



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

May 2015

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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.

California Department of Public Health

Brendan Darsie
Janet Bates
Madhurima Gadgil
Shannon Conroy
Xueying Zhang

Cleveland Department of Public Health, OH

David Bruckman
Jana Rush
Vino Sundaram

Tri-County Health Department, CO

Alix Hopkins
Christine Dermont-Heinrich
Dani Searle
Maura Proser

Kansas Department of Health and Environment

Trevor Christensen
Cynthia Snyder
Erika Welsh
Virginia Barnes

Cuyahoga County Board of Health, OH

Christopher Kippes
Becky Gawelek
Domenica McClintock
Carl Preusser

National Association of Chronic Disease Directors

Margaret Casey

New Mexico Department of Health

Katharine VonRueden
Bryan Patterson
Christopher Lucero
Bambi Bevill

Denver Public Health Department, CO

Tracey Richers-Maruyama
Teddy Montoya
Jennifer Wiczorek
Kaylynn Aiona
Christie Mettenbrink

Children's Environmental Health Initiative, University of Michigan

Mara Geller
Kafi Laramore-Josey
Ruiyang Li
Kaleah Mabin
Marie Lynn Miranda
Nicole Sandberg
Ben Strauss
Joshua Tootoo

South Dakota Department of Health

Carrie Cushing
Lexi Haux
Ashley Miller
Pamela Schochenmaier

Erie County Department of Health, PA

Jeff Quirk
Laura Luther
Mathew Elwell
Valerie Bukowski

US Centers for Disease Control and Prevention

Michele Casper
Sophia Greer
Linda Schieb

Vermont Department of Health

Marieke Jackson
Jessie Curran
Caitlyn Dayman
Patrick Henry
Barbara Carroll

Lake County Division of Community Health Services, OH

Katelyn Coan
Kathy Dorchik
Kathy Milo
Ron Graham

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:

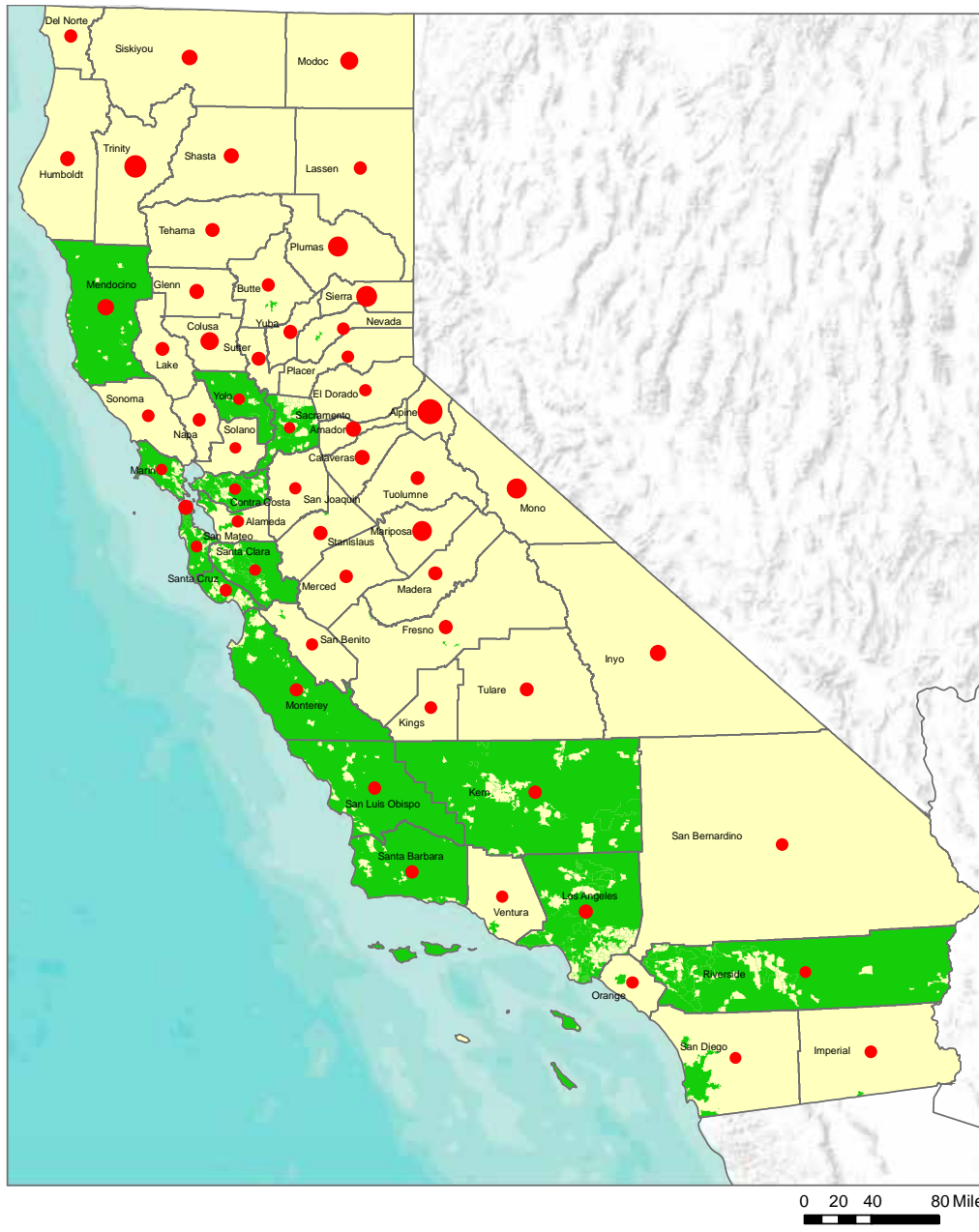
- documenting geographic disparities
- informing policy and program decisions
- enhancing partnerships with external agencies
- facilitating collaboration within agencies

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.

CALIFORNIA

Local Tobacco Retailer License (TRL) Ordinances and Tobacco Retailer Density in California, 2014



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

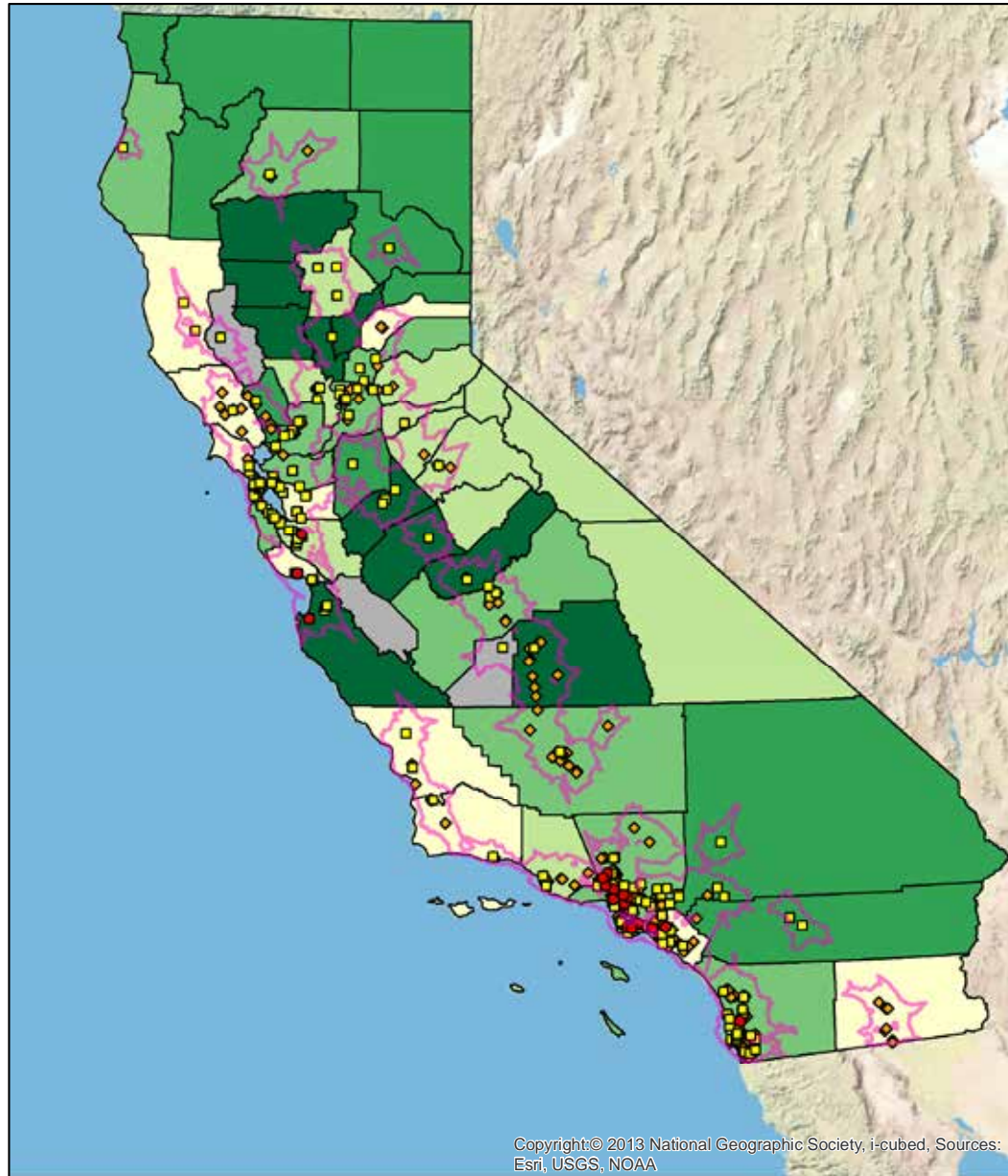
Data source: California Policy Evaluation Tracking System, California Board of Equalization Tobacco Licensing Lis, Census Buearu
Produced by: California Tobacco Control Program

Sources: Esri, USGS, NOAA

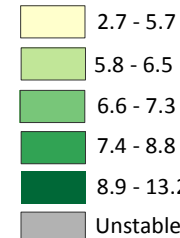
I.Wooten H, McLaughlin I, Chen L, Fry C, Mongeon C, Graff S. Zoning and licensing to regulate the retail environment and achieve public health goals. *Duke Forum for Law & Social Change*. 2013;5(65:65-96).

CALIFORNIA

Adult Type 2 Diabetes Prevalence and Locations of Lifestyle Change and Self-Management Programs, 2015



Adult Type 2 Diabetes Prevalence (%)



30 minute drive-time boundary

Lifestyle Change/Self-Management Programs

- National Diabetes Prevention Program (NDPP)
- Diabetes Self-Management Education (DSME) Program
- Chronic Disease Self-Management Program (CDSMP)

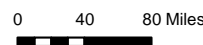
Data Sources: Estimated percent of California adults (aged 18 and above) who were ever told by a doctor that they have Type 2 diabetes based on over 40,000 surveyed via the California Health Information Survey (CHIS) 2011-2012. Unstable estimates have relative standard errors $\geq 30\%$. NDPPs updated February 2015 from national registry (http://nccd.cdc.gov/DDT_DPRP/Registry.aspx). DSME programs updated February 2015 and include diabetes education programs accredited by the American Association of Diabetes Educators (<http://www.diabeteseducator.org/ProfessionalResources/accred/Programs.htm>) and/or recognized by the American Diabetes Association (http://professional.diabetes.org/erp_list.aspx). CDSMP workshops held January 2014 thru February 2015 via Partners in Care Foundation. S Conroy, Chronic Disease Control Branch, CDPH, March 2015.

Key Points

- 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.



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KANSAS

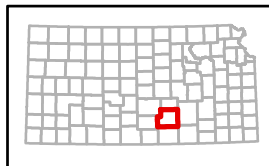
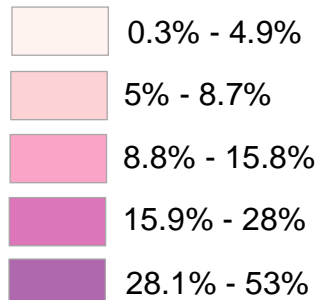
Licensed Tobacco Retailer Locations and Poverty, Sedgwick County, Kansas

Key Points

- Prevalence of poverty among census tracts within 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

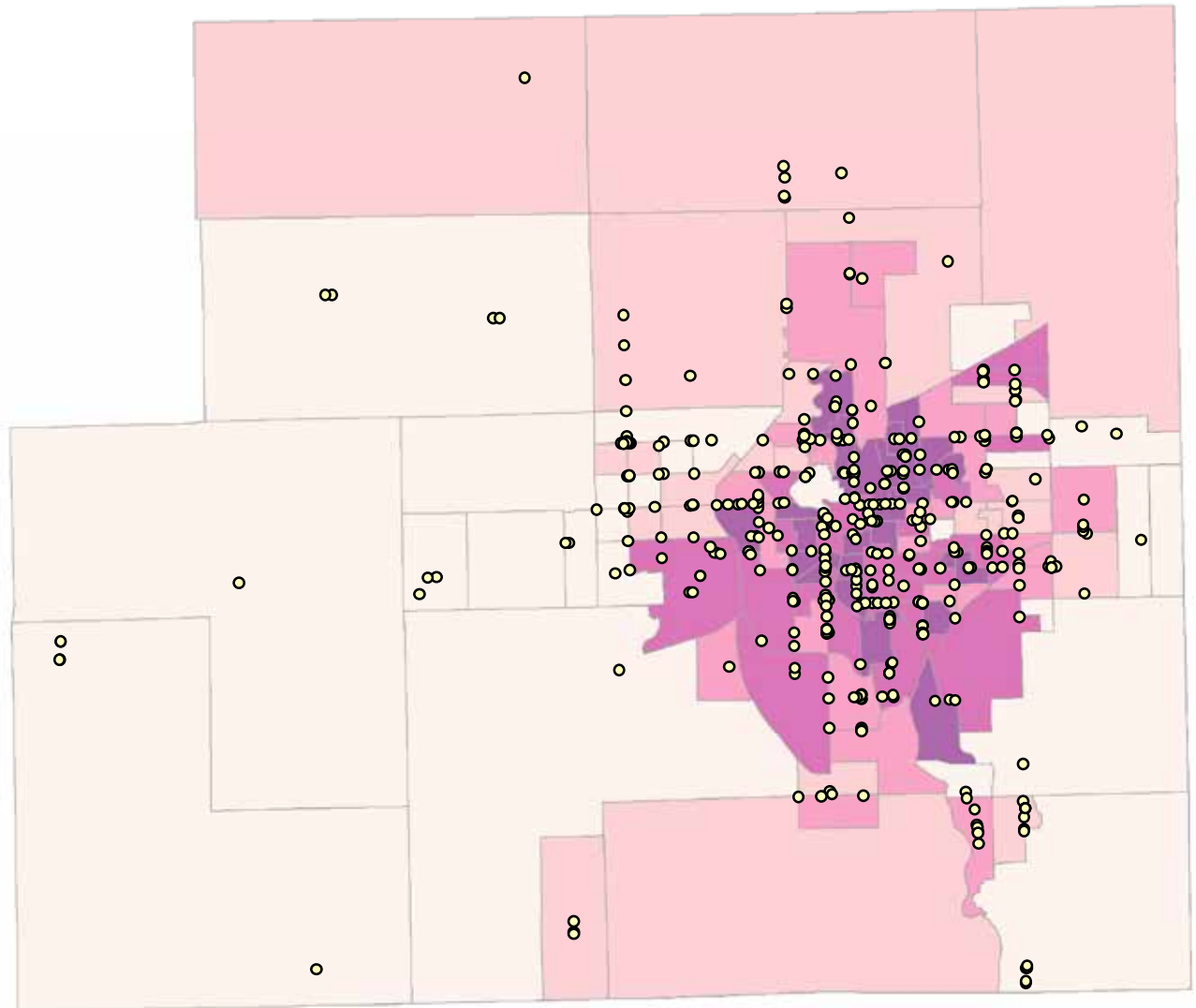
Percent of population below poverty level by tract



Data Source: 2012 American Community Survey 5-year; 2014 Kansas Department of Revenue



0 1.5 3 6 9 12 Miles



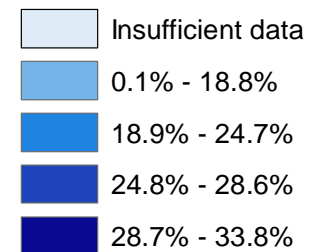
KANSAS

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



Key Points

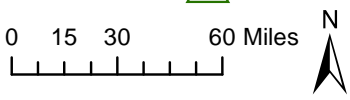
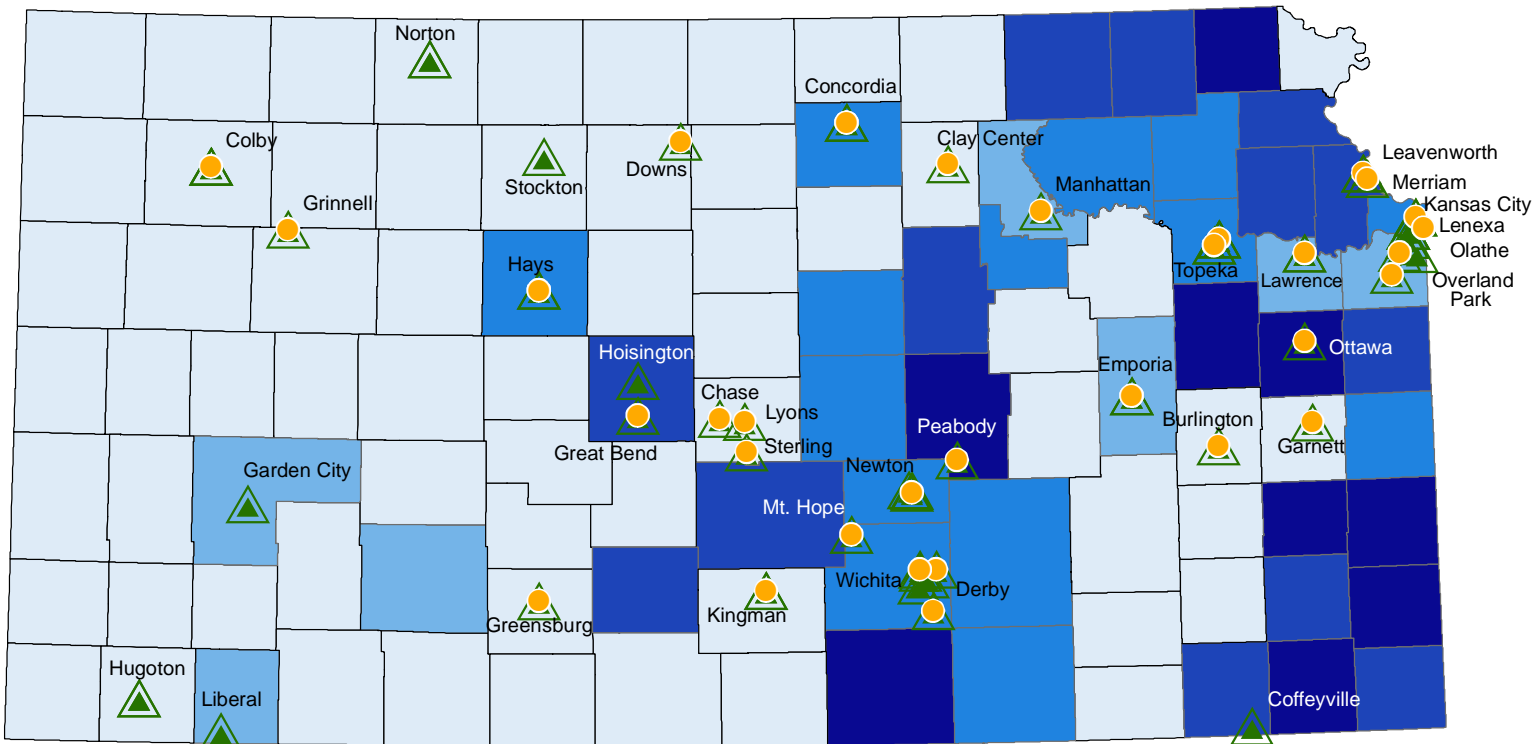
- The Kansas Arthritis Program tries to increase healthcare access for people with arthritis and other chronic conditions so that they can improve self-management.
- One purpose of this map is to determine which areas with high prevalence of arthritis have not yet been targeted.
- The map will help the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

Arthritis Prevalence



Workshops

-  Yr1 workshops n=40
-  Yr2 workshops n=23

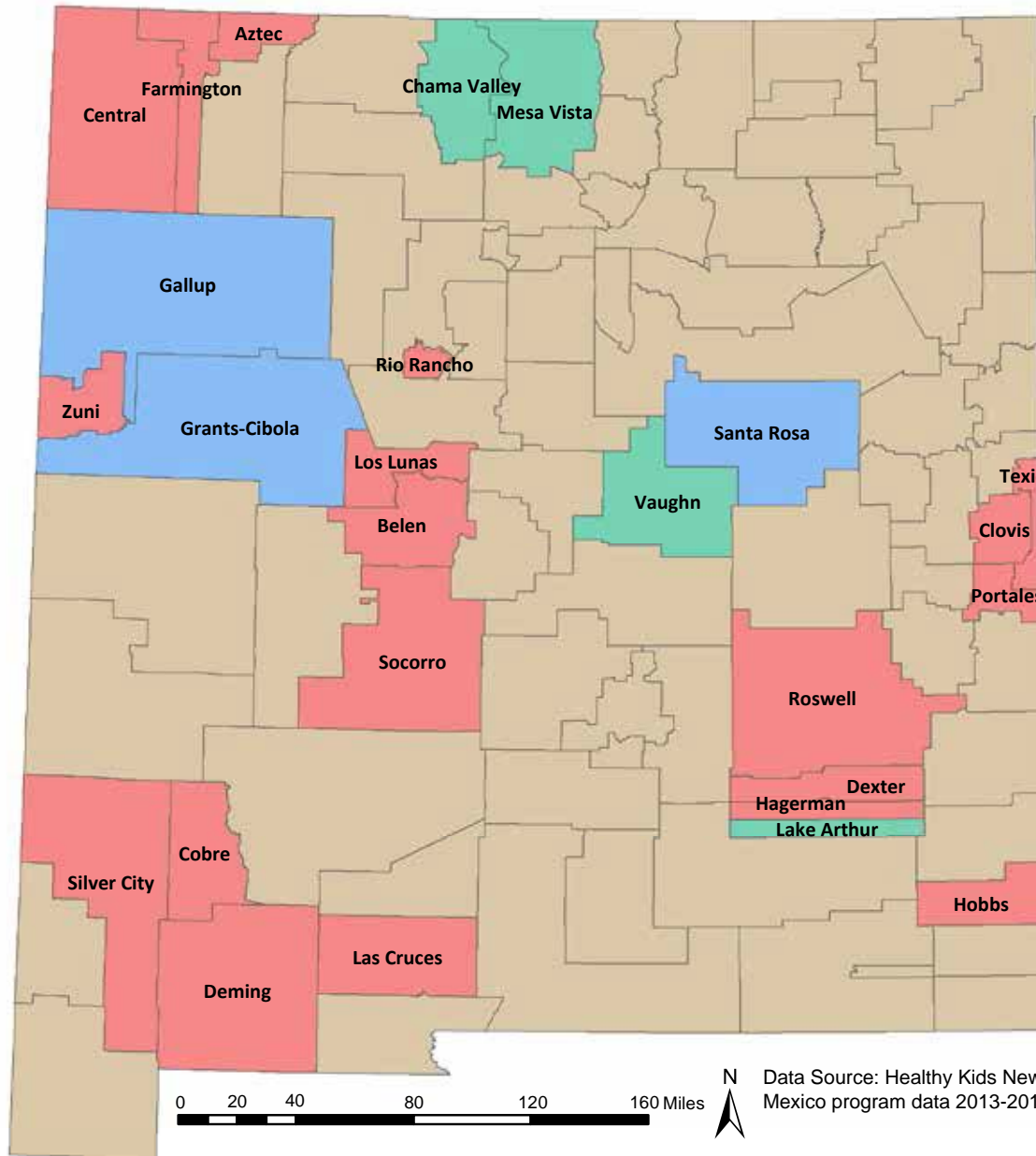


Data Source: Arthritis prevalence: 2011 Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment; CDSMP workshops: 2012-2014 NCOA database



NEW MEXICO

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.

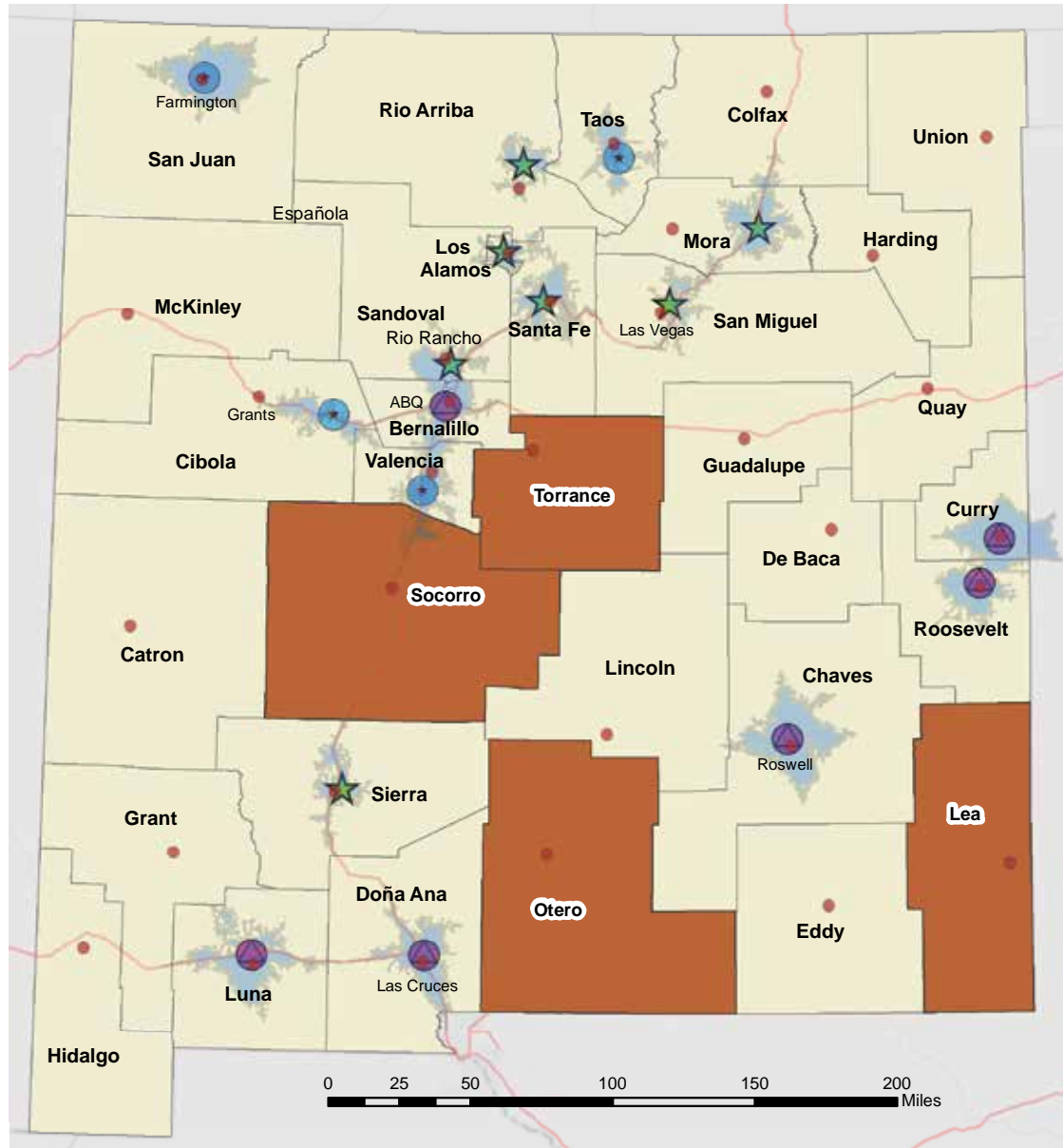
District Wellness Policy Progress

- In Process of Updating Policies
- Updated & Approved Policies
- Implemented New Policies
- No Progress



NEW MEXICO

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.



MyCD



MyCD and Tomando



MyCD - Most Recent Sites (as of 9/2012)



FY15 Counties Targeted for Expansion



30 Minute Drive



Center of Population



Major Interstate



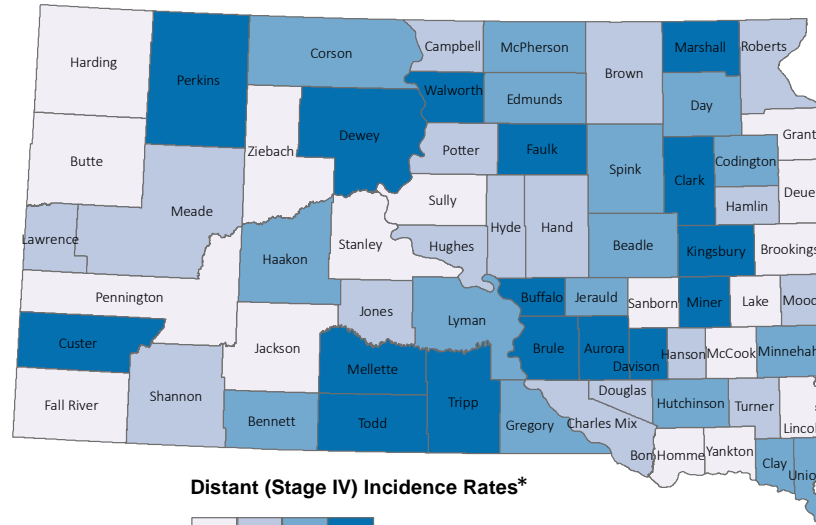
SOUTH DAKOTA

Colorectal Cancer in South Dakota: Age-Adjusted Rates of Incidence, Distant (Stage IV) Incidence, and Mortality, 2002-2011

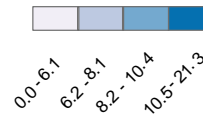
Key Points

- 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.

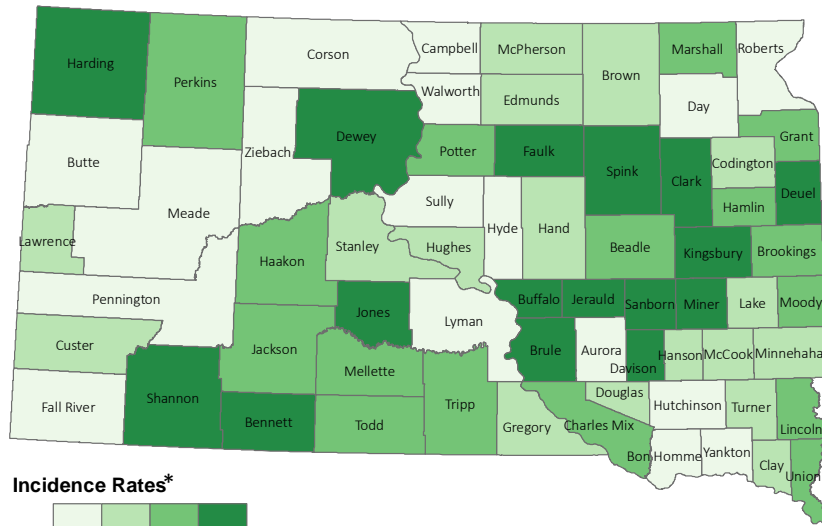
Distant (Stage IV) Incidence



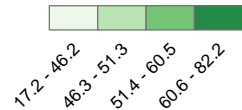
Distant (Stage IV) Incidence Rates*



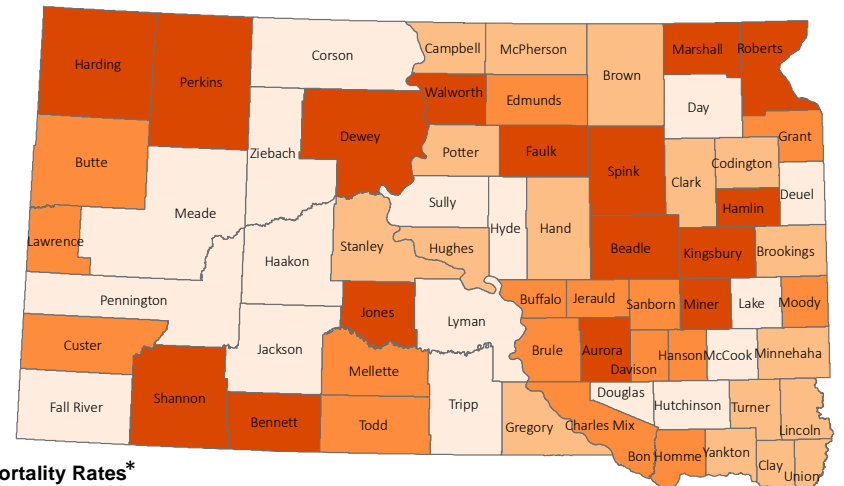
Incidence



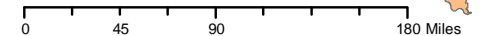
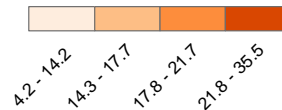
Incidence Rates*



Mortality



Mortality Rates*

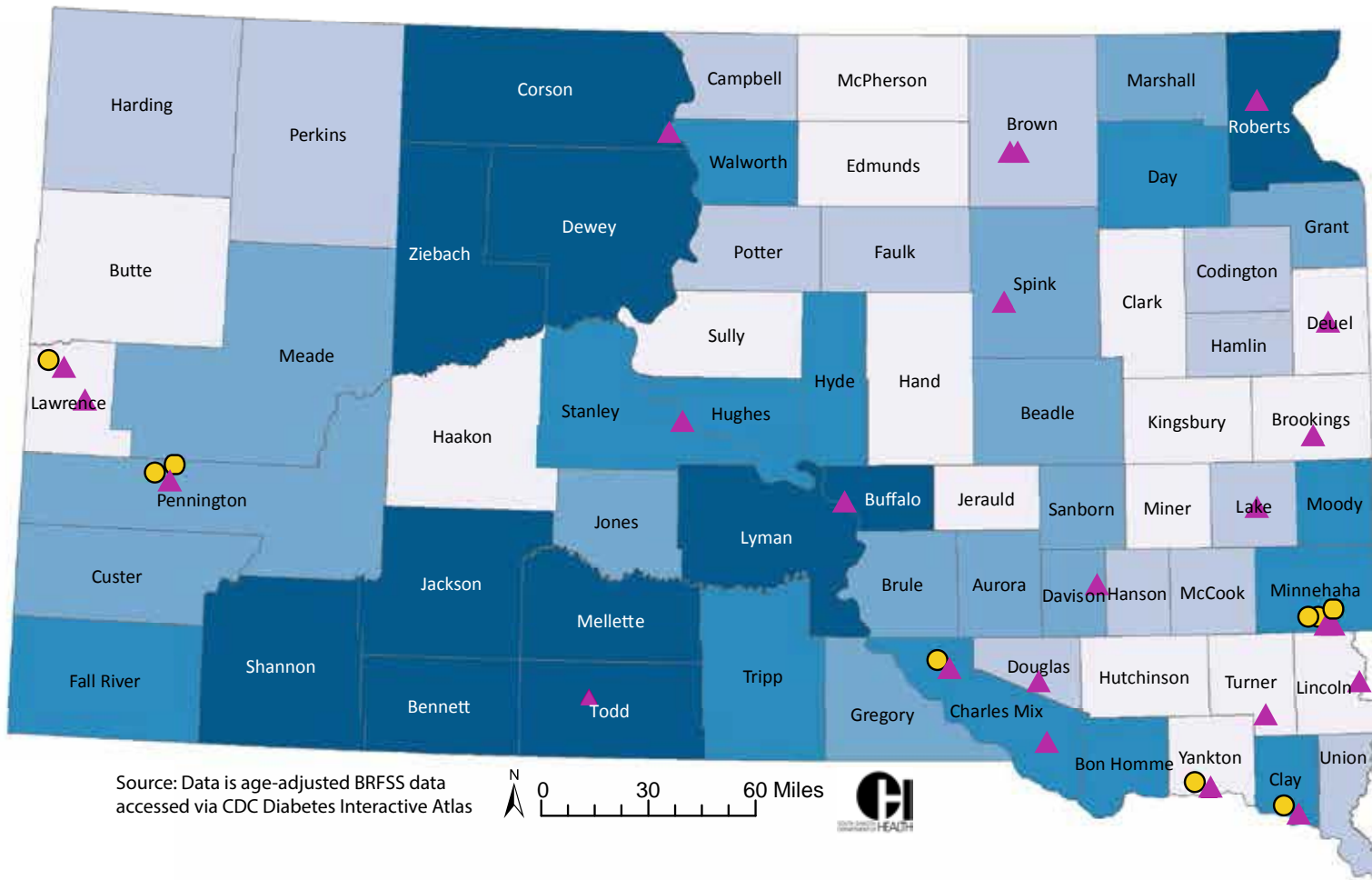


Source: SD Cancer Registry; SD Department of Health
*Rates per 100,000 age-adjusted to the 2000 US standard population



SOUTH DAKOTA

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.

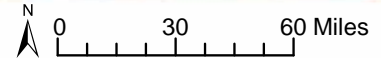
Prevention Programs

- ▲ Diabetes Self Management
- Diabetes Prevention Program

Age-Adjusted Diabetes Prevalence

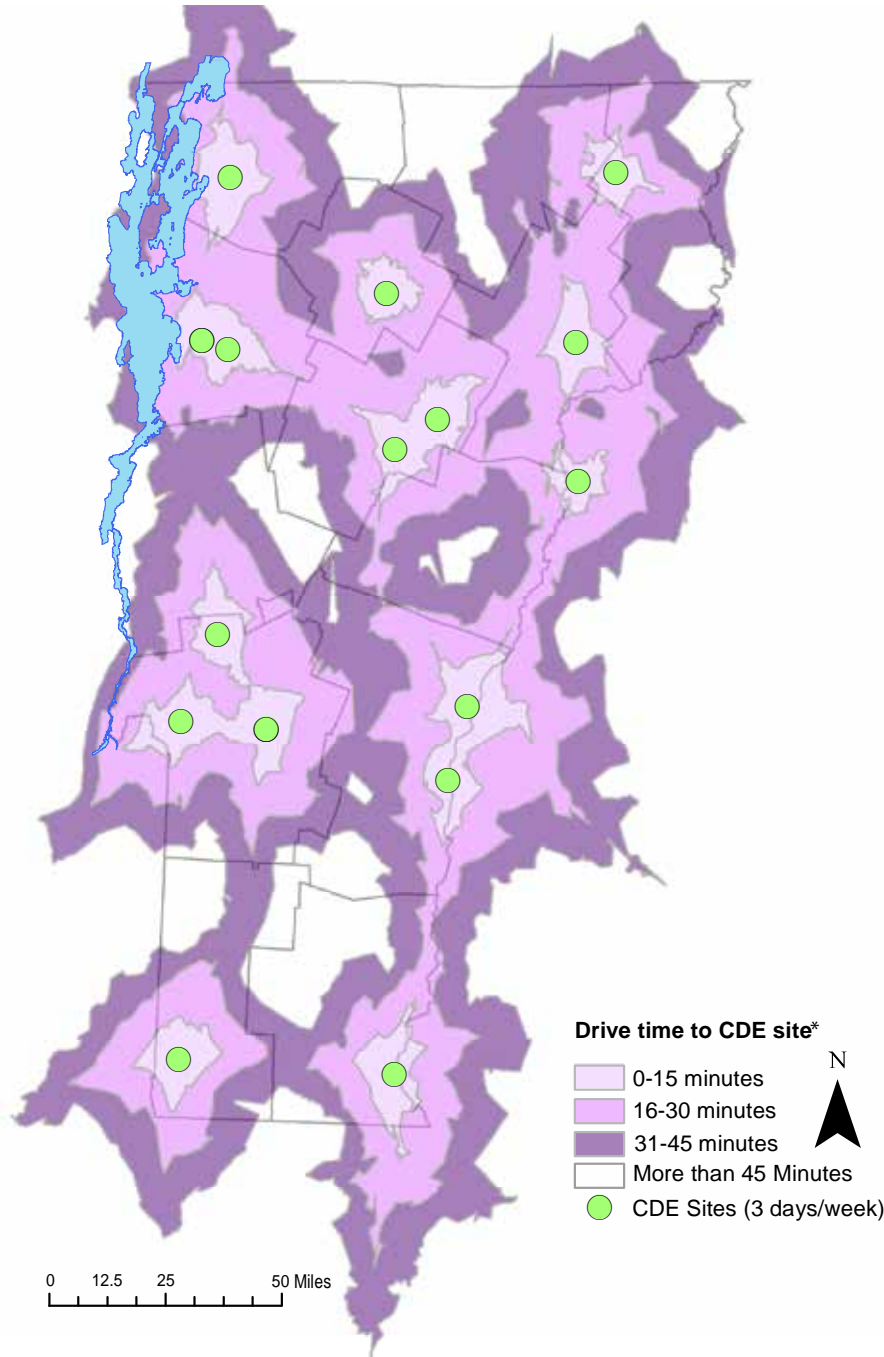
- 6.3 - 7.0
- 7.1 - 7.4
- 7.5 - 7.7
- 7.8 - 9.4
- 9.5 - 18.6

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.



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

2007
State Rate = 91.0

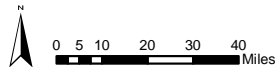
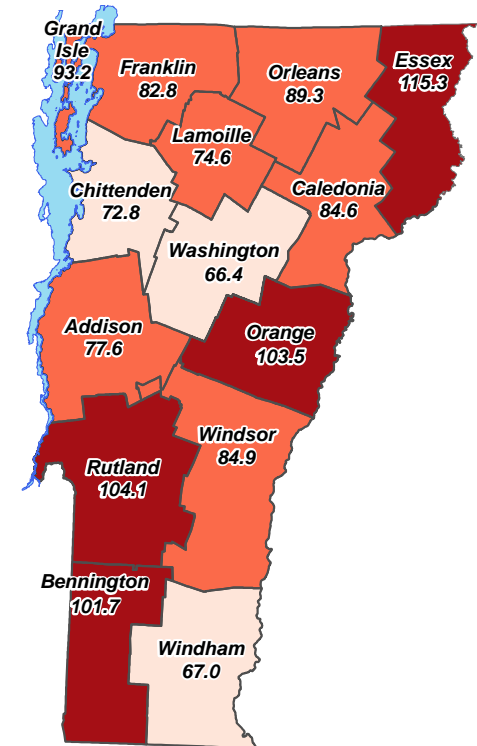
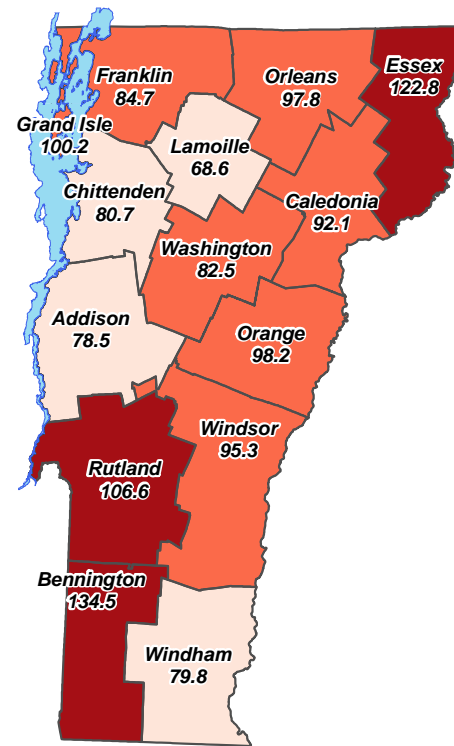
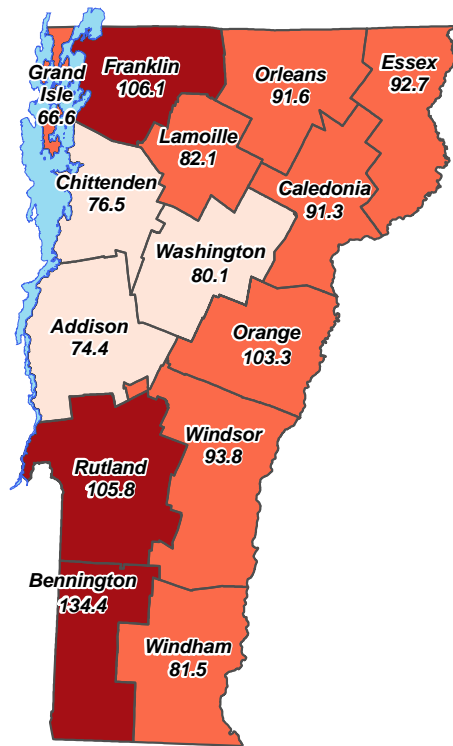
2008
State Rate = 91.6

2009
State Rate = 82.8

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**



*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.

CLEVELAND, OHIO

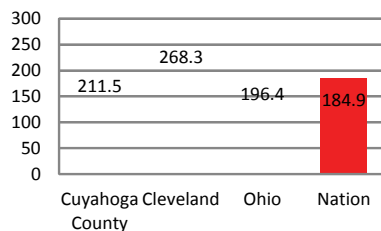
Age-Adjusted Heart Disease Mortality Rates, by Neighborhood with Area Hospitals, City of Cleveland, 2008-2012

Key Points

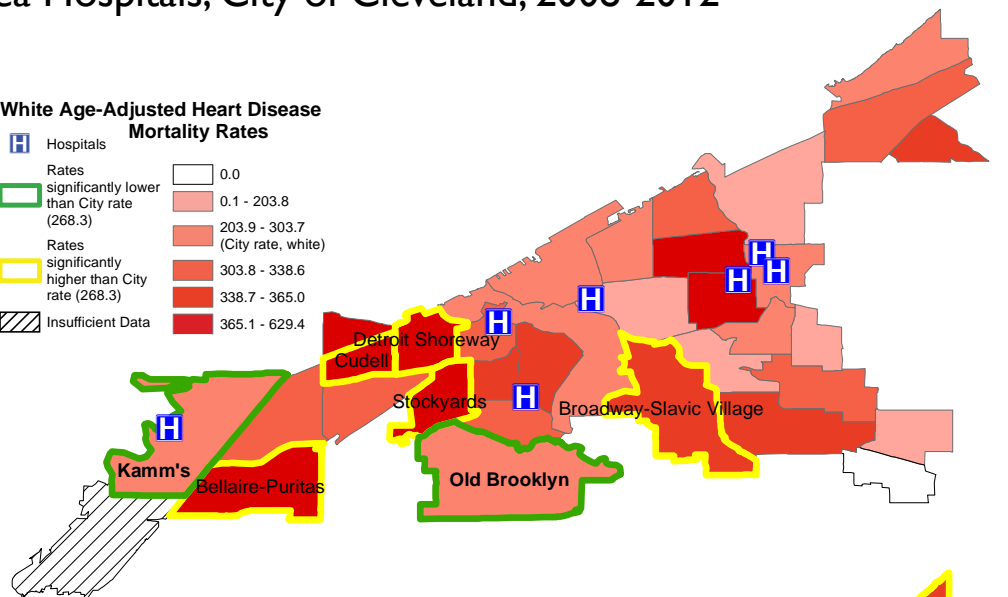
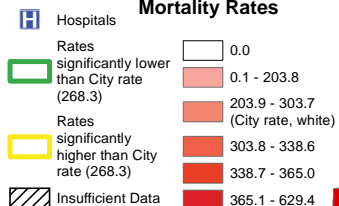
- The average rate of heart disease mortality in Cleveland was 268.3 per 100,000, which is higher than the state average and national average.
- Five neighborhoods in each of the black and white demographics had heart disease mortality rates that were significantly higher than the city's average.
- The 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.



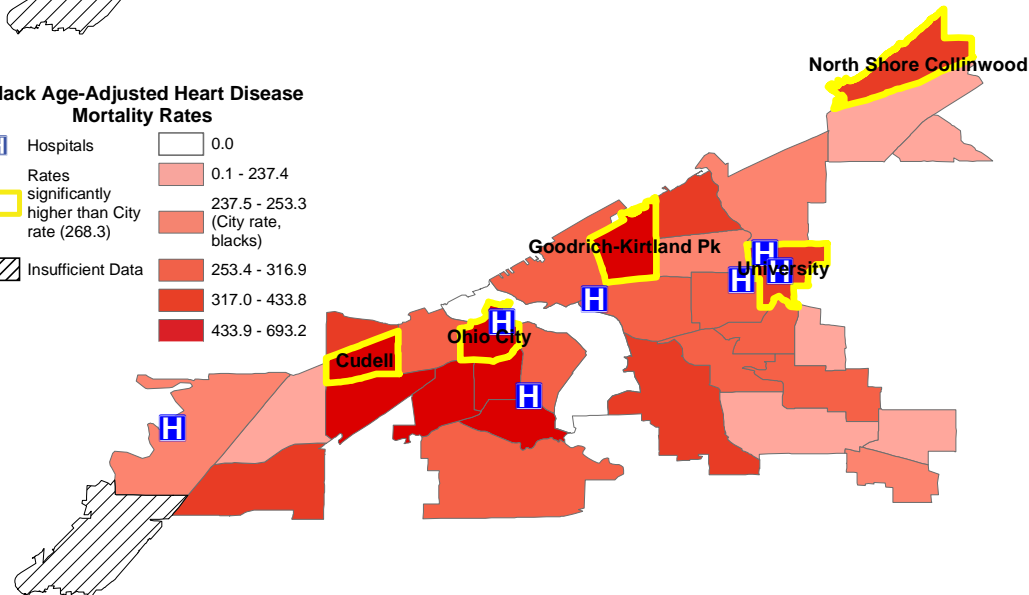
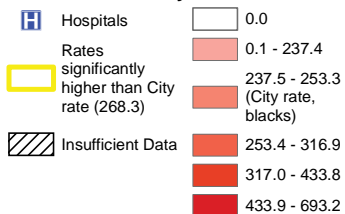
Overall Heart Disease Death Rates



White Age-Adjusted Heart Disease Mortality Rates



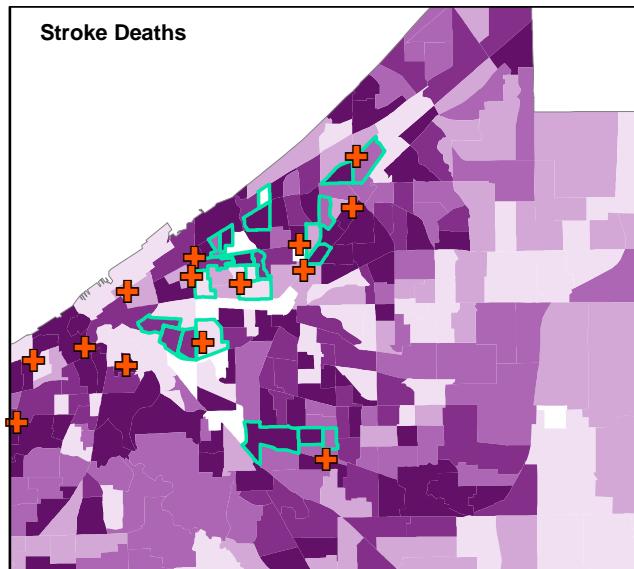
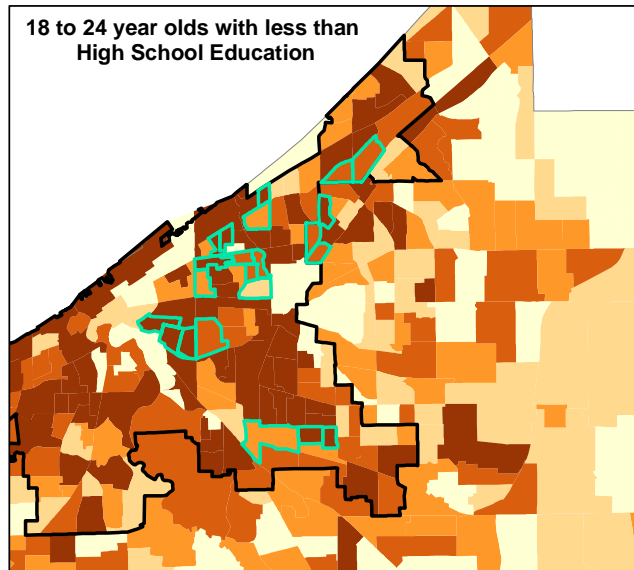
Black Age-Adjusted Heart Disease Mortality Rates



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: I00-I09, I11, I13, I20-I51.

CUYAHOGA COUNTY, OHIO

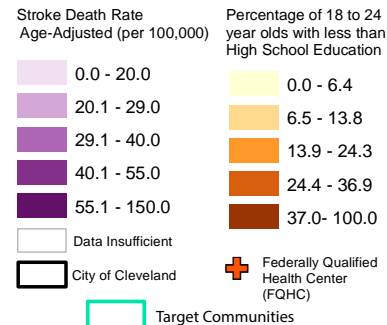
Health Improvement Partnership - Cuyahoga Racial and Ethnic Approaches to Community Health Target Communities



0 2.5 Miles

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.



Cuyahoga County



CUYAHOGA COUNTY
BOARD OF HEALTH
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Source: Ohio Department of Health (ODH) Vital Statistics ICD-10 codes: I60-69. Age-Adjusted to the 2000 U.S. Standard Population and presented using 2010 census tracts. Map created and analysis performed by Epidemiology, Surveillance, and Informatics at the Cuyahoga County Board of Health, March 2015. ODH specifically disclaims responsibility for any analyses, interpretations or conclusions. Federally Qualified Health Centers data downloaded from the Health Resources and Services Administration (HRSA) Data Warehouse, April 28, 2014 <http://datawarehouse.hrsa.gov/data/datadownload/hccddownload.aspx> State and national rate source: Division for Heart Disease and Stroke Prevention: Interactive Atlas. Centers for Disease Control and Prevention. Available at <http://nccd.cdc.gov/DHDSPIAtlas/#>. Accessed on 7/22/14.

DENVER, COLORADO

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

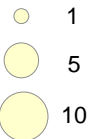
Key Points

- 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



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

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

Name

Brendan Darsie
Janet Bates
Madhurima Gadgil
Shannon Conroy
Xueying Zhang

Chronic Disease Unit

California Colon Cancer Control Program
Chronic Disease Control Branch
Chronic Disease Control Branch
Chronic Disease Control Branch
California Tobacco Control Program



Kansas Department of Health and Environment

Name

Trevor Christensen
Cynthia Snyder
Erika Welsh
Virginia Barnes

Chronic Disease Unit

Bureau of Health Promotion/ Epidemiology
Bureau of Health Promotion
Bureau of Health Promotion/Epidemiology
Bureau of Health Promotion/Heart Disease and Stroke Program



New Mexico Department of Health

Name

Katharine VonRueden
Bryan Patterson
Christopher Lucero
Bambi Bevill

Chronic Disease Unit

Chronic Disease Prevention and Control Bureau/Epidemiology
Emergency Medical Systems Bureau, Division of Epidemiology and Response
Diabetes Prevention and Control Program
Chronic Disease Prevention and Control Bureau/Public Health Division



Facilitating Collaboration

South Dakota Department of Health

Name

Carrie Cushing
Lexi Haux
Ashley Miller
Pamela Schochenmaier

Chronic Disease Unit

South Dakota Department of Health
Comprehensive Cancer Control Program
Office of Chronic Disease Prevention and Health Promotion/Epidemiology
Heart Disease and Stroke Prevention Program



Vermont Department of Health

Name

Marieke Jackson
Jessie Curran
Caitlyn Dayman
Patrick Henry
Barbara Carroll

Chronic Disease Unit

Vermont Department of Health
Vermont Department of Health
Epidemiology
Women, Infants, and Children Program
Vermont Uniform Hospital Discharge Data



Local Health Departments

Cleveland Department of Public Health, OH

David Bruckman, MS; Chief Systems

Analyst / Biostatistician

Jana Rush; Chief Epidemiologist
Vino Sundaram; Epidemiologist

Cuyahoga County Board of Health, OH

Becky Gawelek; Researcher

Carl Preusser; Registered Sanitarian

Christopher Kippes; Director

Domenica McClintock; Supervisor

Denver Public Health Department, CO

Christie Mettenbrink; Epidemiologist

Jennifer Wiczorek; Chronic Disease Manager

Kaylynn Aiona; Statistical Research Specialist

Teddy Montoya; Health Program Specialist

Tracey Richers-Maruyama; Program Manager

Erie County Department of Health, PA

Jeff Quirk; Public Health Preparedness/Epidemiology

Laura Luther; Program Coordinator

Mathew Elwell; Public Health Preparedness Coordinator

Valerie Bukowski; Erie County Department of Health

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

Tri-County Health Department, CO

Alix Hopkins; Nurse Manager

Christine Dermont-Heinrich; Public Health Planner

Dani Searle; Nutrition

Maura Proser; Prevention Manager



E-mail: cehi.snre@umich.edu
<http://cehi.snre.umich.edu>

