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Hypertensive subjects' perceptions of the food system and health

Sistema alimentar e saúde na percepção de sujeitos com hipertensão

Abstract

The hegemonic food system is associated with malnutrition and the increasing prevalence of chronic non-communicable diseases, such as hypertension. This study aims to describe the food system from the perspective of individuals diagnosed with hypertension. It is a qualitative study conducted in Primary Health Care in Ouro Preto, Minas Gerais, Brazil, through four workshops using the "talking map" technique, each lasting approximately 90 minutes. The data produced were systematized into reports and analyzed through thematic content analysis. Participants reported significant changes in the food system, highlighting the shift from food practices based on family cultivation and preparation to the consumption of ultra-processed foods. They associated these transformations with the loss of sensory quality in food, reduced dietary diversity, and the intensive use of chemical inputs, all of which have negative impacts on planetary health. In addition, they identified food prices as a determining factor in food choices and recognized farmers' markets as spaces whichpromote access to healthy foods. In conclusion, participants perceived the hegemonic food system as a health risk factor and acknowledged the need for changes to promote adequate and healthy eating practices.

Keywords: Food System. Qualitative Research. Health Promotion. Social Determinants of Health.

Resumo

O sistema alimentar hegemônico está associado à má nutrição e ao aumento das doenças crônicas não transmissíveis, como a hipertensão arterial. O objetivo deste artigo é descrever o sistema alimentar, segundo a percepção de sujeitos com diagnóstico de hipertensão arterial. Trata-se de pesquisa qualitativa, desenvolvida na Atenção Primária à Saúde em Ouro Preto, Minas Gerais, por meio de quatro oficinas utilizando a técnica do mapa falante, com duração média de 90 minutos. Os dados produzidos foram organizados em relatórios e submetidos à análise de conteúdo, segundo a técnica temática. Os participantes relataram mudanças no sistema alimentar, destacando a transição de práticas alimentares baseadas no cultivo e nopreparo familiar para o consumo de alimentos ultraprocessados. Associaram essas

transformações à perda de qualidade sensorial dos alimentos, à menor diversidade alimentar e ao uso intensivo de insumos químicos, com impactos negativos na saúde planetária. Além disso, identificaram o preço dos alimentos como fator determinante para as escolhas alimentares e reconheceram as feiras como espaços que favorecem o acesso aos alimentos saudáveis. Conclui-se que os sujeitos percebem o sistema alimentar hegemônico como um fator de risco à saúde e reconhecem a necessidade de mudanças para promover a alimentação adequada e saudável.

Palavras-chave: Sistema Alimentar. Pesquisa Qualitativa. Promoção da Saúde. Determinantes Sociais da Saúde.

INTRODUCTION

Food systems have been the focus of studies, as they integrate elements such as environment, people, inputs, processes, infrastructure and institutions, and activities related to the production, processing, distribution, preparation and consumption of food, as well as the impacts of these practices on the health and nutrition of populations.[1,2] The hegemonic food system, supported by industrial and mechanized production models and the intensive use of pesticides in monocultures mainly destined for export,[3] has favoredan increase in the consumption of ultra-processed foods (UPF) in recent decades, to the detriment of consuming unprocessed and minimally processed foods.[4,5]

This hegemonic model is part of the causal network of the Global Syndemic, characterized by the synergistic interaction of the pandemics of obesity, malnutrition and climate change, with impacts on the health and food and nutritional security of populations.[6] In convergence with this understanding, the Food and Agriculture Organization of the United Nations (FAO) points out that obesity, malnutrition and non-communicable chronic diseases (NCDs) constitute simultaneous and interdependent expression factors of malnutrition,[7] influenced by common social and environmental determinants, especially those related to the hegemonic food system and consequently to the dietary pattern marked by increased consumption of ultra-processed foods.[8]

Addressing this situation involves the expanded concept of health[9] and converges with the health promotion strategy established by the Ottawa Charter,[10] which considers actions aimed at healthy public policies, strengthening community action, developing personal skills, favorable environments, and reorienting care, aiming to improve the health of populations.[9]

In this context, although knowledge about the negative impacts of contemporary food systems on the health and nutrition of populations is widely described in the literature,[6,8,11,12] studies on subjects' perception of the food system are incipient and necessary, especially in vulnerable groups such as people with NCDs, including hypertension.

The relevance of analyzing the food system from the perspective of people diagnosed with hypertension is directly related to the role of food in managing this chronic condition. Subjects diagnosed with hypertension are particularly impacted by the availability, cost, and quality of food, constituting factors which modulate dietary practices, which in turn are capable of reducing or aggravating the risk of cardiovascular complications.

The perceptions approach enables access to subjective and contextual dimensions that are not solely revealed through objective indicators, contributing to planning strategies which are more sensitive to the territory and the daily lives of populations.[13] Furthermore, the process by which knowledge, memories, and meanings become visible in contexts of listening and participation is central to understanding how subjects construct[14] and express their interpretations of the food system.

Considering that consumer behavior is one of the structuring components of the food system,[1] understanding these perceptions can favor individual and collective changes towards healthy eating, thereby strengthening articulation between health, food culture, and actions directed towards populations with NCDs. Thus, the objective of this article is to describe the perceptions of subjects diagnosed with systemic arterial hypertension about the food system.

MATERIAL AND METHODS

This is a qualitative study with document analysis, integrating the initial phase of a nutritional intervention study for managing blood pressure levels in subjects diagnosed with hypertension. The study was conducted in Ouro Preto, Minas Gerais, a municipality that ranks as the 50th most populous in the state with 70,281 inhabitants, a population density of 56.41 inhabitants/km², and a Human Development Index (HDI) of 0.741.[15]

The data for this study were collected in order to understand the perception of Primary Health Care users diagnosed with hypertension regarding the food system in a medium-sized city. The study was based on the qualitative approach in health according to Minayo,[16] aiming to understand the relationships, representations, beliefs, perceptions, and opinions attributed by the subjects to their food reality.

To this end, the study used the talking map technique with participatory workshops, which enables dialogical spaces for knowledge construction, enabling volunteers to present their interests, concerns, and experiences regarding the food system. This strategy favors integration, dialogue, and the active participation of the population in identifying socio-environmental and health problems where they live.[17-19] It also allows the subjects' perception and understanding of the identified problems to emerge, as well as their demands, desires for change, and the search for solutions built collectively.[18]

The workshops took place in four health territories considering historical diversity (centennial regions and recently occupied regions), economic diversity (different per capita family income brackets), and geographic diversity (central and peripheral regions with limited access, such as hills and alleys).

Specific precautions were taken for applying the talking map technique in preparing the environment, including prior scheduling of the location with the capacity to accommodate the expected number of participants, in addition to physically preparing the environment, such as lighting, ventilation, and furniture. There was also advance planning of the materials needed for each workshop, such as graphite and colored pencils, erasers, sharpeners, poster board, magazines, glue, and scissors. The choice of locations prioritized pleasant, comfortable, welcoming environments close to the participants' residences and in accordance with the biosafety protocols in force in the municipality considering the sanitary context of COVID-19.

This study was approved by the Research Ethics Committee of the Federal University of Ouro Preto, under opinion CAAE: 42858120.90000.5150 and Clinical Trial Registration RBR-5hvgtky. The Informed Consent Form was presented and signed by the participants.

Recruitment of subjects and data production

The participants were adults diagnosed with hypertension, invited through pamphlets distributed by community health workers. The field team consisted of an undergraduate student and a researcher in nutrition, previously trained in applying the technique and in mediating the meetings. Four talking map workshops were held between November and December 2021, each with an average of 7 participants (total of 28) and lasting approximately 90 minutes.

A script was developed after the literature review based on the model proposed by Matuk,[19] to be followed in all meetings in order to seek dynamism, participation and reflections that would provide opportunities to develop critical thinking about the observed scenario.

The workshops were divided into five moments: 1) presentation of the subjects; 2) introduction of the theme with the showing of the video "What is healthy eating?", available on the Alliance for Adequate and

Healthy Eating channel (https://www.youtube.com/watch?v=PFxwtzf8XW0); 3) Development of the talking map; 4) Presentation of the talking maps; and 5) Final considerations.

Talking map itinerary

The script for creating the talking map was based on the one developed by Matuk,[19] with the addition of a question regarding knowledge about food and nutrition policies in the municipality:

1. Introduction of team members, initial explanation of the activity rules and ethical issues.

2. Contextualization with the definition of a food system.

3. Graphical representation of the food system of the region where you live through drawing or collage, highlighting: i) places or situations in the food system that affect the health of the group; ii) places or situations in the food system that affect the environment; iii) positive and negative aspects of the food system (how the food system interferes with personal choices: access, food security, availability, etc.).

4. Community involvement in the food system (how do personal choices interfere with the food system? Where does each person act, could, or would like to intervene?).

5. Knowledge about food and nutrition policies in the municipality.

6. Presentation of the talking map and closing.

Dialogues and reflections were promoted during construction of the talking map regarding the facilitating and hindering aspects of their eating practices in order to bring to light their lived reality. The participants' discussions and reflections during the activities were recorded. This material was systematized into narrative reports after each workshop.

Data analysis

Thematic content analysis according to Bardin[20] was used for the analysis of the data produced in the talking maps and workshop reports. This technique was chosen for its ability to interpret messages from a systematic process of categorization, enabling construction of latent meanings in the participants' speech and representations.

The analysis followed three stages: pre-analysis, which consisted of a floating reading of the reports, to familiarize oneself with the content and define the analytical objectives based on the guiding questions of the study. This was followed by exploration of the material, with identification and selection of recording units (words, expressions, phrases or blocks of meaning) that revealed elements about the subjects' perception of the food system. These units were grouped into initial categories and then reorganized into intermediate and final categories based on their frequency and relevance to the study objectives. The content was then analyzed in the treatment and interpretation stage based on the final categories, articulating the empirical findings with the theoretical framework of the study. This process enabled revealing the meanings attributed by the subjects to food, its transformations and implications for health and the environment (Table 1).

Table 1. Categories constructed from content analysis of reports from Primary Health Care users diagnosed with hypertension.

Final Category	Intermediate Category	Initial Categories (Registration Unit)
Changes in diet: past and present	Food productionandpreparation	"Before, we planted and harvested..."; "the stove was wood-burning and the kitchen was large"; "Today, you buy ready-made food."
	Supplyand marketing	"In the past, food came from farms and markets; today it comes from the wholesale markets (*Centrais de Abastecimento - CEASA*) in Belo Horizonte and supermarkets."
	Sensory transformations Loss of connection with natural foods	"The taste of chicken and bread isn't what it used to be."; "Meat loses its flavor and spoils faster these days."; "Fruits are bad, tasteless." "Now everything is from thesupermarket."; "I don't even like packaged food."
The relationship between food and the environment	Impacts of production on the environment	"Indiscriminate use of fertilizers causes damage to soil and water."; "Year-round production increases water and input use."
	Seasonalityandbiodiversity	"Today there's almost no seasonal fruit, everything is produced outside of the rainy season."; "In the old days, chickens grew without any medicine, and now they grow quickly and are ready for us to eat."; "The texture changes due to large-scale production, it's like styrofoam..."
	Perceivedenvironmentalimpact	"Pre-cut and packaged food is convenient, but it increases waste, especially plastic."
Facilitating and hindering aspects of daily eating habits	Priceandaccessibility	"The exorbitant price of gas interferes with food preparation."; "The high price of meat makes us choose other options." "We buy at the grocery store...and even in another neighborhood, because the price is good for making the monthly shopping list."
	Availabilityandconvenience	"Today, people buy ready-made food because of the rush of daily life."; "Having shops nearby makes things easier, but it sells more processed products."
	Dependence on long supply chains	"Rice, corn, beans, and cereals are not produced in Ouro Preto; they come from other cities."; "The supply has always depended on other municipalities, such as Belo Horizonte currently."; "Mining threatens family farming and reduces local production."; "Most processed foods come from distant locations, with transportation that pollutes the environment."

RESULTS AND DISCUSSION

Three categories of analysis emerged upon analyzing the produced material: a) Changes in diet - past and present; b) Relationship between diet and environment; and c) Facilitating and hindering aspects of daily eating habits.

Changes in diet - past and present

The situations within the food system that affect health were presented and linked to the transformations that have occurred in food over time.The subjects reported that the process of producing and accessing food in the past involved several stages performed within the family, such as planting, cultivating, harvesting, processing, raising and slaughtering animals, in addition to preparing meals. These stages were performed daily for each culinary preparation. They highlighted that foods produced in rural areas were sold in urban areas and delivered directly to homes, without the need to travel long distances. In contrast, residents of rural areas traveled long distances daily to ensure all stages of food production, which, according to the participants, was reflected in greater physical activity and consequently better health conditions. Regarding sales in cities, they recalled that foods such as meat were sold on the streets, packaged in paper and transported by animals.

Urban practices marked by convenience and the consumption of ultra-processed foods currently predominate,[21] characterized by being high in calories, of lower nutritional quality, and associated with chronic diseases.[22,23] These reports align with findings by Proença,[24] who associates food industrialization with a loss of perception about origin and ingredients, contributing to the increased consumption of ultra-processed foods and health risks.

The subjects also reflected on how the physical structure of dwellings influenced eating habits in the past. They reported that meal preparation required time, dedication, and ample spaces, often shared among family members, from cultivation and raising food to final preparation. They highlighted that kitchens were larger, with wood-burning stoves that kept food warm throughout the day and served to dry cheeses, meats, and derivatives. In turn, backyards housed vegetable gardens and orchards, whose production was consumed by the family itself and often shared with neighbors through donations or exchanges.

In contrast, they observed that fruits and vegetables have been purchased from stores near homes in the last decade, and that ready-made meals have become common in everyday life. They attributed this change to the scarcity of time for household chores due to the demands of formal work. Although the proximity of establishments facilitates access to food, they emphasized that these stores offer mostly ultra-processed foods, contributing to abandon healthier eating practices.

These perceptions of the subjects corroborate the literature, which recognizes eating behavior as a complex and multifactorial phenomenon.[25] According to Garcia,[26] urbanization has promoted reorganized living conditions, resulting in changes in eating habits. Among the main determinants of consumption, the time for meal preparation, financial resources, access to adequate spaces for cooking, and above all, the wide availability of ultra-processed foods in commercial establishments stand out, regardless of the public or age group.[27,28]

Data from the Family Budget Survey (*Pesquisa de Orçamentos Familiares - POF*) indicate that food consumption outside the home fell from 40.2% to 36.5% between 2008/2009 and 2017/2018.[29] However, an increase was observed in the share of ultra-processed foods in calories consumed, from 12.6% in 2002/2003

to 18.4% in 2017/2018. The caloric contribution of ultra-processed foods grew by 1.02 percentage pointsin that same period, reaching 19.69% of the Brazilian diet.[30]

This scenario highlights how convenience, reduced meal preparation time, and the dominant presence of ultra-processed foods at points of sale shape the population's food choices. The subjects' accounts, which recognize these products in local businesses and their relationship with their fast-paced routines, reflect national trends, highlighting the need for strategies which promote healthy and sustainable food environments.

Participants reported that food in the past was healthier and associated with lower disease incidence. They attributed the increase in health problems to the introduction of processed foods, reduced consumption of fruits, vegetables, and legumes, and the ease of access to supermarkets. On the other hand, they highlighted practices which still refer to the traditional model, such as local rural production, direct sales by market vendors, the use of handcarts to sell food door-to-door, and even commerce via WhatsApp during the pandemic. They emphasized that foods purchased directly from producers are tastier, more durable, and more affordable, citing the example of beetroot sold with stems and leaves, which are considered sweeter than that offered in supermarkets.

These reports reflect the effects of the nutritional transition characterized by the replacement of foods rich in vitamins, minerals, and fiber, such as whole foods, with ultra-processed foods, rich in sugars and fats,[31,32] which has been associated with an increase in NCDs.[22,23]

National data show a higher prevalence of malnutrition in women (6.1% vs. 3.9%) and overweight in men (54.1% vs. 50.2%).[33] These findings reinforce the urgency of promoting healthy food environments, especially for vulnerable groups, such as hypertensive patients treated by Primary Health Care.

Relationship between diet and environment

The subjects linked changes in food systems to impacts on food quality and environmental degradation. They raised issues related to the abusive use of pesticides and industrial fertilizers in food cultivation and reflected on the intensive animal farming system. They stated that the way food is produced affects its quality, flavor, aroma, and durability.

They reflected on the contemporary model of food cultivation and animal farming which prioritizes economic and profitable aspects to the detriment of sensory quality, human and environmental health. They highlighted that the production method directly affects the flavor, texture, and durability of food, in addition to generating negative environmental impacts such as air, soil, and water pollution due to the excessive use of insecticides and pesticides. They also linked the consolidation of this model to rural exodus driven by agricultural mechanization, intensive livestock farming, and replacement of labor with machines. They expressed concern about the health of rural workers exposed to these chemical inputs, which are often neglected in the context of large-scale production.

These perceptions about the impacts of intensive production are in dialogue with studies that denounce the harmful effects of the dominant agri-food model on human, environmental and social health.[34,35] Prioritizing profit over the well-being of workers and consumers has been described as a structural characteristic of this system marked by the intensive use of chemical inputs and devaluation of family farming, constituting aspects which deepen inequalities and compromise the country's food and environmental sustainability.[36,37]

The subjects further pointed out that foods grown on a largescale disregard seasonality and use many industrial inputs which compromise flavor, texture, and durability, in addition to impacting water and land use. Regarding vegetables, they emphasized the absence of sweetness and commented on the "styrofoam" texture. They also reported that although the external color suggests a mature vegetable, the interior has characteristics of a still-green vegetable. However, instead of providing greater durability, this structure results in food that is unfit for consumption.

Proença[24] highlights that byusing machinery in large-scale food production, the long-term preservation and transportation of these items cause a change in the time and space of production and access to food, altering its organoleptic and cultural characteristics. Thus, cultivation outside of seasonality and far from traditional production territories can cause a strangeness feeling among consumers, which is consistent with the perceptions shared by the subjects of this study.

Regarding meat products, the subjects also highlighted the shorter shelf life and lack of characteristic flavor of each type of meat when produced in the hegemonic, large-scale production model. These sensory and shelf-life aspects were attributed to the use of industrialized inputs in the cultivation and breeding process, as well as the short period in which these foods are ready for consumption. They described the use of large quantities of spices to improve the flavor of foods produced in this model, but without improving the flavor.

In addition, the subjects criticized standardization and loss of food diversity, with a decrease in the variety of fruits, vegetables, and greens available. Participants reported less full use of food and reduced use of plant and animal parts, in parallel with an increase in the consumption of longshelf-life foods, such as sliced bread, which was associated with the presence of many ingredients and additives.

The subjects' perceptions of the short shelf life, loss of flavor, and need for spices in meat products produced on a large scale reflect the impacts of the intensive agricultural model. According to Fardet & Rock,[38] this system compromises sustainability by affecting dimensions such as health, the environment, biodiversity, and food traditions due to the use of low-cost ingredients and standardized production. Moreover, this model is associated with high greenhouse gas emissions, a measure which assesses environmental impact, exceeding by 30% what could be considered an adequate and healthy diet in terms of quantity and quality.[39] In this scenario, public policies that encourage more diverse diets with a lower content of animal products are fundamental to mitigating its deleterious effects.

Subjects also mentioned the purchase of pre-chopped and packaged foods, which although facilitates preparation, generates more waste, especially plastics that are difficult to degrade, and thereby contribute to pollute "our home, planet Earth." They reflected on the impact of this practice on waste production and environmental pollution and recognized the need to care for the planet sustainably, ensuring a dignified life with health for future generations.

This perception aligns with the literature, which highlights the challenges of excessive use of plastics in food packaging and its interconnection with public health. It is estimated that approximately 380 million metric tons of plastics were produced worldwide in 2015, of which 152 million tons became packaging.[40]

Although plastics extend the shelf life of products and prevent losses, these materials do not decompose easily, fragmenting into microplastics with potential risks to human health and the environment.[41-43] The effects of exposure to these microplastics are not yet fully understood, but there is growing concern about their possible physical and chemical effects on human health.[43]

Studies show that food packaging contributes to a large volume of non-biodegradable solid waste, which is directly associated with environmental problems.[44,45] The production of plastic packaging is a significant source of greenhouse gas emissions, such as carbon dioxide (CO_2), and incineration of plastic waste also contributes to emitting polluting gases.[42]

Facilitating and hindering aspects of daily eating habits

The subjects stated that the purchase place of food is primarily related to price, followed by the fact that the location is close to home. They reported that large supermarket chains frequently offer attractive promotions, which makes them attractive for monthly and/or bi-weekly shopping trips. They also mentioned making food purchases at establishments far from home, reflecting that this is a valid strategy since the price of food sold in these establishments is lower than the price in stores closer to home, even after spending on transportation.

This preference for price is observed in the literature, especially in more vulnerable socioeconomic contexts in which the cost of food limits access to healthier and fresher foods.[46,47] In addition, the physical proximity of the point of sale influences access and purchasefrequency, especially in urban areas.[48] Although the subjects value convenience, many opt for more distant establishments to save money, even considering transportation costs. This choice shows that the search for lower prices can overcome the barrier of distance, especially in urban areas where large supermarket chains offer competitive prices due to their scale.[49]However, this strategy can affect the shopping routine, as well as the frequency and dietary pattern of consumers.

One unique aspect of food production in the region was highlighted by the participants: the municipality has low local production and depends on food produced in distant cities. This is because the city established itself as a mining hub, with no space for raising animals or growing vegetables since the land is used for mineral extraction. They reflected that the supply has historically always come from another municipality. Food was supplied by a nearby municipality in the mid-18th century due to gold mining in the area. The supply is currently done by a large urban center, whose geographical proximity and a large supply hub facilitate the process. They pointed out that foods such as beans, rice, corn, and other cereals are not produced in the municipality.

A large portion of the participants reported never having reflected on the origin of the ultra-processed food they consume, concluding that most food is produced far from their place of residence; they commented on the conditions under which food is grown, stored, and transported. They emphasized the long journey that food takes to reach the supermarket, consuming fuel and further polluting the environment. This aligns with studies showing low consumer awareness of the food production chain and its socio-environmental impacts, but a growing interest in sustainable practices and reducing environmental impact.[50,51]

Furthermore, supply chain difficulties and dependence on long chains increase environmental impacts and transportation costs. Short agri-food chains represent an alternative to the problems faced by farmers, such as increased production costs and concerns about food security and quality.[52] The closer relationship between producers and consumers enables enhancing local trade, as well as creating trust relationships. The formation of an emerging market in short agri-food chains brings benefits to both parties involved, such as reduced transportation costs and easier access to quality food and more diversified consumption habits.[53,54]

FINAL CONSIDERATIONS

This investigation identified that the food system is perceived among subjects diagnosed with hypertension as having undergone negative changes over the years, with a considerable impact on health resulting from the ease of purchasing ultra-processed foods, mainly due to their low price, as well as a loss of sensory quality in food.

They demonstrated awareness of the harmful effects of the excessive use of pesticides in food production on environmental health and recognize the need for change, as well as the factors which facilitate or hinder consuming healthy foods.

In addition, they identified only a few public food and nutrition policies in the municipality and reflected on possible paths for change, suggesting to implement measures such as expanding farmers' markets in different parts of the city to increase the supply of fresh or minimally processed foods, either through apps or businesses near their homes.

Thus, the description of the food system from the subjects' perspective highlights concrete barriers to adopting healthy eating practices and signals the need for public policies that expand access to fresh and sustainable foods, as well as more effective regulations to control the supply of ultra-processed foods in vulnerable populations. Finally, a gap is observed between the guidelines of the National Food and Nutrition Policy and its local application, suggesting the urgency of strengthening intersectoral strategies that integrate health, agriculture, and education to improve the care and quality of life of people with hypertension.

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Contributors

Santos AP contributed to the conception, design, production, data analysis and interpretation, and writing of the article; Ferreira BR contributed to the data production and to the data analysis and interpretation; Menezes MC, Vieira RAL and Carraro JCC contributed to the conception and critical review of the article; Mendonça RD contributed to the conception, design, supervision of the research, writing of the manuscript and critical review of the article. All authors approved the final version of the manuscript and agreed to be responsible for all aspects of the work.

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