



**Food Environment and Sustainable Cities: analysis of Interrelationships
in Political, sociocultural, and economic contexts**

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ABSTRACT

Within the most diverse spheres of society (politics, academia, civil society, media, public and private sectors), cities have increasingly gained prominence as places where various socio-environmental and contemporary socio-environmental problems are negatively intensified. Correlatively, cities have also been seen as places where the mitigation of such issues can typically be most effectively carried out. More than half of the world’s population lives in urban areas, making cities complex and dynamic. In this context, public health policies play a fundamental role in promoting well-being and expanding access to health. Achieving Sustainable Development Goals (SDGs) 2 (Zero Hunger) and 11 (Sustainable Cities and Communities) are vital in promoting health in cities, mainly through the creation of healthy and sustainable urban food environments that can improve the quality of people’s lives, promoting equity and social inclusion and mitigating the impacts of climate change. The food environment refers to the physical, economic, environmental, political, and sociocultural context in which consumers acquire food. This environment, as it was possible to infer from the development of this work, greatly influences people’s food choices and nutritional status. Through a broad systematic literature review, the present study aimed to investigate how urban food environments in cities that typically adhere to healthy, less demonetized, and sustainable precepts can contribute to constructing more sustainable, inclusive, and resilient cities.

KEYWORDS: City Food Environments; Sustainable Cities; Healthy eating; Public health; Sustainable Development Goals.

1. INTRODUCTION

The last few decades have been marked by rapid and unprecedented changes in several sectors of society, including the economy, technology, the environment, and health. These transformations have led to an increasing complexity of social structures, such as health problems, environmental issues, and socioeconomic inequalities. Climate change has become a growing threat to public health, affecting people's quality of life directly and indirectly. Furthermore, epidemiological and demographic transitions, such as the increase in chronic non-communicable diseases and urban living conditions, have challenged health systems and required a review of public policies.

Cities have gained prominence as places where many of these challenges are faced intensely. Currently, more than half of the world's population lives in urban areas. It is estimated that by 2050 we will have around 70% of the population living in these areas, which makes cities complex and dynamic environments where interactions between health, social determinants and the environment become increasingly evident (Rydin *et al.*, 2012; WHO, 2016). Cities offer a unique opportunity to understand the links between these factors and implement solutions through cross-sectoral approaches, involving different government sectors, civil society organizations, and the local population. These approaches have proven effective in promoting health in city areas (Ramirez-Rubio *et al.*, 2019).

The close relationship between health and urban development has been evidenced by several scientific studies. Favorable urban development, for example, can significantly contribute to the advancement of health by providing adequate infrastructure, access to health services, and safe and healthy public spaces. On the other hand, a healthy population can also boost the development of a city, generating jobs, increasing productivity, and reducing health

treatment costs. The interconnection between health policies and urban strategies is intense, as are other issues relevant to urban and health planning, such as food security, air quality, and accessibility to public transport. It is important, therefore, that this relationship is constantly reviewed and improved to ensure sustainable development and improved quality of life in cities (Rydin *et al.*, 2012; WHO, 2016).

Public health policies play a fundamental role in promoting well-being and preventing diseases, especially in urban environments. The urban context presents specific challenges for the health of the population, such as exposure to atmospheric pollutants, limited access to green areas, food insecurity, lack of adequate housing, and in the context of food, food environments that mostly neglect healthy and adequate eating (Dover; Lambert, 2016; Golay, [s.d.]). Furthermore, social and economic inequalities are often more evident in cities, contributing to health disparities between different population groups (Ramirez-Rubio *et al.*, 2019; WHO, 2016).

Promoting urban health is a key element in achieving Sustainable Development Goal 11 (SDG 11), which aims to make cities and communities more inclusive, safe, resilient, and sustainable. This objective recognizes the importance of creating healthy and sustainable urban environments that prove capable of improving people's quality of life, promoting equity, social inclusion, and mitigating the negative impacts of climate change (UN, [n.d.]). In turn, it is essential to address Sustainable Development Goal 2 (SDG 2), which aims to end hunger, achieve food security, improve nutrition, and promote sustainable agriculture (UN, [n.d.]).

These two goals are interdependent, as food security and adequate nutrition are essential for building sustainable and healthy cities and communities. The achievement of SDG 11 can contribute to the achievement of SDG 2, through the creation of healthy and sustainable urban environments, which can improve people's quality of life and promote food and nutritional security through the building of green spaces. In such context, it is possible to mention urban and peri-urban agriculture (AUP), parks and community gardens that encourage the production and consumption of healthy and fresh foods, which can reduce dependence on ultra-processed foods, in addition to encouraging the practice of physical activities and socialization. By achieving SDG 2 through the practice of sustainable agriculture, it is possible to promote the production of healthy food, reducing hunger and poverty and improving people's health and quality of life, contributing to a healthier environment, as well as boosting local small businesses and economy (Ramirez-Rubio *et al.*, 2019; UN, [s.d.]).

When we talk about sustainable cities, urbanization - inclusive, safe, resilient, and sustainable human settlements - and access to healthcare, it is also necessary to talk about how food environments have been built, most of which have not provided access to healthy and sustainable food. In this article, we sought, through a systematic bibliographic review, to understand how food environments in cities can contribute to building more sustainable, inclusive, and resilient cities, through access to health and healthy and sustainable food. In this sense, understanding the factors that influence access to healthy and sustainable food is essential for promoting health in cities.

1.1 FOOD ENVIRONMENT

The environment in which people live and work can influence several aspects, including access to food and, consequently, the quality of food. This relationship is studied in the literature as a food environment and is fundamental to ensure a healthy and adequate diet. To this end, it is necessary that the built environment provides opportunities for people to have access to food and the minimum conditions for a healthy life (CSDH, 2008; Diez Roux; Mair, 2010; Morland *et al.*, 2002).

The food environment refers to the physical, economic, political, and sociocultural context in which consumers interact with the food system to acquire, prepare, and consume food (HLPE, 2014). The physical context encompasses the availability, quality, and promotions of food, while the economic concerns costs. The political context encompasses government and industry policies, and the sociocultural is related to norms and behaviors. The latter influences food choices and nutritional status, along with the opportunities and conditions of each individual and/or group (Swinburn; Egger; Raza, 1999).

The importance of studying the food environment arises from the need to understand the growing number of obese people, as proposed by Egger and Swinburn (1997). At the time, there was already mention of an obesity pandemic that could be related to three influencers: biological, behavioral, and environmental. Regarding the environment, the "obesogenic" environment was highlighted: it encourages the consumption of foods with high-energy content and discourages the consumption of healthy foods, mainly in relation to physical and monetary availability (Lake; Townshend, 2006; Swinburn; Egger; Raza, 1999). Behavioral influencers include social factors, such as the influence of friends and family, and psychological factors, such as stress and emotions (Dover; Lambert, 2016). Furthermore, environmental obesogenicity was defined as the sum of the influences that circumstances, opportunities or living conditions have on the promotion of obesity in individuals or populations (Swinburn; Egger, 2002). All of these factors can influence people's eating behavior in different and complex ways.

The food environment is one of the determinants for access to healthy foods, especially fruits and vegetables (FV), which are important for promoting health and preventing chronic non-communicable diseases. There are two other nomenclatures used in the literature to describe the food environment: "food swamps" (Bridle-Fitzpatrick, 2015; Fielding; Simon, 2011; Castro Junior, 2018; Sushil *et al.*, 2017) and "food deserts" (Beaulac; Kristjansson; Cummins, 2009; Borges; Cabral-Miranda; Jaime, 2018; Carnaúba, 2018). The term "food swamp" refers to urban areas with many establishments that offer unhealthy foods, such as fast food and junk food, compared to establishments that offer healthy foods, while the term "food desert" describes areas with limited access to healthy, affordable food. In the United States, a place is considered a "food desert" if it contains 500 people who need to travel more than 1.5 km to access healthy food, such as fruits and vegetables, while a "food swamp" is an area of 4 km², where 90% of establishments offer cheap and high-calorie foods, such as fast food and convenience stores. In Brazil, there is still no parameter defined by the Ministry of Social Development (MDS) to classify these food environments (Carnaúba, 2018).

Some studies (Rose; Richards, 2004; Rundle *et al.*, 2009) have shown a possible relationship between the proximity of urban residents to healthy foods and increased

consumption of these foods. Therefore, in addition to demonstrating that the availability of healthy foods and the walkability in an area were significantly associated with lower levels of obesity, while others (Cummins *et al.*, 2005) did not find this association.

Placing supermarkets in disadvantaged neighborhoods has been a common strategy to improve access to healthy foods and promote better nutrition and health in underserved populations. These efforts were motivated by food safety and justice concerns and the theory that proximity to full-service supermarkets would encourage healthier eating (Giang *et al.*, 2008). However, recent studies show that this strategy has not yet produced significant results in improving diet quality and reducing obesity (Cummins *et al.*, 2005).

To improve access to healthy foods, other community-level interventions, such as urban garden programs and local farmers' markets, have been proposed and have proven to be more effective in promoting healthy eating, as well as eating habits and socioeconomic factors (Boone-Heinonen *et al.*, 2011; Cummins *et al.*, 2005; Franco *et al.*, 2008; Freedman *et al.*, 2013).

The built environment is the result of actions carried out by different actors and can promote or hinder healthy behaviors. It includes the availability of buildings, such as residences, leisure areas, parks, public transport, and lighting. In the specific case of the food environment, it is important to consider commercial food establishments, such as restaurants, cafeterias, and fast-food chains, among others. It is believed that this environment can significantly influence whether the diet is more or less healthy and adequate (Claro *et al.*, 2007; Jaime; Monteiro, 2005).

One of the important markers of adequate and healthy eating is the consumption of fruits and vegetables (FV), as these foods have great potential to promote health. Therefore, different studies have sought to understand how the built environment can influence access to these foods, considering that easier access may be associated with increased consumption of FV. The low consumption of these foods is related to a series of factors, including sociodemographic, biological, cultural, economic, and environmental determinants (Dover; Lambert, 2016; Filomena; Scanlin; Morland, 2013; Mook, 2016).

The socioeconomic conditions of the territory, income, and access to FV are factors intrinsically related to the consumption of these foods. Socioeconomically vulnerable areas are generally inhabited by people who consume less FV, which can negatively impact the food and nutritional security of families and the guarantee of the Human Right to Adequate Food (DHAA) (CSDH, 2008; Filomena; Scanlin; Morland, 2013; Mook, 2016). The influence of access to food on consumption may vary according to the type of establishment available in the territory. Among them, supermarkets, grocery stores and open-air markets have been identified as encouraging the consumption of healthy foods, such as fruits and vegetables (FV), as they offer greater variety, better quality and lower cost. On the other hand, small businesses and convenience stores have higher prices and lower quality in relation to what is sold, mainly because they contain ultra-processed products, rich in fats, salt, sugar, and chemical additives (Franco *et al.*, 2008; Larson; Story; Nelson, 2009).

The need to implement intersectoral actions, guidelines, and public policies that positively affect the dynamics of social land use, production, distribution, marketing, and supply

of healthy foods is a way of addressing the influence of the environment on food. Stimulating the practice of urban agriculture and the implementation of public or private establishments in deprived and lower-income areas is fundamental to guaranteeing the Human Right to Adequate Food (DHAA) and Food and Nutritional Security (SAN). The World Health Organization (WHO) highlights that actions that promote health equity, such as universal access to healthy foods, should be the top priority in urban planning and public policies (CSDH, 2008).

Lack of access to these foods in urban environments can lead to excessive consumption of ultra-processed foods, which increases the risk of cardiovascular disease, diabetes, and obesity. Despite the different studies on the food environment, diet quality, risk of obesity, and chronic diseases, there is still a need for more research, since the evidence presented does not have a single result, especially because it is a transdisciplinary area (Cannuscio *et al.*, 2014).

Sassen (2014) argues that cities need to be rethought as living; complex ecosystems and those solutions to improve urban health must involve the active participation of the population, as well as public policies that encourage the creation of healthier urban environments. Through these studies, added to the study by Canella *et al.* (2015), which addresses the growing number of individuals who dine outside their homes with the distribution of restaurants, bars and snack bars in the city of São Paulo. Mostly of these places sell ultra-processed foods; so, it is possible to state that the food environments distributed through cities influence the diet of both those who need to eat outside their homes and those who make home purchases in territories and are concentrated in areas of food swamps and deserts (Canella *et al.*, 2015).

For Caspi *et al.* (2012), there are 5 factors influencing food environments: availability (food supply), accessibility (location of establishments and means of getting to them), financial accessibility (food prices and individuals' perception), acceptability (individuals' attitudes toward the local food environment attributes and whether or not the food supply is meeting acceptable standards for these individuals), and accommodation (the extent to which individuals' needs are being met by local food establishments) (Caspi *et al.*, 2012). Other researchers also highlight the great impact that physical establishments have on individuals' food choices and health (Borges; Cabral-Miranda; Jaime, 2018).

It is essential, therefore, to consider the advertising present in these environments, whether through banners, billboards, electronic panels along the route, or within the establishments themselves. According to Ortigoza (2001, p.20), advertising with images is part of a strategy in the face of the "world of merchandise". The spaces are built based on a strong appeal to the global image, of modern and fast. In this way, commercial spaces become commodities, as do forms of commerce that aim to meet the needs required by the scarcity of time in cities. To meet the needs of different audiences, various instruments of attraction are used to awaken consumption desire and the illusion of need, creating transformative meanings of the need for consumption. This leads consumers to buy foods that do not contribute to a healthy diet (Ortigoza, 2001).

The organization of food environments is directly related to interest groups. Recent studies (Caivano *et al.*, 2017; Mariath; Martins, 2020) demonstrate that the ultra-processed food

industry belongs to an interest group that has great economic and political power, acting with the objective of "shaping public food policies and nutrition to your advantage." This ability to reorganize the public system is linked to the high availability of resources and the strategic organization of corporate politics (Gomes, 2015; Mariath; Martins, 2020; Nestle, 2007; Stuckler; Nestle, 2012).

Mariath and Martins (2020) state that this sector uses several strategies, such as the production and dissemination of information favorable to its activities, the distribution of incentives, including financial ones, to politicians, political parties and decision makers, the stimulation of opinion formation public policy favorable to the company. It is also possible to mention, in the same context, the destabilization of groups or individuals who criticize or oppose its products or practices, or who defend policies that may negatively impact its business, and the use or threat of legal proceedings, whether to block unfavorable government decisions, or to intimidate their opponents (Mariath; Martins, 2020). Therefore, it can be stated that these companies exert a notable influence on individual attitudes, perceptions and preferences (Mariath; Martins, 2020).

Decisions that affect health status are made in a broad context, which may include pragmatic influences and personal values or more complex hierarchies. In fact, more complex hierarchies can be seen in the study by Bhawra *et al.* (2015), who mention the difficulties in eating healthier and with foods that correspond to the food culture, such as the inaccessibility of healthy foods and the complexities associated with low income. In the context of these complexities, it is possible to quote, dependence on public transport or frequent distance travel to make purchases, as well as the lack of access and shelf-life of fresh food (Bhawra *et al.*, 2015).

The increase in the sale of ready-to-eat foods, with low nutritional value, combined with the difficulty in accessing healthy and fresh foods, especially fruits and vegetables (FV), impacts health negatively. Therefore, it is understood that creating food environments in cities can influence people's diet in several ways, such as the availability of healthy foods, green areas for growing food and ease of access, both physical and monetary, including urban transportation. It is crucial to highlight and understand how all these factors affect nutrition and, to this end, it is essential to create effective interventions to improve the health of urban populations, with the participation of public health professionals (Barton; Grant, 2013).

2.0 METHODS

2.1 Search strategy

The method used was a systematic literature review. The main electronic databases used as search engines were: PubMed, Virtual Health Library, Scopus, SciELO, among others. The search was carried out in English and Portuguese, together with the terms "sustainable cities" and "food environment"; and, to refine the search, the terms "public health", "collective

health”, “sustainable development objectives”, “food security”, “food consumption” and “public policies” were also used as search words for titles, abstracts, and keywords.

2.1.1 Article selection

To select the studies to be reviewed, the authors used the articles' titles and abstracts. Original research from the areas of sustainability, nutrition, public health, epidemiology, and urbanism that addressed the terms “sustainable cities”, “healthy cities” and “food environment” was included. Furthermore, the reference lists of the selected articles were screened and classified according to their relevance to the topic in question.

After screening the titles and abstracts, the authors excluded studies that did not correspond to the research objectives. In such context, 44 studies were selected from the 150 found for a complete review, in order to identify relevant definitions and actions on the food environment in building sustainable cities. The review included urban areas and food environments, with a focus on physical access to food. This contributed to understanding the importance of the food environment in promoting health and achieving SDGs 2 and 11.

3. DISCUSSION AND RESULTS

With the aim of identifying the main challenges and opportunities to promote healthy and sustainable eating in urban areas, considering SDG 11 (Sustainable cities and communities) and SDG 2 (Zero hunger and sustainable agriculture), it is possible to understand the relationship between them for the development of more sustainable cities. A sustainable city is one that aims to promote the population's quality of life and social, economic and environmental well-being. To achieve this goal, it is essential that cities invest in urban planning, sustainable mobility, waste management, efficient use of natural resources, and environments that promote health and healthy sustainable eating.

The sustainable cities project is considered a structuring health project in which social actors (governments, civil society organizations and organizations) seek to transform cities into a space for the social production of health, which is included in the concept of quality of life and contemplated in SDG 11 and SDG 2. For this reason, integrated health policies are necessary; particularly, in this context, environments that favor food practices that promote health, education, housing, basic sanitation, transport, and leisure.

Throughout this article, it was highlighted that the food environment can represent a fundamental factor in promoting healthy and sustainable eating in cities, and that a change in public policies is necessary to deal with the current challenges. The concept of healthy eating goes beyond just ingesting enough calories to carry out daily tasks: it includes the cultural and socio-environmental context. When analyzing that the current food system, in this context, the food environment, has neglected the Human Right to Adequate Food (DHAA), it is increasingly

necessary to support or strengthen relations with a more sustainable production system, which allows the population's right and autonomy of choice.

In this context, when we approach food as a promoter of health and quality of life for the development of more sustainable cities (SDG 11), it is necessary to build spaces and food environments that promote the adoption of an adequate and healthy diet (SDG 2), such as spaces that promote physical activities and outdoor leisure, which are fundamental for maintaining quality of life. Thus, it is understood that when studying the food environment as an influencer of eating habits and food consumption in cities, it should be included in studies for the implementation of such SDGs.

Studying the food environment goes beyond the availability of healthy and affordable food in public places, such as schools, parks, plazas, and the environment close to homes. It is about understanding how this environment influences eating practices and proximal and distal factors. The study for the implementation of sustainable cities in relation to quality of life and health needs to account for the moment of decision-making in a social and environmental context, and how the set of choices can be changed with the aim of increasing opportunities for people. This change goes beyond just predictive public policies in relation to behavior choices in health. They need to offer tools that allow individuals to better evaluate and consider the factors that make up their set of choices, providing autonomy in healthier and more sustainable food choices, especially in an urban context that has transformed over time, both in relation to population size and in the planning of urban environments.

The involvement of different sectors of society, including government, companies, non-governmental organizations and civil society in general, is essential to promote effective changes. The authors highlight the need for programs and public policies that encourage the production and consumption of healthy, locally sourced foods, as well as the creation of public spaces that promote the availability of healthy and accessible foods and spaces for socialization and physical activities. However, these actions require commitment from all actors to create policies that minimize challenges, such as population density, lack of green spaces and limited availability of healthy foods.

Achieving SDG 11 and SDG 2 requires the adoption of intersectoral public policies that consider the complex interactions between health, environment, and society, and promote the active participation of the population in creating healthier and more sustainable urban environments. Implementing these SDGs is an opportunity to address the global challenges of food security and climate mitigation.

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