Mapping For Wellness: Then and Now

John Ritter, Ph.D.
Geomatics Dept.
Oregon Institute of Technology
Klamath Falls, OR 97601
John.Ritter@oit.edu

Sponsors

[Logos and images]
Objectives

- Understand how medical mapping can inform our study of disease incidence and progression.
- See how 2-dimensional regression analysis can be used to model disease incidence
- See how spatial analyses (i.e. GIS) can be used to help direct resources needed to address current health issues

Downtown Salem, OR: A Mapping Example
Then

Plague: Bari, Naples 1690-1692

Source: Koch, Tom. (2005); Scasciamacchia, et al. (2012)
New York City: 1795 Yellow Fever Outbreak
(Seaman, 1798)

Sanitary Map for Leeds
(Chadwick, 1842)
London: 1849 Cholera Density  
(Grainger, 1850)

Soho's Saint James Parish  
The Broad Street Pump Analysis  
(Snow, 1854)

Source: Koch, T. and Denike, K. (2007); Wired.com
Now

Risk Factors for Childhood Trauma

- Poverty
- Poor Housing / Poor Nutrition
- Unstable Families
- Foster Care
- Domestic Violence
- Substance Abuse
- Behavioral Health
- Unsafe Neighborhoods

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Credit: John A. Kitzhaber, M.D., Apr., 2017
Foster Care Episodes by CCO

Klamath Falls Wellness Mapping Initiative

- Mapping Disease Incidents in Klamath Falls, OR
  - Working in tandem with personnel from SLMC and SLWC, approximately 60,000 (de-identified) patient records for 2012 were obtained for the following disease categories:
    - Diabetes (DM)
    - Hypertension (Htn)
    - Obesity (OB)
    - Cholesterol (HL)
    - Stroke (ST)
    - Heart Disease (HD)
    - Smoking (SM)
  - Data were also obtained on the total cost of care
Ordinary Least Squares (OLS)
Results
- Heart Disease (HD)
  - Variable significance
    - HL, Walk, AvgHHInc – passed
    - Spatial Autocorrelation – passed
    - Normally Distributed in value – passed
    - VIF – passed
  - Adjusted R-Sq: 0.43
  - Map of locally varying R-sq

Hot Spot Analysis
Getis-Ord Gi*
Hot Spot Analysis: Definitions

Study Area with Neighborhood & Feature

Neighborhood & Feature

Klamath Falls, OR
Hot Spot Analysis for Disease Incidence Density

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Cluster & Outlier Analysis
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Cluster & Outlier Analysis: Definitions

Study Area with Neighborhood & Feature

Neighborhood With Feature Omitted

Feature

Mapping Wellness: Then and Now
Cluster & Outlier Analysis: Definitions

There are four possible outcomes.

- Clusters:
  - HH – the disease incidence in the *feature area is higher* than that within its *neighborhood* and the disease incidence of its *neighborhood is higher* than that of other neighborhoods in the study area.
  - LL – the disease incidence in the *feature area is lower* than that within its *neighborhood* and the disease incidence of its *neighborhood is lower* than that of other neighborhoods in the study area.

- Outliers:
  - HL – the disease incidence in the *feature area is higher* than that within its *neighborhood* and the disease incidence of its *neighborhood is lower* than that of other neighborhoods in the study area.
  - LH - the disease incidence in the *feature area is lower* than that within its *neighborhood* and the disease incidence of its *neighborhood is higher* than that of other neighborhoods in the study area.

Note that this analysis can’t be done in any other way other than in a spatial context. Even though one could sort the data in a tabular construct to find the ‘high’ or ‘low’ values, these would be the ‘global’ high/low values. This process enables one to find the ‘local’ high/low value, i.e. outliers.

The areas that show HL or LH results are almost always the most interesting.
Klamath Falls, OR
Cluster & Outlier Analysis for Disease Incidence Density

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Obesity

Diabetes

Heart Disease
Grouping Analysis

Results

- Obesity, Diabetes, Heart Disease

The values for each variable, for each census block group, were placed into one of three groups such that values for features within a group were most similar to each other.

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Klamath Falls Wellness Mapping: Conclusions

- The results of this analysis show that remediation efforts should be specifically directed towards the extended downtown and south-central suburbs
- Grouping analysis shows OB, DM, Htn, and HL to be ‘high’ in the extended downtown area and DM, Htn, OB, HL, and HD to be ‘high’ in the south-central area
- Based on these results a protected bike lane has been proposed that would pass through the extended downtown area

Klamath County Tobacco Retail Licensing Program

- In April 2016, Klamath County Public Health received a grant to propose a tobacco retail licensing ordinance throughout the county. Tobacco retail licensing (TRL), similar to an alcohol or marijuana license, requires retailers to obtain a license in exchange for the privilege of selling tobacco products.
- Currently, Oregon is one of only 10 states without a TRL ordinance.
- The following link shows the distribution of average household income across the county superimposed upon the tobacco retailer-school proximity display.

Swipe map of Schools-Tobacco Retailers/Ave HH Income
Blue Zones Initiative - Healthy Klamath

Healthy Klamath is an up-to-date source of population health and socio-economic data, providing resources for community assessment, strategic planning, collaboration and advocacy.

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References


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