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Access to fruits and vegetables in the peripheral areas of the metropolitan region of São Paulo

Acesso à frutas e hortaliças em áreas periféricas da região metropolitana de São Paulo

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Abstract

The absence of favorable food environments constitutes an obstacle to the adoption of healthy food practices. A qualitative and quantitative study was carried out in the city of Embu das Artes, State of São Paulo, Brazil, in order to describe the fruit and vegetable purchasing practices of the inhabitants living in the peripheral areas of São Paulo metropolitan region and how they perceive the access to these foods. In total, 47 individuals were interviewed. The main fruit and vegetable retailers were open-air markets and in fruit and vegetable stands. From the analysis of semi-structured interviews, the following main themes were identified: fruit and vegetable availability, distance between home and retailers, food variety, food quality and food prices. This analysis revealed the insufficient supply of fruits and vegetables. Respondents who lived or worked near open-air markets and fruit and vegetable stands showed and declared their positive perceptions regarding availability and quality of fruits and vegetables. Adequate and healthy food was associated with high prices, although the prices in open-air markets generated positive perceptions. This study showed that the population that lives close to open-air markets and fruit and vegetable stands usually go to these places to buy fruits and vegetables. Thus, one can notice the importance of such traditional establishments that sell healthy foods and are located in these regions.

Keywords: Food and Nutrition Security. Food Supply. Nutrition Policy. Feeding Behavior. Environment and Public Health.

Resumo

A ausência de ambientes alimentares favoráveis constitui-se em um obstáculo à adoção de práticas alimentares saudáveis. Com o objetivo de descrever práticas de aquisição de frutas e hortaliças de moradores de áreas periféricas da região metropolitana de São Paulo e como percebem o acesso a estes alimentos, foi realizado um estudo descritivo no município de Embu das Artes, São Paulo. Foram conduzidas entrevistas com 47 indivíduos. Os principais locais de aquisição de frutas e hortaliças eram feiras-livres e sacolões. Da análise das entrevistas semiestruturadas identificou-se os seguintes temas principais: disponibilidade de frutas e hortaliças, distância entre o domicílio e os locais de compra, variedade dos alimentos, qualidade dos alimentos e preços dos alimentos. Essa análise revelou o abastecimento insuficiente de frutas e hortaliças. Os relatos que manifestaram percepções positivas em relação à disponibilidade e qualidade de frutas e hortaliças foram daqueles que moravam ou trabalhavam próximos a feiras-livres e sacolões. A alimentação adequada e saudável foi associada a preços altos, ainda que os preços praticados nas feiras-livres tivessem apresentado percepções positivas. Este estudo mostrou que a população que reside próxima a feiras-livres e sacolões utiliza-os com frequência para a compra de frutas e hortaliças. Assim, nota-se a importância destes estabelecimentos típicos de comercialização de alimentos saudáveis distribuídos nos territórios.

Palavras-chave: Segurança Alimentar e Nutricional. Abastecimento de Alimentos. Política Nutricional. Hábitos Alimentares. Meio Ambiente e Saúde Pública.

Introduction

In recent years, Brazilian people have shown a significantly lower consumption of traditional foods and, in contrast, a considerable increasing consumption of ultra-processed products.[1] Besides the fact that this dietary pattern is associated with increases in the prevalence of obesity and chronic non-communicable diseases (CNCD), it entails an obvious damage to food culture and commensality.[2] Considering that the behavior and lifestyle of individuals and social groups are strongly determined by the physical, socioeconomic and cultural environment in which they live, the lack of favorable food environments constitutes an obstacle to the adoption of healthy eating practices.[3]

There is evidence that food environments in socioeconomically disadvantaged regions are less healthy considering the availability of fruits and vegetables (F&V), quality and price of food, types of establishments, lack of infrastructure to store certain food items, among others.[4-7]

Broadly speaking, food environment is an implicit determinant of access to food. Studies on this subject applying subjective approaches play a pivotal role in the implementation of changes in the food environment aiming at efficiently improving the diet quality of individuals.[8,9]

In Brazil, the discussion about the food environment is recent and limited and has only been addressed from a quantitative perspective.[4,10-14] The international specialized literature brings evidence that the perception of individuals on the food environment is influenced by neighborhood attributes and the socioeconomic and demographic characteristics of the population, possibly causing a negative effect on self-efficacy not only for healthy eating but also for unhealthy food acquisition habits.[9,15,16] Thus, the role that the food environment plays in dietary choices with regard to individual perceptions can provide important clues about subjective motivations, attitudes and experiences that may influence the acquisition and consumption of healthy foods.

National policies have signaled the importance of actions in territories aiming at facilitating healthy eating choices from the perspective of food and nutritional security (FNS) and social determinants of health.[2,17,18] Stronger emphasis is needed on the nutritional quality of food to which people have access, given the alarming increase in obesity and other risk factors for CNCD.[19]

The challenge of promoting the nutritional dimension of FNS is important and complex, since healthy eating, as well as one of the determinants of health, is culturally and socially constructed and strongly influenced by social determinants, such as access, environment and food system.[18,20,21] Considering the negative – and already reported – changes that have been taking place in the dietary habits of Brazilian people and that food environment may be acting as an impediment to the adoption of healthy eating practices, especially in socioeconomically disadvantaged regions, this study aims at contributing to the specialized literature referring to the urban scenario. This article describes the F&V purchase and dietary patterns of inhabitants from outlying areas of the metropolitan region of São Paulo and how they perceive access to these foods.

Methodology

The present study is the result of a larger project investigating the experience with community gardens developed in Basic Health Units (BHU) and Municipal Schools in the city of Embu das Artes, State of São Paulo, Brazil, and was conducted in accordance with the current fundamental principles of ethical health research (OF.COEP/056/12).

Study location

The municipality of Embu das Artes, located in the Metropolitan Region of São Paulo, has approximately 240 thousand inhabitants living in urban areas.[22] This study encompassed the regions assigned to four Basic Health Units (BHU) with community gardens – Santa Emília, Nossa Senhora de Fátima, Jardim Independência and São Luiz – which also have a greater population density and are located closer to the city of São Paulo, within a peripheral context of the metropolitan region of São Paulo. According to the Center for Studies and Research "Dr. João Amorim" - CEJAM, a social organization responsible for the management of the municipal BHU, the number of inhabitants served by the BHU of this study is: Santa Emília – 23,456; Nossa Senhora de Fátima – 21,091; Jardim Independência – 19,666; São Luiz – 13,318.

Data collection

Data collection took place in July 2013. It was performed by a team of undergraduate and postgraduate students who were properly trained.

The Municipal Health Department provided the maps of the territories assigned to the four BHU, where the community gardens were developed. Through a consultation ran with the employees of the BHU (managers and community health agents – CHA), it was verified which areas corresponded to the territories of each one.

The subjects invited to participate in the survey were inhabitants from these four regions. Semi-structured interviews were conducted, and a sociodemographic questionnaire was filled out with the participants. The interview script consisted of 13 open questions about F&V purchasing patterns and perceptions regarding the price, quality, variety and availability of these foods in the areas surrounding their home location.

A convenience sampling was performed, and it did not seek to be statistically representative of the population of the region or municipality surveyed. In total, 49 census sectors (CS) were located when added to the four regions included in the study, and the aim was to interview one inhabitant of each CS covered. The criteria for composing the sample were the following: the participant must reside in the corresponding CS, be aged 18 years old and over and be the responsible for feeding the family.

The interviewees were informed about the general purpose of the study and provided free and informed consent for their participation.

Data analysis

The sociodemographic questionnaires were entered using the Epi InfoTM software (Centers for Disease Control and Prevention, Atlanta, USA). The database was then transferred to the SPSS statistical package (IBM, New York, USA) for editing and analysis.

The materials obtained from the individual semi-structured interviews (audio recordings and notes) were organized to compose a database for analysis using NVivo10 software (QSR International Pty Ltd. Version 10, 2012).

The analysis of reports was carried out through the content analysis by two nutritionists, graduate students in public health, under the supervision of their advisor.[23] It consisted of breaking the transcribed text into categories, highlighting the thematic nuclei that are guided by themes related to the Human Right to Food (HRF) and FNS and taking place in three stages: pre-analysis – organization and systematization of ideas through fluctuating reading and formulation of hypotheses; material exploration – categories classification and, finally, treatment and interpretation of data obtained, which was carried out jointly by the researchers.

Results

The sociodemographic characteristics of the interviewees can be observed in Table 1. The interviewed population was mainly composed by women (79%), belonging to the age group 41-43 years, married (49%), holding a high school degree (45%), employed (83%), working on the books (46%) or self-employed (38%) and with a per capita income of 1.4 minimum wages.

Tabela 1: Sociodemographic characteristics of the interviewees living in the regions assigned, to four BHU (n=47). Embu das Artes, SP, Brazil, 2013.

	N	%
BHU		
Santa Emília	16	34,0
Nossa Senhora de Fátima	12	25,5
Jardim Independência	11	23,4
São Luiz	8	17,0
Sex		
Female	37	78,7
Male	10	21,3

continue

	N	%
Marital status		
Single	16	34,0
Married	23	48,9
Separated/Divorced/Widow	8	17,0
Education		
Never went to school/Incomplete elementary school	9	19,1
Complete elementary school	10	21,3
Complete High school level	21	44,7
Undergraduate Diploma	7	14,9
Working status		
Does not work	2	4,3
Unemployed	3	6,4
Retired	3	6,4
Currently working	39	83,0
Working regime (n=39)		
Working on the books	18	46,2
Temporary or informal work	4	10,2
Self-employment	15	38,5
Other	2	5,1
Occupation[1] (n=39)		
Health services	11	28,2
Service providers	9	23,1
Educational professional	5	12,8
Paid domestic workers	4	10,3
Workers of the commerce sector	3	7,7
Other	7	18,0

continue

	N	%
Beneficiary paid by Social Security	3	6,4
	Average (IC95%)	**Median**
Age (years)	43,4 (38,8-48,0)	41,0
Per capita income (BRL)	999,4 (730,5-1268,3)	787,5
Per capita income (minimum wages)	1,4 (1,0-1,8)	1,1

[1]Health services: Community health agents; Service providers: hairdressers, seamstresses, mechanics, drivers and painters; Educational professionals: teachers, school inspector, school principal and cooks; Paid domestic workers: domestic workers, baby-sitters and caretakers; Workers of the commerce sector: Salespeople, shop owners and businessmen; Other: Self-employed, casual work, administrative assistant and civil servants with unclear duties and functions.

Forty-seven inhabitants of the 49 census sectors (95.9%) identified by BHU professionals as members of the corresponding territories were interviewed, two CS were inaccessible.

When the retailers were evaluated, it was observed that the inhabitants bought the fruits in open-air markets (39.1%), fruit and vegetable stands (37.0%), supermarkets (19.6%) and grocery stores (4.4%). On the other hand, the purchase of vegetables took place in fruit and vegetable stands (42.6%), open-air markets (31.9%), supermarkets (21.3%) and grocery stores (4.3%).

The frequency distribution of F&V purchase, means of transportation used and travelled distance to retailers are shown in Table 2. One must highlight the percentage difference found between the means of transportation for commuting to open-air markets/fruit and vegetable stands in comparison with other locations. The vast majority of individuals go walking to open-air markets (89%), in other words, these places are close to their homes. As for those who buy them in supermarkets, this rate drops to 44% for fruit purchasing patterns and 50% for vegetables. The opposite occurs when one observes the "private car" category. In the case of open-air markets, only 6% of the individuals use it. In relation to people who buy food products in supermarkets, the rate of fruit acquisition is 57% and 50% for vegetables.

On average, the distance travelled to purchase fruits was 532m (95% CI 339m-725m) and the median was 300m. To buy vegetables, the distance travelled was 509m (95% CI 314m-703m) and the median was 250m.

Tabela 2: Frequency distribution of fruits and vegetables purchase, means of transportation used and distance travelled according to the retailers chosen by 47 inhabitants of Embu das Artes, SP, Brazil, 2013.

	Fruits								Vegetables							
	All the supermarkets *		Supermarkets		Open-air markets/ F&V stands		Grocery stores		All the supermarkets *		Supermarkets		Open-air markets/ F&V stands		Grocery stores	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Frequency																
Daily	0	0,0	0	0	0	0,0	0	0,0	1	2,1	0	0,0	1	2,9	0	0,0
Weekly	34	73,9	4	44,4	28	80,0	2	100,0	35	74,5	6	60,0	27	77,1	2	100,0
Fortnightly	11	23,9	4	44,4	7	20,0	0	0,0	8	17,0	2	20,0	6	17,1	0	0,0
Monthly	1	2,1	1	11,1	0	0,0	0	0,0	3	6,4	2	20,0	1	2,9	0	0,0
Total	46	100,0	9	100,0	35	100,0	2	100,0	47	100,0	10	100,0	35	100,0	2	100,0
Means of transportation																
Walking	37	80,4	4	44,4	31	88,6	2	100,0	38	80,8	5	50,0	31	88,6	2	100,0
Public transport	2	4,4	0	0,0	2	5,7	0	0,0	2	4,3	0	0,0	2	5,7	0	0,0
Private car	7	15,2	5	55,6	2	5,7	0	0,0	7	14,9	5	50,0	2	5,7	0	0,0
Total	46	100,0	9	100,0	35	100,0	2	100,0	47	100,0	10	100,0	35	100,0	2	100,0
Travel distance (meters)																
Average (IC 95%)	532 (339-725)		375 (144-606)		591 (347-835)		150 (52-248)		509 (314-703)		375 (144-606)		562 (314-809)		150 (52-248)	
Median (IC95%)	300 (200-400)		250 (200-662)		300 (200-523)		150 (100-200)		250 (200-400)		250 (200-662)		300 (300-423)		150 (100-200)	

* Supermarkets, Open-air markets, F&V stands and grocery stores.

From the analysis of the semi-structured interviews, main thematic categories were identified: Availability of F&V, Distance between home and retailers, Food variety, Food quality and Food prices.

Availability of F&V

The following subcategories were identified: Lack of establishments offering fruits; Insufficient supply of fruits and vegetables; Open-air markets in the region shutting down; and Satisfaction of inhabitants living near open-air markets and fruit and vegetable stands. The statements selected to illustrate the inhabitants' perceptions regarding the availability of fruits and vegetables are presented in Table 1.

The lack of establishments offering fruits and vegetables, such as open-air markets and fruit and vegetable stands was reported by most of the interviewees, as well inadequate supply of F&V, which determined the lack of these foods during the week. The small number of establishments offering fresh food products was considered as an obstacle to the adoption of healthy eating practices.

In one of the regions, inhabitants reported that two supermarkets controlled the F&V trade, which forced a shutdown of open-air markets in the neighboring areas. Among the inhabitants living near open-air markets and fruit and vegetable stands, the expression of positive perceptions was frequent, as was the case with bakeries and butcheries.

Some inhabitants mentioned strategies to deal with the F&V local supply problem, such as the implementation of public fruit and vegetable stands, new open-air markets or establishments that prioritize the sale of F&V and the continuity and expansion of community garden projects in the BHU.

Distance between home and retailers

The following subcategories were identified: Few open-air markets and fruit and vegetable stands close to the homes and Displacement to more distant places for better quality foods. Table 1 presents the statements revealing the inhabitants' perceptions regarding the distance between home and retailers.

The interviewees reported a great deal of dissatisfaction regarding the distance to places to shop for food, mainly high-quality F&V at affordable prices. Most of those who expressed positive perceptions on this category reported the proximity to supermarkets and specialized establishments, such as bakeries.

Some residents reported that they did not own a car, thus it was difficult to go shopping, as the establishments do not offer home delivery. Going shopping in the neighboring areas was often done because of necessity.

Food variety

"Lack of variety in F&V is observed in the region" stood out as a subcategory. The statements and declarations chosen to exemplify the inhabitants' perceptions on food variety are shown in Chart 1.

The customers dissatisfaction due to the lack of variety in F&V was also reported by the interviewees. Vegetables, in general, were more criticized regarding variety in comparison with fruits. The interviewees compared the neighborhoods in which they lived with high-income neighborhoods, where a greater variety of establishments and diversity of healthy foods was available.

Chart 1. Statements and declarations of residents of each region, according to the main thematic categories. Embu das Artes, SP, Brazil, 2013.

Availability of fruits and vegetables
The number of open-air markets is continuously decreasing [...] In fact, I believe that not only here, but in several regions, the number has certainly fallen, because there was an open-air market in our neighborhood and now there is not anymore (resident of Santa Emília region). "Interviewer: [...] what suggestions would you make to the government or city hall to improve the food quality in the region in which you live? *Interviewee: I think that we should have more community gardens, although it is not only the government that should become aware, but mainly the population, because there was a community garden here and we invited the patients from the BHU Independência to take part, and they did not participate" (resident of Jardim Independência region).*
Distance between home and retailers
"There are few options to buy fruits and vegetables, we have to walk, for example, about ten minutes to buy and sometimes it is difficult because we have to do a house chore and we cannot go and come home straight away". (resident of Jardim Independência). "There is a F&V stand close to where I live, and it always offers fresh foods" (resident of Nossa Senhora de Fátima region). *"Here you only have one option and you have to go there [...] if you have a car you can choose the place, right?! But when you don't have transport facilties, you must go to that place because it is near the place you live. (resident of* Santa Emília region*).* "There are few options to buy fruits and vegetables, we have to walk, for example, about ten minutes to buy and sometimes it is difficult because we have to do a house chore and we cannot go and come home straight away". (resident of Jardim Independência). "There is a F&V stand close to where I live, and it always offers fresh foods" (resident of Nossa Senhora de Fátima region).
Food variety
"[...] Here it should offer a wider variety, it's just the usual such as lettuce, cabbage, broccoli and still, of poor quality, it looks like leftovers... then one must to leave and go to other places to buy better stuff and find a wider variety (resident of Jardim Independência region). "[...] Certain varieties in relation to vegetables that are lacking, so sometimes I need to go the neighboring towns to find a greater diversity" (resident of Santa Emília region). *"I think it should have a wider variety of places and foods, for example, when we go somewhere further away, the supermarket in which we don't find people of our condition has a greater variety of food than in our own neighborhood" (resident of Independência region).*

Food quality

The following subcategories were identified: Satisfaction with the F&V stands and open-air markets and Satisfactory quality of F&V according to the days of supply for the supermarkets. Chart 2 depicts the statements that exemplify the inhabitants' perceptions on food quality.

Positive perceptions in relation to food quality were frequent, especially among those living near open-air markets and F&V stands. It was reported that on the days of F&V supply for the supermarkets, prices were more attractive and quality was acceptable. However, over the following days, the fresh foods deteriorated and were not replaced.

Some interviewees reported that they did not buy F&V due to their unsatisfactory quality. A resident mentioned the presence of establishments offering F&V at low prices and reported his concern about the hygiene of the place and the food quality.

Food prices

The following subcategories stood out: Satisfaction regarding open-air markets; Criticism of supermarkets (lack of "competition"); Healthy foods associated with high prices; and Expensive prices in nearby grocery stores. The statements and declarations selected to indicate the residents' perceptions on food prices are presented in Chart 2.

In general, food prices was one of the most recurring themes. Some people affirmed they stopped buying food because of the prices. The most affordable places were open-air markets, but they occurred infrequently. Many respondents revealed that the lack of "competition" in the healthy food trade resulted in high prices.

Foods like F&V, organic foods, fish, dairy, beans and meat were associated with high prices, often determining bad food choices. A resident affirmed that she associated the community vegetable garden of the neighboring BHU with the guarantee of access to high-quality vegetables at no charge.

Chart 2. Statements and declarations of residents of each region, according to the main thematic categories. Embu das Artes, SP, Brazil, 2013.

Food quality
"[...]There are good things in F&V stands, and when we buy them we feel good because all the things are good" (resident of São Luiz region). *"I know there are good things on Wednesdays, because they go to Ceasa [Central Supply Company], but just on Wednesdays*" (resident of Santa Emília region). *"[...]We have no option to buy, to choose what we want, you look for a small potato and you cannot find one, only rotten or expired food products, I do not know how long [they had been there]*" (resident of Santa Emília). *"[...] We generally observe that there is a lack of care in the storage of these food products and that the hygiene conditions are not very appropriate, but we buy there because we need to*" (resident of Jardim Independência region).
Food prices
"I think it is very expensive, it doesn't pay to go [shopping] very close to home, so we always try to go where we can find more offers, we go further and further away" (resident of Jardim Independência region). *"I think it is too expensive, so we buy once a week in the Sunday open-air market as it is cheaper, because the F&V stand located in the neighborhood is too expensive*". (resident of Jardim Independência region). "*The variation of prices here, as there are a few grocery stores in the neighborhood [...] It has pulled with just two, or one [trader]... Thus you subject yourself to buying there and consequently, you have to pay the price they ask for, they have no competitors here*". (resident of Jardim Independência region). *"I think they should, like, set the prices, all traders, like a price list, oh how can I say, usually in pharmacies, most prices are the same, there is just a little difference, here, due to the lack of options, they rip us off*" (resident of Jardim Independência region) *"The problem arises when it comes to price, you know, when we still had the community garden, at least we always had vegetables, but now I do not have it, I do not have the time and enough room in my house*" (resident of Jardim Independência region).

Facilitators and obstacles to the adoption of healthy eating habits

Some perceptions of the participants could be recognized as facilitators or obstacles to the adoption of healthy eating practices (Figure 1). Among the facilitators, the fact of living near open-air markets and F&V stands and the possibility of buying F&V on the days of supply for the supermarkets were identified. As obstacles, the high prices associated with healthy food, few options of F&V varieties, the lack of open-air markets and F&V stands, and insufficient supply of F&V were identified.

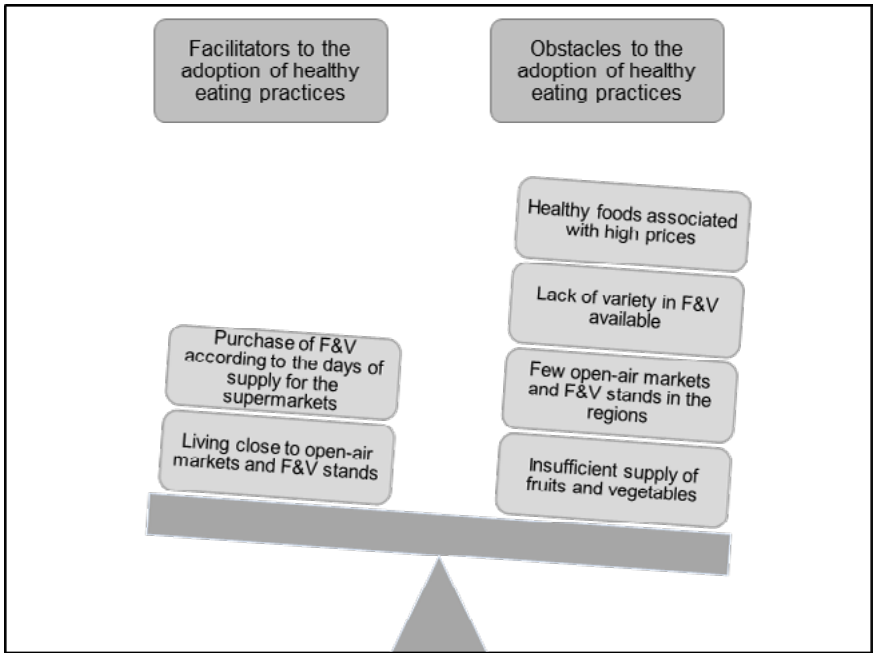

Figure 1. Facilitators and obstacles to the adoption of healthy eating practices for 47 inhabitants from the regions assigned to four Basic Health Unit in Embu das Artes, SP, Brazil, 2013.

Discussion

In the present work, one of the pioneer studies in Brazil in presenting qualitative data on individuals' perception on food environment of the region in which they live, the population interviewed was mainly composed of economically active middle-class women. It is interesting to highlight the gender of the majority of respondents (79% of females), considering the singularities observed in the relationship they establish with the city.

Women are generally responsible for buying and preparing food for the family and also, they are principally involved in the education of children, thus they play a strategic role in promoting dietary habits.[24] They show a particular sensitivity towards the aspects that interfere with and determine social and health needs, including those related to food, for the achievement of their family, household and professional tasks.

Declarations revealing positive perceptions on the availability, variety and quality of F&V were made by inhabitants living near the establishments offering these types of foods. It was observed that the most commonly used means of transportation to go shopping for F&V was by walking, therefore, the presence of open-air markets and F&V stands close to home may contribute to the selection of such places.

Studies have shown that although food price is an important barrier to the consumption, the location of the establishments may also prevent access to adequate and healthy food (AHF).[25] Vedovato et al., in a study carried out in Santos, State of São Paulo, found that two factors, the presence of open-air markets or F&V stands in the neighboring areas and walking as the primary mode of transportation to go shopping, contributed to the association between the positive perceptions on the availability of F&V in the neighborhood and healthy food-purchasing patterns.[10]

Other studies have shown a positive association between favorable environments for the sale of healthy foods and positive perceptions regarding quality, variety, price and consumption, which are decisive factors to choose and buy of this type of food.[25,26] Therefore, one must highlight the importance of the presence of establishments selling healthy foods in residential areas, especially in neighborhoods where the residents make long commutes, as the lack of such establishments can make access to AHF difficult.[27]

It is well known that between the supply, acquisition and consumption of healthy foods involve complex processes underlying purchasing power, habits and food preferences, as well as nutritional education, cooking skills, time available for preparation, among others. In order to ensure that all individuals know how to identify and are able to adopt healthy eating options, it is necessary, among other factors, a minimum level of income and universal access to basic knowledge on the relationship between food and health.[28] All these factors should be taken into account in interventions that seek to promote AHF, including in the food environment.

In this study, respondents associated high-AHF and higher-income neighborhoods with a wider variety of healthy foods compared to their neighborhoods. The socioeconomic mechanisms of stratification and unequal distribution of wealth, associated with the lack of people political and organizational power to respond to this scenario, are determinants of health inequities, affecting the peripheral communities and imposing a social vulnerability to some groups.[29] In a study carried out by Pessoa et al. in Belo Horizonte, State of Minas Gerais,[11] it was observed that the higher the average income of the neighborhood, the greater the number of establishments selling all types of foods, and that this population showed the highest consumption of F&V.

In the present work, some interviewees reported a decrease in the number of open-air markets due to the rise of supermarkets in the periphery. In fact, there has been a change in the dynamics of urban wholesale, especially in relation to F&V offer. Open-air markets, important wholesale establishments for buying F&V, have been losing their share of the retail of these products to F&V stands and supermarkets, and especially to big supermarket chains.[30]

Wegner[31] stresses that the lack of public regulatory mechanisms for supplying F&V is an obstacle to the implementation of the HRF. Patterns of concentration of wholesale establishments have intensified in the 1990s due to numerous mergers and acquisitions in this sector, the entry of large international groups and the expansion of preexisting retail chains, along with a lack of commitment of the public power with food supply, allowing supermarkets to become the main responsible for food distribution, including F&V, to the population.[31,32]

Currently, several supermarkets target low-income customers and big supermarket chains are present in the outlying neighborhoods of large cities through the installation of smaller stores with different brands.[33,34]

The results obtained in this study indicate important relations between the characteristics of the food supply in the territory and the purchase of F&V. Food supply is an integrating subject, which expresses the connections between food production and consumption and requires a greater participation of the state to make healthy food accessible. Nabuco & Porto[35] affirm that market practices impose distortions in food distribution and retail business, therefore, it is for the state to intervene in the agri-food chain to allow excluded sectors access to food, in appropriate quantity and quality and in accordance with their daily needs. In a capitalist society context, where food is treated as a commodity, the food supply responds to the logic of the consumer society, with seductive marketing strategies, mass consumption and a tendency for consumerism.

The interviewees reported that open-air markets and F&V stands were the main places to buy this type of food, followed by supermarkets, a result that differs from the international specialized literature, which shows that supermarkets offer more quantity and a wider variety of healthy foods in comparison with small grocery stores.[5,7] In Brazil, Vedovato et al.[10] found that the habit

of purchasing F&V in open-air markets and F&V stands was associated with a twofold increase in the chance of buying minimally processed foods in comparison with the families that usually buy F&V in supermarkets. The advantages offered by supermarkets in F&V trade were reported in our study. However, at the same time as they connive with it, supermarkets also offer many varieties of ultra-processed foods at lower prices that may encourage a greater consumption of these products.

It is crucial to understand that individual approaches to promote the consumption of AHF, although important, are not sufficient to address this important public health issue. Political will, consumer empowerment and an organized civil society are needed to require the implementation of policies prioritizing public health in the face of the interests of economic agents.

The results obtained in the present study should be interpreted in the light of some limitations. The fact that the four regions surveyed are neighboring areas and very similar in their sociodemographic characteristics did not allow comparisons between them. As a result of the interviewees' selection method, there may have been a tendency to select profiles of similar individuals, as most of the population evaluated was composed by married economically active females. Also, it is worth mentioning that 28% of the interviewees worked as community health agents in the BHU of the region in which they lived. Therefore, perhaps this group showed more critical perceptions regarding the food environment because they are health professionals. Finally, the sample comprising 47 individuals did not allow more complex statistical analyses.

Concluding remarks

This research revealed relevant issues regarding the insufficient supply and the lack of a wider variety of fruits and vegetables (F&V) in such regions, highlighting the scarcity of establishments selling quality food products. The population that lives near open-air markets and F&V stands usually buy their F&V there, due to the better quality and the lower price. Hence, it is important to note the presence of these small-scale establishments selling healthy foods in residential areas, since their absence can decrease F&V purchase. The implementation of accessible public supply trades, such as public retail and open-air markets on weekends or at night, as an alternative time, may constitute fundamental strategies to make adequate and healthy food (AHF) accessible to low-income population.

Collaborators

Garcia MT participated in the study design and elaboration, as well as in the data analysis and interpretation of the results, review and approval of the final version of the manuscript. Franco JV participated in the study design and elaboration, data analysis and interpretation of the results,

review and approval of the final version of the manuscript. Costa CGA participated in the study design and elaboration, as well as in the data analysis and interpretation of the results. Bógus CM participated in the study design and elaboration, data analysis and interpretation of the results, review and approval of the final version of the manuscript.

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