Community Health and GIS: Using GPS and GIS for Foetal Alcohol Syndrome Education and Outreach in the Bergriver Municipality in the Western Cape, South Africa

Y Bowers[1], E Nel[2], N Jacobs[3], A Davids[4], K Rendall-Mkosi[5], L London[3]

[1]Mount Sinai School of Medicine International Exchange Program for Minority Students; [2]South African Medical Research Council; [3]School of Public Health and Family Medicine, University of Cape Town; [4]Human Sciences Research Council; [5]School of Public Health and Health Systems, University of Pretoria

Background

South Africa's Western Cape Province is known to have the highest reported rates of Foetal Alcohol Syndrome (FAS) in the world[1]. FAS is used to describe physical and mental defects including brain damage, facial deformities and growth deficits that an affected child exhibits[2]. Part of the problem can be linked to the availability of alcohol and the payment of alcohol to farm workers as part of their conditions of employment, though illegal, this "dop" system continued into the 1990s[1]. "Shebeens" or informal bars are found in every township in South Africa, and have replaced the "dop" system with another cycle of poverty and alcohol dependence[3]. The Western Cape Liquor Act, No. 4 of 2008 seeks to control the proliferation of drinking places in residential areas, and to crack down on retailers and distributors who supply illegal shebeens through heavy fines, jail terms and forfeiture of assets[5].

Research has supported the association between alcohol availability, rates of alcohol consumption, and drinking-related problems such as alcohol-related hospital admissions, child abuse and neglect, motor vehicle accidents, pedestrian injuries, drunk driving[4]. In January 2009, there were approximately 900 licensed shebeens, 3,200 legal and 30,000 illegal shebeens in the Western Cape[5]. GIS data can be used to analyze the Western Cape Liquor Act, No. 4 of 2008 by providing baseline data in which to compare after changes in enforcement and licensing have been made for legal and illegal alcohol vendors.

Research Objective

The aim of this study was to map legal and illegal alcohol vendors in the Bergriver Municipality—a West Coast district in the Western Cape—as part of the FAS prevention study. Formal documentation contributes toward planning outreach initiatives via health communications, identifying socioeconomic and health rights violations, and providing a baseline measure to assess the impact of the Western Cape Liquor Act, No. 4 of 2008.

The study explores the relationship of alcohol availability and accessibility as it relates to consumption of alcohol by an at-risk population susceptible to FAS. The alcohol-related harm for this study is use of alcohol by pregnant women or women childbearing age, and subsequent health consequences such as FAS. Mapping these outlets using GIS provides data on alcohol accessibility as an indicator of consumption and risk for FAS.

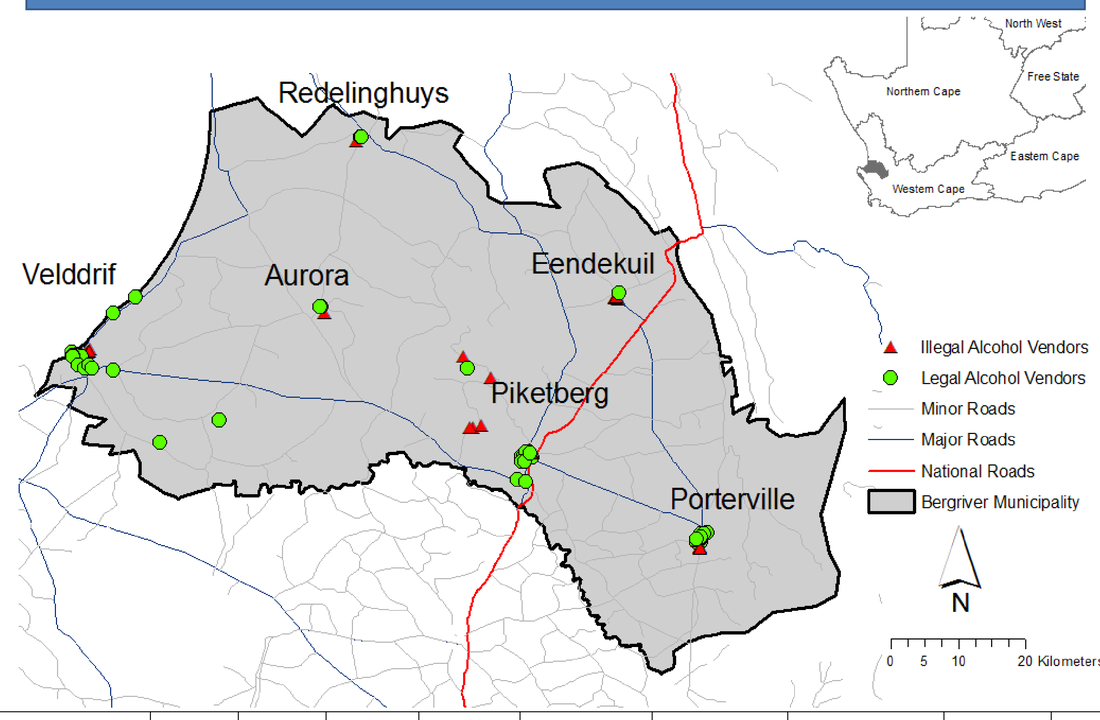
Methods

In August 2008, two researchers visited the following towns in the FAS study area--Aurora, Eendekuil, Piketberg, Porterville, Redelinghuys, and Velddrif. Using Garmin Car GPS, latitude and longitude coordinates were saved for each vendor as a point of interest (units of Decimal Degrees) and recorded by hand (units of Degrees Minutes Seconds) along with a description: Name--street and number; Town; Size--small or large; Legal Status; Latitude; Longitude; and Additional Notes.

From the "Points of Interest" file, Name, Latitude and Longitude Data were exported as a an Excel Workbook. The other attributes were added from the written journal and saved as a "Comma Separated Values" File, FASAlcohol.csv. Due to flooding in Redelinghuys, estimated points were made in Google Earth and saved as three different KML files. The Executable Program "KML2SHP" was used to create three different shapefiles. The shapefiles were loaded into ArcMap and their Decimal Degrees were recorded into the existing "FASAlcohol.csv" Excel Spreadsheet along with their attributes.

The CSV file provided the XY Coordinates in Arc Map and the projection was defined as WGS84. The resulting spatial data layer was exported and saved as a shapefile "FAS Alcohol". Alcohol accessibility was calculated and defined as alcohol vendors/km2, alcohol vendors/person and alcohol vendors/1000 persons. Percentage of illegal alcohol vendors were also calculated. These calculations were made using population and density data gathered from the Bergriver Spatial Development Framework: Draft Framework for Discussion.

Results



Town	Illegal	Legal	Total	Percent Illegal	Total Population	Population Density	Alcohol vendors/km2	Alcohol vendor/ Person	Alcohol vendors/ 1000 Persons
Aurora	1	2	3	33.33	420	5.9/km2	.042	.007	7
Eendekuil	6	2	8	75	1000	13.5/km2	.107	.008	8
Piketberg	17	22	39	43.59	11900	33.9/km2	.111	.003	3
Porterville	6	13	19	31.58	7900	28.4/km2	.068	.002	2
Redelinghuys	1	2	3	33.33	840	12.4/km2	.044	.0035	3.5
Velddrif	16	24	40	40	10700	15.4/km2	.057	.0037	3.7
Total	47	65	112	41.96	32760	21.3/km2	0.073	0.003	3.4

Conclusion

The GPS collection of legal and illegal alcohol vendors provided GIS data to support FAS outreach in the Bergriver Municipality of the Western Cape. The study has documented evidence of alcohol accessibility which is an indicator of a behavioural risk that leads to FAS. Future data collection is needed to analyze the impact that the Western Cape Liquor Act, No. 4 2008 has had on the relative density of legal and illegal alcohol vendors in the study area. It is important to continue to collect health data at the same scale for further spatial analysis of alcohol accessibility and it links to adverse health outcomes.

References

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