

UNT's course evaluation system (SPOT - Student Perceptions of Teaching) opens on **Monday, April 16** and runs through **Thursday, May 3**.



You should receive an email on April 16 providing guidance on how to respond.

Please do respond: I need and value your feedback on what worked well this semester, and what can be improved.

Thanks in advance for your helpful comments

Also, as the due date for your **final report/presentation** approaches, please pay attention to the documents I have placed in the **assessment page** of your course website

- 1. **Final report** evaluation rubric
- 2. **Final presentation** evaluation rubric

The Healthcare Domain

Week 11



The Healthcare Domain

- This week we conclude the industry survey component of the course with a look at the healthcare industry
- Healthcare represents something different from the industries we have already discussed in this course
 - **1. For-Profit Business Opportunity:** a wide range of businesses engage in profit-generating activities related to healthcare in the United States
 - **2. Public Service:** many non-profit organizations and government departments also operate within the healthcare system
 - There are many public quality-of-life considerations bundled with consideration of health issues

The Healthcare Domain

- In the United States, the role of for-profit businesses in health is substantial
 - **Health Insurance:** United Healthcare, Blue Cross/Blue Shield, Humana, Aetna
 - **Hospital systems:** Community Health Systems, Hospital Corporation of America ("HCA"; owners of the Medical City healthcare system in Texas), Tenet Health
 - **Pharmaceutical companies:** Pfizer, Novartis, Merck, GlaxoSmithKline
 - **Individual health service practices:** doctors, dentists, therapists
- This business dominance means that public debate over health overwhelmingly focuses on healthcare as a profit-generating industry
- However, healthcare involves issues that go well outside the for-profit business realm

The Healthcare Domain

- Healthcare represents something different from other economic sectors because of the nature of the needs served by the industry
- Indeed, the dual "business/non-profit" nature of healthcare is recognized by federal statute:
 - The 1986 **Emergency Medical Treatment and Labor Act (EMTALA)** is a federal law that requires anyone coming to an emergency department to be stabilized and treated, regardless of their insurance status or ability to pay
- **Q:** why do you think such a federal law is necessary?
 - Healthcare represents a distinctive situation within the US economy

Map Ass: Q: What's the value in being able to map and track these health risks? What positive outcomes could come from having these kinds of capabilities?

<http://www.sfu.ca/healthgeography/research.htm>

1. Spatial Epidemiology

- Q: Where do you see spatial epidemiology as falling on the profit/non-profit spectrum?
 - Clear profit opportunities?
 - Public policy relevance?
 - Would you have any concern if spatial epidemiology was completely entrusted to a for-profit company like Google, Amazon, or Wal-Mart?
 - What might be an appropriate role for business, versus what role would be best for government to play?

1. Spatial Epidemiology: Video Case Study

- Technology and economic development have opened up many opportunities for a variety of players to become involved with spatial epidemiology in recent years
- One business that you might not think of as connected to this discussion is the pharmacy chain **Walgreens**
- Let's view a brief video that, among other things, shows that Walgreens has strategic positioning and unique capabilities related to the geographic monitoring of emerging health issues

1. Spatial Epidemiology: Application Areas

- As we think about the power of spatial epidemiology, it can be helpful to tabulate the major types of applications in the field
 - A. Data Visualization
 - B. Spatial Data Analysis
 - C. Spatial Data Modeling

1. Spatial Epidemiology: Application Areas

- A. Data Visualization
 - At a foundational level, geographic technologies contribute to good decisions by providing a spatial view of health needs and services
 - Basic mapping of disease distributions and health service provider locations can open up some powerful planning changes on their own

Q: What does this pair of maps tell us?

How might decision-makers with the State of Texas or Dallas County non-profit organizations make use of this kind of basic mapping?

Map 1: Dallas County Health Providers
Map 2: Dallas County Family Incomes

Key question to ask:
On this map are there statistically-significant clusters of disease activity that require particular healthcare intervention?

One Solution:
Employ a spatial pattern analysis* to determine the meaningful clusters

* SaTScan Hotspots used here

Fig. 3. The distribution of human anthrax transmission hotspots per village from 2000 to 2012 in the country of Georgia.

Identifying hotspots of human anthrax transmission using three local clustering techniques

Alexander S. Baran¹, Jan T. Kravallik¹, Lili Mikashvili¹, Nikoloz Dzemachvili¹, Jolanta Momenyan¹, Tamar Imerashvili¹, Jason K. Blackburn^{1,2}

¹Georgian State University, School of Health Sciences, Department of Geography and Planning, Tbilisi, Georgia; ²University of Illinois, Department of Geography, Urbana, Illinois, USA

Another Example: Significant Disease Clusters in the Country of Georgia

In this SaTScan Hotspot Analysis Map:
1. Red and orange clusters are both statistically significant
2. The red cluster is the strongest

Identifying hotspots of human anthrax transmission using three local clustering techniques

Alexander S. Baran¹, Jan T. Kravallik¹, Lili Mikashvili¹, Nikoloz Dzemachvili¹, Jolanta Momenyan¹, Tamar Imerashvili¹, Jason K. Blackburn^{1,2}

¹Georgian State University, School of Health Sciences, Department of Geography and Planning, Tbilisi, Georgia; ²University of Illinois, Department of Geography, Urbana, Illinois, USA

Having the results of this analysis would inform policy-makers as to where to focus their intervention attention

In this SaTScan Hotspot Analysis Map:
1. Red and orange clusters are both statistically significant
2. The red cluster is the strongest

Identifying hotspots of human anthrax transmission using three local clustering techniques

Alexander S. Baran¹, Jan T. Kravallik¹, Lili Mikashvili¹, Nikoloz Dzemachvili¹, Jolanta Momenyan¹, Tamar Imerashvili¹, Jason K. Blackburn^{1,2}

¹Georgian State University, School of Health Sciences, Department of Geography and Planning, Tbilisi, Georgia; ²University of Illinois, Department of Geography, Urbana, Illinois, USA

1. Spatial Epidemiology: Application Areas

- C. Spatial Data Modeling
 - Geographic technology makes further analytical power available, past even cluster analysis methods
 - Not only analysis of disease and healthcare provider patterns, but insight into the factors that generate the observed distributions
 - One prominent methodology to connect with again is regression modeling (recall our earlier mention of regression modeling under site selection methods)

2. Healthcare System Planning

- Identification of healthcare needs via spatial epidemiology leads to a next, logical role for geography:
 - Planning an entire, integrated system that responds to and treats those needs
- Healthcare system planning focuses on identifying
 - 1. The elements of the medical service system necessary to respond to a given community's health needs
 - 2. The location and distribution of medical service elements that can most effectively serve the community

Location-Allocation Case Study Analysis: Canada's Living Sky Health District

We saw one partial example of this thinking in our transportation discussion, when we looked at the application of location-allocation methods to clinic location in the Living Sky Health District

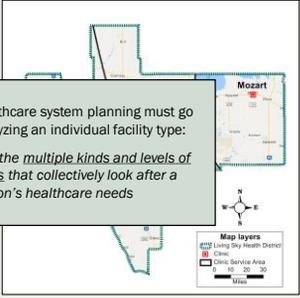
Map layers:
Living Sky Health District
Clinic
Clinic Service Area

Location-Allocation Case Study Analysis: Canada's Living Sky Health District

We saw one point thinking in our when we look location-allocation location in the

But of course healthcare system planning must go further than analyzing an individual facility type:

Need to deal with the multiple kinds and levels of medical services that collectively look after a population's healthcare needs



Map layers

- Living Sky Health District
- Clinic
- Clinic Service Area

2. Healthcare System Planning: Video Case Study

- Let's view another brief video case study now that gives us a view of the operations of a large healthcare system
 - The **Inland Empire Health Plan** provides comprehensive medical services to over 900,000 people living in southern California
 - The video was produced in 2014, but its basic insights and applications are definitely still true today
 - Watch for specific applications of *geographic thinking and technology* as explained by the administrators of this health plan organization

Q: How can attention to geography help with any of these application areas?

- Visualize current providers
- Analyze gaps in care
- Visualize community resources
- Filter by quality metrics
- PCP Assignment
- Filter resource types
- Visualize member utilization
- Model provider additions
- Provide route instructions
- Filter by provider specialty

Esri "Using Location to Improve Health Care: Inland Empire Health Plan" Case Study Video

Following are several health system map examples for the collection of healthcare services available in Dallas County

Hospital Map of Dallas County

Geography provides immediate insight into health system service availability

Q: What observations can we make based on this simple map?



Visualize Current Providers

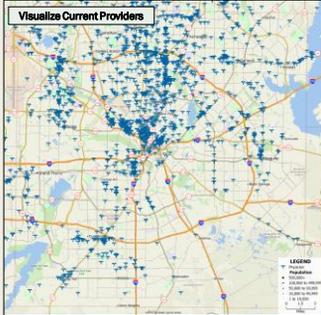
LEGEND

- Hospital
- Physician
- Pharmacy
- Specialty
- Other

Physician Map of Dallas County

Geographic analysis represents multiple elements of an overall system

Q: How does this physician map relate to the hospital map?



Visualize Current Providers

LEGEND

- Hospital
- Physician
- Pharmacy
- Specialty
- Other

Physician Map of Dallas County With Median Incomes

Relate to Community Characteristics

Q: What does this combined-theme map add to our understanding?

Diagnostic Radiologist Specialty Physician Map of Dallas County With Median Incomes

Filter by Provider Specialty

Q: What can we observe about the distribution of this medical specialization?

Hospital Map of Dallas County With 2-Mile Service Bands

Service Gap Analysis

Q: What observations are possible with this new type of analysis? What about in combination with previous maps?

Geographic analysis does not need to be elaborate to produce results with immediate health system planning applications

2. Healthcare System Planning: Applied GIS Exercise

- Our healthcare domain applied GIS exercise focuses on a healthcare system planning scenario
 - Focus: **First Texan Healthcare**, non-profit developer and operator of health clinics in Texas
 - First Texan focuses on serving "at-risk" communities across the state
 - First Texan defines "at-risk" communities as having two things in common:
 - 1. a vulnerable population
 - 2. few affordable healthcare options in the local area

2. Healthcare System Planning: Applied GIS Exercise

- The geographic area considered in the exercise is close to home: Tarrant County
- The fundamental problem that you need to address is **identification of the geography of First Texan's two "at-risk" factors** (vulnerability and access to services) in Tarrant County
- Basic questions: **Is there a need** for First Texan's clinic services in Tarrant County, and **where in the county** are the best clinic locations to provide this service?