/Skin Color		(0.185)	(0.904)	(0.779)
White/Brown	291 (90.4)	34.4	33.3	33.0
Black	31 (9.6)	22.6	32.3	35.5
Education		(0.158)	(0.028)*	(<0.001*)
0 - 4 years	80 (24.8)	32.5	42.5	15.0
4 ├ 8 years old	118 (36.6)	26.3	33.1	36.4
> 8 years old	124 (38.5)	40.3	27.4	41.9
Per capita family income		(0.577)	(0.981)	(0.092)
< 0.25 Minimum Wages	168 (53.7)	33.3	33.3	29.2
≥ 0.25 to <0.50 Minimum Wages	106 (33.9)	31.1	33.0	36.8
≥ 0.50 Minimum Wages	39 (12.5)	41.0	33.3	41.0
Food and Nutritional Security Condition		(0.006*)	(0.089)	(0.333)
FNS and LFI	258 (80.1)	36.8	31.0	34.5
MFI and SFI	64 (19.9)	18.8	42.2	28.1
Tobacco smoking		(0.862)	(0.420)	(0.507)
Yes	20 (6.2)	35.0	25.0	40.0
No	302 (93.8)	33.1	33.8	32.8
Alcohol consumption		(0.371)	(0.551)	(0.371)
Yes	64 (19.9)	28.6	30.2	38.1
No	258 (80.1)	34.5	34.1	32.2
Vigorous physical activity		(0.094)	(0.094)	(0.279)
No	299 (92.9)	34.4	34.4	32.4
Yes	23 (7.1)	17.4	17.4	43.5

Table 2. Sample characteristics and distribution of high consumption (higher tercile) as to the eating patterns, according to sociodemographic, behavioral and health variables of women of reproductive age from Vitória de Santo Antão, PE, Brazil, 2013. (Continues).

Variable	N (%)	Eating Patterns – High Consumption		
		EP I (p-value) %	EP II (p-value) %	EP III (p-value) %
Serum ferritin		(0.090)	(0.183)	(0.090)
Low (<15 µg/L)	38 (11.8)	34.9	34.5	34.9
Normal (≥ 15 µg/L)	284 (88.2)	21.1	23.7	21.1
Serum hemoglobin		(0.985)	(0.035)*	(0.352)
Non-anemic	262 (81,4)	33.2	35.9	32.1
Anemic	60 (18.6)	33.3	21.7	38.3
Body Mass Index		(0.348)	(0.784)	(0.352)
Eutrophy	126 (39.1)	30.2	34.1	32.1
Overweight/Obesity	196 (60.9)	35.2	32.7	38.3

EP I: Healthy/Prudent; EP II: Brazilian Typical Common; EP II: Westernized/Fast-food; Vigorous Physical Activity = running, treadmill running; aerobic workout; football/indoor football, basketball, tennis, and heavy chores. FNS = Food and Nutritional Security; LFI = Light Food Insecurity; MFI = Moderate Food Insecurity; SFI = Serious Food Insecurity; p-value; Pearson's Chi-squared; *p=value ≤ 0.0

In the regression analysis, age and food and nutritional security condition presented positive association with high consumption of foods in the Eating Pattern I, or healthy pattern. As for education, family income and serum hemoglobin levels, they showed inverse association with higher consumption of foods in the Eating Pattern II, or Brazilian-Typical Common pattern; finally, age and education presented positive association with greater consumption of foods in the Eating Pattern III, or Fast-food pattern, as displayed in Table 3.

After model adjustment, it was possible to observe that women aged ≥ 40 years old were about three times more likely to consume more foods in the Eating Pattern I compared to those aged < 20 years old. By contrast, women aged ≥ 40 years old were less likely to consume more foods in the Fast-Food eating pattern than younger ones were.

Those with more than eight years of education were more likely to consume more foods in the Eating Pattern III than those with ≤ 4 years were. About per capita income, women with income ≥ 0.50 minimum wages were less likely to consume more foods in the Brazilian-Typical Common eating pattern compared to those with < 0.25 minimum wages, even after the confounding variables were adjusted, as shown in Table 3.

Besides, women presenting moderate to serious food and nutritional insecurity were less likely to consume more foods in the Eating Pattern I compared to those presenting food and nutritional security and light food and nutritional insecurity. Moreover, women without anemia were more likely to consume more foods in the Eating Pattern II than anemic ones were.

Table 3. Prevalence ratios (PRs) for the effect of sociodemographic, behavioral and health variables on consumption as to eating patterns (EP) I, II and II in women from Vitória de Santo Antão, PE, Brazil, 2013.

Variable	EP I (p-value) PR (95%CI)		EP II (p-value) PR (95%CI)		EP III (p-value) PR (95%CI)	
	Crude	Adjusted	Crude	Adjusted	Crude	Adjusted
Age	(0.002)*	(<0.001)*	(0.903)	_	(<0.001)*	(<0.001)*

Table 3. Prevalence ratios (PRs) for the effect of sociodemographic, behavioral and health variables on consumption as to eating patterns (EP) I, II and II in women from Vitória de Santo Antão, PE, Brazil, 2013.(Continues)

	EP I (p-value) PR (95%CI)		EP II (p-value) PR (95%CI)		EP III (p-value) PR (95%CI)	
Variable	Crude	Adjusted	Crude	Adjusted	Crude	Adjusted
19 years old	1	1	1	1	1	1
20 to 39 years old	2.82 (1.38 – 5.79)	2.62 (1.27-5.38)	1.09 (0.70-1.70)	_	0.59 (0.43-0.80)	0.61 (0.44-0.85)
≥ 40 years old	3.00 (1.42-6.34)	2.96 (1.40-6.27)	0.99 (0.59-1.65)	_	0.24 (0.13-0.45)	0.30 (0.16-0.54)
Skin color	(0.221)	_	(0.905)	_	(0.776)	_
White/Brown	1	1	1	1	1	1
Black	0.65 (0.33-1.28)	_	0.96 (0.56-1.65)	_	1.07 (0.65-1.77)	_
Education	(0.175)	(0.185)	(0.027)*	(0.326)	(<0.001)*	(0.002)*
0 - 4 years	1	1	1	1	1	1
4 ├ 8 years old	0.80 (0.52-1.25)	0.90 (0.58-1.39)	0.77 (0.54-1.11)	0.85 (0.58-1.24)	2.42 (1.36-4.31)	1.77 (0.95-3.27)
> 8 years old	1.24 (0.84-1.81)	1.20 (0.82-1.77)	0.64 (0.43-0.94)	0.79 (0.53-1.19)	2.79 (1.59-4.90)	2.28 (1.26-4.14)
Per capita family income	(0.828)	_	(<0.001)*	(0.002)*	(0.002)*	(0.054)
< 0.25 MW	1	1	1	1	1	1
≥ 0.25 to <0.50 MW	0.99 (0.70-1.39)	_	0.72 (0.50-1.02)	0.78 (0.54-1.12)	1.51 (1.06-2.15)	1.22 (0.86-1.72)
≥ 0.50 MW	1.07 (0.67-1.72)	_	0.25 (0.98-0.65)	0.27 (0.10-0.72)	1.80 (1.17-2.76)	1.47 (0.97-2.21)
FNS condition	(0.013)*	(0.016)*	(0.076)	(0.245)	(0.349)	_
FNS and LFI	1	1	1	1	1	1
MFI and SFI	0.50 (0.29-0.86)	0.51 (0.30-0.88)	1.36 (0.96-1.91)	1.23 (0.87-1.75)	0.81 (0.53-1.24)	_
Tobacco smoking	(0.861)	_	(0.448)	_	(0.487)	_
Yes	1	1	1	1	1	1
No	0.94 (0.50-1.75)	_	1.35 (0.62-2.93)	_	0.81 (0.46-1.43)	_
Alcohol consumption	(0.812)	_	(0.988)	_	(0.193)	_
Yes	1	1	1	1	1	1
No	1.03 (0.80-1.32)	_	0.99 (0.77-1.29)	_	0.81 (0.60-1.10)	_
Vigorous PA	(0.139)	(0.499)	(0.139)	(0.168)	(0.246)	(0.578)
Yes	1	1	1	1	1	1
No	0.50 (0.20-1.24)	0.73 (0.29-1.80)	0.50 (0.20-1.24)	0.52 (0.21-1.30)	1.34 (0.81-2.19)	1.14 (0.71-1.83)
Serum ferritin	(0.121)	(0.185)	(0.214)	_	(0.121)	(0.168)
Low (<15 µg/L)	1	1	1	1	1	1
Normal (≥ 15 µg/L)	0.60 (0.31-1.14)	0.66 (0.36-1.21)	0.68 (0.37-1.24)	_	0.60 (0.31-1.14)	0.61 (0.30-1.23)
Serum hemoglobin	(0.985)	_	(0.052)	(0.048)*	(0.340)	_
Non-anemic	1	1	1	1	1	1
Anemic	1.00 (0.67-1.49)	_	0.60 (0.36-1.00)	0.59 (0.35-0.99)	1.19 (0.82-1.72)	_

Table 3. Prevalence ratios (PRs) for the effect of sociodemographic, behavioral and health variables on consumption as to eating patterns (EP) I, II and II in women from Vitória de Santo Antão, PE, Brazil, 2013. (Continues)

	EP I (p-value) PR (95%CI)		EP II (p-value) PR (95%CI)		EP III (p-value) PR (95%CI)	
Variable	Crude	Adjusted	Crude	Adjusted	Crude	Adjusted
BMI (Kg/m2)	(0.354)	_	(0.784)	_	(0.014)*	(0.389)
Eutrophy	1	1	1	1	1	1
Overweight/Obesity	1.16 (0.84-1.61)	_	0.95 (0.69-1.31)	_	0.67 (0.50-0.92)	0.87 (0.63-1.19)

EP I: Healthy/Prudent; EP II: Brazilian Typical Common; EP III: Westernized/Fast-food; MW: Minimum Wages; PA: Physical Activity; BMI: Body Mass Index; Vigorous Physical Activity; running; treadmill running; aerobic workout; football/indoor football, basketball, tennis, and heavy chores; FNS: Food and Nutritional Security; LFI: Light Food Insecurity; MFI: Moderate Food Insecurity: SFI: Serious Food Insecurity. p-value: Poisson's regression; *p-value ≤ 0.05

DISCUSSION

The present study identified three eating patterns among the women: Healthy, Brazilian-Typical Common, and Fast-Food. These results converge with the investigations by Cunha et al.[14] and Neumann et al.,[32] which also identified similar food consumption patterns in women.

However, other findings have shown divergences as to the food consumption patterns of women residing in different Brazilian states.[16,17] A study conducted in the South of the country identified five risk and protective eating patterns as to non-communicable chronic diseases and in association with food costs: Healthy and Risk pattern - Cost 1, until Healthy and Risk pattern - Cost 5, with the Cost 1 eating pattern being composed of low-cost fruits and leaves compared to patterns with higher costs.[33] An investigation carried out in Caxias do Sul, with 646 women aged 40 to 65 years old, identified five eating patterns: fruits and leaf vegetables; Brazilian traditional, composed of rice and beans; prudent, including fish and whole wheat bread; snacks, with pizza and pasta; and regional, characterized by regional foods.[15]

Brazilian studies have also reported that eating patterns may be associated with sociodemographic, behavioral and health determinants,[14,15,34-37] as shown by Sichieri et al.[18] in a research conducted with 5,121 adults aged between 20 and 50 years old from the Northeast and Southeast of Brazil, based on the Living Pattern Survey, identifying that black skin color and engagement in physical activity were inversely associated with the Mixed Pattern, consisting basically of the region's traditional foods, such as rice, beans, wheat and sugar. Another study, in its turn, conducted with 1,026 women between 20 and 60 years old, found that higher educational level and higher family income were associated with a greater consumption of foods in the Healthy pattern and in the Risk pattern - High cost.[35]

The association between eating patterns and sociodemographic factors, such as educational level and family income, as evidenced in the present study, was also detected in recent research.[12,15,16,34] A study conducted by Canuto et al.[38] reported that age was inversely associated with the consumption of fast-food and processed foods, and directly associated with a healthy pattern, which includes fruits, green salad and other vegetables. According to the authors, this may be due to the improvement in the eating habits of women as they age.[38]

In the present investigation, women with > 8 years of education reported a high consumption of foods in the Fast-Food pattern. Diverging results were found in different studies, which revealed that better

educated women consumed more foods in the Healthy pattern.[3] On the other hand, an investigation by Cunha et al.[14] in Rio de Janeiro found that women with lower educational level consumed more foods in the Healthy pattern.

About family income, the present research found that women with income ≥ 0.50 minimum wages were less likely to consume more foods in the Brazilian-Typical Common eating pattern than women with < 0.25 minimum wages were. Similar results were evidenced by Gimeno et al.,[34] who identified that the traditional pattern, with greater predominance of foods such as rice and beans, was inversely associated with family income in adults living in Ribeirão Preto, Brazil.

These associations may be explained by greater access to and purchase of processed and ultra-processed foods ready for consumption, which facilitates a higher number of meals out of home and reduces food preparation time for women.[39,40] In addition, although women with higher educational level and family income have better access to information on the benefits of a healthy lifestyle (healthy diet and exercising), they do not necessarily incorporate these practices in their daily lives.[36]

The present study also found that women in a situation of moderate to serious food and nutritional insecurity were less likely to consume more foods in the Eating Pattern I, which corroborates the results found by Rezazadeh et al.[41] and Ntwenya et al.,[42] in Tanzania and Iran, respectively. The authors showed that food-insecure households were more likely to consume less food such as fish, vegetables, roots and tubers compared to food-secure ones.[41] Furthermore, they also point out that food insecurity may be associated with health-damaging eating patterns, being influenced by sex, age and season of the year.[41,42]

This information is alarming, since the risk of illnesses increases, as the food and nutritional security of families is not guaranteed.[41,42] In Brazil, food insecurity has been associated with inadequate eating habits, characterized by a higher consumption of processed foods to the detriment of foods *in natura*, which results in the poor diet of women.[43] However, there still is a scarcity of information at the population level on eating patterns and food and nutritional insecurity, especially nationwide.

It was possible to observe as well that women without anemia were more likely to consume more foods in the Eating Pattern II than anemic ones were. The present study diverges from the study conducted by Xu et al.[1] with Chinese women aged over 60, which reported that a traditional eating pattern, characterized by greater ingestion of vegetables, pork and rice, was positively associated with anemia in women. Another research, conducted by Bhandari et al.,[44] with 21,111 women of reproductive age, from 15 to 49 years old, residing in three different ecological regions of Nepal, showed that most of them consumed meat and fruits at least once a week, which is deemed an insufficient eating pattern for an adequate nutritional status and to prevent non-communicable chronic diseases, such as anemia, at this stage of life.

Thus, it is worth noting that good eating habits must be encouraged in this reproductive phase, since anemia can be caused by low intake of iron and other micronutrients, such as folate and vitamin B12.[11] Bearing this in mind, identifying eating patterns and anemia can contribute to the planning and design of programs aimed at improving the food and nutritional security of these women.[1,11,44]

This study found no association between tobacco smoking, alcohol consumption, vigorous physical activity and BMI with different eating patterns. These results converge with the findings of Osler et al.[45] Nevertheless, they diverge from the study by Olinto et al.,[36] which reported that non-smoker women and those who exercised in leisure contexts were more likely to consume foods in the Healthy pattern, consisting of vegetables and fruits. It is worth stressing that the high prevalence of these negative health-related behaviors, characterized by consumption of alcoholic beverages, tobacco smoking and physical inactivity,

may favor the Fast-Food eating pattern, causing the onset of non-communicable chronic diseases, such as obesity.[2,35]

This non-evidenced association may be explained by other factors, such as the growth of the food industry combined with greater accessibility to ultra-processed foods, the expansion of Fast-Food marketing networks, and the menopausal state of women. They can have a negative influence on eating patterns, due to an increased purchase of processed foods in replacement of those traditionally consumed in the region at this stage of life.[35,40,45,46] It is worth highlighting that food consumption can be underestimated, considering that the eating frequency questionnaire may not have included all foods consumed by the studied population, since the list of foods was defined before data collection and used standardized measures.[11] Besides, the application of the eating frequency questionnaire requires good memory and cooperation from the interviewee, which might have been a limitation in this study.[11]

CONCLUSION

In summary, the present study found different eating patterns associated with sociodemographic and health factors in women from the Northeast of Brazil, contributing to enrichening the literature about this theme in Latin America, because there is a deficit, especially when it comes to studies on women of reproductive age.

Thus, taking into account the influence of diet on nutritional and epidemiological profile, especially among women, new studies on eating patterns should be conducted in order to help improve strategies for the promotion of healthy eating and nutrition. The consumption of healthy foods should be encouraged earlier so as to reduce the risks of several negative consequences to the health and quality of life of women of reproductive age.[15,22,35,46]

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Oliveira JS, Lira PIC e Leal VS participated in the study conception and design; Andrade MLSS, Canuto R, Oliveira JS, Tavares FCLP, Lira PIC e Leal VS participated in the data analysis and interpretation; Andrade MLSS, Canuto R, Oliveira JS, Bacalhau SPOS, Tavares FCLP, Lira PIC e Leal VS participated in the composition and approval of the final version of the manuscript.

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