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Food Deserts Debunked and Decentered: From Deficit to Relational Mapping for Food Justice in Worcester, MA

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ABSTRACT

The mapping of food deserts has become a standardized component of food and health policy work concerned with expanding food access. These maps often follow a similar format of spatially identifying where grocery stores are absent in communities, thus suggesting a straightforward problem diagnosis and intervention blueprint. This paper questions the over-emphasis among many food and health policy practitioners on these technically engineered policy stories, specifically for their obstruction of histories of white supremacy and capitalism within the US food system and urban landscapes. A mixed-methods approach is applied to a case study of Worcester, MA which appropriates GIS to ask different food access questions informed by the history and social context in which food systems exists and the work of local community development and food access practitioners. Centering a critical examination of social relations and power dynamics by challenging notions of which actors matter, what factors shape food access, and the relevance of certain interventions can reveal a robust pathway towards community food autonomy.

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INTRODUCTION

The origin story of Geographic Information Systems (GIS) and their utility in socio-spatial analysis is often traced back to John Snow's 1845 map of the London cholera outbreak. In their piece *The Map as Intent: Variations on the Theme of John Snow*, Koch (2006) details how this map and its history is emblematic of a sentiment perpetuated today that "map-making is a science that, without further research, can solve complex problems with nothing more than the possibility of a simple spatial correlation" (ibid., 13). GIS technology as a modern map-making tool can produce easily legible visuals and identify patterns in large and small corners of space. When it is used to tell stories about space, specifically in the interests of diagnosing social problems, the results can often divert attention from the most seriously needed courses of action, prioritizing visual and political convenience of narratives over authenticity or a mapping process embedded among other methods (Guthman 2011, 70–71).

Food deserts, or areas supposedly lacking access to healthy foods via grocery stores, have emerged as a policy concept and spatial phenomena showing what happens when these concerns that Guthman and Koch raise play out in a power-laden context. The injustices that have shaped, constrained, and distorted the US food system call for systemic change, however food desert maps and the policies they inform have not inspired collective confidence and enthusiasm (Hope Alkon and Figueroa 2017). Instead, many activists, food desert residents, researchers, and practitioners continually call the idea of food deserts and the prominence it is given to shape and inform political action into question (Brones 2018).

This paper will delve into the gap between GIS depictions of food access and the calls and priorities of food justice scholars and activists to understand why food desert mapping has gone wrong using a case study of Worcester, MA. It will then seek to re-appropriate GIS to

better depict the drivers of food injustice and transformative solutions which resonate with a food justice agenda at the city-level. Through a mixed-methods analysis combining information gathered from stakeholders through interviewing and the production of alternative GIS visualizations, it will analyze how the employment of GIS can be rethought to be more resonant and potent in advancing the food justice movement's agenda.

LITERATURE REVIEW

Positionality and Doing Science

Knowledge production does not occur in a subjectivity vacuum, rather it is created by and among certain people, in certain contexts, and in the interest of certain agendas. Specifically, in the case of science and its associated tools and technologies, the combination of the knowledge of particular people mobilized with tools that connote power can advance the potentially unchecked and unbalanced agendas and interests of certain people under a guise of enlightenment (Harding 1986). Asserting one's assessments, measurements, recommendations on social patterns necessarily grounds these ideas in particular partial perspectives of the world and how it does and should work (hooks 2000).

This orientation is needed to understand the political and layered work of two spheres of knowledge and practice with which this paper will engage: that of the broad spectrum of food politics, especially efforts on food security and food justice, and that of geographic information systems (GIS), mapping, and other ways of representing space. The deficit framework through which conversations and cartographies of food access are often filtered, especially those focused on food deserts, obscures structural injustice with a deficit framework which acts to constrain

political visions of a more equitable and fair food system. Using an alternative framework to illuminate the uneven power relationships, especially those manifesting within cities through land control, which have produced the current food system is therefore critically needed in food access mapping and in the broad work required to enact systemic food justice.

Food can be seen and experienced as a microcosm of practical, positive, and problematic realities and patterns tied to the way society is organized in certain configurations based on, for example, geography, economics, race, coloniality, ecology, culture, and religion. Patterns of domination, oppression, resistance, and survival related to food systems have not materialized abstractly – they have been created by people who made intentional choices about how to relate to others through food (Figueroa 2015). Therefore, different activists, scholars, and practitioners seeking food-related justice use positionality as a key orientation for their work and use it in certain ways when this work engages people across lines of racial and class difference. Black farmer activist Leah Penniman as well as Karen Washington asks us to consider where we see our ancestors in histories of food injustice and how this informs our present (Groundswell Center 2018; Brones 2018). Others, such as scholars Guthman (2008) and Alkon and Figueroa (2017, 207–10), make space to identify how whiteness constrains the visions and potency of food politics. When food, which is intimately political, is up for examination and contestation, the power-laden experiences that inform the knowledge of those asserting themselves as experts has real implications for the collective narrative that results.

Maps and their associated technologies have a similarly power-laden history and present, with the ability to convey broad generalizations and narratives about spaces in a technical and authoritative language. These agendas and objectives of those creating and using maps come to be embodied in the technologies themselves (Harley 1992). As these problematic assumptions

and associations become more and more rooted, they are normalized and thus obscured by the objectivity awarded to knowledge produced with supposed scientific rigor and exactness. Where cartographers and GIS users misconstruct the grounded reality they claim to depict, the intervention or basic consideration of the voices of non-experts can push beyond identifying "only bad science as the problem", to additionally politicize mapping as a practice and institution, questioning the implications of "science-as-usual" (Harding 1986, 25). The emergence of the practice of Critical GIS therefore marks the academic turn towards thinking deeply about the stories being told and not being told with GIS and cartography and what the implications were for the mappers and the mapped (Schuurman 2000). As feminist and others thinking and acting from the margins point out, there is clear power in both using GIS and cartographies in their mainstream forms, as well as appropriating them to tell counter-stories (Harley 1992, 7–8).

Systems and histories around food and mapping have both been socially designed and manipulated to be life-giving and life-taking. In dealing both with issues of food-based oppression and the employment of GIS to narrate and counter-narrate issues, starting from a place of positionality awareness opens spaces of creative potential for accountability and liberation.

Food Deserts and Deficits

Why food deserts? Mapping a Formula for Food Security

The relevance of positionality emerges through observing the range of approaches taken to understand and address food inaccess and the political commitments implied in each. Within the spectrum of food politics, actors mobilizing around the frameworks of food security and food

justice and sovereignty have stories that are not mutually exclusive. They do, however, call on systemic injustices to different extents to understand how history has shaped present imbalances, and which leads to different problematizations, cartographic depictions, and motivations to challenge food access along different trajectories.

Food security broadly is "a state in which all people have access to sufficient food and nutrition" (Havens and Roman Alcalá 2016). The top priority of the food security framework is to ensure that all people have enough food to sustain themselves, without regard to of what this food consists, where and how it is grown, who grows it, how these people access this food, and its cultural relevance (Holt-Giménez 2010, 3). From this perspective, food is a "nutritional commodity," invoking the need for it and its consumers to be scientifically governed and managed (Mares and Peña 2011, 203). To achieve this vision, only some technical fixes are needed to redistribute food more effectively and fill in some reoccurring but manageable gaps in food access (Holt-Giménez 2010, 3).

When specific geographies are attached to these food security gaps, the result is swaths of urban and rural communities deemed "food deserts." This phrase, which a public housing resident in the UK first offered up in the 1990s, has caught significant traction in the US over the last decades as a conveniently packaged public health policy concept (Walker, Keane, and Burke 2010, 876; Cummins and Macintyre 2002, 436; Short, Guthman, and Raskin 2007, 353). For the nine percent of US Americans determined to live in these low-income neighborhoods more than one mile away from a supermarket, the problem and solution is set up to be as easy inserting grocery stores into landscapes where they did not exist previously (Bell et al. 2013, 6; Guthman 2011, 66). This approach does not have to interrogate the deeper meaning of the absence of supermarkets in certain places or see beyond a universalized understanding of what kinds of food

people need and how they acquire them. Its simplicity and straightforwardness has attracted

concrete public investment dollars for state and federal efforts and has been elevated by scholars

and practitioners alike (American Civil Liberties Union and New York Law School Racial

Justice Project 2012, 29–30; Larsen and Gilliland 2008, 13–14; Olendzki et al. 2015, 7).

As a spatial phenomenon with suggested solutions rooted in the built environment, food

deserts lend well to cartographic visualizations. GIS technologies, which emerged in the 1990s,

like the food desert concept itself, have been elevated as a primary tool for identifying and

intervening in these supposedly deprived landscapes (Shannon 2014, 255; De Master and

Daniels 2019, 2–4). These maps from policy and academic literature often follow a similar

template, relying on both supermarket distribution as a predictor of food access, and census or

polygon-like geometries as a canvas (Olendzki et al. 2015, 4; Larsen and Gilliland 2008;

Guthman 2011, 75; Sperling 2012, 220). The USDA's Food Desert Atlas is a notably

comprehensive example, identifying low-income and low supermarket access census tracts as

food deserts, represented as colored polygons, through an online interactive map of the entire US

(USDA 2017).

This technical, formulaic, and homogenizing food security-based approach to addressing

food inaccess has held resonance and shaped action on food access for nearly 30 years. However,

by centrally problematizing poor neighborhoods and neighborhoods of color while pushing

examination of systemic oppression to the periphery, the concept and its deployment has been

deeply contested. While possibly offering one piece of a dynamic picture of food access, the

term food desert and all it has come to mean perhaps should be seen as less of a diagnosis, and

more of a prompt to examine the agendas and commitments of those who employ it.

Interrogating Othering in Food Security

The embrace of the food desert concept by public health researchers and planners, media outlets, and other sectors of the food movement has been in parallel to a sharp rejection of the label by activists, scholars, thinkers, and "food desert" residents. While the validity of food deserts as an informative food access metric within technical policy discussions is questioned and debated, this does not seem to impede the term's power and salience (Bell et al. 2013; Cummins and Macintyre 2002; Short, Guthman, and Raskin 2007). At the crux of the work of those who legitimize the term and those who see it as delegitimizing to their food experiences and histories is the use of a deficit framework to contain the operation of the problem as solely in "food desert" neighborhoods (Hope Alkon and Figueroa 2017, 207). Relying on this superficial approach to navigate food inaccess allows for the fragmentation of the processes by which food injustice comes to exist and the spaces in which it occurs to obstruct its deeper roots and solutions.

The deficit approach from which food security and food deserts specifically are built carefully confines and restricts holistic thinking about what drives food inaccess and what might end this type of marginalization. While food desert research might acknowledge that "residents of predominantly African-American neighborhoods in Chicago have to travel the farthest distance to get to a grocery store as compared to white or even racially diverse neighborhoods," it does not generally seek to address why this is so (American Civil Liberties Union and New York Law School Racial Justice Project 2012, 6). By positioning "corporate commerce as a solution to a social problem," "availability and proximity" become actionable while "affordability and need" become afterthoughts (Hope Alkon and Figueroa 2017, 208; Guthman 2011, 69). When these patterns are mapped in constellations of points and polygons which serve

as fragmented containers for homogenous spatial experiences, the solution, for example, of building more grocery stores, makes sense, because it is clean and mechanistically consistent (Shelton 2018, 5; Payne 2017, 2).

How must thinking shift, however, when technocrats and others calling for food desert-informed interventions are held accountable to more than some new artwork on their latest census block canvas? What changes when these practitioners operating through political convenience and self-innocence must see themselves in relation with, rather than as other to, the people and places food deserts imply? For Black food and farming activist Karen Washington, "food deserts" is an "outsider term" because it is ignorant to the food resources and provisioning practices of her and her neighbors who reside in a so determined food desert (Brones 2018). Washington makes tangible the force of a label when used by the subject to separate, fragment, and other itself from the object up for debate, and how this process becomes one of intentional obstruction of their own positionality when suggesting a deficit in the object (Chilisa 2012, 14). In other words, the food desert label makes it easy for practitioners who have a role in perpetuating the unjust systems which drive food inaccess, what Washington and others term "food apartheid," such as white supremacy and capitalism, to ignore this as they go about their work and lives (Holt-Giménez and Harper 2016, 4; Mares and Peña 2011, 197–98; Guthman 2008, 443; Brones 2018). The silences in their rhetoric are made concrete by the maps they employ and create to elevate their claims and literally contain blame, in no way implicating communities or historical forces which have driven and continue to make resilient factors underpinning food inaccess (Harley 1992, 14; DeFilippis 2013).

The ease with which the food security agenda is adopted in mainstream food and health research, policy, and mapping speak to its shallow politics. That is to say that contributions to

food access are being made through the food security agenda, but with significant limitations

rooted in its narrow and sterile depiction of the food system, space, and people's food needs

(ibid., 443). Countless bridges have been built to overcome the limitations of food security's

deficit perspective, particularly by those actively marginalized and oppressed by the US food

system. However, crossing them calls distant practitioners to move beyond technocratic and

charity-oriented approaches to begin questioning their own authority and the food visions to

which they commit their tools.

Relational Alternatives to Mapping Food Access

Bringing the positionality of food security and food justice practitioners into focus invites

a politicization of otherwise technical work complicit in the power relations driving food

injustice. In realizing that different people and practitioners have different experiences and

investments they bring to the work they do and the types of stories they convey, it is important to

think about who is making these maps, how they know about complications of food access, and

the patterns that emerge in their analysis. In the case of deficit-based food desert mapping as the

main cartographic depiction of food access, an alternative approach which illuminates the

relationship of "food deserts" to non-"food deserts" and the critical role of land control can better

instigate food justice, rather than food security-based, conversations and interventions.

Seeing Food Access Relationally

Food justice views inaccess to food as more than a result of the occurrence of unfortunate

demographic factors and spatial arrangements. Instead, this framework sees these demographic

factors, like race and class, as key to the decisions made by political, real estate, food industry

and other leaders in other sectors to intentionally build up the mainstream food system in certain places and not in others. This perspective is about recognizing the historical and ongoing production of various, and in this study particularly urban, landscapes and who controlled this process with what motives (Holt-Giménez 2010, 3). Racial capitalism understands that capitalism is a process of profiting from devalued spaces, and that this differentiation and extraction which elevates and protects European peoples has and continues to extend into the embodied experience of people and communities (Pulido 2017, 527). With these systems working cooperatively, their effect to construct racially segregated cities was propelled by the state in the early 20th century with the United States Supreme Court *Buckley v.* Corrigan case and later subsidization of suburban homes for white families with the New Deal (American Civil Liberties Union and New York Law School Racial Justice Project 2012, 15–16). The basis for the occurrence and persistence of space-based food inaccess, therefore, is the persistence of capitalism and white supremacy, and discourses of food justice that do not have these realities as their origin point should be questioned for their ability to see these roots as negligible.

Therefore, in a food system that "is unjust and unsustainable but… not broken", people and social processes must be centered in analyzing the perpetuation and implications of food injustice (Holt-Giménez and Harper 2016, 3; Figueroa 2015, 499). Thinking about food access in spatial terms which do not, as food desert mapping does, simply rely on spatialized deficit identification, points to geographic relational poverty studies. As Elwood et al. (2017, 749) describe, this perspective reverses "the usual lenses of inquiry to focus on the role of the non-poor, powerful institutions and/or technocrats in producing poverty," and sees space with deep histories which engender future trajectories. With these insights, the illumination, rather than the

obstruction, of race- and economic-based power relations can anchor cartographic storytelling on food access.

Alternative GIS Approach

In order to appropriate the power of maps to embolden this call for food justice, an alternative mapping approach is needed which is based in thinking about how people can more equitably relate to food as well as to each other. Expressing these ideas in cartographic form is possible thanks to the development of Critical GIS scholarship which can help us understand how mainstream mapmaking practices produce maps that are tied up in the problematic social relations that require critique from critical academics and activists (Mares and Peña 2011; De Master and Daniels 2019). In order to map food justice in a way that is relevant to the framework's agenda, a Critical GIS practice should be built on reflections of land use, ownership, and control, and should also reorient to see space as a site of social relations where social reality is produced and networks are woven.

In colonial and recent histories, maps have been key to the control of land while the control of land has been key to the control and self-determination of food. Thus, when considering the establishment of a Critical GIS approach to food justice, addressing the centrality of land to food justice is a critical dimension. In a social context, "land is thoroughly saturated with racism," and has been central to the project of white supremacy through both "appropriation" of native lands and restrictive rules of "access" (Pulido 2017, 528). This appropriative aspect in the context of mapping can even be extended to consider the use of western maps and techniques in non-western countries as they marginalize the spatial knowledge of indigenous peoples and instigate counter-mapping, such as the process Peluso (1995, 385–88)

documents in Indonesia. Mapping food justice from a critical standpoint requires engagement with questions of who owns, has territorialized, and/or is contesting the land under question, how are they politically engaging with and relating to it, and whose interests their interventions will serve. This first component of a Critical GIS-based approach to food justice does not necessarily present an alternative technical approach, but instead calls for reflection and intentionality on the significance of maps as a tool of domination or contestation in the food histories of different communities.

A second dimension to mapping food justice via Critical GIS practices centers approaching space as social relations and as social process. In recognizing how space is a human-constructed and human-interpreted entity, the power dynamics that are imbedded in social processes can emerge in food justice GIS analysis. Most importantly, the human networks and processes that occur in space and as space must ground a sense of thinking about space as interconnected and not isolated fragments. This sentiment is in rejection of the walled-off polygons which characterize the mainstream approach used to map food deserts of inaccessibility. Particularly relevant to urban food desert mapping, thinking of territorial units like neighborhoods, which dominate "contemporary social scientific literature around neighborhood effects and opportunity, as naturalistic, depoliticized, ahistorical, and functionalist," leads only to literal and figurative superficial conclusions (Payne 2017). By approaching space as "an active moment within sociospatial process, or as a splintered geometry shot through with power and meaning-making practices," different questions can emerge about the trajectory of space and its actors (Bergmann and O'Sullivan 2018, 8). Since mapping generally and food justice mapping especially relates to uncovering relationships, questioning

traditional spatial assumptions and separations can ensure GIS users are not limiting their creative imagination.

To bring a central focus on space as relational even further, mappers should seek out ways to demonstrate the power relations that are at work with the process they are spatially representing. For example Shelton (2018) and his piece examining racially concentrated areas of poverty as co-produced with areas of racially concentrated affluence in Lexington, KY through a critically-informed GIS analysis provides an illuminating model to demonstrate the fluid processes that guide uneven development. Henderson's (2006) study looks into transportation planning debates in Atlanta, GA using the concept of "secessionist automobility" to examine how racism and anti-urbanism function with automobility to enable metropolitan-area segregation. In both of these approaches, power dynamics and the actors which exploit them unjustly are centered to inform decision making and interventions in ways that, instead of technocratically managing or saving marginalized communities, promote accountability for those actively perpetuating marginalization.

METHODOLOGY

Methodological Approach

In order to explore how maps can be an elevating vehicle for food justice efforts, this paper will use Worcester as a case study to understand how alternative food access cartographies might be built to tell different stories. As this research seeks to answer questions about people's motivations, collective decisions, and the trajectories of localized politics, a case study is well

suited to intimately track and dissect these concentrated social processes (Yin 1989, 18). In

particular, a mixed-methods approach will be used to holistically capture and analyze the active

work and possibilities around food access theorization and interventions. Following the call of

Figueroa (2015, 500) for a "people-centered approach" in food systems and access research, this

study will pursue a dual qualitative and quantitative analytical process. Stakeholder interviews

will capture the different work of food access practitioners in the city, while GIS will be used to

model alternative means of mapping a path to food access beyond food deserts.

Interviews were conducted first with a total of six different individuals around the city

working on or towards some aspect of food access. Some of these practitioners are working

directly with the food system, while others focus on tangential topics of economic development,

health, or housing. A pool of interviewees which represent a broad spectrum of work, from urban

farming to youth development to local policy, was intentionally chosen to gauge the political

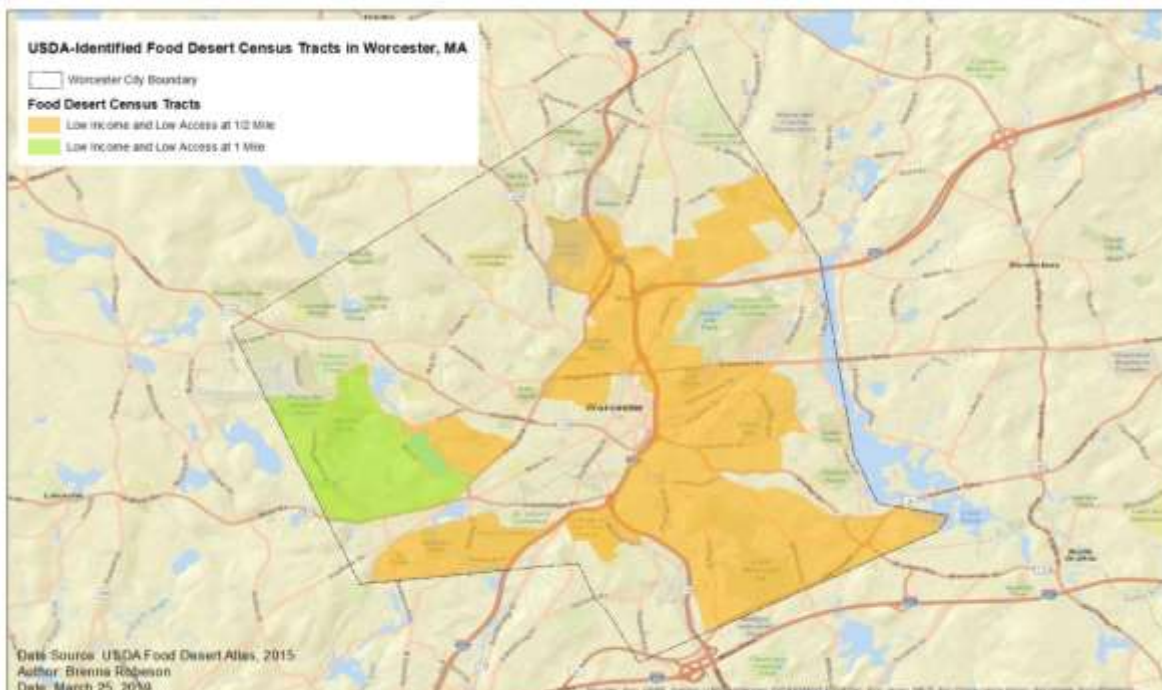discourse in different food access spaces (Fujii 2017, 38).

Figure 1. USDA-Identified Food Desert Census Tracts

These one-on-one, semi-structured and often conversational interviews focused on the role and relationship of the interviewee and their organization to Worcester's food system. While questions regarding practitioners' work were more specialized, interviews were standardized by discussion of a version of the USDA's Food Desert Atlas map, which appeared in a Worcester Community Health Assessment report in 2015 (Central MA Regional Public Health Alliance 2015). Working from a print replica of the map (Figure 1), interviewees shared their reactions to the document and its conceptual and factual accuracy as well as thoughts on what types of political action and policies it might support. The feedback and overall perspectives shared in these meetings helped to establish a contextual understanding of the needs, biases, and vision of food access practitioners and the relationship mapping, however technical or distant, has to their work.

Along with stakeholder interviews, the second component of my analytical process involved using GIS to conceptualize and produce alternative cartographic approaches to advance food access work. A review of scholarly, activist, and policy-oriented literature and resources as well as reflection on the dynamics of the case study helped to envision different paths of communicating the intricacies of city-level social and spatial dynamics relevant to food justice.

Data on features of Worcester's demographic, built environment, and food access landscapes were collected from the City of Worcester, the USDA, and MassGIS. Important data layers included MassGIS's 2010 U.S. Census Environmental Justice Populations, which identifies census block groups across the state of Massachusetts with high representation of residents of color, low-income households, and households with low English proficiency ("MassGIS Data: 2010 U.S. Census Environmental Justice Populations" 2012). The USDA's

Food Access Research Atlas was also used as a conventional measure of food desert

cartography. This dataset uses two criteria to label certain census tracts as food deserts – those

with low "supermarket accessibility," which measures proximity of residents to a grocery store,

and low income levels. The two specific variables relied on in this analysis to define the

boundaries of the city's food deserts are "Low income and low access measured at ½ mile and 10

miles" and "Low income and low access measured at 1 mile and 10 miles" ("USDA Economic

Research Service" 2017). Additional data came directly from the City of Worcester and include

spatial data on building and driveway footprints across the city. Spatial property parcel data was

also accessed with a detailed property database which was used to extract property ownership

information at a large scale.

GIS analysis was conducted in R using mainly the tidyverse, sf, ggplot2, and ggmap

packages to produce a total of three maps showing the deeper and wider processes shaping food

access. First, using the Environmental Justice Populations data, which identifies where

marginalized communities reside in Worcester, a map displaying the inverse information for

each of the three criteria was produced. All three maps produced in this analysis are choropleth

maps, or a map where the area of study is broken into certain spatial units and each unit's values

for a certain variable are expressed with a certain color palette. The first map output shows the

spatial locations of communities which are predominantly white, of middle and higher incomes,

and have high English proficiency. A second map was made to explore two interactive

dimensions of automobility infrastructure – highway systems and driveway footprints. A ratio of

the aggregated area of driveway footprints to the area of building footprints was calculated per

census block group to understand the spatial patterns of where car ownership was well

accommodated in the built environment. To explore the relationship of this factor with other

components of the city's automobility infrastructure, following Koch's (2006, 7) reflections on the importance of building multi-dimensional ecologies into maps, the location of highways is included in this choropleth display of the calculated ratio by block group.

The last map explores food desert property ownership relations following a method developed by Shelton (Shelton 2018, 10–11). First, census tracts considered low income and low access at the half mile or mile based on USDA-defined food desert criteria, were used to select within food deserts, census block groups where all three Environmental Justice criteria compounded. This process was mirrored in non-food desert areas of the city related to the Environmental Injustice Criteria created in the first map. From there, property parcels and their database records inside the selected food desert census block groups were identified, and the addresses of each property's listed owner geocoded. Properties which were owned by an individual with a mailing address in the selection of census block groups within non-food desert areas were selected and mapped to understand cross-community land ownership dynamics. The results of both of these phases of the research process, in dialogue with each other, are then used to understand the deeper realities of how food injustice persists in Worcester, where systems of power are obstructing the problem and solutions, and how to elevate a transformative course of action.

Case Overview

This paper will use Worcester, MA as a case study for analyzing the meaning of using food deserts to inform local city policy priorities and how the underlying issues posed by food inaccess might be better addressed. Worcester is the second-largest city in New England and is classified as a Massachusetts Gateway City for its post-industrial economy, high proportion of

immigrant families, and smaller professionalized workforce ("About the Gateway Cities" n.d.). It is also a city where the food desert narrative has been mobilized in public health studies and policy recommendations. The 2015 Community Health Assessment, a community-level research study sponsored by major healthcare providers and the city's Department of Public Health, uses food deserts prominently in their analysis of food access in Worcester (Central MA Regional Public Health Alliance 2015, 39). The 2018 version of the study again emphasizes food deserts – this time called "Grocery Gaps" to coordinate with a new grant program run by the Massachusetts Public Health Association – but contextualizes them more comprehensively among other factors (Central MA Regional Public Health Alliance 2018, 53–57). While the work of different food-oriented organizations in the city, such as the Worcester Food Policy Council, Black Seed Farmers Market, and the Regional Environmental Council, show a more socially holistic grounding to their efforts, it is unclear whether or not this trajectory will be embraced in local research and policy.

Of course, as this paper will explore, the food system is about more than policies, organizations, and people who talk about food. Worcester as a whole is currently undergoing a major wave of economic development activity, upping the stakes for decision making which will have implications in the lives of residents for decades to come. The type of economic development the city is pursuing is continually questioned as exclusionary and narrowly downtown focused. Characterized by the construction of multiple high-end apartment buildings, coordination among large businesses and institutional actors to exert a spatial downtown presence, and the construction of a massive parking garage, there is clear coordination to define downtown Worcester as a "creative class" hub (BSC Group and L.J. Boudreau Associates 2016). This is in the context of a demonstrated and worsening housing need among residents, where

median monthly rents in 2018 have increased by 16 percent among currently available apartments, even as city leaders assert their confidence that they are adequately addressing the situation (Hibbett 2019; Thompson 2019). Therefore, in a context where there is a demonstrated an investment in using food deserts to frame food access issues, and in a highly charged and dynamic time of economic decision making and change with equity and justice consequences, this study will investigate the implications and importance of deeply informed mapping for food justice.

ANALYSIS

Food desert mapping is insufficient and irresponsible because it leaves the role of racial capitalism in the continued production of uneven food landscapes unaddressed. Talking to food access and justice practitioners and appropriating GIS to interrogate social power relations and track urban land control can produce alternative maps grounded in food justice principles. These alternative cartographies can de-obstruct, procedurally and tangibly, the oppressive power dynamics enforced through conventional mapping and assert transformative spatial depictions which can hold political interventions (and interveners) accountable to principles of food justice.

Which actors matter?

The environmental justice movement, in ways similar to movements for food justice, emerged to assert a more power-informed agenda alongside the environmental movement developing in the 1960s. The emphasis on exploring, conserving, and appreciating the wilderness made the movement most targeted towards white, middle-class US Americans, who apparently

cared about the well-being of all aspects of nature aside from that of their fellow humans (Taylor

2000, 556–58). In 1991, the First National People of Color Environmental Leadership Summit

convened to draft the Principles of Environmental Justice. These principles established a vision

detailing how society should be organized to provide a collective quality of life for all living

things and especially to uphold the rights of people of color to live free from environmental

burdens (Mares and Peña 2011, 202; "17 Principles of Environmental Justice" 2007). In response

to the exclusivity and narrow commitments of the environmental movement, the environmental

justice framework and movement provided a orienation through which to look beyond the

indifference of environmentalists' white, elitist leadership.

In 1994, an executive order responding to the threat that environmental injustices pose to

low income communities and communities of color was filed by the Clinton Administration.

This has since resulted in the creation of federal, state, and local policies and agencies charged

with monitoring environmental and pollution-based discrimination to varying degrees

("Objectives of Environmental Justice" 2019). In Massachusetts, this responsibility falls on the

Executive Office of Energy and Environmental Affairs, who has produced GIS data related to

their office's policy agenda ("MassGIS Data: 2010 U.S. Census Environmental Justice

Populations" 2012). An examination of this datafile shows that the operationalization of needing

to provide tools to promote "environmental justice" takes the form of a geographic data file

which identifies census block groups susceptible to discrimination based on certain demographic

criteria. The exact statistical standards used to define these categories include the proportion of

the population identified as a minority being equal to or greater than 25 percent, a median

household income of the block group which is less than or equal to the 2010 state median income

of $62,133, and 25 percent or more of all households being identified as English language-isolated ("MassGIS Data: 2010 U.S. Census Environmental Justice Populations" 2012).

Without canceling out the benefits of an accessible geographic data resource like this, the assumptions implied in this tool's creation raises critical contradictions to be considered. This is in particular reference to the way this framing suggests which actors are deemed relevant and within he intended scope of an analysis of something as charged with abuses of power as is environmental justice. Of course, in the conventional set of spatial data resources available for mapping food access, the same organization of the problem and corresponding data design can be seen. The tools available define an area of impact and vulnerability, such as food deserts, and some additional complimentary metrics on the side which can help quantify and define the scope and extent of the present or potential disturbance. How though, can environmental and food justice be advanced, if these tools are only mechanistic and technocratic and not power dynamic-aware as are the moments from which they emerged?

The Principles of Environmental Justice from 1991 are in clear response to the politics of a U.S. society which are settler colonialist, capitalist, undemocratic, white supremacist, and exploitative of natural resources ("17 Principles of Environmental Justice" 2007). When a data tool created to promote environmental justice seeks to invisibilize, in the exact same fashion as the environmentalist movement of the late 20th century, the power of middle- and upper-class white people in fueling these injustices, the misappropriation demands explanation. In fact, a clarifying take on this contradiction provided by Pulido (2017) contends that exact state initiatives such as this which seek to provide channels for environmental justice continually fail because of the state's investment in maintaining racial capitalism (ibid., 525–26).

This insight from Pulido on the centrality of racial capitalism to projects of

environmental and, along similar lines, food injustice is a reality check on the potential of these

advocacy tools as they are prescribed. It can also inspire thinking on how a dataset such as this

might be reimagined with the power to reveal racial capitalist power dynamics it intentionally

obscures. The first alternative spatial depiction presented in this paper seizes on the previously

described MassGIS Environmental Justice Populations to fashion and visualize Worcester's

"Environmental Injustice Populations" (Figure 1). Mapping environmental injustice where it

truly starts emphasizes social relations across different communities versus a deficit in one over

the other (Elwood, Lawson, and Sheppard 2017, 758). Therefore, along with a plotting of the

original "Environmental Justice Populations," this intervention follows this given map's

cartographic clues, particularly its empty spaces, further upstream to reveal the spatial locations

of those who, lest they be held accountable, are more conveniently forgotten by the

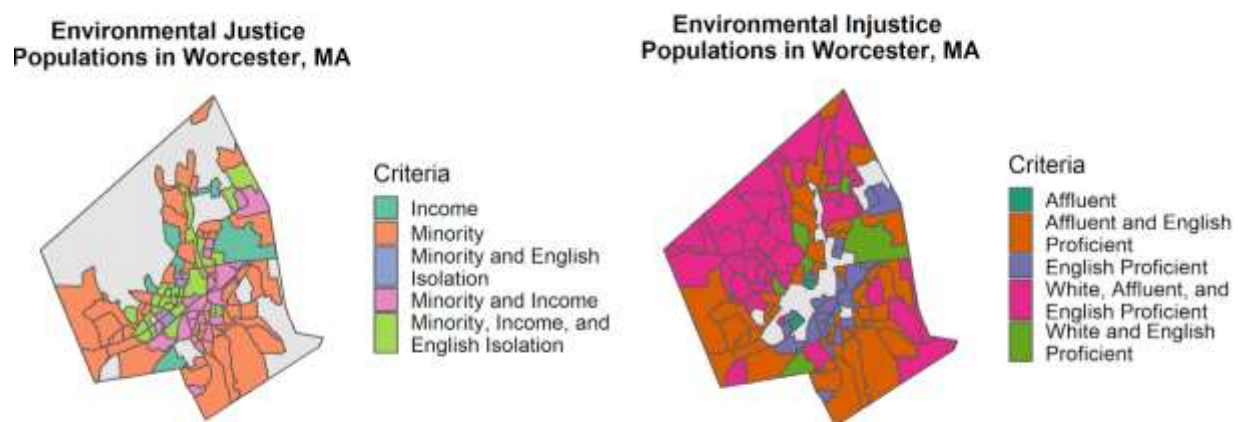environmental justice movement.

Figure 2. Environmental Injustice Populations

The result is a choropleth map which can more comprehensively understand the spatial

relations of environmental oppression. Analyzing the output shows how census block groups

which can be classified, based on the inverse labels of the Environmental Justice layer, as predominantly white, English proficient, and of stable to high incomes, dominate the upper western half of the city. These block groups, along with those who demonstrate affluence and English proficiency or a predominantly White and English proficient population line the border of nearly the entire city, enforcing a strong pattern of clustering of like-colored block groups. The number of block groups identified in each category show that only in two instances was a block group considered Affluent without also being labeled as English Proficient (46 block groups) or White, Affluent, and English Proficient (43 block groups). The patterns in this map reveal trends identified across urban landscapes which have been researched and thought over at length (Painter 2011, 359–73; American Civil Liberties Union and New York Law School Racial Justice Project 2012, 19–23). Rather, these depiction ensures that a balanced story can be pursued of how certain people used the power they had to leave lasting legacies of segregation, which continue to be actively maintained today, on cities across the US.

Through flipping the script on this Environmental Justice Populations dataset, the undertones of this alternative perspective speak more directly to what it will take and what has already been done to challenge environmental and food injustice among interviewed practitioners. While all interviewees were looking and working to different extents to challenge the food system's imbalances or related structural issues, a few interviewees in particular in reviewing the food desert map were caught up in debating the spatial accuracy of the map (Interview with food access practitioner #2 2019; Interview with food access practitioner #6 2019). While of course it is important to assess the gap between a map and the ground truth it depicts, especially a previously unfamiliar document, the way the food security framework establishes a narrow "politics of the possible" felt especially present in these conversations

(Guthman 2008, 442). When the centralized actor is not one that "makes sense" within an impact-response practitioner setting, it can reframe the conversation from square one to both assess accuracy and validity in a larger context of questioning where power flows through these equations.

This alternative map also moves away from suggesting a passive posture of communities most often targeted by environmental injustices. Activism, advocacy, and scholarship, from prominent cultural examples to practitioners in Worcester, are cultivating an active, holistic, forward-leaning and future-focused resistance against food apartheid they see in their communities (Interview with food access practitioner #1 2019; Interview with food access practitioner #3 2019; Brones 2018). Pushing the narrative of who is implicated in situations of food injustice literally and rhetorically into more places of the city brings critical facets of the issue out of the shadows to more fully illuminate how more equitable relationships for all people to and through food can be made real.

How is food access and inaccess conceptualized?

The core assumption at the heart of the concept of food deserts is that proximity to a grocery store translates to access to food. Where proximity does not exist, perhaps vehicle access may facilitate mobility which then, by definition, would result in literal food access as the USDA suggests in one version of their food desert maps (USDA 2017). Car ownership therefore is an extended piece of the supply-side solution that is packaged with the food desert concept (Guthman 2011). The deficit framework that this implies, however, is equally effective at obscuring automobility's role in processes of historical urban disinvestment from poor

communities and communities of color and distracting from more genuine solutions to problems of inaccess.

Automobility in 20th century US urban development was a key organizing factor in the spatial demographic patterns of cities and thus distributions of wealth and social services. Suburban living came with an entitlement to the protection, at any cost, of the value of one's property (Trounstine 2018, 3). The manufactured white racial and middle- and upper-class homogeneity of suburban communities assured this value guarantee through housing policies built around racial exclusion of anyone aside from white families at all levels of governance (Painter 2011, 366–67). On a specifically local scale, gatekeeping was further advanced through prioritization of suburbanites' interests in the design of local land use policies and neighbor-on-neighbor violence towards residents of color when all other measures did not produce their intended results (ibid., 3; Coates 2014).

The homogenization campaign at its core was about self-isolation. The low-cost trade-offs of car ownership made this urban "secession" for white middle- and upper-class families feasible (Henderson 2006, 294). Part of the costs of this automobility embrace were bore by inner-city communities of color and low-income neighborhoods. The Federal Aid Highway Act was introduced in the 1950s to accommodate more automobiles in the urban landscape and apparently also to use city infrastructure to entrench white supremacy. The initiative succeeded more comprehensively at the latter goal more so than the former, using an urban development and slum clearance rationale to displace, divide, and cordon off entire communities of marginalized people with federal funds (Miller 2018). Understanding the role of automobiles in US urban development reveals them as yet another vehicle to carry out a tired US tradition of the state and other organized and resourced interest groups using land against people to uphold

projects of racial capitalism. If car ownership is to be seen in relation to food justice, rather than

as a simple demarcator of "haves" and "have nots", it must be treated with the full weight it had

and has today to manipulate land use in the interest of entrenched power dynamics.
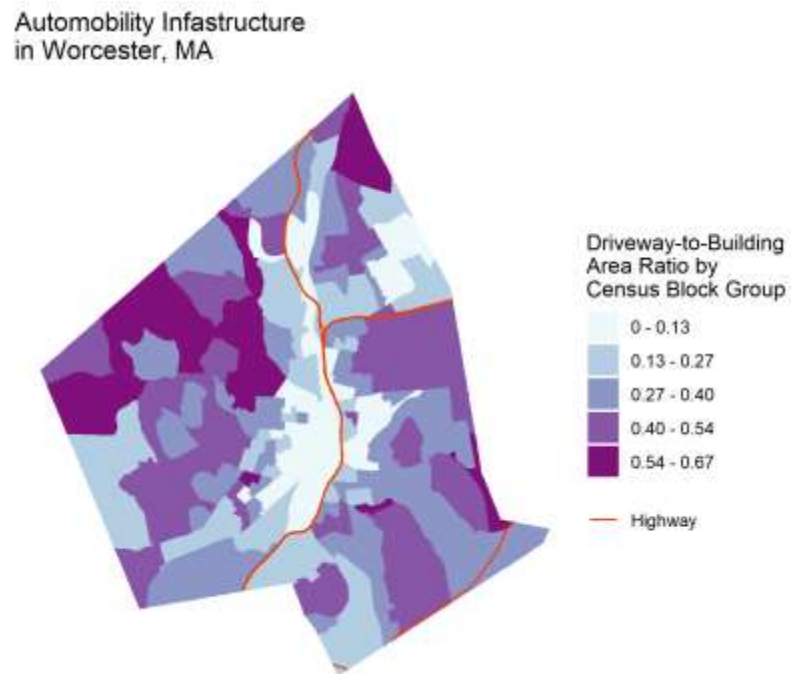

Figure 3. Automobility Infrastructure

Imagining urban automobility as a shaper of landscapes from which community food

access flows is a process demonstrated by this second food justice-informed mapping of the case

study area (Figure 3). The extent of driveway infrastructure is explored – a piece of the built

environment enabled and necessitated by lower density – in relation to the city's highway

system. The highest ratio values can be mainly found in the northwestern quadrant of the city – a

pattern which mirrors the location of census block groups identified as White, Affluent, and

English Proficient in the Environmental Injustice Populations map. While only one census block

groups with a ratio value of 0.54 or higher directly touches the highway system, nine census

block groups with a ratio of 0.13 or lower, in the lowest ratio bracket, are abutters of this piece of city auto infrastructure.

It is not productive to narrowly villainize cars for the functional ways in which they help different people navigate urban environments. However, it is productive and necessary in working towards food justice to know how they have been leveraged to drive community disinvestment, racially discriminatory wealth grabs, and white secession from the urban core. Looking simply at where low vehicle mobility is most prevalent as a defining piece of information in the design of food access policy and intervention neglects the history of injustice that has characterized US urban automobility. The two different origin points for why automobility matters in conversations of food access and justice clearly indicate two different political trajectories to inform action.

When speaking with food access practitioners in Worcester, their commitment to inclusive economic development affirms the importance of tools to deeply examine the intentionally designed foundations for wealth accumulation of certain populations over others in US cities. The efforts of these practitioners address various forms of workforce exclusion and exploitation, working to assert space on both the supply and demand sides of the labor market for marginalized people, as well as ensuring they are paid a living wage in the process (Interview with food access practitioner #3 2019; Interview with food access practitioner #4 2019; Interview with food access practitioner #6 2019; Interview with food access practitioner #2 2019). Others worked to hold intrusive large-capital projects accountable to promoting the development of the working class communities of color whose neighborhoods they seek out (Interview with food access practitioner #6 2019; Interview with food access practitioner #1 2019). One interviewee spoke directly about their entrepreneurial experience developing a retail

food system in the space left in their neighborhood after white flight which eventually supported 60 jobs, the diets of their neighbors, and a regional food distribution network (Interview with food access practitioner #1 2019). Their work is not about how to make mechanistic shifts in the food experiences of atomized car owners or even atomized "food deserts" in the city. Instead, it is a systems-focused approach to promoting inclusive economic development, if not economic justice, where this has been a marginalized or completely contradicted focus of the city's overall economic decision-making process for so long.

Bringing more attention to the real spatial process of automobility by examining the infrastructure that has been built up around it could easily be labeled as not relevant enough to inform food access decision making. After seeing how the intention, adoption, and outcomes of car culture has done so much to shape cities as they are known today, in fact it is more questionable to simply suggest a binary measure of car ownership could offer much information on a path towards expanded and equitable food access. Seeking a depiction of automobility as a social process connected deeply to power over urban land sets a course in conceptualizing food inaccess which has the depth and breadth to support the development of the variety of interventions needed to enact food justice.

What are relevant interventions?

There are clearly many holes in the concept of food deserts, its operationalization in policy and advocacy work, and its resonance on the ground. The culminating question that the idea of food deserts is prematurely trying to answer is to determine what should be done about different communities' problematic food access. Food desert maps, as they have become naturalized, present a clean cut solution to the policy or GIS analyst – increase poor people's

proximity to sources of food (Koch 2006; DeFilippis 2013). For a technically pleasing answer derived from elitist tunnel-vision theorization, this solution functions beautifully. However, this is not the point of social policy that is meant to serve the interests of marginalized people.

The last of three maps presented here explores what intervention, beyond the building of supermarkets, can concretely and authentically contribute to expanded health, dignity, and equity in the city's food system. This final map, continuing in line with the intervention of Figueroa (2015) to emphasize people and social relationships in food landscapes, examines property ownership patterns within "food deserts." Starting from the seemingly obvious assumption that all communities are adept in building the types of food systems they need to sustain themselves, albeit under varying degrees of societal marginalization, the conceptual foundations for this map seeks to investigate infringements on community autonomy that operate in neighborhoods deemed food deserts (ibid., 506; Interview with food access practitioner #1 2019; Interview with food access practitioner #6 2019).
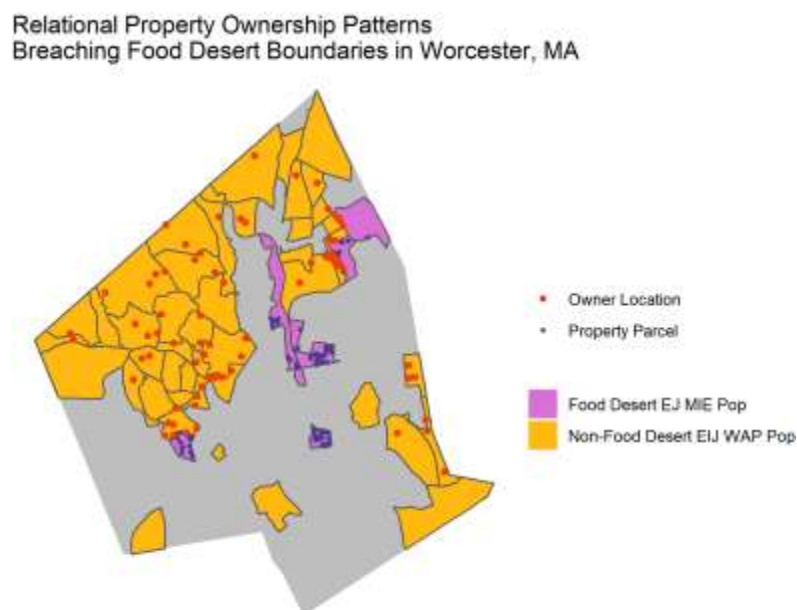

Figure 4. Relational Property Ownership Patterns

The results of this mapping in Figure 3 establish that even as the rhetoric and trajectory of the Environmental Injustice Populations established earlier suggest otherwise, residents of these neighborhoods still want to be part of these communities they disrespect and rob of resources, specifically to enrich themselves. Of the 1,698 property parcels in the subsetted food desert area that have residential associations, the ownership of 148 of them can be traced directly to mailing addresses in areas of the city which are predominantly white, affluent, and English proficient.

This makes visibly clear how class inequities, and the racial division that continually accompanies it, can be maintained, through no function of cartesian proximity. When the deficit framework that ushers through a narrative of deprivation is shattered, it is hard to see any other explanation to fall back. Food deserts when seen as the silver bullet solution to food inaccess are best explained as a concrete and conceptual infringement on the autonomy of marginalized communities' food systems and systems of food meaning.

CONCLUSION

This paper has explored how food deserts, as a policy concept and cartographic theme, are not only politically shallow but also, as mechanistic and uncritically conceptualized, obstruct the history and perpetuation of white supremacy and capitalism in U.S. mainstream food systems. While the way that food deserts conceptually exist in policy and in the imagination of many as a defining reference point for food injustice is problematic for the reasons described here, in its essence, it does speak some truth. Proximity does affect people's food access and for some communities, building grocery stores or establishing other types of retail food spaces has been and may be the solution.

As this paper has emphasized, however, such a conclusion, if it is to work in the interest of greater food access through a shifting of past patters of power, will not come from the magic creation and interpretation of a map. To use the authority of maps to naturalize a misinformed policy solution because it is clean and politically convenient, and it attempts to bury the systemic and persistent oppression that is woven into the food system, is a practice that needs to be interrupted. As one interviewee noted, "everything in the city is driven by numbers" (Interview with food access practitioner #1 2019). When those numbers are informed by history, the needs of affected residents and community leaders, and the solutions that these leaders are already using to meet their needs, obstruction can be replaced with deep analysis and transformation.

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