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### GIS and Public Health

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*Editorial*

## GIS and Public Health

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This Special Issue on GIS and public health is the result of a highly selective process, which saw the participation of some 20 expert peer-reviewers and led to the acceptance of one half of the high-quality submissions received over the past year. Many threads link these papers to each other and, indeed, to our original call for papers, but the element that most clearly emerges from these works is the inextricable connection between public health and the environment. Indeed, GIS analysis of public health simply cannot disregard the geospatial dimension of environmental resources and risks. What consistently emerges from these analyses is that current geospatial research can only scratch the surface of the complex interactions of spatial resources, risks, and public health. In today's world, or at least in the developed world, researchers and practitioners can count on virtually endless data, on inexpensive computational power, and on seamless connectivity. In this research environment, these papers point to the need for improved analytical tools, covering concepts, representation, modeling and reliability. These works are important contributions that help us to identify what advances in geospatial analysis can better address the complex interactions of public health with our physical and cultural environment, and bridge research and practice, so that geospatial analyses can inform public health policy making.

Luan and Law [1] analyze the use of Web GIS-based public health surveillance systems. Unlike in other fields, technological advances are yet to be matched by public health applications. Spatial analytical capabilities are widely available in desktop applications, but lag behind in Web applications, and privacy issues hamper many applications. Geographical disparities remain a major barrier to the development of public health surveillance systems. Prohibitive costs, incomplete access to data and lack of infrastructure hamper technology implementation, particularly in those parts of the world still afflicted not only by infectious, but by endemic disease, poorer hygiene, and higher incidence of injuries. Lyseen and Hansen [2] tackle the spatial and semantic validation of secondary food source data. An increasing body of research analyzes public health in relation to food access and security. Geospatial analysis of health and nutrition relies on measurement of food environments and foodscapes. As data is available from many sources, the paper assesses the validity of government lists of food retailers and their location. Indeed, increasing volumes of data are of little use in analysis if not properly validated,

and innovative validation techniques can reduce the need for direct field research, reducing research costs and increasing its efficiency. While the research confirms the validity of government food retail data, it also points to a large percentage of retailers that are not covered by these lists. Such discrepancies present ample geographical variations, as they are also related to local food culture: this remains a limitation of geospatial analysis of nutrition and health. Tran *et al.* [3] present a spatio-temporal model of the occurrence of highly pathogenic avian influenza in the Red River delta of Vietnam. Avian influenza exemplifies the link between animal health and human health, and the consequent need to implement measures to control upstream animal health. Furthermore, the paper discusses the effects of weather, showing that high temperatures and low precipitation increase the risk of influenza in areas of high poultry density. In addition, the risk is increased by humidity in areas of low elevation. Geospatial analysis can therefore identify higher risk areas, where public health measures should be implemented to control animal and human health. This is related to local practices in poultry farming, which constitute important economic and cultural resources. A higher risk of influenza is found in the peak of the summer and winter seasons, respectively. Despite the use of advanced geospatial analytical tools, the reliability and predictive value of these seasonal results is likely to decrease as local climates are affected by global climate change. Christidis and Law [4] analyze the challenges of mapping wind turbines in the Canadian province of Ontario. The paper points to the need for accurate mapping of wind turbines, to better assess the health risks of this relatively new technology. Echoing Lyseen and Hansen's work on food retail data sources, this research seeks to validate locational data that are often voluntary, inaccurate, and prone to contradictory, duplicated, or missing records [2]. Unresolved privacy issues further complicate matters. Critical issues in epidemiology and environmental health research are spatial misalignment and error propagation, particularly through hierarchical models. Hence, detailed and critical metadata accompanying environmental mapping are an important step toward more accurate and reliable risk and health models.

As a final note, I would like to extend my warm thanks to all the reviewers, for their insightful and patient work, that helped improve the quality and presentation of the papers; to Gary Mason for his help drafting and distributing the call for papers; and to Yuanyuan Yang for her precious editorial assistance throughout this process.

## Conflicts of Interest

The author declares no conflict of interest.

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