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Visualization of Preterm Birth Health Disparities

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Abstract and objective

Preterm birth is one of the leading causes of infant mortality in industrialized countries. There is a growing body of literature that suggests socio-economic and socio-demographic factors may be causal factors that either explain or confound birth outcome disparities. Understanding differential patterns in birth outcomes is necessary to develop effective interventions designed to decrease birth outcome disparities amongst pregnant women. This project used geographic information systems and publicly available birth records to explore geographic disparities in birth outcomes in North Carolina. Building on prior statistical and computational models, this poster presents the visualization of geographic variation in birth outcomes as associated with the following maternal demographic predictor variables: race/ethnicity; age; education level; and marital status. Birth outcomes associated with health history variables of cigarette smoking and the Kotelchuck Index are also visualized. Data visualization is an important step in exploring patterns and understanding the context of preterm birth. This research will help to identify target areas for future preterm birth prevention interventions.

Keywords:

premature birth, geographic information systems, population characteristics, health services research, informatics

Methods

The purpose of this study was to use geographic information systems (GIS) to explore geographic variations in birth outcomes associated with selected demographic and health history variables. This study is a retrospective, secondary analysis of de-identified, 2003 North Carolina birth record data.

Data source

This data set contained approximately 120,000 live births and included maternal, paternal, infant and health care system variables. When filtered for out-of-state births, induced or stimulated labor and multiple births, the data set contained approximately 73,000 birth records.

Data analysis

Both statistical and computational methods were used to investigate a parsimonious preterm birth prediction model based solely on birth certificate data. Methods included: logistic regression, neural networks, classification and regression trees, Support Vector Machines and Bayesian classifiers for model comparison. Receiver Operating Characteristics curves were used to compare results across methods. Individual predictor variables were visualized using GIS for geographic variation in preterm birth outcomes.

Results

Data visualization demonstrated wide geographic variation in preterm birth outcomes in the selected maternal demographic variables and selected medical history variables. Noticeably different patterns emerged for each variable. Descriptive variable pattern maps will be presented on the poster.

Conclusion

Data visualization is an important step in exploring patterns and understanding the context of preterm birth. The geographic variation in the demographic and medical history variables illustrates the need for incorporating context into prediction models. GIS visualization enhances researchers' abilities to discover patterns across variables that may not be readily apparent within numeric tables.

The next step in this research is to apply spatial statistics to the individual variables and to assess the geographic variation in the full statistical and computational model. This research will help to identify target areas for future preterm birth prevention interventions.

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