11-1-2008

Exploratory Study of Environmental Effects on Physical Activity and Overweight in Older Women: Research Update

Heather A. Whitcomb  
*Purdue University - Main Campus, hwhitcom@purdue.edu*

Kosuke Tamura  
*Purdue University - Main Campus, ktamura@purdue.edu*

Lauren Milius  
*Purdue University - Main Campus, lmilius@purdue.edu*

Francine Laden  
*Harvard School of Public Health*

Steve Melly  
*Harvard School of Public Health*

*See next page for additional authors*

Follow this and additional works at: [http://docs.lib.purdue.edu/gisday](http://docs.lib.purdue.edu/gisday)  
Part of the [Epidemiology Commons](http://docs.lib.purdue.edu/gisday), [Public Health Education and Promotion Commons](http://docs.lib.purdue.edu/gisday), and the [Urban Studies and Planning Commons](http://docs.lib.purdue.edu/gisday)

Whitcomb, Heather A.; Tamura, Kosuke; Milius, Lauren; Laden, Francine; Melly, Steve; James, Peter; Puett, Robin; Cromley, Ellen; Ben-Joseph, Eran; and Troped, Philip J., "Exploratory Study of Environmental Effects on Physical Activity and Overweight in Older Women: Research Update" (2008). GIS Day. Paper 13.  
[http://docs.lib.purdue.edu/gisday/13](http://docs.lib.purdue.edu/gisday/13)

This document has been made available through Purdue e-Pubs, a service of the Purdue University Libraries. Please contact epubs@purdue.edu for additional information.
Physical inactivity and obesity are major public health issues. Recent studies have provided evidence that attributes of the built environment influence physical activity among adults and that factors such as greater urban sprawl are related to overweight and obesity. Few studies have developed objective individual-level measures of the built environment, a geographic scale that may be more relevant to certain types of physical activity, such as walking. In addition, further research is needed to assess the associations of both objective and perceived environmental factors with physical activity. In this 2-year exploratory study funded by the National Cancer Institute, we are addressing these research gaps.

**Background**

**Objectives**

The purpose of this poster presentation is to provide a brief overview of progress to date on a major aspect of this study, which is to develop objective measures of the built environment for approximately 30,000 women in the Nurses’ Health Study (NHS) using Geospatial Information Systems (GIS) techniques. In particular, we will briefly summarize pilot work focused on development and assessment of built environment variables.

**Pilot study sample**

NHS participants (n=300) from six counties in Massachusetts, Pennsylvania and California.

**NHS Survey data**

Every two years NHS participants complete a comprehensive survey with items on health care, symptoms and diagnoses, risk exposures, and health behaviors. Self-reported height and weight are used to calculate body mass index. Physical activity items are used to derive estimates of daily energy expenditure and to measure specific activities such as walking and bicycling.

**Built environment variables**

- **Street Connectivity**
  - Intersection density: Number of intersections per length of road within 400m, 800m, and 1200m network distances
  - Street density: Kilometers of streets per km² within 400m, 800m, and 1200m network buffer areas
  - Pedestrian route directness: Ratio of road-network distance to straight-line distance from participants’ homes to facilities within 400m, 800m, and 1200m network distances

- **Land-use Mix (LUM)**
  - LUM access: Median distance to facilities within 400m, 800m, and 1200m network distances
  - LUM density: Number of facilities within 400m, 800m, and 1200m network distances per km² of the respective network buffer areas
  - LUM diversity: Diversity of facilities (using an entropy formula and five categories of facility types) within 400m, 800m, and 1200m network distances

- **Residential Density**
  - Population density in buffer: Number of residents per km² within 400m and 800m network buffers (residents assumed to live within 50m of roads)
  - Census tract: Number of residents per km² of area of census tract

**Data layer sources**

- Subjects’ geocoded home addresses
- ESRI StreetMap 9.2 (road classes 2, 4, and 6)
- 2000 U.S. Census Blocks (population counts)
- Facility Database with geocodes from InfoUSA

**Data summary of built environment variables**

**Next steps**

- Create environmental variables for the full study sample
- Merge these data with NHS survey data
- Conduct validation study of the InfoUSA database
- Test associations with physical activity and overweight outcomes

**Ongoing work**

- Conduct validation study of the InfoUSA database
- Implement supplemental survey with sub-sample (n=3,800) of NHS participants
- Test the use of available tools to develop micro-scale measures of the neighborhood environment

**Exploratory Study of Environmental Effects on Physical Activity and Overweight in Older Women: Research Update**

Heather Whitcomb 1, Kosuke Tamura 1, Lauren Millius 1, Francine Laden 2, Steve Melly 2, Peter James 3, Robin Puett 3, Ellen Cromley 4, Eran Ben-Joseph 5, Philip J. Troped 6

1 Purdue University, Department of Health & Kinesiology, 2Harvard School of Public Health, 3University of South Carolina, 4The Institute for Community Research

www PosterPresentations.com

**GIS Day 2008**

Presented at GIS DAY @ Purdue, November 19, 2008