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DIETARY PATTERNS AND SOCIOECONOMIC POSITION IN OLDER ADULTS FROM A FOOD ASSISTANCE PROGRAM: A STUDY OF FOOD CONSUMPTION ADEQUACY

PADRÕES ALIMENTARES E POSIÇÃO SOCIOECONÔMICA DE IDOSOS PARTE DE UM PROGRAMA DE ASSISTÊNCIA ALIMENTAR: UM ESTUDO SOBRE ADEQUAÇÃO DO CONSUMO ALIMENTAR

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ABSTRACT

Background: The diet quality of older adults is directly linked to the socioeconomic aspects of society. **Objective:** To assess the adequacy of food group consumption according to older adults' socioeconomic status. **Methods:** A cross-sectional study conducted with community-dwelling older adults. Food consumption was assessed using the 24-hour dietary recall on three non-consecutive days. The Multiple-Pass Method and a food quantification photo album were used to improve food report. The consumed foods were classified into eight food groups and converted into portions according to the Adapted Healthy Eating Index. Socioeconomic classification was determined according to the criteria of the Brazilian Association of Research Companies. The socioeconomic status classification ranges from A (highest) to E (lowest). Potential associations between the adequacy of food consumption based on the Adapted Healthy Eating Index recommendations and socioeconomic status were assessed. **Results:** Eighty-five individuals aged between 60 and 91 years (mean age: 71.4 ± 6.7 years) were part of the study. A positive association was found between the adequacy of consumption of the fruit and natural juice group and socioeconomic classes A-B1 ($P = 0.05$ and $P = 0.014$, respectively). **Conclusions:** Individuals of higher socioeconomic status presented higher adequacy of fruit and natural juice consumption.

Keywords: Socioeconomic Status; Food Intake; Elderly Nutrition.

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RESUMO

Introdução: *A qualidade da dieta de idosos está diretamente ligada aos aspectos socioeconômicos da sociedade.* ***Objetivo:*** *Avaliar a adequação do consumo de grupos alimentares de acordo com a posição socioeconômica de idosos.* ***Métodos:*** *Estudo transversal realizado com idosos residentes na comunidade. O consumo alimentar foi avaliado por meio do recordatório alimentar de 24 horas em três dias não consecutivos. Para melhor acurácia do relato alimentar, utilizou-se o Método de Múltiplos Passos e um manual fotográfico de quantificação alimentar. Os alimentos consumidos foram classificados em oito grupos alimentares e convertidos em porções conforme o Índice de Alimentação Saudável Adaptado. A classificação socioeconômica foi determinada segundo os critérios da Associação Brasileira de Empresas de Pesquisa, variando de A (mais alta) a E (mais baixa). Foram avaliadas potenciais associações entre a adequação do consumo alimentar, baseada nas recomendações do Índice de Alimentação Saudável Adaptado, e a posição socioeconômica.* ***Resultados:*** *O estudo incluiu 85 indivíduos com idades entre 60 e 91 anos (média: 71,4 ± 6,7 anos). Foi encontrada associação positiva entre a adequação do consumo do grupo de frutas e sucos naturais e as classes socioeconômicas A-B1 (P = 0,05 e P = 0,014, respectivamente).* ***Conclusões:*** *Indivíduos de maior posição socioeconômica apresentaram maior adequação no consumo de frutas e sucos naturais.*

Palavras-chave: *Classe social; Ingestão de alimentos; Nutrição do idoso.*

BACKGROUND

An adequate diet is key for maintaining health and reducing the risk of non-communicable chronic diseases (NCDs), particularly among older adults. With aging, changes in nutritional status become more frequent, and the risk of developing NCDs, such as cardiovascular diseases, diabetes, and cancer increases (WORLD HEALTH ORGANIZATION, 2015). However, suboptimal intake of foods and nutrients, along with unhealthy dietary patterns, is frequently observed among older adults (MALTA; PAPINI; CORRENTE, 2013). A recent study carried out in Brazil reported that only 36.4% of elderly individuals presented an adequate nutritional status (BARBOSA *et al.*, 2023).

Dietary patterns that emphasize the consumption of healthy foods, such as fruits and vegetables, appear to have a positive effect on the prevention of NCDs, reducing the risk of adverse health outcomes (UNITED STATES DEPARTMENT OF AGRICULTURE, 2014). Still, diet quality appears to be linked to socioeconomic status (SES) of the population (DARMON; DREWNOWSKI, 2015; SCHRÖDER *et al.*, 2016), and financial constraints may drive food choices that are primarily based on cost-related criteria (ROSE *et al.*, 2020; BORGES *et al.*, 2015;). Older adults without sufficient financial support tend to consume lower quantities of healthy foods (ZAREI *et al.*, 2021).

Although there is much debate in the literature regarding whether healthier diets are more expensive than less healthy diets (VERLY *et al.*, 2019; MENDOZA-VELÁZQUEZ *et al.*, 2022), eating a healthy and varied diet on a limited budget can be quite hard (WATERLANDER; MACKAY, 2016). Low-income older adults tend to have monotonous diets (LOUREIRO *et al.*, 2021), and it appears to be necessary for individuals of lower socioeconomic status to increase their food

spending in order to achieve an adequate and balanced diet. However, increased food expenditures could strain individuals' income, potentially disrupting other aspects of their social and financial quality of life (BORGES *et al.*, 2015). Additionally, other sociodemographic factors, such as educational level and age, also play a significant role in individuals' food choices (ROSE *et al.*, 2020; BESORA-MORENO *et al.*, 2020). Among older adults, issues such as chewing or swallowing difficulties, reduced appetite and functional capacity, depression, and social isolation may contribute to changes in dietary choices, leading individuals to opt for foods that are easier to access, prepare, and consume (VENTURINI *et al.*, 2015).

With the growing number of older adults in the Brazilian population, the focus on this group is becoming increasingly crucial (SAES *et al.*, 2022). However, there is a significant scarcity of studies in Brazil that investigate the dietary intake of older adults and their relationship with socioeconomic factors. Therefore, this study is necessary to evaluate the adequacy of food group consumption among community-dwelling older adults according to their socioeconomic classification.

METHODS

STUDY DESIGN AND POPULATION

This was a cross-sectional study involving community-dwelling older adults, who were selected through convenience sampling. The inclusion criteria were: (a) participants must be 60 years of age or older, and (b) they must be enrolled in the health programs offered by the Food Bank of Porto Alegre, RS, Brazil. The sample size was calculated using GPower software, with a power of 80% and a significance level of 0.05, resulting in a total study population of 82 older adults.

DATA COLLECTION AND TOOLS

Data collection took place from January to November 2023 on weekly health programs organized by the Porto Alegre Food Bank and its partner community institutions. Questionnaires were administered by dietitians and nutrition students, gathering information on dietary intake and socioeconomic status. Researchers received prior training on how to administer the questionnaires and tools used in the study. The collected data were entered into the DietWin Professional Plus software, version 2979 (Brubins LTDA, Porto Alegre, RS, Brazil), and stored in the electronic database REDCap (Research Electronic Data Capture).

ASSESSMENT OF DIETARY INTAKE

Data on dietary intake were collected using the 24-hour dietary recall and the Multiple-Pass Method, in which the 24-hour dietary recall is conducted in five sequential steps (MOSHFEGH *et al.*, 2008) The Photographic Manual of Food Quantification was also used to enhance the accuracy of the data collected (CRISPIM *et al.*, 2017). The dietary recalls were administered to each participant on three non-consecutive days, with at least one of those days being a Sunday. The average of the three dietary recalls was then calculated for each individual. Nutrient values were estimated using the Brazilian Food Composition Table - IBGE, the USDA Food Composition Databases, and the Tucunduva Food Composition Table.

Nutrient intake was estimated using the DietWin Professional Plus software, based on foods and preparations pre-established within the software. Although the Brazilian Dietary Guidelines do not provide specific recommendations regarding the number of food portions to be consumed (BRASIL, 2014), the present analysis sought a criterion to classify food intake into different groups with daily intake recommendations. Thus, we utilized the Healthy Eating Index adapted for Brazil (IASad), a validated version of the Healthy Eating Index optimized for the Brazilian population (MOTA *et al.*, 2008) and in line with the country's dietary guidelines. The IASad assesses 12 components that constitute a healthy diet, including eight food groups. Food portions were defined to meet the nutritional recommendations of three dietary patterns within different energy values (1,800, 2,200, and 2,600 kcal). Box 1 presents the energy value and recommended servings for each food group.

Box 1 - Serving size and recommended number of servings per food groups.

Food group	Kcal/serving	Recommendation (no. of servings)
Cereals	150	> 5
Vegetables and greens	15	> 4
Fruits and natural juices	70	> 3
Milk and dairy products	120	> 3
Meat and eggs	130	> 1
Pulses	55	> 1
Fats and oils	120	< 2
Sweets and snacks	80	< 2

Recommendation of servings to be consumed adapted for this study based on the IASad.

For the present analysis, an intake equal to or greater than the minimum recommendation established by the IASad was considered adequate for each of the first six food groups. For the two remaining food groups, an intake equal to or lower than the recommended amount was considered adequate.

To determine the number of servings consumed by each person, we divided the total energy intake from the consumed foods by the energy value of a standard serving of its respective food group.

Subsequently, associations between socioeconomic classes and the adequacy of consumption within the food groups were examined.

ASSESSMENT OF SOCIOECONOMIC STATUS

To assess the socioeconomic status of the participants, a questionnaire developed by the Brazilian Association of Research Companies (ABEP), known as the Brazilian Economic Classification Criterion, was used. The Brazilian Criterion was developed to classify Brazilian households according to their purchasing power and socioeconomic status. It measures factors such as the educational level of the household head, ownership of durable goods, housing, access to public services, household income, the number of household members, location, level of consumption of goods and services, as well as the education and occupation of family members.

Each of these indicators assigns a score to the participant, and the final score determines their overall classification. For each social class, an estimated average monthly household income is provided (Table 2). The Brazilian Criteria stratifies the Brazilian population into six social classes, with Class A representing the highest purchasing power and Classes D-E the lowest. Considering the low number of participants from some social classes in the study, the classes were grouped, for analytical purposes, into A-B1, B2, C1, and C2-DE.

Box 2 - Socioeconomic class according to Brazilian Criterion (ABEP).

Socialeconomic class	Score	Estimated Average Income (R$)
1 - A	45 - 100	21,826.74
2 - B1	38 - 44	10,361.48
3 - B2	29 - 37	5,755.23
4 - C1	23 - 28	3,276.76
5 - C2	17 - 22	1,965.87
6 - DE	0 - 16	900.6

ETHICAL CONSIDERATIONS

This study was approved by the Research Ethics Committee of the Federal University of Health Sciences of Porto Alegre (UFCSPA), under opinion number 5700530.

DATA ANALYSIS

Quantitative variables were presented using mean and standard deviation, while categorical variables were expressed as absolute and relative frequencies. Normality was assessed using the Kolmogorov-Smirnov test. To evaluate the association between social class and the outcomes of each food group, Chi-square tests with adjusted standardized residuals, ANOVA and/or the Kruskal-Wallis test with Bonferroni correction for multiple comparisons were applied, depending on the nature and

distribution of the variables. Statistical analyses were performed using SPSS software, version 25.0 (IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp.), with a significance level set at $P < 0.05$.

RESULTS

A total of 85 older adults participated in the study, with a mean age of 71.4 ± 6.7 years. Of these, 87.1% (n = 74) were female, 71.8% (n = 61) self-identified as White, 40% (n = 34) presented incomplete primary education, and 30.6% (n = 26) were classified as socioeconomic class C2, as shown in Table 1.

Table 1 - Demographic and social data of 85 community-dwelling elderly individuals.

Variáveis	N	%
Sex		
Female	74	87.1
Male	11	12.9
Skin color		
White	61	71.8
Non-white	24	28.2
Education level		
Incomplete elementary school	34	40
Completed elementary school	12	14.1
High school graduate	24	28.2
College degree or higher	15	17.6
Social class		
A	1	1.2
B1	11	12.9
B2	24	28.2
C1	17	20
C2	26	30.6
DE	6	7.1

Table 2 presents the mean number of portions consumed by individuals across socioeconomic classes. The “vegetables and greens” group had the highest average number of portions consumed (5.6). The “pulses” and “fats and oils” groups had the lowest mean intake (1.3 portions). The mean number of portions consumed of “fruits and natural juices” was higher among older adults in socio-economic class A-B1 (3.6), with a value approaching statistical significance ($P = 0.050$). No significant associations were observed for the remaining variables.

Table 2 - Mean number of servings of each food group consumed by 85 community-dwelling elderly individuals.

	Total (n = 85)	A-B1 (n = 12)	B2 (n = 24)	C1 (n = 17)	C2-DE (n = 32)	p-value
	Mean (SD)					
Cereals	3 (1.2)	2.7 (1.1)	2.9 (0.9)	2.9 (1,2)	3.1 (1.5)	0.927
Vegetables and greens	5.6 (5)	6 (5.2)	5.8 (4.4)	6.3 (7,4)	4.8 (3.6)	0.796
Fruits and natural juices	2.6 (2.1)	3.6 (2.4)	3.1 (2.3)	2.3 (1.9)	1.9 (1.6)	0.05
Milk and dairy products	1.6 (1.2)	1.7 (1.3)	1.8 (1,1)	1.2 (0.8)	1.6 (1.4)	0.566
Meat and eggs	2.5 (1.5)	2.7 (2)	2.1 (1,2)	2.6 (1.5)	2.6 (1.4)	0.71
Pulses	1.3 (1.5)	1.5 (2.6)	1.1 (1,2)	1.1 (1.1)	1.4 (1.4)	0.469
Fats and oils	1.3 (0.9)	0.9 (0.6)	1.5 (1,2)	1 (0.5)	1.3 (0.9)	0.344
Sweets and snacks	1.7 (1.6)	1.2 (1)	1.9 (1,1)	1.4 (1.5)	2 (2)	0.245

The percentage of individuals in each socioeconomic class who met the recommended intake for the food groups is presented in Table 3. Socioeconomic class A-B1 was associated with a higher prevalence of adequate intake of "fruits and natural juices" compared to classes C2-DE. All socioeconomic classes showed low adequacy in the intake of the "cereals," "vegetables and greens," "fruits and natural juices," "milk and dairy products," and "pulses" groups, and high adequacy in the intake of the "meat and eggs" and "fats and oils" groups,

Table 3 - Percentage of community-dwelling elderly individuals (n = 85) who met the recommended intake for each food group.

	Total (n = 85)	A-B1 (n = 12)	B2 (n = 24)	C1 (n = 17)	C2-DE (n = 32)	p-value
	n (%)					
Cereals	6 (7.1)	0 (0)	1 (4.2)	2 (11.8)	3 (9.4)	0,562
Vegetables and greens	45 (52.9)	7 (58.3)	13 (54.2)	10 (58.8)	15 (46.9)	0,834
Fruits and natural juices	25 (29.4)	7 (58.3)	10 (41.7)	3 (17.6)	5 (15.6)	0,014*
Milk and dairy products	12 (14.1)	2 (16.7)	5 (20.8)	1 (5.9)	4 (12.5)	0,577
Meat and eggs	76 (89.4)	12 (100)	19 (79.2)	15 (88.2)	30 (93.8)	0,192
Pulses	37 (43.5)	5 (41.7)	9 (37.5)	8 (47.1)	15 (46.9)	0,896
Fats and oils	72 (84.7)	11 (91.7)	20 (83.3)	16 (94.1)	25 (78.1)	0,438
Sweets and snacks	57 (67.1)	9 (75)	14 (58.3)	14 (82.4)	20 (62.5)	0,352

DISCUSSION

While healthy dietary patterns are crucial for maintaining health and quality of life during aging, the dietary habits of older adults appear to be directly influenced by socioeconomic factors. The present study aimed to investigate the relationship between the consumption of various food groups and the socioeconomic status of older individuals. The main findings were: (a) individuals from higher socioeconomic classes (A-B1) showed greater adequacy in the intake of fruits and natural juices; (b) all socioeconomic classes presented low adequacy in the consumption of the "cereals," "vegetables and greens," "fruits and natural juices," "milk and dairy products" and "pulses" groups, with only one-third of the individuals reaching the recommended number of portions of fruits and

natural juices. No associations were found between the intake of other food groups and the socioeconomic status of the participants.

The findings of this study suggest that older adults from higher socioeconomic classes consume more fruits and natural juices. Several studies also report that healthier dietary patterns, characterized by higher consumption of vegetables, pulses, cereals, and low-fat dairy products, are more prevalent among individuals from higher socioeconomic classes (LOUREIRO *et al.*, 2021; MEDINA *et al.*, 2019). Similarly, older adults from lower socioeconomic classes have been associated with poorer dietary patterns and an increased risk of malnutrition (LOUREIRO *et al.*, 2021; BESORA-MORENO *et al.*, 2020). Given that to achieve an adequate diet low-income Brazilians would need to allocate a substantial portion of their income (BORGES *et al.*, 2015), it is expected that healthier foods are more prevalent in the diets of higher-income individuals. Thus, higher consumption of foods such as fruits and vegetables by individuals from higher socioeconomic classes may be one of the contributing factors to disparities in diet quality among individuals from different socioeconomic positions (DARMON; DREWNOWSKI, 2015).

Low intake adequacy of cereals, vegetables, greens, fruits, natural juices, milk, dairy products, and pulses was observed across all socioeconomic classes. These findings are consistent with those of Malta *et al.* (2013), who found that the majority of older adults consumed low-quality diets, with the food groups "fruits," "greens," "carbohydrates," and "milk and dairy products" showing the lowest levels of adequacy. Furthermore, Brazilian population-based studies show that the consumption of pulses has decreased nationwide over the years (RODRIGUES *et al.*, 2021). Location, income, education, and family structure have been identified as key factors contributing to this decline (REZENDE; COELHO; TRAVASSOS, 2022).

We also found that all socioeconomic classes presented high adequacy of consumption of meat and eggs. However, protein-energy malnutrition is a common problem resulting from inadequate intake of protein and calories (VAN DER POLS-VIJLBRIEF *et al.*, 2014) . A study conducted in Brazil found that only 17.9% of individuals consumed meat daily (SAES *et al.*, 2022). Moreover, older adults with low incomes do not consume sufficient amounts of meat (ZAREI *et al.*, 2021). The high adequacy observed in this study may be related to the low caloric value (130 kcal) required to meet the IASad intake recommendations. Considering that adequate protein consumption is associated with the maintenance or reduction of muscle mass loss (DEER; VOLPI, 2015), a process inherent to aging, adequate protein intake appears to be of utmost importance.

The underlying causes of the widespread low consumption of healthy foods among older adults remain a matter of debate in the scientific literature. In addition to an overall reduction in food intake, social determinants such as income, educational level, and barriers related to food access and preparation may influence food choices in later life. Clinical factors, including chewing and swallowing difficulties, may further compromise dietary intake, while living arrangements also appear to shape

nutritional behavior. The literature shows dietary intake patterns differ between institutionalized and community-dwelling older adults, reflecting variations in autonomy, health status, and environmental context. Institutionalized individuals generally present a higher prevalence of malnutrition and nutritional risk, whereas community-dwelling older adults may exhibit greater inadequacy in specific nutrient intakes (PAVLOVIC *et al*., 2019; MADEIRA *et al*., 2022).

In a recent study, Saes *et al.* (2019) found that older adults with higher levels of education consumed greater amounts of healthier foods compared to those with lower levels of education. In contrast, Canuto *et al.* (2019) observed that education was negatively associated with the consumption of other healthy foods, such as beans and fish. Other studies show that individuals with higher levels of education also consume more sweets and ultra-processed foods (LOUZADA *et al*., 2023). Amid such contradictory findings, Saes *et al.* (2019) concluded that income and cultural factors may have a greater influence on the dietary habits of Brazilians than education. Factors such as greater access to different types of food may play a more prominent role in food choices compared to nutritional knowledge.

Income and educational level are factors that are mutually dependent and closely tied to an individual's social class: higher levels of education lead to increased income, and higher income, in turn, provides more educational opportunities (BARRO; LEE, 2013). Moreover, they affect other determinants of food choices, such as food access, time availability, the social environment in which the individual is situated, the pursuit of convenient and palatable foods, and even the challenge of developing healthier eating habits (DARMON; DREWNOWSKI, 2015; SCHRÖDER *et al*., 2016; SAES *et al*., 2022). Thus, identifying the role that each socioeconomic factor plays in individuals' diets is a multifaceted and complex process. Regardless of whether one of these factors prevails over the others, further studies are still needed to clarify this dynamic.

Regarding food prices, it has not yet been established that healthier foods are more expensive than less healthy alternatives (DE MELLO *et al*., 2022). However, total food expenditure represents a much larger portion of the monthly budget for individuals from lower socioeconomic classes, making food price one of the main criteria in their choices. Darmon and Drewnowski (2015) suggest that changes in individuals' diets may require public policies, such as food price interventions or nutrition education programs. In Brazil, the recent legislation that modified the components of the Basic Food Basket by adding more fresh foods and introducing tax subsidies for healthy foods is an example of efforts to ensure adequate nutrition for the entire population (BRASIL, 2024) .

The present study stands out for its originality in examining the association between food group classifications and the socioeconomic status of elderly individuals in a Brazilian city. Limitations of this study include: (1) the use of the 24-hour dietary recall (R24h), which, despite employing visual aids and tools to improve the accuracy of dietary intake information, may be subject to memory biases, omissions, variability, and difficulties in estimating portion sizes; (2) the classification of meats and eggs as part of the same food group. Although both are sources of high biological

value protein, they provide vastly different amounts of protein per food portion; therefore, a high adequacy in the consumption of this group does not necessarily indicate an adequate intake of meats or proteins, which are important for maintaining health during aging; (3) the sample was composed of older adults participating in a food assistance program. Individuals enrolled in such programs are likely to present distinct socioeconomic and health profiles compared to the general older adult population, potentially limiting the external validity of the findings, and (4) the relatively homogeneous socioeconomic composition of the sample, characterized by a predominance of individuals in lower economic strata, may have influenced the observed associations between socioeconomic position and dietary patterns. As such, the findings are more likely to capture variability within vulnerable groups than differences across broader socioeconomic gradients.

CONCLUSION

Among the elderly individuals in the assessed community, higher adequacy in the consumption of the fruit and natural juice group was observed among those belonging to the A-B1 socioeconomic class, which has greater purchasing power. These results demonstrate the impact of socioeconomic disparities on the diets of older adults, emphasizing the importance of implementing effective public policies to improve food access for those in socioeconomic groups associated with greater vulnerability. Furthermore, new studies employing other dietary assessment tools and strategies could be conducted to investigate the relationship between these factors further.

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