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Factors associated with inadequate consumption of fruit and vegetables among users of Primary Health Care in Brazil

Fatores associados ao consumo inadequado de frutas e hortaliças entre usuários da Atenção Primária à Saúde no Brasil

Abstract

Introduction: Inadequate fruit and vegetable (FV) consumption may derive from individual, cultural, socioeconomic, and environmental issues. **Objective:** This study aims to identify factors associated with inadequate fruit and vegetable consumption among men and women in Brazilian Primary Health Care. **Methods:** This is a cross-sectional study with a sample representative of the Health Academy Program (Programa Academia da Saúde-PAS, in Portuguese). The consumption of FV was evaluated by a validated questionnaire which included the frequency and number of portions consumed. The inadequate consumption was classified as fruits <3 servings/day; vegetables <2 servings/day. Sociodemographic, health, and anthropometric profile, such as the purchase of fruit and vegetable were investigated. **Results:** The inadequate consumption of fruits (women: 61.4%; men: 68.1%) and vegetables (women: 40.6%; men: 51.1%) was high. Among women, factors associated with inadequate FV consumption were: being elderly, report their quality of life as good and their knowledge about food crop season; and the diagnosis of diabetes was associated with inadequate fruit intake. For men, factors associated with inadequate fruit consumption were: being elderly and current attempt to lose body weight; and for vegetables, good quality of life and having a risk of metabolic complications. **Conclusion:** Equal and different factors for women and men associated with inadequate consumption of FV were identified. These results highlight the importance of actions to promote healthy eating which considers the differences in the consumption of these foods according to the gender of the participants.

Keywords: Associated Factors. Food Consumption. Fruit. Vegetables. Primary Health Care.

Resumo

Introdução: O consumo inadequado de frutas e hortaliças (FH) pode derivar de questões individuais, culturais, socioeconômicas e ambientais. **Objetivo:** Este estudo tem como objetivo identificar os fatores associados ao consumo inadequado de frutas e hortaliças entre homens e mulheres na Atenção Primária à Saúde brasileira. **Métodos:** Trata-se de um estudo transversal com amostra representativa do Programa Academia da Saúde - PAS. O consumo de FH foi avaliado por um questionário validado, incluindo a frequência e o número de porções consumidas. O consumo inadequado foi classificado como frutas <3 porções/dia; hortaliças <2 porções/dia. Foram investigados o perfil sociodemográfico, de saúde, antropométrico, relacionado à compra de frutas e hortaliças. **Resultados:** O consumo inadequado de frutas (mulheres: 61,4%; homens: 68,1%) e hortaliças (mulheres: 40,6%; homens: 51,1%) foi

elevado. Entre as mulheres, os fatores associados ao consumo inadequado de FH foram: ser idosa, considerar a sua qualidade de vida como boa e ter conhecimento sobre a safra dos alimentos; e para frutas, ter diabetes. Para os homens, os fatores associados ao consumo inadequado de frutas foram: ser idoso e tentativa atual de emagrecer; e para hortaliças, qualidade de vida boa e risco de complicações metabólicas. **Conclusão:** Foram identificados fatores iguais e diferentes para mulheres e homens associados ao consumo inadequado de FH. Esses resultados mostram a importância de ações de promoção da alimentação saudável que considerem as diferenças no consumo desses alimentos de acordo com o sexo dos participantes.

Palavras-chave: Fatores Associados. Consumo Alimentar. Frutas. Hortaliças. Atenção Primária à Saúde.

INTRODUCTION

Fruits and vegetables (FV) are sources of vitamins, minerals, and fiber, contain low-calorie density,¹ and have protective effects against diseases, such as obesity, cardiovascular diseases, and some types of cancer.^{2,3} Adequate FV intake could prevent 16 million Disability-Adjusted Life Years (DALYs) and 1.7 million deaths per year.⁴

Despite the benefits of FV consumption, inadequate consumption of these foods is a risk factor in several countries.⁵ This inadequate consumption is one of ten major risk factors for global disease burden.⁴ In Argentina, 95.1% of the population had an inadequate consumption of FV, with the highest averages of adequate consumption of FV recorded among the elderly and those with a level of education.⁶ In Chile, 85% of the population had an inadequate consumption of FV⁷ and in Mexico, 57.7% had an inadequate consumption of vegetables and approximately 79% had an inadequate consumption of fruits.⁸

Brazilian research has shown a high percentage of the inadequacy of FV consumption.^{9,10} In the whole of Brazilian cities, 77.5% of people (≥ 18 years old) do not consume five daily servings of FV, primarily men, younger people, and those with less education.⁹ Adequate FV consumption tends to increase with the level of education in both sexes and age between women up to 64 and men from 35 years old.¹⁰

FV consumption is influenced by different biological, social, economic, cultural, agricultural, and environmental aspects.¹ The literature points out that major interfering factors are: differences between sexes, schooling, and age;^{9,10} price;¹¹⁻¹⁴ lack of habit, laziness, disliking, the conviction of consuming enough;^{11,13} lack of culinary skills;¹² difficulties in access^{13,14} and quality of food stores.¹⁵

As seen, analyzing the factors associated with FV consumption implies investigating different dimensions. Two highlighted aspects regard consumption specifically: differences between sexes;^{9,10,16} and, fruits are different from vegetables and may have different associated factors.^{11,13} However, most studies examined a reduced scope of factors, focused on adequate consumption, and analyzed FV together for both sexes.¹¹⁻¹⁴ In addition, few studies have been conducted on Primary Health Care (PHC) services, which have a high capacity to cover the population.^{13,14,17} Thus, the importance of carrying out studies in PHC is highlighted, analyzing separately the fruits and vegetables and the various factors that interfere with their consumption, in addition, to the analysis carried out separately between the sexes. In this sense, this study aimed to analyze the factors associated with inadequate fruit and vegetable consumption among men and women users of PHC in Brazil.

MATERIAL AND METHODS

Study location

This study is part of a randomized and controlled community trial that was carried out in a representative sample of the PHC service called the Health Academy Program (Programa Academia da Saúde – PAS, in Portuguese) in Belo Horizonte, Minas Gerais, Brazil. Belo Horizonte is the sixth-largest city in Brazil, with a population of >2.5 million inhabitants distributed in nine administrative regions.¹⁸

The PAS is a point of PHC that has the infrastructure, equipment, and qualified professionals to guide participants toward healthy ways of living - physical exercise and healthy eating.¹⁹ In Belo Horizonte, the PAS was implemented in 2006 and currently has 79 units that serve about 19000 individuals.

Study design, participant selection, and data collection

The PAS study units were randomly selected from a sample by a simple conglomerate, stratified by the nine regions of the municipality.²⁰

The inclusion criteria for the PAS units were: being in operation during the sampling process period (November 2012); being located in areas with medium or high Health Vulnerability Index (HVI)*¹ values²¹ (excluded = 06 units in areas with low HVI); being in operation in the morning, and had not participated in any nutritional intervention studies in the last two years (excluded = 02). Therefore, 42 of the 50 PAS units installed in the municipality were considered. Of these, 18 units were sampled, representing the municipality with a 95% confidence interval and an error of less than 1.4%. After the data collection, statistical analyses were performed, which compared the sociodemographic data of all units (n = 50) with the collected dataset (n = 18) and the levels of confidence and error were maintained. More details regarding the sampling process are available in Menezes et al. (2017).²⁰

In the 18 sampled units, 3763 participants were eligible, of which 3414 (90.7%) were interviewed, accounting for 237 refusals (6.3%) and 112 exclusions (3.0%)²⁰. The inclusion criteria were: being ≥ 20 years old and being present at assistance activities. Those with cognitive difficulties that prevented them from answering the questionnaire and pregnant women were excluded.²⁰

The data were obtained from 2013 to 2014 through a questionnaire applied face-to-face by trained interviewers. The instrument was developed based on national studies²⁰ and the previous experience of the research group.^{22,23} Before its application, pre-tests and pilot studies were performed.²⁰

Fruit and vegetable consumption

The outcomes investigated were inadequate FV consumption. The fruits and vegetables were analyzed separately because they were considered distinct foods in a qualitative study carried out on the population and had different factors that interfered with their consumption.¹³

The consumption of fruits and vegetables was evaluated by the QBreve-FV, which is validated for this study.²⁴ The questionnaire uses the following questions: "How often do you eat fruits and vegetables?"; "On an average day, how many portions of fruits do you eat?"; and "On an ordinary day, how many servings of vegetables do you eat?". For the analyses, the questions were categorized into: "How often do you eat fruits and vegetables?" 6 categories: 1 to 2 days/week, 3 to 4 days/week, 5 to 6 days/week, every day, never, and seldom (1 to 3 times/month). For vegetables, the number of servings was calculated by the number of tablespoons according to the method of preparation (raw or cooked). The measures were converted into grams and later into portions by the research team through the use of the manual that was created to contribute to this process of converting grams to portions of food.²⁴

Inadequate consumption was classified for fruits as < 3 servings/day and for vegetables < 2 servings/day. If the participant consumed 3 servings of fruits or 2 of vegetables, but this consumption did not occur daily, it was also considered inappropriate. These criteria were based on the WHO recommendation of at least 400 g/day of FV or five daily servings.²⁵

¹*HVI: indicator composed of different variables, such as income, work, education, social insertion, and leisure, which, together, allow the disclosure of inequalities in epidemiological profiles of different social groups and identification of areas with unfavorable socioeconomic conditions within a given urban space²¹.

Explanatory variables

Sociodemographic, health profile and anthropometric variables were investigated with the purchase profile.

Sociodemographic characteristics

The following sociodemographic data were evaluated: age (adult: 20-59 years; elderly: ≥ 60 years), education (0-4 years; 5-9 years; ≥ 10 years), marital status (married; single; widowed/separated/divorced), time of participation in PAS (0-6 months; 7-12 months; ≥ 13 months) and professional status (retired/pensioner/employee; household/unemployed).

Health profiles data

The health profiles evaluated were reported morbidity (diabetes mellitus - DM; hypertension; hypercholesterolemia: yes/no); perception of health and quality of life (bad: very bad, bad and regular; good: good and very good); smoking habit (yes/no); current attempt to lose body weight (yes/no); and advice from a health professional to improve diet and health (yes/no).

Purchase profile of fruits and vegetables

The FV purchase profile was evaluated by the following questions: if the user was responsible for the preparation or purchase of food, the knowledge about food crop season, the frequency of purchase, and the place of FV purchase. It was also investigated whether meals eaten outside the home affected FV consumption.

The FV purchase profile was classified into: responsible for the preparation or purchase of food (yes/no), knowledge about food crop season (yes/no), frequency of purchase (5-7 times/week; 1-4 times/week; rare: 1-3 times/month, < 1 time/month or rare; don't know), and the place of FV purchase (supermarkets; specialized markets; local markets, convenience stores, and bakery; and others - street vendor, garden/orchard and donation),²⁶ and whether meals eaten outside the home affected FV consumption (yes/no/do not eat outside the home).

Anthropometric variables

The anthropometric measurements of weight, height and waist circumference (WC) were collected. The weight measurement was obtained by a single take on a digital scale of the Marte®, with a capacity of 180 kg and an accuracy of 100g. Height was also checked in a single take using a portable Alturaexata® stadiometer with a capacity of 220 cm.²⁰

From the measures of weight and height, the Body Mass Index was calculated [BMI = (weight (kg)/height (m)²)], which was classified differently for adults²⁷ and the elderly.²⁸ The BMI presents the categories of underweight, eutrophic, and overweight, and for this study, it was classified as: not overweight (underweight/eutrophic) and overweight (overweight/obesity).

The WC was measured in triplicate as the smallest abdomen circumference, and its mean and classification were performed according to the WHO recommendations.²⁹

Statistical analysis

The data were analyzed in the Stata/SE version 14.0 program (Stata Corp., College Station, TX, USA) and the statistical significance was established at 5%.

Analysis was performed using the chi-squared statistical test to compare the explanatory variables (sociodemographic, health, anthropometric, and purchase profiles) and outcomes (inadequate consumption of fruits and vegetables). All the analyses were stratified by sex.

To evaluate the factors associated with inadequate FV consumption, multiple logistic regression was used. The variables were inserted into the model by the backward method and the following were considered: biological plausibility, scientific support, or statistical significance in univariate analysis ($p < 0,25$).

For women, the significant variables included in the model for fruits were: age, marital status, education, time of participation in PAS, professional status, DM, hypertension, hypercholesterolemia, perception of health and quality of life, smoking habit, current attempt to lose body weight, responsible for the preparation or purchase of food, knowledge about food crop season. For vegetables, the significant variables included in the model were: age, marital status, education, professional status, DM, hypercholesterolemia, perception of health and quality of life, responsible for the preparation or purchase of food, knowledge about food crop season, and whether meals eaten outside the home affected FV consumption.

For men, the significant variables included in the model for fruits were: age, education, professional status, smoking habit, current attempt to lose body weight, advice from a health professional to improve diet and health, and knowledge about food crop season. For vegetables, the significant variables included in the model were: age, education, time of participation in PAS, professional status, hypertension, perception of health and quality of life, WC, and FV purchase frequency.

In the final model, only the significant variables remain ($p < 0,05$). The quality of adjustment was verified by the Hosmer&Lemeshow test and the magnitude of association was described through the Odds Ratio (OR) and confidence intervals (95% CI).

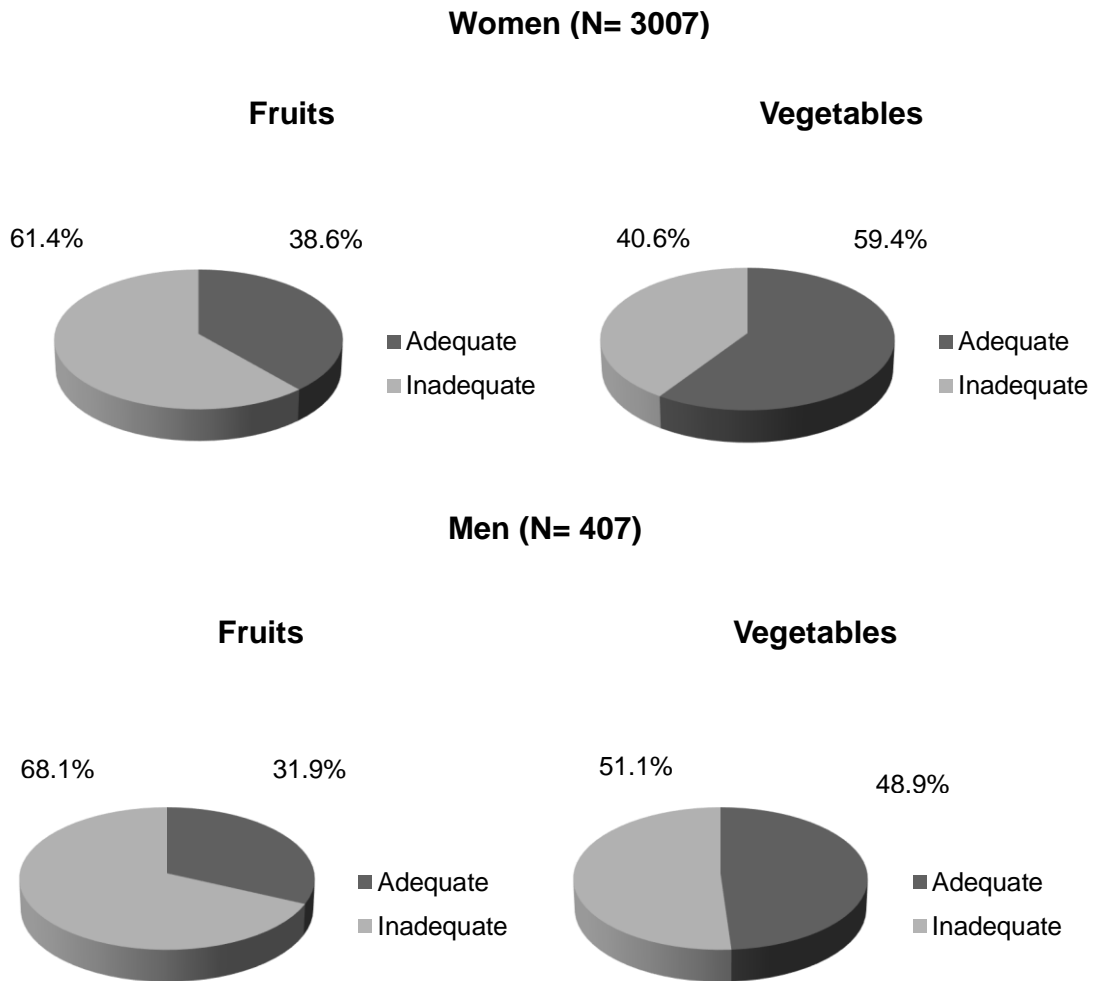
Ethical aspects

The study was conducted according to the standards required by the Declaration of Helsinki and approved by the Research Ethics Committees of the University (0537.0.0203.000-11) and the City Hall (0537.0.0203.410-11A).

RESULTS

Overall, 3414 individuals were evaluated, and most were women (88.1%). Among women, the prevalence of inadequate consumption of fruits was 61.4% and vegetables were 40.6%; while for men, these values were 68.1% and 51.1%, respectively (Figure 1).

Figure 1. Fruit and vegetable consumption among men and women (N = 3414). Belo Horizonte, Brazil, 2013-2014



3007 women participated in the study, from these 58.9% were 20 to 59 years old, 59.9% were married, 37.9% had less than 4 years of study, and 60% had more than 13 months of participation in the service and 65.6% were retired, pensioner or employed. As for men, 407 were interviewed participants, from these 60.7% were 60 years old, 74.5% were married, 37.1% had less than 4 years of study, 56,3% had more than 13 months of participation in the service, and almost all (96.6%) were retired, pensioner or employed (Table 1).

Regarding sociodemographic characteristics, the women who had the worst FV consumption were adults, single, with shorter time participation in the PAS, who were unemployed; and the inadequate vegetable consumption was related to having less education. For men, the rate of inadequate fruit consumption was higher among adults; and vegetable consumption was associated with a shorter time of participation in the PAS (Table 1).

The inadequate consumption of FV was higher among women the ones who presented a bad perception of quality of life; the fruit consumption among women without morbidities, and smokers; and the vegetable consumption was related to a bad perception of health status. Already for men, the inadequate fruit consumption was higher as those who did not nutritional receive professional advice (Table 2).

See that in table 3 that inadequate vegetable consumption among women was related to eating meals outside the home; and for men, vegetable consumption was associated with a lower frequency of FV purchases (Table 3)

Table 1. Inadequate of fruits and vegetables consumption according to sociodemographic factors, stratified by sex. Belo Horizonte, Brazil, 2013-2014.

	Women						Men																					
	Total (N=3007)		Fruits ^a (N=1842)		P value ^b	Vegetables ^c (N=1216)	P value ^b	Total (N=407)		Fruits ^a (N=277)		P value ^b	Vegetables ^c (N=208)	P value ^b														
	n	%	n	%		n	%	n	%	n	%	n	%															
Age	<0.001						0.028						0.008						0.512									
20 - 59 years	1771	58.9	1190	67.4		745	42.2		160	39.3	121	75.6		85	53.1													
≥60 years	1236	41.1	652	52.9		471	38.2		247	60.7	156	63.2		123	49.8													
Civil Status	0.041						0.156						0.350						0.296									
Married	1799	59.9	1113	62.0		714	39.8		303	74.5	209	69.0		148	48.8													
Single	773	25.7	281	65.2		193	44.8		55	13.5	29	59.2		28	57.1													
Widowed/Separated/Divorced	434	14.4	448	58.1		309	40.1		49	12.0	39	70.9		32	58.2													
Education	0.674						0.017						0.194						0.199									
≤4 years	1140	37.9	706	62.1		498	43.8		151	37.1	96	63.6		85	56.3													
5to 9 years	784	26.1	485	61.9		304	38.8		112	27.5	83	74.1		57	50.9													
≥10 years	1081	36.0	651	60.4		414	38.4		144	35.4	98	68.1		66	45.8													
Time attending the service	0.028						0.292						0.559						0.022									
0 - 6 months	748	24.9	485	65.1		320	43.0		110	27.0	77	70.0		55	50.0													
7 - 12 months	455	15.1	284	62.7		180	39.7		68	16.7	49	72.1		45	66.2													
≥ 13 months	1804	60.0	1073	59.6		716	39.8		229	56.3	151	65.9		108	47.2													
Professional occupation	0.001						0.571						0.373						0.933									
Retired/Pensioner/Employed	1973	65.6	1168	59.3		791	40.2		393	96.6	269	68.4		201	51.1													
Household/Unemployed	1033	34.4	674	65.4		425	41.3		14	3.4	8	57.1		7	50.0													

^aInadequate (<3 servings/day). ^bChi-square test. ^cInadequate (<2 servings/day).

Table 2. Inadequate of fruits and vegetables consumption according to health profile, stratified by sex. Belo Horizonte, Brazil, 2013-2014.

	Women						Men												
	Total (N=3007)		Fruits ^a (N=1842)		P value ^b	Vegetables ^c (N=1216)		P value ^b	Total (N=407)		Fruits ^a (N=277)		P value ^b	Vegetables ^c (N=208)		P value ^b			
	n	%	n	%		n	%		n	%	n	%		n	%				
Diabetes Mellitus							<0.001									0.625			0.625
Yes	488	16.3	249	51.1		185	38.0		88	21.6	58	65.9		47	53.4				
No	2512	83.7	1588	63.4		1029	41.1		319	78.4	219	68.6		161	50.5				
Arterial hypertension							<0.001									0.253			0.218
Yes	1577	52.5	918	58.3		631	40.1		237	58.2	156	65.8		115	48.5				
No	1428	47.5	924	64.9		585	41.1		170	41.8	121	71.2		93	54.7				
Hypercholesterolemia							0.027									0.301			0.439
Yes	1327	44.6	781	59.0		517	39.0		164	40.5	107	65.2		80	48.8				
No	1648	55.4	1035	63.0		681	41.4		241	59.5	169	70.1		127	52.7				
Smoking							0.016									0.098			0.366
Yes	165	5.5	116	70.3		67	40.6		28	6.9	23	82.1		12	42.9				
No	2841	94.5	1726	60.9		1149	40.6		379	93.1	254	67.0		196	51.7				
Perception of health status							0.245									0.455			0.103
Good	2166	72.1	1314	60.8		835	38.6		281	69.0	188	66.9		136	48.4				
Bad	840	27.9	528	63.1		381	45.5		126	31.0	89	70.6		72	57.1				
Quality of life							<0.001									0.255			0.097
Good	2389	79.5	1424	59.7		893	37.5	<0.001	328	80.6	219	66.8		161	49.1				
Bad	616	20.5	418	68.2		322	52.5		79	19.4	58	73.4		47	59.5				
Current attempt to lose body weigh							0.114									0.065			0.274
Yes	1876	62.4	1169	62.5		755	40.4		204	50.2	130	63.7		99	48.5				
No	1130	37.6	673	59.6		461	40.8		202	49.8	146	72.3		109	54.0				
Professional advice							0.411									0.042			0.738
Yes	1793	59.7	1088	60.8		715	40.0		229	56.7	147	64.2		119	52.0				
No	1210	40.3	751	62.3		499	41.4		175	43.3	129	73.7		88	50.3				
BMI classification							0.051									0.447			0.136
No excess weight	1042	36.3	613	58.8		432	41.5		174	44.4	122	70.1		97	55.7				
Excess weight	1829	63.7	1143	62.5		730	39.9		218	55.6	145	66.5		105	48.2				
Waist circumference							0.970									0.209			0.056
Low risk (<94cm; <80cm)	892	31.2	546	61.2		356	39.9		199	51.0	142	71.4		112	56.3				
High risk (≥94cm; ≥80cm)	1964	68.8	1203	61.3		798	40.6		191	49.0	125	65.5		89	46.6				

^aInadequate (<3 servings/day). ^bChi-square test. ^cInadequate (<2 servings/day). ^dParticipant could give more than one answer. ^eOthers: street vendor, vegetable garden, orchard and donation. ^fRare = 1-3 times/month/<1 times/month/rare. Note: FV = fruits and vegetables

Table 3. Inadequate of fruits and vegetables consumption according to purchase profile, stratified by sex. Belo Horizonte, Brazil, 2013-2014.

	Women									Men																	
	Total (N=3007)		Fruits ^a (N=1842)		P value ^b		Total (N=3007)		Vegetables ^c (N=1216)		P value ^b		Total (N=407)		Fruits ^a (N=277)		P value ^b		Total (N=407)		Vegetables ^c (N=208)		P value ^b				
	n	%	n	%			n	%	n	%			n	%	n	%			n	%	n	%					
Prepared/purchased food	0.201									0.203						0.375						0.496					
Yes	2699	92.8	1643	60.9			2699	92.4	1085	40.2			291	73.3	195	67.0			291	73.3	148	50.9					
No	208	7.2	136	65.4			208	7.2	93	44.7			106	26.7	76	71.7			106	26.7	58	54.7					
Know the food crop season	<0.001									<0.001						0.160						0.596					
Yes	2156	74.2	1268	58.8			2156	74.2	823	38.2			319	80.1	212	66.5			319	80.1	163	51.1					
No	749	25.8	509	68.0			749	25.8	353	47.1			79	19.8	59	74.7			79	19.8	43	54.4					
Eating meals outside the home and FV consumption	0.756									0.031						0.463						0.691					
Yes	1261	43.5	768	60.9			1261	43.5	530	42.1			155	39.1	107	69.0			155	39.1	80	51.6					
No	870	30.0	541	62.2			870	30.0	364	41.8			143	36.1	101	70.6			143	36.1	78	54.5					
Doesn't have meals outside	770	26.5	465	60.5			770	26.5	281	36.5			98	24.8	62	63.3			98	24.8	48	49.0					
Purchase place ^d																											
Supermarket																											
Yes	1025	35.5	618	60.3			950	33.2	370	39.0			134	33.8	87	64.9			114	29.2	58	50.9					
No	1858	64.5	1148	61.8			1914	66.8	785	41.0			262	66.2	183	69.8			277	70.8	145	52.3					
Specialized FV markets	0.274									0.049						0.858						0.208					
Yes	2697	93.5	1645	61.0			2674	96.8	1070	40.0			376	94.9	256	68.1			367	96.6	189	51.5					
No	186	6.5	121	65.1			87	3.2	44	50.6			20	5.1	14	70.0			13	3.4	9	69.2					
Local market, convenience store, bakery	0.676									0.723						0.711						0.555					
Yes	314	10.9	189	60.2			302	10.6	119	39.4			41	10.3	29	70.7			42	10.7	20	47.6					
No	2569	89.1	1577	61.4			2554	89.4	1033	40.5			355	89.7	241	67.9			349	89.3	183	52.4					
Others ^e	0.799									0.041						0.162						0.778					
Yes	275	10.0	170	61.8			448	16.4	199	44.5			40	10.6	31	77.5			56	14.9	28	50.0					
No	2467	90.0	1505	61.0			2285	83.6	899	39.3			338	89.4	225	66.6			319	85.1	166	52.0					
Frequency of FV purchase	<0.001									<0.001						0.243						0.003					
5-7 times/ week	34	1.1	19	55.9			90	3.0	36	40.0			9	2.2	7	77.8			21	5.2	5	23.8					
1-4 times/ week	2462	81.9	1442	58.6			2468	82.1	953	38.6			341	83.8	225	66.0			331	81.3	173	52.3					
Rare ^f	402	13.4	311	77.4			324	10.8	174	53.7			43	10.6	34	79.1			35	8.6	24	68.6					
Do not know	109	3.6	70	68.6			125	4.1	53	45.3			14	3.4	11	78.6			20	4.9	6	30.0					

In the multiple logistic regressions, significant associations were found between women and men. For women, old age (elderly), related quality of life as good, and knowledge about food crop seasons were associated factors with inadequate fruits and vegetable consumption; whereas DM was associated only with fruit consumption. However, for men, the associated factors against inadequate fruit consumption were: old age (elderly) and currently trying to lose body weight; and for vegetables, the associated factors were related to the quality of life as good and having a risk of metabolic complications (Table 4)

Table 4. Factors associated with inadequate fruits and vegetables consumption, stratified by sex. Belo Horizonte, Brazil, 2013-2014.

Women (N=3007)			
Variables	Odds Ratio (CI 95%)	P value	
Inadequate fruits consumption			
Age (years)			
20 - 59	1.0		
60 or more	0.6 (0.5-0.7)	<0.001	
Diabetes Mellitus			
No	1.0		
Yes	0.6 (0,5-0,7)	<0.001	
Quality of life assessment			
Bad	1.0		
Good	0.6 (0.5-0.8)	<0.001	
knowledge about food crop season			
No	1.0		
Yes	0.7 (0.6-0.8)	<0.001	
Inadequate vegetables consumption			
Age (years)			
20 -59	1.0		
60 or more	0.8 (0.7-0.9)	0.010	
Quality of life assessment			
Bad	1.0		
Good	0.6 (0.5-0.7)	<0.001	
knowledge about food crop season			
No	1.0		
Yes	0.7 (0.6-0.8)	<0.001	
Men (N=407)			
Variables	Odds Ratio (CI 95%)	P value	
Inadequate fruits consumption			
Age (years)			
20 - 59	1.0		
60 or more	0.5 (0.3-0.8)	0.006	
Currently trying to lose weight			
No	1.0		
Yes	0.6 (0.4-0.9)	0.038	
Inadequate vegetables consumption			
Quality of life assessment			
Bad	1.0		
Good	0.5 (0.3-0.9)	0.023	
Waist Circumference			
Low risk	1.0		
High risk	0.6 (0.4-0.9)	0.038	

Note: Multiple Logistic Regression with Confidence interval (CI95%); Women - Model Fruits: Likelihood test = $p < 0.001$. Model adjustment for fruits: Goodness of fit = 0.8305. Model for Vegetables: Likelihood test = $p < 0.001$. Model adjustment for vegetables: Goodness of fit = 0.9983; Men - Model for Fruits: Likelihood test = $p = 0.0036$. Model adjustment for fruits: Goodness of fit = 0.1390. Model for Vegetables: Likelihood test = $p = 0.0112$. Model adjustment for vegetables: Goodness of fit = 0.4184

DISCUSSÃO

We identified factors associated with inadequate fruit and vegetable consumption among men and women in Brazilian Primary Health Care. For women, old age (elderly), related quality of life as good, and knowledge about food crop seasons were associated factors with inadequate fruits and vegetable consumption; whereas DM was associated only with fruit consumption. However, for men, the associated factors against inadequate fruit consumption were old age (elderly) and current attempt to lose body weight; and for vegetables, related quality of life as good and having a risk of metabolic complications. As seen the proper consumption of FV is a factor of protection against various diseases such as obesity, cardiovascular diseases, and cancer.^{2,3}

The prevalence of inadequate FV consumption was high in men and women in our sample. The women had a wider range of associated factors. These results confirm the importance of investigating FV consumption differently between the sexes^{9,10,16} as well as the separate analysis of these foods.¹³

The interference of age (elderly) in FV consumption is confirmed by Brazilian^{9,10,16} and international⁶ surveys. In Brazil, FV consumption is higher among women and through advancing age.^{9,10,16} In Argentina, a national survey showed that the elderly (2.4 servings/day) have a higher intake of FV; however, among men, age did not influence the consumption of vegetables.⁶

In this study, an important associated factor against inadequate FV consumption that was identified exclusively among women was the knowledge about food crop seasons, as women are, in Brazil, the main party responsible for the purchase and preparation of food. It is noteworthy that the food crop seasons should be a factor to be worked on in educational actions to promote the adequate consumption of in nature food because it is related to quality¹³ and price.¹¹⁻¹⁴

Reducing prices policies and financial incentives are important strategies to encourage the consumption of FV. A study carried out in the United States of America (N = 2784) called "Healthy Incentives Pilot" found that the financial incentive increased the intake of FV.³⁰ Similarly, a Brazilian study with data from the "Family Budget Survey"(2002-2003), conducted in 48470 households, showed that increases in household income or reductions in the prices of FV led to increased FV consumption.³¹

The other associated factors identified in this study (DM, current attempt to lose body weight, and having a risk of metabolic complications) are related to health. The literature shows that the presence of chronic diseases and their risk factors favor the adoption of healthy lifestyles and greater care for health.³²⁻³⁴ Individuals with some disease, overweight women, and the elderly are more likely to be counseled about healthy ways of life (healthy eating and physical exercise).³⁵ In addition, a cross-sectional study carried out in Brazil, with 1255 PHC services users, found higher consumption of FV among overweight men.³⁶ Excess body weight or abdominal fat can lead the individual to undertake dietary changes to control these events.³⁷

In this scenario, the development of food and nutritional education actions aimed at the consumption of healthy foods can contribute to positive changes in lifestyle and should be adopted as preventive and health promotion. Intervention studies conducted in the PAS have shown positive results,^{22,23} such as reduced consumption of foods rich in calories and fat, changes in weight and body perception,²² increased consumption of healthy foods, reduced consumption of sugar and oil, and changes in anthropometric profiles.²³ Likewise, a randomized controlled trial with 83 elderly people in the United Kingdom found that participating in an FV intervention improved long-term FV consumption.³⁸

In this study, women, and men who related their quality of life as good presented higher FV consumption, however, among men, this association was not observed for fruit consumption. The literature

on the relationship between food and quality of life is scarce, making comparisons impossible. Further investigations in this regard, especially longitudinal studies, are recommended.

Knowing the interfering factors in FV consumption is important for designing effective strategies to promote this food consumption.¹⁷ The interferences in intake identified in this study were related to individual-level and macro determinants, demonstrating the need for intersectional policies that also improve the lives and health conditions of the population so that it is possible for the population to reach adequate levels of FV consumption.

This study has limitations. The first of these is the difficulty of individuals in related food consumption, especially vegetables that can be used as ingredients in different culinary preparations. To minimize this limitation, the quality of the data was emphasized in all stages of the study, including the use of a kit of household measures to determine the portion sizes and the use of validated questions to measure the FV consumption.²⁴ Despite the internal validity of the study, its external validity is limited, and the results cannot be extrapolated to the general population because the study was conducted in the Brazilian PHC health service. However, the results can be useful to support public policies aimed at users of health services in different contexts.

The study's potential points are the simultaneous investigation of a larger scope of interferences related to inappropriate FV consumption, and the analysis was stratified by sex and carried out separately for fruits and vegetables. These issues are important when considering the differences in consumption between men and women,^{9,10,16} the different factors involved in FV consumption, and the need for these specificities to be considered in actions intended to encourage the consumption of these foods.³⁹ We performed separate analyzes for the consumption of fruits and vegetables, and men and women, considering the diversity of factors that influence the consumption of these foods in these groups. In addition, we investigated multiple factors associated with inadequate consumption of fruits and vegetables in a study with a large sample of Primary Care services of the Unified Health System. Thus, this study can contribute to other scientific research that seeks to investigate several factors that are associated with inadequate consumption of both fruits and vegetables, considering the differentiated consumption between the sexes so that educational actions are more efficient.

CONCLUSION

The prevalence of inadequate FV consumption was high in men and women. Factors several associated with inadequate fruit and vegetable consumption were identified. There are equal factors for women and men, such as age and assessment of the quality of life; and there are also factors that are different between the sexes, such as DM, knowledge about food crop seasons, currently trying to lose body weight, and risk of metabolic complications. Thus, it points to the need to develop preventive educational actions that are aimed mainly at adults and those who do not have chronic diseases.

Factors that were relatively simple to work on in health education actions were also detected, such as knowledge of food crop seasons, as well as complexes, such as quality of life, that require macro-level interventions. Such results show the need to identify factors that are more specific for intervention and that encompass the complexity involved in inadequate food consumption. In this sense, this study is highly relevant as it may contribute to further studies that aim to investigate a wide range of factors associated with inadequate consumption of FV, analyzing these foods and the sex of the participants separately.

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Contributors

Silva SLR participated in the data collection, analysis and interpretation; writing, development and approval of the final version of the manuscript. Mendonça RD participated in the conception and design of the study; data collection, analysis and interpretation; writing, development and approval of the final version of the manuscript. Lopes ACS participated in the conception and design of the study; capture of financial resources; analysis and interpretation of data; writing and approval of the final version of the manuscript.

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