# **Dollar Stores: The New Kroger?**

# Examining the Relationship between Food Insecurity and Dollar Store Locations in Mississippi, 2017

## **Background & Theme of Interest**

Food insecurity affects over 40 million Americans every year, and is particularly prevalent in southern states.<sup>1</sup> In 2017, Mississippi had one of the highest food insecurity rates in the country at 19.2%.<sup>1</sup> Food insecurity is defined as the uncertainty or inability to acquire enough food to meet one's nutritional needs.<sup>2</sup> It is especially common in "food deserts," which are areas with limited access to grocery stores and nutritional food.<sup>2</sup> In recent years, dollar stores have taken on an increasing larger role in the food retail settings; they've begun to infiltrate many communities with limited access to grocery stores and provide residents with better access to food. Dollar stores are especially common in southern states; Mississippi has more than 140 dollar stores per million residents.<sup>3</sup>

Little research has been done on the role of dollar stores as a food retail solution for food insecurity. Studies that have been done have been very community-specific, and lack generalizability. A state-wide assessment of the role of dollar stores in Mississippi and food insecurity rates would be an excellent first step to address these gaps. My theme of interest was to examine the relationship between food insecurity rates by county and the location of Dollar Tree stores in Mississippi. I also wanted to look at how these factors affected population health measures such as obesity and diabetes. I also wanted to compare locations of dollar stores and grocery stores to help visualize differences in access that may exist.

### Results

The prevalence of food insecurity in Mississippi is highest along the Western part of the state. There are 85 Dollar Tree stores in the state as of 2018, and 474 grocery stores. Fifty different counties contained at least one Dollar Tree store, while all but one of the 82 counties had at least one grocery store. This county, Issaquena, had the fourth highest food insecurity rate. The county with the highest food insecurity rate, Jefferson, had two grocery stores and no Dollar Tree stores. DeSoto county had the second highest number of Dollar Tree stores with 7, and it also had 17 grocery stores. Rankin county had the lowest food insecurity rate at 11.7%, and also had 4 Dollar Tree stores and 12 grocery stores. In terms of obesity, we saw a correlation between higher food insecurity rates and higher obesity rates. Spatially, we notice a trend of Dollar Tree stores located along major state and U.S highways, with fewer located in the more central part of the state with no highways. Because we were unable to Geocode the actual addresses of the grocery stores, we cannot make any

#### Location of Mississippi in U.S



Access to Dollar Stores along Major Highways Mississippi, 2017



# Methods

The first dataset I acquired was from Feeding America, which had a table for food insecurity rates for each Mississippi county from the year 2017. The quality of this dataset was very high; it was not missing any data, and listed food insecurity rates to the tenth decimal place. The only downside to this dataset was that it was a PDF document that I then had to convert into Excel to be GIS compatible. The second source of data I pulled was the Dollar Tree Store locations. I pulled these addresses from the Dollar Tree Store website as of 2018, and input the addresses into an Excel sheet. The one downside of this method was that I only used Dollar Tree store locations, and did not include other branches of dollar stores, such as Dollar General or Family Dollar. Had I done this project over, I would have gone through ReferenceUSA to get these so I could have mapped all types of dollar stores as opposed to only <12.00% Dollar Tree stores. Once I had added the excel 12.00-18.00% 18.01-24.00% document to ArcMap, I Geocoded the addresses. I also 24.01-30.00% >30.00% pulled two datasets from the Mississippi GIS database: one was a Shapefile of all the counties in the United States, and the other was a shapefile of all the highways and roads in Mississippi. This dataset was good in the sense that it was all encompassing with data from the whole country, but it needed to be edited down because some of the county names were abbreviated and did not match up with my other data. I used the "Select by Attribute" function in GIS so select only Mississippi counties from that dataset, and then added that as a layer of data to my map and deleted the original file. From there, I joined my food insecurity rate dataset to this dataset, and then used the Quantities function to display a color gradient that would indicate varying levels of food insecurity. This became the base for all my maps, and I exported it as a layer so I could easily layer additional data on top. Additionally, I pulled a dataset from USDA Food Environment Atlas that had the number of grocery stores per county in 2014; this was a lower quality dataset because it did not have exact addresses that I could Geocode; it only had a total number of grocery stores per county. I joined this dataset to the county dataset as well. However, I opted not to map these points because they would have been spatially misleading, but it was helpful to compare the raw data. Lastly, I used Census.gov to download demographics data for obesity in Mississippi; this dataset had a lot more information in it than I needed, but it was helpful because it had everything designated by county. This data was from 2015. I used the food insecurity data to create a Choropleth map that served as the base for all of my maps, and then I made quantitative thematic map to show varying rates of obesity in different counties. I did a spatial analysis using the roads to visual where store locations were along major highways.

#### trend that many food insecure counties are located to the west of highway 55, and have lower prevalence of Dollar Tree stores. In the future, I'd like to properly Geocode the grocery store locations, as well as include Family Dollar and Dollar General Stores in my analyses. The salient findings include the fact that even counties that have the highest rates of food insecurity have at least one grocery store, with the exception

spatial inferences from these data, but we can compare total

number of stores in counties to food insecurity. We do notice a

of Issaquena. DeSoto, which had the second highest number of dollar stores, had the second lowest food insecurity rate, but also had 17 grocery stores. The northeastern and Southeastern parts of the state had the lowest rates of food insecurity. I would like to conduct an analysis that focus on buffer analyses of these regions regarding dollar stores and grocery stores, and compare to the western part of the state that has higher food insecurity rates.

## Discussion

The primary goal of this study was to investigate the relationship between food insecurity and dollar store locations in Mississippi. Our findings show a potential correlation between Dollar Tree stores and county food insecurity. Of the five counties 100 Miles with food insecurity rates greater than 30%. none had Dollar Tree stores. These five counties also had anywhere from zero to 5 grocery store locations. Because of dollar stores smaller size, there could be an opportunity to populate in these counties to help fill the gaps regarding food access. One strength of these analyses was that I was able to pinpoint the exact addresses of Dollar Tree store locations by Geocoding in GIS. It is interesting to visualize how the highway network influences food insecurity rates and dollar store locations, and would be interesting to analyze further in future studies. Another strength is that we were able to clearly visualize the dynamic between food insecurity rates and diabetes using overlay functions in GIS. There were some limitations with these datasets. First, the years were not consistent; data ranged from 2014 to 2018. Additionally, because I was unable to Geocode exact grocery store locations, I could not display the differences in access to grocery stores compared to dollar stores. I also would have liked to examine some of these relationships at individual county levels. The broad approach of looking at food insecurity across the whole state was helpful to understand more general trends in the play between food insecurity, dollar stores, and grocery store access. In the future, it would be helpful to examine at the country level the differences in spatial access of these two types of stores using street mapping and buffer zones. As I mentioned previously, it would also be really helpful to include all types of dollar stores in future analysis, and not just Dollar Tree stores.

#### **Dollar Store Locations and Food Insecurity Rates** Mississippi, 2017



# **Food Insecurity Rates in Mississippi Counties, 2017**

# % of Population that is Food Insecure



#### **GIS for Public Health with Professor Thomas Stopka**

#### GIS Data Sources: Feeding America, Dollar Tree Store, Mississippi GIS, USDA Food Environment Atlas, Census.gov

Map the Meal Gap. Feeding America. <u>https://map.feedingamerica.orgcounty/2017/overall/massachusetts/county/suffolk/</u>. Accessed February 18, 2020. Weaver BL. Health and Socioeconomic Disparities of Food Deserts | Global Ecological Humanities. https://sites.duke.edu/lit290s-1 02 s2017/2017/03/04/health-and-socioeconomi arities-of-food-deserts/. Accessed May 2, 2020.

Drichoutis AC, Nayga RM, Rouse HL, Thomsen MR. Food environment and childhood obesity: the effect of dollar stores. *Health Econ Rev.* 2015;5. doi:10.1186/s13561-015-0074-2



