Applying The Science of Where™ to Improve Health

Este Geraghty, MD, MS, MPH/ CPH, GISP
Chief Medical Officer
Esri
Hippocrates

The Father of Medicine

Born ~460 BCE
“When a race lives in a rough mountainous country, at high elevation, and well watered, where great difference of climate accompany the various seasons, there the people will be of large physique, well-accustomed to hardihood and bravery, with no small degree of fierceness and wildness in their character.”
"On the other hand," he said “in low-lying, stifling lands, full of meadows, getting a larger share of warm than cold winds, and where the water is warm, the people will be neither large nor slight, but rather broad in build, and fleshy. Bravery and hardihood are NOT an integral part of their natural characters."
For centuries, health has been focused on the microscopic
Joseph Lister
The Father of Antiseptic Surgery
Watson & Crick Discover the Structure of DNA
Finally, we’re seeing a shift from microscope to the telescope and an appreciation for community context.
The Science of Where

Helps us to answer the fundamental questions of where . . .

- Where is it
- How do I get there
- What’s nearby
- Where are we going
- Where’s the problem
- Where is it changing
- Where is the issue
- Where is it suitable
- Where should we locate
What is where?
Why is it there?
Why do I care?
How can I prepare?
GIS Provides the Framework and Process
That improves health workflows

Data Collection, Integration & Management
Visualization and Mapping
Analysis and Modeling
Mobilize Resources
Measure Outcomes
Outreach & Communication

Transforming How We Think and Act . . .
. . . Creating a Healthier Future
Homelessness
Why Should You Care?

Individuals:
• Kids drop out of school (increased vulnerability to long term unemployment)
• Chronic ill-health (depression, poor nutrition, poor dental health, substance abuse, mental health problems)

Communities:
• Exclusion from social, recreational, cultural and economic opportunities

National:
• More likely to interact with police, Juvenile Justice Dept., other government departments. It's costly!

Many are just one paycheck away from the street.
Are there overlapping relationships in space and time?

Syndemic
Tools for Prevention
Data collection & visualization of risk factors

- Unemployment
- Poverty
- Lack of Insurance
- Lack of Affordable Housing
Locations with one or more risk factors (the darkest areas on the map) are much more likely to generate homelessness.

The risk factors analyzed include poverty, unemployment, disabilities, public assistance, paying more than 50% of total income for rent, domestic violence, mental illness, post traumatic stress disorder (PTSD) among Veterans, lack of health insurance, and substance abuse.
These census tracts don't necessarily have the largest homeless populations, but they do have the largest potential for generating new homeless individuals and families.
Each of these high risk tracts is associated with key risk factors.

Key Risk Factors:
- Domestic Violence
- Domestic Violence, Serious Mental Illness
- Domestic Violence, Vets with PTSD
- Lack of Affordable Housing
- Lack of Affordable Housing, No Health Insurance
- Lack of Affordable Housing, Unemployment
- No Health Insurance
- No Health Insurance, Serious Mental Illness
- No Health Insurance, Unemployment
- Serious Mental Illness
- Unemployment
- Unemployment, Domestic Violence
- Vets with PTSD
- Vets with PTSD, Serious Mental Illness
- Vets with PTSD, Unemployment
- Three or more project areas
- No top 100 issues
- Rare risk factor combination

Identifying where these key risk factors are (and where they are not) provides a solid strategy for where to focus remediation efforts.

Tailor Interventions
Quantifying the Problem

- Australia: 1 in 200 are homeless on any given night
- Japan: 25,000 homeless
- Philippines: Manila has the largest homeless population of any city in the world
- South Korea: homelessness is increasing
- India: 78 million homeless
- USA: about 500,000 are homeless on any given night
Homeless
Point In Time Count

* Survey123 Forms can be opened in a browser or Mobile App
Determine and communicate the extent of the problem in the community.
Interactive decision-making
Real-time data and intervention
Community Participation & Engagement
Manage Reports

<table>
<thead>
<tr>
<th>Status</th>
<th>Activity Observed</th>
<th>Activity Observed Other</th>
<th>Details</th>
<th>Observed On</th>
</tr>
</thead>
<tbody>
<tr>
<td>Submitted</td>
<td>Individual</td>
<td></td>
<td>Found a shopping cart that looks like it belongs to a homeless person</td>
<td>06/05/2017</td>
</tr>
<tr>
<td>Submitted</td>
<td>Individual</td>
<td></td>
<td>I came across a cart with a person's belongings</td>
<td>06/04/2017</td>
</tr>
<tr>
<td>In Progress</td>
<td>Encampment</td>
<td></td>
<td>I found several beds underneath the hill</td>
<td>06/03/2017</td>
</tr>
<tr>
<td>Submitted</td>
<td>Individual</td>
<td></td>
<td>Homeless person sleeping on a park bench</td>
<td>06/06/2017</td>
</tr>
</tbody>
</table>
Assign Cases

- Track field workers
- Assign cases by location
- Enable mobile status updates
Track Status

Open Reports
- Individual
  - Submitted on: 6/9/2017, 12:00 AM
- Individual
  - Submitted on: 6/9/2017, 12:00 AM
- Individual
  - Submitted on: 6/4/2017, 12:00 AM

Report Types
- Encampment
- Individual

# of Open Reports
4
Interventions

LOST OUR HOME
PLEASE HELP

GOD BLESS!
Connect People with Programs
Optimize social equity

One option is to promote social equity. If we believe that everyone has a responsibility to share the burden of homelessness, the goal will be to distribute resources equitably. From this perspective, a location with 1% of the population should be associated with 1% of homelessness.

For this scenario, adding new resources to the green tracts would improve equity.

To create this map, you will create a supply-versus-demand variable based on the total number of people and the total number of homeless people in each census tract.
Where should new resources go?

Optimize access to resources

A second option is to prioritize access by putting new facilities where existing homeless people live.

Adding new resources to the green tracts will improve access.

To create this map, you will create a supply-versus-demand variable based on the total number of homeless people and the total number of homeless resources in each census tract. The number of shelter beds will be used as a surrogate for homeless resources.
Focus on high risk areas

A third option is to locate new resources in the highest risk areas. If resources are available where they become homeless, people are more likely to remain close to existing communities where their children attend school, where they know their neighbors, and where they are likely to have existing resources.

For this scenario, avoid the purple tracts and add new resources to the green tracts.

This is the strategy the mayor of New York is promoting.
Centralize resources

Another option is to consolidate new resources into homeless triage centers by encouraging centralization of resources.

Adding new resources to the green areas will promote centralization.

This is the model San Francisco has adopted.
Street strategy

A final option focuses on the most vulnerable homeless populations, evidenced by high numbers of 311 calls and crime incidents related to homelessness, and high numbers of chronically homeless individuals. These locations become candidates for rapid-response, focused interventions aimed at getting every homeless person precisely the resources they need to move out of homelessness permanently.

Research indicates a small portion of the homeless population use a majority of money targeted for homelessness. Addressing these people first, will have the biggest impact on reducing costs.
Overlaying the maps for each scenario reveals solutions that optimize one or more objectives.

Click the map to see which objectives are met in each location.
Evaluate for Impact
Combating Homelessness

The Richland County Homeless Task Force is a coalition of Health and Human Services agencies and volunteer groups that have come together to eliminate homelessness in your community through education, outreach, and targeted intervention. Our strategy includes locating both at-risk communities and the existing homeless to connect them with the resources they need.

Homelessness is a complex issue and to eliminate it we need to better understand it and address the underlying causes. While every individual's path to homelessness is unique, there are a number of factors that can put individuals and communities at higher risk. The Taskforce selected the 5 different factors below to help locate areas to target initial outreach efforts:

- Lack of Affordable Housing
- Unemployment
- Poverty
- Low Wages
- Lack of Insurance

Identifying At Risk Communities

Data to represent these factors from a variety of sources was mapped to the census tract level to help visualize the distribution of the overall risk in each community. This process helped determine what communities were being impacted by each factor and which areas were performing poorly across the board on all factors.
The Value of GIS in Addressing Homelessness

1. Created a risk surface for homelessness and examining the spatial patterns of various risk factors.

2. Map the distribution and characteristics of the homeless population.

3. Weigh different options for locating new homeless resources.

4. Develop a framework to quantify and monitor performance (return on investment).

5. Quantify the homeless population in the community.


7. Identify resources and make them easily accessible.
The Value of GIS in Addressing Homelessness

8. Is the average number of days a person remains homeless going down?

9. Is the percentage of chronically homeless decreasing?

10. Are outreach programs (for substance abuse, domestic violence, unemployment or institutional discharge, for example) assisting a larger number of people and as a consequence, are the percentages of people homeless due to these factors decreasing?

11. Has every homeless veteran been placed in permanent housing?

12. Does emergency shelter and housing capacity match the number of newly homeless each month?
Reduce Homelessness Solutions

**Conduct Point-in-Time Counts**
- Homeless Count Survey
- Homeless Count Dashboard
- Homeless Count Analysis View

**Report Homeless Activity**
- Homeless Activity Reporter
- Homeless Activity Manager
- Homeless Activity Dashboard
- Homeless Activity Reporter Analysis View

**Planning & Analysis**
- ArcGIS Desktop
- Community Analyst

**Collect & Promote Resources**
- Health Resource Inventory
- Homeless Service Locator

http://solutions.arcgis.com/local-government/health/homeless/
Get Connected!
We’re Regularly Sharing Useful Information

Este Geraghty, egeraghty@esri.com

See what’s going on by subscribing to our newsletter: http://www.esri.com/industries/health/newsletter

@Esri_Health
@Esri_HumanServices
@EsteGeraghty

Groups:
Esri Health
Esri for Human Services

Esri Health & Human Services Conference
October 23-25, 2018
Redlands, CA

Esri News for Health & Human Services

Creating a Healthier Klamath County
A Geographic Approach to Building a Healthy Community

Finding out that your county is scored to be last in the 2016 County Health Rankings for Oregon can be a motivation to take action to improve the health of Klamath County. By turning to the geographic information system (GIS) to assemble the data needed to create the County Health Rankings tool, the County Health Improvement Project (CHIP) worked to improve the health of the people living in Klamath County.

The Challenge
Public health advocates wanted to increase Klamath County’s overall health indicators, but they wanted to implement targeted interventions where they were most needed. An opportunity to make those improvements came about through the work of Healthy Klamath and the Rio Jones Project, which works to improve the socioeconomic status of the people. With the help of Dr. John Ellis from Esri, the team wanted to find the geographic areas that had the highest incidence of certain chronic diseases and other health outcomes. With the help of the Corbas Health Foundation, the team used GIS technology to see whether those disease occurrences were related to neighborhood sociodemographics or both. The goal was to use spatial analysis to help direct resources for intervention efforts, and the GIS team can assist.

The Solution
The team began by creating a sociodemo model using data such as local slope, population density, and maintenance - and variables in total. The team also worked with the Medical Center and Marla Dietrich, and the team identified data of the known datasets to create the patterns and data. The team was then aggregated into a GIS-generated shapefile, reducing the size of each disease category. Using ArcGIS Online, the team was able to show how the spatial distribution of the disease categories across the identified disease categories. ArcGIS Online showed the maps to be reviewed by multiple organizations and whole, enabling them to see patterns and create feedback quickly and easily.

The Results
The team worked with the health care providers and the prevention of the identified disease patterns of the disease categories more effectively, but few relationships were stronger than others. Where there was a high