Food Deserts in the East Bay: Community Asset Assessment and Policy Solutions

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ABSTRACT

Food deserts are an environmental justice issue caused by decades of underinvestment and neglect. In this study, I evaluated food deserts in the East Bay through three different methods. Census data analysis revealed that racial minorities and low income households are strongly overrepresented in food deserts. School aged children (5-19 years) are also overrepresented. A community based participatory research approach revealed the various ways that community members have come together to reduce food insecurity. Through urban gardening, farmers markets, and free pantries and fridges, community organizations have began to close the gap caused by government neglect. A GIS mapping approach revealed how government resources are distributed throughout the East Bay in relation to food deserts, and how community resources fill the gaps. The visual representation of food deserts, community assets, and government assets all on one map created a useful picture to support policy recommendations. Based on the results, I have produced a set of policy solutions which work together to address food insecurity and the deep-rooted issues that cause food insecurity. First, local businesses and urban agriculture should be supported and expanded. Next, the social safety net should be expanded. Finally, inclusive housing policy should be prioritized. Food insecurity is one part of a much larger issue, *food apartheid*, and cannot be addressed without addressing deep structural inequalities.

KEYWORDS

environmental justice, food apartheid, community based participatory research, community food system, policy

INTRODUCTION

Food deserts are defined by the US Department of Agriculture as "census tracts with a substantial number or share of residents with low levels of access to retail outlets selling healthy and affordable foods" (Ploeg et al 2011). The USDA Research Atlas uses supermarkets as proxies for measurement, which the USDA defines as "foodstores with at least $2 million in annual sales and containing all the major food departments" (Ploeg et al 2011). Often there are a number of food options in food deserts, but the problem is that the food options are not nutritionally adequate and lack variety. Food deserts exist in both rural areas, where residents are spread out and thus live a large distance away from supermarkets, and in urban pockets where supermarkets simply do not exist and the majority of food options are convenience stores and fast food restaurants. Another key characteristic of food deserts is that they tend to disproportionately impact low income neighborhoods and neighborhoods with higher proportions of racial minorities. In fact, "half of all black neighborhoods in the United States are reported to be without full-service grocery stores and supermarkets" (Raja et al 2008).

Residents of food deserts face a number of problems later in life due to their lack of access to proper nutrition. One negative health impact that residents of food deserts face is increased risk of poor cardiovascular health compared to those who have access to proper nutritional resources (Testa et al 2020). Additionally, residents of food deserts experience higher rates of obesity (Shaw 2014). These negative health outcomes are attributable to the increased prevalence of fast food options in food desert tracts, as well as the lack of affordable nutritious food options in supermarkets. Poor cardiovascular health and obesity are both precursors to some of the leading causes of death in the United States, such as heart attacks, strokes, and heart failure. Aside from being a clear public health problem, food deserts contribute to a cycle of poverty. When children chronically experience low levels of nutrition, especially during key developmental stages, they tend to have low levels of academic achievement (Hoynes et al 2012). A child's level of academic achievement is highly correlated with their achievement and economic self sufficiency later in life (Hoynes et al 2012).

Although a few policies have been proposed and implemented to combat the formation of food deserts, they have been mostly problematic. An ordinance in South Los Angeles sought to address the poor health outcomes of living in food deserts by using zoning laws to ban fast food

restaurants from entering low income neighborhoods (Edwards 2015). Although fast food is clearly not a healthy food option and should not be one of the only food options in a neighborhood, this kind of zoning policy is not necessarily an effective way to combat the impact of food deserts. Without providing any sort of new healthy food option to these low income communities, the policy merely removed one of the few affordable and quick food options available in the neighborhood, which low income individuals rely on to feed their families. Researchers also suggest that community investment to increase the walkability, land use density, and public transportation access of communities will decrease the likelihood that a census tract is a food desert (Hamidi 2020). Community investment is a wonderful way to ensure that community members have access to healthful resources, but these kinds of investments often cause gentrification and displacement of original community members in the transformation process. When new communities are highly invested in as they are being built, they are often highly inaccessible to low income individuals most impacted by food deserts. The key problem here is finding a policy solution that can bring food desert communities relief without displacing them from their communities.

In my research, I intend to explore how the impact of food deserts can be relieved here in the East Bay. Using census data and the USDA's Food Access Research Atlas, I will analyze several demographic factors of food desert and non-food desert neighborhoods in Berkeley and Oakland. By analyzing age structure, racial makeup, and household income distribution, I can gain a better understanding of which communities are being most strongly impacted by food deserts in the East Bay. Although there are already known demographic patterns within food desert communities, it is important to know that these patterns are true here in the East Bay as well. I will also conduct interviews with key community informants to understand the community's strengths. I aim to understand how community members have come together to meet the needs of food insecure households that are most impacted by food deserts. Using the results from my interviews and government databases, I will create a *community asset map* in QGIS. These methods will inform a set of policy solutions that will be discussed in depth.

BACKGROUND

A history of neighborhood segregation practices

Because food deserts so strongly impact minority groups, especially African Americans, it is crucial to examine the political processes that lead to this disproportionate impact. Throughout the 1900s and continuing even today, a number of housing policies contributed to strong neighborhood segregation patterns. Alongside strong neighborhood segregation, Black neighborhoods have been routinely divested from, leaving their residents overcrowded and under resourced. Low income communities of color tend to have limited social determinants of health, thus they "experience health burdens grounded in inequalities…[and] an unequal distribution of resources across communities" (Ware 2021). As this relates to food deserts, the lack of healthy food retailers in poor and minority communities is "influenced by larger structural forces…[these inequalities are] largely the result of historic and contemporary policies, practices, and attitudes" (Ware 2021). Most notably, these segregation policies and practices are redlining, lending policies, zoning laws, real estate practices, urban renewal policies, and the development of the interstate highway system.

Beginning in the 1930s during the Depression, the Home Owners' Loan Corporation (HOLC) was established and created a system of rating neighborhoods "allegedly to help banks assess the risk of lending money to prospective homeowners" (Barber 2018). Through this system, the HOLC rated every neighborhood in America between A and D, with a ranking of A being the safest and highest recommendation for banks, and D being the lowest (Ware 2021). When evaluating neighborhood risk assessment rankings, there are clear patterns: "neighborhoods rated A had to be homogenous and occupied by the families of business and professional men who were white and usually native born," and neighborhoods were rated D "if African Americans lived in it, even if it was a solid middle-class neighborhood of single family homes" (Ware 2021, Barber 2018). These risk maps were used to gatekeep certain neighborhoods from Black prospective homeowners, effectively forcing neighborhood segregation.

Strong patterns of neighborhood segregation can also be attributed to the development of suburbs and associated restrictive covenants. Strict single-family zoning laws were implemented in many areas, which required that only single family homes be built on a lot, and banned the building of multi-family units such as apartments. This was "about more than separating homes from apartments; it was about separating white families from everyone else" (Baldassari and Solomon 2020). As suburban neighborhoods were starting to be developed in the 1940s and 50s, the Federal Housing Administration (FHA) "required lenders to include racially restrictive covenants on all properties with federally issued mortgages" (Ware 2021). The FHA's 1935 underwriting

manual outlined that "if a neighborhood is to retain stability, it is necessary to be occupied by the same social and racial classes. A change in social or racial occupancy generally leads to instability and reduction in value" (Ware 2021). Consequentially, suburban areas were only accessible to upper class white families, while low income families of color were crowded into what little land remained that wasn't zoned for single family housing units.

Evaluating real estate practices also reveals a long history of discriminatory practices which have contributed to neighborhood segregation. It was common for land economists to link property values to the racial composition of the neighborhood; as a result, "local real estate boards warned their members not to introduce elements into a neighborhood that would be detrimental to property values, and explicitly included black among the undesirable elements" (Ware 2021). The Federal Fair Housing Law was passed in 1968 as part of the Civil Rights Act, which banned those explicit kinds of discrimination in housing (Ferre-Sadurni 2019). However, real estate practices today continue to be highly discriminatory, most notably using the practice of "steering". An undercover investigation of real estate agencies in Long Island New York exposed thorough widespread evidence of such discriminatory practices; the study showed that "real estate agents treated people of color unequally 40% of the time compared with white people" (Ferre-Sadurni 2019). This discrimination took several forms: real estate agents offered selections in different neighborhoods to faux candidates with exactly the same budgets, incomes, and approval rates, "steered" white candidates away from black neighborhoods and vice versa, and sometimes even refused to show homes to black prospective homeowners.

Segregation was also reinforced through deliberate planning methods in the construction of America's interstate highway system. Interstates were built to make travel in and out of American cities simpler and faster, and the building of the interstate system supported the fast growth of suburban communities (Ware 2021). the 1965 Highway act allocated several billion dollars to construct a network of interstate highways throughout the country, and "each state transportation department managed its own program for location, design, right of way acquisition, and construction" (Ware 2021). Many local officials used this as an opportunity to completely "destroy entire neighborhoods and isolate others, creating inner city ghettoes and reinforcing residential segregation" using highways as physical barriers separating black and white neighborhoods (Ware 2021).

Black neighborhoods were also evidently destabilized through postwar urban renewal efforts. The Housing Act of 1949 was intended to relieve the major housing shortage that many cities

were facing, "but the program destroyed thousands more units than it replaced and dislocated tens of thousands of small businesses and residents" (Ware 2021). Urban renewal projects facilitated the destruction of "slum neighborhoods", similar to the construction of the interstate highway system, and the cleared land was sold to real estate developers at incredibly low prices (Ware 2021). Real estate developers were supposed to replace the neighborhoods with dense affordable housing developments, but in reality, the neighborhoods' original residents were pushed away.

Deliberate policies and practices throughout the 20th century, some enduring today, have had a strong and lasting legacy, creating highly segregated communities throughout the country. These high levels of segregation are the starting point for geospatial inequalities, as white neighborhoods tend to be well resourced and healthy, while low-income communities of color are under resourced and over polluted.

Neighborhood segregation in Alameda County
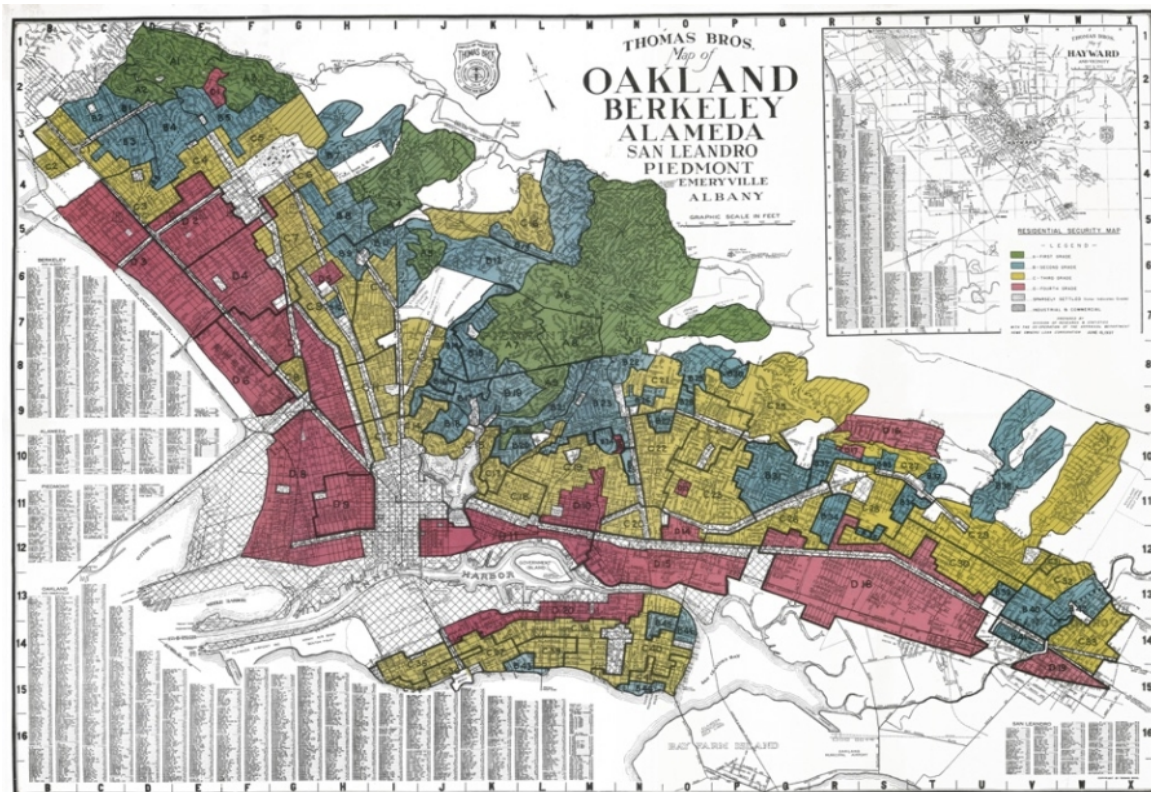
Figure 1. Alameda County HOLC Lending Safety Map. Thomas Bros Map of Alameda County neighborhoods, colored according to lending safety ranking. Red neighborhoods received a rank of D, while blue neighborhoods were ranked A (Barber 2018)

Now let us take a look at neighborhood segregation in a more localized context. Only having lived here in the East Bay for a few years of my life, it has become very obvious to me that certain neighborhoods are associated with certain demographics. Within Berkeley, there is a clear divide between the vast single family homes with expensive landscaping and expensive cars parked in garages in the Hills belonging to affluent white families, and the more modest, mixed use, and dense urban blocks that are home to the diverse communities that come to mind when one thinks of Berkeley. The city of Piedmont is similar; a tiny city of expensive homes on vast winding roads with a clearly white demographic, smack in the middle of the much more diverse city of Oakland. These neighborhoods did not end up so segregated on their own, rather, it was years of deliberate policy decisions, community investment and divestment, and racism that created these heterogenous communities.

When looking at HOLC lending safety map above, it is easy to see that redlining and lending recommendations strongly shaped the demographics of Berkeley's neighborhoods. While the HOLC map designates Claremont neighborhoods as the highest order of lending safety, it defined areas South of Dwight and West of MLK as hazardous. The HOLC cited that the hazardous zones have "Detrimental Influences", describing a "predominance of Negroes and Orientals. Also mixed classes of wage earners and colored professional people" (Barber 2018). Berkeley was also strongly shaped by racial covenants; for example, "the Claremont Improvement Club enforced a covenant that restricted residents to 'pure Caucasian blood'" (Barber 2018). Additionally, Berkeley "was the first city in the country to implement single-family zoning. It adopted the zoning rule for the Elmwood neighborhood in 1916" (Baldassari and Solomon 2020). As a result of the zoning and redlining policies, racial minorities became concentrated in Southwest Berkeley. It is also worth mentioning that these concentrated segregated communities were severely disrupted by the construction of the underground BART line, which decimated many homes and businesses (Barber 2018).

Neighborhood segregation and community destabilization policies are also a part of the city of Alameda's history. Measure A, an exclusionary zoning amendment adopted by the Alameda electorate in 1973, essentially prohibited the construction of multifamily housing units in certain parts of the island (EBHO 2020). The city's electorate also "supported Proposition 14, a statewide

initiative overturning fair housing legislation, and the Alameda Housing Authority displaced thousands of black tenants" (EBHO 2020). These policies created clear neighborhood segregation; black and Asian residents were shoved into the North part of the island. Alameda's leaders pushed industrial growth into this side of the island as well, which protected white homeowners from the toxic pollutants and associated lowering property values (EBHO 2020).

The city of Piedmont, known as the "City of Millionaires," also had "racist housing covenants that excluded people of color from owning property within its boundaries" (Phillips 2021). Despite these covenants, Sidney and Irene Dearing managed to become Piedmont's first black homeowners in 1924 (Phillips 2021). When they moved into the neighborhood, the Dearings were faced with aggressive pushback from the community. Shortly after their move, a mob of 500 residents showed up at their home demanding they leave; when these efforts were unsuccessful, residents placed multiple bombs around their home as well. In the face of violence and death threats, the Dearings "couldn't exactly count on Police Chief Burton Becker, who was an active member of the Ku Klux Klan" at the time (Phillips 2021). In 1925, just one year after they moved to Piedmont, they had no choice other than to sell their home back to the city (Phillips 2021). Today, the community's racism takes much subtler forms; single family zoning policies and an outsourcing of affordable housing development projects to Oakland have kept the city highly inaccessible to black families. In fact, between 1920 and 2019, the city's black population only rose 0.3%, which is significantly small compared to the increased diversity of the surrounding city of Oakland (Phillips 2021).

Finally, let's take a look at the history of the city of Oakland. Through the 1960s, Oakland neighborhoods experienced a killer combination of "urban renewal, freeway construction, BART construction, and government action [which] destroyed over 7,000 housing units in Oakland, almost 5,100 of which were located in West Oakland" (oaklandplanninghistory.weebly). The FHA promoted the development of all white suburbs much like it had in many other cities, leaving black communities subject to the terrors of urban renewal. The Oakland Redevelopment Agency's (ORA) first project was the Acorn Project, which designated a good portion of West Oakland for demolition and rehabilitation. About 50 blocks were demolished, but "construction did not begin in Acorn until five years after demolition was completed, leaving a giant barren area in the middle of West Oakland…[these] demolition policies would create deep scars in the black neighborhoods close to downtown" (oaklandplanninghistory.weebly). Construction of the Cypress portion of the

I-880 freeway also wreaked havoc; properties throughout West Oakland were demolished and families were pushed out (oaklandplanninghistory.weebly).

Heavy handed disruption of black communities and institutionalized discriminatory lending and housing practices have created remarkable patterns of neighborhood segregation throughout the East Bay. Disparities in food access throughout the East Bay cannot be properly contextualized and understood without considering the structural forces that created them.

An argument for community asset assessment

To provide quality policy solutions for food desert neighborhoods in the East Bay, I have chosen to complete a Community Asset Assessment. My approach took into account both deficits and assets of the Easy Bay, taking strong influence from the assets model outlined by McKnight and Kretzmann.

A traditional approach often used by policymakers is a deficits based model, which has its strengths, but its weaknesses cannot be overlooked. This kind of approach "positions us well to develop programming for community problems…[but typically] results in a fragmented approach to solutions, where resources are obtained and directed to a specific problem rather than building the community infrastructure to address all [problems]" (Ammerman and Parks 1998). The deficits model also reinforces a narrative that the communities are helpless in a way, and can only be "saved" by outside institutions.

In contrast, the assets model assesses the strengths of the community and identifies what brings the community together, rather than just looking at its problems. These "resources, social structures, people, and existing programs…become the basis for change" (Altschuld et al. 2014). This approach guides policy solutions in a completely different way, asking: "how can we capitalize and take advantage of what we have; how can we leverage off of what is there?" (Altschuld et al. 2014). By using the community's existing resources, community members become part of the solution themselves; this kind of community empowerment can go a long way.

I used a hybrid model, to "determine needs and assets in independent yet intertwined ways" to come up with the most effective solution to bring food access to food desert communities in the East Bay (Altschuld et al 2014). The McKnight and Kretzmann model outlines three levels of

community asset assessment: an assessment of individual level skills and experiences of community members, "an inventory of local citizen associations and organizations, [including] political groups, support groups…church groups", and an inventory of more formal institutions such as "parks, libraries, schools…human service agencies"
(Ammerman and Parks 1998). Taking into account the community's assets has determined the most effective way to distribute the resources identified as needed through deficits analysis.

Another major plus of this approach is that it builds long term community competence. Competent communities are better able to identify their problems and needs, and collaborate effectively to meet their goals (Ammerman and Parks 1998). Low income communities of color that been so divided and disenfranchised through historic policy efforts to destabilize and segregate. It is essential to "see these communities as filled with a dynamic and emerging group of citizens with potential and possibility for community change" (Ammerman and Parks 1998), to empower these communities.

METHODS

Demographic analysis of food deserts and non-food deserts

To understand the demographic makeup of food desert neighborhoods compared to non-food desert neighborhoods, I conducted a census level analysis. I used the USDA's Food Access Research Atlas, an interactive map that displays food access indicators at the census tract level. I used the Atlas's most recent data, which was recorded in 2019, and focused on census tracts within the boundaries of Berkeley, Oakland, Emeryville, Piedmont, and Alameda. To determine a census tract's food desert status, I used the atlas's "Low Vehicle Access" component layer; the atlas designates tracts as "Low Vehicle Access" if "more than 100 households [within the tract] have no access to a vehicle and are more than 1/2 mile from the nearest supermarket, or a significant number or share of residents are more than 20 miles from the nearest supermarket" (USDA Economic Research Service). If a tract was designated as "Low Vehicle Access," I considered it a food desert tract. I chose this definition of a food desert because the incorporation of vehicle access creates a stronger representation of food insecurity than geographic metrics alone. The component layer that

did not consider vehicle access designated many wealthy neighborhoods in the Berkeley and Oakland Hills as food insecure; these neighborhoods are suburban enclaves of wealth and privilege, so I avoided a definition that would consider them a food desert. I compiled every food desert tract and every non-food desert tract within the boundaries of my study into a master sheet, and randomly selected 25 of each for demographic analysis. It was not within the scope of my study to analyze the census data of every single census tract.

To get a representation of the demographic makeup of each census tract, I used 2019 American Community Survey (ACS) data for three different categories: household income, race, and age. I broke each of these categories into groups. For the category of household income, I used six groups: less than $10,000, between $10,000 and $24,999, between $25,000 and $49,999, between $50,000 and $99,999, between $100,000 and $199,999, and $200,000 and over. I used smaller ranges for the groups representing lower income levels because the effects of economic differences are felt more strongly between low income groups than groups with moderate or high income. Since household income is reported in groups as percentages, I converted the percentages into household numbers by multiplying the reported percentage by the number of households in each census tract as reported in the 2019 ACS. For the category of race, I used 2019 data on populations of single race only. I broke this category into five groups based on the survey's own distinctions: White, African American, Pacific Islander, and Native American. For the final category, age, I broke the data down into five groups: less than 5 years, 5-19 years, 20-39 years, 40-59 years, and 60 years and older. I chose these age groups for a few specific reasons: children under the age of 5 are in a key developmental stage during which proper nutrition is crucial; children ages 5-19 are school aged and will likely be attending a public school, which is a government institution that could potentially serve as a resource for policy solutions; those aged 60 and older are more likely to be retired or to have mobility issues.

For each dataset, I used the chi-squared method to create expected and observed values to assess the representation of each group in food deserts compared to non-food deserts. To create the "expected value," I began by adding together the data points within each group in each category across non-food desert census tracts. I created a proportion to represent each group by dividing the data points in each group by the number of data points in each category. Finally, I multiplied the proportions representing each group by the total number of data points in each related food desert category. This resulted in an "expected value" for each group in the food desert census tracts; if a

group was equally represented between food desert census tracts and non-food desert census tracts, the "expected value" will roughly equal the "observed value". To create the "observed value" of each group in the food desert census tracts, I added together all data points for each group within each category. To compare the "expected" and "observed" values, I divided the "observed value" for each group by the "expected value" for each group. The population sample size is too large to complete the full chi-squared test, but comparing "expected values" and "observed values" of each group is very insightful on its own. The ratio generated by dividing "observed values" by "expected values" of each group paints a picture of which groups are overrepresented in food deserts and which groups are underrepresented.

Semi-structured interviews

To gain insight about the community's strengths and resources, I conducted a few interviews. Through an extensive literature review and internet search, I identified a number of East Bay community organizations combating food insecurity through community engagement and empowerment. I reached out to several staff members from each organization who I consider to be key informants, "trusted people who keep track of the everyday events in a neighborhood and are often at the center of informal helping networks" (Sharpe et al. 2000). Unfortunately, despite reaching out to over twenty individuals, I was only able to conduct three interviews. To respect the privacy of the organizations and community members, I will not disclose the names of the organizations or the individuals I interviewed.

Two of the interviews were conducted over zoom, and one was conducted in person. When reaching out to potential interviewees, I left the location of the interview (virtual or in person) entirely up to them. The interviews were semi-structured, and each took roughly an hour to complete. For each interview, I obtained permission to voice record the interview so that I could provide my full attention to the interviewee. One of the main goals of the interviews was to understand the network of resources that the community most relies on, and the unique strengths of the community. Another goal of the interviews was to understand the various interventions used by the organizations themselves, and to understand the failures and strengths of government interventions according to community members.

I began each interview by introducing myself, a bit about my own personal background, my research goals, and some information about my key findings so far in the study. I provided the opportunity for interviewees to introduce themselves as well, to better understand their specific role within the community. This first casual portion of the interview was essential to creating an open dialogue where interviewees felt comfortable sharing their beliefs and concerns.

Next, I asked a set of questions without variation in each interview:

> 1. How would you describe the East Bay to someone who has never been here?
>
> 2. What would you say are some of this community's greatest strengths?
>
> 3. What do community members take great pride in?
>
> 4. What most unites the community?
>
> 5. How do community members engage with one another? Are there specific places, organizations, or institutions that come to mind?
>
> 6. How do community members take care of each other?
>
> 7. Besides physical location, what do you see as the greatest barriers to food access for communities in the East Bay?
>
> 8. Are there community members you feel you are unable to adequately reach? What are the barriers between you?

Responses to these specific questions allowed me to understand how community members view their own strengths and define the community's unique network of resources. While I kept the structure of questions the same throughout each interview, I asked unique follow up questions based on interviewees' responses.

Finally, I created a unique set of questions for each interviewee regarding their personal work in the community. These questions pertained mostly to the community interventions conducted by the organizations they belong to. These questions allowed me to understand what methods of intervention community organizations found to be most effective, what their limitations were, and how these interventions might contribute to a larger scale solution.

To analyze the qualitative data I collected through the interview process, I categorized responses and ranked them based on their frequency of appearance. This allowed me to determine what community assets are most commonly utilized by the community. This also helped me understand what most unites community members.

Community asset map

To better understand the geographic distribution of a community's resources, I created an "asset map" using QGIS. The "asset map" combines key information from my first two subquestions, as well as additional information from an extensive literature review. My map consists of two different categories of assets: government assets and community assets.

Government assets consist of public transportation routes and public schools. I define government assets by their public ownership, funding, and maintenance. Government assets are marked in red. To map public transportation data, I used bus route GIS shape files and bus stop GIS data shape files from the AC Transit Data API & Resource Center (AC Transit). To map public school data, I used the Alameda County Schools dataset from the Alameda County Open Data portal (Alameda County Data Sharing Initiative). After importing this dataset to my community asset map, I coded the dataset to exclude any private schools.

Community assets will be determined by the results of the interview process. Community assets are different from government assets in that they are founded and maintained by the community, rather than by the government. Examples of community assets include food pantries, farmers markets, and youth centers. Community assets represent the ways in which communities have responded to decades of structural neglect.

My map also highlights food desert census tracts. To create visual data representing food desert census tracts, I used 2019 Census Tract TIGER/Line Shapefiles for the state of California (United States Census Bureau). I used the polygon shape tool in QGIS to designate which tracts were food deserts, based on data from the USDA Food Access Research Atlas (USDA Economic Research Service).

By highlighting community assets, government assets, and food desert status all on one map, I am able to visually understand the abundance or lack of government resources in neighborhoods related to their food desert status, and how communities have responded to this abundance or lack. This map presents a visual picture of community resilience that can be used to guide policy recommendations.
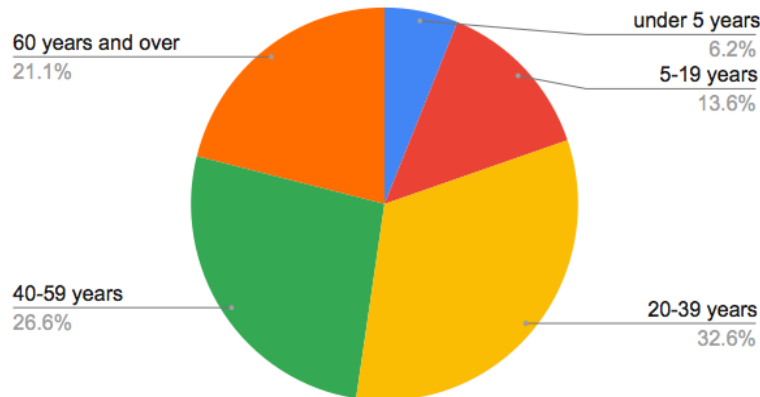
RESULTS

Demographic analysis of food deserts and non-food deserts

I found that there were notable differences between the age structure of non-food desert census tracts compared to food desert census tracts (Figures 2 and 3).
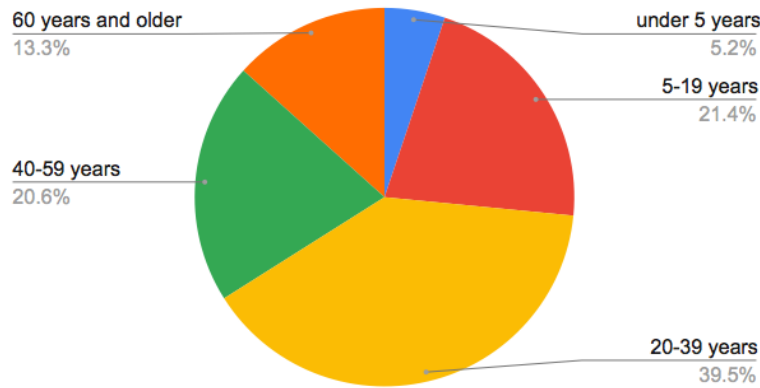
Figure 2. Age Structure of Non-Food Desert Census Tracts. Based on 2019 census data.

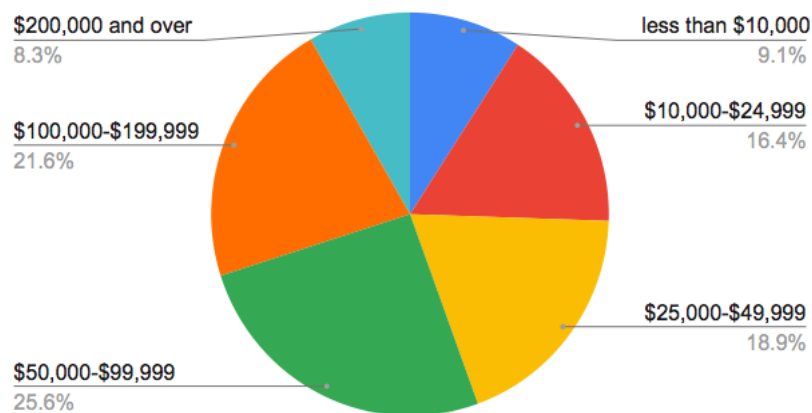**Figure 3. Age Structure of Food Desert Census Tracts.** Based on 2019 census data.

The most significant difference was observed in school aged individuals (5-19 years), who were overrepresented by 56.8% in food desert census tracts when compared to the proportion observed in non-food desert census tracts. School aged individuals represented 13.6% of the population in non-food desert census tracts, compared to 21.4% of the population in food desert census

tracts. There were also significant differences observed in the proportion of individuals in the oldest age group. Compared to non-food desert census tracts, the eldest population group was underrepresented in food desert census tracts by 37.1%. In non-food desert census tracts, the eldest population group represented 21.1% of the population, while in food desert census tracts, the eldest population group represented just 13.3% of the population.

There were moderate differences in representation between non-food desert census tracts and food desert census tracts of the age groups 20-39 years and 40-59 years. Compared to their representation in non-food desert census tracts, the second eldest age group (40-59 years) was underrepresented by 22.7% in food desert census tracts. In non-food desert census tracts, individuals ages 40-59 years represented 26.6% of the population, compared to 20.6% in food desert census tracts. Those aged 20-39 years were slightly overrepresented in food desert census tracts, by approximately 20.4%. In non-food desert census tracts, this age group made up 32.6% of the population, compared to 39.5% in food desert census tracts.

The difference in representation between non-food desert census tracts and food desert census tracts for the youngest age group, individuals under 5 years, was not very significant. The youngest age group was slightly underrepresented in food desert census tracts; in non-food desert census tracts, they represented 6.2% of the population, compared to 5.2% of the population in food desert census tracts.

I also found significant differences in household income distribution between non-food desert census tracts and food desert census tracts (Figures 4 and 5).

Figure 4. Household Income Distribution of Non-Food Desert Census Tracts. Based on 2019 census data.
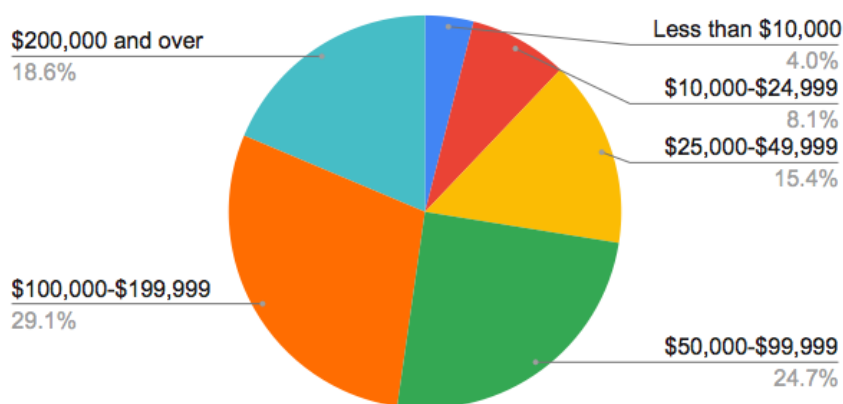
Figure 5. Household Income Distribution of Food Desert Census Tracts. Based on 2019 census data.

The most significant differences in representation were observed in the lowest income groups and the highest income group. Households earning less than $10,000 per year were overrepresented in food desert census tracts by 128%. In non-food desert census tracts, the lowest income group only represented 4% of households, compared to 9.1% in food desert tracts. The difference was similarly strong for the proportion of households falling into the second lowest income group, $10,000-$24,999. Households falling into the second lowest income category were overrepresented in food deserts census tracts by 105%. Although households earning between $10,000 and $24,999 made up 8.1% of the total households in non-food desert census tracts, they made up 16.4% of the total households in food desert census tracts. The difference was also strong in the highest income group; households earning $200,000 or more were underrepresented in food desert census tracts by 55%. In non-food desert census tracts, this high income group constituted 18.6% of households, compared to only 8.3% of households in food desert census tracts. These figures demonstrate that poverty is highly concentrated in food desert neighborhoods, while wealth is highly concentrated in non-food desert neighborhoods.

More moderate differences were observed in the household income groups $25,000-$49,999 and $100,000-$199,999. In food desert census tracts, households earning $25,000-$49,999 were overrepresented by 22%. Households falling into this income category represented 15.4% of households in non-food desert census tracts, compared to 18.9% of households in food desert census tracts. Predictably, households in the second highest income group were underrepresented in food desert census tracts compared to non-food desert census tracts. In non-food desert

census tracts, households earning between $100,000 and $199,999 represented 29.1% of households, compared to 21.6% in food desert census tracts.

There was no significant difference in the representation of moderate income households ($50,000-$99,999) between non-food desert census tracts and food desert census tracts. In non-food desert census tracts, households earning $50,000-$99,999 represented 24.7% of households, compared to 25.6% in food desert census tracts. When examining household income distribution, there is a clear trend: low income households are strongly overrepresented in food desert neighborhoods, while wealthy households are concentrated in non-food desert neighborhoods.

There were also clear disparities in the representation of race groups between non-food desert census tracts and food desert census tracts (Figures 6 and 7).
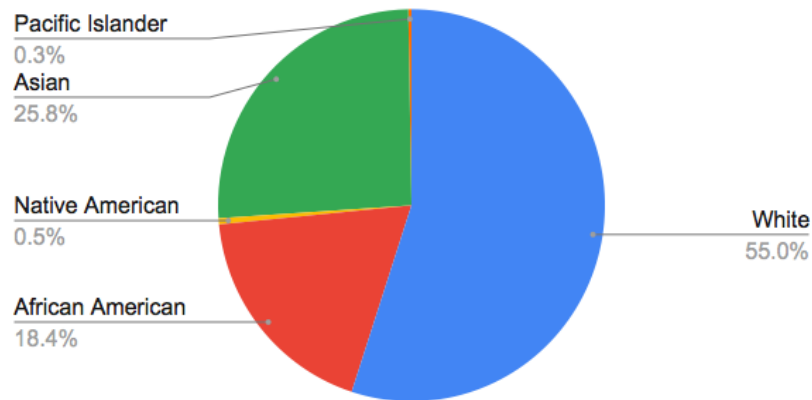
Figure 6. Racial Makeup of Non-Food Desert Census Tracts. Individuals of single race only. Based on 2019 census data.
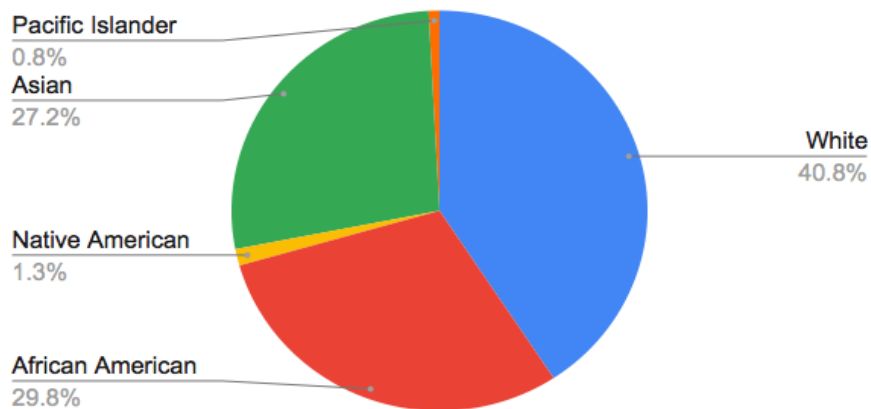
Figure 7. Racial Makeup of Food Desert Census Tracts. Individuals of single race only. Based on 2019 census data.

The most extreme differences in representation between non-food desert census tracts and food desert census tracts were observed among Native Americans and Pacific Islanders. Pacific Islanders were overrepresented by 215.2%. While Pacific Islanders made up 0.3% of the population in non-food desert census tracts, they made up 0.8% of the population in food desert census tracts. Similarly, Native Americans were overrepresented by 163.5%. In non-food desert census tracts, Native Americans made up 0.5% of the population, compared to 1.3% of the population in food desert census tracts. While the proportion of these individuals is small among the total population, it is important to note that the populations are highly concentrated in food deserts.

More moderate, but still significant, differences were observed in the representation of African Americans and Whites between non-food desert census tracts and food desert census tracts. African Americans were overrepresented by 61.8% in food desert census tracts. In non-food desert census tracts, African Americans only made up 18.4% of the population, compared to 29.8% in food desert census tracts. In the other direction, Whites were underrepresented in food desert census tracts compared to non-food desert census tracts by 26%. Whites made up 55% of the population in non-food desert census tracts, compared to only 40.8% in food desert census tracts.

The difference in representation of Asians between non-food desert census tracts and food desert census tracts was not significant. Asians are overrepresented in food deserts by 5.6%; in non-food deserts, Asians make up 25.8% of the population, compared to 27.2% in food desert census tracts.

Semi-structured interviews

My interviewees all provided unique perspectives and insights into the functioning of the community I am studying, but there were clear commonalities between interview responses. When asked about the greatest strengths of community members, all three of my interviewees cited resilience and creativity. As one key informant described, the community has "a real ingenuity, an impressive ability to make something, to uplift the community, with very few resources." All three described that, although community members have diverse backgrounds and identities, they are united through art and culture. One interviewee listed a few youth empowerment centers that sup-

port art and culture, and another interviewee described art and culture events that connect community members, both of which act as spaces of community connection and empowerment. One interviewee also described the power of food and tradition in uniting communities.

In addition, all three of my interviewees mentioned the term food apartheid. As one interviewee described, "it's not a desert, it didn't magically end up like this, it's very intentional and deliberate by the systems that be. This happened because of years and years of development, intentional redlining that determined where grocery stores were built. This is an apartheid issue, not a wondrous desert." The term food apartheid emphasizes that it is not just nutritious food that is lacking in these communities, but dozens of other government resources, including green spaces, libraries, quality schools, and the reach of public transportation, that come together to try to weaken communities and keep them

Despite this food apartheid, community members have come together to build a strong network of community organizations that engage with each other in critical ways. The key informants I interviewed all mentioned partnerships between different organizations, which helped various interventions benefit more community members. For example, urban farming organizations described that it is beyond their capacity to distribute the produce they grow on their own, but they have partnered with other organizations that bring their produce to farmers markets, free fridges and pantries, and sometimes even deliver packages of produce directly to the homes of community members.

A unique conversation about the importance of culturally relevant foods emerged from one interview. My interviewee described that "if you give a giant box of dino kale to a family who has never cooked with it and has no recipes to use it, it will likely go to waste." She described that, to be effective at reducing food insecurity, foods must be culturally relevant and bring comfort to community members. My interviewee described how the organization she works with has overcome this barrier by sourcing unique seeds to grow culturally relevant produce. She said, "we grow very specific East Asian vegetables that can't be found in many grocery stores; giving people the power and knowledge to grow that food is very exciting and empowering. This is what keeps people growing and going and eating these nutritious foods." She described the joys of reconnecting people to foods they haven't eaten since they were children, emphasizing the comfort and empowerment that community members feel.

With another interviewee, I discussed barriers of access between community members and their organization's interventions. The first she noted was the limit of existing public transportation routes. She described that her organization's main distribution site is relatively isolated from traffic; the site is roughly a 15 minute walk from the nearest bus stop, along a transit line that only runs every 30 minutes or so. She described that although the site is not totally isolated, it can be difficult to access for elderly people with mobility issues or people who are not able-bodied, especially if they are carrying groceries during their return. This also raises concerns over the travel time to get to the site. Many community members simply don't have two hours to commit to visiting the site, especially if they have children they need to look after or a job with long hours. This interviewee also mentioned that, despite these barriers, food is always completely gone within 24 hours; a full fridge harvest from her organization's urban farms can only happen once a week, there is simply not enough produce to give away for free to meet the needs of the community. This interviewee also mentioned the big debate in the urban gardening community about the role of community farms in gentrification. She described "creating a beautiful, lush, inviting green space, which developers capitalize off and market, which is really out of the farm's control, and in trying to help the community, the farm becomes a weapon of gentrification." While urban gardening has many benefits, this is a clear shortcoming of the intervention.

A conversation with my final interviewee gave some insight into the failures of past interventions. She cited one common denominator: no long term plan. She described during COVID, the government gave several community organizations grants, which greatly helped the organizations increase their reach and their capacity to help. Now, however, the grant money has been spent, and no more money is coming in; "the organizations are floundering, they can't support themselves now that they have become larger, and many of them have had to close for good," she described. We also discussed a corner store conversion initiative in Oakland that failed for similar reasons. She described that the government just threw a bit of money at the problem for a short period of time, without providing any real guidance or connections for corner store owners. Once the money ran out, the corner stores stopped carrying produce, and were once again liquor stores. She also described that this initiative was severely crippled by high produce prices, making it so people in the neighborhood couldn't afford to buy the produce anyways.

The community strengths and assets revealed by my interviews, along with the challenges facing community members, will guide unique policy solutions to target those in the community with the most need.
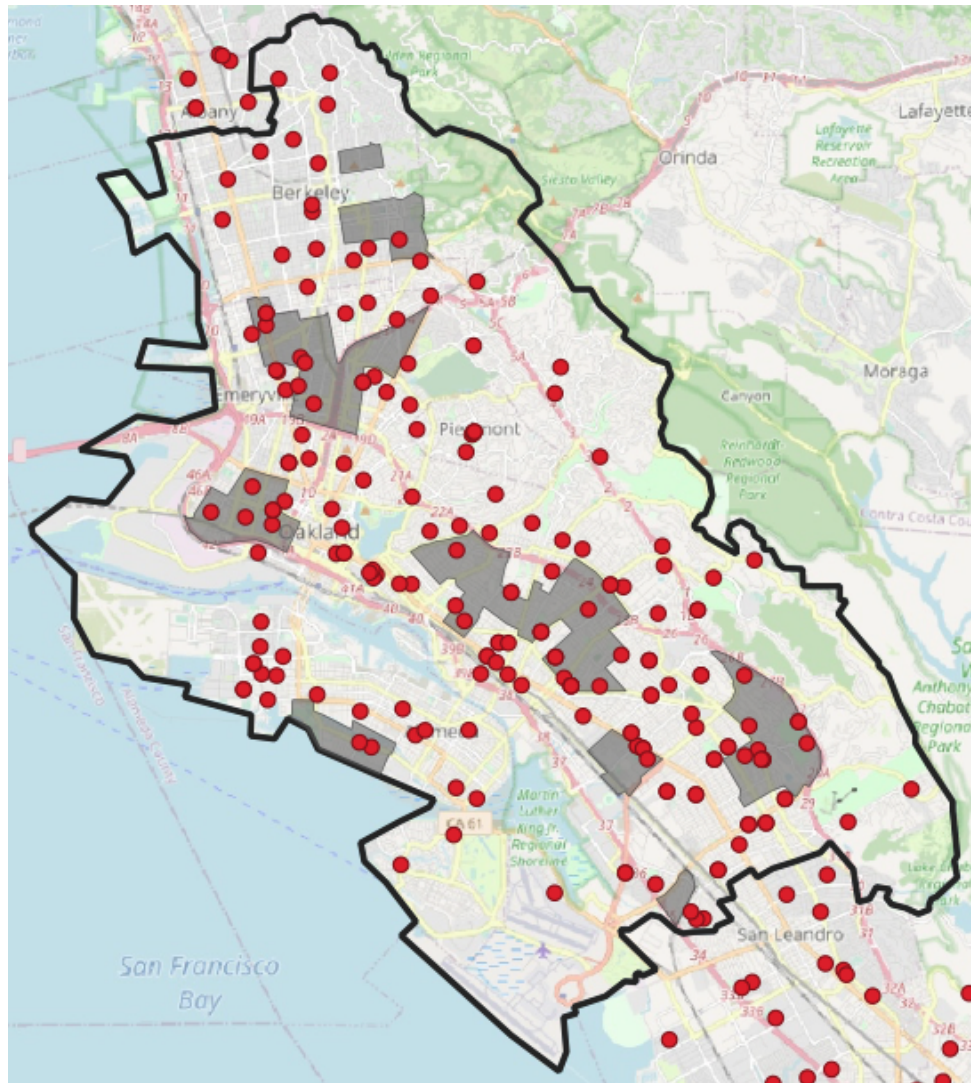
Community asset map

The community asset map (Figure 8) reveals important information about the distribution of government assets and community assets within the study site and their geographic relationships to food deserts. The first thing to take note of is the distribution of food deserts (shaded in gray) within the study site. There are six main clusters: one near the University of California, Berkeley, one in West Oakland, one in the Temescal/Pill Hill neighborhood of Oakland, one on the island of Alameda, and two main clusters in East Oakland. Because food deserts are clustered, those living in the center might experience more severe levels of food insecurity.
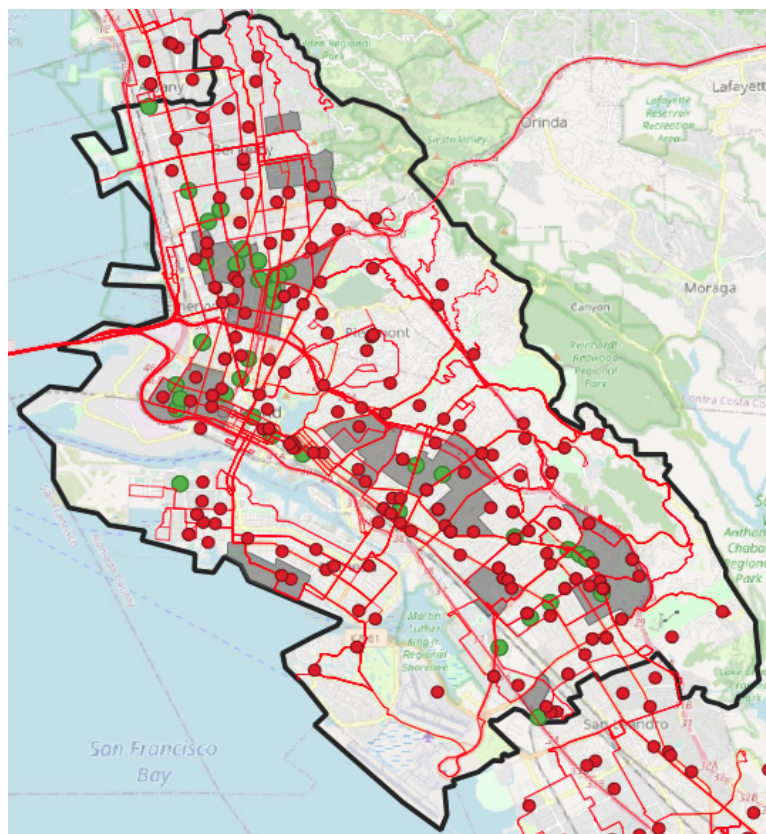
Figure 8. Community Asset Map. All layers selected for viewing. Red lines depict public transit routes, red dots depict public schools. Green dots depict community assets. Grey blocks depict food deserts. The study boundaries are enclosed in black.

Generally, public schools are evenly distributed throughout the study site (Figure 9). This indicates that they could be powerful assets to include in a policy solution. As revealed by my demographic analysis of the study site, school-aged children are overrepresented in food desert census tracts. As a result, public schools are a government asset of particular interest.
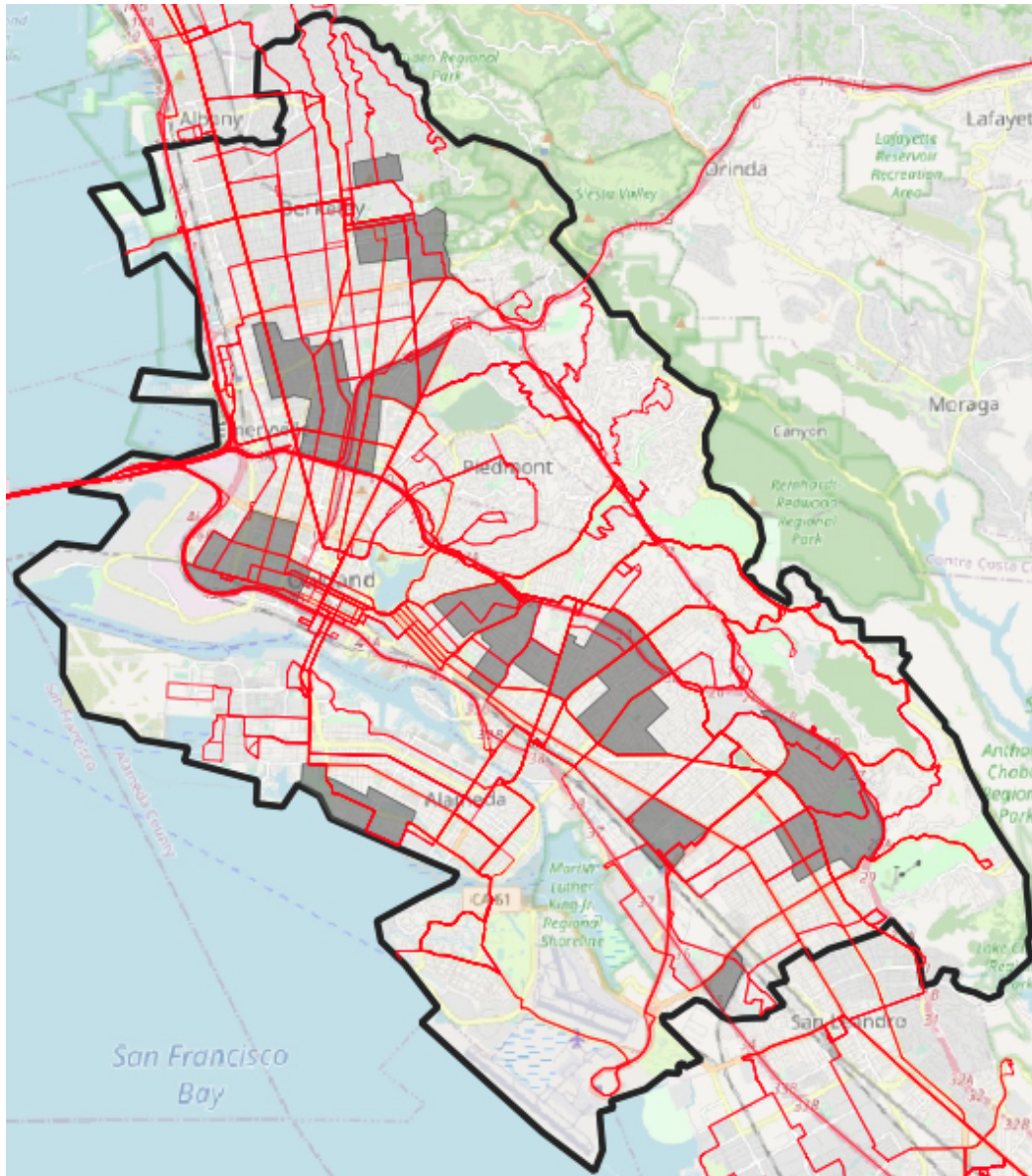

Figure 9. Community Asset Map. Public schools (government asset) in relation to food deserts.

At first glance, it appears that transit lines cover the study site evenly, and food deserts are well served by public transportation (Figure 10). However, when you consider the frequency of the transit lines, the picture becomes very different (Figure 11). Red lines run every 10-15 minutes,

while blue lines run every 16-30 minutes, and light blue lines run ever 31 minutes or less frequently. Transit lines run frequently near the food desert cluster in Berkeley, but the other food desert clusters are served much less frequently. The food desert cluster in Alameda is served by public transit the least frequently, by one light blue line. The remaining food desert clusters are primarily served by blue lines.


Figure 10. Community Asset Map. Public transit lines (government asset) in relation to food deserts.

Figure 11. AC Transit System Overview. From the AC Transit website (https://www.actransit.org/overview-maps)

Examining the community assets within the map, the true resiliency of the community becomes clear. Community assets, which include youth centers, free pantries and fridges, farmers markets, and community organizations are distributed throughout the study site. There is a clear trend: most community assets fall in or near food deserts. This demonstrates that community leaders and organizers are keenly aware of what areas are most in need, and they work to meet those

needs. Something not as clear by the simple view of the map is the ways that community assets are related to each other, which confirms what was discussed in the interview portion of the study. For example, many urban gardens participate in farmers markets and donate to free pantries and fridges, and many community organizations work with youth centers, urban gardens, and free parties and fridges. This strong network of community assets is a testament to the knowledge and strength of community members; community members know how to help themselves more than government leaders who do not necessarily have shared lived experiences. Community members and organizations should play a key role in informing policy decisions to maximize benefit.
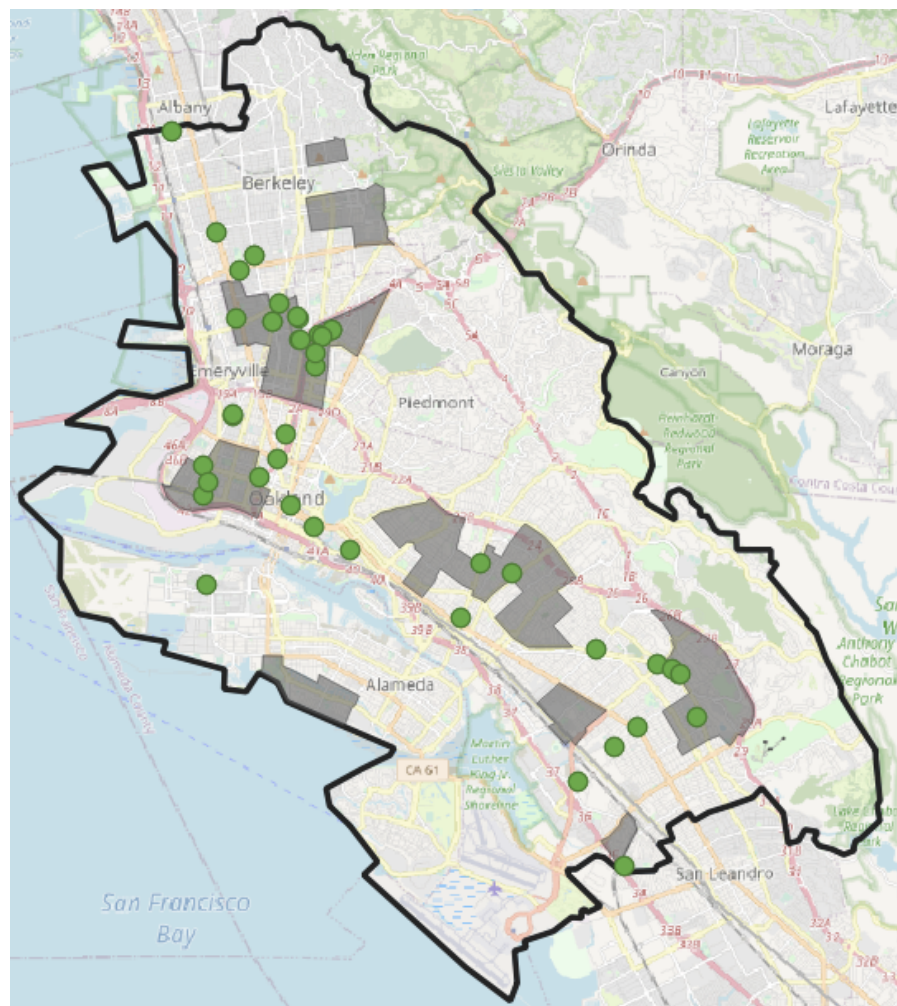
Figure 12. Community Assets. A network of youth centers, free pantries and fridges, farmers markets, and community organizations.

DISCUSSION

Food insecurity is a symptom of structural violence. Decades of neglect have left several communities in the East Bay without the means to access culturally relevant and nutritionally adequate foods. While the community has come together in ingenious ways to create solutions, they simply do not have the resources to meet the needs of every food insecure household, nor should they be responsible for filling the gaps the government has created. A comprehensive policy solution is costly, but essential. Such a policy framework would support the economic development of local businesses in neglected neighborhoods, expand the social safety net to allow residents to support those local businesses and access quality produce, and protect residents from displacement that could occur due to gentrification.

Improving Food Access by Strengthening Community Assets

A Department of Food should be developed with key goals of supporting local food related business development and strengthening existing community food systems (Unger and Wooten 2006). Two key takeaways from my interviews inform this suggestion. First, after discussing the failures of past interventions, it is clear that a strong, organized, and sustained system for development and support is key to the success of any intervention. I also learned that since the food access issue is part of a larger issue, food apartheid, it is essential to create a solution that will uplift and empower the community and its economic systems directly. The Department of Food needs to focus on empowering a community food system: a system in which healthy food is produced, distributed, and consumed locally, allowing "farmers and their customers to develop relationships that enhance food security by cutting out the middleman" (City Slicker Farms). A food system that is locally conducted empowers and strengthens the community, as opposed to a food system influenced by international market forces, which has proven to exclude low income communities of color.

One way to do this is to support local businesses through corner store conversions. Although food desert neighborhoods are without major supermarkets with fresh produce, they are often abundant with locally owned corner stores. Rather than attracting grocery stores owned by major corporations, the government has the power to support those smaller local businesses to

carry healthier options. One example of this support is the Fresh Food Financing Initiative, which began in Pennsylvania in 2004. The program provided funding to support the renovation of grocery stores to improve food access in underserved areas (Graves). Another intervention that could be initiated is modeled in New York City. The city's Food Retail Expansion to Support Health program "provides real estate tax reductions, density bonuses, and reduced parking requirements" for businesses that provide healthy produce (Graves). Both of these programs provide economic incentive for local businesses to expand their merchandise and carry fresh produce options. Reducing the cost of corner store conversion is helpful, but support beyond financing is needed for corner store conversions to be successful, as indicated in one of my interviews. To ensure the success of these developing small businesses, leadership and guidance should be provided. This could look like streamlined license and permit processes, connecting food retail stores to produce distribution programs, and connecting retailers with local urban gardens (Unger and Wooten 2006).

Another way to improve food access and empower communities is to support the expansion of urban agriculture. Urban agriculture allows community members to engage collaboratively with each other, improve their knowledge of produce and cooking to contribute to improved dietary decisions, and to grow culturally appropriate produce which may not be available in many grocery stores. A study of vacant land in Oakland by Portland State University Urban Studies and Planning faculty identified 1200 acres of arable public land within the city, mostly located in East Oakland and the West Oakland flatlands (McClintock et al). The locations of these arable sites directly align with the areas of highest food insecurity. The study found that, if only 14% of this land was used, as much as 3% of Oakland's produce consumption needs could be met by urban agriculture (McClintock et al). If even just 30% of the land was used, a considerable portion of produce consumption needs of the most food insecure households could be met.

Expanding the Social Safety Net

To effectively combat food insecurity, it is essential to expand the social safety net that helps low income individuals access quality foods. One major component of food insecurity besides physical access is economic insecurity, as revealed both by the interviews conducted during the study and the demographic analysis of food desert neighborhoods, which demonstrated concentration of low income households in food desert census tracts. There needs to be a strong effort

to maximize enrollment in food assistance programs. Both CalFresh and the Free and Reduced Lunch programs can be improved and expanded to decrease food insecurity in the East Bay.

CalFresh is part of the federal Supplemental Nutritional Assistance Program (SNAP). This is "the largest federal food assistance program, [which] provides eligible individuals and households with money to buy food via an electronic benefit transfer card that functions like a debit card" (Graves). For local governments, this program is extremely cost effective; the "federal government provides 100% of benefits and covers 85% of a county's administrative costs" (Graves 2015). Despite these strengths, the program's application process is difficult to navigate, many households are unaware of their eligibility, and the eligibility requirements bar many food insecure households from using the program. In addition, benefits often stop without warning; this happens when recipients fail to submit documents confirming their sustained eligibility, but the program does reach out to recipients to inform them of the requirement before the due date. To improve the reach of CalFresh, income eligibility requirements should be expanded. Currently, a household is only eligible to receive benefits if their income falls below 130% of the Federal Poverty Level (Legal Services of Northern California). In addition, the administration of the program should be improved. Households should be sent mailers informing them of their eligibility, should be sent scheduling options for their interviews, and should be sent reminders of documents needed to continue receiving benefits.

Another program that could be improved is the Free and Reduced School Lunch (FRL) program. The Free and Reduced Lunch program is a critical component of food security for students in low income households and who might be living in food deserts. Similarly to CalFresh, the federal and state governments fund the program by reimbursing school districts for the number of FRL meals served, making it a low cost program for local governments (Graves 2015). A number of improvements could be made to the program. First, similar to CalFresh, there should be an outreach program to inform families of their children's eligibility for the program. The program could also be expanded to include take-home meals, meal kits, or produce packages for children in low income households. Since there is a large share of school-aged children in food desert census tracts and public schools are relatively evenly distributed throughout the study site, this could be an effective way to reach households facing high levels of food insecurity. In addition, FRL meals should be improved to include more culturally appropriate meals. As discussed in the interview portion of the study, cultural relevance is essential; many students may not even want to eat

meals if they are not culturally relevant. Cultural relevance can be improved by the development of a farm to school program, in which urban farms and community gardens supply schools with nutritious and culturally relevant produce (Unger and Wooten 2006). This farm to school program would also help support economic development of urban agriculture systems in the East Bay.

Rebuilding Neighborhoods: Addressing Segregation, Concentrations of Poverty, and Gentrification

Food deserts are in large part the result of historic policy that has created highly segregated neighborhoods with concentrations of poverty that are geographically isolated from better resources communities. Inequalities of place, such as food access, cannot be fully addressed without comprehensive inclusive housing policy and community development. It is also essential to protect residents from gentrification as their neighborhoods change and access to resources improves.

One essential step to reconnecting food desert neighborhoods to the rest of the city is to improve public transportation services, specifically by increasing the frequency of buses running through food desert neighborhoods. It is important to acknowledge that transit-oriented development (TOD) does have the potential to contribute to gentrification; "TOD creates conditions for real estate investment, so land values are expected to increase, which would lead to restrictions for low income groups with regards to housing and maintaining their residential locations" (Padiero et al. 2019). It is also important to acknowledge the role of urban agriculture in gentrification, as mentioned in the interview portion of the study; "as once vacant and undervalued land becomes more valuable, we see increases in property values, taxes, rents, and resulting gentrification and displacement of low income residents" (Rosan 2020). It is crucial to protect residents of food desert neighborhoods from gentrification and displacement, to make sure that the policies designed to help them do not end up harming them.

To protect residents from displacement, I suggest two policies: rent control and civil right to counsel. Rent control prevents exuberant increases in the cost of living as an area develops, which allows residents to remain in their homes even though the area they live in is improving and market rates may naturally rise otherwise. A study of rent control found "no evidence that rent control or public housing caused market rents to rise" (Troutt 2020). Another component to protecting residents is providing civil right to counsel. Housing instability is most strongly caused by

eviction, and "tenants who go to landlord-tenant court without a lawyer almost always lose, and indigent tenants are almost never represented by counsel" (Troutt 2020). Closing the gap in representation in court between landlords and low income tenants can increase housing security and prevent displacement by wrongful eviction.

In addition to protecting residents from displacement, it is important to make neighborhoods equally accessible to families regardless of their income or race. This can be done by expanding the Housing Choice Voucher Program, and prioritizing inclusionary zoning to increase the amount of affordable housing. The Housing Choice Voucher Program supplements the rent of extremely low income families, and studies have shown that, in terms of poverty de- concentration, voucher recipients are more likely to live in low poverty neighborhoods and are less likely to live in high poverty ones (Aronson et al.). The program's impact could be strengthened by increasing the availability of vouchers by expanding income eligibility requirements, and by increasing the number of participating landlords through a landlord outreach and incentive program.

Another important component of neighborhood accessibility is inclusionary zoning, which makes the approval of a development conditional on its inclusion of a number of affordable units, to ensure that market-rate developers will accommodate low income residents (Troutt 2020). To increase availability of affordable housing, Alameda County should mandate inclusionary zoning laws for all new developments, and increase requirements for the number of affordable units in new developments.

Limitations and Future Directions

One of the main limitations of my study was time. Since I decided to implement interviews in the final stages of my project, I was only able to conduct three interviews. While the interviews were extremely insightful, the three interviewees do not serve as an accurate representation of my entire study population; this limitation likely resulted in an underrepresentation of community assets in my community asset map. In addition, relying on census data caused a few limitations. Census data excludes homeless populations, who are a large and highly food insecure population here in the East Bay. In addition, the census uses an aggregated representation of Asian Americans, which results in an underrepresentation of food insecurity among Asian American families. Finally, I did not have time to explore solutions to food insecurity among college students as much

as I would have liked to. A significant portion of food desert census tracts surrounded the UC Berkeley campus, indicating that food insecurity is a significant issue for students.

In the future, it would be wise to conduct a broader set of interviews. Instead of interviewing just a few key informants, it would be helpful to interview food insecure households of many different backgrounds. Increasing the number of interviews and broadening the scope of the interviews would create a much richer understanding of community strengths and resources, which could be used to strengthen the policy recommendations I provided. Interviews should also be conducted with college students about their experiences with food insecurity, and what resources they turn to. It would also be helpful to find more detailed population data. This could include disaggregated racial data, household size and daily structure information, and more.

Broader Implications

One of the main implications of my study is that the term food desert should be abandoned, and the issue should be reframed as food apartheid. Through each stage of my research process, it has become increasingly clear that the issue of food insecurity is much more complex than simply a lack of grocery stores. Without addressing the deep structural forces that created food deserts, such as housing inequality and long-term community divestment, the issue of food insecurity will not be resolved. It is essential to include community members in important conversations and decision-making processes to address these larger issues.

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