BEHAVIOR, ENVIRONMENT AND HEALTH IN GEOGRAPHICALLY DIVERSE WORK SITE POPULATIONS

Exploring Community Context in Type 2 Diabetes

Alberto Colombi, Juna Papajorgji

2010 ESRI Health GIS Conference, October 18 - 20 - Denver, Colorado
background – Study Area

29 work sites, in 22 counties, in 14 states (6 sites in one county)
background — PPG study summary


- Predicting Hypertension, Obesity, Diabetes

- Data from: 2002 – 2007

- Study Area: 29 work sites in 14 states

- Individual Focus
  - personal history
  - age
  - behavior

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background — PPG study summary

- Multi-factorial models tested
  - population risk
  - social determinants of health
- Variance predictions in work site occurrence of episodes of care
- Variables considered and preliminary results
Variables and domains tested

- Worksite
- Wellbeing
- Co-morbidities
- Business culture
- Wellness management
- Population health risk profile
- Wellness programs
- Outcomes of interest
- Geography
81% of the variance in Hypertension episodes of care/1000 active members in 29 worksites was predicted by: worksite percent Aged 50+, Percent at Low Risk, Nutrition Supportive Environment Score, and by the Community median property value.

63% of the variance in Diabetes-Episodes of Care /1000 (active and retired) members was predicted by worksite percent Aged 50+, Percent in pre-diabetes risk pool, and by the Community median property value.
...and then GIS

Goal
Conduct an exploratory analysis to investigate if there is any relationship between community context and the findings of the PPG study.
objectives

- Convert PPG Study results into a geospatial format
- Compile a context geospatial data library for the study area
- Develop method (try, fail, try again) and shape analysis
strategy

- Explored three variables from the PPG Study
  - Summarized Obesity Prevention Activities per work site
  - Percentage of Obese Population (BMI 30+) per work site
  - Diabetes Medical Episodes of care per 1,000 members per work site

- Considered a framework of four domains
  - Air Pollution Environment
  - Food Environment
  - Public Health Environment
  - Socioeconomic Environment
method — data sources and providers

- Map Extent – PPG sites data (~15 layers)

- Map Extent – Nationwide data (~50 layers)
  - Air Pollution NAAQS – EPA (‘06)
  - Local Food – LocalHarvest (‘10)
  - General Food – USDA Food Environment Atlas (‘10)
  - Health/Behavior – UW County Health Ranking (‘10)
  - Socioeconomic/Demographic – ESRI (2009)
method - overall

- For each of the 4 domains we created Spatial Composite Indices.

- Each of the 4 Indices was overlaid and compared with each of the 3 main variables from the PPG study.

- Next we discuss the food environment domain as an example
method — food environment example

CSAs
Local Restaurants
Grocery Coops
Farmer Markets
Farms

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method — food environment example

Grocery Stores /1,000 pop
Convenience Stores /1,000 pop
Restaurants /1,000 pop

Fast Food Stores /1,000 pop
Perc No Car HHold > 1ml grocery
Perc Low Income People > 1ml grocery

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method – food environment example

- Spatial Composite Index of Local Food per 10,000 population
  - summarize all local food layers

- Spatial Composite Index of Food Availability per 1,000 population
  - restaurants, groceries, convenient stores

- Spatial Composite Index of Food Accessibility per 1,000 population
  - no car households and low income individuals > 1ml

- Spatial Composite Index of Unhealthy Food per 1,000 population
  - convenience and fast food stores

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method — 3 PPG variables
method – food environment example

Summary Results

- 90% of PPG sites with highest Obesity Index are in counties where 3 conditions are met at once
  - availability of local food is at its lowest compared to PPG sites
  - availability of general food is at its lowest compared to PPG sites
  - availability of unhealthy food is at its highest compared to PPG sites
method — air pollution environment example (NAAQS)
method – air pollution environment example

- Composite Index Air Pollution Intensity (CIAPI) - values 1 to 7

- 74% of sites with highest obesity are in places with highest numbers of unmet NAAQ standards

- Not counting sites adjacent to non attainment areas (NCarolinias)
afterthoughts

- Did we meet objectives?
- Did we stumble into un-anticipated ones?
- Did we uncover much?
- Were we able to come to conclusions?
- Next?
Hypertension Episodes of Care/1000 Active Full time Employees - Prediction Profiler Inclusive of geospatial factors

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book report at:

http://web.dcp.ufl.edu/juna/temp/ppg.pdf

contacts

Alberto Colombi, PPG Industries Inc. – colombi@ppg.com
Juna Papajorgj, University of Florida – juna@ufl.edu