

Understanding the Impact of Dollar Stores on Food Deserts

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GOVT-310-006: Introduction to Political Research

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April 30, 2020

Purpose and Overview

In America, shopping at grocery stores is a regular chore. Most Americans do not think twice about it as they make their shopping lists and navigate the aisles. However, there are many impoverished citizens who struggle daily with nutrition. Not only are they experiencing poverty, but they are also having difficulty accessing stores that provide nutritionally valuable foods. Without a supermarket nearby, many are left with only one option: dollar stores.

The purpose of this study is to investigate the relationship between dollar stores and food deserts in the United States. More specifically, this study will use locations of Dollar General Corp. and Dollar Tree Inc. stores as these are the largest national dollar store chains in the country. This study hypothesizes that, in comparing states with high levels of food insecurity, those that have more food deserts will have more Dollar General Corp. and Dollar Tree Inc. store locations than those with less food deserts. To test this hypothesis, data from the United States Department of Agriculture is combined with the annual report data from the two corporations in the study. By using a linear regression line imposed onto scatterplots of the data, this study investigates the relationship between dollar store locations and the locations of food deserts within the 30 states with the highest number of food desert areas. As a result, this study finds that there is significant data that lends support to the hypothesis.

Introduction

Free markets and capitalistic growth are the basis of the American economy. Since economic liberalization policies were put in place in the 1970s and 80s, America has seen an immense industry shift with overseas production and deindustrialization increasing annually

(Shrestha 2016). Though these policies were implemented for business growth, there have been many negative impacts on the country's disadvantaged populations as a result. One area that this is most noticeable is within dollar store development.

Impoverished communities are often found in distinct pockets, centered around affordable housing. These areas often parallel with food deserts, areas that the United States Department of Agriculture (USDA) defines as having “a poverty rate of 20% or greater” and “at least 500 persons and/or at least 33 percent of the population [living] more than 1 mile from a supermarket,” with the exception of 10 miles for rural areas (USDA 2011). As current research shows, dollar stores continue to profit off of food deserts because supermarkets refuse to build stores in the areas, deeming them unprofitable (Shrestha). Most of their customers make under \$40,000 a year (Shrestha 2016), and 20% of Supplemental Nutrition Assistance Program (SNAP) purchases occur at these small food stores (Caspi et al. 2016). Simply looking at customer characteristics, it is evident that their marketing and location targets impoverished communities to some degree.

While it is important to ensure that areas in need have access to groceries, dollar stores have not been a viable solution. When looking at purchases made at these and similar convenience stores, they often have little nutritional value. Specifically at dollar stores, purchases had a median value of 53% of energy coming from added sugars (Caspi et al. 2017). Since prices are low and these stores are located in communities far away from supermarkets, the low product diversity, made up mostly of sugar and energy dense foods, negatively impacts low-income communities. To measure the nutritional value of foods, the USDA ranks diet quality on a scale from 0 to 100. The average score from small retail and dollar stores is 36.4,

well below the benchmark for ‘poor’ at 51 (Caspi et al. 2017). Much of this is because of a lack of store infrastructure to provide refrigerated, frozen, and fresh foods. Main offerings of fruits and vegetables are only available in cans and make up a small percentage of stock.

It is well known in the global community that Americans consistently rank in the highest rates of obesity, as well as the myriad of health conditions that come with it. In 2011, 30% of American children were overweight and 15% were obese (Dannenberg, Frumkin, Jackson 2011). By 2015, there was a stark change, increasing to 35% being overweight and 19% being obese in just a 4 year span (Drichoutis et al. 2015). Not only does this negatively impact their current health, but it also leads to conditions like cardiovascular disease, depression, and musculoskeletal complaints (Dannenberg, Frumkin, Jackson 2011). With the surplus of stores selling sugary, energy-dense foods that market to low income households, this comes at no surprise. One study reported that “dollar stores are especially dense in regions of the country where childhood obesity rates are highest,” (Drichoutis et al. 2015). By marketing to households who need low prices and convenience, these retailers are able to profit heavily off of foods with little to no nutritional value beyond calorie intake.

The surplus of dollar stores in food deserts and low income communities is not simply caused by the companies’ desire for profits. It is also impacted by supermarkets avoiding these areas. Reviewing Hartford, Connecticut as a case study, one journal article coined the term “supermarket redlining” to explain “the disinclination of chain supermarkets” to build stores in impoverished neighborhoods (Zhang and Debarchana 2016). Using perceived obstacles such as crime, profitability, and zoning restrictions, corporations are able to avoid placing their stores in food deserts that desperately need access to affordable, fresh foods (Zhang and Debarchana

2016). Both rural and urban areas suffer from supermarket redlining, leaving dollar and corner stores to fill their grocery needs. In 2012, the rural poverty rate was 17.7% and 14.5% for metropolitan areas (Piontak, Rayanne, Schulman 2014). These near equal rates frequently align with both food deserts and dollar store locations. Where rural areas fall short, however, is the distance between residents and social services like food pantries and soup kitchens (Piontak, Rayanne, Schulman 2014). Resources and non-profits are often concentrated in cities, making it more difficult for rural residents to receive assistance.

There is some discrepancy among current research since this topic is only recently beginning to be discussed in academia. As one study points out, the addition of a grocery store or supermarket to a community does not mean that healthier purchases will be made, since fresh foods are often more expensive and less convenient (Engler-Stringer et al. 2019). Low income communities require stores that provide nutritionally valuable foods at prices that are affordable, like those at dollar stores. While prices are a deterrent, there is evidence that living in a neighborhood near a supermarket that has diverse and healthier stock than small retailers aligns with better health (Dannenberg, Frumkin, Jackson 2011). While this topic does need more research to find a viable solution, most signs point to improved diet and health in areas that are not classified as food deserts.

Theory and Expectations

The purpose of this study is to analyze the relationship between the number of food deserts in American states alongside the number of major dollar stores. In doing so, this study hypothesizes that, in comparing American states with high levels of food insecurity, those with

high numbers of food deserts will be more likely to have a high number of Dollar General Corp. and Dollar Tree Inc. locations than those with less food deserts. The null hypothesis is that, in comparing American states, there is no difference in the concentration of Dollar General Corp. and Dollar Tree Inc. between states with high numbers of food deserts and those with relatively few food deserts.

As discussed prior, there is a variety of evidence suggesting that dollar stores can have devastating effects on impoverished communities. One of the main examples of this is shown in research concerning the nutritional value of foods available at and purchased from these store types. Stores owned by Dollar General Corp. and Dollar Tree Inc. cannot offer the same diversity of product as large supermarkets because they lack the store infrastructure to provide fresh and frozen foods. Instead, they sell canned, bagged, shelf-stable items that frequently lack in necessary nutrients beyond calories. According to the National Center for Health Statistics, the most recent data in the United States puts the prevalence of obesity at 42.4%, meaning nearly one in two people in this country are obese (Hales et al. 2020). While many factors play into the issue of obesity, access to nutritionally valuable food is a major component.

Although research on nutrition, food deserts, and small scale stores exists separately, this study combines the issues to draw conclusions about the overlap. Because food deserts are frequently areas with high levels of poverty, they are also areas that are easily manipulated for corporate success. Dollar stores can easily fill the gaps that supermarkets leave behind through “supermarket redlining,” but they can also use that power to take advantage of a population that cannot afford long commutes and expensive prices from true grocers (Zhang and Debarchana 2016). By analyzing the relationship between the number of food deserts and dollar store

locations in the states with high levels of food insecurity, it will become evident whether or not Dollar General Corp. and Dollar Tree Inc. target more vulnerable communities.

Operationalization and Measurement of Concepts

Within this study, the dependent variable will be the number of Dollar General Corp. and Dollar Tree Inc. store locations within the 30 American states with the highest levels of food insecurity. To gather this data, this study will utilize the annual reports from 2018 of Dollar General Corp. and Dollar Tree Inc., as this is the most recent public data available from these companies. The level of food insecurity will be determined by data provided by the United States Department of Agriculture (USDA), which monitors and updates this data annually. Using the USDA Food Access Research Atlas, this will provide the number of food desert areas per state, which will act as the independent variable.

By comparing these values with the number of food deserts in these states, the results will reveal whether or not dollar stores are indicators of food desert communities. Selecting 30 states with the highest levels of food insecurity will act as a control variable because it will ensure that there is a reasonable level of comparison between the units of analysis.

Research Design

This study will combine the above data into the existing dataset provided by Guttmacher Institute with data on a variety of variables applied to American states. This merged data will then provide a thorough look at each of the 30 units, the states with the highest levels of food insecurity. With the addition of food insecurity level, number of food deserts, and number of

Dollar General Corp. and Dollar Tree Inc. locations, this study will be able to control for any potential influence on a state level such as geographical location or economic standing as measured through GDP.

With this newly created dataset, this study will then conduct a linear regression by creating a scatter plot visual. Because the independent and dependent variables are interval variables, this is the most useful test. This method of testing the hypothesis will generate a comparison of the means of the independent and dependent variables, which will allow the study to accurately test the validity of the hypothesis. Upon creating and producing a linear regression, analysis of the r^2 variable, or the slope of the line on the scatter plot, will take place. If r^2 is equal to 1, this would indicate a perfect slope, disproving the null hypothesis. Any slope reasonably near 1 could also suggest this outcome, but will require closer evaluation to determine if the results are statistically significant. Should the r^2 value be distant from 1, the scatterplot will show data with high levels of variance, lending support to the null hypothesis.

Analysis

This study used three separate linear regression models imposed onto scatterplots of data in an attempt to disprove the null hypothesis that there is no relationship between the number of food deserts within a state and the number of Dollar General Corp. or Dollar Tree Inc. locations. Using a correlation table, the most notable statistics are revealed together. For Dollar General Corp. locations, the Pearson's correlation coefficient is equal to .355, meaning that there is a moderately positive relationship between the locations of these stores and the locations of food deserts. In comparison, Dollar Tree Inc. has a Pearson's correlation coefficient of .729, showing

a much stronger positive relationship between this company's stores and food desert areas across the United States.

To then supplement and strengthen the correlation matrix observations, individual analysis of Dollar General Corp. stores, Dollar Tree Inc. stores, and the number of total dollar stores from these corporations took place through linear regression models. Paralleling the analysis above, the Dollar General Corp. variable reported a t-ratio of 2.008. Because this number is above 2, which acts as the benchmark to reject the null hypothesis, the study then considered the P-value, labeled "Sig." For this variable, the P-value rested at .054, which is slightly above the .05 benchmark that the number must be below to comfortably reject the null hypothesis. Therefore, for the Dollar General Corp. stores alone, the null hypothesis cannot be rejected.

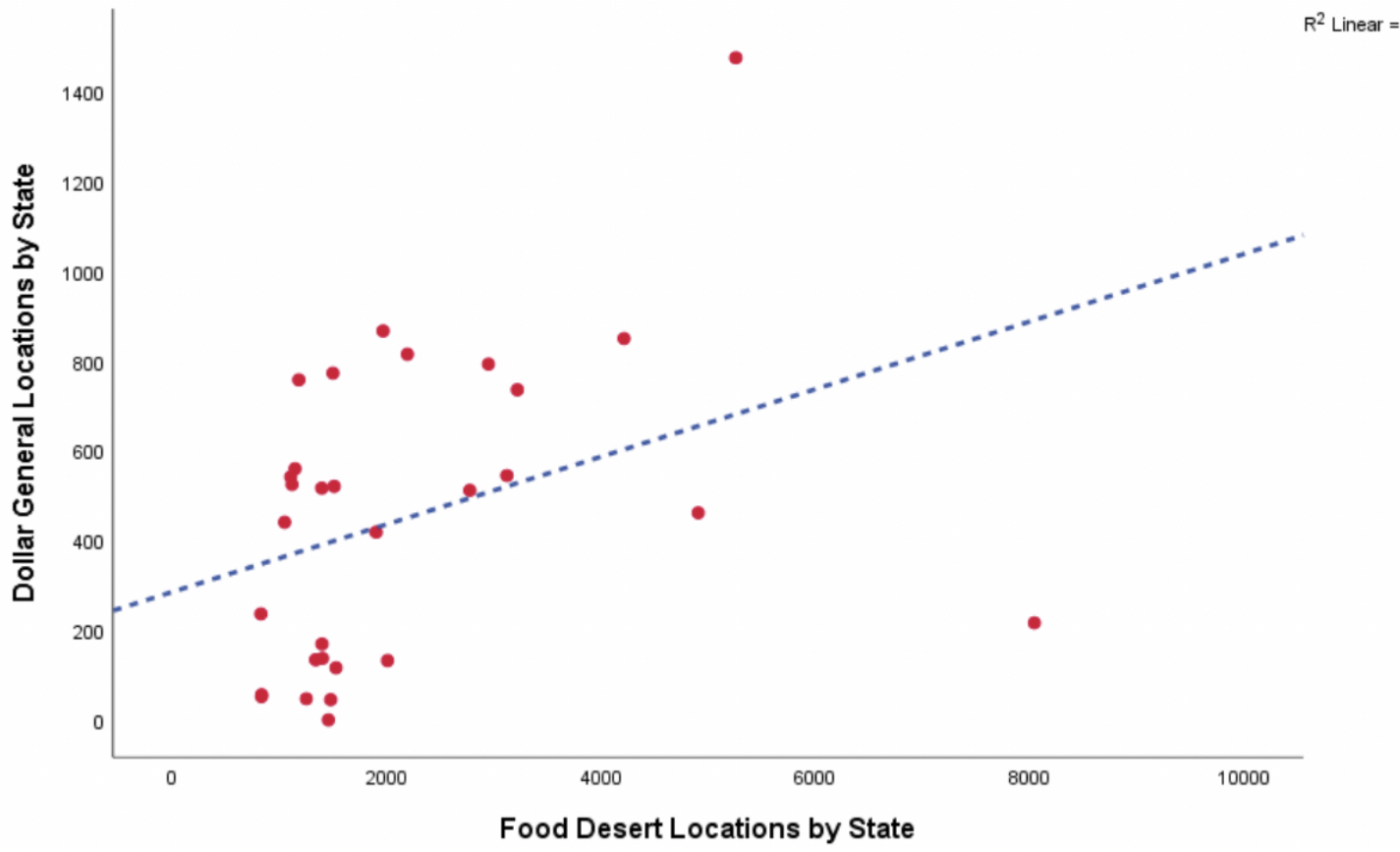
Looking at the Dollar Tree Inc. stores, there is a t-ratio of 5.629, reaching well beyond the value of 2 needed to reject the null hypothesis. Turning to the P-value of this variable, the value is equal to .000. This means that if the null hypothesis is correct, the random sampling error would have produced these results no times in one thousand, allowing the study to reject the null hypothesis for Dollar Tree Inc. locations. Finally, when considering both Dollar Tree Inc. and Dollar General Corp. stores combined, there is a t-ratio of 3.617, reaching the necessary benchmark. The P-value is equal to .001, well below .05, which allows the study to reject the null hypothesis and lend support to the hypothesis that there is a correlation between dollar store locations and food desert areas.

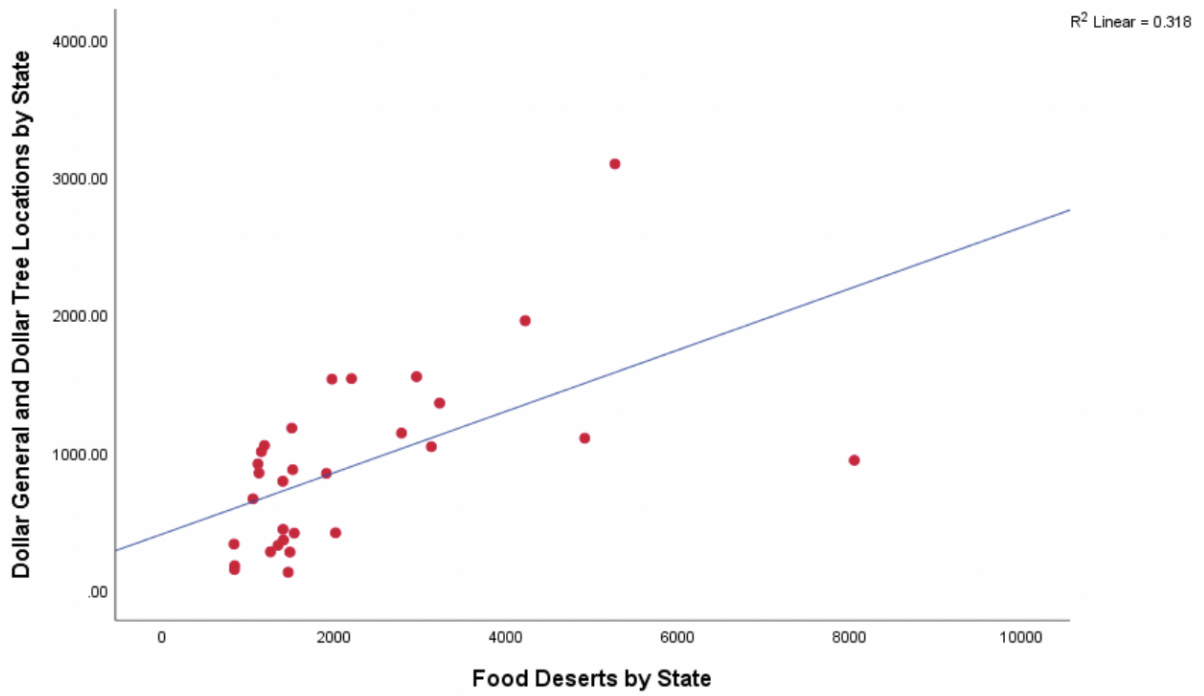
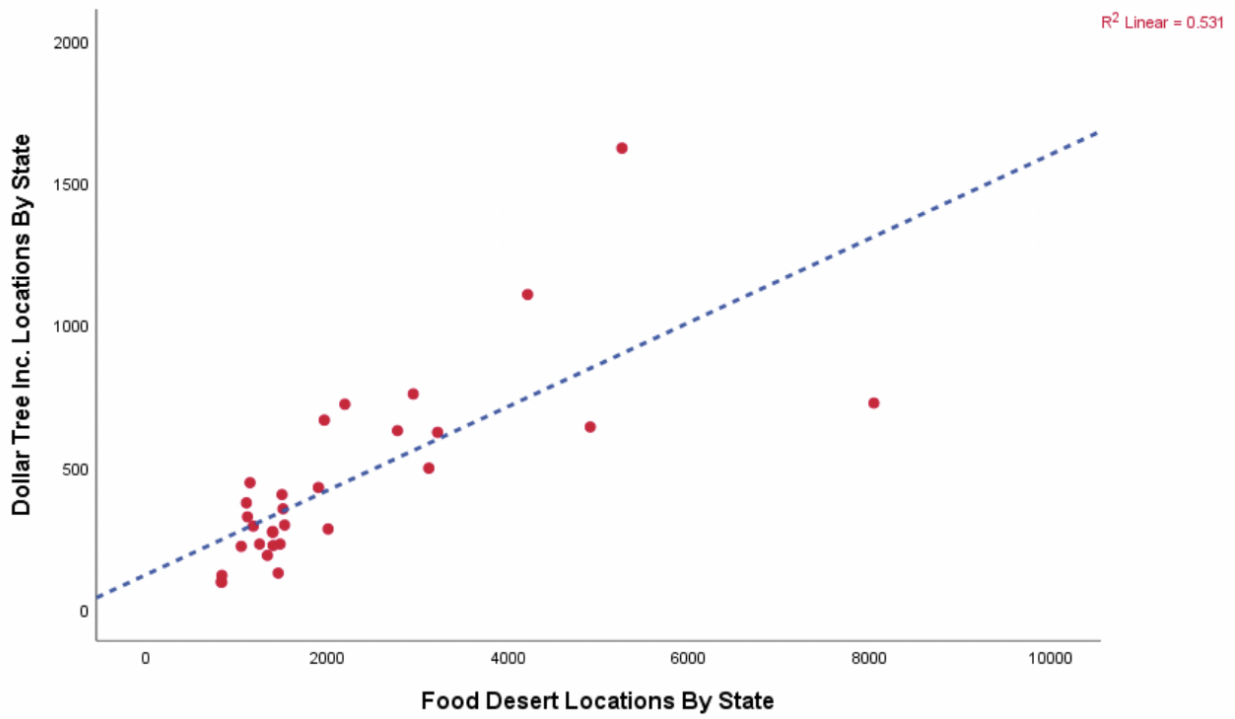
The final point of consideration for this data is the r^2 value for each best fit line found on the scatterplots of the data. This variable can rest anywhere between 0 and 1, with 0 being

absolutely no relationship and 1 being a perfect relationship. When considering the Dollar General Corp. variable, the r^2 value is equal to 0.126, showing a relatively weak positive relationship. In comparison, the r^2 value for Dollar Tree Inc. is .531, which is moderately positive. When combined, the total dollar store variable has a r^2 value of .318, showing a moderately positive relationship that suggests with reasonable error that there is evidence to reject the null hypothesis.

These tests were conducted with controls built into the variables themselves. Food desert areas are low income, low access areas, so the count of food deserts controls for poverty. By using only the 30 states with the highest numbers of food deserts, the tests are controlled as well because there is a common ground among each instance of the variable through having a significant number of food deserts in comparison to the other states. Below, the summary of the data explained above is provided. This is given alongside the scatterplots for Dollar General Corp. locations, Dollar Tree Inc. locations, and the number of these stores combined to visually demonstrate the data that the chart provides.

| Linear Regression Model | Dollar General Corp. | Dollar Tree Inc. | Total Stores |
|--------------------------------|-----------------------------|-------------------------|---------------------|
| Regression Coefficient | .075 | .148 | .223 |
| t-ratio | 2.008 | 5.629 | 3.617 |
| P-value ("Sig.") | .054 | .000 | .001 |





Conclusion

Although the analysis of Dollar General Corp. alone does not have a particularly strong correlation with the locations of food desert areas, the weak positive correlation taken with the strong positive correlations of Dollar Tree Inc. and the total number of these dollar stores lends support to the hypothesis that there are more dollar stores in states with higher numbers of food deserts. This is shown through multiple statistics: t-ratio, P-value, r^2 . Because of the repeated evidence, it is possible to reject the null hypothesis that there is no relationship between states with high numbers of food deserts and dollar store locations.

These results then lend support to the pattern of dollar store corporations like Dollar General Corp. and Dollar Tree Inc. profiting off of low income communities with low access to fresh, nutritionally valuable foods. Because these stores often lack the necessary infrastructure and store space to carry fresh fruits and vegetables as well as refrigerated and frozen goods, they do not qualify as full grocery stores. However, those who are unable to access supermarkets or afford their prices utilize these stores for their groceries because of their lower price points and close proximity. This results in purchases that are not nutritionally valuable and increased rates of chronic illnesses like heart disease and diabetes. Communities are being put at greater risk for serious health issues simply because they cannot easily access a supermarket.

To build off of these results, future studies should consider the impact of rural versus urban food deserts and how access to quality nutrition varies in these different communities. Another useful area to explore would be how dollar store corporations are developed and how they are changing to better fill the needs of these communities, if they are doing so at all. Further research will provide necessary exposure to this issue and reveal potential solutions that will lend

support to communities within food desert areas, resulting in a positive impact on food access and security across the country.

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