Mapping Heart Disease, Stroke and Other Chronic Diseases: A Program to Enhance GIS Capacity within Health Departments

Map Highlights from California; Kansas; New Mexico; South Dakota; Vermont; Cuyahoga County, Ohio; Cleveland, Ohio; and Denver, Colorado

Submitted to the US Centers for Disease Control and Prevention, Division for Heart Disease and Stroke Prevention, and the National Association of Chronic Disease Directors

Prepared by the Children’s Environmental Health Initiative at the School of Natural Resources and Environment, University of Michigan

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ACKNOWLEDGEMENTS

The following staff from each of the participating agencies provided valuable contributions to the success of this project’s ability to enhance the use of GIS within health departments for the prevention and treatment of heart disease, stroke, and other chronic diseases. In addition, we extend our deep appreciation to the Environmental Systems Research Institute (Esri) for their provision of software grants to the state and local health departments participating in this project.

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CHRONIC DISEASE GIS EXCHANGE

To see additional maps that address heart disease, stroke and other chronic diseases, visit the Chronic Disease GIS Exchange at www.cdc.gov/dhdsp/maps/gisx. The site includes a map gallery, GIS training modules, and a wide range of GIS resources. Visitors to the site are also invited to submit their own map to the map gallery.
INTRODUCTION

Geographic Information Systems (GIS) are powerful tools for enhancing the ability of health departments to address the public health burden of heart disease, stroke, and other chronic diseases. In order to build the capacity of health departments to utilize GIS for the surveillance and prevention of chronic diseases, the Division for Heart Disease and Stroke Prevention at the national Centers for Disease Control and Prevention (CDC) funds a collaborative training project with the National Association of Chronic Disease Directors and the University of Michigan. The central objective of this GIS Surveillance Training Project is to enhance the ability of health departments to integrate the use of GIS into daily operations that support existing priorities for surveillance and prevention of heart disease, stroke, and other chronic diseases. Staff members from health departments receive training regarding the use of GIS surveillance and mapping to address four major purposes:

- documenting geographic disparities
- informing policy and program decisions
- enhancing partnerships with external agencies
- facilitating collaboration within agencies

In 2014, the following state health departments were competitively selected to participate in this GIS Surveillance Training Project: California, Kansas, New Mexico, South Dakota, and Vermont. The following local health departments were also selected to participate: Cuyahoga County, Ohio; Cleveland, Ohio; Lake County, Ohio; Erie County, Ohio; Denver, Colorado; and Tri-County, Colorado. The project is intentionally designed to develop a GIS infrastructure that can serve a vast array of chronic disease areas, yet with a focus on heart disease and stroke.

The maps displayed in this document highlight examples of how each participating health department produced maps to support their chronic disease priorities by documenting the burden, informing program and policy development, and enhancing partnerships. The extent of collaboration among chronic disease units within each health department is evident in the diversity of the teams that participated in the training and have continued to work to strengthen GIS infrastructure within their respective health departments.
Key Points

- Increased exposure to tobacco marketing in retail stores leads to increased youth tobacco use and also decreases likelihood of quitting.

- Research has documented that TRL ordinances can be used to limit the location and density of tobacco retailers and thereby reduce the tobacco industry’s influence.(1)

- This map suggests that the density of tobacco retailers is smaller in most areas with a TRL ordinance than in areas without a TRL ordinance.

Number of tobacco retailers per 10,000 population

- 8 - 10
- 11 - 15
- >15

Local Tobacco Retailer License Ordinances

Data source: California Policy Evaluation Tracking System, California Board of Equalization Tobacco Licensing Lie, Census Bureau
Produced by: California Tobacco Control Program
Sources: Esri, USGS, NOAA

An estimated 1.9 million Californian adults (6.9%) have been diagnosed with type 2 diabetes. This map helps identify gaps in access to lifestyle change and self-management programs for diabetes and opportunities for collaborations among the different programs. Only 40 counties (69%) have DSME programs and approximately 10% of Californians live outside a 30-minute drive-time boundary of NDPPs, DSME programs, and CDSMPs.
 meets Sedgwick County ranges from 0.3% to 53.0%.

• Tobacco retailers are more densely concentrated in poorer areas in Sedgwick County.

• The purpose of this map is to visually demonstrate how tobacco access is geographically correlated with poverty.

- Licensed Tobacco Retailer

Percent of population below poverty level by tract

<table>
<thead>
<tr>
<th>Percentage Range</th>
<th>Legend</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.3% - 4.9%</td>
<td></td>
</tr>
<tr>
<td>5% - 8.7%</td>
<td></td>
</tr>
<tr>
<td>8.8% - 15.8%</td>
<td></td>
</tr>
<tr>
<td>15.9% - 28%</td>
<td></td>
</tr>
<tr>
<td>28.1% - 53%</td>
<td></td>
</tr>
</tbody>
</table>

Data Source: 2012 American Community Survey 5-year; 2014 Kansas Department of Revenue
The Kansas Arthritis Program tries to increase healthcare access for people with arthritis and other chronic conditions so that they can improve self-management.

One purpose of this map is to determine which areas with high prevalence of arthritis have not yet been targeted.

The map will help the Bureau of Health Promotion strategically plan where new workshop sites will be implemented.

Key Points
- The Kansas Arthritis Program tries to increase healthcare access for people with arthritis and other chronic conditions so that they can improve self-management.
- One purpose of this map is to determine which areas with high prevalence of arthritis have not yet been targeted.
- The map will help the Bureau of Health Promotion strategically plan where new workshop sites will be implemented.


Kansas Chronic Disease Self-Management Program Workshop Sites, 2012-2014

Arthritis Prevalence
- Insufficient data
- 0.1% - 18.8%
- 18.9% - 24.7%
- 24.8% - 28.6%
- 28.7% - 33.8%

Workshops
- Yr1 workshops n=40
- Yr2 workshops n=23
Status of School District Wellness Policies in New Mexico, School Year 2013-2014

Key Points
- Healthy Kids New Mexico works with public school districts to update and strengthen their wellness policies to include language supporting healthy eating, physical activity, and staff wellness.
- This map shows the progress school districts are making in updating and strengthening their wellness policies.
- This map is helpful for statewide programming, strategic planning, identifying gaps and opportunities, and building collaborative partnerships across state agencies and organizations.

Data Source: Healthy Kids New Mexico program data 2013-2014
New Mexico’s Evidence-Based Manage Your Chronic Disease (MyCD) and Tomando Control de su Salud Programs, 2010 -2015

Key Points

• Most of New Mexico is considered rural or frontier and there are large distances between central cities and outlying towns, making health-care access difficult for residents.

• The New Mexico Diabetes Prevention and Control Program is working with statewide partners to increase access to evidence-based chronic disease self-management programs.

• This map can be used by the state to implement new programs in areas that still lack access to healthcare resources.
Colorectal Cancer in South Dakota: Age-Adjusted Rates of Incidence, Distant (Stage IV) Incidence, and Mortality, 2002-2011

Key Points

- Colorectal cancer accounted for 9.7% of all cancer cases reported in South Dakota in 2011.
- According to the U.S. Preventive Services Task Force, regular screening, beginning at age 50, is the key to preventing colorectal cancer.
- These maps will assist the state with planning interventions and determining where additional screening services are needed.

Incidence

- Distant (Stage IV) Incidence

Mortality

- Mortality Rates*

Source: SD Cancer Registry; SD Department of Health

* Rates per 100,000 age-adjusted to the 2000 US standard population
Diabetes Prevalence and Prevention Programs
Among South Dakota Adults, 2011

Key Points
- Prevalence of diabetes within South Dakota counties ranges from 6.3%-18.6%.
- Diabetes Self-Management and Prevention Programs are proven ways to combat and control the disease.
- The purpose of this map is to determine the need for and location of future diabetes self-management and prevention program sites.

Prevention Programs
- Diabetes Self Management
- Diabetes Prevention Program

Age-Adjusted Diabetes Prevalence
- 6.3 - 7.0
- 7.1 - 7.4
- 7.5 - 7.7
- 7.8 - 9.4
- 9.5 - 18.6

Source: Data is age-adjusted BRFSS data accessed via CDC Diabetes Interactive Atlas
Vermont

Drive Times to Certified Diabetes Educator (CDE) Sites*, 2014

Key Points

- Only 18% of Vermonters live within 15 minutes of a site where a CDE is available at least 3 days a week.
- This map shows that there are several areas in Vermont where the drive time is more than 30 minutes to reach a CDE.
- The purpose of this map is to show areas where more Certified Diabetes Educators are needed.

Drive time to CDE site*

- 0-15 minutes
- 16-30 minutes
- 31-45 minutes
- More than 45 Minutes
- CDE Sites (3 days/week)

Data sources: CDEs from the Vermont Association of Diabetes Educators provided the practice locations and their FTE information for each site as of September 2014. *Sites with CDE available at least 3 times per week. For more information contact VDH-GIS@state.vt.us
**Vermont**

**Hospitalization Rates** for Diseases of the Heart by Vermont County of Residence, 2007-2009

**Key Points**

- These maps illustrate variation of hospitalization rates among individual counties and show a slight decrease of the state rate over time.

- While the state rate has declined from 2007 to 2009, the total number of counties with significantly higher rates has increased.

- The maps can be used to illustrate areas of Vermont with relatively higher or lower rates of hospitalization for heart disease.

**County rates compared to State Rate**

- **significantly lower**
- **not different**
- **significantly higher**

*Rates are age-adjusted to the US 2000 standard population, per 10,000. Includes Vermont residents hospitalized in Vermont or neighboring states with a primary ICD-9-CM diagnosis code of 390-398, 402, 404, or 410-429. Data Source: Vermont Uniform Hospital Discharge Data Set, 2007-2009.**

**Comparisons of county rates to state rates are considered statistically significant when confidence limits are non-overlapping.**
Key Points

- The average rate of heart disease mortality in Cleveland was 268.3 per 100,000, which is higher than the state average and national average.
- Five neighborhoods in each of the black and white demographics had heart disease mortality rates that were significantly higher than the city's average.
- The purpose of this map is to highlight disparities in heart disease mortality within the city of Cleveland so that public health officials can specify where chronic disease interventions are needed most.

Map is based on average annual age-adjusted heart disease mortality rate over the five year period in the City of Cleveland's Statistical Planning Areas (SPA) as neighborhoods. Rate is determined by the number of deaths per 100,000. Age-adjusted to 2000 U.S. standard population. Data Source: Ohio Department of Health. Stroke deaths defined as ICD-10 codes: 100-109, I11, I13, I20-I51.
Health Improvement Partnership - Cuyahoga Racial and Ethnic Approaches to Community Health Target Communities

Key Points

- Racial and Ethnic Approaches to Community Health (REACH) intends to increase access for better nutrition, more physical activity and improved chronic disease prevention in 22 census tracts across Cleveland.
- These maps show REACH target communities and the locations of federally qualified health centers where hypertension programs are being implemented to help improve chronic disease management.
- These maps will be used to provide a baseline of the chronic disease burdens and social determinants of health within these target communities.

Smoking Violations on Denver Health Campus, Jan.-Aug. 2014

Key Points

- The Denver Public Health Chronic Disease Tobacco Team conducted weekly surveys of the Denver Health Campus to see if smoking violations were a serious issue on the hospital's campus.
- The areas with the largest amount of smoking violations seem to be near major roadways and parking lots.
- Smoking violations represent smokers who were hospital system employees, patients, or visitors.

“No Smoking” Signs

Smoking Violations

- 1
- 5
- 10

Data collected by the DPH Chronic Disease Tobacco Team during weekly campus audits.
Facilitating Collaboration

The GIS Surveillance Training Program was intentionally designed to develop a GIS infrastructure that would facilitate collaboration among an array of chronic disease units within each health department, yet with a focus on heart disease and stroke. To that end, the staff members from each health department that participated in the training represented different chronic disease units. Each health department was led by a member of the heart disease and stroke unit (bold). The following lists the chronic disease units that were represented in each of the participating health departments:

**California Department of Public Health**

<table>
<thead>
<tr>
<th>Name</th>
<th>Chronic Disease Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brendan Darsie</td>
<td>California Colon Cancer Control Program</td>
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<td>Janet Bates</td>
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<td>Chronic Disease Control Branch</td>
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<td>Xueying Zhang</td>
<td>California Tobacco Control Program</td>
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**Kansas Department of Health and Environment**

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<tbody>
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<td>Cynthia Snyder</td>
<td>Bureau of Health Promotion</td>
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<td>Erika Welsh</td>
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<tr>
<td>Virginia Barnes</td>
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**New Mexico Department of Health**

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<tbody>
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<td>Bryan Patterson</td>
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<tr>
<td>Bambi Bevill</td>
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Pamela Schochenmaier

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Office of Chronic Disease Prevention and Health Promotion/Epidemiology  
Heart Disease and Stroke Prevention Program

Vermont Department of Health

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Jessie Curran  
Caitlyn Dayman  
Patrick Henry  
Barbara Carroll

**Chronic Disease Unit**
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Vermont Department of Health  
Epidemiology  
Women, Infants, and Children Program  
Vermont Uniform Hospital Discharge Data

Local Health Departments

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Becky Gawelek; Researcher  
Carl Preusser; Registered Sanitarian  
Christopher Kippes; Director  
Domenica McClintock; Supervisor

**Lake County Division of Community Health Services, OH**
Katelyn Coan; Lake County Health District  
Kathy Durchik; Clinical Services  
Kathy Milo; Health Promotion and Planning  
Ron Graham; Health Director

**Denver Public Health Department, CO**
Christie Mettenbrink; Epidemiologist  
Jennifer Wieczorek; Chronic Disease Manager  
Kaylynn Aiona; Statistical Research Specialist  
Teddy Montoya; Health Program Specialist  
Tracey Richers-Maruyama; Program Manager

**Tri-County Health Department, CO**
Alix Hopkins; Nurse Manager  
Christine Dermont-Heinrich; Public Health Planner  
Dani Searle; Nutrition  
Maura Proser; Prevention Manager

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Becky Gawelek; Researcher  
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Alix Hopkins; Nurse Manager  
Christine Dermont-Heinrich; Public Health Planner  
Dani Searle; Nutrition  
Maura Proser; Prevention Manager
Participants to Date

- Trained state
- Trained local clusters