Consortium on Law and Values in Health, Environment & the Life Sciences
Award Report for the 2016-17 Academic Year

“Bridging the Gap Between Health Geography and Evidence-based Public Health Policy by
Facilitating Knowledge of Spatial Methods with Dynamic Geovisualization”
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Project Summary
Population responsiveness to public health policy and community intervention strategies is
substantially dependent on geographically-constrained social, economic, and
environmental determinants of health. Because these contexts vary from place to place,
space needs to be considered a vital part of investigations of health, and yet there is a clear
lack of real-world examples that show how ever-improving geographic information
systems (GIS) have influenced public health policy. It has been suggested that the absence
of GIS-informed public health policy is due to a lack of confidence in geospatial methods
(Cockings et al., 2004). Many public health researchers are not well-trained to engage in
“spatial thinking” and geographic studies of health can oftentimes be characterized as
having nontransparent methods. The aim of the present project was to demonstrate
transparency in geospatial methods by shedding light on a concept that threatens the
integrity of research relying on spatially aggregated data for analysis. By facilitating
understanding of the risks tied to using spatially aggregated units and encouraging
appropriate strategies for geographically meaningful aggregation, we are able to motivate
GIS applications in public health research.

In specific, this project set out to create an educational resource in the form of a dynamic
geovisualization (map animation) and informational webpage that could be shared with
public health researchers to promote appropriate use of GIS in public health. Animations
are known to facilitate learning when the concept intended to be conveyed is a dynamic
process such as the MAUP. This map animation serves as an educational resource---
facilitating knowledge of MAUP and furthering transparency of geospatial methods. This
animation also demonstrates how investigators might frame their work to acknowledge the
presence and severity of the MAUP within their own data.

Results
During the past year, I developed and refined a dynamic geovisualization demonstrating
the influence of the Modifiable Areal Unit Problem (MAUP) in a public health dataset. The
animation shows how the MAUP affects the correlation between median household income
and respiratory health in the Minneapolis metropolitan area. It was imperative that the
units chosen would help portray the severity of the concept of MAUP, and by careful
selection, I was able to find a series of units that outputted dramatically different
correlation coefficients. By adding a graph within the animation, I was able to show the
reverse of the relationship among the two variables. In addition to the geovisualization, I
developed and launched an online informational resource that describes MAUP effects and
how to address these within your own data. The website is still under construction as I am
intending to expand it beyond MAUP effects and cover other issues central to spatial
analysis of public health data.
Furthermore, this project was presented at the GeoMed Conference in Porto Portugal last August. The initial geovisualization was well-received and the audience provided generous feedback in terms of how to make improvements. Three more versions of the animation were developed in the time following, and the final product was derived from audience feedback and consultation with an expert in visualization. I have intentions to present the new, improved version of the animation at the next GeoMed conference in 2019 and/or at the International Medical Geography Symposium (IMGS) in 2019. For these I intend on submitting travel grants to COGS and the CLA this year. Furthermore, because I plan to expand the aims of the project, I am in the process of developing a proposal for the Interdisciplinary Doctoral Fellowship (IDF) program this Fall. It is expected that, within the next year, a final manuscript will be submitted for publication.

The web resource: www.studyspatialhealth.com

**Future project plans**

Because this project is a part of my dissertation—which I intend to complete by Spring 2020—I am expanding the aims to include two other approaches of representation. In addition to the dynamic geovisualization, I plan to develop an interactive space/time visualization and an interactive tool—both of which will be hosted on the informational web resource along with the animation. It is my intention that these three educational tools will be tested for their effectivity in collaboration with the center for cognitive sciences under the support of an IDF.