

GIS and Public Health

Stephen A. Matthews

Basics

The application of geographical or spatial analysis to public health concerns can trace itself back to the mid-nineteenth century and the work of John Snow on Cholera in London. Somewhat surprisingly perhaps for most of the 150 years since Snow, public health researchers and epidemiologists paid little attention to matters spatial. But things are changing fast. Today there are numerous public health research projects that have embraced GIS-related technology, albeit in some cases for applications that focus on tracking and monitoring functions within GIS.

Public health is beginning to turn towards GIS for many reasons, not least of which are (a) the availability of numerous geospatial databases including socioeconomic, demographic, environmental as well as health-related; and (b) recent developments in spatial analysis methods (increasingly found within commercial GIS). Increasingly, government agencies including various branches of the CDC (www.cdc.gov) and EPA (www.epa.gov) and are using GIS and their websites include reports of many applications (see web resources section below). Others in the health field such as large health organizations, health insurance companies, hospitals and emergency management services are investing in GIS.

Recent Publications

Ellen K. Cromley and Sara L/ McLafferty. 2002. *GIS and Public Health*. New York, NY: Guilford Press. This book provides a thorough introduction to GIS techniques, data, and methods of analysis, while focusing explicitly on issues and applications salient to public health practitioners, medical geographers and epidemiologists. This is the first true textbook on GIS AND public health.

Anthony C. Gatrell. 2002. *Geographies of Health*. Oxford, UK: Blackwell Publishers. This is not a GIS book but rather an excellent text showing how health may be studied from geographical perspectives and reviews a wide range of studies linking health outcomes with social and physical environments.

Anthony C. Gatrell and Markku Loytonen [Eds].1998. *GIS and Health*. London: Taylor & Francis. This is an edited volume that includes many examples of how GIS is being applied in studies of health.

P. Elliott, J.C. Wakefield, N.G. Best and D.J. Briggs [Eds]. 2000. *Spatial Epidemiology: Methods and Applications*. Oxford, UK: Oxford University Press. Spatial epidemiology is concerned with describing, quantifying, and explaining geographical variations in disease, especially with respect to variations in environmental exposures at the small-area scale.

Selected Special Issues

Special Issue of *Health and Place* on “Research Applications of GIS in Health” (Guest Editor Gary Higgs). March 2002. Volume 8:1. The special issue includes five papers illustrating some innovative uses of GIS and spatial analysis techniques to investigate a broad range of health issues (accessibility and health outcomes, health inequalities, historical surveys, webGIS, resource allocation).

Special Issue of Public Health Reports on “Geographic Information Systems in Public Health.” These reports are provided courtesy of Oxford University Press. <http://www.healthgis-li.com/library/phr/phr.htm>

Two Special Issues of *Journal of Public Health Management Practice* 5:2 and 5:4 (1999) focused on GIS applications.

Web Resources

One of the best resources for those interested in GIS applications in public health is the newsletter produced and edited by Chuck Croner [Public Health GIS News and Information](#). This newsletter is available at <http://www.cdc.gov/nchs/gis.html> or http://www.cdc.gov/nchs/about/otheract/gis/gis_publichealthinfo.htm

The National Center for Health Statistics maintains a number of useful GIS and Public Health links (http://www.cdc.gov/nchs/about/otheract/gis/gis_links.htm) also GIS events (http://www.cdc.gov/nchs/about/otheract/gis/gis_events.htm).

Gerry Rushton, a leader in the field of Health GIS, and colleagues at the University of Iowa have developed a short lecture course on Public Health and GIS available both online and on a CD-ROM (see <http://www.uiowa.edu/~geog>).

Other useful websites include but are not limited to:

The Long Island Breast Cancer Study Project <http://epi.grants.cancer.gov/LIBCSP/>

The Dartmouth Atlas of Health Care <http://www.dartmouthatlas.org/>

National Cancer Institute Health GIS <http://www.healthgis-li.com/links/links.htm>

Penn State Resources

The development of tools for the visualization of health data has been one of many research foci of the Geographic Visualization Science, Technology, and Applications (GeoVista) Center (www.geovista.psu.edu) directed by Dr. Alan MacEachren. Products developed include: [HealthVis](#) that includes exploratory tools for spatiotemporal analysis of health data, and a follow-up package called [HVPCP: HealthVIS: Parallel Coordinate Plots](#). Dr. MacEachren (Geography) recent received NCI funding for “Geovisualization and Spatial Analysis of Cancer Data.” (see <http://epi.grants.cancer.gov/GIS/maceachren.html>).

The GIS Library on the 8th floor of Oswald includes some books referring to GIS and (public) health applications (e.g., Lang, L., 2000. GIS for Health Organizations, Redlands, CA: ESRI Press).

Dr. Stephen Matthews has a personal copy of Rushton’s Public Health and GIS CD-ROM and numerous books and articles on GIS, medical geography, public health and epidemiology.