GIS Mapping to Identify Vulnerable Neighborhoods in Gainesville, FL

December 10, 2012

Tiffany Lane
Craig Stokes
Jeffrey Young
Rebecca Herrin

Introduction

According to the 2010 Census data, Alachua County currently holds 248,770 residents, making it Florida's 23rd most populous county. The population is unevenly distributed across many neighborhoods with varying economic, cultural, and social capital. The fragmented nature of these resources creates vulnerable neighborhoods within Alachua County. Mechanic and Tanner (2007) state vulnerability results from an interaction between the resources available to individuals and communities and the life challenges they face. Our goal is to identify the vulnerable neighborhoods in Alachua County, with an emphasis on families and children, as evidence for county government to create advocacy programs in these areas. Serving these areas could increase opportunities and prevent continued vulnerability.

Scope and Characteristics

Alachua County is located in North Central Florida. It is Florida's 23rd most populous county, with 1.3% of Florida's population. The total land area for the county is 970 square miles, 875 of which is land and 95 of which is water. Alachua County contains 9 different municipalities; Alachua, Archer, Gainesville, Hawthorne, High Springs, La Crosse, Lochloosa, Micanopy and Newberry. Alachua county is also home of the University of Florida, which runs most of the economy in the County. As of the 2010 census, there were 100,518 households. 53,500 of those households were said to be family households. 41.3% of those households had children under the age of 18. The 2010 census showed 26.3% of those under the age of 18 are in poverty. This is slightly higher than the Florida average which is 23.6%. As of 2010, the average income per capita was $34,859 which less than the Florida state average of $38,210.

Although the average income per capita is lower than the state average, the unemployment rate as of 2011 was 7.7%, which was slightly less than the state average(10.5%). The crime rate of Alachua County is higher than the state average. For every 100,000 people in Alachua County, 275.3 people were admitted to prison. The state average of those admitted to prison per 100,000, was 185.1.

We identified the following as sources for vulnerability in Alachua County:

- Food desserts

- Domestic violence

- Income

- Child neglect and abuse

- Incarceration rates

Food Deserts

One of the primary vulnerability indicators chosen is the existence of food deserts. A food desert is the lack of access or availability of nutritious fresh foods through supermarkets or farmer's markets. These tend to occur in low income areas.

Food deserts are a sign of neighborhood vulnerability because the correlated effects on health. Studies show that children within food deserts have higher rates of obesity, diabetes, and other weight related issues. When there is a lack of good nutrition these effects seem to snowball. Poor nutrition leads to poor grades in school, which has correlated effects on incarceration rates and poverty. To address areas that are food deserts will help improve the correlated issues associated with poor nutrition.

The United States Department of Agriculture has its own food desert locator, which utilizes GIS data in order to construct a map at the federal level. They determine their food desert off of census tract data. Qualifying tracts must have at least 500 people, and 33% of the population living further than one mile from a supermarket or grocery store. A mile was chosen as an appropriate distance, because it is a reasonable amount of distance for an individual to walk in order to reach such a resource.

When mapping out the food deserts, a more refined definition was used. A food desert was designated any block outside of a one mile radius of a grocery store or farmer's market, that also contained a child on free or reduced school lunch. The mile radius was still applied to the distance from a place to obtain proper nutrition, however, the qualification for what was considered low income was calculated differently. Census tract data separated the county into

much larger neighborhoods than desired, so census blocks were used instead. Figure 1 represents the flow chart of the processes that were conducted in order to get the map of food deserts. Figure 2 through 4 show the maps during the progression. The final map, Figure 5, represents the areas that are food deserts. You can note that the blue circles are the mile radius for each supermarket or farmers market. All the food deserts are beyond that radius.
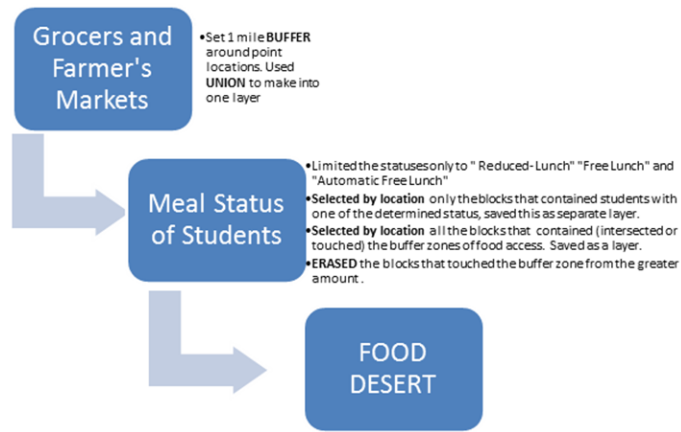

Figure 1 (above). Flow Chart on Methodology of GIS Mapping of Food Deserts in Alachua County
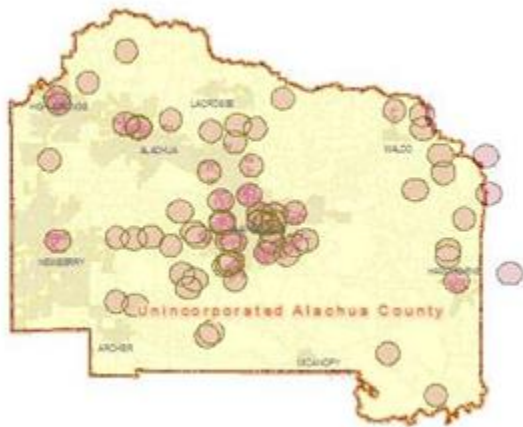
Figure 2(to the left). Mapping of Supermarkets and Grocers with Farmer's Markets with a Mile Radius Surrounding the Location.

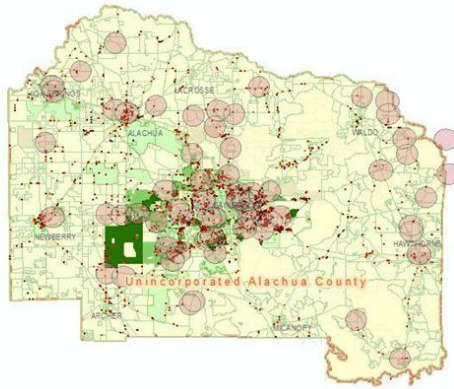Figure 3 (to the right). Locations of Food Access Overlayed Census Blocks.

Figure 4 (to the left). Free and Reduced Lunch Cases Overlayed with Food Access and Census Blocks.
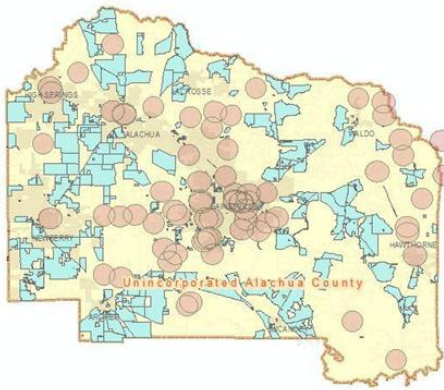

Figure 5 (to the left). Food Deserts

Domestic Violence

Another qualifying measure used to map the vulnerable areas in Alachua County, is the presence of domestic violence. Studies suggest that domestic violence affects more than just the victims. In 70% of cases of partner abuse, children are also abused. As a implication 7.5 million children learn violence as a way to reconcile conflicts. Additionally, children who grow up in homes of domestic violence are 74% more likely to commit an assault. Vulnerable neighborhoods would consist of instances of domestic violence and that resources used to address such an issue, would be well spent. While there are several types of domestic violence, physical and emotional, there was a strong correlation with physical domestic battery having the most detrimental effect on children. The incidents of domestic violence was reduced to only

show the events that had domestic battery. Figure 6 shows the flowchart for the process of obtaining the vulnerability map from domestic violence. Figure 7 is the domestic violence data overlayed on the census blocks. Figure 8 is the vulnerability map for domestic violence and shows only the blocks that have domestic battery cases in them.

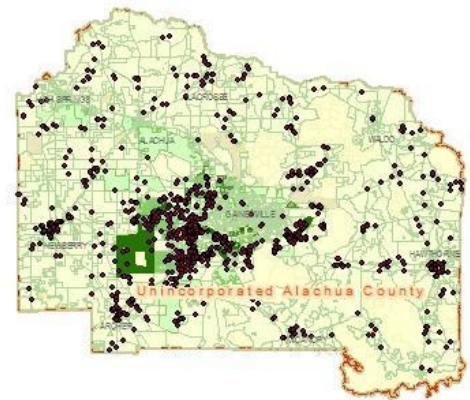Figure 6 (to the left). Flow Chart on Methodology of GIS Mapping of Domestic Violence Vulnerability Areas
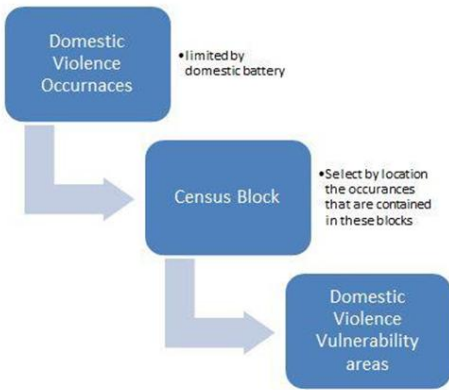

Figure 7 (to the right). Domestic Violence Occurrences Overlayed on the Census Blocks
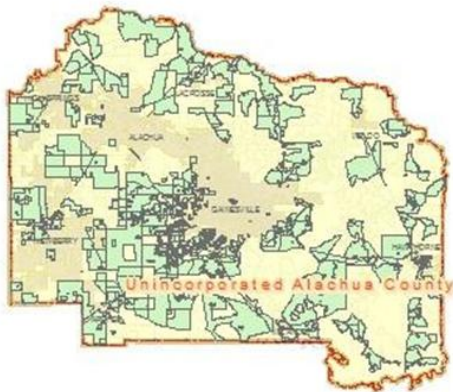

Figure 8(above). Map of Domestic Violence Vulnerability Areas

Income:

Children coming from poverty or low income families are typically left with lasting negative effects. Children in poverty, fare more poorly than children in wealthy homes in certain

areas like education, social and emotional development, economic security and health. (Moore 2009) The child poverty rate provides important information about the percentage of U.S. children whose current life circumstances are hard and whose futures are potentially limited as a result of their family's low income. Poor children are more likely to complete fewer years of education and are more likely to drop out of high school. Children in poverty are also at an increased risk for teen births, less positive peer relationships, and low self esteem issues. Children who come from families of poverty or low income are also subjected to health problems. For example, lower birth weights and food insecurities that stem from problems like not having enough to eat, inadequate diets or not being able to afford meals. For this project we were given information of children who received free or reduced lunches. All of these children were either in poverty or just slightly above that.
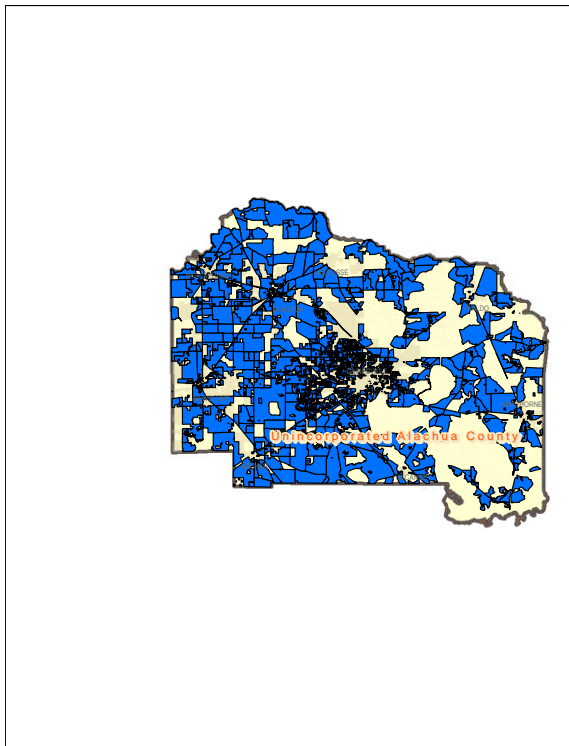
This figure shows all children who received free or reduced lunches in Alachua county.

Child Abuse and Neglect

Early-life challenges and their negative effects increase the likelihood of poor adult outcomes. One example of an early-life trauma includes child abuse and neglect. Our research showed that experiencing child abuse or neglect had a negative impact on emotional and behavioral development, brain and neurobiological development, and social relationships with

parent and peers. (Panos Vostanis, et al. 2012) Additionally, these victims had the greatest risk of being revictimized as adults. (Windom etal. 2008) The adverse effects of these challenges resulted in psychological, physical, or intellectual employment disabilities in adulthood. These individuals also have a greater risk for inter-partner violence which also results in work interference. (Bassuk 2006) Finally, even with no revictimization or inter-partner violence, individuals who experienced child abuse or neglect had lower numbers of looking for a job. (Alexander 2011) The negative impacts of child neglect and abuse loiter within individuals well into their adult life and inhibit the economic and social success of that individual and their entire community. Figure 9 shows the blocks that contain instances of reported child abuse and neglect.
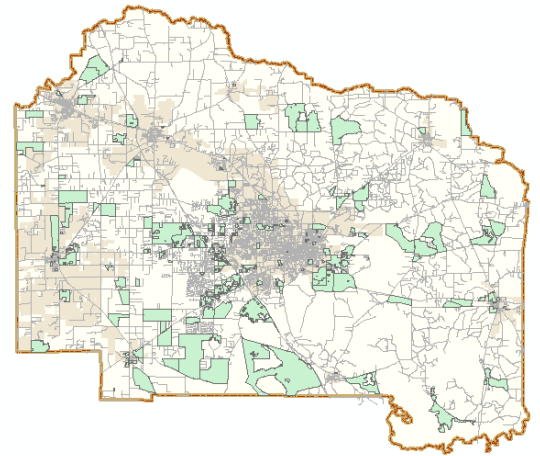
Figure 9 (above) areas with child abuse or neglect cases

Incarceration:

Children whose parents have been incarcerated are also at risk of social and educational problems. (Murray et al. 2012) Studies have shown that children whose parents have been incarcerated represent anitsocial behavior, mental health problems, drug use and below average performance. (Wright 2000) Parents are apt to have been living in poverty before incarceration and to have been unable to provide basic material. The parental arrest and incarceration expose

the child to additional risks: further separations from the parent and possibly siblings, unstable care arrangements, uncertainty about his or her future, secrecy and deception regarding the incarceration, and stigma. In older children, delinquency, substance abuse, sexual misconduct, and gang activity are found. Separation from the parents could also lead to an inability to form later relationships, self-blame, depression and antisocial behaviors.
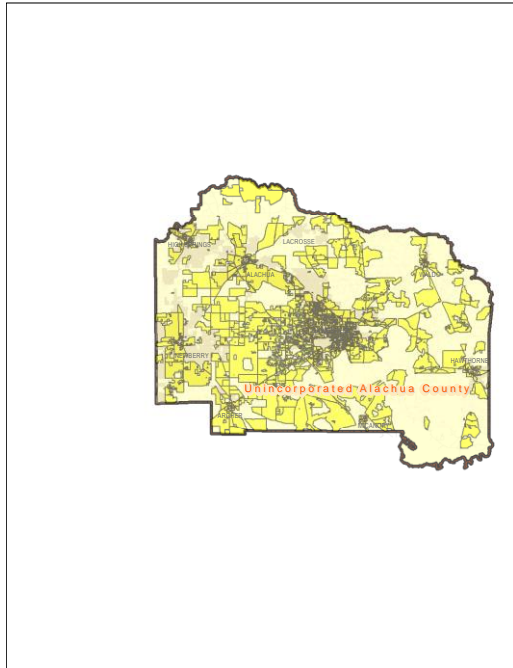
This figure shows all incarceration convictions in Alachua county.

Methodology

To show where the vulnerable neighborhoods in Alachua county are, the intersect command to overlay the blocks that match the different criteria for vulnerability. We started with the blocks that had at least one incarceration (Figure 10). Then we intersected that with blocks that had at least one case of domestic violence (Figure 11). The third criteria we intersected was blocks that had cases of child abuse(Figure 12). Next we took blocks that had residents that used assisted lunches to show a low income and intersected it with the other three blocks(Figure 13).

Lastly we intersected these blocks with areas that are food deserts to show the most vulnerable areas. Each map progressively shows areas that are more and more vulnerable, with the final map showing the most vulnerable areas to be in east Gainesville and also west of the interstate in Gainesville, the tower area in Archer, and the outskirts of Micanopy, High Springs, and Waldo.

Results and Conclusion

The final map (figure14) demonstrates the collective overlay of all the variables that were defined to constitute a vulnerable area. These areas are spread about the county, but typically located in rural or economically depressed areas. The most vulnerable areas are in east Gainesville and also west of the interstate in Gainesville, the tower area in Archer, and the outskirts of Micanopy, High Springs, and Waldo. All blocks have 10 or more people under age 18. The Gainesville Blocks are in an urban area and have the highest concentration of people. The Archer Blocks have the largest concentration of young people. These results can be used to help target advocacy programs to certain areas that can be seen as most vulnerable. Depending on the size of the project or the amount of funds available, by targeting one of the mapped areas, it will be possible to directly address the key issues in that neighborhood, and hopefully have more promising results.
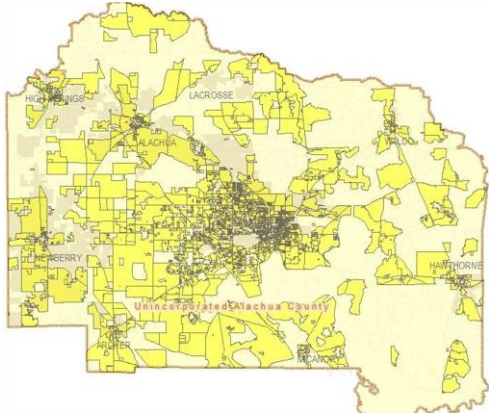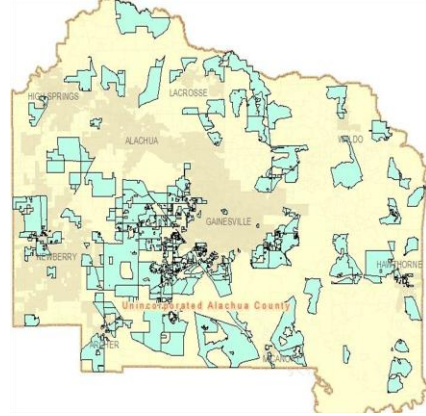
Figure 10 (above) shows incarceration in Alachua

Figure 11(above) joins incarceration and domestic viololence
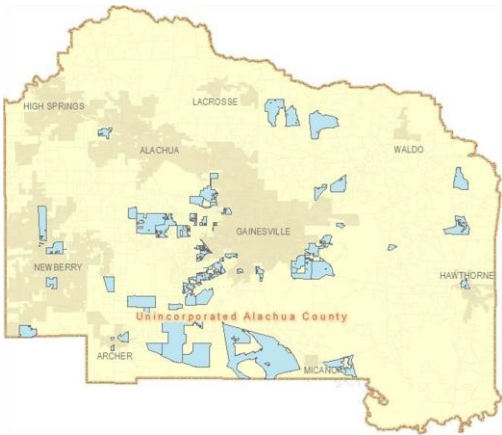

Figure 13 (above) shows Incarceration,

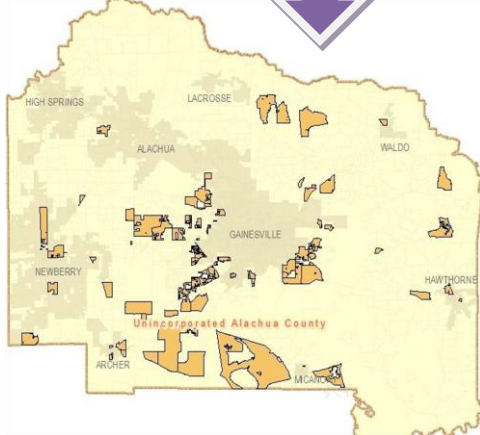Domestic Violence, Child Abuse and Assisted

Lunches

Figure 12 (above) represents the block with Incarceration, Domestic Violence and Child Abuse

Figure 14 (above) represents the areas in Alachua County that are vulnerable according to our identifiers: Food desserts, Domestic violence, Income, Child neglect and abuse, Incarceration rates