

**Exploring Issues of Access to Nutritious Foods: Seattle
High Schools and Food Environments**

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Abstract

Food-related health problems remain widespread throughout the United States. A growing body of research shows that certain populations are disproportionately affected by issues of access to nutritious foods. Limited access is often the result of structural risks and barriers in the “food environment,” including socioeconomic status, physical proximity to food store locations, etc. The purpose of this study is to explore food environments in the city of Seattle for evidence of related disparities between youth of different backgrounds. The findings could support policies to improve access to nutritious foods for all.

Chapter 1: Introduction & Literature Review

Hunger, obesity, diabetes, and other food-related health issues continue to plague communities throughout the United States. These problems remain widespread despite a number of government programs and initiatives to assist those in need. Furthermore, we know that certain populations are disproportionately affected by these issues. For example, Black and Hispanic households experience more than twice the rate of food insecurity than White non-Hispanic households.¹ Similarly, rates of obesity are significantly higher among Black and Hispanic populations.² Socioeconomic status (SES) is also known to be closely related to level of access to nutritious foods.

Explanations for known disparities in access to nutritious foods and food-related health issues fall into several schools of thought. Many would argue that the most important causal mechanisms exist at the individual level; meaning that outcomes are largely the result of poor choices, lack of education, etc. Alternatively, some would argue that these disparities are better explained as the results of structural mechanisms that influence and limit people's choices and abilities. The distinction between these explanations is of great importance, not only in understanding causal mechanisms, but also in how to implement policy interventions that are appropriate and effective. For example, proponents of individual-level interventions might propose education programs that teach individuals or families about nutrition and health. Alternatively, advocates for structural-level interventions might suggest government regulation of food industries and increased spending on social welfare programs like the Supplemental

¹ United States Department of Agriculture Economic Research Service (2015). *Food Security in the U.S.* Retrieved from <http://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/key-statistics-graphics.aspx>

² Centers for Disease Control and Prevention (2014). *Adult Obesity Facts*. Retrieved from <http://www.cdc.gov/obesity/data/adult.html>

Nutrition Assistance Program. Of course, both approaches seem well-intentioned; but, the potential outcomes are drastically different. With this in mind, my research attempts to explore how, and the degree to which, food environments affect access to nutritious foods.

To better understand issues of access to nutritious foods, it's useful to think in terms of "food environments." The concept of a food environment helps us explore and describe how individuals and communities exist in relation to food. As such, examining food environments allows us to think about the intersection of individual and structural level factors that determine access to nutritious foods. Food environments might include measures of physical access, income level, cultural influences, and so forth. The Centers for Disease Control define the food environment as, "the physical presence of food that affects a person's diet, a person's proximity to food store locations...[or]any physical entity by which food may be obtained, or a connected system that allows access to food."³ This definition is informed by more traditional understandings about access to nutritious foods, including the idea of the existence of food deserts. Alternatively, the USDA simply defines the food environment as, "...determinants of food choices and diet quality."⁴ I prefer the USDA's definition for its simplicity, but also because it allows us to consider other structural, non-physical elements of the food environment such as socioeconomic status (SES) and advertising, for example.

I would argue that inadequate access to nutritious foods, and the resulting health outcomes, are in large part the result of structural-level injustices. Individuals are not solely responsible for inequities in food environments. Rather, food environments are born within the context of a myriad of interconnected policies, cultures, business interests etc. As such, my

³ Centers for Disease Control and Prevention (2014). *General Food Environment Resources*. Retrieved from <http://www.cdc.gov/healthyplaces/healthtopics/healthyfood/general.htm>

⁴ United States Department of Agriculture Economic Research Service (2015). *Food Environment Atlas*. Retrieved from <http://www.ers.usda.gov/data-products/food-environment-atlas.aspx>

research seeks to explore characteristics of local food environments so as to highlight structural risks and barriers that certain populations face in terms of access to nutritious foods.

SES & Access to Nutritious Foods

As mentioned above, socioeconomic status is often associated with lower levels of access to nutritious foods and higher rates of food-related health issues. For example, we know that hunger, and in some cases obesity, are negatively correlated with income level; meaning that rates of both health problems increase as SES decreases. The same is true of hunger/obesity and education levels (Ogden, Lamb, Carroll, & Flegal, 2010). As such, it appears that socioeconomic factors play a large role in determining levels of access to nutritious foods. In fact, experts from the Center for Public Health Nutrition at the University of Washington argue that socioeconomic factors are perhaps the most salient variables in predicting “access” (Drewnowski et al., 2014, p. 312).

In their report *Food environment and socioeconomic status influence obesity rates in Seattle and Paris*, Drewnowski and a team of researchers found that “physical distance to the primary supermarket had no impact on obesity rates either in Seattle or in Paris. These findings run counter to the general consensus in the United States that distance to the nearest supermarket is a predictor of diet quality” (Drewnowski et al., 2014, p. 311). Rather, Drewnowski et al. (2014) explain, “low income communities may be vulnerable to obesity not because the nearest supermarket is several kilometers away, but because lower-cost foods tend to be energy dense but nutrient poor” (p. 312).

In the above study, researchers asked participants to self-report heights and weights and respond to a series of questionnaires. Participants’ addresses were geocoded and surrounding food environment characteristics were determined, in part, by using online tools such as

GoogleMaps and Yelp. Also, surrounding supermarkets were classified into three price categories. Finally, a regression analysis was performed to measure the association between “individualized food environment variables, SES and obesity risk” (Drewnowski et al., 2014, p. 309). Again, SES was found to be closely associated with obesity.

Local Community Concerns & Access to Nutritious Foods

Local community-based projects have also identified structural risks/barriers and the importance of SES in terms of access to nutritious foods. The *Seattle Women and Food Access: Learning from Women in Delridge* report outlined the “top priorities for women in Delridge” as they pertain to “food access.” This project asked participants to attend workshops where a series of qualitative questions and exercises took place. Also, surveys were administered to local women at three “normal food bank distribution times” at the West Seattle Food Bank (WSFB) (p. 16). Survey responses were coded, aggregated, and percentages were used to highlight the frequency of specific concerns.

Women in the Delridge neighborhood were selected for two main reasons. First, it was important to involve women “given the reality that women still occupy household management roles in our society and play a critical role in ‘meeting the food and nutrition needs of their families’” (“Seattle Women and Food Access,” 2014, p. 10). Essentially, more often than not, women are the “food experts” in their respective households. Secondly, focusing on residents of Delridge was important because their neighborhood had been identified as a “Limited Food Retail Access Area” given geography and community demographics (p. 11). Some of the unique geographic characteristics that make Delridge a limited access area include lack of public transportation, steep hills on either side of the neighborhood’s north/south-running corridor, and

no “full service” grocery stores (p. 12). Interestingly, however, the most pressing community concern was economic opportunity.

While only 11% of respondents said that “distance to the grocery store limited access to healthy food,” a whopping 35% said “healthy food is too expensive,” and another 20% said they were affected by federal and state cuts to food stamp benefits (“Seattle Women and Food Access,” 2014, p. 17). Furthermore, the number one priority for workshop participants was creating “Community Economic Opportunity.” The next priority concerned transportation options, but “good jobs at a wide-range of skill-levels in or near the community for current residents [and] more affordable high quality and organic produce” were the main focus of residents’ concerns (p. 21).

The *Seattle Women and Food Access* report demonstrates the value of community engagement; furthermore, the report identifies socioeconomic access to nutritious foods as a relevant area of research, especially given the current rate of growth in Seattle. To a lesser extent, the report also illustrates how physical characteristics of a food environment can reinforce other risks and barriers. Again, these are largely structural issues that adversely affect access to nutritious food.

Advertising, Race/Ethnicity, & Access to Nutritious Foods

In addition to the impacts of SES and geography, corporate and business interests also play an active role in shaping food environments. Food has become commodified to the point that corporate producers are rarely, if ever, concerned with the nutritional value – or lack thereof – of what they’re selling. In her book *Appetite for Profit*, Michele Simon explains that corporations do not operate with intentional malice so much as it’s simply their nature to be profit-driven; the results of which are often disastrous for the environment and public health.

Make no mistake about it – food corporations exist to generate profits. Admittedly, there is a distinction to be made here between major corporations and local businesses that are perhaps more concerned with quality and nutrition. That being said, any food-selling entity would cease to exist if it wasn't paying attention to the bottom line.

As our food production system has become so profit-oriented, advertising and marketing efforts have been taken to the extreme. Advertising remains one of the most effective strategies for increasing profits and market share. Furthermore, as technology and media continue to advance, there are seemingly endless opportunities for new marketing and advertising strategies; or at least new platforms for old strategies.

Youth are especially impressionable when it comes to food advertising. This is partly due to a relatively limited ability to identify advertising apart from other types of media messaging. Not to discount or underestimate the perceptive abilities of young people, but as Connell, Brucks, & Nielsen (2014) explain, “While children respond readily to messages of fun and happiness, they are unlikely to consider advertiser motivations or to integrate these understandings with multiple product dimensions into their processing of advertising messages” (p. 120). Essentially, advertising can be very subtle, the effects of which often work at a subconscious level even among adults. Furthermore, Connell et al. (2014) explain that, “what is learned early is learned well,” implying that the effects of advertising last into adulthood (p. 121). For food companies, this means a golden opportunity to create brand recognition/loyalty among a group of consumers whose spending power will only continue to grow into the future.

Snack FACTS 2015, published by a group of researchers from UConn Rudd Center for Food Policy & Obesity, examined recent marketing and advertising efforts targeting children. Their research specifically focused on “snack foods” that are typically calorie rich and nutrient

poor (Harris et al., 2015, p. 6). Harris et al. (2015) made use of Nielsen syndicated data describing advertisers' spending across several food categories as well as demographics of audiences. Furthermore, "USDA Smart Snacks standards" were used to analyze the nutritional content of advertised food products (Harris et al., 2015, p. 6). Data for the years 2010 and 2014 were compared so as to measure any differences in the frequency and type of advertising as well as any changes in target audience. Harris et al. (2015) found that both Hispanic and Black youth were significantly more likely to be exposed to advertising for "snack foods." Although this is in part due to differences in the average amount of time spent watching television, their findings still show that a disproportionate amount of advertising dollars are being spent on Spanish language television as well as on programs with predominantly Black audiences (Harris et al., 2015).

In addition, Harris et al. (2015) found that the disparity between races/ethnicities in levels of exposure to food advertising is steadily increasing over time (p. 59). For example, data shows that "Black children and teens viewed 29% and 49% more snack food ads in 2014 than in 2010, while exposure for white children and teens increased by only 16% and 25%" (Harris et al., 2015, p. 59). These numbers suggest that food advertisers are intensifying their efforts targeting specific demographics. Again, this is a clear example of a structural mechanism that creates disproportionate risks for certain populations.

Summary

Knowing the disparities that exist between people of different backgrounds in access to nutritious foods, we should explore ways of creating more equitable food environments for all communities. The underlying motivation for my own research is the belief that all people have a

basic right to adequate access to nutritious foods. As such, we should seek to identify and address structural injustices with effective policy interventions.

Chapter 2: Questions, Methodology, & Hypotheses

Research Question

In my research, *I asked whether relationships between race/ethnicity, SES, and characteristics of the surrounding food environment indicate disproportionate risks and/or barriers for certain populations.* My “target populations” were free and reduced lunch (FRL) students, Black students, and Hispanic students at Seattle public high schools. The percentage of FRL students at a school (% FRL) was the best available indicator of SES or income level. Essentially, I worked on the assumption that students at a school with a higher % FRL were, on average, of lower SES. Again, based on previous research identifying SES as a strong predictor of access to nutritious foods, I assumed that FRL students would generally have more limited access to healthy foods.

Black and Hispanic students were also included as “target populations” because of the related disparities discussed earlier. For example, assuming that similar disparities between races/ethnicities in hunger and obesity rates (as found in larger studies) hold true at a local level, Black and Hispanic students would be at a higher risk to begin with. Furthermore, given recent research showing increasing disparities between races/ethnicities in levels of exposure to junk food advertising, I assumed that local Black and Hispanic youth face additional structural risks. For these reasons, I wanted to pay special attention to schools with a higher percentage of FRL, Black, and/or Hispanic students.

I chose to focus on high schools, in part, because of the neighborhood school assignment system.⁵ The neighborhood school assignment system automatically assigns students to the nearest public high school. The Seattle school district does have an “open enrollment” two-week period, where students can apply to attend other schools, but the vast majority of students end up attending the high school nearest to their home.

As discussed below, there are fairly distinct demographic differences between Seattle neighborhoods. Thus, the school assignment system tended to result in school populations that reflected similar racial/ethnic and socioeconomic characteristics. In effect, the schools almost functioned as pre-selected samples for the variables I was most interested in (% FRL/Black/Hispanic). Admittedly, this was convenient for the purposes of my research, but of course this raises a number of concerns about diversity and segregation in our schools.

I chose to focus on high schools because high-school-aged youth are a target demographic for food companies, in part, because they’re developing individual brand/ taste preferences (hence the aggressive advertising tactics discussed above). Research has shown that the tastes we develop in our youth have profound effects on our diets and related health outcomes into adulthood. Furthermore, teens have tremendous purchasing power and tend to spend on food (Barmann, 2014). For these reasons, teens are generally thought of as being at greater risk. That being said, for the very same reasons, adolescence is an ideal time for interventions that promote healthy lifestyles and the importance of nutrition. I would argue that this time period in a young person’s life represents a window of opportunity. Thus, it’s crucial that we work to understand the forces at play and recognize that certain youth might require special attention and assistance in securing adequate access to nutritious foods.

⁵ Seattle Public Schools (2016). *Open Enrollment Fast Facts*. Retrieved from <https://www.seattleschools.org/cms/one.aspx?pagelid=9359205>

Methods

My methods consisted of exploratory data analysis, using both spatial and quantitative data. I chose these methods to allow exploration of potential relationships between pertinent variables. I started by creating demographic maps of the city of Seattle using American Community Survey estimates for 2014 (most recent available year) from the U.S. Census Bureau.⁶ I then mapped food environments surrounding Seattle public high schools using Google maps (described below). With the data from my maps and secondary data from the school district's high school reports⁷, I ran simple correlations to measure the strength of relationship between selected variables. Those variables included percentage of FRL students (% FRL), percentage of Black students (% Black), percentage of Hispanic students (% Hispanic), percentage of White students (% White), average distance to different food resource types (Avg. Dist. [type]), and the number of different food resource types (# [type]) within the designated environment.

Initially, I had wanted to focus more on the socioeconomic and other non-physical elements of the food environment. For example, I might have liked to explore disparities in advertising exposure between students of different racial/ethnic and socioeconomic backgrounds. However, due to time constraints and, more importantly, limited access to potential research participants, I instead focused on physical characteristics of food environments surrounding high schools. In doing so, my aim was to look for indicators of risks and/or barriers for certain populations that might act to reinforce other known inequities in food environments. For example, assuming that Black high school students do in fact view a disproportionate number of

⁶ Social Explorer (2016). Retrieved from <http://www.socialexplorer.com>

⁷ Seattle Public Schools (2016). *2014-2015 School Reports*. Retrieved from <http://www.seattleschools.org/cms/One.aspx?portalId=627&pageId=6369011>

junk food ads, are there other aspects of the food environment (perhaps an abundance of fast food restaurants) that might additionally contribute to adverse outcomes?

To explore questions like these, I created a series of Google maps. I started by mapping all of the food resources within roughly a half-mile radius of each high school. I chose a half-mile radius because, assuming that the average person walks about three miles per hour, it represents roughly a 20 minute round-trip walk for students who have a half-hour lunch break. In addition, I classified food resources into six different types which I considered to be more or less “healthy.” This allowed me to measure the average distance between schools food resources, as well as count the number of total resources within the designated environment.

In an effort to remain as objective as possible and ensure consistency in comparisons, I created a set of “food resource type classification criteria.” The criteria are as follows:

Grocery: *Bulk foods, selling fresh produce, meats, grains/cereals, dairy, etc.*

***Market:** *Selling only produce and/or local/artisan food products*

***Mini-mart:** *Convenience store, small selection of processed snack foods*

Small Business: *Sit-down restaurants, cafés, or non-fast food takeout, local and/or non-chain*

Chain: *Non-fast food restaurant, café, or specialty chain/franchise (i.e. Starbucks, Panera, Menchie’s, etc.)*

Fast Food: *Hamburgers, fried foods, etc., inexpensive, mostly takeout/drive-thru, large brand names (i.e. McDonald’s, Burger King, Wendy’s, Taco Bell, KFC, etc.)*

* = *Sample size not large enough to test for individual food resource type relationship to other variables.*

The first three resource types (Grocery, Market, and Mini-mart) represented food stores that mostly sell unprepared ingredients and/or processed foods. “Mini-marts” were considered the

least healthy of these resource types because they typically sell processed junk foods rather than unprocessed/whole ingredients. The last three resource types (Small Business, Chain, and Fast Food) represented restaurants and food stores that mostly sell prepared foods. Again, I considered “Fast Food” the least healthy resource type of these three, although this was a trickier distinction to make. For example, some resources classified as “Small Business,” like Rain City Burgers (located near Roosevelt High School), served at least vaguely similar food to “Fast Food” restaurants like McDonald’s. The difference here is that Rain City Burgers uses grass fed beef and fresh vegetables among other healthier ingredients. Also, Rain City is currently a locally owned and operated small business with only one location. Now, does this make Rain City Burgers more nutritious than McDonald’s? It depends on your definition of “nutritious.” Admittedly the distinctions here are somewhat subjective and represent a weakness in my methods. However, I tried as best I could to consistently follow the above criteria.

In my study, I chose to include the 10 main Seattle public high schools. From north to south those schools are: Ingraham, Nathan Hale, Roosevelt, Ballard, Garfield, West Seattle, Franklin, Cleveland, Chief Sealth, and Rainier Beach. I omitted 5 smaller, alternative schools mostly because of their relative size but also because several are located within a short walking distance of much larger schools that were included.

Again, my maps allowed me to collect data about the physical characteristics of food environments surrounding high schools. Coupled with secondary data from school district reports, I was able run simple correlations to test for strength of relationship between selected variables. The Seattle school district’s high school reports were publicly available via the

district's website.⁸ Data from these reports are included in the appendices of this paper.

Limitations

I'd like to acknowledge several limitations. First, I was not able to collect data from any of the selected schools on the number of students who eat on/off campus. This is a significant limitation because if we assume that FRL is a good indicator of SES, it seems unlikely that students at schools with higher % FRL would buy lunch off campus as much. I made several requests to access school-level data on how many lunches were served per day, which would have at least given me an idea of the number of students who do *not* eat school lunch; however, school district representatives were unable to provide me this data.

Another limitation is that I calculated distance between schools and food resources “as the crow flies,” meaning in a straight line. Thus, the distances I used don't capture a perfectly accurate distance at street level.

An unknown number of students drive off campus for lunch. I would assume that access to a car is positively correlated with SES and, furthermore, students likely drive beyond a half-mile radius of their school. This further complicates the issue of how many students are actually participating as consumers in the food environments I imagined.

Finally, the demographic categories I used (as reported by the Seattle School District) are somewhat broad. Obviously, for example, there are a variety of much more specific backgrounds and identities that exist within “Hispanic.” This is an important limitation because if we disaggregated these demographic categories, we might be able to find issues that pertain to more specific communities and populations. In turn, we might be able to come up with more effective

⁸ Seattle Public Schools (2016). *High Schools in Seattle Public Schools*. Retrieved from <http://www.seattleschools.org/cms/One.aspx?portalId=627&pageId=2301183>

policy interventions. Hypothetically, for example, a smaller group of Peruvian students (within the category “Hispanic”) might be particularly affected by issues of food insecurity. In such case, it would be useful to have this information so that resources could be directed towards the group(s) of students who are most “at-risk” or in need.

Keeping these limitations in mind, I would still argue that the physical food environment is important; even if its influences work at a subconscious level, shaping the way youth imagine food and nutrition. Much like advertising, the physical presence of certain food resources subtly affects a person’s thought process in deciding which types of food they prefer. For example, if a young person grows up in an environment with no grocery stores and an abundance of fast food restaurants, it’s more likely that they will have a preference for fast food. For these reasons, regardless of the aforementioned limitations, I would argue that the physical food environment remains relevant.

Hypotheses

My hypotheses follow the assumptions that non-White and lower-SES communities are generally at higher risk of having limited access to nutritious foods, as shown by research discussed in my literature review. As such, we would expect Black and Hispanic students to have limited access in socioeconomic terms and, furthermore, we would expect low-income, Black, and Hispanic students to have limited physical access as well. Thus, my hypotheses are as follows:

First, I expect to find a strong relationship between race/ethnicity and % FRL. More specifically, I hypothesize that there will be a positive relationship between % Black/Hispanic and % FRL. This means that as the percentage of Black or Hispanic students at a school increases, I expect the number of FRL students to increase as well. Also, I hypothesize that there

will be a negative, although weaker, relationship between % White and % FRL. Again, this means that I expect the percentage of White students at a school to increase as the percentage of FRL students decreases. Using % FRL as our best indicator of SES or income level, these hypotheses indicate that I expect to find significant socioeconomic disparities between White and Black/Hispanic high school students.

Secondly, I predict that there will be a positive relationship between the percentage of students who belong to our “target demographics” (FRL, Black, and Hispanic) and the average distance to grocery stores, markets, and small businesses. As a reminder, these are the food resources I considered relatively healthy. Essentially, I hypothesize that the healthiest food resources will, on average, be farther away from schools with a higher percentage of FRL, Black, or Hispanic students.

Lastly, I predict that there will be a negative relationship between the same demographic categories and the average distance to mini-marts and fast food restaurants. Again, as a reminder, these are the two food resource categories that I consider least healthy. This means I expect that as the percentage of FRL, Black, or Hispanic students increases, the average distance to the least healthy food resources will decrease.

Notably, I did not make any hypotheses regarding % White and the average distance to food resources, primarily because I was unsure how higher SES might relate to prevalence of/proximity to different food resource types. For example, if White students are in fact generally of a higher SES, might food store locations (including unhealthy options) be attracted by this market? Also, I did not include “Chain” resources in my hypotheses because this was the most vague resource type, meaning it would be especially difficult to make any assumptions about nutritional quality or affordability. Finally, I did not make any hypotheses regarding the number

of resources within designated food environments versus the average distance because I assumed that the findings would be roughly the same.

Chapter 3 Findings & Discussion

Seattle Demographics

As illustrated by Maps 1-4 in my appendices, I found noticeable demographic differences between Seattle neighborhoods. This result is somewhat unsurprising given the local history of residential segregation. For example, many communities within Seattle had “racial restrictive covenants” against selling or renting property to non-White buyers/renters (“University of Washington Seattle Civil Rights & Labor History Project,” 2016). Some areas were also “sundown towns,” meaning people of color were required to leave before nightfall. Many of our local neighborhoods continue to reflect historical patterns of segregation and discrimination to this day.

Generally, median household income and higher education levels were higher in North Seattle and lower in South Seattle. However, we do see some exceptions, including higher-SES areas along the water throughout the city and lower-SES areas around Lake City and Aurora/Hwy 99 in the north end. For the purposes of my research, it’s most useful to look at the areas surrounding the approximate locations of the high schools (marked by red stars in Maps 1-4). It seems that several schools in the south end (including Franklin, Cleveland, Chief Sealth, and Rainier Beach) and at least one school in the north end (Ingraham) are located in and around lower-SES areas.

Again, as with SES, there were distinct differences in race/ethnicity between neighborhoods in Seattle. I found higher percentages of both Black and Hispanic populations in South Seattle. More specifically, Black/African-American populations tended to be especially

concentrated in close proximity to Franklin and Rainier Beach. Meanwhile, Hispanic/Latino populations tended to be more concentrated near Cleveland, Chief Sealth, and Rainier Beach. Although these findings aren't unexpected, they are worth keeping in mind as we explore high school demographics and food environments.

High School Demographics

Unsurprisingly, given the neighborhood school assignment system, I found that school demographics tend to reflect neighborhood demographics. For example, as of 2014, Roosevelt High School, located in Northeast Seattle, had 67% White students and only 14 % FRL students. By comparison, Rainier Beach High School, located in South Seattle, had 51% Black students and 80% FRL students. Translating the percentages to number of students, as of 2014 Rainier Beach had about 20 White students compared to more than 1,000 at Roosevelt. Meanwhile, Roosevelt had somewhere around 85 Black students compared to more than 300 at Rainier Beach, a school less than half its size. This illustrates some of the most extreme demographic differences between high schools in different parts of Seattle.

To be clear, my research did not specifically focus on or discuss the advantages/disadvantages of the neighborhood school assignment system, although I would argue that this system likely extends existing patterns and disparities in a largely segregated landscape. Furthermore, my research regarding race/ethnicity was limited to issues of access to nutritious foods. That being said, I would recommend that future research further explores the implications of diversity, or a lack thereof, in high schools.

High School Food Environments

My high school food environment maps show the location and number of food resources within a half-mile radius of each school (see Maps 5-14). There are quite obvious differences

among the maps in distance between schools and the nearest food resources. Furthermore, some schools appear closer in proximity to mini-marts and fast food restaurants. Finally, some food environments are in part characterized by significant physical barriers that would make access to the nearest food resources considerably more difficult (see Map 12: Cleveland High School).

Some of the contrasts in food environments are quite striking. For example, Roosevelt High School, located in a predominantly White, higher-SES neighborhood, has a relatively large number of food resources within a short walking distance. Furthermore, looking at the list of resources (see Table 3.1), the variety of resource-types is good. For example, within two-tenths of a mile are a grocery store, a produce market, and a large number of restaurants and small businesses. Obviously, in terms of physical accessibility, Roosevelt students have an abundance of choices and options.

Rainier Beach High School, located in a lower-SES neighborhood with a higher percentage of Black and Hispanic residents, also has a good number of food resources within short walking distance; however, several of those resources are fast food restaurants (represented by the red markers in Map 14). For example, the closest resource is a Jack in the Box, and not much farther away are a McDonald's, Taco Bell, and KFC. So, although there is relatively good physical access to food resources, we can tell intuitively that those resources are generally less healthy.

Another example is West Seattle High School, where there is a large variety of food resources within a short walking distance; however, it just so happens that the closest is a McDonald's, less than 1,000 feet away. We would need to collect data on students' lunch-time eating habits to know the significance of this finding; however, this is obviously a potential area of concern.

Finally, Cleveland, located in a lower-SES neighborhood with a relatively higher percentage of non-White residents, is another example of a school that is more physically isolated. Although the average distance to all food resources (0.34 miles) was comparable to some other schools, you'd have to navigate around a freeway, railroad tracks, and a steep hill to arrive at the nearest food resource. Furthermore, virtually all of those resources are small businesses, several of which are bars/taverns that serve an adult clientele.

These four examples begin to illustrate some of the differences in food environments between school neighborhoods. Again, we should keep in mind that to better understand the implications of these findings we would need to collect data on students' eating habits. Nevertheless, I would argue that the food resources in a young person's environment affect their perceptions of food and nutrition. In part, this argument follows research on the importance of "age-of-acquisition" in recalling and conceptualizing words, objects, and so forth (Ellis, Holmes, & Wright, 2010). Developmental psychologists have found that people are more able to recognize "early learned brands" (Ellis et al., 2010). Of course, the ways people learn brands include exposure in the physical food environment. Much like with television advertising, I argue that food environments play an important role in "teaching" tastes, preferences, etc. Thus, my findings remain relevant and, at the very least, raise a number of other questions that future research might seek to explore.

Race/Ethnicity & Socioeconomic Status

As predicted, there were moderate to strong relationships between race/ethnicity and SES (as measured by % FRL), although these relationships differed slightly from what I had predicted (see Table 11). First, I did find positive relationships between % Black/Hispanic and % FRL. This indicates that as the percentage of Black or Hispanic students at a school increases, so does

the percentage of FRL students. However, the relationship between % Hispanic and % FRL was somewhat weaker than expected; only a moderate positive relationship ($r^2 = 0.32$). The relationship between % Black and % FRL was a very strong positive relationship ($r^2 = 0.88$). Thus, as the percentage of Black students at a school increases, so does the percentage of FRL students. Finally, the strongest relationship between race/ethnicity and SES was between % White and % FRL, where I found an almost perfect negative relationship ($r^2 = -0.98$). This indicates that as the percentage of White students at a school increases, the percentage of FRL students decreases, or vice versa (See Table 11).

These findings tell us that race/ethnicity and SES are moderately to very strongly correlated. It appears that White students tend to be from relatively affluent backgrounds, whereas Black and, to a lesser degree, Hispanic students seem to be of a lower socioeconomic status. Of course, this has implications in terms of levels of access to nutritious foods. As previous research has shown, socioeconomic status is perhaps one of the most important predictors of adequate access. Because Black and Hispanic students in Seattle public high schools seem to be poorer on average, we can assume that low SES is a risk or barrier that likely impacts their access to nutritious foods.

Race/Ethnicity, SES, & Avg. Dist. to Food Resource Types

The relationships between % Black and average distance to food resources (see Table 12) were generally weak, with the exception of % Black and the average distance to chain resources ($r^2 = 0.58$). This suggests that physical access to nutritious foods is generally not related to the percentage of Black students, except for in the case of chain restaurants. These findings are at least in part contrary to my hypotheses, as I expected to find limited access to healthier options and an abundance of unhealthy options. The relationship between % Black and the average

distance to chain resources is difficult to interpret in the absence of any other moderate/strong relationships to other food resource types because the criteria I used to categorize “chain restaurants” were somewhat vague in terms of nutritional quality. For example, according to my criteria, Panera (sandwiches, soups, etc.) and Menchie’s (frozen yogurt) were both considered chains but serve markedly different types of food. However, this perhaps tells us something about the SES and perceived purchasing power of Black youth as a consumer group. Thus, I would recommend a more in-depth analysis at a future time.

The relationships between % Hispanic and the average distance to food resources (see Table 12.1) were much stronger and positive. Interestingly, the weakest relationship was between % Hispanic and the average distance to grocery stores ($r^2 = 0.30$). I found a stronger positive relationship between % Hispanic and the average distance to fast food restaurants ($r^2 = 0.47$) Thus, it’s difficult to make any arguments about the nutritional quality of closest available options. However, the moderate/strong positive relationships between % Hispanic and small businesses ($r^2 = 0.75$), as well as all food option types ($r^2 = 0.74$) does indicate limited physical accesses at high schools with a higher percentage of Hispanic students. Again, this might tell us more about the SES and perceived purchasing power of Hispanic youth than anything else.

In stark contrast, I found weak to moderate negative relationships between % White and the average distance to all food resources (see Table 12.2). This indicates that as the percentage of white students at a school increases, the average distance to all food resources decreases. With the exception of average distance to chain restaurants which was more strongly negatively correlated with % White ($r^2 = -0.52$), there were no notable distinctions in direction or strength of relationship between average distance to different food resource types. Overall both healthy and unhealthy food resources were generally closer to schools with a higher percentage of White

students. Thus, although it appears that my assumptions about differences in proximity to different food resources types based on race/ethnicity were at least in part wrong, it is clear that all food resources tend to be closer to schools with a higher percentage of White students. This certainly indicates better access to food resources for students at schools with higher % White, but also potentially tells us something about the perceived purchasing power of youth of different backgrounds and how food businesses target markets.

In exploring the relationships between SES and physical access to food resources (see Table 12.3), I found moderately positive correlations between % FRL and the average distance to all food resource types. Again, the direction of those relationships remained the same for all food resource types. However, the strongest relationship was between % FRL and the average distance to chains ($r^2 = 0.56$). This seems to indicate that students of a lower socioeconomic status, as measured by % FRL, have more limited physical access to food resources.

In summary, I found that food resources are farther away from schools with a higher percentage of Hispanic and FRL students, and closer to schools with higher percentage of White students. This appears to be especially true for chains and small businesses. Essentially, this is evidence that non-White and lower-SES students in Seattle public high schools face additional structural risks and barriers in terms of access nutritious food resources.

Discussion of Findings

Based on my findings, it appears that there are disparities in variables that predict access to nutritious foods between high school students of different backgrounds. First, Black and Hispanic students generally seem to be of a lower socioeconomic status. I found an especially strong positive relationship between % Black and % FRL in high schools (see Table 11). This indicates that especially Black youth face disproportionate socioeconomic risks in terms of

access to nutritious foods. Again, this signals one of potentially many other risks and/or barriers that should be further explored as interrelated issues.

In terms of my findings regarding the physical food environment, it appears that Hispanic students face the most significant risks/barriers. The strongest positive relationships between race/ethnicity and average distance to food store locations was between % Hispanic and all food resource types, but especially for small businesses and chains. This suggests that Hispanic youth may particularly face disproportionate risks in terms of physical access to nutritious foods. The next strongest positive relationships between demographics and the physical food environment were between % FRL and average distance to all food resource types. Furthermore, there was a very strong relationship between % Black and % FRL.

Thus, I would argue that, based on my findings, Black, Hispanic, and low-income Seattle high school students are at a disproportionate risk of inadequate access to food resources in the environment surrounding their schools. Given the research discussed in my literature review, we can assume that these findings likely reinforce other inequities in the food environment, such as disproportionate levels of exposure to advertising for non-nutritious junk foods. Considering these issues, I would suggest that Black, Hispanic, and low-income youth be our target demographics for policy interventions that might help improve access to nutritious foods.

Chapter 4 Conclusions

Policy Implications

In terms of the policy implications of my findings, I believe there are a number of interventions that might help improve long term outcomes. First, the Seattle school district might consider allowing schools with a higher percentage of “at-risk” students to modify their curriculum so as to emphasize the importance of nutrition and health. Of course, education alone

will not immediately solve socioeconomic disparities or change the physical characteristics of a food environment; however, in the long term, education can be a powerful and is at least a first step in combatting the related risks and barriers.

The school district might also consider making changes to the school lunch program. This has more potential to immediately improve access to nutritious foods. As of now, the school lunch program is run at the district level, meaning that lunches are essentially the same at all schools. However, assuming that certain students have more limited access to nutritious foods, why not pay special attention to lunch programs at schools with a higher percentage of “at-risk” students? For example, perhaps the district could rearrange its budget so as to have funds to purchase and serve more fresh fruits and vegetables at schools with a higher percentage of low-income students. Nutrition is especially important for high-school aged youth to succeed at school and beyond. The benefits here would be both immediate and potentially long-lasting.

Additionally, it might be worth reconsidering the neighborhood school assignment system. Less than 10 years ago, students from all over the city were being bussed to high schools across town (Shaw, 2009). There are certainly advantages to the neighborhood system, for example, less money has to be spent on transportation. That being said, what are the disadvantages? Of course the demographic differences we see in high schools are only reflecting segregation at the societal level; however, what are the potential impacts of a lack of diversity in our high school classrooms? I would not necessarily argue that the neighborhood school assignment system be changed tomorrow, but simply that an open and honest discussion about the pros and cons is had. Of course, this discussion would need to take place at a city or regional level, seeing as community positions would likely differ between neighborhoods that are largely segregated as discussed above.

Finally, it might be useful to examine our zoning policies as they pertain to food store locations near public high schools. For example, does the community want to allow a McDonald's to operate within 1,000 feet of their high school? There are already a number of zoning policies regarding the location of certain businesses relative to schools. For example, strip clubs and gun shops have to be a certain distance from schools. Of course, it is already illegal for any of those businesses to sell/serve to minors. However, considering that fast food companies aggressively target youth, I would argue it's even more important to consider restrictions on where they're allowed to operate.

In thinking about the above policy implications, it should be noted that my recommendations require equal access to the political process. This is a major concern as many of these communities have historically been excluded and disenfranchised from the political system. This is a larger issue in and of itself that I do not have time to discuss here. However, it is worth asking, if schools that are most affected by these issues tend to have a higher percentage of FRL, Black, and Hispanic students, what resources and mechanisms are in place to ensure that those communities are included in the political process?

Limitations

As mentioned earlier, there were several limitations to my research. Most importantly, I was not granted permission to collect primary data from potential research participants (i.e. high school students). Again, this was in part due to the school district's lengthy review and approval process relative to the short timeline of this project. As a result, I was not able to ask students about their eating habits, taste/brand preferences, or levels of exposure to junk food advertising. Thus, although I was able to explore the physical food environments surrounding high schools, I have very limited information about how these findings impact students on a daily basis.

In place of student involvement, I attempted to gather school-level data from the district on how many lunches are served per day. Unfortunately district representatives were not able to provide that information, which would have at least helped us understand how many students are *not* eating school lunches.

Another limitation was the way I measured distance on my high school maps. Again, distance was measured as the crow flies; meaning, the distances I used do not capture a perfectly accurate distance at street level. However, because I consistently used these same methods, this is a relatively minor limitation.

Finally, as mentioned above, the demographic categories I used were very broad. Again, if we were able to disaggregate these categories, we might find issues that pertain to more specific populations. Of course, this would be helpful in thinking of more effective policy interventions.

Future Research

In terms of future research, there are a number of areas that would be worth further exploration. To start, collecting data on how many students eat on versus off campus would be tremendously helpful in understanding the significance of my findings in terms of lunchtime habits. For example, if future research found that the majority students at a particular school ate on campus, perhaps we would have less reason to be concerned about the proximity of fast food restaurants. However, if research found that a significant number of students did in fact eat off campus, we might be more concerned about the surrounding food environment.

Another area for future research might be to more closely examine the disparities in non-physical elements of the food environment. Again, I believe that marketing and advertising are important factors to consider. If, for example, research found that Black students were exposed

to a disproportionate amount of junk food advertising (as I would hypothesize based on previous research) then we might be able explore how multiple risk factors are interacting. Again, this might help in thinking of more specific policy interventions.

In addition, I would suggest a more thorough analysis of how school district policies, like the neighborhood school assignment system and the school lunch program, affect access to nutritious foods. For example, it would be interesting to know how recent changes in both district policies have affected the eating habits of students, if at all. Thinking more broadly about district policies, it might be useful to explore the relationships between demographics, student achievement, and access to nutritious foods among other social justice issues. Given that diversity and equity are such important topics in current public discourse, this seems like a worthwhile area for future research.

Finally, a more in-depth study of zoning policies and how zoning shapes food environments could be useful. Research here might explore whether or not zoning plays any role in determining why some high schools seem to be surrounded by more fast food restaurants than others.

Conclusion

Food-related health issues remain a major public health crisis in the United States among other communities around the world. Whether people are suffering from hunger, obesity, or other illnesses, the underlying causes undoubtedly include inadequate access to nutritious foods. Seeing as certain populations face disproportionate risks and barriers, we must act to protect and provide for the most vulnerable members of our society. Every human being inherently possesses certain basic rights; I argue that those rights include the right to an adequate and healthful diet.

In Seattle, it appears that especially Black, Hispanic, and low-income youth are disproportionately affected by issues of access to nutritious foods. My research has explored and identified several areas of particular concern, as well as potential policy interventions and questions for future research. These issues will likely persist at a local level, as well as nationally and internationally, for many years to come. It is thus crucial that we continue to ask questions and seek answers in working towards ensuring adequate access to nutritious foods for all.

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Appendices

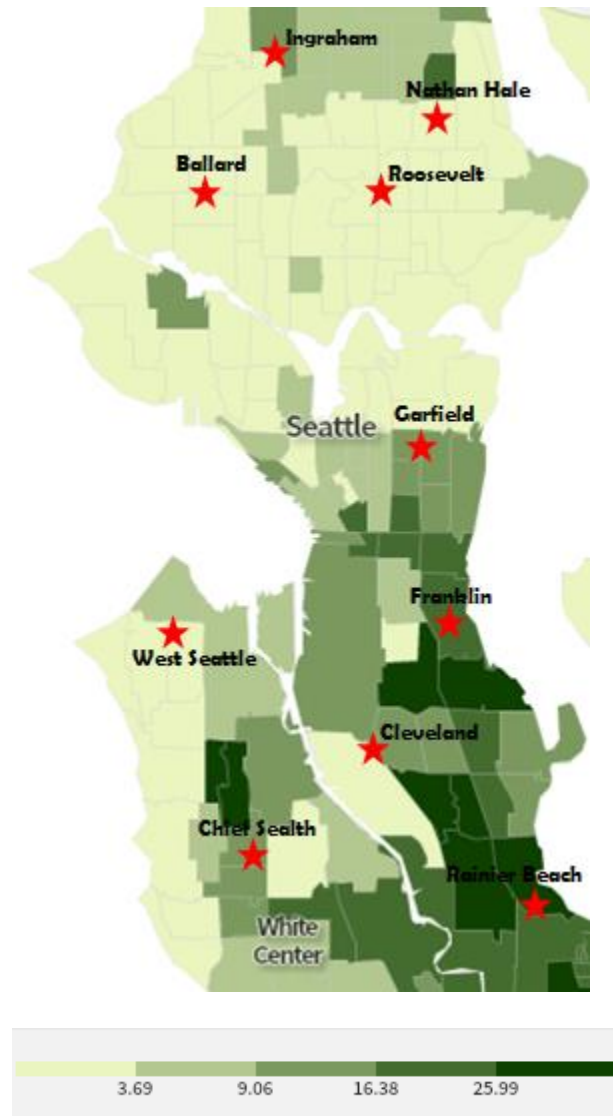
Map 1: Median household income (in 2014 inflation adjusted dollars) in census tracts in the City of Seattle (data from 2014 estimates by U.S. Census Bureau)



Map 2: Percent of population 25 years and over with “Some College or More” in census tracts in the City of Seattle (data from 2014 estimates by U.S. Census Bureau)



Map 3: Percent “Black or African American Alone” of total population in census tracts in the City of Seattle (data from 2014 estimates by U.S. Census Bureau)



Map 4: Percent “Hispanic or Latino” of total population in census tracts in the City of Seattle (data from 2014 estimates by U.S. Census Bureau)



Map 5: Food Environment of Ingraham High School (data from Google Maps) Yellow marker = High School; Blue Markers = Grocery, Market, Small Business, Chain; Red = Fast Food, Mini-mart

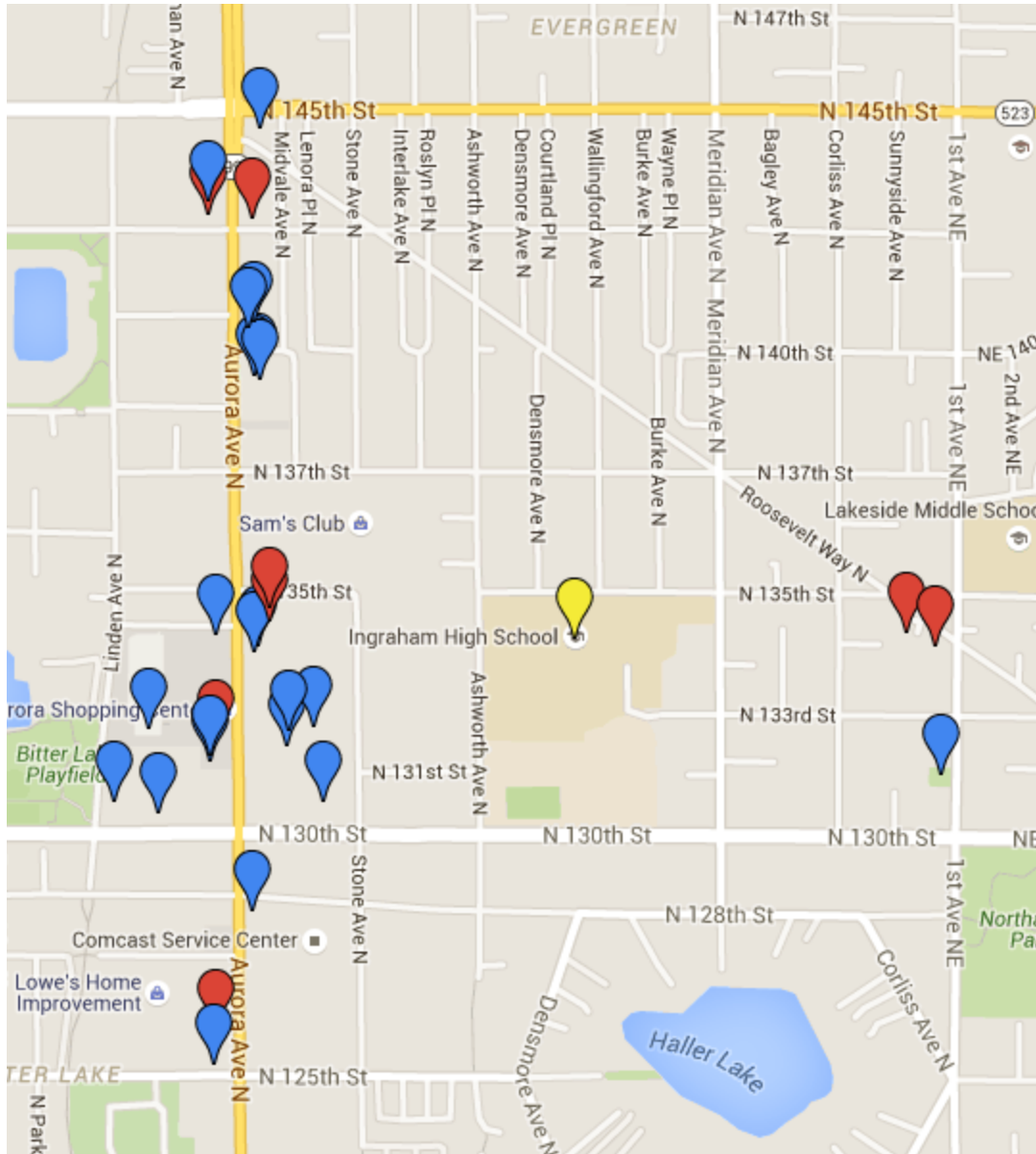


Table 1: Ingraham High School Student Demographics (data from Seattle Public Schools High School Reports)

Students:	1,234	Percent:
Black:	111	9%
Hispanic:	136	11%
White:	691	56%
FRL:	370	30%

Table 1.1: Name, Yelp Rating and Cost, Business Type, and Distance to High School of Food Options within 1 mile of Ingraham High School

Name:	Yelp Rating:	Yelp Cost:	Business Type:	Distance:
Albertsons	3	2	Grocery	0.31
Pho Country House	4.5	1	Small Business	0.44
Burger King	2	2	Fast Food	0.39
Starbucks	3	1	Chain	0.4
Teriyaki & Pho	3.5	2	Small Business	0.4
HK Dim Sum	3	2	Small Business	0.32
Rain Café	4	1	Small Business	0.29
Asian Food Center	3.5	2	Grocery	0.31
Jack in the Box	2.5	1	Fast Food	0.55
Krispy Kreme	3.5	1	Chain	0.58
Style Hot Pot	4	N/A	Small Business	0.47
Forno Pizza	4	2	Small Business	0.51
Grocery Outlet	4	1	Grocery	0.45
Pop Pop Thai Street Food	4.5	1	Small Business	0.33
Jimmy John's	3.5	1	Chain	0.34
Baskin-Robbins	3.5	1	Chain	0.38
Ivar's Seafood Bar	4	1	Fast Food	0.32
KFC	2	1	Fast Food	0.32
7-Eleven	3.5	1	Mini-mart	0.35
Haller Lake Food Shop (Valero)	5	N/A	Mini-mart	0.38
Indo Café	4	2	Small Business	0.43
Warabi Japanese Restaurant	N/A	N/A	Small Business	0.43
Sunny Teriyaki	3	1	Small Business	0.43
Mezcales Mexican Grill	4.5	2	Small Business	0.46
Super Mercado Latino	N/A	N/A	Small Business	0.47
Taco Time	3	1	Fast Food	0.55
Kidd Valley	3	1	Fast Food	0.58
Black Rock Coffee Bar	4	1	Small Business	0.6
Las Margaritas	3	2	Chain	0.62

Table 1.2: Average Distance to Ingraham High School by Food Option Type

	All:	Grocery:	Market:	Mini-mart:	Small Business:	Chain:	Fast Food:
Sample Size:	29	3	0	2	13	5	6
Average Distance:	0.43	0.36	n/a	0.37	0.43	0.46	0.45
Median Distance:	0.43	0.31	n/a	0.37	0.43	0.40	0.47

Map 6: Food Environment of Nathan Hale High School (data from Google Maps) Yellow marker = High School; Blue Markers = Grocery, Market, Small Business, Chain; Red = Fast Food, Mini-mart

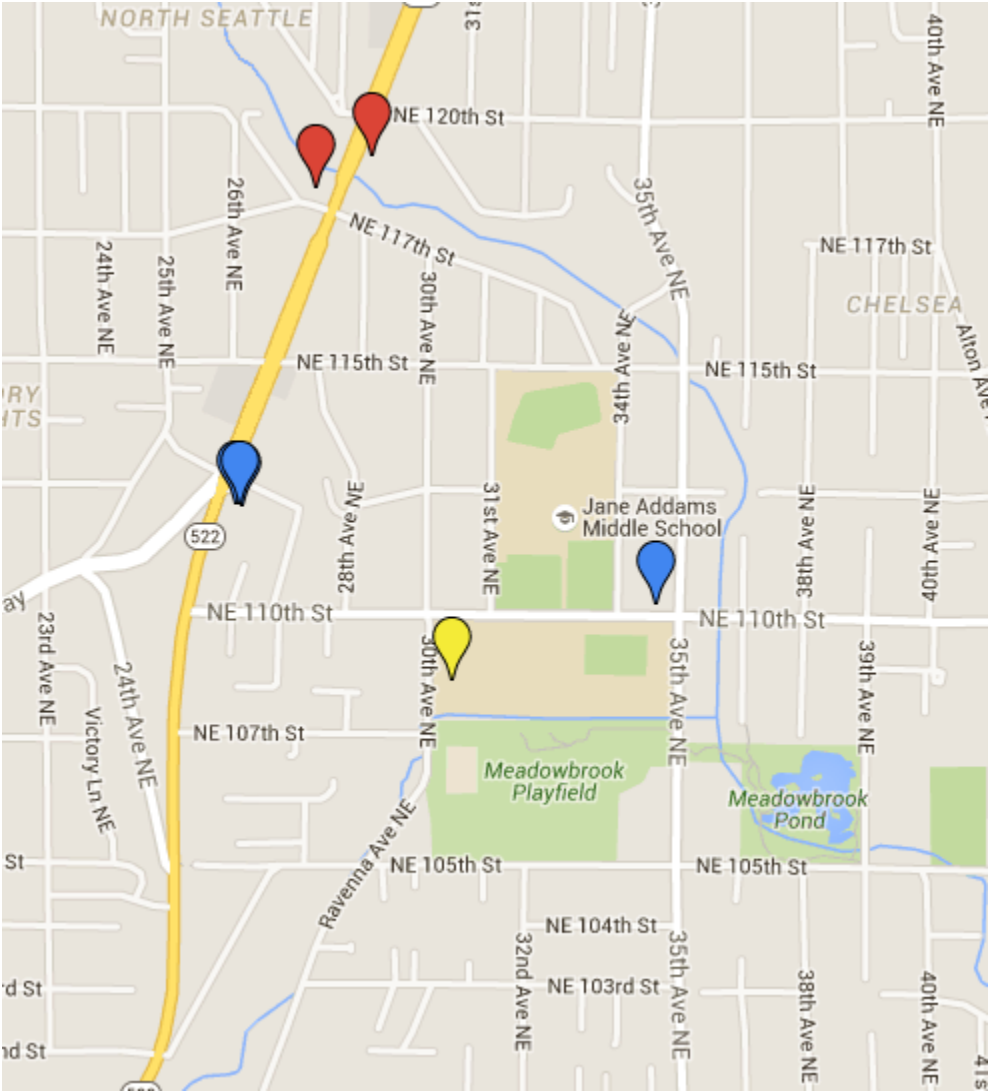


Table 2: Nathan Hale High School Student Demographics (data from Seattle Public Schools High School Reports)

Students:	1,169	Percent:
Black:	152	13%
Hispanic:	129	11%
White:	631	54%
FRL:	362	31%

Table 2.1: Name, Yelp Rating and Cost, Business Type, and Distance to High School of Food Options within 1 mile of Nathan Hale High School

Name:	Yelp Rating:	Yelp Cost:	Business Type:	Distance:
Santorini Pizza & Pasta	4	2	Small Business	0.21
Luciano's Pizza & Pasta	3	2	Small Business	0.27
Tubs	4.5	1	Chain	0.27
Manna Teriyaki	3.5	1	Small Business	0.27
Taco Time	2	1	Fast Food	0.51
Wendy's	2	1	Fast Food	0.53

Table 2.2: Average Distance to Nathan Hale High School by Food Option Type

	All:	Grocery:	Market:	Mini-mart:	Small Business:	Chain:	Fast Food:
Sample Size:	6	0	0	0	3	1	2
Average Distance:	0.34	n/a	n/a	n/a	0.25	0.27	0.52
Median Distance:	0.27	n/a	n/a	n/a	0.27	0.27	0.52

Map 7: Food Environment of Roosevelt High School (data from Google Maps) Yellow marker = High School; Blue Markers = Grocery, Market, Small Business, Chain; Red = Fast Food, Mini-mart

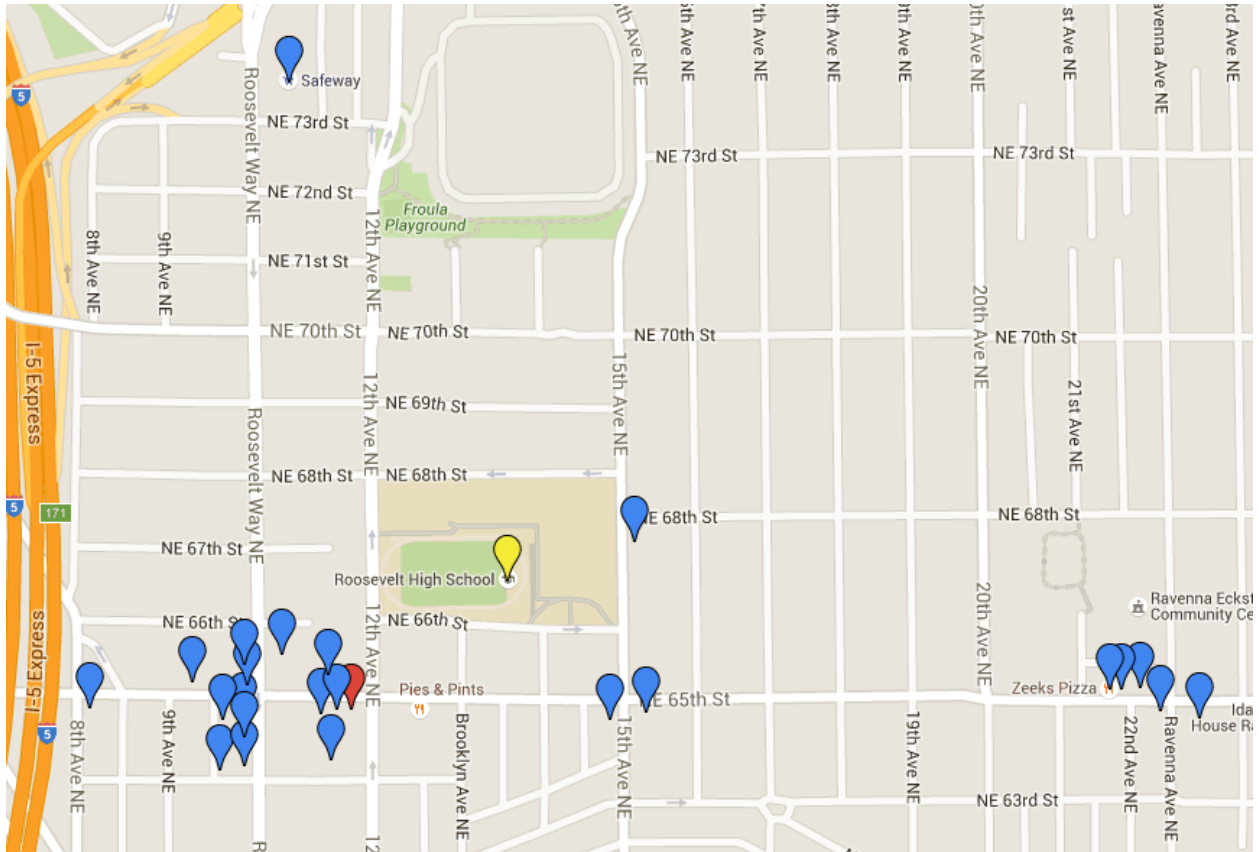


Table 3: Roosevelt High School Student Demographics (data from Seattle Public Schools High School Reports)

Students:	1,721	Percent:
Black:	86	5%
Hispanic:	155	9%
White:	1,153	67%
FRL:	241	14%

Table 3.1: Name, Yelp Rating and Cost, Business Type, and Distance to High School of Food Options within 1 mile of Roosevelt High School

Name:	Yelp Rating:	Yelp Cost:	Business Type:	Distance:
Taco Del Mar	3.5	1	Fast Food	0.14
Starbucks	N/A	N/A	Chain	0.16
Subway	N/A	N/A	Fast Food	0.15
Thrive Café	4	2	Small Business	0.14
Whole Foods	3.5	3	Grocery	0.17
Royal Palm Thai	3	2	Small Business	0.21
India Bistro	4	2	Small Business	0.22
Bol Pho Bistro	4	2	Small Business	0.24
Sunlight Café	3.5	2	Small Business	0.22
Olympic Pizza and Pasta	4	2	Small Business	0.21
Portage Bay Café	3.5	2	Chain	0.23
Rain City Burgers	4.5	1	Small Business	0.19
Bengal Tiger	3.5	2	Small Business	0.19
An Nam Pho	4	1	Small Business	0.16
Pizza Hut	1.5	2	Fast Food	0.13
Rising Sun Produce	4.5	1	Market	0.12
Dan's Kitchen	5	1	Small Business	0.1
Harissa Mediterranean Cuisine	3.5	2	Small Business	0.49
daPino	4	2	Small Business	0.46
Crepe Café	4	2	Small Business	0.44
Bagel Oasis	3	1	Small Business	0.43
Zeek's Pizza	3.5	2	Chain	0.42
Wayward Vegan Café	4.5	2	Small Business	0.3
Safeway	3.5	2	Grocery	0.38
Café Racer	3.5	1	Small Business	0.41
Cowen Park Grocery	4	1	Grocery	0.41

Table 3.2: Average Distance to Roosevelt High School by Food Option Type

	All:	Grocery:	Market:	Mini-mart:	Small Business:	Chain:	Fast Food:
Sample Size:	26	3	1	0	16	3	3
Average Distance:	0.26	0.32	0.12	n/a	0.28	0.20	0.14
Median Distance:	0.22	0.38	0.12	n/a	0.22	0.23	0.14

Map 8: Food Environment of Ballard High School (data from Google Maps) Yellow marker = High School; Blue Markers = Grocery, Market, Small Business, Chain; Red = Fast Food, Mini-mart

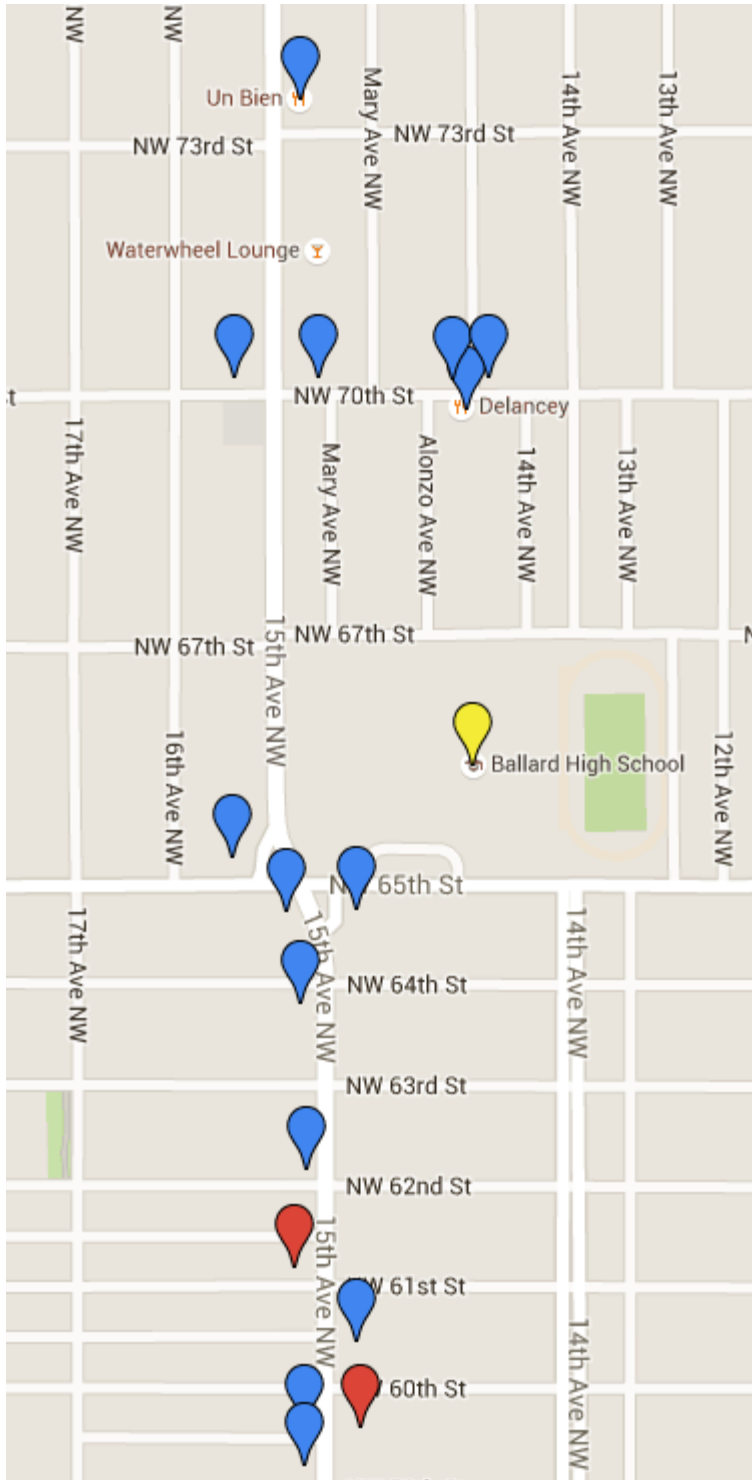


Table 4: Ballard High School Student Demographics (data from Seattle Public Schools High School Reports)

Students:	1,674	Percent:
Black:	88	5%
Hispanic:	167	10%
White:	1,205	72%
FRL:	285	17%

Table 4.1: Name, Yelp Rating and Cost, Business Type, and Distance to High School of Food Options within 1 mile of Ballard High School

Name:	Yelp Rating:	Yelp Cost:	Business Type:	Distance:
El Camion	4	1	Small Business	0.09
Mae Ploy Thai Cuisine	3	2	Small Business	0.13
Tony's Teriyaki	2.5	1	Small Business	0.15
Top Banana	4.5	1	Market	0.13
Honore Artisan Bakery	4.5	2	Small Business	0.18
Tarasco	3.5	1	Small Business	0.19
The Fat Hen	4.5	2	Small Business	0.19
Brunswick & Hunt	4	2	Small Business	0.21
Grumpy D's	4	1	Small Business	0.23
Benito's Chicago Eatery	4	2	Small Business	0.22
Un Bien	4.5	2	Small Business	0.35
Taco Del Mar	3.5	1	Fast Food	0.27
MOD Pizza	4	1	Chain	0.29
Taco Bell	2.5	1	Fast Food	0.34
Pasta Bella	4	2	Small Business	0.34
Morsel and Bean	4.5	1	Small Business	0.36
Vietnam Café & Sandwich	4	1	Small Business	0.46

Table 4.2: Average Distance to Ballard High School by Food Option Type

	All:	Grocery:	Market:	Mini-mart:	Small Business:	Chain:	Fast Food:
Sample Size:	17	0	1	0	14	0	2
Average Distance:	0.24	n/a	0.13	n/a	0.24	0.29	0.31
Median Distance:	0.22	n/a	0.13	n/a	0.21	0.29	0.31

Map 9: Food Environment of Garfield High School (data from Google Maps) Yellow marker = High School; Blue Markers = Grocery, Market, Small Business, Chain; Red = Fast Food, Mini-mart

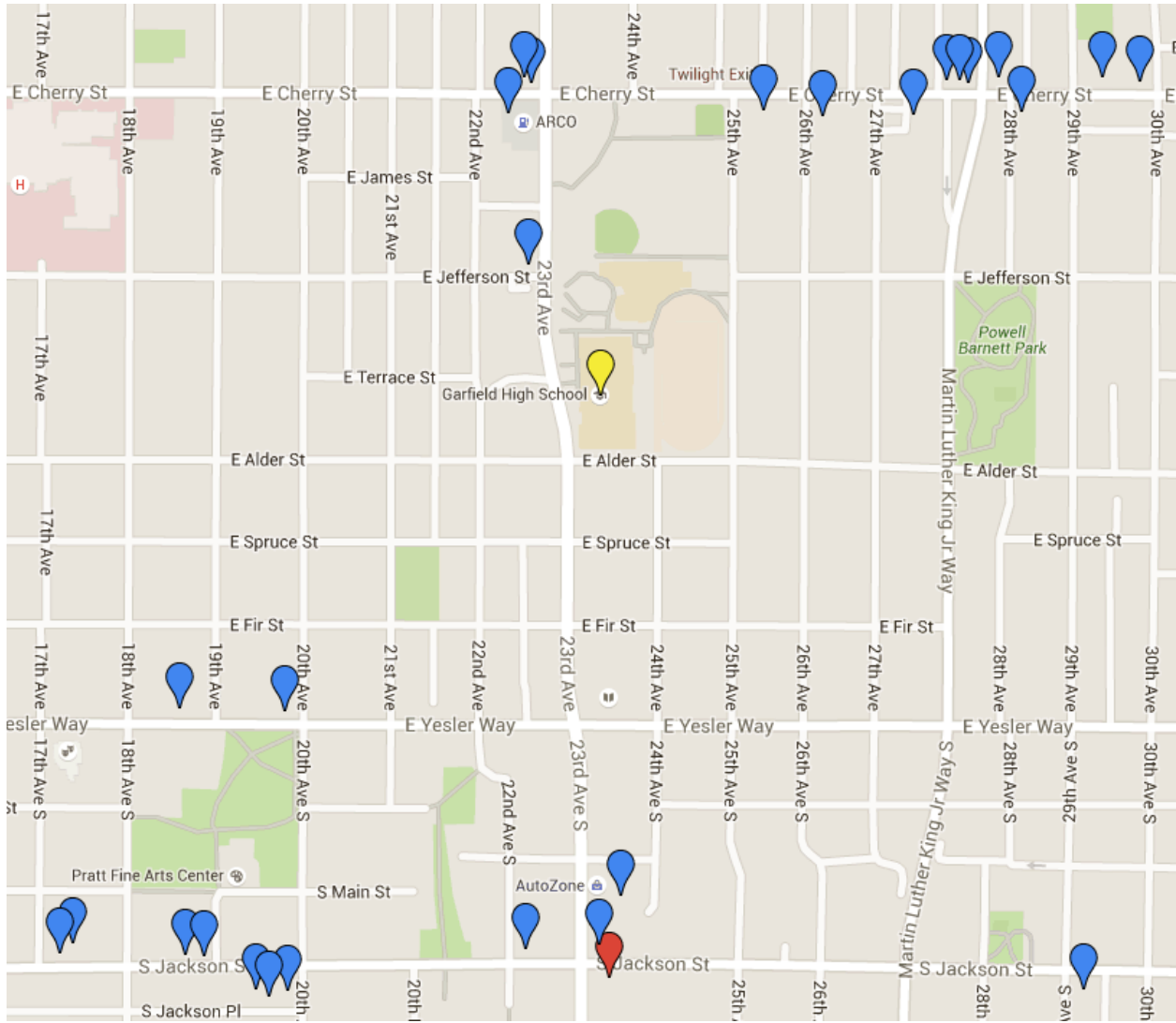


Table 5: Garfield High School Student Demographics (data from Seattle Public Schools High School Reports)

Students:	1,622	Percent:
Black:	454	28%
Hispanic:	130	8%
White:	616	38%
FRL:	616	38%

Table 5.1: Name, Yelp Rating and Cost, Business Type, and Distance to High School of Food Options within 1 mile of Garfield High School

Name:	Yelp Rating:	Yelp Cost:	Business Type:	Distance:
Ezell's Famous Chicken	4	1	Small Business	0.1
701 Coffee	4.5	1	Small Business	0.22
Dur dur Café	4.5	1	Small Business	0.23
ampm (ARCO)	N/A	N/A	Mini-mart	0.21
The Barbeque Pit	4.5	1	Small Business	0.23
Meskel Ethiopian	4	2	Small Business	0.25
Café Selam	4.5	1	Small Business	0.29
Assimba Ethiopian Cuisine	4	1	Small Business	0.33
Fat's Chicken and Waffles	4	2	Small Business	0.34
Lotus Thai	4.5	1	Small Business	0.33
King's Deli	4	1	Small Business	0.35
Ras Dashen	4.5	1	Small Business	0.35
Fatima Café	4	1	Small Business	0.54
Cortona Café	4.5	1	Small Business	0.54
First Cup Coffee	3.5	1	Small Business	0.51
Shodai Teriyaki	3.5	1	Small Business	0.56
Grocery Outlet	4	1	Grocery	0.59
Golden Wheat Bakery	4.5	1	Small Business	0.41
Amy's Merkato	4.5	1	Mini-mart	0.43
Central Pizza	3.5	2	Small Business	0.53
Taco Del Mar	4	1	Fast Food	0.4
Chef Café	4	1	Small Business	0.35
Moonlight Café	4	1	Small Business	0.47
Northwest Tofu	3.5	1	Small Business	0.48
Seven Star Mini Mart	2.5	1	Mini-mart	0.48
Domino's Pizza	2.5	2	Chain	0.48
Wonder Café	4	2	Small Business	0.48
Lake Chad Café	4	2	Small Business	0.53
Cheeky Café	4	2	Small Business	0.54
Starbucks	3.5	1	Chain	0.38
Magic Dragon	3	1	Small Business	0.35
Adey Abeba Ethiopian	4	1	Small Business	0.55
R&L Home of Good Bar-BQ	3.5	2	Small Business	0.36
Broadcast Coffee Roasters	4	1	Small Business	0.3

Table 5.2: Average Distance to Garfield High School by Food Option Type

	All:	Grocery:	Market:	Mini-mart:	Small Business:	Chain:	Fast Food:
Sample Size:	34	1	0	3	27	2	1
Average Distance:	0.40	0.59	n/a	0.37	0.39	0.43	0.40
Median Distance:	0.39	0.59	n/a	0.43	0.35	0.43	0.40

Map 10: Food Environment of West Seattle High School (data from Google Maps) Yellow marker = High School; Blue Markers = Grocery, Market, Small Business, Chain; Red = Fast Food, Mini-mart



Table 6: West Seattle High School Student Demographics (data from Seattle Public Schools High School Reports)

Students:	1,015	Percent:
Black:	142	14%
Hispanic:	132	13%
White:	487	48%
FRL:	365	36%

Table 6.1: Name, Yelp Rating and Cost, Business Type, and Distance to High School of Food Options within 1 mile of West Seattle High School

Name:	Yelp Rating:	Yelp Cost:	Business Type:	Distance:
McDonald's	2	1	Fast Food	0.12
PCC Natural Markets	4	3	Grocery	0.14
Freshy's	4.5	1	Small Business	0.17
Circa	4	2	Small Business	0.31
Baked	4.5	2	Small Business	0.31
Jack in the Box	2	1	Fast Food	0.3
Admiral Bird	4	1	Small Business	0.31
Menchie's Frozen Yogurt	4.5	1	Chain	0.28
Safeway	N/A	N/A	Grocery	0.23
Baskin-Robbins	2.5	1	Chain	0.3
Starbucks	3	2	Chain	0.29
Blackboard Bistro	4.5	2	Small Business	0.21
Spiro's Pizza and Pasta	3.5	2	Small Business	0.25
Westcity Sardine Kitchen	4	2	Small Business	0.26
Caffe Fiore	4	1	Small Business	0.49
Pailin Thai Cuisine	3.5	2	Small Business	0.47
Pizzeria 22	4	2	Small Business	0.43
Yen Wor Village	3	2	Small Business	0.43
Sky Blue Bakery	N/A	N/A	Small Business	0.4
Angelina's	3.5	2	Small Business	0.42
Mission	N/A	N/A	Small Business	0.4
Copper Coin	3.5	2	Small Business	0.39
Luciano's Pizza & Pasta	3	2	Small Business	0.37
New Leaf Bistro	4	2	Small Business	0.35
Café Mawadda	3.5	2	Small Business	0.34
Bartell Drugs	3.5	2	Mini-mart	0.37
Metropolitan Market	4	3	Grocery	0.34

Table 6.2: Average Distance to West Seattle High School by Food Option Type

	All:	Grocery:	Market:	Mini-mart:	Small Business:	Chain:	Fast Food:
Sample Size:	27	3	0	1	18	3	2
Average Distance:	0.32	0.24	n/a	0.37	0.35	0.29	0.21
Median Distance:	0.31	0.23	n/a	0.37	0.36	0.29	0.21

Map 11: Food Environment of Franklin High School (data from Google Maps) Yellow marker = High School; Blue Markers = Grocery, Market, Small Business, Chain; Red = Fast Food, Mini-mart

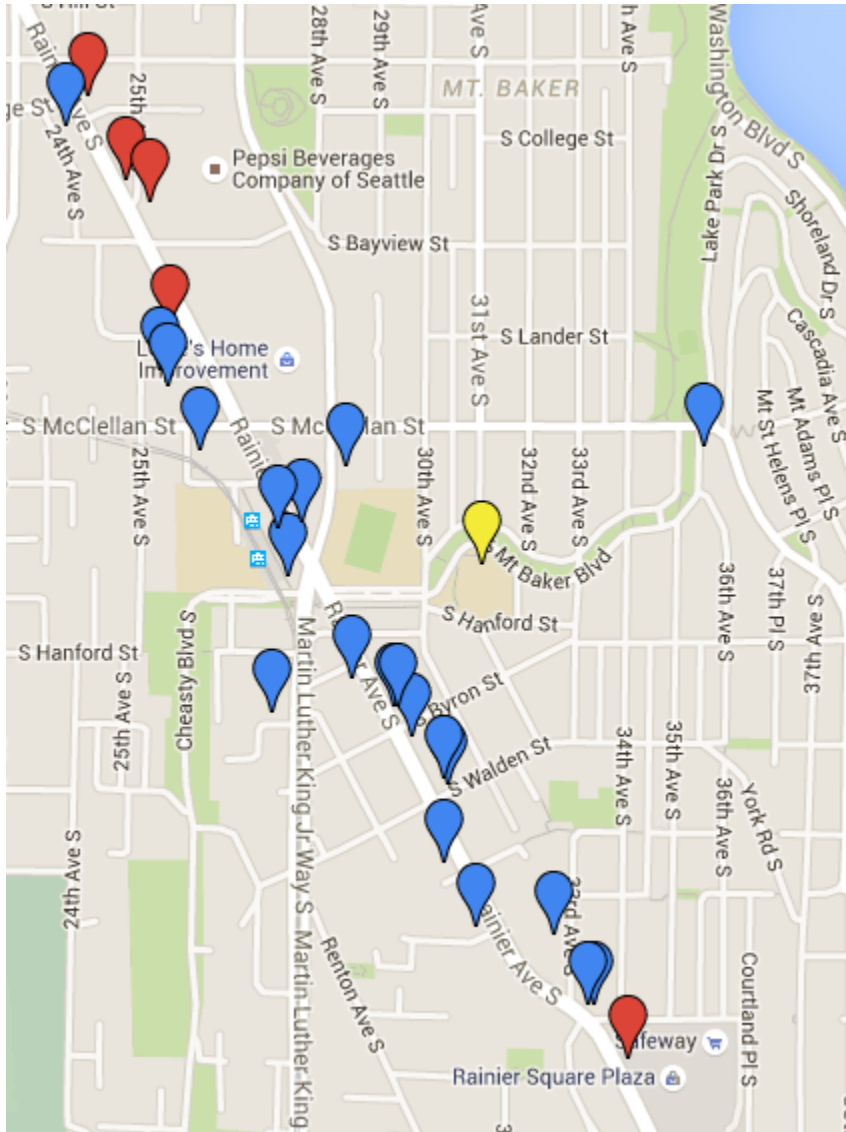


Table 7: Franklin High School Student Demographics (data from Seattle Public Schools High School Reports)

Students:	1,345	Percent:
Black:	363	27%
Hispanic:	121	9%
White:	81	6%
FRL:	955	71%

Table 7.1: Name, Yelp Rating and Cost, Business Type, and Distance to High School of Food Options within 1 mile of Franklin High School

Name:	Yelp Rating:	Yelp Cost:	Business Type:	Distance:
Pho Bac	4	1	Small Business	0.19
Van Loi Noodle	3.5	1	Small Business	0.17
Kim Teriyaki	N/A	N/A	Small Business	0.17
Rainier Teriyaki	3.5	1	Small Business	0.22
Thien Phat	3.5	1	Small Business	0.22
The Original Philly's	3.5	1	Small Business	0.2
Starbucks	4	1	Chain	0.19
Compadre Coffee	4.5	1	Small Business	0.19
Viengthong	4	2	Small Business	0.17
Wendy's	3	1	Fast Food	0.39
Mioposto Pizzeria	4	2	Small Business	0.25
Ben Thanh	4	1	Small Business	0.17
Willie's Taste of Soul	3	2	Small Business	0.3
QFC	3	2	Grocery	0.38
Starbucks	N/A	N/A	Chain	0.38
Thai Recipe	4	1	Small Business	0.3
Taco Time	3.5	1	Fast Food	0.61
Borracchini's Bakery	4	1	Small Business	0.6
Subway	3.5	1	Fast Food	0.52
McDonald's	2	1	Fast Food	0.49
Taco Bell	3	1	Fast Food	0.52
Taqueria El Asadero	4.5	1	Small Business	0.36
Emerald City Fish & Chips	4	1	Small Business	0.45
Padrino's Pizza & Pasta	2.5	2	Small Business	0.45
Chicken Express	4.5	1	Fast Food	0.38
Café Ibex	4.5	2	Small Business	0.26

Table 7.2: Average Distance to Franklin High School by Food Option Type

	All:	Grocery:	Market:	Mini-mart:	Small Business:	Chain:	Fast Food:
Sample Size:	26	1	0	0	17	2	6
Average Distance:	0.33	0.38	n/a	n/a	0.27	0.29	0.49
Median Distance:	0.30	0.38	n/a	n/a	0.22	0.29	0.51

Map 12: Food Environment of Cleveland High School (data from Google Maps) Yellow marker = High School; Blue Markers = Grocery, Market, Small Business, Chain; Red = Fast Food, Mini-mart

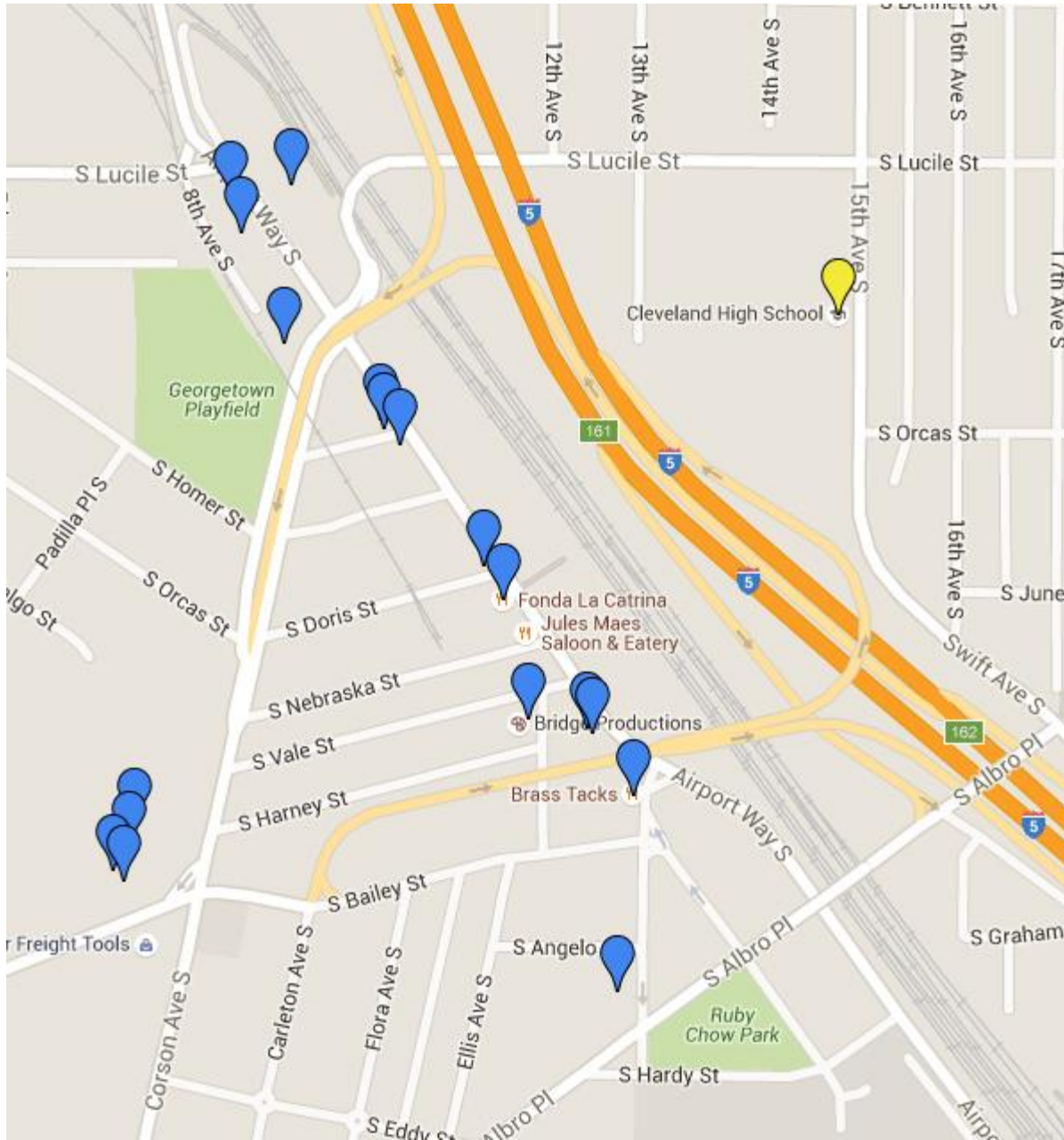


Table 8: Cleveland High School Student Demographics (data from Seattle Public Schools High School Reports)

Students:	831	Percent:
Black:	283	34%
Hispanic:	83	10%
White:	50	6%
FRL:	573	69%

Table 8.1 Name, Yelp Rating and Cost, Business Type, and Distance to High School of Food Options within 1 mile of Cleveland High School

Name:	Yelp Rating:	Yelp Cost:	Business Type:	Distance:
Cutting Board	4	2	Small Business	0.35
Stellar Pizza Ale...	4	2	Small Business	0.34
Two Tartes Bakery	4.5	1	Small Business	0.26
Zippy's Giant Burgers	4	1	Small Business	0.26
Flying Squirrel Pizza	4	2	Small Business	0.26
Hallava Falafel	4.5	1	Small Business	0.24
Fonda La Katrina	4	2	Small Business	0.25
Square Knot Diner	3.5	2	Small Business	0.27
Smarty Pants	4	2	Small Business	0.27
Brass Tracks	3.5	2	Small Business	0.29
Hangar Café	4	2	Small Business	0.4
Hitchcock Deli	4	2	Small Business	0.29
Corson Building	4	4	Small Business	0.31
Elysian Brewery	4	2	Small Business	0.32
Pho Hiho	3.5	1	Small Business	0.49
Khaosan Road Thai Cuisine	3.5	2	Small Business	0.5
Daimonji Sushi & Grill	4	2	Small Business	0.51
Starbucks	3.5	2	Chain	0.51

Table 8.2 Average Distance to Cleveland High School by Food Option Type

	All:	Grocery:	Market:	Mini-mart:	Small Business:	Chain:	Fast Food:
Sample Size:	18	0	0	0	17	1	0
Average Distance:	0.34	n/a	n/a	n/a	0.33	0.51	n/a
Median Distance:	0.30	n/a	n/a	n/a	0.29	0.51	n/a

Map 13: Food Environment of Chief Sealth High School (data from Google Maps) Yellow marker = High School; Blue Markers = Grocery, Market, Small Business, Chain; Red = Fast Food, Mini-mart

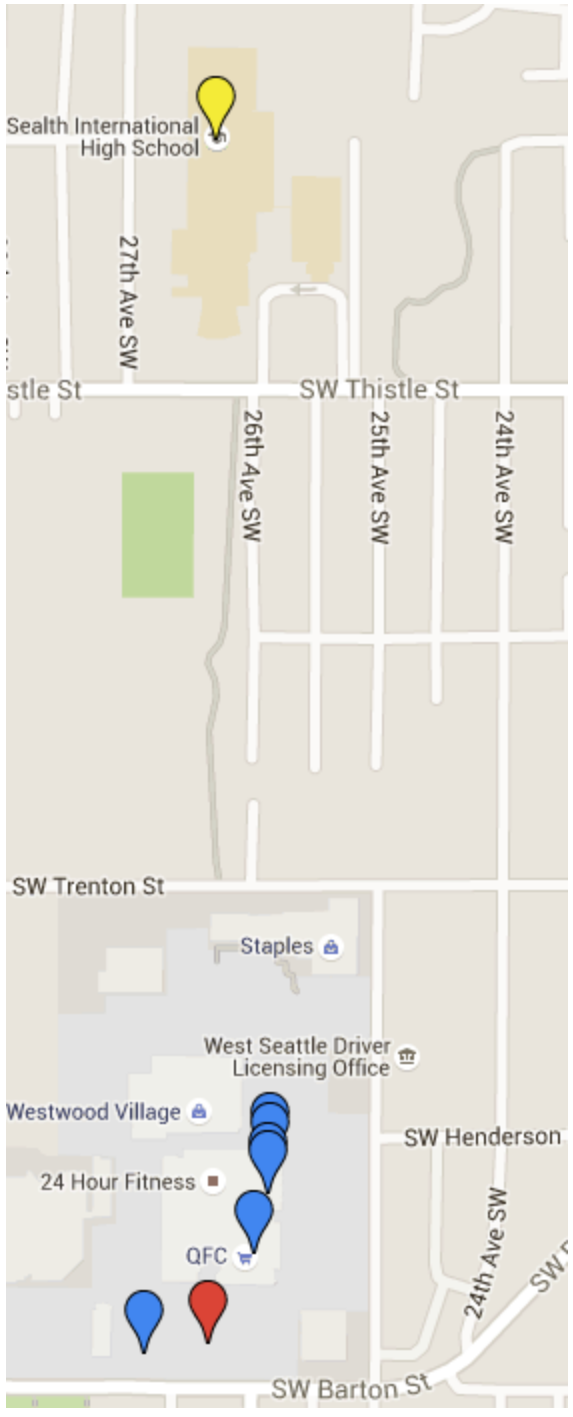


Table 9: Chief Sealth High School Student Demographics (data from Seattle Public Schools High School Reports)

Students:	1,236	Percent:
Black:	260	21%
Hispanic:	321	26%
White:	321	26%
FRL:	778	63%

Table 9.1: Name, Yelp Rating and Cost, Business Type, and Distance to High School of Food Options within 1 mile of Chief Sealth High School

Name:	Yelp Rating:	Yelp Cost:	Business Type:	Distance:
El Rey Del Taco	4.5	1	Small Business	0.54
Starbucks	N/A	N/A	Chain	0.51
Vatsana's Thai	3	2	Small Business	0.52
Toshi's Teriyaki	3.5	1	Small Business	0.52
Subshop	4	1	Small Business	0.53
QFC	2.5	2	Grocery	0.56
McDonald's	2	1	Fast Food	0.6
Giannoni's Pizzeria	3.5	1	Small Business	0.61

Table 9.2 Average Distance to Chief Sealth High School by Food Option Type

	All:	Grocery:	Market:	Mini-mart:	Small Business:	Chain:	Fast Food:
Sample Size:	8	1	0	0	5	1	1
Average Distance:	0.55	0.56	n/a	n/a	0.54	0.51	0.60
Median Distance:	0.54	0.56	n/a	n/a	0.53	0.51	0.60

Map 14: Food Environment of Rainier Beach High School (data from Google Maps)

Yellow marker = High School; Blue Markers = Grocery, Market, Small Business, Chain; Red = Fast Food, Mini-mart

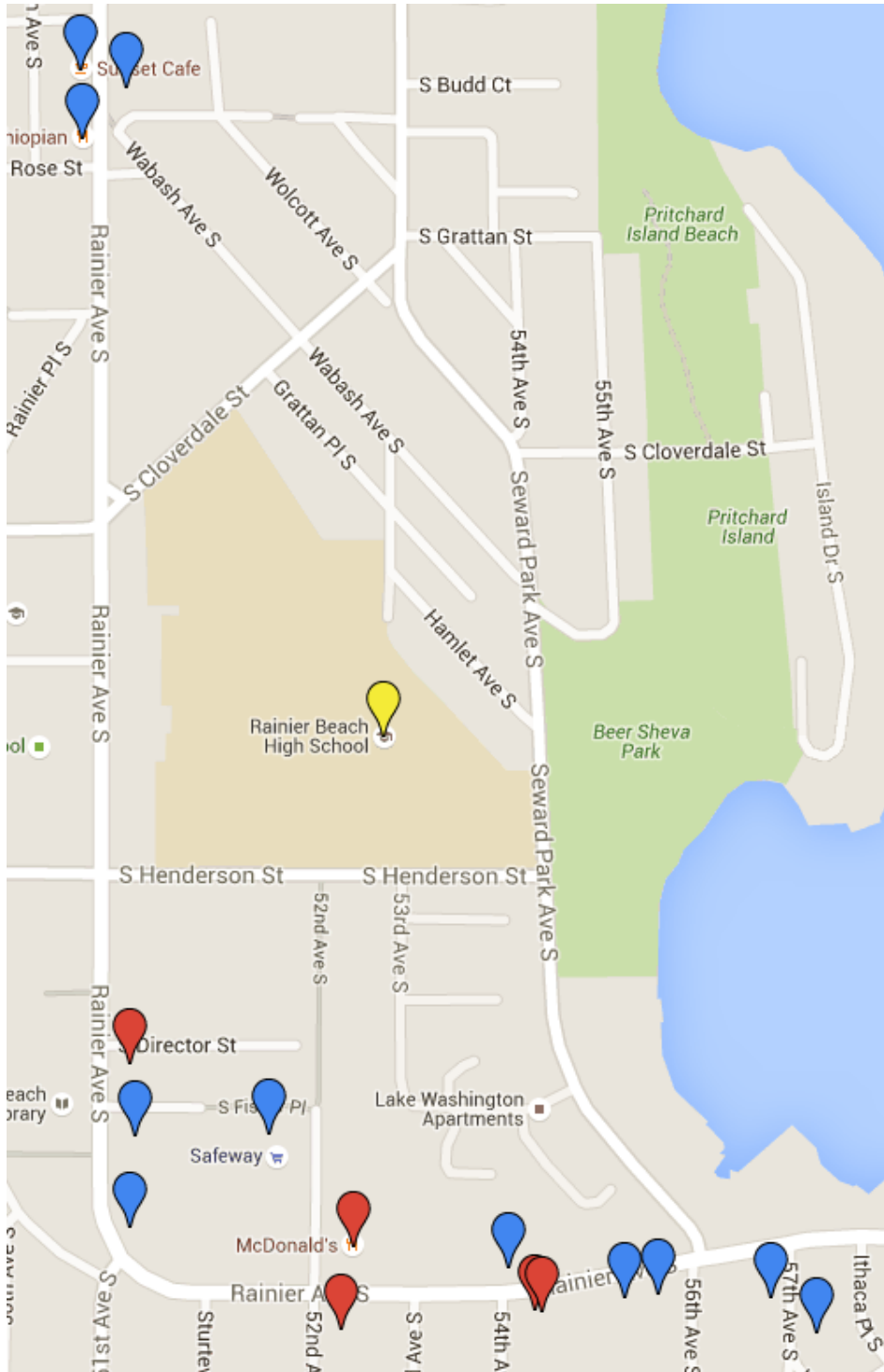


Table 10: Rainier Beach High School Student Demographics (data from Seattle Public Schools High School Reports)

Students:	601	Percent:
Black:	307	51%
Hispanic:	78	13%
White:	18	3%
FRL:	481	80%

Table 10.1: Name, Yelp Rating and Cost, Business Type, and Distance to High School of Food Options within 1 mile of Rainier Beach High School

Name:	Yelp Rating:	Yelp Cost:	Business Type:	Distance:
Jack in the Box	2	1	Fast Food	0.23
Pho Van	3	1	Small Business	0.27
Safeway	3	2	Grocery	0.24
King Donuts	4	1	Small Business	0.31
McDonald's	2.5	1	Fast Food	0.29
Subway	4	N/A	Fast Food	0.34
Taco Bell	3	N/A	Fast Food	0.34
KFC	2.5	1	Fast Food	0.34
Hong Kong Seafood	3.5	2	Small Business	0.31
Giorgina's Mediterranean Kitchen	3.5	2	Small Business	0.35
Maya's	3.5	2	Small Business	0.35
Altaye Ethiopian	4.5	1	Small Business	0.38
Haffa	N/A	N/A	Small Business	0.4
Sunset Café	5	2	Small Business	0.42
Drae's Lake Route Eatery	5	1	Small Business	0.39
Redwing Café	4.5	1	Small Business	0.42

Table 10.2: Average Distance to Rainier Beach High School by Food Option Type

	All:	Grocery:	Market:	Mini-mart:	Small Business:	Chain:	Fast Food:
Sample Size:	16	1	0	0	10	0	5
Average Distance:	0.34	0.24	n/a	n/a	0.36	n/a	0.31
Median Distance:	0.34	0.24	n/a	n/a	0.37	n/a	0.34

Table 11: Correlation between Proportion of Race/Ethnicity and % Free and Reduced Lunch (FRL) (data from Seattle Public Schools High School Reports)

Variables	Correlation
% White & % FRL	-0.98
% Hispanic & % FRL	0.32
% Black & % FRL	0.88

Figure 11.1: Relationship between % White/Black and % FRL

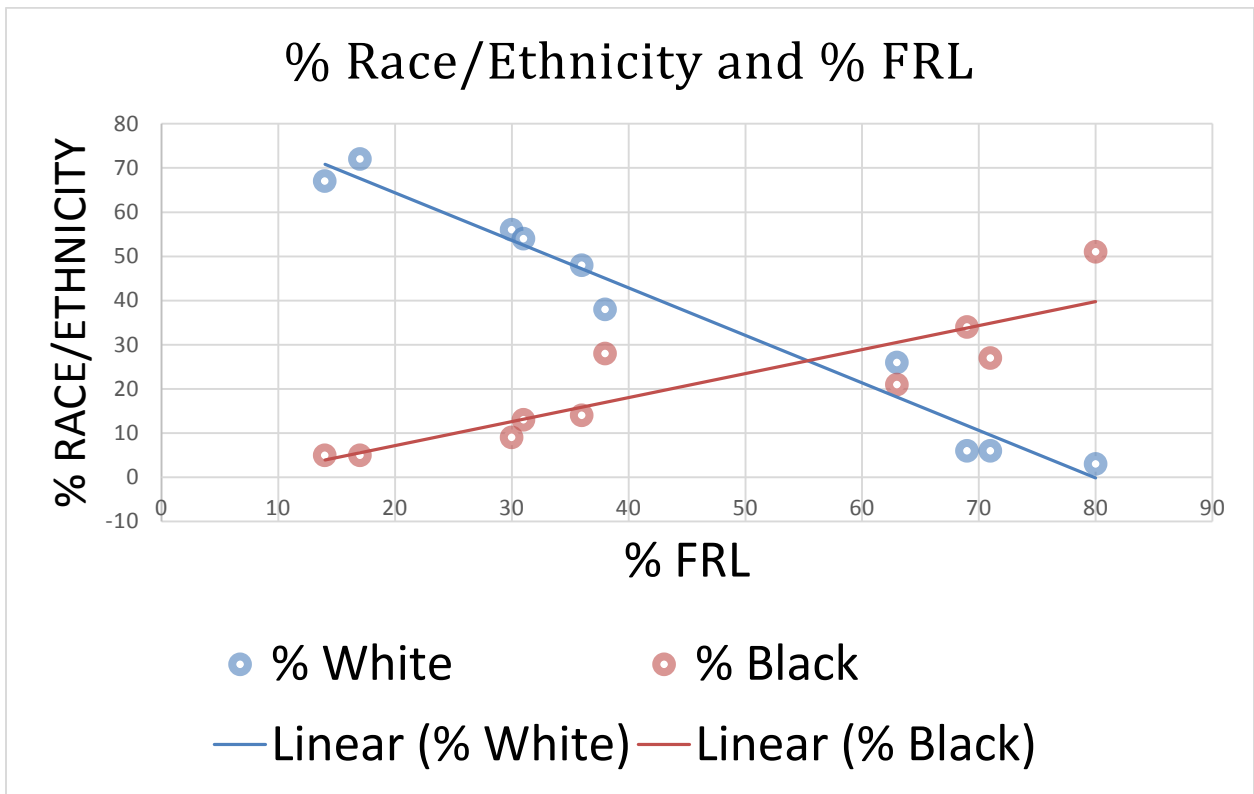


Table 12: Correlation between Proportion of Black Students and Average Distance to Food Option Types (data from Seattle Public Schools High School Reports)

Variables	Correlation
% Black & Avg. Dist. All	0.20
% Black & Avg. Dist. Grocery	-0.04
% Black & Avg. Dist. Small Business	0.21
% Black & Avg. Dist. Chain	0.58
% Black & Avg. Dist. Fast Food	0.16

Table 12.2: Correlation between Proportion of Hispanic Students and Average Distance to Food Option Types (data from Seattle Public Schools High School Reports)

Variables	Correlation
% Hispanic & Avg. Dist. All	0.74
% Hispanic & Avg. Dist. Grocery	0.30
% Hispanic & Avg. Dist. Small Business	0.75
% Hispanic & Avg. Dist. Chain	0.44
% Hispanic & Avg. Dist. Fast Food	0.47

Table 12.3: Correlation between Proportion of White Students and Average Distance to Food Option Types (data from Seattle Public Schools High School Reports)

Variables	Correlation
% White & Avg. Dist. All	-0.31
% White & Avg. Dist. Grocery	-0.03
% White & Avg. Dist. Small Business	-0.25
% White & Avg. Dist. Chain	-0.52
% White & Avg. Dist. Fast Food	-0.37

Table 12.1: Correlation between Proportion of Free and Reduced Lunch Students (FRL) and Average Distance to Food Option Types (data from Seattle Public Schools High School Reports)

Variables	Correlation
% FRL & Avg. Dist. All	0.38
% FRL & Avg. Dist. Grocery	0.01
% FRL & Avg. Dist. Small Business	0.32
% FRL & Avg. Dist. Chain	0.56
% FRL & Avg. Dist. Fast Food	0.43

