Madison County Alcohol Outlet Density Study
A Collaborative Project between
the Syracuse Community Geography Program at Syracuse University and
BRiDGES, Madison County Council on Alcoholism and Substance Abuse, Inc.
October 2012

Introduction

Reducing excessive alcohol consumption is a major public health and economic concern. According to the Centers for Disease Control, excessive alcohol consumption resulted in approximately 88,000 deaths in the U.S. between 2006 and 2010. Excessive drinking includes "heavy drinking, binge drinking, and any drinking by pregnant women or underage youth" (http://www.cdc.gov/alcohol/fact-sheets/alcohol-use.htm). Some of the many immediate harmful health consequences associated with excessive drinking include unintentional injuries, violence, risky sexual behaviors, and alcohol poisoning. Long term health risks include neurological, cardiovascular, psychiatric, and social problems, as well as several types of cancer and liver disease. Excessive drinking also has economic consequences valued at $223.5 billion in 2006! Economic costs include emergency room visits, physician office visits, years of potential life lost for each death associated with drinking, and property damage (http://www.cdc.gov/alcohol/fact-sheets/alcohol-use.htm).

Because the health risks associated with excessive alcohol use are preventable, much public health research has been undertaken to identify effective prevention interventions. Recent research suggests that an effective way to prevent excessive alcohol consumption and reduce public health problems is to address environmental risk factors, or the "alcohol environment". One specific aspect of the alcohol environment that has been shown to be associated with excessive alcohol consumption is the physical availability of alcohol in communities. "The availability of alcohol at different places where people may drink affects drinking practices and shapes the incidence, prevalence, and geographic distribution of alcohol-related problems in the community" (Gruenewald, Remer and Lipton 2002). Alcohol outlet density, the geographic concentration of retail alcohol establishments, in particular, is increasingly viewed as one such environmental risk factor for excessive alcohol. Although limited, some research suggests that alcohol outlet density is correlated with alcohol-related problems (Connor, et al. 2010 and Weitzman et al. 2003). Other research suggests that changes to the alcohol environment, such as regulating alcohol outlet density may be an effective public health policy tool for reducing excessive alcohol consumption and related harms (Campbell, et al. 2009).

Geographical analysis and the use of Geographic Information Systems (GIS) mapping is a useful way to investigate the spatial associations between aspects of the alcohol environment and associated problems, such as motor vehicle crashes, pedestrian injuries and violence. GIS can also help to elucidate the relationship between alcohol outlet density and associated problems in communities. In 2009, BRiDGES, a substance abuse prevention program serving Madison County, New York conducted exploratory research into the alcohol environment of Madison County by mapping alcohol outlet locations, or venues where alcoholic beverages are sold for on- and off-premises consumption and DWI crashes (Gamble and Meltzer, 2009). Following the

example of an alcohol environment study conducted in Syracuse, New York by Robert Pezzolesi in 2009, BRiDGES and its partners mapped alcohol outlet and DWI crash locations to visualize simple geographic patterns. To build upon its exploratory mapping of the alcohol outlet environment, BRiDGES reached out to the Syracuse University Syracuse Community Geography Program (SCG) in November 2011 to request assistance in using Geographic Information Systems (GIS) mapping and spatial analysis to further visualize and analyze the alcohol environment, and in particular alcohol outlet density in Madison County. This report describes the research project, explains the findings, and makes recommendations for key stakeholders.

Background

A Community Guide issued by the Community Preventive Services Task Force, a program of the Centers for Disease Control, reported that a systematic review of extant studies investigating the association of alcohol outlet density and adverse outcomes recommends "the use of regulatory authority (e.g., through licensing and zoning) to limit alcohol outlet density on the basis of sufficient evidence of a positive association between outlet density and excessive alcohol consumption and related harms" (http://www.thecommunityguide.org/alcohol/outletdensity.html). The Guide to Community Preventive reviewed published studies and found that more often than not, when the density of alcohol establishments in communities increased, there was a corresponding increase in adverse outcomes. Similarly, when the density of alcohol outlets decreased, there were fewer adverse outcomes. Research goes on to further state that an effective approach to reducing excessive drinking and the many health and social consequences associated with alcohol use and abuse is to limit the physical availability of alcohol. According to Strategizer 55 – Regulating Alcohol Outlet Density: An Action Guide, "a high concentration of alcohol outlets leads to a variety of serious health and social consequences, including violence, alcohol-impaired driving, neighborhood disruption, and public nuisance activities." Studies conducted in other communities suggests that a reduction in the number of alcohol outlets is correlated to a reduction in police calls for service for issues like fights, sexual assaults, public intoxication, drinking and driving, loitering, and other nuisance problems in areas where alcohol outlet density is high.

Study Description

The goal of this exploratory investigation was to map and spatially analyze the alcohol environment in Madison County. Specifically, SCG and BRiDGES used GIS to map alcohol outlet density, DWI crashes and alcohol-related arrests to explore the relationship between alcohol outlet density and adverse outcomes. BRiDGES initiated this project because they wanted to determine whether there is an association between outlet density and adverse consequences associated with excessive alcohol consumption in Madison County and whether it might be appropriate to advocate for increased regulation of the local alcohol outlet density. BRiDGES was also interested to make recommendations based on the finding to local law enforcement to help in preventing future alcohol related problems.

During the first meeting between representatives from BRiDGES and Syracuse Community Geography, the following research questions were developed and identified as priorities:

- What is the density of onsite and offsite alcohol outlets in Madison County?
- Is greater outlet density associated with increased reports of "harm," as noted in the literature?
- Are outlets clustered near to "sensitive land uses" such as schools and parks?
- Is there a higher concentration of alcohol outlets in low income communites?
- What broad geographic trends in alcohol-related crashes and arrests might be visible?

Due to constraints in data availability, however, it was not possible to sufficiently address all of these questions. Working with data that *could* be obtained from the NYS Liquor Licensing Agency and local law enforcement agencies, BRiDGES and SCG refined and narrowed the scope of the project to answer the following questions:

- What is the ratio of onsite and offsite alcohol outlets to the population (a measure of density) in each of the towns in Madison County?
- Is greater outlet density correlated to increased rates of (1) DWI crashes and (2) alcohol-related arrests across Madison County?
    - What is the ratio of DWI crashes to population for each town?
    - What is the ratio of alcohol-related arrests to population for each town?
    - What is the ratio of DWI crashes to traffic volume for each town?
- Is there greater outlet density in close proximity to public schools?
- Can we identify spatial trends in DWI crashes over time in Madison County?

Definitions of Important Study Terms

Alcohol Outlets: An outlet is a setting in which alcohol may be sold legally for either on-premises or off-premises consumption (Campbell et al. 2009).

On-Premise Alcohol Outlets: Places where alcoholic beverages are served and consumed on site. On-premise outlets include bars, restaurants, and clubs.

Off-Premise Alcohol Outlets: Sites where alcoholic beverages are bought and consumed elsewhere. Off-premise outlets include grocery stores, convenience stores, liquor stores, and big box/discount stores.

Alcohol Beverage Outlet Density: The number of physical locations in which alcoholic beverages are available for purchase either per area or per population (Campbell et al. 2009).

DWI Crashes: Includes the XY coordinate location of all reported motor vehicle crashes where the driver was identified to be driving while intoxicated.

Liquor Law Violations: "The violation of state or local laws or ordinance prohibiting the manufacture, sale, purchases, transportation, possession, or use of alcoholic beverages, not including driving under the influence and drunkenness. Included in this classification is the

manufacture, sale, transporting, furnishing, possessing, etc., of intoxicating liquor; maintaining unlawful drinking places; bootlegging; operating a still; furnishing liquor to a minor or intemperate person; underage possession; using a vehicle for illegal transportation of liquor; drinking on a train or public conveyance; all attempts to commit any of the aforementioned" (http://www.mcw.edu/).

Public Intoxication Arrests: "Public intoxication charges, often called being "drunk and disorderly", is a legal charge alleging that a person is visibly drunk or under the influence of drugs in public. It is usually a misdemeanor crime under state and local law. Public intoxication laws exist to prevent people from disturbing others in public and to remove people who appear to be unable to stop themselves from hurting themselves or others" (http://criminal.findlaw.com/criminal-charges/public-intoxication.html).

Study Partners

BRiDGES (the Madison County Council on Alcoholism and Substance Abuse, Inc) is incorporated as a private, not-for-profit organization whose mission is to improve the quality of life by providing advocacy and services in the community, the workplace, and to families and individuals affected by addiction and the abuse of alcohol, tobacco and other substances. BRiDGES offers prevention and intervention programs that promote, change, and build healthy communities. BRiDGES programming includes training for alcohol service providers, under-age drinking prevention programs, smoking cessation support, substance abuse counseling and referral, employee assistance programs for local employers, and gambling addiction programs. BRiDGES operates with a staff of about 15 people in Madison County and assists communities in four counties.

Syracuse Community Geography is a community-driven collaboration that uses Geographic Information Systems (GIS) to map and analyze a wide variety of issues in the Greater Syracuse Area. GIS and geographic information can help the community to visualize challenges in new ways by raising awareness about community problems and resources; informing planning processes; supporting community organizing; advocating community concerns. All projects address community-identified needs and priorities. Syracuse Community Geography partners with community-based organizations working in the areas of: community and urban development, public health, transportation, and social and environmental justice. We seek to contribute geographical skills and empower communities—from neighborhoods to regions—to use maps and spatial analyses to better understand their social landscape and to build a more just and equitable society.

Study Site: Madison County

Madison County is located in Central, Upstate New York and is part of the Syracuse Metropolitan Area (See Map 1). The total population of Madison County is 73,442 (2010 US Census). Located between Syracuse and Utica-Rome, Madison County is a predominantly rural county with an area of 655 square miles. Nearly half of the County's land area (46 percent) is agricultural, with nearly 750 active farms (http://madisoncountyida.com/agriculture.php). In addition to a thriving agricultural sector, the County's predominant employment industries include education, manufacturing and retail trade, employing a combined 50 percent of the

civilian workforce. The County's four colleges (SUNY Morrisville State College, Cazenovia College, Colgate University and the Utica School of Commerce) have a combined student population of nearly 7,550 students (See Table 1). The County contains the City of Oneida, 15 towns, and 9 villages. The median age of the population is 39.5 and approximately 29 percent of the people living in Madison County are under the age of 21. The population is predominately white (95 percent). The median household income is $53,006 and slightly fewer than 10 percent of the population lives in poverty.

Table 1: Student Populations of Colleges in Madison County, New York

Name	Total Students Enrollment	% Female Population	% Male Population
Morrisville State College	3,229	48%	52%
Colgate University	2,947	53%	47%
Cazenovia College	1,043	75%	25%
Utica School of Commerce	330	72%	28%

Mapping the Alcohol Environment

To begin the mapping process, SCG gathered basic U.S. Census data for census tracts and towns in Madison County. BRiDGES staff provided data they had collected from their own private database or received from local law enforcement officials. These data included locations of alcohol-related arrests and locations of DWI automobile crashes. BRiDGES also obtained the names and addresses of on- and off-premises alcohol outlets in Madison County from the New York State Liquor Authority website (http://www.sla.ny.gov/). BRiDGES staff verified the accuracy of the alcohol outlet names and addresses by visiting the outlets.

The location data on arrests, crashes and outlets were then reformatted and verified so that they could be accurately mapped using GIS software. Once the available data were mapped, SCG calculated densities of each variable based on the average population reported during the 2000 and 2010 Census. This calculation produced new data which showed the occurrence of arrests, crashes and outlets per 1,000 people in each town (See Maps 2, 3 and 4). These new data provide a means for quantifying the variables so that rates of alcohol-related problems can be meaningfully compared between towns in Madison County.

Next, SCG mapped the locations of on- and off-premises alcohol outlets with the location of public schools in Madison County. In order to determine the proximity of outlets to schools, a quarter-mile buffer was created around each school and GIS software was used to determine the number of alcohol outlets within one-quarter mile of schools (see Map 5).

Finally, SCG combined the location data of DWI crashes with traffic volume data for roads in Madison County to create another measurement of crash densities for each town. First, "annual

average daily traffic" (AADT) for each road was obtained from the NYS Department of Transportation (https://www.dot.ny.gov/tdv). Then, GIS software was used to calculate the length of each road. The AADT was multiplied by the length to generate new values that represent the "vehicle miles travelled" (VMT) for the roads in each town. These data were then combined with DWI crash totals for each town to create a measure of crashes per VMT (see Map 6).

Description of Maps and Study Results

Map 1 provides orientation for Madison County. It includes the boundaries for towns and villages, as well as the major highways that traverse the county. It also shows the locations of the four colleges and the 26 public schools in the county.

Map 2 shows the number of on- and off-premises alcohol outlets in each town of Madison County per 1,000 residents. Thus, in addition to showing the locations of outlets, this map shows the *density* of outlets for each town in the county. The towns with the highest outlet density include Hamilton (3.86 outlets per 1,000 people), Madison (3.44 outlets per 1,000 people), and DeRuyter (3.2 outlets per 1,000 people). The towns with the lowest outlet densities include Lincoln, Fenner, and Lebanon (each with zero outlets per 1,000 people).

Map 3 shows the number of DWI crashes in each town of Madison County per 1,000 residents from 2004 to 2011. This is a map of DWI crash density across the county. The towns with the highest densities of DWI crashes include Stockbridge (11.48 crashes per 1,000 people), Nelson (9.13 crashes per 1,000 people), and Lincoln (8.36). The towns with the lowest densities of DWI include Oneida (0.27 crashes per 1,000 people), Hamilton (1.93 crashes per 1,000 people), and Cazenovia (3.1 crashes per 1,000 people). The bar graph on the right side of this map also shows that between 2004 and 2011 there was a significant decline in the number of DWI crashes reported in Madison County.

A visual comparison of Map 2 and Map 3 indicates that the towns with the highest alcohol outlet density do not positively correlate with the towns that report the highest DWI crash densities. As will be discussed below, however, this *does not* mean that we are able to conclude that there exists no positive correlation between outlet density and alcohol-related problems more generally. Determining that relationship would require access to a wider range of data.

Map 4 shows alcohol-related arrest densities across Madison County. Because the alcohol-related arrest data were incomplete, the results shown in this map are not reliable. Not only was the dataset of alcohol-related arrests incomplete, but the data were also significantly skewed. The town of Eaton, for example, appears to have a dramatically higher density of arrests (26 total) because the dataset includes multiple arrests that occurred at two single addresses near SUNY Morrisville. Through improved data collection and management, however, it would be possible to investigate the relationship between outlet density and alcohol-related arrests.

Map 5 is a map of the proximity of on- and off-premises outlets to public schools in Madison County. It shows that there are a total of 12 schools in the county which are located within .25 miles of an alcohol outlet.

Map 6 shows the number of DWI crashes in each town of Madison County per "vehicle miles traveled" (VMT, as defined above) from 2004 to 2011. In other words, this is a map of another measure of density for DWI crashes across the county. Instead of related crash rates to population, as in Map 3, this map relates crash rates to traffic volume on the roads of each town. The map indicates that the towns with the highest rates of DWI crashes are Stockbridge, Fenner, and Brookfield. A visual comparison between Map 6 and Map 2 (outlet density) indicates there is not a positive correlation between the two variables. Again, however, this does not mean that we can conclude that there exists no positive correlation between outlet density and alcohol-related problems more generally.

Interpretation of Study Results

The results and maps produced by this project indicate that there is not a clear *spatial* correlation between alcohol outlet density and DWI crashes or alcohol-related arrests in Madison County. This conclusion, however, is limited by the availability and quality of data. Furthermore, as discussed previously, this conclusion does *not* mean that there is no positive correlation between outlet density and alcohol-related problems more generally. There are two possible reasons why no spatial correlation was found and identifies other datasets which might allow broader determinations to be made about outlet density and alcohol-related problems. The recommendation section below details recommendations for improving data quality and availability.

One possible explanation for why no positive correlation was found between outlet density and DWI crashes / alcohol-related arrests pertains to the rural nature of Madison County. From this perspective, the study area might present a fundamentally different kind of "alcohol environment" than those studied in other projects which have found a positive correlation (see, for example, Blake and Nied 1997, McCarthy 2005, and Task Force 2009). For example, the "rurality" of a study area might mean that DWI crashes will necessarily occur *away from* outlets since most residents would be travelling significant distances between work, home and commercial areas. Likewise, the relatively dispersed residential patterns of rural areas and the small number of total outlets could preclude the appropriateness of density measures generally (i.e. outlets might simply be located in the few commercial districts that exist in a rural county and these districts might always have higher populations). If these speculations are true, then it would not make sense to focus on regulating density in substance abuse prevention efforts. This does not mean that the maps such as the ones seen below are useless, but it may require a reevaluation of what exactly it is that spatial analysis can tell us.

A second explanation for why no positive correlation was found in the present study has to do with the availability and quality of data pertaining to alcohol-related problems. As discussed above, the primary indicator of "alcohol-related problems" in this study is DWI crashes. Alcohol-related arrests were also considered, but the quality and size of the dataset was too

limited to allow for meaningful analysis. Since the variables were so limited, we may simply be missing the necessary data to satisfactorily determine if a correlation exists between outlet density and alcohol-related problems. In other words, it is likely that the spatial analysis of the present study was only able to get at one piece of a much larger picture. A number of other studies (see for example Connor *et al.* 2011 and Weitzman *et al.* 2003) use survey data of individuals and households that defines "alcohol-related problems" in terms consumption rates, health problems, and occurrences of domestic violence. While obtaining these kinds of data is beyond the current capabilities at BRiDGES and SCG, it is entirely possible that better data on alcohol-related problems and public health statistics could alter the findings of future studies.

Study Recommendations

Although the results of this study do not allow for recommendations to be made regarding policies and legislation that aim at impacting outlet density, the project has provided great insight into possible improvements for data collection, organization and sharing. The recommendations below highlight a number of ways that BRiDGES and their local law enforcement partners can improve data management procedures to improve knowledge about alcohol-related problems across the county which have the potential to inform future public health and safety efforts.

BRiDGES may need to improve and streamline their data collection and management process so that they are better prepared to conduct studies like this one in the future. For example, BRiDGES dedicated a significant amount of staff time in this project to securing, editing, and double checking the list of on- and off-premise outlets operating in Madison County. This was necessary because our analysis found that the list of outlets available through the NYS Liquor Authority was inaccurate – some recently opened outlets were missing and some closed outlets were still included in the dataset. Annual updates of datasets may help streamline processes for research projects. This same approach to edits and updates could be extended to other datasets that BRiDGES collected for this study from local law enforcement officials, specifically DWI crash data and alcohol-related arrest data (see below). Since these are data that BRiDGES deems valuable to their on-going prevention efforts, a well-designed data management plan could prove very helpful.

There are also opportunities for local law enforcement officials to improve data collection and management procedures so that alcohol-related problems in the county can be better understood. First, for GIS analyses to be possible, all records of alcohol-related problems need to include specific addresses or geographic coordinates, a date, and a time. Of the datasets described in this study, for example, only the DWI crash records came with easily usable locations (x, y coordinates) but it took a significant amount of time to assign dates to these records. In contrast, many of the records in the arrest dataset did not include a specific address that could be mapped using GIS software (most only listed the name of the nearest road or intersection). Because of this, we were unable to accurately assign a location to several arrests and include them in the analysis. We also found that it would be valuable to have a dataset on alcohol-related calls (i.e. domestic disturbance calls, public nuisance calls, etc.) which may or may not have resulted in an arrest. Arrests are not always the outcome in police calls that respond to alcohol-related problems and therefore underrepresents the issue. Another potentially valuable dataset is the "last drink log" associated with DWI crashes. "Last drink logs" include information on the last

drink consumed by someone arrested for driving while under the influence. If it were possible to link individual "last drinks" with specific crashes, these relationships could be mapped and analyzed spatially. Finally, this study recommends that the collection and maintenance of the data described above be systematized and regularized at a central location. There currently exist two law enforcement officials in Madison County who serve as community contacts in the dissemination of alcohol-related information.

Works Cited:

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Connor, J. et al. 2011. "Alcohol outlet density, levels of drinking and alcohol-related harm in New Zealand: a national study." *Journal of Epidemiology and Community Health*, 65: 841-846.

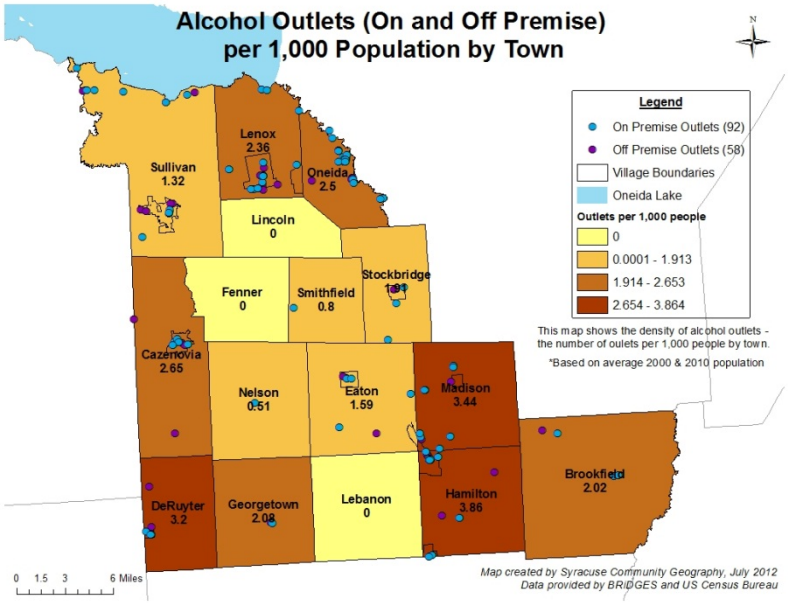
McCarthy, P. 2005. "Alcohol, public policy, and highway crashes: a time-series analysis of older-driver safety. *Journal of Transport, Economics, and Policy,* 39(1):109–25.

Task Force on Community Preventive Services. 2009. "Recommendations for Reducing Excessive Alcohol Consumption and Alcohol-Related Harms by Limiting Alcohol Outlet Density." *American Journal of Preventative Medicine,* 37(6).

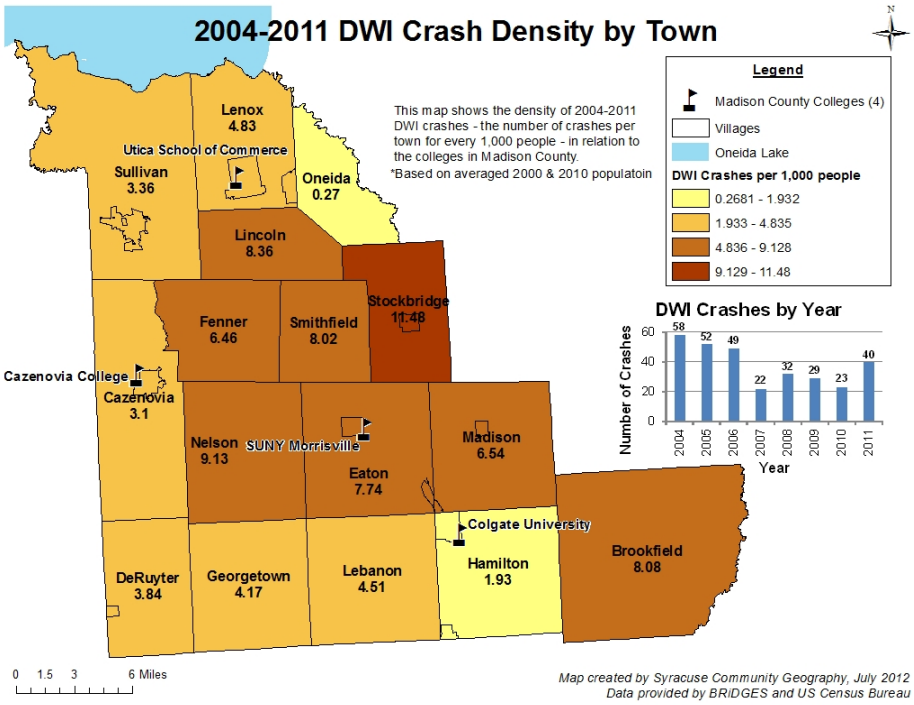
Weitzman, E. et al. 2003. The relationship of alcohol outlet density to heavy and frequent drinking and drinking-related problems among college students at eight universities." *Health & Place,* 9: 1-6.


Madison County, New York
Legend
Colleges (4)
Madison County Schools (26)
Villages
Lakes
Streets
Interstate Highways
State Highways
Sullivan
Lenox
Canastota
Wampsville
Oneida
Chittenango
Lincoln
Stockbridge
Munnsville
Fenner
Smithfield
Cazenovia
Morrisville
Madison
Cazenovia
Nelson
Eaton
Madison
Hamilton
DeRuyter
Georgetown
Lebanon
Hamilton
Brookfield
DeRuyter
Earlville
0 1.5 3 6 Miles
Map created by Syracuse Community Geography, July 2012

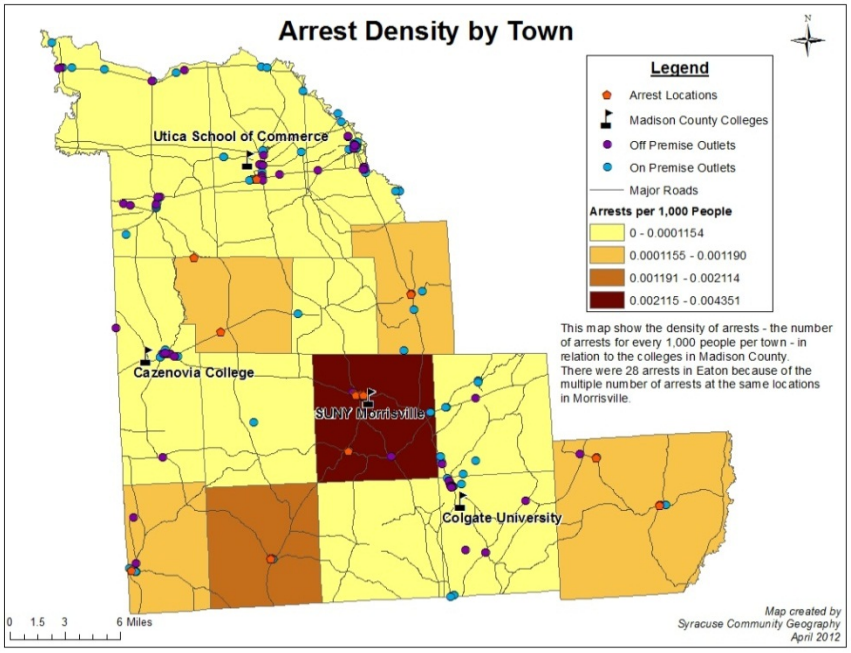
Map 1


Alcohol Outlets (On and Off Premise)
per 1,000 Population by Town
Legend
On Premise Outlets (92)
Off Premise Outlets (58)
Village Boundaries
Oneida Lake
Outlets per 1,000 people
0
0.0001 - 1.913
1.914 - 2.653
2.654 - 3.864
This map shows the density of alcohol outlets - the number of oulets per 1,000 people by town.
*Based on average 2000 & 2010 population
Sullivan 1.32
Lenox 2.36
Oneida 2.5
Lincoln 0
Fenner 0
Smithfield 0.8
Stockbridge 1.91
Cazenovia 2.65
Nelson 0.51
Eaton 1.59
Madison 3.44
DeRuyter 3.2
Georgetown 2.08
Lebanon 0
Hamilton 3.86
Brookfield 2.02
0 1.5 3 6 Miles
Map created by Syracuse Community Geography, July 2012
Data provided by BRIDGES and US Census Bureau

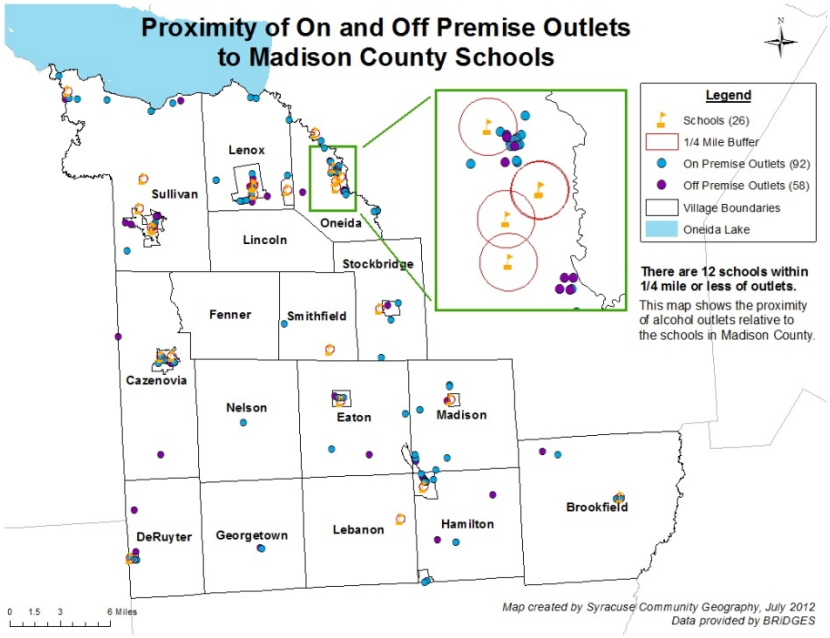
Map 2


2004-2011 DWI Crash Density by Town
Legend
Madison County Colleges (4)
Villages
Oneida Lake
DWI Crashes per 1,000 people
0.2681 - 1.932
1.933 - 4.835
4.836 - 9.128
9.129 - 11.48
This map shows the density of 2004-2011 DWI crashes - the number of crashes per town for every 1,000 people - in relation to the colleges in Madison County.
*Based on averaged 2000 & 2010 populatoin
Lenox 4.83
Utica School of Commerce
Sullivan 3.36
Oneida 0.27
Lincoln 8.36
Stockbridge 11.48
Fenner 6.46
Smithfield 8.02
Cazenovia College
Cazenovia 3.1
Nelson 9.13
SUNY Morrisville
Eaton 7.74
Madison 6.54
Colgate University
Hamilton 1.93
Brookfield 8.08
DeRuyter 3.84
Georgetown 4.17
Lebanon 4.51
DWI Crashes by Year
Number of Crashes
Year
58
52
49
22
32
29
23
40
2004
2005
2006
2007
2008
2009
2010
2011
0 1.5 3 6 Miles
Map created by Syracuse Community Geography, July 2012
Data provided by BRiDGES and US Census Bureau

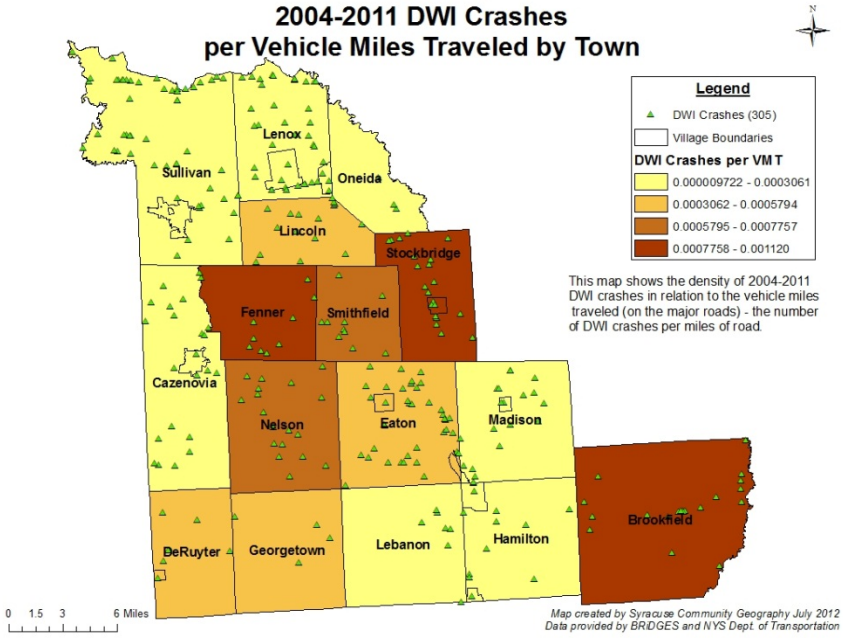
Map 3


Arrest Density by Town
Legend
Arrest Locations
Madison County Colleges
Off Premise Outlets
On Premise Outlets
Major Roads
Arrests per 1,000 People
0 - 0.0001154
0.0001155 - 0.001190
0.001191 - 0.002114
0.002115 - 0.004351
This map show the density of arrests - the number of arrests for every 1,000 people per town - in relation to the colleges in Madison County.
There were 28 arrests in Eaton because of the multiple number of arrests at the same locations in Morrisville.
Utica School of Commerce
Cazenovia College
SUNY Morrisville
Colgate University
0 1.5 3 6 Miles
Map created by
Syracuse Community Geography
April 2012

Map 4


Proximity of On and Off Premise Outlets
to Madison County Schools
Legend
Schools (26)
1/4 Mile Buffer
On Premise Outlets (92)
Off Premise Outlets (58)
Village Boundaries
Oneida Lake
There are 12 schools within 1/4 mile or less of outlets.
This map shows the proximity of alcohol outlets relative to the schools in Madison County.
Lenox
Sullivan
Oneida
Lincoln
Stockbridge
Fenner
Smithfield
Cazenovia
Nelson
Eaton
Madison
Brookfield
DeRuyter
Georgetown
Lebanon
Hamilton
0 1.5 3 6 Miles
Map created by Syracuse Community Geography, July 2012
Data provided by BRIDGES

Map 5


2004-2011 DWI Crashes
per Vehicle Miles Traveled by Town
Legend
DWI Crashes (305)
Village Boundaries
DWI Crashes per VMT
0.000009722 - 0.0003061
0.0003062 - 0.0005794
0.0005795 - 0.0007757
0.0007758 - 0.001120
This map shows the density of 2004-2011 DWI crashes in relation to the vehicle miles traveled (on the major roads) - the number of DWI crashes per miles of road.
Lenox
Sullivan
Oneida
Lincoln
Stockbridge
Fenner
Smithfield
Cazenovia
Nelson
Eaton
Madison
Brookfield
DeRuyter
Georgetown
Lebanon
Hamilton
0 1.5 3 6 Miles
Map created by Syracuse Community Geography July 2012
Data provided by BRIDGES and NYS Dept. of Transportation

Map 6