Linking Obesity With Income and Fast Food Availability

By Ellen McGuiness and Andrew Roberts

Presented November 30, 2006

Abstract: The purpose of this project was to look for a relationship between location of fast food restaurants, average income per household, and obesity. To do this, we compiled data from ReferenceUSA to obtain addresses of all McDonald's, Taco Bells, and Burger Kings. Once we compiled this data, we contacted the state health departments from the continental United States for obesity data at the county level. The final step of data collection was to get income levels per household, which we got from the U.S. Census Bureau. Using ArcMap, we created visual maps to understand the correlation between obesity, income and fast food restaurants. Preliminary results indicate that the prevalence of fast food locations was highest in more urban areas; these areas had higher income and lower obesity levels. However, there were some areas that displayed a relationship between low income, numerous fast food locations, and high obesity. More data will be needed to develop a more accurate trend between these three variables.
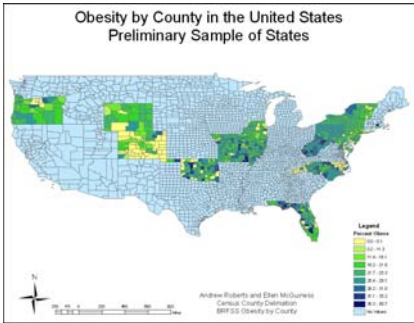
Figure 2: This map shows the median income per capita by county. Lighter greens correspond to lower income. Darker blues correspond to highest income levels.

Figure 4: This map is a close up of the North East looking at median income per capita. Light green corresponds to counties with lowest income levels and darker blues correspond with counties with a high median per capita income.

Figure 6: This map compares obesity levels across the north east and the median income level. The preliminary data shows a strong correlation between areas of higher obesity and lower median income level.

Figure 1: These are the states that we have gathered data for obesity for by county. Moving from light green to dark blue percent obese increases. Counties coded yellow no data exists.

Figure 3: This Map shows distribution of different fast food chains across the continental U.S. Red dots are McDonalds (~14,000 Locations), Yellow are Taco Bells (~ 5,000 Locations) Gold are Burger Kings (~ 7,000 Locations)

Figure 5: This map does not seem to indicate a direct correlation between fast food locations and obesity. The fast food locations mirror urban areas, indicating that we may need to adjust for population per location.

Figure 7: This map compares percent obese with prevalence of fast food locations and income levels. It seems to confirm the correlation between low income levels, large concentration of fast food locations and high obesity.

Introduction: For the past 20 years or so, the amount of Americans with obesity has been on a steady incline. Obesity is a leading cause of Type II Diabetes and hypertension, as well as a multitude of other health related problems. It is obviously in our best interest to monitor trends in obesity in order to better predict where obesity is likely to occur in a population, and therefore, to hopefully learn ways of counteracting these environmental and social factors to ensure the health of our population. In this project, the focus is on average household income, poverty levels, and the locations of fast food restaurants as variables that can be used to see where obesity is likely to be prevalent.

Methodology: The first part of the project consisted of gathering the data. For the restaurants, this was a fairly easy task, all be it a time-consuming one. We used the ReferenceUSA database to download locations of all of the Burger Kings and Taco Bells in the country. We added this data to the existing data for all of the McDonald's locations. This brought our total dataset for fast food restaurants to close to 26,000 locations. Using the ArcGIS software, ArcMap, we plotted the locations on top of a county layer for the United States using Lat/Long coordinates. We have chosen to focus specifically on the continental 48 States. To acquire the percentages of people who suffer from obesity per county, we contacted state health departments of all of the Lower 48 asking for obesity data. Most of this data came from the Behavioral Risk Factor Surveillance System (BRFSS), which is a nationwide survey tracking behavioral health trends. Every state participates; however, the 15 states we are presenting represent the only states we have heard from thus far. Some states were able to give us numbers for every county, while others had to consolidate some counties into a larger division in order to have a representative sample. To account for this, counties that were grouped together were assumed to each have the same obese population as that indicated for the group. Census data (average household income and poverty levels) was gathered from the Small Area Income and Poverty Estimates (SAIPE) division of the U.S. Census Bureau. Once all of the data was collected, we did a visual analysis of the data by trying to identify regions that were high in poverty, high in obesity, and high in number of fast food restaurants. Had we had more states to analyze, we would have used various analysis tools to look for global trends, but with only 15 states, a visual comparison was sufficient.
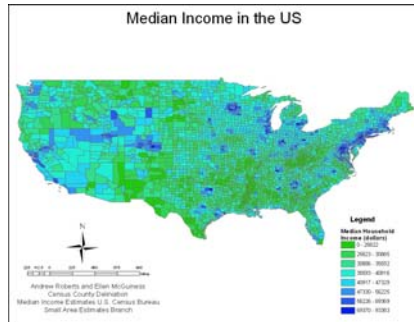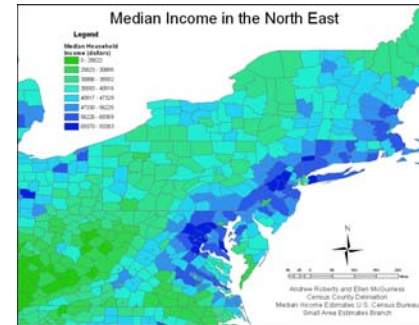
Conclusion: For this sampling of the U.S. we are starting to see a relationship develop between obesity levels and lower income regions. A larger sampling of the U.S. and eventually data for the entire country will be needed to find a more definitive trend between obesity and fast food locations. Further improvements will include the use of statistical models and adjusting the amount of fast food restaurants to account for population density.

Sources:
- American Obesity Association- www.obesity.org
- Reference USA Online database
- U.S. Census Bureau 2000
- 2003 Poverty and Median Income Estimates - U.S. Census Bureau, Small Area Estimates Branch Release date: 10.02.2006
- CDC's BRFSS 2000-2005 State and Metropolitan Area based data.
- State Health Departments
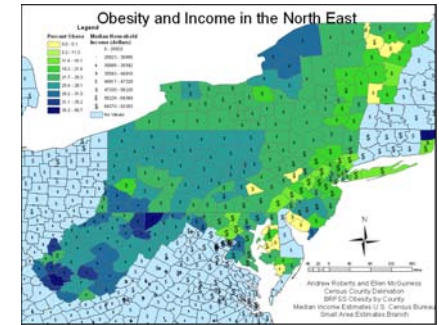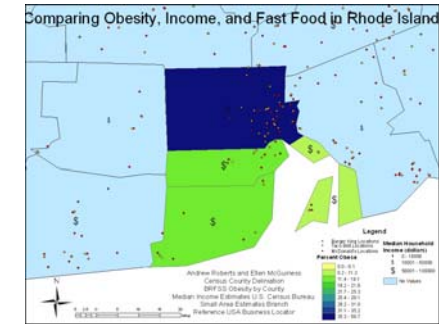- Projection: GCS Assumed Geographic 1
- Datum: NAD 27