



**The Vespucci Initiative
for the Advancement of Geographic Information in Science**

11th Annual Vespucci Institute
Catalina Island, CA: April 3 to 7 2013

“Synthesizing Population, Health and Place”

Facilitators: Miles Cockburn, Geoffrey Jacquez, Martin Raubal, John Wilson

PREPARATORY READINGS

Readings have been divided into several topic areas, with a motivating question for each topic. Top picks are denoted with a double asterisk (**).

Overview / Introduction

Place and health: What geographic syntheses have been proposed to better understand human health outcomes and determinants?

Genetic GIS: How has research to date linked environment, genetics and behavior to inform our understanding of human health outcomes?

Genetics: Can genomic and proteomic knowledge and databases support individual- and population-level geographic research on human genetics and health outcomes?

Environment: How can we resolve individual-level exposures and place-based information?

Behavior: How do place-based human behaviors mediate health-related exposures, and can simulation and gaming approaches yield lasting salubrious health behaviors?

Spatial epidemiology: What are the current methodological issues and approaches in spatial epidemiology?

Methods and modeling: What quantitative approaches have been used for disease mapping and modeling?

Data and resources: What data and tools are available for research in these topic areas?



Preparatory Readings

Overview / Introduction

Rhind D 2012 GIS and Health (Editorial) GIM International Dec. 2012: 6

Richardson, D.B. et.al. 2012. Spatial Turn in Health Research. VOL 339 SCIENCE www.sciencemag.org

Place and health: What geographic syntheses have been proposed to better understand human health outcomes and determinants?

** National Research Council. 2011. How does where people live affect their health? In *Understanding the Changing Planet: Strategic Directions for the Geographical Sciences*. National Academy of Sciences: 67-82.

** Matthews SA. 2011. Spatial polygamy and the heterogeneity of place: Studying people and place via egocentric methods. In Burton L M , Matthews S A, Leung M-C, Kemp S P, and Takeuchi D T (eds) *Communities, Neighborhoods, and Health*. Berlin, Springer: 35-55.

Torrens, P. M. 2010. Geography and computational social science. *GeoJournal* **75**: 133-148.

Genetic GIS: How has research to date linked environment, genetics and behavior to inform our understanding of human health outcomes?

** Sloan C D, Duell E J, Shi X, Irwin R, Andrew A S, Williams S M, and Moore J H 2009 Ecogeographic genetic epidemiology. *Genetic Epidemiology* 33: 281-289

Biek, R. and L. A. Real (2010). "The landscape genetics of infectious disease emergence and spread." *Molecular Ecology* 19: 3515–3531.

** Janies, D. A., T. Treseder, et al. (2011). "The Supramap project: linking pathogen genomes with geography to fight emergent infectious diseases." *Cladistics* 27(1): 61-66.

Mantooth, S. J. and B. R. Riddle (2011). "Molecular Biogeography: The Intersection between Geographic and Molecular Variation." *Geography Compass* **5**(1): 1-20.

Storfer, A., M. Murphy, et al. (2007). "Putting the 'landscape' in landscape genetics." *Heredity* **98**: 128–142.



Genetics: Can genomic and proteomic knowledge and databases support individual- and population-level geographic research on human genetics and health outcomes?

Mefford, H. C. (2012). "Diagnostic Exome Sequencing — Are We There Yet?" New England Journal of Medicine **367**(20): 1951-1953.

Meissner, A. (2012). "What can epigenomics do for you?" Genome Biology **13**(10): 420.

1000 Genomes Project Consortium. (2012). "An integrated map of genetic variation from 1,092 human genomes." Nature **491: 56-65.

e! Science News. 2012. "Scientific team sequences 1,092 human genomes to determine standard range of human genetic variation". (News article)

Environment: How can we resolve individual-level exposures and place-based information?

Balshaw, D. M. and R. K. Kwok (2012). "Innovative Methods for Improving Measures of the Personal Environment." American Journal of Preventive Medicine **42(5): 558–559.

Balshaw, D. M., M. Philbert, et al. (2005). "Research Strategies for Safety Evaluation of Nanomaterials, Part III: Nanoscale Technologies for Assessing Risk and Improving Public Health." Toxicological Sciences **88**(2): 298–306.

Qj, F. and F. Du (2013). "Tracking and visualization of space-time activities for a micro-scale flu transmission study." International Journal of Health Geographics **12(1): 6.

Meliker, J. R. and G. M. Jacquez (2007). "Space-time clustering of case-control data with residential histories: insights into empirical induction periods, age-specific susceptibility, and calendar year-specific effects." Stoch Environ Res Risk Assess **21**(5): 625-63

Behavior: How do place-based human behaviors mediate health-related exposures, and can simulation and gaming approaches yield lasting salubrious health behaviors?

Ahlqvist, O., T. Loffing, et al. (2012). "Geospatial Human-environment Simulation through Integration of Massive Multiplayer Online Games and Geographic Information Systems." Transactions in GIS **16(3): 331-350.



Spatial epidemiology: What are the current methodological issues and approaches in spatial epidemiology?

Aimone, A. M., N. Perumal, et al. (2013). "A systematic review of the application and utility of geographical information systems for exploring disease-disease relationships in paediatric global health research: the case of anaemia and malaria." International Journal of Health Geographics **12**(1): 1.

** Auchincloss, A. H., S. Y. Gebreab, et al. (2012). "A Review of Spatial Methods in Epidemiology, 2000–2010." Annual Review of Public Health **33**(1): 107-122.

Beale, L., J. J. Abellan, et al. (2008). "Methodologic Issues and Approaches to Spatial Epidemiology." Environmental Health Perspectives **116**(8): 1105-1110.

** Ostfeld, R. S., G. E. Glass, et al. (2005). "Spatial epidemiology: an emerging (or re-emerging) discipline." TRENDS in Ecology and Evolution **20**(8): 328-336.

Vazquez-Prokopec, G. M., C. Spillmann, et al. (2012). "Spatial Heterogeneity and Risk Maps of Community Infestation by *Triatoma infestans* in Rural Northwestern Argentina." PLoS Negl Trop Dis **6**(8): e1788.

Methods and modeling: What quantitative approaches have been used for disease mapping and modeling?

Goovaerts, P. (2009). "Medical geography: A promising field of application for geostatistics." Mathematical Geology **41(3): 243-264.

Greengard, S. (2013). "A New Model for Healthcare." Communications of the ACM. 56 (2): 17-19

Koch, T. (2005). *Cartographies of Disease - Maps, Mapping, and Medicine*. Redlands, California: ESRI Press.

Kurland, K., & Gorr, W. (2012). *GIS Tutorial for Health*. Redlands, California: ESRI Press.

Lawson, A. B. (2012). "Bayesian point event modeling in spatial and environmental epidemiology." Statistical Methods in Medical Research **21 509-529.

Stevens, K. B. and D. U. Pfeiffer (2011). "Spatial modelling of disease using data- and knowledge-driven approaches." Spatial and Spatio-temporal Epidemiology **2**(3): 125-133.



Waller, L.A. and Carlin, B.P. (2010). "Disease Mapping", in Handbook of Spatial Statistics. A.E. Gelfand, P.J. Diggle, M. Fuentes, and P. Guttorp, eds. Boca Raton, FL: Chapman & Hall/CRC. pp. 217-243.

Data and resources: What data and tools are available for research in these topic areas?

Janies, D. A., L. W. Pomeroy, et al. (2012). "Analysis and visualization of H7 influenza using genomic, evolutionary and geographic information in a modular web service." *Cladistics* **28**(5): 483-488.

Linard, C. and A. Tatem (2012). "Large-scale spatial population databases in infectious disease research." *International Journal of Health Geographics* **11(1): 7.

** Tatem, A., S. Adamo, et al. (2012). "Mapping populations at risk: improving spatial demographic data for infectious disease modeling and metric derivation." *Population Health Metrics* **10**(1): 8.

New York Times – Opinionator (2013): The Benefits of Mobile Health, on Hold

<http://opinionator.blogs.nytimes.com/2013/03/13/the-benefits-of-mobile-health-on-hold/>

ICT works (2013): A Ugandan mHealth Moratorium Is a Good Thing

<http://www.ictworks.org/news/2012/02/22/ugandan-mhealth-moratorium-good-thing/>