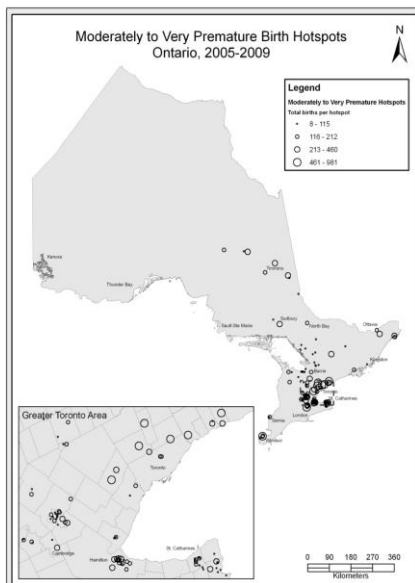


Statistics are vital to understanding geographic variation in health problems. Mapping population health in local areas and using spatial statistics to identify hotspots where health problems such as premature births are significantly higher than surroundings is a vital area of exploration. Hierarchical modeling provides an understanding of the effects of individual risk factors through their interaction with ecologic factors from the surrounding social and physical environment. Statisticians work with public health professionals to guide them in using this knowledge to develop better local interventions.

Identifying Local Hotspots

Geographic mapping of health issues lays a fundamental foundation for understanding the epidemiology of communicable and non-communicable morbidities in a region, whether a neighborhood, city, state or nation. Identifying areas where diseases have statistically significantly higher rates:

- allows for a more focused exploration of individual risk factors,
- illustrates patterns that may suggest significant ecologic (local area) level risk factors and
- suggests potential targets for possible local intervention.



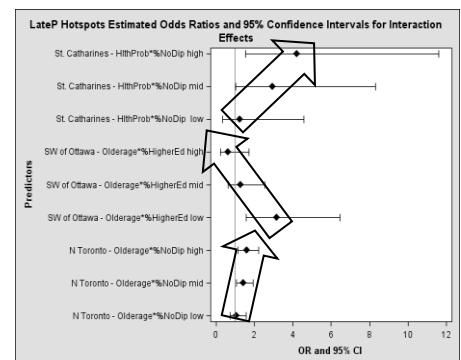
Hierarchical Modeling of Individual and Local Area Risk Factors

Non-communicable diseases represent a major, costly and growing challenge for public health professionals today. Effective interventions have not been identified; it is not yet clear if broad or local interventions are more effective. Spatial cluster analysis identifying local hot spots allows for a more focused exploration of health problems. Hierarchical modeling using individual and local area risk factors underscores the importance of local area variables and suggests risk factors that best explain the hotspots.

Exploring the Distribution of Adverse Birth Outcomes in Ontario, Canada

Preterm birth rates have increased in western countries at approximately 1% per year. The short term cost of preterm babies (9% of births) represents almost 50% of the Ontario budget for birthing; long term costs are also substantial. The ability to link state/province-wide individual data with census aggregate data at local geographic areas allows for granular results and the identification of interactions between ecologic and individual risk factors as these form social determinants of health.

From our research we understand that risk factors for like outcomes were markedly different for spatial clusters in different places. We show how low ecologic levels of education are a consistent risk-increasing predictor of all adverse outcomes, more influential than median household income. Late premature births (LateP) odds ratios illustrate how local area education levels modify the effect older age has on this outcome.



Education interventions at a local area may provide more substantial gains than individual or province-wide actions. This will require recognition by state and local public health authorities of the diversity of small area geographic hotspots of adverse birth outcomes. These findings that different areas can have markedly different models suggests that each public health region should individually analyze their service areas in order to understand local risk factors and then intervene accordingly.