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ORIGINAL ARTICLE / *ARTIGO ORIGINAL*

The dietary profile of socially vulnerable participants in health promotion programs in a brazilian metropolis

Perfil alimentar de usuários de serviços de promoção da saúde em vulnerabilidade social em uma metrópole brasileira

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ABSTRACT: ***Objectives:*** To analyze the dietary profile of participants who used two health promotion services located in socially vulnerable areas in a Brazilian metropolis. ***Methods:*** A cross-sectional comparative study was conducted with participants (n = 370) aged ≥ 20 years who joined two services of the *Academias da Cidade* program in Belo Horizonte, Minas Gerais, Brazil. The study participants engaged in physical activity and nutritional education actions directed by the services from 2009 to 2010. The sociodemographic and economic conditions and health and nutrition profiles of each individual were assessed. ***Results:*** Participants from a high social-risk who used the service did not demonstrate adequate intake of vegetables (54.6 *versus* 43.6%; p = 0.038), sweets (33.5 *versus* 23.2%; p = 0.030), soft drinks (28.5 *versus* 11.9%; p < 0.001), artificial juice (34.7 *versus* 22.6%; p = 0.011), and processed meat (48.8 *versus* 32.7; p = 0.002). However, in the other service, lower social vulnerability, a higher prevalence of abdominal adiposity (60.7 *versus* 43.0%; p = 0.004) and consumption of high-fat meat products (53.0 *versus* 36.5%; p = 0.002) was observed. ***Conclusion:*** Participants who used both services demonstrated inadequate food intake compatible with the development of chronic disease profiles. However, the participants in each service were distinct from each other. This suggests that promotion of healthy eating should to contemplate the territory and its interface with people health.

Keywords: Feeding. Health promotion. Health services. Social vulnerability. Nutrition. Public health. Health status.

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RESUMO: ***Objetivo:*** Analisar o perfil alimentar de usuários de dois serviços de promoção da saúde localizados em áreas de elevada vulnerabilidade social de uma metrópole brasileira. ***Métodos:*** Estudo transversal realizado com todos os usuários (n = 370) com 20 anos ou mais de idade que ingressaram em duas Academias da Cidade de Belo Horizonte, Minas Gerais para prática regular de exercícios físicos e ações de educação nutricional, no período de 2009 a 2010. Avaliou-se condições sociodemográficas, econômicas, perfil nutricional e de saúde. ***Resultados:*** Usuários do serviço com maior vulnerabilidade social apresentaram maior frequência de consumo inadequado de hortaliças (54,6 *versus* 43,6%; p = 0,038), doces (33,5 *versus* 23,2%; p = 0,030), refrigerantes (28,5 *versus* 11,9%; p < 0,001), sucos artificiais (34,7 *versus* 22,6%; p = 0,011) e embutidos (48,8 *versus* 32,7%; p = 0,002). Contudo, no outro serviço, com menor vulnerabilidade social, observou-se maior prevalência de obesidade abdominal (60,7 *versus* 43,0%; p = 0,004) e consumo de carnes gordurosas (53,0 *versus* 36,5%; p = 0,002). ***Conclusão:*** Os usuários de ambos os serviços apresentaram perfil alimentar inadequado e compatível com o desenvolvimento de doenças crônicas não transmissíveis, mas distintos entre si. Este fato sugere que ações de promoção da alimentação saudável devem contemplar o território e sua interface com a saúde das pessoas.

Palavras-chave: Alimentação. Promoção da saúde. Serviços de saúde. Vulnerabilidade social. Nutrição em saúde pública. Nível de saúde.

INTRODUCTION

In recent years, public health services have had to meet several challenges related to the alarming increase in the incidence of non-communicable diseases (NCDs) resulting from a rapidly aging population and increased global urbanization[1]. The World Health Organization (WHO) recommends that current public health services integrate public health action plans through primary health care to ensure healthier communities. Public policies that intervene to provide protection for individuals against determinants that negatively affect public health will be essential[2].

One of the most important health determinants is social vulnerability. Research conducted by the Brazilian Ministry of Health in 2012 established that prevalence of NCDs is higher among individuals with lower levels of education[3]. This relation was also observed in individuals who spent less time participating in physical activity and demonstrated patterns of low quality food consumption[3]. Individuals who are socioeconomically disadvantaged or undergo long periods of income deprivation typically demonstrate low quality dietary intake. In addition, a low-cost diet is characterized by a higher caloric density, inadequate vitamin and mineral content, and increased prevalence of disease[4].

Several Brazilian cities and states have developed initiatives to promote health, prevent, and control prevalence of NCDs in populations with high social vulnerability. Health promotion services that offer regularly physical activity and nutritional guidance have

been proposed in the cities of Aracajú (SE), Vitória (ES), Curitiba (PR), Recife (PE), and Rio de Janeiro (RJ)[5].

The capital city of the state of Minas Gerais, Belo Horizonte, has also implemented a health promotion service called *Academia da Cidade* Program to improve the quality of life of residents of the city. Individuals may enroll in the service spontaneously or through health care professional referral. The programs provide nutritional counseling and guided physical activity for individuals who live in areas of high social vulnerability[6]. Analysis of the programs demonstrated positive changes in the anthropometric profile and food consumption patterns of participating individuals[7,8].

The *Academias da Cidade* Program provides important benefits to socioeconomically disadvantaged individuals with unhealthy lifestyles who are more likely to develop NCDs[5]. Understanding the dietary choices of socially vulnerable individuals will enable programs such as *Academias da Cidade* to formulate effective action plans. The aim of this study was to analyze the feeding profile of individuals who accessed the *Academias da Cidade* health promotion services located in areas characterized by high levels of social vulnerability in a Brazilian metropolis.

METHODS

DESIGN AND SAMPLE

This study was conducted in the city of Belo Horizonte, state of Minas Gerais, Brazil. Belo Horizonte is a municipality divided into nine administrative regional centers with an estimated population of 2,412,937[9]. The expected prevalence of obesity in 2012 for Belo Horizonte residents aged ≥ 20 years was 14.5% and occurrence rates for systemic arterial hypertension and diabetes *mellitus* were 25.9 and 6.6%, respectively[3]. This municipality has focused on strategies to enhance public health policies and inter-sectors actions for health promotion in more socially vulnerable populations.

The study sample was comprised of individuals ≥ 20 years who used two separate services (Service I and Service II) of the *Academias da Cid*ade Program between August 2009 and November 2010. All members of the *Academias da Cidade* program agreed to participate in the study and all of the study participants engaged in morning physical exercise during the data collection period. At the time of this study, the services of the *Academias da Cidade* Program were the only services available with regular nutrition intervention accompanied by promotion of physical activity. It is also important to highlight that the two services were open in the morning.

The services of the *Academias da Cidade* Program were located in areas characterized by high social vulnerability, with social vulnerability indices of 0.5 to 0.63 for Service I and 0.77 for Service II. This index is used to classify living conditions by measuring access to five "dimensions of citizenship" included as follows: environmental (access to housing and urban

infrastructure), cultural (access to education), economic (access to work and income), legal (access to legal assistance), and survival safety (access to health services, public social welfare, and safe food). The index varies between 0 – 1.0, and the closer the value is to 1.0, the higher the social vulnerability of the population[10]. Therefore, based on this index scale, we identified that Service II was located in a region of higher social vulnerability when compared to Service I.

Consent to participate in the study was considered after inclusion criteria were filled. All individuals provided written and informed consent for their participation in the study. The project was approved by ethics committees from both the Federal University of Minas Gerais (103/07) and from Belo Horizonte City Hall (087/2007).

MEASURES

Data were obtained from individuals upon their arrival at the service site. The data on each study participant's socioeconomic and demographic conditions, health profile, food consumption, and anthropometry were acquired by properly trained nutrition students and nutritionists who administered a 40 minute examination.

The socioeconomic and demographic data evaluated included participant's age, sex, professional occupation, level of education, number of household members, and family per capita income.

The health profile of each participant was investigated based on self-referral for NCDs and attempts to lose weight in the six-month period prior to the study were searched. This study used self-referral criteria similar to those reported by national research studies[3].

Anthropometric assessment was conducted by measuring weight, height, waist circumference (WC), and hip circumference (HC) using techniques recommended by the WHO[11]. From these data, the body mass index (BMI, kg/m²) and the waist to hip ratio [WHR = WC (cm)/HC (cm)] were calculated.

Classification of nutritional status of adults based on their BMI was performed according to WHO[11] cut-points and Nutrition Screening Initiative[12] classifications were used for the elderly. Adults with levels of undernourishment from I to III were classified as underweight, and individuals with obesity levels I to III were classified as overweight. The WC and WHR indices were classified using the criteria recommended by the WHO[13].

Participants were asked about their eating habits and food consumption frequency to determine their dietary profiles. Snacking habits between meals, drinking habits at mealtimes, and eating while watching television were investigated. Additionally, the intake of chicken skin and meat with apparent fat were also investigated. All variables described above were obtained from the interviewees' report.

The food consumption frequency was investigated by applying a qualitative Food Frequency Questionnaire that comprised a list of 16 foods referring to the six-month period prior to the interviews. The consumption data obtained were analyzed according to the recommendations provided by national standards[14,15] (Table 1).

Table 1. Criteria to evaluate the food consumption frequency of participants who used the health promotion services.

Food	Recommendation	Criterion adopted for adequate intake
Fruits	3 portions a day	≥ 3 portions a day
Vegetables	3 portions a day	≥ 3 portions a day
Beans	Daily	5 – 7 times a week
Meats	Daily	5 – 7 times a week
Milk and dairy products	3 portions a day	≥ 3 portions a day
Sweets	2 times a week or less	≤ 2 times a week
Stuffed cookies*	Not available	≤ 2 times a week
Regular soft drinks*	Special occasions or reduce consumption	≤ 2 times a week
Artificial juice*	Consume moderately	≤ 2 times a week
Ice cream*	Consume moderately	≤ 2 times a week
Fried food	Avoid or reduce consumption	≤ 2 times a week
Snacks and sandwiches	Occasionally	< 2 times a month
Stuffed meat products	Occasionally	< 2 times a month
Pork fat	Occasionally	< 2 times a month
Industrialized sauces	Avoid	Rare/never
Egg	Daily	Restrict (< 2 times a week)

*Recommendation from III Brazilian Guidance on Dyslipidemias and Prevention of Atherosclerosis from Sociedade Brasileira de Cardiologia (Brazilian Cardiology Society).

ANALYTIC STRATEGY

The data were analyzed using descriptive analysis and evaluation of variable distribution by the Kolmogorov-Smirnov normality test. Furthermore, the χ^2 test was used to compare proportions. The level of significance was noted at $p < 0.05$. The Epi Info program (version 3.4.3), and the Statistical Package for the Social Sciences software (version 17.0) were used for the analysis.

RESULTS

There were 370 total participants in the study. Service I included 168 participants and Service II included 202 participants, with a mean age of 48.7 ± 13.6 years. There were a

higher percentage of women in both services (95.8% for Service I and 90.1% for service II). In addition, there were statistical differences between the two services in terms of the number of employed individuals (p = 0.028) (Table 2).

Table 2. Sociodemographic and economic profiles of participants who used the health promotion services.

Variables	Service I (n = 168)		Service II (n = 202)		p-value
	n	%	n	%	
Age range					
Adults	132	79.0	158	78.2	0.848
Elderly	35	21.0	44	21.8	
Sex					
Women	161	95.8	182	90.1	0.035
Men	7	4.2	20	9.9	
Professional occupation					
Employed	83	50.3	99	49.3	0.028
Retired	22	13.3	38	18.9	
Homemaker	56	33.9	49	24.4	
Unemployed	4	2.4	15	7.5	
Years of education					
≤ 4 years	46	27.4	61	30.2	0.644
5 – 8 years	45	26.8	46	22.8	
≥ 9 years	77	45.8	95	47.0	
Household members					
< 4 members	90	53.6	94	46,5	0.178
> 4 members	78	46.6	108	53.5	
Per capita income (Quartile)					
≤ R$ 255.00	36	22.0	58	30.1	0.218
R$ 256.00 – R$ 400.00	41	25.0	45	23.3	
≥ R$ 401.00	87	53.0	90	46.6	

Note: The response rate decreased the overall sample size.

Systemic arterial hypertension was considered the most prevalent NCD (37.7% of participants in Service I and 39.3% in Service II). Both services presented a similar pattern of disease distribution (Table 3).

Participants of Service I were at high-risk for developing metabolic complications associated with abdominal obesity ($p = 0.004$). Both services had a high prevalence of overweight individuals (75.6% for Service I and 70.3% for Service II) and participants at high-risk for cardiovascular disease determined by WHR (65.1% for Service I and 57.5% for Service II) (Table 3).

The results from our analysis indicated that a significantly higher number of participants in Service I (70.1%) had attempted to lose weight in the six-month period prior to the interview when compared to participants in Service II (53.0%, $p = 0.001$). A follow up on participants in both services who had attempted to lose weight with the help of a health professional was not conducted on 76.2% of the total 223 individuals. Attempting to lose weight without the help of a health professional prevailed among participants of Service I (84.1 *versus* 70.8%, $p = 0.018$). Dietary restriction combined with physical activity was the

Table 3. Anthropometric and health profiles of participants who used the health promotion services.

Variables	Service I (n = 168)		Service II (n = 202)		p-value
	n	%	n	%	
Diseases and Grievances					
Systemic arterial hypertension	63	37.7	79	39.3	0.757
Hypercholesterolemia	45	28.5	65	33.3	0.328
Hypertriglyceridemia	22	14.5	23	12.5	0.597
Diabetes *mellitus*	17	10.4	17	8.8	0.606
Body Mass Index Classification					
Underweight	3	1.8	8	4.1	0.318
Eutrophy	38	22.6	50	25.6	
Overweight	127	75.6	137	70.3	
Waist circumference Classification – Risk of metabolic complications					
No risk	36	21.4	59	30.6	0.004
High risk	30	17.9	51	26.4	
Very high risk	102	60.7	83	43.0	
Waist-to-hip ratio Classification – Risk of cardiovascular diseases					
No risk	58	34.9	82	42.5	0.144
With risk	108	65.1	111	57.5	

Note: The response rate decreased the overall sample size.

most common behavior (40.2%) among participants in Service I, whereas dietary restriction alone prevailed among participants in Service II (38.7%).

Participants in Service I exhibited a higher prevalence of eating chicken skin ($p = 0.026$) and meat with apparent fat ($p = 0.002$), and Service II participants showed a higher prevalence of liquid intake during lunch and dinner ($p < 0.001$) (Table 4). In addition, more than 50.0% of the individuals of both health promotion services demonstrated inadequate fruit and milk intake. The comparison of food frequency consumption patterns between the services showed that adequate intake of vegetables ($p = 0.038$), sweets ($p = 0.030$), regular soft drinks ($p < 0.001$), artificial juice ($p = 0.011$), and processed meats ($p = 0.002$) was more common among Service I participants (Table 5).

DISCUSSION

Participants in Services I and II demonstrated significant differences regarding food intake patterns. Participants in Service II (located in the more social vulnerability area) consumed greater amounts of ultra-processed food high in sugar, whereas Service I participants reported adequate intake of vegetables and fatty meat.

The results from this study indicated that participants in Service I who resided in environments with less social vulnerability consumed more fatty meats, whereas users from Service II consumed more ultra-processed food. This is in concordance with a recent survey among Brazilians that indicated that the ultra-processed food consumption has increased in people with lower incomes[16]. In addition, a study of 3,835 low-income adult participants in the National Health and Nutrition Examination Survey (NHANES 1999–2004) also demonstrated that low-income adults consumed increased processed meats, high sugar items, such as candy, ready-to-eat desserts, and sweetened beverages, in excess while consumption of whole grains, fruits, vegetables, fish, and legumes has decreased[17].

The differences regarding dietary habits of participants in the separate health services could be related to the lack of availability of high-quality foods and lack of access to

Table 4. Eating habits among participants who used the health promotion services.

Variables	Service I (n = 168)		Service II (n = 202)		p-value
	n	%	n	%	
Snacks between meals	88	52.7	112	55.4	0.598
Drinks during the main meals	66	39.3	122	60.7	< 0.001
Watches TV while eating	87	52.1	120	60.0	0.128
Consumes meat with apparent fat	123	74.5	126	63.6	0.026
Eats chicken skin	88	53.0	72	36.5	0.002

Note: The response rate decreased the overall sample size.

Table 5. Inadequate food consumption patterns among participants who used the health promotion services.

Variables	Service I (n = 168)		Service II (n = 202)		p-value
	n	%	n	%	
Fruits	113	67.7	153	75.7	0.085
Vegetables	72	43.6	107	54.6	0.038
Beans	28	16.7	24	12.0	0.200
Meats	27	16.1	36	17.9	0.640
Milk and dairy	132	78,6	171	85.9	0.064
Sweets	39	23.2	67	33.5	0.030
Stuffed cookies	7	4.2	13	6.5	0.325
Regular soft drinks	20	11.9	57	28.5	<0.001
Artificial juice	38	22.6	69	34.7	0.011
Ice cream	4	2.4	8	4.0	0.401
Fried food	52	31.0	78	39.2	0.100
Snacks and sandwiches	57	33.9	72	36.0	0.678
Meat stuffed products	55	32.7	98	48.8	0.002
Pork fat	17	10.1	20	10.1	0.983
Industrialized sauces	67	39.9	84	42.4	0.622
Egg	20	11.9	26	13.0	0.752

Note: The response rate decreased the overall sample size.

information in socially vulnerable areas. The ability to access information about healthier lifestyle choices promotes voluntary changes in dietary practices[18]. For example, a higher number of individuals from Service I attempted to lose weight in the six-month period prior to the study when compared to participants in Service II, which fits with recommendations for weight loss and healthy lifestyles promoted by several associations and government entities[14,19,20]. The participants' preference for calorie restriction or changes in diet and increased physical activity was reflected in increased energy expenditure. In addition, the attempt to lose weight could also result from increased consumption of vegetables and decreased intake of sugar rich food[19].

Studies demonstrate that residents in socially vulnerable areas have restricted access to high-cost healthier food[21]. The availability of fresh food in these areas is typically limited to small local markets where prices are higher and there are low-quality fresh products and

less variety[22,23]. In addition, Service II was located in an area of high social vulnerability with poor housing conditions, less urban infrastructure and work opportunities, limited access to health care, and deficiencies in guaranteed food security[10] that all deterred the purchase of food outside the neighborhood[22,23]. These characteristics may contribute significantly to the observed dietary profiles of each service group in our study[24-26].

Studies have shown that urban areas with insufficient resources to provide high-quality education have more local grocery stores, bars, fast food restaurants, and eating establishments that commercialize unhealthy products in comparison to supermarkets and shops that specialize in fresh fruits and vegetables[24,25]. Additionally, a majority of the establishments that sell ready-to-eat food do not offer nutritional content of the products, thus making it difficult for individuals to choose healthy food[27]. These findings indicate that in order to provide adequate access to healthy food, the assessment of insufficient intake of healthy food should encompass understanding both the family and external environments[26].

Participants in Service II demonstrated increased intake of high-sugar beverages including soft drinks and artificial juice, which may explain the increased intake of liquids during main meals for these participants. High-sugar beverages with low satiating power provide excessive calories and rapidly absorbed sugar, and are associated with being overweight. This was verified in an eight-year cohort study in the United States with 51,603 nurses from 1991 to 1999, in which increased intake of high-sugar beverages was positively associated with weight gain and risk of developing type II diabetes independently of other risk factors[28].

Participants in Service I demonstrated a higher intake of fat and saturated fat from fatty meat, chicken skin, and meat with apparent fat. This increased consumption may have contributed to the differences observed in WC. Indeed, Wang and Beydoun analyzed national studies to identify that North American individuals with a higher daily intake of meat demonstrated higher dietary caloric intake that was directly associated with increased WC[29].

In this study, participants of both services presented a low intake of fruits and vegetables. This is in contrast to the high intake of ultra-processed food (artificial juice, fried food, processed meats, and snacks). This profile corroborates results from a Brazilian survey that showed that increased consumption of ready-to-eat products was associated with reduced intake of natural or minimally processed food[16].

The study corroborates the hypothesis that social vulnerability may interfere with healthy nutrition practices. It is crucial to understand the experiences of socially vulnerable populations in order to implement efficacious public health strategies to confront health problems in this group. It is well known that the components of a social environment are direct determinants of an individual's quality of life. Therefore, implementation of appropriate programs that promote healthy eating and exercise habits may provide a positive impact on quality of life[21].

The innovative *Academia da Cidade* initiative promotes healthy lifestyles, is interdisciplinary, and aims to encourage people living in areas of high social vulnerability to adopt healthier lifestyles. Individuals in areas with social vulnerability may present variability in dietary habits and require distinct intervention by local health promotion services. Therefore, programs developed by health services should consider all aspects of citizenship, autonomy, and

empowerment. Individuals will then be able to recognize that a healthy lifestyle is their responsibility and work to improve their access to quality healthy food[30].

CONCLUSION

The results from this study indicated that participants of the *Academia da Cidade* program exhibited inadequate intake of healthy food and dietary profiles compatible with the development of NCDs. This suggests that consideration of sociodemographic conditions, infrastructure for accessible food, and an individual's autonomy for making healthier food choices should be considered when promoting healthy diet programs in socially vulnerable populations.

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