Assessing the Food Environment around Elementary Schools in the U.S. with GIS Analysis

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Introduction

According to the USDA, "Food security means access by all people, at all times, to enough food for an active healthy lifestyle". Food insecurity is not only a problem in developing nations but it is also a problem in the United States. Having access to healthy food choices effects the health and well being of children. Our research project analyzes the spatial distribution of food stores located around public elementary schools across the United States. Featuring a comparison between Alabama and Florida with a concentration on Orange County, Florida.
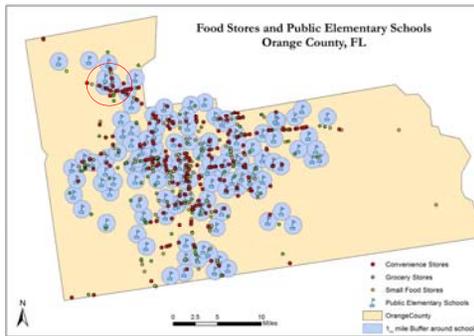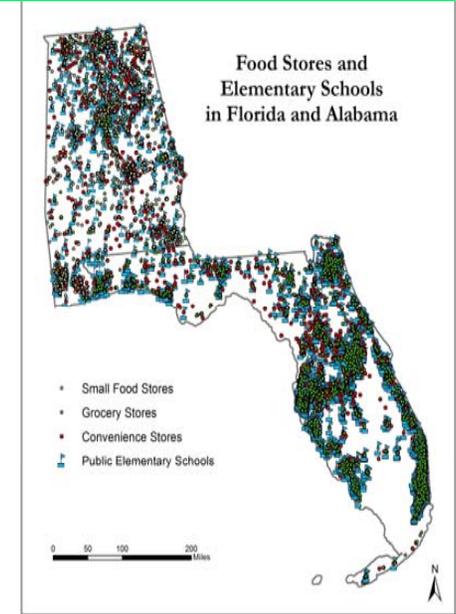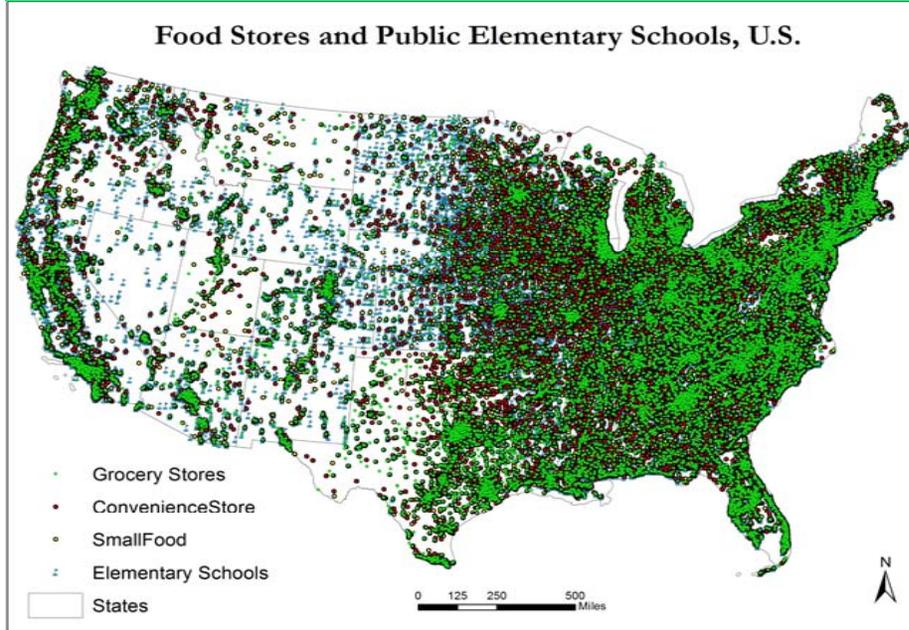

Data & Methods

Data:
Two data layers were used in this study: (1) all public elementary schools, and (2) all food retail stores in the U.S.

Methods:
1) Classify three types of stores: convenience stores; small food stores, and grocery stores
2) Geocode all stores and elementary schools onto two digital layers in ArcGIS.
3) Buffer analysis was used to analyze stores within a radius of 0.5 or 1 mile around each school.
4) The Geographic Information System was used to create maps that form spatial relationships. That we can then use to analysis and compare data.

Results

Food Stores and Public Elementary Schools, U.S.

Food Stores and Elementary Schools in Florida and Alabama

Food Stores and Public Elementary Schools Orange County, FL

	Convenience Store		Small Food Store		Grocery Store	
	0.5 mile	1 mile	0.5 mile	1 mile	0.5 mile	1 mile
U.S.	15677 (25%)	32308 (51.6%)	12224 (29.3%)	22711 (54.5%)	11919 (26.6%)	25236 (56.4%)
Alabama	267 (16.8%)	708 (44.6%)	132 (16.56%)	301 (37.8%)	115 (19.1%)	298 (49.6%)
Florida	890 (26.1%)	2123 (62.3%)	672 (29.8%)	1610 (71.3%)	488 (24.2%)	1266 (62.7%)
Orange County	56 (28.4%)	131 (66.5%)	54 (28.1%)	140 (72.9%)	23 (19.3%)	77 (64.7%)

From the figures and table, we found a high concentration of convenience and small food stores closely around public elementary schools. When comparing Florida and Alabama, we saw a worse situation in Florida. It maybe due to the dominant rural setting in Alabama compared to a highly urbanized Florida. We further analyzed food stores in Orange County, FL, and found that almost 67% of convenience stores and 73% of small food stores are located within a 1 mile buffer around public elementary schools. The highlighted school, Oak Hill Elementary, was surrounded by 11 convenience and small food stores as you can see from the Orange County Map. From the Google map, the CVS and Dollar General are directly across the street. Children are frequently exposed to these nearby unhealthy food stores on their way back home.

Conclusion

In summary, our study provides a multi-level analysis on food environments around the public elementary schools in the U.S. The major findings increase our awareness of unhealthy food environments around our children, which have contributed to the rising childhood obesity rates in the U.S. This issue should be paid more attention to by parents, school teachers, professionals, policy makers, and local governments.

Reference: http://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us.aspx; http://www2.ed.gov/rschstat/landing.jhtml?src=image