

Case Study

Putting children's health on the map with GIS



Ground-breaking atlas adds geographic context to the study of children's health

Children's health issues are on the rise in Canada: almost 1/3 of children are currently overweight or obese, while cases of asthma, injury and mental health issues continue to climb. In exploring these trends, researchers are beginning to place greater emphasis on the role of geography. Dr. Jason Gilliland, a professor with Western University and a scientist with the Children's Health Research Institute used GIS to map out the social and environmental factors that are affecting children's health in Southwestern Ontario. The results were compiled into a 400+ page atlas that will be used as a foundation to build healthier communities.

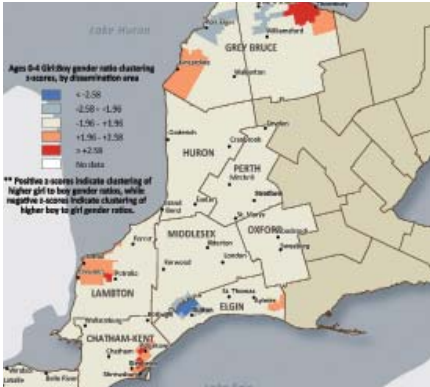


Challenge

The geographic location where children and adolescents spend their time plays a significant role in whether or not they will eat healthy food, get enough exercise, be exposed to pollutants or susceptible to injury. Where children live can also affect accessibility to health services and natural environments which may increase vulnerability to chronic illness or mental health issues.

A small amount of Canadian research exists on this subject, and there lacks a clear understanding of the effects of social and environmental factors on children's health. Though studies have been conducted on a global scale, more work is required at the community level. For example, exploring the impact of built environments on neighbourhood walkability, air quality and access to parks, schools or hospitals.

Recognizing this challenge, a study was commissioned by the Children's Health Foundation and funded by the Green Shield Canada Foundation that would seek to develop a platform for in-depth research on children's health and its connection with geography. Tasked with leading the project, Dr. Gilliland and his multidisciplinary research team would need to leverage robust technology to collect, integrate and visualize vast amounts of health, socioeconomic and environmental datasets. Advanced functionality would also be required to identify, analyze and map spatial trends over large geographic areas.



Mapping geographic clusters where there are significantly more girls than boys raises hypotheses about potential environmental determinants.



Calculating proximity to nearest grocery stores highlights areas with poor access to healthy food retailers, known as "food deserts."

"When it comes to public health, where we live matters. GIS allows us to easily integrate and visualize vast amounts of data to determine the links between children's health issues and their environment."

Dr. Jason Gilliland
Western University

Solution

Dr. Gilliland and his team used Esri's ArcGIS technology to map the distribution of child populations and environmental features in the region. ArcGIS was chosen for its advanced functionality, though the technology was already in use at the University's Human Environments Analysis Laboratory (HEAL).

The team combined hundreds of datasets associated with children's health, socioeconomic status and environment. This included base layers from DMTI Spatial, socio-demographic information from Census Canada and a number of environmental datasets gathered from local municipalities and public health units. Maps from the atlas were also integrated with specialized datasets such as national pollutant release inventories, child health information from local hospital databases, environmental audits and data derived by the University through GPS tracking and child/parent surveys.

Esri's ModelBuilder was used to manipulate large datasets and re-test hypotheses. Major determinants affecting children's health were explored with Esri's Network Analyst, including density and proximity to junk food, access to parks, recreational facilities and schools as well as neighbourhood walkability. Results were then compiled into a unique children's health atlas known as "Opportunities for Healthy Living in Southwestern Ontario: A Focus on Children's Environments."

Benefits

Using ArcGIS, Dr. Gilliland and his team were able to study spatial trends and identify patterns that could only be visualized on a map. Easy-to-use query functions allowed the team to quickly investigate questions such as "Where do the kids with gastro-intestinal illness live?" Simple queries made it possible to develop further hypotheses and investigations into potential environmental determinants.

The ability to integrate vast amounts of interrelated data and visualize clusters not readily apparent supports a powerful form of medical intelligence known as geomedicine. This approach to healthcare recognizes the critical connection between human health and where we live. Using this approach, the atlas uncovers inextricable links between a child's environment and the ability to eat well, engage in recreational activity, and mitigate exposure to factors that may adversely affect mental and physical health.

The atlas is currently being used to develop articles for scientific journals and serves as the foundation for new mapping projects throughout the region. Maps will be distributed to local practitioners, researchers and municipalities to support the development of healthier communities. Dr. Gilliland's team is also looking at leveraging Esri technology to make non-sensitive information publicly available via the Internet, and to update the atlas as new data and research becomes available.

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