

Preliminary communication

Received: 2022-11-13

Accepted: 2022-12-30

WHERE ARE FOOD DESERTS GOING?

A systematic literature review of food deserts

Nikola Črček, RIT Croatia (nc8324@rit.edu)

Irena Guszak, RIT Croatia (irena.guszak-cerovecki@croatia.rit.edu)

Abstract

Food deserts are areas with little to no access to healthy, fresh food, and as such present major social and economic problems. As a research topic, food deserts have been explored for over three decades and are still an interesting topic. The main goal of this research was to systematically review the most recent research in food deserts and establish direction for further research. As the basis for this paper, 63 articles were reviewed and analyzed with regards to their main characteristics: researched location, food deserts perspective of interest and definition of food deserts. The data shows an increased interest in the topic, as well as the development of new, previously unexplored methods for combating food inequality. Out of the four food deserts perspectives of interest, the impact of different measures created to combat food deserts proved to be the most interesting, covering topics such as the COVID-19 pandemic, school reforms, and community gardens.

Key words: food deserts, systematic literature review, community gardens

1. Introduction

Food deserts emerged as a topic in the late 1980s and gained momentum in the early 2000s. They were initially in the research focus of urban scientists, such as Steven Cummins, Amanda Whelan and Neil Wrigley, and that interest has with time spread amongst researchers in various areas, practitioners and policy makers, such as Boys at al. (2021), Gebrehiwot (2022), Kolata (2012), Solomon (2011) etc. The interest in food deserts keeps expanding and it was a very relevant topic in the last few years, gaining attention both within the research community, from journals like the Public Health Nutrition, Landscape and Urban Planning, Journal of Agriculture, Food Systems, and Community Development, Sustainability, and others, as well as multiple news outlets, such as The Guardian, Forbes, Fortune and Chicago Tribune.

The focus of this study is to summarize and analyze the scope and type of research carried out on the topic of food deserts, as well as tracking rising trends and the most popular topics, over the years, in order to establish direction for further research. After decades of research and numerous attempts to define food deserts in a simple and comprehensive way, for example by Laurence (1997): food deserts are “[t]hose areas of inner cities where

cheap, nutritious food is virtually unobtainable. Car-less residents, unable to reach out-of-town supermarkets, depend on the corner shop where prices are high, products are processes and fresh fruit and vegetables are poor or non-existent.”, Morton et al. (2005): “[...] food deserts - places where few or no grocery stores exist.”, Needham et al. (2022): “Food deserts’ and ‘food swamps’ are food retail environment typologies associated with unhealthy diet and obesity.”, etc., a single definition still doesn’t exist. Dahle (2022) described food deserts as areas or regions that feature a large proportion of households with lower income, lack of transportation, and limited access to food retailers. As a complex and multifaceted concept, food deserts influence many different industries and spheres of life. With topics like the impact of diets on lung function in infants (Wolff et al., 2022), availability of grocery stores during pandemic times (Kang and Lee, 2022), promoting healthier food to customers (Boys et al., 2021), and using delivery services as a solution to food insecurity problems (Haider et al., 2022), there was clearly a wide selection of problems related to food deserts that researchers’ became aware of in the last few years.

The initial goal of this paper was to review the research on food deserts in the last 10 years, in order to identify a direction for future research. As the first search in the RIT Wallace Library, an extensive online electronic library managed by the Rochester Institute of Technology, resulted in 94,900 items, the goal was adjusted to the most recent publications – focus was on the period of 12 months: December 1st, 2021 – November 30, 2022. The adjusted time frame allowed for more manageable results, 10,700 publications. Further literature search criteria refinement and the relevance assessment yielded 61 articles to be reviewed and used for this study. The key characteristics that all publications included were analyzed with regards to include publication venue/journal, geographic area of interest, food desert perspective (food availability, health, methodology, impact of measures), and the definition of the construct.

The paper first describes the background of food deserts research, followed by an explanation of the methodology, data analysis and findings, and ends with conclusion, research limitations and recommendations for further research.

2. Where did food deserts come from?

Cole-Hamilton and Lang (1986, in Cummins & Macintyre, 2002) were among the first to notice that due to food retail restructuring in the UK, residents in deprived areas with lower income might be facing less food options in stores and higher food prices. Several other researchers pointed to the problem of food availability in the suburban socially deprived neighborhoods throughout the UK (Smoyer-Tomic et al., 2006). On the other side, research from US revealed that areas with limited food availability were more typical for inner city neighborhoods (Clarke et al., 2002; Donkin et al., 2000; Smoyer-Tomic et al., 2006; Sooman et al., 1993).

This area of research is as heterogeneous today as it was two decades ago. Regardless of the growing body of research, there was and still is no comprehensive definition of food deserts or characteristics of such areas. Hence research approaches and results also vary greatly. Topics that were explored included connection between food stores availability and residents’ nutrition (Wrigley, 2002), level of food stores presence in deprived versus more affluent areas (Guy & David, 2004), food prices in deprived and more affluent

neighborhoods (Cummins & Macintyre, 2002), as well as availability and prices of healthy food choices in deprived and more affluent districts (Ball et al., 2009).

Some studies have confirmed that availability of supermarkets in neighborhoods was correlated with residents' poor nutrition (Wrigley et al., 2002). On the other side, others, including research conducted in Scotland (Cummins & Macintyre, 2005, in Hawkes, 2008), found that availability of supermarkets and other food stores did not have a significant impact on residents' nutrition (Wrigley, 2002, Cummins & Macintyre, 2006, White, 2007, Pearce et al., 2008, in Hawkes, 2008).

Guy, O'Neill, Larsen, Gilliland, Morland, Baker and Powell (Hawkes, 2008; Ball et al., 2009) were among the authors who found that there were significantly less supermarkets in the deprived areas compared to the more affluent neighborhoods. At the same time, the research by Cummins, Macintyre, Apparicio, Winkler, Smoyer-Tomic (Hawkes, 2008; Ball et al., 2009) found that there were no significantly fewer supermarkets in the poorer areas. Additionally, different UK and US based research established that there were fewer healthy food options (Ball et al., 2009), and they were more expensive in deprived neighborhoods compared to the more affluent ones (Ball et al. 2009; Cummins & Macintyre, 2002). Furthermore, prices were in general higher in neighborhood food stores versus in large chain stores (Cummins & Macintyre, 2002; Ellaway & Macintyre, 2000).

Geographically, the first research into food deserts occurred in Leeds, Glasgow, Newcastle upon Tyne, Cardiff, Coventry, London and Manchester (Shaw, 2006). Next to Adelaide, Brisbane, and Melbourne as early research locations, in US researchers started exploring the topic in Erie County, San Francisco, Chicago and Detroit (Guszak, 2011).

The term 'food desert' was used for the first time by Beaumont et al. in 1995 to describe a deprived neighborhood in the West of Scotland where food was expensive and scarcely available. Guszak Cerovečki & Grünhagen (2016) did a comprehensive review of available food desert definitions and structured them into four groups:

1. Areas without any food stores (Cummins & Macintyre, 1999; Morton et. al, 2005)
2. Areas with stores that are far away (Donkin et al., 1999; Wrigley et al., 2002)
3. Areas with poor choices of fresh produce (Coveney & O'Dwyer, 2009; Gallagher, 2008; Wrigley et al., 2002)
4. Areas with specific socio-economic characteristics of residents (Coveney & O'Dwyer, 2009; Short et al., 2007).

Their definition relied on the marketing perspective, acknowledging that one dimension is the supply and that the second one is the demand: "...(a) on the supply side a lack of food store availability and/or access (ranging from the actual existence of stores, to store and assortment variety, as well as infrastructure, mobility and affordability of access), and (b) on the demand side a surrounding population of consumers whose financial means are depressed." (Guszak Cerovečki & Grünhagen, 2016, p. 339).

With time and growing research body around food deserts, researchers were focused on identifying new food deserts, but also on exploring complex socio-economic consequences of food deserts. Although the causal relationship between nutrition habits and living in food deserts is difficult to establish, poor nutrition is directly connected with poor health

(Gallagher, 2006). If the population of an area is in poor health, costs of healthcare rise, labor productivity is reduced and that negatively impacts the local business and community welfare overall (Gallagher, 2006 Gallagher, 2007). More identified food deserts, in particular in the US, raised public health concerns. First Lady Michelle Obama was explicit that eliminating food deserts was crucial in her work fighting childhood obesity (Kolata, 2012). In 2015, food deserts as a concept appeared in Michael Solomon's Consumer Behavior textbook (2015). Discussing consumer and social well-being, Solomon described the food deserts as an important concept in the market access, pointing out that "Limited access to healthy choices can lead to poor diets and higher levels of obesity and other diet-related diseases." (Solomon, 2015, p. 169).

All this indicates that although there was already much work completed, many questions around food deserts are still not answered. Hence, authors in this paper strive to identify the current food deserts key research areas and use them as a guideline for further research.

3. Methodology

A systematic literature review was used as the method to gather and review the data from recent publications on food deserts. The RIT Wallace Library was selected as the primary tool for identifying the publications needed for analysis. The RIT Wallace library provides access to more than 220 electronic databases, 98,000 electronic journals, thousands of multimedia sources, more than 550,000 electronic books and 320 print journal titles (RIT Wallace Library, 2023). In order to efficiently search through numerous resources, a powerful search engine is available to users. To identify publications relevant for this review, a search was completed using "food desert" as a key concept, publication date and type of publication. The parameters selected included: "journal article", "dissertation", "magazine article" and "e-journal" for types of publications and a publication date within the last 10 years: December 1st, 2012 – November 30th, 2022. The search identified over 94,900 publications, which is 57% more publications than in the previous decade, as the same search yielded with 60,500 publications for the period December 1st, 2002 – November 30th, 2012. It became apparent that the number of publications available was far too big for this project. Therefore, it was decided to scale back the scope of the research and focus on the papers published within the last 365 days: December 1st, 2021 - November 30th, 2022, resulting in slightly more manageable results of 10,700 publications. These results were sorted by relevance to the main topic of food deserts, meaning that at least the words "food desert" or "food" and "desert" had to be included in the publication title, and the focus was placed on journal papers and dissertations. This search round brought back 61 publications and through screening of the publication title and abstract, 58 publications were selected for the analysis. Through the screening process an additional five publications from 2021, published before December 1st, 2021, were identified as relevant for the analysis, so the analysis ultimately included a total of 63 publications. A data set that included the title, authors, date of publication, type of publication, research location, food deserts perspective of interest, definition of food deserts, and a summary of the paper was recorded in an excel spreadsheet for each publication.

4. Data analysis and findings

The data used in this paper was collected from a set of 63 most relevant journal articles and dissertations, published about food deserts, in the previously mentioned period between 2021-2022. The data extracted from these publications paints an interesting picture of the current state of research on food deserts.

The data shows that interest in exploring the food deserts keeps growing, evidenced by the 60,500 papers written on the topic of food deserts in the period December 1st, 2002 – November 30th, 2012, 94,700 publications in the period December 1st, 2012 – November 30th, 2022, and 10,700 publications during the research period December 1st 2021 – November 30th 2022.

Out of the 63 papers that were analyzed, four of them were dissertations, the rest being journal papers. The journal with the most published papers on the topic of food deserts was the International Journal of Environmental Research and Public Health, with six different papers published.

Next, research question was what were locations that were researched from the food deserts perspective. Data on locations where the food deserts are being researched allow for identifying geographical areas with potentially negative consequences of food deserts, so that they could be addressed, as well as identify areas where corrective actions were already taken and to follow their effectiveness, and ultimately identify areas where food deserts research does not exist and should be conducted. The data showed that 78.7% of all papers were written about food deserts in the US, with the rest of papers looking into food deserts in Australia, Brazil, South Korea, Italy, Canada, Mexico, Kuwait, and France. In the US, in particular, North Carolina was in focus of five different journal papers, most of which talked about the North Carolina Healthy Food Small Retailer Program (HFSRP), a program which provided up to \$25,000 in funding and equipment (coolers, freezers, etc.) to small food shops to stock healthy food and drinks (Jilcott Pitts et al., 2021).

North Carolina also saw research done on the relationship between COVID-19 and food deserts, as the pandemic highlighted the vulnerable position the food deserts communities were in even further (Liang et al., 2021). The research proposed a concept for an integrated design to examine and identify strategies needed to prepare for future natural disasters and events such as the pandemic, demonstrating how unpredictable events can hurt the wellbeing of citizens in food desert areas more than those in more food-secure communities (Liang et al., 2021).

The pandemic was a popular research topic in other parts of the world too, notably in South Korea. Research done in Seoul tried to find out how spatial accessibility of grocery stores to citizens changed during COVID-19 times (Kang & Lee, 2022). The results showed that, while grocery stores became less available during the pandemic, the restaurant industry increased its offerings despite the harsh economic conditions. This was due to a few key points, the main ones being that restaurants hoped the pandemic would end soon, they could offer takeout and delivery, unemployed citizens opened their own small restaurants, and many employees couldn't be fired as they were protected by the Labor Standards Act (Kang & Lee, 2022).

The papers were sorted based on their content into one of four topic areas – food deserts perspectives, identified by authors as a general guideline to help systematize the findings. The topic areas were: nutrition, health, methodology, and impact of measures. The topics structure is as follows: 9.8% of the papers focused on nutrition and food preferences, 24.6% on health and health issues caused by lack of proper nutrition, 37.7% on different types of methodology used in researching food deserts, and 27.9% on the impact of measures introduced to combat the phenomenon of food deserts.

Papers on the topic of nutrition, health and methodology provided some interesting insights, such as cutaneous manifestations as a result of a lack of nutrients due to a lack of access to quality food (Canakis et al., 2022), using predictive models to find potential food deserts with the help of geotagged Twitter posts related to food (Sigalo et al., 2022), and identifying potential “pharmacy deserts” - areas with a lack of available medicine, using food deserts as a base for the theory (Wisseh et al., 2021). The impact of different measures implemented to combat food deserts proved to be the most valuable for this paper, as it provided a unique outlook on what was being done to improve the quality of life for people around the globe. This topic covered everything from new and improved food delivery systems designed to improve access to groceries (Haider et al., 2022), allowing for the development of new delivery businesses, improved land management and development (Gebrehiwot et al., 2022), which relates to the growth of whole branches of the local industry, and various papers about community gardens.

Community gardens are gardens designed to bring communities together, as a place of comfort, social interactions, and a physical place for gardening meant for those who live in areas in which they are not able to garden (Brock, 2022). From an economic perspective, community gardens offered a unique insight into how people, when exposed to a lack of proper infrastructure and food supply, and given the space and authority to do so, worked to improve their own living standards.

Community gardens, in the context of food deserts, were explored as a way of combating food insecurity and establishing self-sufficiency (Cattivelli, 2022), ensuring equal access to food and the cooling benefits of plants during urban sprawl (Zhang et al., 2022), and school integrated programs with the goal of educating children and improving their vegetable intake (Davis et al., 2021).

In one of the papers, researchers looked at how urban gardens contribute to self-sufficiency of mountain municipalities, specifically in South Tyrol, Italy, which has already been at risk of becoming a food desert, prior to 2020 (Cattivelli, 2022). During the 2020 lockdown, the economic downturn and the mobility restrictions imposed by the measures at the time meant that many non-essential workers were left without assured access to groceries. Due to the previously stated reasons, typical methods used to combat food deserts, like opening new supermarkets and controlling the supply chain, were not viable (Cattivelli, 2022). Therefore, the research proposed looking into community gardens as a stable source of healthy food. Currently, community gardens contribute only around 1% to the food supply of the region, even though most municipalities produce more than is necessary for their own needs (Cattivelli, 2022). The research suggests that utilization of more agricultural land, a more systematic redistribution of groceries in the region, as well as a reduction of

food waste, all serve as a basis for further exploration of the community garden phenomenon.

Another explored topic was how community gardens impacted the citizens involved and helped them form a stronger community. Participants were interviewed about their experiences working in the gardens, and the findings suggested mental and social benefits, especially during the COVID-19 pandemic times (Brock, 2022). The study also found that in times of economic uncertainty and inflation, such as the pandemic, community gardens were an excellent source of fresh fruits and vegetables, without breaking the budget.

5. Conclusion, research limitations and recommendations for further research

The objective of this study was to learn about the scope and type of recent research carried out on the topic of food deserts, as well as tracking rising trends and the most popular topics, in order to establish direction for further research. The data shows that interest in exploring the food deserts keeps growing, evidenced by the 60,500 papers written on the topic of food deserts in the period December 1st, 2002 – November 30th, 2012, 94,700 publications in the period December 1st, 2012 – November 30th, 2022, and 10,700 publications during the research period December 1st 2021 – November 30th 2022.

Even though food deserts appeared as topics in different types of publications, the most relevant still remain journal papers and dissertations.

The first publications that explored food deserts at the end of the 20th century were focused on different parts of UK. Interestingly, none of the 63 papers analyzed in this paper were exploring the food deserts in the UK. This opens an interesting question for the future research, whether the food deserts are no longer a problem in the UK and hence should be explored for the best practices that could be employed at other locations, or the interest of researchers simply shifted to other topics. During the research period, food deserts were mostly explored in the US area, but also in Australia, Brazil, South Korea, Italy, Canada, Mexico, Kuwait, and France. This signals that an interest for exploring food deserts expands to different parts of the world, there are most likely still many unexplored areas and work should be continued, as benefits from successful interventions could be useful for many communities.

The food deserts topic in the early research from 1990s focused on food retail offerings and their impact on shopping habits and nutrition. Analysis in this paper showed that the topic of food deserts now covers many different sub-topics like general health, specific medical conditions, nutrition, methodology of research and impact of implemented measures to combat the food deserts. The highest proportion of papers dedicated to methodology of research at 37.7% suggests that this is still a young discipline and researchers are still using an aptitude of different approaches to explore the food deserts, area and consumers' characteristics, consequences and potential interventions.

This systematic literature review of food deserts publications focused only on one year period. A more detailed analysis of all publications from the first appearance of food deserts in 1980s and 1990s might provide a better insight into development of this research topic and its impact. Also, a more systematic approach to the literature review, such as using the PRISMA 2009 (Titis et al., 2021) or PRISMA 2020 protocol (Page et al., 2021) would be advisable, as it would enable a more structured content analysis of reviewed papers, as well

as more precise conclusions. This study was focused on the secondary data, while conducting a primary research might provide an additional perspective of the topic.

The most research comes from the US, so it would be interesting to explore some additional locations, as well as to review the status of food deserts in the UK. From the topics perspective, impact of food deserts can be further explored from different health conditions and nutrition. It is to expect further research aiming to create a comprehensive methodology for researching food deserts. Still, given the confirmed existence of food deserts all over the world (for example Guszak Cerovečki & Grünhagen, 2016; Kang & Lee, 2022; Wrigley, 2002), the biggest interest is expected in research aimed at identifying effective interventions in reducing negative socio-economic consequences of the food deserts. Within that, an interesting avenue for further research is the rising trend of community gardens, which is seen all over the world, not just as a hobby, a form of working out, or a project, but as a powerful tool used to combat food scarcity in areas qualified as food deserts.

References

- Ball, K., Timperio, A., & Crawford, D. (2009). Neighbourhood socioeconomic inequalities in food access and affordability. *Health & Place, 15*, 578-585.
- Beaumont, J., Lang, T., Leather, S., & Mucklow C. (1995). *Report from the Policy Sub-group to the Nutrition Task Force Low Income Project Team of the Department of Health*. Radlett, Hertfordshire: Institute of Grocery Distribution.
- Boys, K. A., Haynes-Maslow, L., McGuirt, J. T., Ammerman, A. S., Van Fleet, E. E., Johnson, N. S., Kelley, C. J., Donadio, V. E., Fleischhacker, S. E., Truesdale, K. P., Bell, R. A., & Jilcott Pitts, S. B. (2021). Perceived barriers and facilitators to participating in the North Carolina Healthy Food Small Retailer Program: A mixed-methods examination considering investment effectiveness. *Public Health Nutrition, 24*(18), 6555-6565.
- Brock, A. G. (2022). *A qualitative analysis of lived experiences of community garden participants in local food deserts*. Minneapolis, Walden University.
- Canakis, J. P., Swink, S. M., Valle, N. P., Rivers, D. A., Lim, K. M., Oberlender, S., Purcell, S., & Bartus, C. (2022). Cutaneous manifestations of nutritional deficiencies in the context of food deserts of United States. *Cureus, 14*(9).
- Cattivelli, V. (2022). The contribution of urban garden cultivation to food self-sufficiency in areas at risk of food desertification during the COVID-19 pandemic. *Land use Policy, 120*, 106215.
- Clarke, G., Eyre, H., & Guy, C. (2002). Deriving Indicators of Access to Food Retail Provision in British Cities: Studies of Cardiff, Leeds and Bradford. *Urban Studies, 39*(11), 2041–2060.
- Coveney, J., & O'Dwyer, L. A. (2009). Effects of mobility and location on food access. *Health & Place, 15*(1), 45–55.
- Cummins, S., & Macintyre, S. (1999). The location of food stores in urban areas: a case study in Glasgow, *British Food Journal, 101*(7), 545-553.
- Cummins, S., & Macintyre, S. (2002). A Systematic Study of an Urban Foodscape: The Price and Availability of Food in Greater Glasgow. *Urban Studies, 39*(11), 2115–2130.

- Dahle, H. M. (2021). Creating oases throughout America's food deserts. *Brigham Young University Law Review*, 47(1), 287.
- Davis, J. N., Pérez, A., Asigbee, F. M., Landry, M. J., Vandyousefi, S., Ghaddar, R., Hoover, A., Jeans, M., Nikah, K., Fischer, B., Pont, S. J., Richards, D., Hoelscher, D. M., & Van Den Berg, A. E. (2021). School-based gardening, cooking and nutrition intervention increased vegetable intake but did not reduce BMI: Texas sprouts - a cluster randomized controlled trial. *The International Journal of Behavioral Nutrition and Physical Activity*, 18(1), 18.
- Donkin, A. J. M., Dowler, E. A., Stevenson, S. J., & Turner, S. A. (1999). Mapping access to food at a local level, *British Food Journal*, 101(7), 554-564.
- Donkin, A. J. M., Dowler, E. A., Stevenson, S. J., & Turner, S. A. (2000). Mapping access to food in a deprived area: the development of price and availability indices. *Public Health Nutrition*, 3(1), 31-38.
- Ellaway, A., & Macintyre, S. (2000). Shopping for food in socially contrasting localities. *British Food Journal*, 102(1), 52-59.
- Gallagher, M. (2006). *Examining the impact of food deserts on public health in Chicago*. Chicago, Mari Gallagher Research and Consulting Group.
- Gallagher, M. (2007). *Examining the impact of food deserts on public health in Detroit*. Chicago, Mari Gallagher Research and Consulting Group.
- Gallagher, M. (2008). *Food desert and food balance indicator fact sheet*. Chicago, Mari Gallagher Research and Consulting Group.
- Gebrehiwot, A. A., Hashemi-Beni, L., Kurkalova, L. A., Liang, C. L., & Jha, M. K. (2022). Using ABM to study the potential of land use change for mitigation of food deserts. *Sustainability (Basel, Switzerland)*, 14(15), 9715.
- Guszak, I. (2011). *Utjecaj maloprodajne lokacije na ukupni trošak kupnje proizvoda svakodnevne potrošnje*. Zagreb, Sveučilište u Zagrebu.
- Guszak Cerovečki, I., & Grünhagen, M. (2016). "Food Deserts" in Urban Districts: Evidence from a Transitional Market and Implications for Macromarketing. *Journal of Macromarketing*, 36(3), 337-353.
- Guy, C. M., & David, G. (2004). Food retail change and growth of food deserts: A case study of Cardiff. *International Journal of Retail & Distribution Management*, 32(2), 72-88.
- Haider, Z., Hu, Y., Charkhgard, H., Himmelgreen, D., & Kwon, C. (2022). Creating grocery delivery hubs for food deserts at local convenience stores via spatial and temporal consolidation. *Socio-Economic Planning Sciences*, 82, 101301.
- Hawkes, C. (2008). Dietary Implications of Supermarket Development: A Global Perspective. *Development Policy Review*, 26(6), 657-692.
- Jilcott Pitts, S. B., Wu, Q., Truesdale, K. P., Rafferty, A. P., Haynes-Maslow, L., Boys, K. A., McGuirt, J. T., Fleischhacker, S., Johnson, N., Kaur, A. P., Bell, R. A., Ammerman, A. S., & Laska, M. N. (2021). A four-year observational study to examine the dietary impact of the North Carolina Healthy Food Small Retailer Program, 2017-2020. *The International Journal of Behavioral Nutrition and Physical Activity*, 18(1), 44-55.

- Kang, J., & Lee, S. (2022). Exploring food deserts in Seoul, South Korea during the COVID-19 pandemic (from 2019 to 2021). *Sustainability (Basel, Switzerland)*, 14(9), 5210.
- Kolata, G. (2012), *Studies Question the Pairing of Food Deserts and Obesity*, New York Times, April 17, (accessed January 22, 2023), [available at <http://policylinkcontent.s3.amazonaws.com/Food%20Deserts%20and%20Obesity%20Role%20Challenged%20-%20NYTimes.pdf>].
- Laurence, J. (1997). More Equality – Just What the Doctor Ordered. *The Independent*, June 11, (accessed January 22, 2023), [available at <https://www.independent.co.uk/news/uk/more-equality-just-what-the-doctor-ordered-1255340.html>].
- Liang, C., Kurkalova, L., Hashemi Beni, L., Mulrooney, T., Jha, M., Miao, H., & Monty, G. (2021). Introducing an innovative design to examine human-environment dynamics of food deserts responding to COVID-19. *Journal of Agriculture, Food Systems, and Community Development*, 10(2), 1-11.
- Morton, L. W. et al. (2005). Solving the problem of Iowa food deserts: Food insecurity and civic structure. *Rural Sociology*, 70(1), 94-112.
- Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C.D., Shamseer, L., Tetzlaff, J. M., & Moher D. (2021) Updating guidance for reporting systematic reviews: development of the PRISMA 2020 statement. *Journal of Clinical Epidemiology* 2021.
- RIT Wallace Library (2023), RIT Croatia Guide to the RIT Library: Welcome! (accessed January 22, 2023), [available at <https://infoguides.rit.edu/croatia>].
- Shaw, H. J. (2006). Food deserts: towards the development of a classification. *Geografiska Annaler: Series B, Human Geography*, 88(2), 231–247.
- Short, A., Guthman, J., & Raskin, S. (2007). Food Deserts, Oases, or Mirages? *Journal of Planning Education and Research*, 26(3), 352–364.
- Sigalo, N., St Jean, B., & Frias-Martinez, V. (2022). Using social media to predict food deserts in the United States: Infodemiology study of Tweets. *JMIR Public Health and Surveillance*, 8(7).
- Smoyer-Tomic, K. E., Spence, J. C., & Amrhein, C. (2006). Food Deserts in the Prairies? Supermarket Accessibility and Neighborhood Need in Edmonton, Canada. *The Professional Geographer*, 58(3), 307–326.
- Solomon, M. R. (2011). *Consumer Behavior: Buying, Having, and Being* (10th ed.). Pearson College Div.
- Sooman, A., Macintyre, S., & Anderson, A. (1993). Scotland's health - a more difficult challenge for some? The price and availability of healthy foods in socially contrasting localities in the west of Scotland. *Health Bulletin*, 51(5), 276–284.
- Swafford, M., Sisk, C., Branson, J., Paradis, A., Dale, K. R., Fritts, A., & Boyer, S. C. (2021). Addressing food insecurity in food deserts for children through container gardening. *Journal of Family and Consumer Sciences*, 113(4), 16-22.

- Titus, E., Procter, R., & Walasek, L. (2021). Assessing physical access to healthy food across United Kingdom: A systematic review of measures and findings. *Obesity Science and Practice*, 8, 233-246.
- Wolff, G., Slaven, J., Colbert, J., Andres, U., Cook-Mills, J., & Kloepper, K. (2022). Food Deserts and Lung Function During Early Life. *Journal of Allergy and Clinical Immunology*, 149(2), AB84.
- Wrigley, N. (2002). 'Food deserts' in British cities: Policy context and research priorities. *Urban Studies*, 39(11), 2029-2040.
- Wrigley, N., Warm, D., Margetts, B., & Whelan, A. (2002). Assessing the Impact of Improved Retail Access on Diet in a "Food Desert": A Preliminary Report. *Urban Studies*, 39(11), 2061-2082.
- Zhang, Y., Smith, J. P., Tong, D., & Turner II, B. L. (2022). Optimizing the co-benefits of food desert and urban heat mitigation through community garden planning. *Landscape and Urban Planning*, 226, 104488.