

## Chapter 43

# Towards Healthy Public Policy: GIS and Food Systems Analysis

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### ABSTRACT

*As an issue that affects a significant portion of the Canadian population, food security must be addressed in public health policy and research. Decision-making for food security is a complex task that needs to take into account a diverse range of issues including production, processing, distribution, access, consumption, and waste management. This approach to policymaking for food security, known as food systems analysis, makes use of a large amount of geospatial data. Public health informatics can offer some potential answers to handling and using this large amount of information. The purpose of this chapter is to provide a brief introduction to Geographic Information Systems (GIS) and how they are used in public health, particularly for food systems analysis. A hypothetical scenario that envisions using a type of spatial analytic tool, called Spatial On-Line Analytic Processing (Spatial OLAP or SOLAP), for public health decision-making is also introduced. In describing both GIS and spatial OLAP, a case for incorporating food systems analysis into public health practices is made.*

### INTRODUCTION

Despite Canada's position as one of the wealthiest and most developed countries in the world, food security is still an issue of concern for many Canadians. The Food and Agriculture Organization of the United Nations (2010) defines food security as existing when "all people, at all times, have access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life." To achieve this vision, the full life cycle of food from production to consumption

needs to be taken into account by policymakers. This is known as the food systems approach to food security. Planning for food systems requires a large amount of geospatial data. For example, it is important to know which neighbourhoods have a high prevalence of food insecurity, where healthy food sources are located, and whether people have access to healthy foods through public transit. To this end, several public health informatics technologies can be useful for food systems analysis and research. This paper reviews some of the ways that geographic information systems have been

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used to analyze public health and food systems issues and explores the use of a newer geographic analytic technology, called spatial on-line analytic processing, to aid in decision-making.

## **BACKGROUND**

In 2007-2008, 7.7 percent of Canadian households, equivalent to almost a million households in Canada, were food insecure (Health Canada, 2012). Food security is a matter of importance, not only because of the breadth of its reach, but also because it is significantly associated with other health conditions. The loss of food security can impact people physically, psychologically, and socially. The condition is associated with low self-rated health, nutritional inadequacy, higher rates of chronic disease, higher odds of suffering from major depression and distress, and less social support (Tarasuk, 2009). As food bank usage and global food prices continue to rise (Matern & Kim, 2012; World Bank, 2011), the food security of whole communities is being put at risk. Thus, addressing food security is a matter of public health. However, past attempts to respond to growing food insecurity has not been without problems.

Food banks were the first collective response at the local level to deal with food insecurity but it soon became clear that they were an inadequate solution to the issue. Food banks, after all, were first designed in the 1980s as emergency responses to what was seen as temporary economic recessionary times (Riches, 1997). These non-profit organizations collect, store and distribute donated food items to people who need to supplement what they can afford to buy. As a short-term, reactionary measure, food banks are not designed to address long-term livelihood issues, such as earning adequate income to ensure stable food supplies in the home.

The subsequent shift toward the community food security movement saw a change from a reliance on food banks to finding community-based, non-emergency solutions to the problem. These included using backyard and community gardens, community kitchens, farmers' markets, and community supported agriculture, among other alternative methods, to increase access to food supplies. However, critics of the community food security movement, such as Tarasuk (2001), believe it is ineffective because its strong focus on food production masks the issue of poverty and the lack of adequate income to buy food. While the food bank and community food security movements have very different roots, the common critique of both approaches is that they view the issue as the result of a single cause, whether it is a lack of income, as in the food bank movement, or problems of food production, as in the community food security movement.

Rather than stemming from a single cause, food security is a multi-dimensional issue, necessitating a multi-level, multi-sectorial approach to addressing the issue. Food security can be defined as comprising of five components: availability, accessibility, adequacy, acceptability, and agency (Ryerson University, 2010). These five 'A's identify the matter as related to issues of sufficient quantity, physical and economic access, safe and nutritious foods, environmentally sustainable food practices, cultural acceptability, producing and procuring foods in ways that do not compromise human dignity, and policies and practices to attain food security. To address this multi-dimensional issue, advocates for food security have begun to examine the whole food system, tackling problems that occur 'from farm to fork' and beyond. This approach entails accounting for the whole food cycle including production, processing, distribution, access, consumption, and waste management (Mendes, 2008). Included within this definition are agricultural activities, food processing facilities,

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