...::KENT AKADEMİSİ | URBAN ACADEMY

Volume: 19 Issue: 4 - 2026| Cilt: 19 Sayı 4 - 2026

ARTICLE INFO | MAKALE KUNYESI

Article Type: Research Article | Araştırma Makalesi
Received Date | Gönderilme Tarihi: 28.01.2026
Accepted Date | Kabul Tarihi: 22.04.2026
Published Date | Yayın Tarihi: 26.04.2026

CITATION INFO | ATIF KÜNYESİ

Diker, B.G. & Gökce, D. (2026). The Role of Urban Planning Decisions in the Formation of Food Deserts: From Structural Causes to Justice-Oriented Holistic Strategies, *Kent Akademisi Dergisi*, *19*(4):1-23. https://doi.org/10.35674/kent.1873077

The Role of Urban Planning Decisions in the Formation of Food Deserts: From Structural Causes to Justice-Oriented Holistic Strategies

Gıda Çölleri Oluşumunda Kentsel Planlama Kararlarının Rolü: Yapısal Nedenlerden Adalet Odaklı Bütüncül Stratejilere

Büşra Gül DİKER[1] Duygu GÖKCE[2]

Öz

"Gıda çölleri", kentsel alanlarda yaşayan sosyo-ekonomik açıdan dezavantajlı grupların sağlıklı, taze ve uygun fiyatlı gıdaya erişim olanaklarının sınırlı olduğu bölgeleri tanımlamaktadır. Bu durum, yalnızca bireylerin beslenme biçimlerini değil; halk sağlığını, sosyal eşitsizlikleri ve mekânsal adalet yapısını da olumsuz yönde etkilemektedir. Bu çalışmanın amacı, gıda çöllerinin oluşumunun bireysel sosyo-ekonomik yetersizliklerden ziyade doğrudan mekânsal planlama süreçleri ve kentsel planlama kararlarıyla ilişkili çok katmanlı bir yapısal sorun olduğunu ortaya koymaktır. Bu kapsamda, 2008-2025 yılları arasında yayımlanan ve gıda çöllerini mekânsal açıdan ele alan 26 bilimsel çalışma kapsamlı biçimde incelenmiştir. Çalışmalar, konuyu ele alış biçimleri ve mekânsal analiz kriterleri açısından değerlendirilmiş; böylece gıda çölleri olgusunun kent planlama disipliniyle ilişkisi ortaya konmuştur. Aynı zamanda çalışmada, kentsel planlama kararlarının gıda çöllerinin oluşumuna nasıl zemin hazırladığı irdelenmiştir. Literatür incelemesi, gıda çöllerinin yalnızca fiziksel erişim eksikliği olmadığını; tek işlevli bölgeleme kararları, tek merkezli kentsel gelişim modeli ve kentsel tarımın mevzuatta yer almaması gibi planlama temelli uygulamalarla sistematik olarak üretildiğini göstermektedir. Bulgular, özellikle çeper mahallelerde ve düşük gelir gruplarının yoğunlaştığı bölgelerde erişim dezavantajının kalıcılaştığını ortaya koymaktadır. Ayrıca literatürün büyük ölçüde metropol kentlere odaklanması, orta ölçekli kentlerde ve kent çeperi bölgerinde uygulanabilir politika geliştirilmesi açısından önemli bir boşluk olduğunu göstermektedir. Sonuç olarak çalışma, gıda çöllerinin giderilmesinin yalnızca perakende yatırımlarıyla değil, kentsel gıda sisteminin tüm bileşenlerini kapsayan bütüncül, adalet odaklı ve planlama temelli politikalarla mümkün olduğunu ortaya koymaktadır. Kent planlaması, gıda erişimini mekânsal adaletin somut bir göstergesi olarak ele almalı ve karar süreçlerini bu doğrultuda yeniden yapılandırmalıdır.

Anahtar Kelimeler: Gıda Erişebilirliği, Mekânsal Adalet, Gıda Adaleti, İmar Yönetmelikleri, Kentsel Gıda Sistemi

ABSTRACT

"Food deserts" are areas in urban environments where socioeconomically disadvantaged populations have limited access to healthy, fresh, and affordable food. This condition negatively affects dietary practices, public health, social inequalities, and the structure of spatial justice. The aim of this study is to demonstrate that food deserts represent a multidimensional structural problem directly related to spatial planning processes and urban planning decisions, rather than resulting solely from individual socio-economic constraints. Within this scope, 26 scientific studies published between 2008 and 2025 addressing food deserts from a spatial perspective were comprehensively reviewed. These studies were evaluated based on their analytical approaches and spatial assessment criteria. This analysis clarified the relationship between food deserts and urban planning. In addition, the study examined how urban planning decisions contribute to the formation of food deserts. The literature review demonstrates that food deserts represent not only limitations in physical accessibility, but also spatial outcomes systematically produced through planning-related practices, including single-use zoning decisions, centralized urban development patterns, and the absence of regulatory frameworks supporting urban agriculture. The findings indicate that access disadvantages persist, particularly in peripheral neighborhoods and areas with higher concentrations of low-income populations. Furthermore, the strong focus of existing research on metropolitan areas and peri-urban areas reveals a significant gap in developing planning policies applicable to

[1] **Corresponding Author:** Suleyman Demirel Universty, bussragulkrc@gmail.com, ORCID: 0000-0002-0195-5154
[2] Suleyman Demirel Universty, duygugokce@sdu.edu.tr, ORCID: 0000-0001-6491-7131

medium-sized cities. Overall, the findings demonstrate that addressing food deserts cannot be achieved solely through retail investments. Instead, it requires holistic, justice-oriented, and planning-based policies that consider all components of the urban food system. Urban planning should recognize food accessibility as a concrete dimension of spatial justice and restructure planning and decision-making processes accordingly.

Keywords: Food Accessibility, Spatial Justice, Food Justice, Zoning Regulations, Urban Food System

INTRODUCTION

Inequality in access to food in cities has become an increasingly debated issue in recent years, across both public health and urban planning disciplines. One of the most visible forms of this inequality is "food deserts", which refer to areas where socio-economically disadvantaged communities have limited access to healthy, fresh, and affordable food (Slade et al., 2016). This situation is not merely an individual consumption problem; it is considered a reflection of structural injustices in urban production methods (Fernández-Casal et al., 2025). Therefore, the problem of food access should be addressed as a form of social and spatial inequality directly related to urban planning policies.

Although food deserts are generally defined in the literature through spatial access analyses conducted in developed countries such as the United States of America (USA) and Canada (Larsen & Gilliland, 2008; Karpyn et al., 2019), they are increasingly being studied in cities in Europe, Asia, and Latin America (Mosammam et al., 2017; Roggema et al., 2024; Huda et al., 2025). The common point of these studies is that they explain the emergence of food deserts as a multidimensional inequality arising from a combination of income level, transportation facilities, and land-use decisions. However, studies addressing the direct impact of planning decisions on the formation of food deserts are limited in the current literature (Walker et al., 2010; Shannon, 2014; Widener & Shannon, 2014). This study shifts the focus from viewing food deserts merely as a socio-economic problem to analyzing them as a consequence of spatial planning policies. Single-function land-use patterns, inadequate integration of public transportation, infrastructure deficiencies, and fragmented planning approaches have been identified as key spatial determinants limiting food accessibility (Neumeier, 2015; Taylor & Ard, 2015). This situation has arisen because the production, distribution, marketing, and consumption processes of the food system have not been linked to planning decisions in the planning discipline for many years (Morgan, 2009; Yarış & Karakaya Ayalp, 2023). The historical focus of planning practice on physical infrastructure and economic development goals has led to food access being treated as a secondary issue.

Therefore, food deserts emerge as an issue inextricably linked to urban spatial planning, transcending the conventional boundaries of public health and retail distribution. Land-use decisions, transportation network design, and infrastructure arrangements determine the accessibility of individuals in different parts of the city to food. The existing literature demonstrates that food systems have not been sufficiently integrated into urban planning processes. The failure to integrate residential areas with markets, neighborhood bazaars, and production areas in their design is cited as a major factor deepening food inequality (Roggema et al., 2024; Raja et al., 2008). In Turkey, the issue of food deserts has recently emerged as a topic of scholarly interest within urban planning research. This emerging research area has become increasingly vital for addressing the intersections of food security, sustainable urbanization, and social justice.

This article examines food deserts from an urban planning perspective, specifically questioning how land-use, transportation, and infrastructure decisions contribute to food inequality. The study comparatively evaluates the findings of 26 scientific studies published between 2008 and 2025; identifies the prominent indicators in the spatial analysis of food deserts; and develops planning-based solution proposals. In doing so, the study contributes to redefining the role of food systems within urban planning and positioning food justice as an integral component of spatial planning. It also aims to strengthen awareness of food-based inequalities within the planning discipline.

1. Theoretical Framework

Food deserts represent a multidimensional challenge, characterized by limited access to healthy, affordable food, and reflect broader spatial inequalities within urban environments. According to Harvey's (1973) theory of spatial justice, social inequalities become embedded in space when resources, services, and opportunities are unevenly distributed within cities (Harvey, 1973). Similarly, Lefebvre (1991) argued that space is socially produced and shaped by power relations, capital accumulation, and planning decisions (Lefebvre, 1991). In this context, food deserts can be understood as a form of spatial injustice that extends beyond economic inequalities and reflects the spatial consequences of planning decisions.

The term "food desert" was first introduced in the United Kingdom in the 1990s and subsequently became widely studied, particularly in the United States and Canada (Cummins & Macintyre, 2002; Larsen & Gilliland, 2008). Studies in these contexts demonstrated that low-income neighborhoods often had limited access to supermarkets and other fresh food outlets, highlighting the roles of income, transportation, and land-use patterns in shaping food accessibility (Raja et al., 2008; Karpyn et al., 2019). Early research primarily focused on physical accessibility and socio-economic indicators. Over time, the literature expanded to include critical perspectives, introducing terms such as "food apartheid" and "food injustice" to emphasize structural and policy-driven inequalities (Alkon & Agyeman, 2011; Slocum, 2011). Morgan (2009) noted that food systems had long remained marginal within urban planning discourse and that planning practices had insufficiently addressed production, distribution, and consumption relationships. This omission contributed to spatial inequalities in food access, particularly under neoliberal planning conditions (Slade et al., 2016). In recent years, the paradigm of urban food planning has evolved, and the integration of food systems with zoning plans, transportation infrastructure, and land-use policies has begun to be discussed (Slade et al., 2016; Yarış & Karakaya Ayalp, 2023; Roggema et al., 2024). This perspective recognizes cities as spatial systems in which planning decisions influence food accessibility and distribution patterns.

According to this theoretical framework, food deserts represent a challenge associated with both socio-economic disadvantages and spatial planning decisions. Single-function land use, residential areas without public transport, infrastructure deficiencies, and non-holistic planning approaches can limit food accessibility and contribute to food inequality in urban areas (Neumeier, 2015; Fernández-Casal et al., 2025). In this context, food deserts provide a basis for understanding spatial inequalities and for identifying planning interventions to improve food accessibility.

2. Methodology

This study presents a descriptive and comparative synthesis of literature, evaluating national and international research on food deserts from a spatial perspective. The aim is to examine the effects of land-use, transportation, and infrastructure decisions on food access within the context of urban planning. In this context, the screening criteria applied to select the publications included in the study are presented in Figure 1.

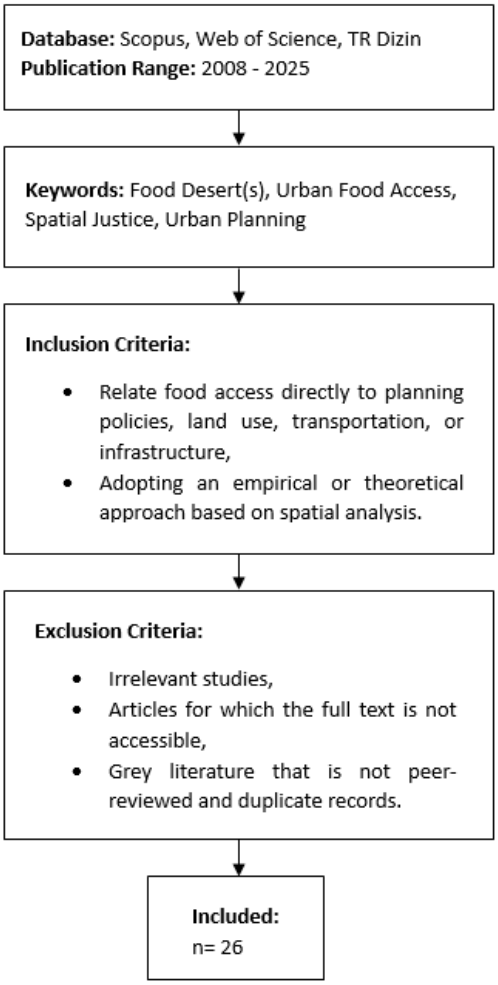

Figure 1. Literature Search Flow Diagram

The selected studies were evaluated using a descriptive review approach. An inductive approach was adopted during the analysis process. The articles were comparatively evaluated based on the research objective, the type of analysis used, the main findings, and the proposed policy directions. As a result of this descriptive analysis, thematic similarities and methodological focal points in the literature were identified, and the studies were manually classified under four main themes:

1. Descriptive-Analytical Studies: Geographic Information Systems (GIS) based research that defines food deserts through indicators of physical access and spatial density.

2. Impact Analysis Studies: Multivariate statistical analyses examining the health, socio-economic, and demographic impacts of food deserts.

3. Planning and Policy-Oriented Studies: Research that develops local government strategies, urban food plans, and intervention policies.

4. Critical-Theoretical Approaches: Theoretical studies that discuss food deserts in the context of structural inequality, environmental justice, and neoliberal planning.

Each study was analyzed along the aim-method-finding-result axis in line with these themes, and common findings related to the planning discipline were evaluated comparatively. This method allows for the synthesis of accumulated knowledge produced at different scales and contexts and the development of planning-based solution proposals. The second dimension of the literature reviewed concerns the spatial analysis indicators used to identify food deserts (Table 1). Most of the research

conducted in different countries relies on similar indicators. These indicators are classified under six main groups:

Table 1. Grouping of Spatial Analysis Indicators Used in Identifying Food Deserts

Group	Content
A	Physical accessibility (market distance, walking time, market density)
B	Socio-economic structure (income level, economic vulnerability)
C	Demographic and racial differences
D	Transportation options and car ownership
E	Economic accessibility and food prices
F	Land use, settlement morphology and spatial structure

The limitation of this study is that only peer-reviewed and accessible sources have been evaluated. Grey literature has been excluded. Nevertheless, the findings comprehensively reveal the spatial dynamics of food deserts in relation to the urban planning discipline.

3. Review of Existing Literature

Food deserts, characterized by limited access to healthy, affordable food among low-income populations, have attracted increasing attention in the urban planning literature. This issue is closely associated with market distribution, transportation infrastructure, demographic characteristics, and planning decisions, highlighting the spatial dimensions of food access inequalities. The term first emerged in the United Kingdom in the late 1990s and has been systematically examined since the early 2000s, particularly with the development of GIS-based spatial analysis methods. In the United States, research has focused on assessing the spatial implications of public policies and local governance in shaping food accessibility (Wrigley, 2002).

Most food desert research has been conducted in the United States, although similar studies have also been carried out in the United Kingdom and Australia (Wrigley, 2002; Burns & Inglis, 2007). In contrast, studies in Europe, Latin America, and developing countries have often approached the issue from public health or sociological perspectives. As a result, spatial analyses within the specific context of urban planning remain relatively limited in these regions. Existing studies have generally been conducted at metropolitan and neighborhood scales, using indicators such as distance to supermarkets, walking accessibility, public transport availability, and income levels. These studies have primarily focused on identifying spatial inequalities, assessing transportation accessibility, and supporting food justice-oriented planning strategies.

Despite the growing body of literature, there remains a lack of standardization in measurement indicators and methodological approaches. Differences in definitions and analytical frameworks across countries limit the comparability of findings. Moreover, many studies have prioritized physical accessibility while giving limited attention to planning-related factors such as land-use patterns, spatial density, and transportation integration. This gap reflects the “unequal distribution of spatial resources” highlighted in Harvey’s (1973) spatial justice framework and suggests that planning decisions play a significant role in shaping food access inequalities (Harvey, 1973).

Recent studies in Europe and Asia have emphasized that food deserts are influenced by both physical accessibility and administrative, institutional, and socio-political processes (Roggema et al., 2024;

Fernández-Casal et al., 2025). This perspective highlights the importance of integrating food systems into urban planning processes and has contributed to the emergence of "urban food planning" as a distinct planning approach.

In the Turkish literature, research on food security, food access, and food inequality began to expand during the late 2010s. Research directly addressing the term 'food desert' as a distinct field of study has only become visible from the 2020s onwards (Karakaya Ayalp et al., 2023; Duran, 2024; Bahtiyar Karadeniz, 2025; SÜRKAD, 2025). Food deserts have often been examined indirectly within broader discussions of urban food systems, food accessibility, and local food networks. This indicates that the integration of food systems into urban planning research is still developing, and empirical spatial analyses remain relatively limited compared to the international literature.

3.1 Descriptive-analytical studies

This category includes GIS-based spatial analyses that primarily assessed food deserts using physical accessibility indicators such as distance to markets, walking accessibility, and market density. These studies were mainly conducted between 2010 and 2020, particularly in the United States, Canada, the United Kingdom, and Latin America. The studies listed in this category (Table 2) identified the spatial distribution of food deserts and the populations affected by limited access to food. However, they generally focused on spatial identification and gave limited attention to the structural causes of food access inequalities, their social implications, and their relationship with planning decisions. This limitation contributed to the emergence of a second group of studies in the literature focusing on impact-oriented analysis.

Table 2. Descriptive-Analytical Studies on Food Deserts

Author Name/Year	Title	Abstract
Larsen & Gilliland, 2008	Mapping The Evolution of "Food Deserts" in a Canadian City: Supermarket Accessibility in London, Ontario, 1961-2005	Larsen and Gilliland (2008) examined spatial changes in supermarket access in London, Ontario, between 1961 and 2005 using GIS and network analysis and found that the suburban relocation of supermarkets increased food access inequalities in inner-city neighborhoods. The study also identified significant relationships between food access and socioeconomic indicators.
Raja et al., 2008	Beyond Food Deserts: Measuring and Mapping Racial Disparities in Neighborhood Food Environments	Raja et al. (2008) quantitatively examined racial and income-based inequalities in supermarket and grocery store access at the block-group level in Erie County using spatial analysis. The study ound that food access was unevenly distributed and was associated with socioeconomic disparities, as demonstrated by Gini coefficients and regression analysis. The study focused on assessing existing inequalities rather than proposing specific planning interventions.

Sisiopiku & Barbour, 2014	Use of GIS Spatial Analysis to Identify Food Deserts in the State of Alabama	Sisiopiku and Barbour (2014) analyzed food deserts in Alabama using GIS to examine spatial inequalities in food access. Their county-level analysis incorporated distance, vehicle ownership, and socioeconomic indicators, and identified statistically significant disparities in food access. The study focused on identifying spatial inequalities rather than proposing planning or policy interventions.
Križan, et al., 2014	Identification and Mapping of Food Deserts in Rural Areas: A Case Study from Slovakia	Križan et al. (2014) mapped the accessibility of large food retailers in the rural periphery of Bratislava using GIS and quantitative accessibility indicators. The study found that food access inequalities were associated with settlement location, transportation infrastructure, and topographical barriers. It identified and visualized the spatial distribution food accessibility disparities.
LeClair & Aksan, 2014	Redefining the Food Desert: Combining GIS with Direct Observation to Measure Food Access	LeClair and Aksan (2014) defined food access using a multidimensional approach by combining GIS-based distance measures with field observations. Their analysis incorporated physical and socioeconomic factors such as market type, product variety, and price levels. The study found that food access could not be fully explained by spatial proximity alone and demonstrated that qualitative factors played a significant role in defining food access conditions.
Karpyn et al., 2019	The Changing Landscape of Food Deserts	Karpyn et al. (2019) presented a comprehensive sectoral analysis of the changing dynamics of food deserts in the United States. The study examined the relationship between retail sector transformations, including dollar store expansion, supercenters, and online grocery retail, and spatial food access. By updating existing statistical data, the study identified food access inequalities and demonstrated their association with ethnic and socioeconomic disparities.

Luo, 2020	Food Deserts or Food Swamps? Using Geospatial Technologies to Explore Disparities in Food Access in Windsor, Canada	Luo (2020) examined the frameworks of "food desert" and "food swamp" in Windsor by spatially analyzing limited access to healthy food and exposure to unhealthy food environments. Using GIS-based mapping and accessibility analysis, the study identified neighborhood-level inequalities in food environments and their association with socioeconomic conditions.
Chen et al., 2025	(Not) İn My Backyard: Access to Community Gardens, Neighborhood Characteristics, and Food Deserts	Chen et al. (2025) analyzed access inequalities by comparing the spatial distribution of 1,874 community gardens across 24 U.S. metropolitan areas with neighborhood-level socioeconomic data. The study identified significant socioeconomic disparities in community garden access and highlighted spatial overlaps with food desert areas. However, it did not evaluate the effects of specific policy or intervention measures.
Ortega & Rodríguez-Serra, 2025	Urban Food Deserts in Lima: Analysis from a Geo-Data Driven Perspective	Ortega and Rodríguez-Serra (2025) analyzed food access in Lima using GIS-based spatial analysis, field surveys, and clustering techniques. The study incorporated multiple variables, including retail diversity, fresh produce availability, infrastructure, and transportation access, and identified neighborhoods with limited food accessibility.

3.2 Studies are conducting impact analysis

This category includes studies that identified food deserts and examined their social, economic, and health-related consequences (Table 3). Using multivariate statistical methods and spatial regression models, these studies analyzed the relationships between food access and variables such as income level, vehicle ownership, health indicators, and quality of life. The findings indicated that food deserts were associated with broader socio-economic inequalities and public health outcomes, extending beyond spatial accessibility alone. However, many of these studies did not establish clear connections with planning policies or propose planning-oriented interventions. This limitation contributed to the development of a third group of studies focusing on planning-based solutions.

Table 3. Studies Conducting Impact Analyses on Food Deserts

Neumeier, 2015	Regional Accessibility of Supermarkets and Discounters in Germany- A Quantitative Assessment	Neumeier (2015) analyzed the spatial justice implications of access to supermarkets and discount stores in Germany. The study demonstrated that physical access constraints created disadvantages in urban peripheral areas and were associated with spatial and socioeconomic inequalities. It also evaluated the limitations of alternative supply strategies and proposed planning-related interventions to address access disparities.
Tanoh & Hashemi-Beni, 2023	Spatial Analysis of Socioeconomic Factors Contributing to Food Desert in North Carolina	Tanoh and Hashemi-Beni (2023) analyzed food deserts in three counties in North Carolina by examining both physical access and socioeconomic vulnerability using GIS-based spatial analysis. The study found that low income, limited vehicle access, and reliance on food assistance were significantly associated with food desert areas. The results demonstrated that food access inequalities were influenced not only by distance but also by broader structural vulnerabilities.
Yun & Lee, 2024	The Spatial Digital Divide in Food Accessibility: Food Desert in Seoul, South Korea	Yun and Lee (2024) introduced the notion of the spatial digital divide by analyzing disparities between physical and digital market access in Seoul. The study measured how access inequalities affected different population groups and identified significant socio-spatial disparities. It extended conventional distance-based approaches by incorporating digital accessibility into food access analysis.
Huda et al., 2025	Identifying Food Deserts in Mississauga: A Comparative Analysis of Socioeconomic Indicators	Huda et al. (2025) mapped areas with limited market access in Mississauga and analyzed their socioeconomic vulnerability using three indices. The study found that neighborhoods with poor market access were also socially and economically disadvantaged. It demonstrated that food access inequalities were closely associated with broader social vulnerability.

3.3 Planning and policy-oriented studies

This category includes studies that went beyond identifying food deserts and focused on developing planning- and policy-oriented solutions (Table 4). These studies proposed interventions through planning policies, local government strategies, food systems planning, and participatory approaches. The number of such studies has increased, particularly since 2020, reflecting a growing interest in integrating food systems into urban planning processes. This shift has recognized food access as a planning-related issue and emphasized the role of planning policies in addressing food inequalities. However, most existing studies have focused on large metropolitan areas, while planning-oriented policy proposals applicable to medium-sized cities remain limited. This gap highlights the need for further research, particularly in contexts such as Turkey.

Table 4. Planning and Policy-Oriented Studies on Food Deserts

Mosammam et al., 2017	Measuring Food Deserts via GIS-Based Multicriteria Decision Making: The Case of Tehran	Mosammam et al. (2017) analyzed food deserts in Tehran using multi-criteria decision-making and GIS methods and demonstrated the limitations of distance-based definitions. The study mapped neighborhood-level access by integrating income, transportation infrastructure, and social vulnerability indicators. The findings indicated that 26% of the population lived in low-access areas and emphasized the need for spatial–social integration in planning. The authors proposed policy measures including mobile markets, food literacy programs, and public transportation improvements.
Abel & Faust, 2020	Modeling Complex Human System: An Adaptable Framework of Urban Food Deserts	Abel and Faust (2020) developed a spatial simulation-based modeling framework to address food access inequalities within planning processes. The study evaluated the effects of spatial interventions, including market placement, pedestrian accessibility, and public transport improvements. The results demonstrated that spatial planning decisions could significantly improve food accessibility and support evidence-based planning strategies.
Neumeier & Kokorsch, 2021	Supermarket and Discounter Accessibility in Rural Germany-İdentifying Food Deserts Using A GIS Accessibility Model	Neumeier and Kokorsch (2021) analyzed market access in rural and urban peripheries using spatial modeling to assess food access inequalities from a planning perspective. The study identified food desert areas and evaluated the influence of

		transportation infrastructure, vulnerable population groups, and market location patterns on accessibility. It also proposed planning-related policy recommendations to address rural access disparities.
Karakaya Ayalp et al., 2023	Karşıyaka Kentsel Gıda Strateji Belgesi	Karakaya Ayalp et al. (2023) analyzed spatial inequalities in access to healthy and equitable food in the Karşıyaka district by mapping the distribution of markets, marketplaces, producers, and direct sales points at the neighborhood level. The study identified significant spatial disparities in food access and delineated food desert areas. It also developed spatial planning strategies and local policy recommendations and proposed a comprehensive framework to promote food access and food justice at the city scale.
Roggema et al., 2024	Spatial Barriers to Transforming toward a Healthy Food System in the Noreste of Mexico	Roggema et al. (2024) analyzed spatial inequalities in the transition to healthy and plant-based diets using a multidimensional approach. The study evaluated the suitability of urban farming areas and identified socio-cultural and spatial barriers affecting food system transitions. It also proposed spatial planning strategies and policy recommendations, including urban farming incentives, infrastructure development, and support for culturally appropriate food practices.
Avila et al., 2025	Mapping Food Justice: Urban Farms and the Examination of Equitable Food Access	Avila et al. (2025) analyzed the relationship between urban agriculture and food access by considering food justice, community needs, planning policies, and public support. Using spatial analysis and qualitative data, the study identified the role of urban agriculture in improving equitable food access. It also proposed policy recommendations that could be integrated into planning systems.
Fernández-Casal et al., 2025	The Quality Turn of Food Deserts into Food Oases in European Cities: Market	Fernández Casal et al. (2025) examined the potential of Alternative Food Initiatives (AFIs) to transform food deserts into food oases across 11 European cities. The study spatially

	Opportunities for Local Producers	analyzed food access conditions before and after AFI implementation and evaluated improvements in access quality, local producer engagement, and socio-spatial equity. The findings demonstrated that AFIs could support spatial planning interventions aimed at improving equitable food access and strengthening food justice.
Kamali et al., 2025	Mapping the Future of Urban Agriculture: A GIS-Based Spatial Framework for Food Equity	Kamali et al. (2025) examined the role of urban farming in improving food access equity in Birmingham using GIS-based spatial analysis. The study identified suitable sites based on land use, vehicle availability, and income levels and evaluated their potential population coverage under different scenarios. The findings demonstrated that strategic site selection for urban agriculture could improve food access in vulnerable neighborhoods and support spatial planning and policy development.

3.4 Critical-theoretical appoaches

This category includes theoretical studies that examined food deserts in relation to systemic inequality, environmental injustice, neoliberal urban policies, and spatial justice (Table 5). These studies drew on theoretical perspectives such as Harvey's (1973) spatial justice framework and Lefebvre's (1991) theory of the production of space to explain the structural dimensions of food access inequalities (Harvey, 1973; Lefebvre, 1991). From this perspective, food deserts were understood in relation to both physical accessibility and broader social and planning-related inequalities.

Table 5. Studies Containing Critical-Theoretical Approaches to Food Deserts

Battersby, 2012	Beyond the Food Desert: Finding Ways to Speak about Urban Food Security in South Africa	Battersby (2012) critically assessed the applicability of the "food desert" framework in developing urban contexts such as South Africa. The study argued that supermarket-based definitions were insufficient and emphasized the importance of considering household assets, transportation infrastructure, informal markets, and decision-making processes. It proposed a more comprehensive framework for understanding food access inequalities in developing cities.

Rodde, 2015	Revitalizing New York City Food Deserts: On Addressing, Examining and Solving Food Insecurity in New York City	Rodde (2015) argued that defining food deserts solely based on physical market access was insufficient and emphasized the importance of structural inequalities, environmental justice, racial discrimination, transportation, and supply chain vulnerabilities. The study developed a multi-layered critical analytical framework and evaluated food access from the perspectives of social justice, environmental sustainability, and public health.
Shannon, 2015	Rethinking Food Deserts Using Mixed-Methods GIS	Shannon (2015) critically evaluated conventional food desert definitions and argued that geographic proximity alone was insufficient to explain food access inequalities. By integrating GIS with qualitative data, the study mapped multidimensional barriers related to transportation, health, time constraints, and social vulnerability. The findings demonstrated that the presence of food outlets did not guarantee actual access and emphasized the importance of participatory data and revised accessibility mapping in planning processes.
Taylor & Ard, 2015	Food Availability and the Food Desert Frame in Detroit: An Overview of the City's Food System	Taylor and Ard (2015) analyzed food access using spatial data and critically examined the limitations of reductionist food desert definitions. The study demonstrated that analyses excluding alternative food sources, such as community gardens and farmers' markets, provided an incomplete understanding of food access inequalities. It also emphasized the role of community-based initiatives in systemic food system transformation and argued for the re-evaluation of existing food access frameworks.
Battersby, 2019	The Food Desert as a Concept and Policy Tool in African Cities: An Opportunity and a Risk	Battersby (2019) critically examined the food desert framework in the context of African cities from both theoretical and political perspectives. The study emphasized that food access was shaped not only by spatial accessibility but also by cultural preferences, informal economies, and power relations. It

	highlighted the limitations of supermarket-based policy approaches and argued for the contextual redefinition of food access frameworks in African urban settings.

The literature on food deserts has contributed to urban planning by highlighting spatial inequalities and informing planning and policy responses. However, the dominance of US-focused, metropolitan-scale studies has limited the understanding of food deserts in diverse urban contexts. To provide an assessment of the urban contexts in which studies were conducted, 26 studies were classified according to urban scale (settlement size) (Table 6). The classification is based on the demographic size and administrative boundary structures of the settlements examined in the studies, and the following criteria have been applied:

Regional Scale: Settlements that go beyond the administrative boundaries of a single city and encompass multiple districts, cities, or states.

Metropolitan Scale: Large urban settlements with populations exceeding 500,000, characterised by polycentric development and national or global functional significance.

Medium-Sized City: Urban areas with a predominantly single-centred, compact structure and populations typically ranging from 100,000 to 500,000.

Peri-urban: Settlements with populations below 100,000, characterised by low development density and a strong association with agricultural production, including rural, semi-rural, or fringe areas.

Table 6. Distribution of Studies Classified by Settlement Scale

Settlement Scale	Number of Studies	Percentage (%)
Regional	12	23,1
Metropolitan	6	46,2
Medium-sized	5	19,2
Peri-urban area	3	11,5

An examination of Table 6 reveals that research focusing on medium-sized cities and peri-urban areas remains relatively limited, thereby representing an important gap in the literature. Research focusing on developing countries, medium-sized cities, and peri-urban areas remains relatively limited and represents an important gap in the literature. In this context, studies examining the relationship between food deserts and planning decisions, particularly within a spatial justice framework and supported by local policy perspectives, can contribute to both theoretical and planning-oriented discussions.

3.5 Spatial indicators used in identifying food desert and trends in the literature

In this section, the indicators used in 26 studies examined between 2008 and 2025 are analyzed comparatively (Table 7).

Table 7. Frequency and Thematic Trends of Spatial Indicators (2008-2025)

	Access and Spatial Distance				Socio-Demographic Vulnerability			Economic and Housing-Based Access Barriers			Spatial Structure/Layout Characteristics
AUTHOR, YEAR / CRITERIA	Physical Access	Public Transportation Access	Density or Number of Markets, etc.	Density of Fast-Food Establishments	Income Level	Ethnic / Racial Composition	Age Distribution	Vehicle Ownership	Housing Status / Economic Value	Food Prices	Urban Form / Spatial Structure
	A1	A2	A3	A4	B1	C1	C2	D1	D2	E1	F1
Raja et al., 2008	•		•		•	•					•
Sisiopiku & Barbour, 2014	•		•		•	•		•		•	
Križan et al., 2014	•		•		•			•	•		
Karpyn et al., 2019	•		•		•	•		•		•	
Larsen & Gilliland, 2008	•	•	•		•			•			
Luo, 2020	•		•	•	•	•		•			
Chen et al., 2025	•		•		•	•			•		•
LeClair & Aksan, 2014	•		•		•	•		•			
Ortega & Rodríguez-Serra, 2025	•		•		•			•			•
Huda et al., 2025	•				•			•			•
Tanoh & Hashemi-Beni, 2023	•				•	•		•			•
Neumeier, 2015	•		•					•			•
Yun & Lee, 2024	•		•		•		•				•
Kamali et al., 2025	•		•		•			•			•
Fernández-Casal et al., 2025	•		•		•						•
Mosammam et al., 2017	•		•		•			•			•
Abel & Faust, 2020	•		•		•			•			
Neumeier & Kokorsch, 2021	•		•		•			•			•
Roggema et al., 2024	•		•		•			•			•
Karakaya Ayalp et al., 2023	•		•		•				•		•
Avila et al., 2025	•		•		•		•	•			
Shannon, 2015	•		•		•	•		•			
Battersby, 2019	•		•		•	•		•			
Taylor & Ard, 2015	•		•		•	•		•			
Battersby, 2012	•		•		•	•		•			•
Rodde, 2015	•		•		•	•		•			

A1: Physical Access **A2:** Public Transportation Access **A3:** Density or Number of Markets, etc. **A4:** Density of Fast-Food Establishments

Criteria codes: **B1:** Income Level **C1:** Ethnic/Racial Composition **C2:** Age Distribution **D1:** Vehicle Ownership **D2:** Housing Status / Economic Value **E1:** Food Prices **F1:** Urban Form / Spatial Structure

Note: ● indicates that the study addresses the corresponding criterion. Criteria classification is based on the authors' review of the literature.

A comparative analysis of 26 studies indicates that the most frequently used indicators in spatial analyses of food deserts include physical accessibility (A1), market density (A3), income level (B1), and vehicle ownership (D1) (Sisiopiku & Barbour, 2014; Križan et al., 2014; LeClair & Aksan, 2014; Taylor & Ard, 2015; Ortega & Rodríguez-Serra, 2025; Avila et al., 2025). In contrast, complementary indicators such as public transport accessibility (A2), food prices (E1), and fast-food density (A4) were used less frequently (Larsen & Gilliland, 2008; Karpyn et al., 2019; Luo, 2020).

While earlier studies (2010–2015) primarily relied on GIS-based distance measures and market accessibility models (Raja et al., 2008; Sisiopiku & Barbour, 2014; Križan et al., 2014), the literature after 2020 has increasingly adopted multidimensional approaches that incorporate urban form, transportation accessibility, and socio-economic vulnerability (Roggema et al., 2024; Chen et al., 2025). This development indicates a growing recognition of food deserts as spatial outcomes influenced by planning, transportation, and socio-economic conditions. (Karakaya Ayalp et al., 2023; Ortega & Rodríguez-Serra, 2025). This fundamental shift in approach requires urban planning to move beyond treating food access solely as a matter of distance. It necessitates the adoption of region-specific and justice-oriented approaches that prioritize socio-economic vulnerability rather than relying on conventional facility-based planning.

Map analyses covering the period 2008-2025 show that the spatial pattern of food deserts is largely shaped by the center-periphery divide and transportation accessibility. While city centers have an advantage in accessing fresh food due to dense commercial areas and strong transportation

networks, peripheral neighborhoods and semi-rural areas experience access disadvantages. The average access distance is between 2 and 5 km in many cities; the decrease in the number of markets in low-density areas restricts access. This finding constitutes a concrete critique of single-center urban development and low-density sprawl patterns. To reduce access inequality in peripheral neighborhoods, planning must encourage mixed-use strategies and multi-center development. This pattern also coincides with racial and income-based segregation, particularly in the US and Canadian cities. Low-income and carless households are often clustered in low-access areas, thus making food deserts a spatial reflection of economic, social, and demographic inequalities. Therefore, the solution requires designing the connection between residential areas and food points based on public transportation rather than automobiles, and integrating transportation planning with land use.

Since 2020, the literature has expanded to include related terms such as “food swamp,” referring to areas with physical access but limited healthy food options, and “food oasis,” referring to areas with high levels of access and food quality. This development reflects a broader analytical approach that considers food quality, affordability, and sustainability alongside physical accessibility. Recent spatial analyses have incorporated indicators such as fast-food density, product quality, and food affordability, extending beyond traditional distance-based measures. This conceptual expansion demonstrates that designating a parcel as a “commercial area” in zoning plans is insufficient for ensuring healthy food access. Consequently, the planning system must develop innovative zoning tools capable of regulating food retail quality -such as restricting fast-food density- rather than focusing solely on spatial presence.

Studies conducted between 2008 and 2025 have demonstrated that food deserts represent a multidimensional form of inequality. When physical accessibility, income level, vehicle ownership, racial composition, and planning policies are considered together, food deserts can be understood as complex spatial outcomes. These outcomes are shaped at the intersection of spatial justice, food security, and urban planning. These findings indicate that food deserts do not emerge randomly but reflect structural outcomes associated with planning decisions, including zoning, transportation, and infrastructure provision. This body of literature highlights the importance of integrating food access considerations into planning processes, particularly in relation to transportation systems, housing policies, and broader social equity objectives.

Building upon this literature review, the following section examines the role of urban planning in the formation of food deserts. It also develops planning-oriented strategies to improve food accessibility.

4. The Role of Urban Planning in the Formation of Food Deserts and Social Justice-Focused Strategic Recommendations

Zoning plans regulate the physical structure of cities while simultaneously influencing the spatial distribution of resources and opportunities as policy instruments. Planning decisions regarding density, housing typologies, land use, and transportation accessibility shape land values, service access, and spatial development patterns. These decisions influence the socio-spatial structure of cities by affecting accessibility to urban services, economic opportunities, and infrastructure. As a result, planning processes play an important role in shaping spatial inequalities and access patterns within urban areas.

One of the most concrete manifestations of spatial inequality is observed in the emergence of food deserts. Within zoning plans, the distribution of commercial areas and their relationship with residential neighborhoods are key determinants of access to healthy and affordable food. In neighborhoods with higher concentrations of low-income and minority populations, planning decisions often locate large-scale food retail developments, such as supermarkets, in car-oriented peripheral areas or high-value districts. This spatial pattern may reduce accessibility for

disadvantaged communities. In addition, rigid functional zoning and the limited regulatory integration of urban agriculture practices, such as community gardens, can constrain the availability of local fresh food outlets. Insufficient public transportation connectivity may further limit accessibility, particularly for households without private vehicles. As a result, households may face increased transportation burdens to access healthy food. In some cases, they may rely on nearby food environments characterized by limited availability of nutritious options. These findings indicate that zoning decisions influence both spatial accessibility and broader patterns of food access inequality. Planning decisions can exacerbate food poverty by reinforcing structural nutritional and public health challenges.

This situation reflects the treatment of food primarily as a commercial commodity rather than as a fundamental human right within urban planning practice. The emergence of food deserts is closely associated with traditional planning approaches that have not fully integrated food system components into planning processes. The urban food system, which encompasses production, distribution, marketing, consumption, and waste management, is often insufficiently integrated into zoning decisions. This disconnection may contribute to spatial limitations in food accessibility (Morgan, 2009; Sonnino, 2019). In addition, the limited integration of urban food systems, together with “social justice” and “public health” perspectives, into planning processes can constrain comprehensive assessments of food access and food justice. The insufficient consideration of social impacts and local context further limits the ability of planning systems to address food-related inequalities effectively.

Ensuring access to affordable, fresh, and nutritious food as a public good across all neighborhoods through land-use and transportation decisions can help reduce the risk of “food desert” formation. Achieving this objective requires planning approaches that integrate food access considerations into broader spatial, transportation, and social planning frameworks.

The effectiveness of such an approach depends on integrating food access considerations into all stages of the planning process, including “Plan Analysis and Synthesis,” “Plan Preparation,” and “Plan Monitoring and Evaluation.”

Within this framework, the “Plan Analysis and Synthesis” stage should include “Food Access Analysis,” “Identification of Potential Food Desert Risk Areas,” “Food Justice Impact Assessment,” and “Identification of Potential Urban Agriculture Areas.” These analyses can be conducted in a manner similar to demographic or environmental assessments.

As part of this process, a “Food Access Map” can be developed by analyzing “walking distances” and “public transportation accessibility” from residential areas to fresh food retail locations, such as supermarkets, markets, greengrocers, and butchers. Areas identified as having “low food access” can then be evaluated together with neighborhood-level indicators such as “household income,” “vehicle ownership,” and “vulnerable populations,” including elderly, disabled, and migrant populations. This integrated assessment can help identify “Potential Food Desert Risk Areas,” where both physical accessibility and socio-economic capacity are limited. It can also support the identification of “Food Swamp” areas characterized by limited access to nutritious food and higher concentrations of unhealthy food outlets.

The analysis process should not be limited to physical distance measurements alone. First, existing zoning plans should be examined to assess whether they include restrictive provisions that limit the location of small-scale food retailers, such as grocery stores, greengrocers, and bakeries, within residential areas. In addition, transportation planning represents another key determinant of food accessibility. As emphasized by Tanoh and Hashemi-Beni (2023), the lack of integration between public transportation routes and food retail locations can limit accessibility for households without

private vehicles and reinforce spatial inequalities. Based on this perspective, the physical barriers created by transportation networks for carless populations and the capacity of public transportation systems to meet food shopping needs, such as route coverage, stop density, and service frequency, should be carefully evaluated. This analysis can help determine whether the spatial structure of cities contributes to "systematic inequalities in food access" among different socio-economic groups.

The effectiveness of these analyses and assessments depends on incorporating the "local context" into the evaluation process. Food desert analyses that do not consider the local context may rely on uniform standards and assume that equal spatial provision ensures equitable access. However, incorporating the local context enables a more comprehensive understanding of food access inequalities. In this regard, assessments of food access conditions in high-risk areas should not rely solely on quantitative indicators. A "Food Justice Impact Assessment" can be conducted to better understand underlying structural factors, using qualitative methods such as focus groups, in-depth interviews, and field observations.

Based on the results of these analyses and impact assessments, planning decisions can be developed during the "Plan Preparation" stage to support public health and improve food accessibility. Within this framework, ensuring that all residential areas have access to at least one "fresh food access point," such as a market, greengrocer, or supermarket, within an acceptable walking distance can be considered as a key planning objective.

However, important structural barriers exist within current land-use planning practices. Single-use zoning approaches often spatially separate residential areas from food retail locations. This separation contributes to the concentration of commercial activities and food retailers in central areas, while peripheral neighborhoods may experience reduced accessibility (Tanoh & Hashemi-Beni, 2023).

To address this issue, planning approaches can incorporate "Mixed-Use" development strategies that allow small-scale food retailers, such as greengrocers, bakeries, and butchers, to operate within residential areas. In particular, planning frameworks can support the provision of designated commercial spaces for small-scale food retailers in new development areas and urban regeneration projects. Such planning measures can contribute to improving local food accessibility and strengthening spatial equity.

Planning decisions should extend beyond commercial land-use designations to include food production activities. One key limitation in current planning practice is that "urban agriculture" is not formally recognized as a legal land-use category in zoning regulations. This traditional approach, which restricts production primarily to rural areas, limits the integration of local food production into the urban fabric and its inclusion within zoning plans. However, practices such as "community gardens" and "farmers' markets" can shorten food supply chains while also strengthening the participatory dimensions of planning processes (Roggema, 2014; Yarış & Karakaya Ayalp, 2023).

To support this potential, planning frameworks can incorporate provisions to allocate a designated portion (e.g., 10-15%) of newly planned parks and green spaces as "Community Gardens" or "Educational Gardens." In addition, publicly owned vacant land can be made available, either temporarily or permanently, for "Urban Agriculture" use. These measures can support the integration of local food production into urban spatial systems. Furthermore, accessible, adequately serviced areas within neighborhoods can be designated as "Neighborhood Markets," which represent an important component of local food access. Where appropriate, "Mobile Market" routes and stops can also be incorporated into planning decisions to improve accessibility.

Finally, during the “Plan Monitoring and Evaluation” stage, periodic impact assessments can be conducted to evaluate the long-term outcomes of planning decisions, including health and economic implications. These assessments can support the revision of plans where necessary and contribute to improving planning responses to food access challenges.

CONCLUSION

The reviewed literature indicates that academic research on food deserts has evolved from primarily technical and spatial measurements toward broader social justice and planning-oriented perspectives. By comparatively examining national and international studies conducted between 2008 and 2025, this research demonstrates that food deserts represent multidimensional spatial inequalities rather than solely physical accessibility limitations. Early descriptive and analytical studies contributed to identifying the spatial and demographic distribution of food deserts. However, these studies often gave limited attention to the structural causes of food access inequalities and their relationship with planning policies. This limitation contributed to the development of impact-oriented studies that examined food deserts in relation to socio-economic conditions and public health outcomes.

The limited integration of food systems into urban planning frameworks has reduced the visibility of how planning decisions shape food accessibility. In particular, single-use zoning approaches can spatially separate residential areas from food retail and production networks. Similarly, centralized urban development patterns may contribute to the concentration of food supply functions in specific locations (Neumeier & Kokorsch, 2021). These spatial patterns can lead to reduced accessibility in peripheral neighborhoods and areas with higher concentrations of low-income populations. Furthermore, the absence of formal recognition of “urban agriculture” as a land-use category within zoning regulations limits the integration of local food production into urban planning processes. As a result, local food systems may remain constrained by limited spatial integration and reliance on market-based food supply structures.

Despite the growing body of research addressing structural dimensions of food access inequalities, important structural and scale-related gaps remain in the literature. While policy-oriented studies highlight the importance of integrating food systems into planning processes, most existing research focuses on metropolitan areas. This limits the development of planning approaches applicable to medium-sized cities and peri-urban areas. This contextual gap underscores the importance of conducting research across diverse urban contexts, including Turkey. Future studies can contribute to the literature by examining food deserts in relation to zoning decisions, evaluating them within spatial justice frameworks, and supporting these analyses with locally grounded planning strategies.

Overall, this study's findings indicate that food deserts are shaped by the interaction between socio-economic conditions and spatial planning decisions. This suggests that food accessibility should be considered in relation to planning processes, rather than solely as a technical accessibility issue. Urban planning policies play an important role in influencing the spatial distribution of food access. Addressing food deserts requires more than establishing new retail outlets. It also requires a holistic and justice-oriented planning approach that considers all components of the urban food system.

In this context, the planning discipline needs to extend beyond the regulation of physical space. It should function as a tool that supports the advancement of food justice within the broader framework of social welfare and spatial sustainability.

Compliance with Ethical Standards

1. Conflict of Interest

The authors declare that they have no actual, potential, or perceived conflicts of interest related to this article.

2. Ethics Committee Approval

Ethics committee approval is not required for this study. The wet-signed informed consent form related to this statement has been submitted as part of the manuscript process files.

3. Generative Artificial Intelligence (GAI) Usage Statement

The authors used Grammarly and ChatGPT (OpenAI) for language editing and improvement of academic expression. All scientific content were developed and verified by the authors.

4. Financial Support

The authors received no financial support for the research, authorship, or publication of this article.

5. Acknowledgements

The authors have no acknowledgments to declare.

REFERENCES

Abel, K. C., & Faust, K. M. (2020). Modeling complex human systems: An adaptable framework of urban food deserts. *Sustainable Cities and Society,* 52, 101795. https://doi.org/10.1016/j.scs.2019.101795

Alkon, A., & Agyeman, J. (Eds.). (2011). *Cultivating food justice: Race, class, and sustainability* (pp. 1-20). Cambridge, MA, USA: MIT Press.

Avila, A., Ayiah, M., Stavely, J., Sager, M. T., Sherard, M. K., & Petrosino, A. J. (2025). Mapping food justice: Urban farms and the examination of equitable food access. *SMU Journal of Undergraduate Research,* 9(1), 1-10. https://doi.org/10.25172/jour.9.1.1

Bahtiyar Karadeniz, C. (2025). Mekânsal, kültürel ve politik bağlamda gıda coğrafyası. *Coğrafi Bilimler Dergisi / Turkish Journal of Geographical Sciences,* 23(2), 734-772.

Battersby, J. (2012). Beyond the food desert: Finding ways to speak about urban food security in South Africa. *Geografiska Annaler: Series B, Human Geography,* 94(2), 141-159. https://doi.org/10.1111/j.1468-0467.2012.00401.x

Battersby, J. (2019). The food desert as a concept and policy tool in African cities: An opportunity and a risk. *Sustainability,* 11(2), 458. https://doi.org/10.3390/su11020458

Burns, C. M., & Inglis, A. D. (2007). Measuring food access in Melbourne: Access to healthy and fast foods by car, bus and foot in an urban municipality in Melbourne. *Health & Place,* 13(4), 877-885. https://doi.org/10.1016/j.healthplace.2007.02.004

Chen, H., Wang, H., Bora, F., & Hu, Y. (2025). (Not) in my backyard: Access to community gardens, neighborhood characteristics, and food deserts. *Cities,* 166, 106226. https://doi.org/10.1016/j.cities.2025.106226

Cummins, S., & Macintyre, S. (2002). "Food deserts"- evidence and assumption in health policy making. *BMJ,* 325(7361), 436-438. https://doi.org/10.1136/bmj.325.7361.436

Duran, H. (2024). Kent-bölge gıda sistemi için yerel yaklaşımlar: İstanbul bağlamında bir mikro model önerisi. *Proceedings of the 2024 International Congress on Eurasian Economies* (pp. 170-174). Eskişehir, Türkiye.

Fernández-Casal, L., Karakaya Ayalp, E., Öztürk, S. P., Navas-Gracia, L. M., Geçer Sargın, F., & Pinedo-Gil, J. (2025). The quality turn of food deserts into food oases in European cities: Market opportunities for local producers. *Agriculture,* 15(3), 229. https://doi.org/10.3390/agriculture15030229

Harvey, D. (1973). *Social justice and the city*. London, United Kingdom: Edward Arnold.

Huda, T., Wang, A., Zhang, H., Gao, L., He, Y., & Zhu, T. (2025). Identifying food deserts in Mississauga: A comparative analysis of socioeconomic indicators. *Urban Science,* 9(7), 265. https://doi.org/10.3390/urbansci9070265

Kamali, M. I., Nazari, R., Karimi, M., & Nikoo, M. R. (2025). Mapping the future of urban agriculture: A GIS-based spatial framework for food equity. *Sustainable Cities and Society*. https://doi.org/10.1016/j.scs.2025.106786

Karakaya Ayalp, E., Tatari, M. F., & Doğan, O. (2023). Karşıyaka kentsel gıda strateji belgesi [Technical report]. Karşıyaka Belediyesi / Yerel İş Birliği Projesi. https://doi.org/10.13140/RG.2.2.28128.70404

Karpyn, A. E., Riser, D., Tracy, T., Wang, R., & Shen, Y. E. (2019). The changing landscape of food deserts. *UNSCN Nutrition,* 44, 46-53. PMID: 32550654

Križan, F., Bílková, D., & Krištofík, P. (2014). Identification and mapping of food deserts in rural areas: A case study from Slovakia. *Geographia Technica,* 9(2).

Larsen, K., & Gilliland, J. (2008). Mapping the evolution of "food deserts" in a Canadian city: Supermarket accessibility in London, Ontario, 1961–2005. *International Journal of Health Geographics, 7*, 16. https://doi.org/10.1186/1476-072X-7-16

LeClair, M. S., & Aksan, A. M. (2014). Redefining the food desert: Combining GIS with direct observation to measure food access. *Agriculture and Human Values,* 31(4), 537-547. https://doi.org/10.1007/s10460-014-9508-6

Lefebvre, H. (1991). *The production of space*. Oxford, United Kingdom: Blackwell Publishing.

Luo, X. (2020). Food deserts or food swamps? Using geospatial technologies to explore disparities in food access in Windsor, Canada. *International Journal of Librarianship,* 5(1), 78-107. https://doi.org/10.23974/ijol.2020.vol5.1.161

Mohammadian Mosammam, H., Sarrafi, M., Tavakoli-Nia, J., & Mosammam, A. M. (2017). Measuring food deserts via GIS-based multicriteria decision making: The case of Tehran. *The Professional Geographer,* 69(3), 455-471. https://doi.org/10.1080/00330124.2016.1266949

Morgan, K. (2009). Feeding the city: The challenge of urban food planning. *International Planning Studies,* 14(4), 341-348. https://doi.org/10.1080/13563471003642852

Neumeier, S. (2015). Regional accessibility of supermarkets and discounters in Germany- A quantitative assessment. *Landbauforschung,* 65(2), 103-116. https://doi.org/10.3220/LBF1439880683000

Neumeier, S., & Kokorsch, M. (2021). Supermarket and discounter accessibility in rural Germany: Identifying food deserts using a GIS accessibility model. *Journal of Rural Studies,* 86, 247-261. https://doi.org/10.1016/j.jrurstud.2021.06.013

Ortega, C., & Rodríguez-Serra, M. (2025). Urban food deserts in Lima: Analysis from a geo-data-driven perspective. In D. B. Ibáñez, E. Gallardo-Echenique, H. Siringoringo, & N. L. Diez (Eds.), *Communication and Applied Technologies: Proceedings of ICOMTA 2024* (Smart Innovation, Systems and Technologies, Vol. 427, pp. 51-61). Singapore: Springer. https://doi.org/10.1007/978-981-96-0426-5_5

Raja, S., Ma, C., & Yadav, P. (2008). Beyond food deserts: Measuring and mapping racial disparities in neighborhood food environments. *Journal of Planning Education and Research,* 27(4), 469-482. https://doi.org/10.1177/0739456X08317461

Rodde, E. A. (2015). *Revitalizing New York City food deserts: On addressing, examining, and solving food insecurity in New York City* (Unpublished master's thesis). Fordham University. https://research.library.fordham.edu/environ_2015/182

Roggema, R., Krstikj, A., & Flores, B. (2024). Spatial barriers to transforming toward a healthy food system in the Noreste of Mexico. *Nutrients,* 16(9), 1259. https://doi.org/10.3390/nu16091259

Shannon, J. (2014). Food deserts: Governing obesity in the neoliberal city. *Progress in Human Geography,* 38(2), 248-266. https://doi.org/10.1177/0309132513484378

Shannon, J. (2015). Rethinking food deserts using mixed-methods GIS. *Cityscape: A Journal of Policy Development and Research,* 17(1), 85-96. Retrieved from https://www.jstor.org/stable/26326924

Sisiopiku, V. P., & Barbour, N. (2014). Use of GIS spatial analysis to identify food deserts in the state of Alabama. *Athens Journal of Health*, *1*(2), 91-103. https://doi.org/10.30958/ajh.1-2-2

Slade, C., Baldwin, C., & Budge, T. (2016). Urban planning roles in responding to food security needs. *Journal of Agriculture, Food Systems, and Community Development*, 7(1), 33-48. https://doi.org/10.5304/jafscd.2016.071.005

Slocum, R. (2011). Race in the study of food. *Progress in Human Geography,* 35(3), 303-327. https://doi.org/10.1177/0309132510395392

Sonnino, R. (2019). The cultural dynamics of urban food governance. *City, Culture and Society,* 16, 12-17. https://doi.org/10.1016/j.ccs.2017.11.001

SÜRKAD. (2025). *Kentli hakları ve kentlerin gıdaya erişimi: Araştırmalar Serisi I*. Ankara, Türkiye: SÜRKAD Yayınları.

Tanoh, V., & Hashemi-Beni, L. (2023). Spatial analysis of socioeconomic factors contributing to food desert in North Carolina. *Sustainability, 15*(10), 7848. https://doi.org/10.3390/su15107848

Taylor, D. E., & Ard, K. J. (2015). Food availability and the food desert frame in Detroit: An overview of the city's food system. *Environmental Practice,* 17(2), 102-133. https://doi.org/10.1080/21550085.2015.1011574

Walker, R. E., Keane, C. R., & Burke, J. G. (2010). Disparities and access to healthy food in the United States: A review of food deserts literature. *Health & Place,* 16(5), 876-884. https://doi.org/10.1016/j.healthplace.2010.04.013

Widener, M. J., & Shannon, J. (2014). When are food deserts? Integrating time into a complex public health debate. *Health & Place,* 30, 1-3. https://doi.org/10.1016/j.healthplace.2014.07.011

Wrigley, N. (2002). Food deserts in British cities: Policy context and research priorities. *Urban Studies,* 39(11), 2029-2040. https://doi.org/10.1080/0042098022000011331

Yarış, A., & Karakaya Ayalp, E. (2023). Kentsel gıda planlaması için çıkarımlar: Gıda'nın kent-bölgesi'ni tanımlamak. *Eskiz: Şehir ve Bölge Planlama Dergisi,* 5(1), 46-60. https://doi.org/10.5281/zenodo.8214074

Yun, H., & Lee, G. (2024). *The spatial digital divide in food accessibility: Food desert in Seoul, South Korea*. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.5049226