Creating a State of Health with GIS: Moving Geographic Technology Forward at the Oklahoma State Department of Health

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GIS Coordinator

Oklahoma State Department of Health

Topics

▸ About OSDH

▸ GIS at OSDH

▸ Enterprise GIS

▸ Strategic Planning

▸ Examples of GIS products
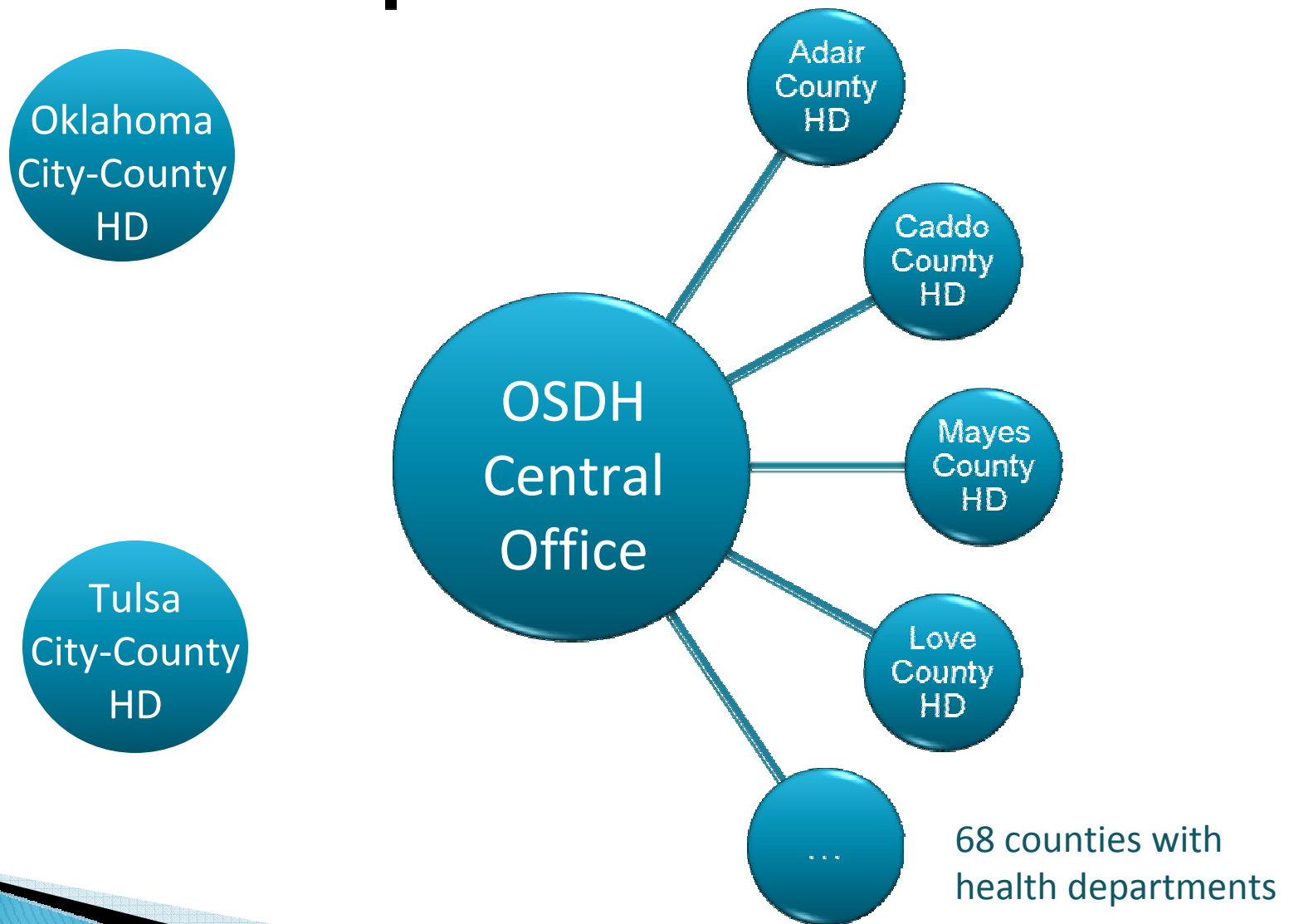
About the Oklahoma State Department of Health

>> Mission:

To protect and promote the health of the citizens of Oklahoma, to prevent disease and injury, and to assure the conditions by which our citizens can be healthy
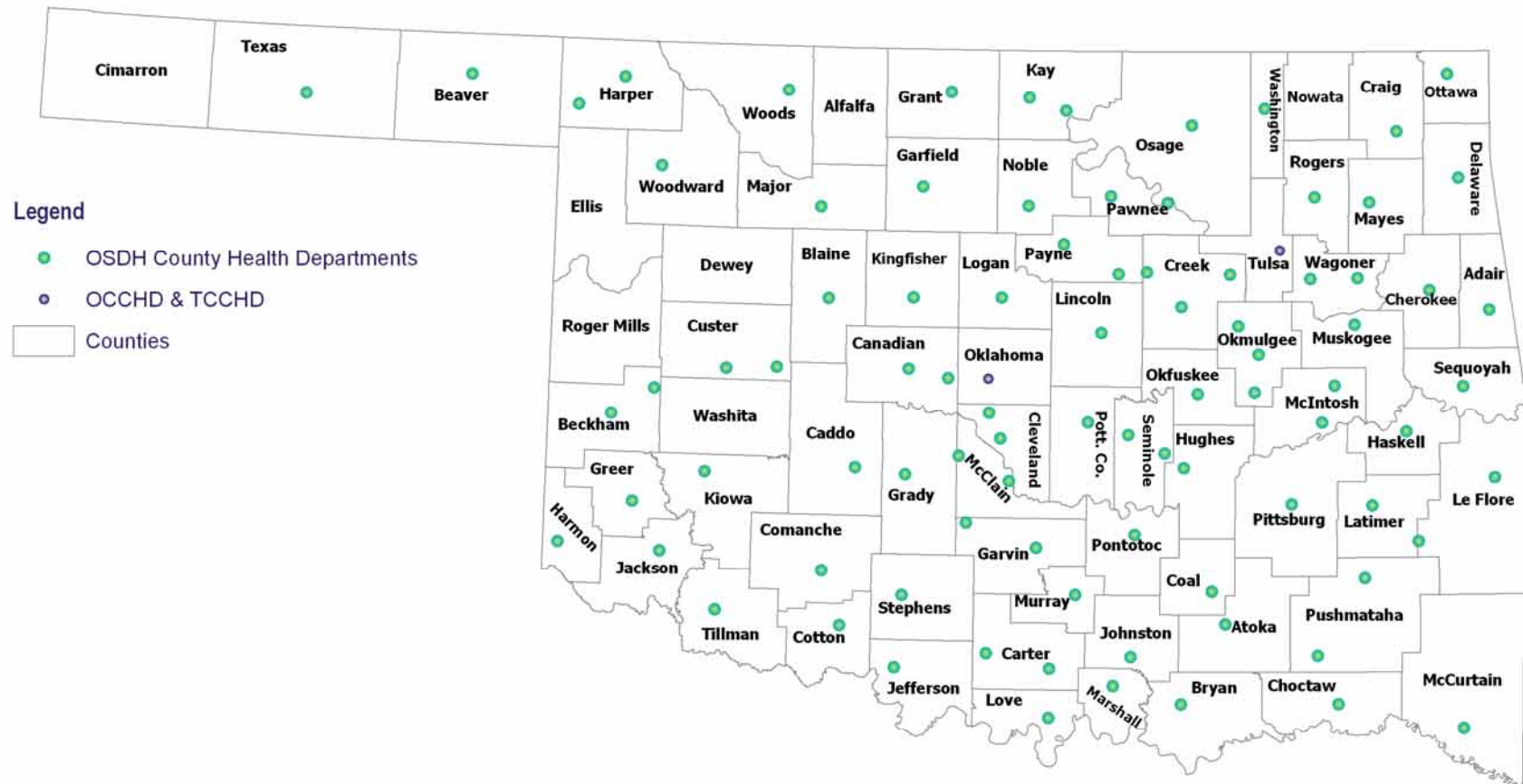
Centralized public health model

County Health Departments in Oklahoma

Legend

- ● OSDH County Health Departments
- ○ OCCHD & TCCHD
- ☐ Counties

Cimarron
Texas
Beaver
Harper
Woods
Alfalfa
Grant
Kay
Washington
Nowata
Craig
Ottawa
Garfield
Noble
Osage
Rogers
Delaware
Ellis
Woodward
Major
Pawnee
Mayes
Dewey
Blaine
Kingfisher
Logan
Payne
Creek
Tulsa
Wagoner
Adair
Lincoln
Cherokee
Roger Mills
Custer
Canadian
Oklahoma
Okmulgee
Muskogee
Okfuskee
Sequoyah
Beckham
Washita
Caddo
Cleveland
Pott. Co.
Seminole
Hughes
McIntosh
Haskell
Greer
Kiowa
Grady
McClain
Pittsburg
Latimer
Le Flore
Harmon
Jackson
Comanche
Garvin
Pontotoc
Coal
Stephens
Murray
Johnston
Atoka
Pushmataha
Tillman
Cotton
Carter
Jefferson
Love
Marshall
Bryan
Choctaw
McCurtain

Created: 10.15.2008

Projection/Coordinate System: USGS Albers Equal Area Conic

| 0 | 40 | 80 | 160 |

Miles

N

Health Care Information Division
Center for Health Statistics
Oklahoma State Department of Health

Major divisions at OSDH

Disease & Prevention Services

Community Health Services

Protective Health Services

Family Health Services

Administrative Services
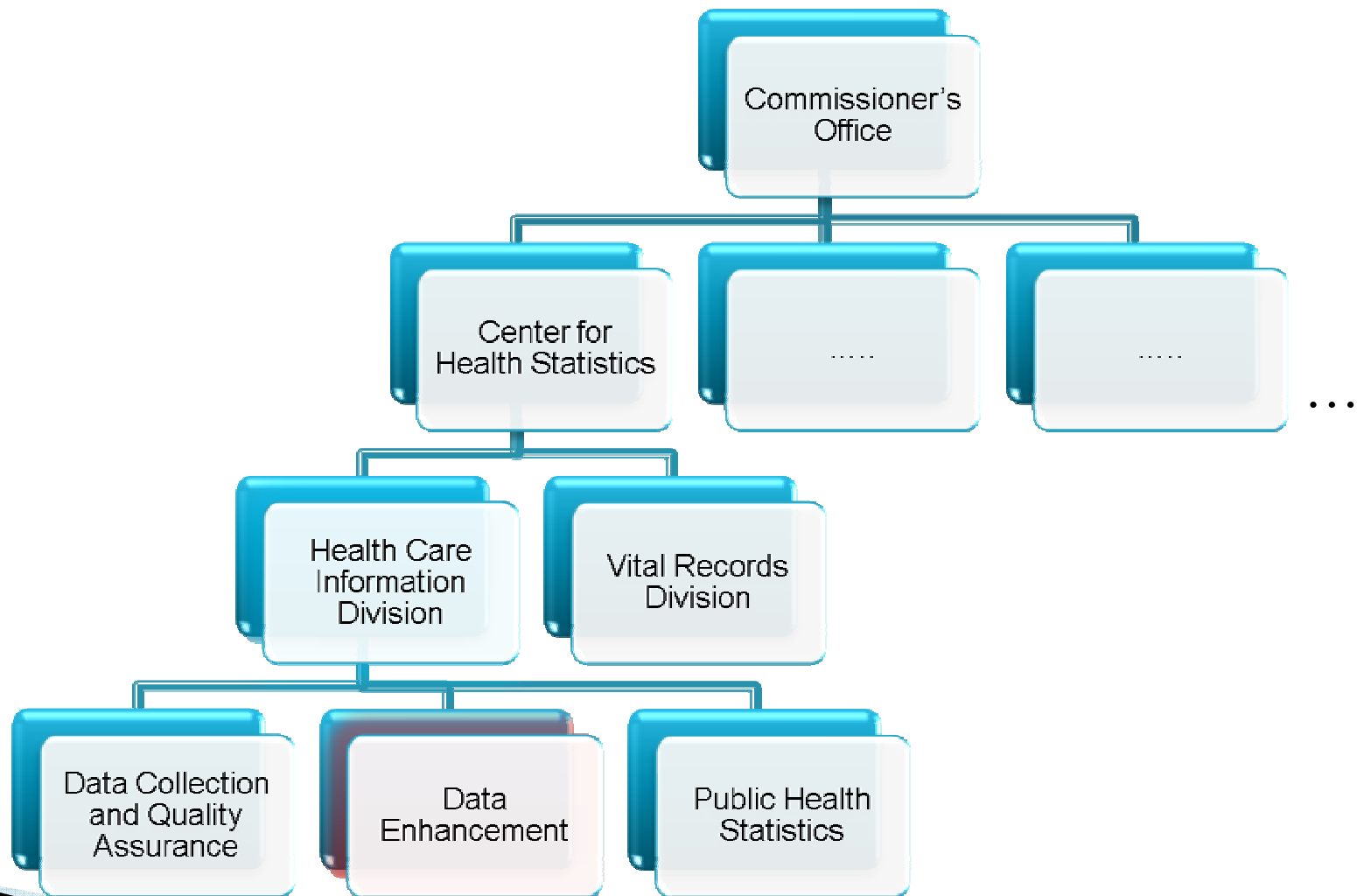
Commissioner's Direct Reports

Geographic Information Systems

》》 An overview of GIS at OSDH

Where GIS fits at OSDH

Health Care Information (HCI)

‣ We dedicate our diverse expertise to collect, analyze and disseminate reliable and timely health care information in order to assess health care service utilization and costs, as well as the overall health status of all Oklahomans.

◦ GIS-related values for HCI:
  • Health care information in a variety of formats
  • Involved and informed public

GIS in Health Care Information

- HCI provides data and services to programs for decision support
- GIS as a tool for data enhancement and analysis fits within the HCI mission/values
  - Geocode core datasets held in HCI
    - Births ≈ 50,000
    - Deaths ≈ 35,000
    - Hospital Inpatient/Outpatient Discharges ≈ 800,000
    - Ambulatory Surgery Center Discharges ≈ 200,000
- Centralized GIS staff can provide more services across the agency

Roles of Centralized GIS Staff

▸ Coordinator:
  ◦ Manage the enterprise system
  ◦ Train agency staff to use GIS
  ◦ Maintain GIS software licenses (maintenance, installation tracking)
  ◦ Monitor software usage, balance users/licenses ratio
  ◦ Guide and coordinate the GIS Advisory Committee
  ◦ Administer the enterprise geodatabase
  ◦ Education and outreach (internal and external)

▸ Coordinator and Interns/Technician:
  ◦ Develop and maintain geodata
  ◦ Advise and assist agency staff on GIS projects
  ◦ Fulfill mapping requests
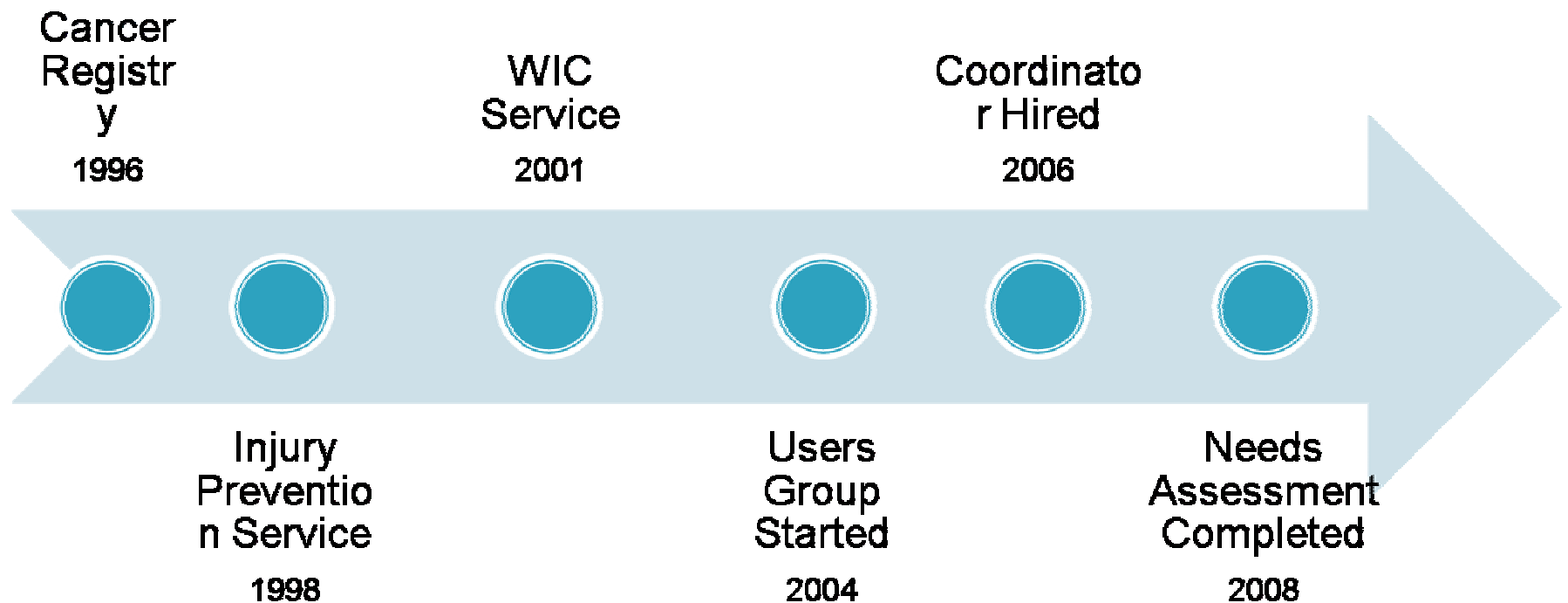
Moving GIS Forward
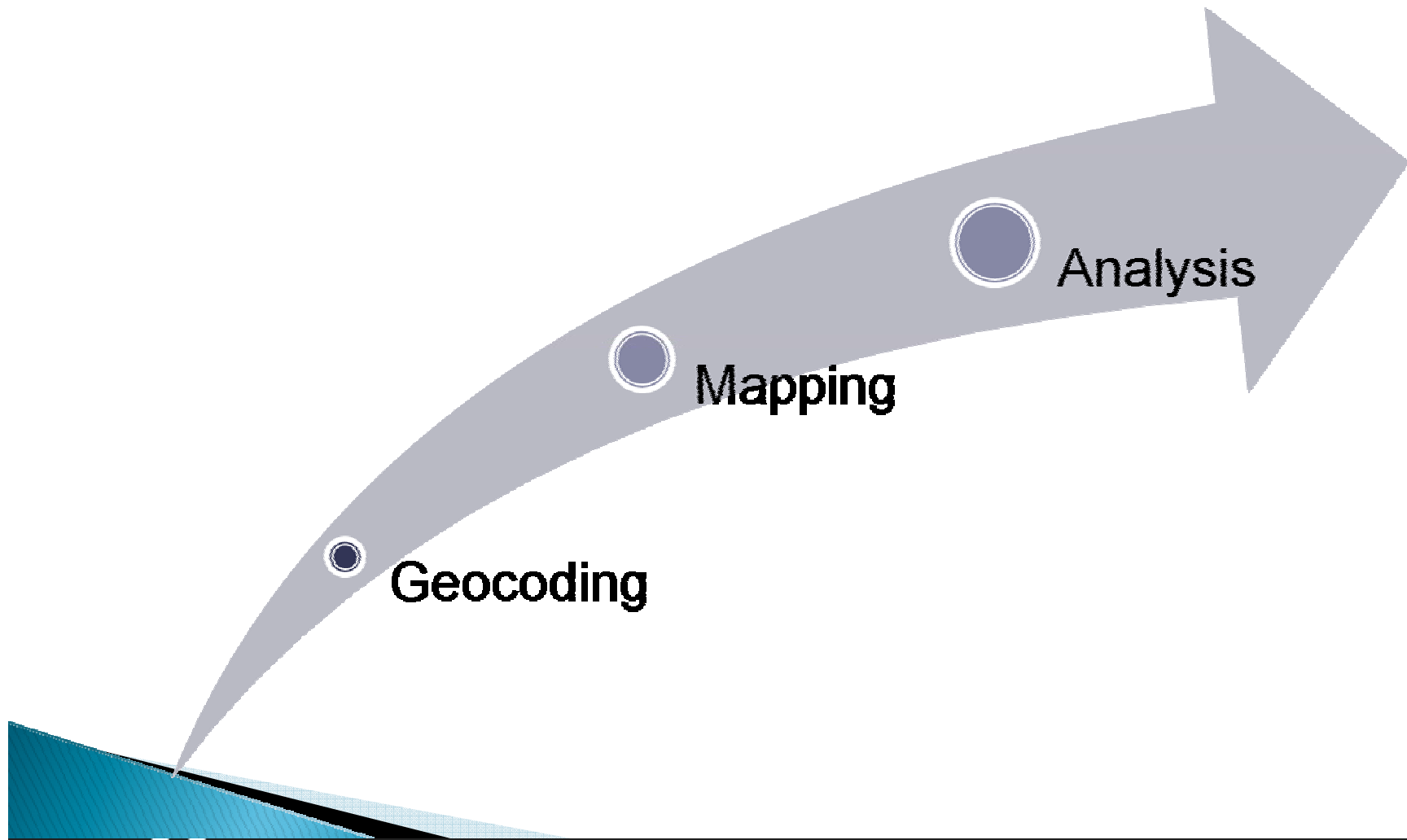
GIS as a tool - Geocoding

- Vital Records
- Hospital Discharge
- Cancer Registry
- Injury Data
- EMS Data
- Health Facilities

GIS as a tool - Mapping

- EMS service areas and stations
- Immunization Coverage
- Health care providers – MDs and DOs, clinics
- Program Staff Regions – DNMs, ARNP, Admin (IT)
- Health indicators
  - State of the State's Health Report – 33 indicators
  - Commissioner's Health Report
  - County Health Profile Report
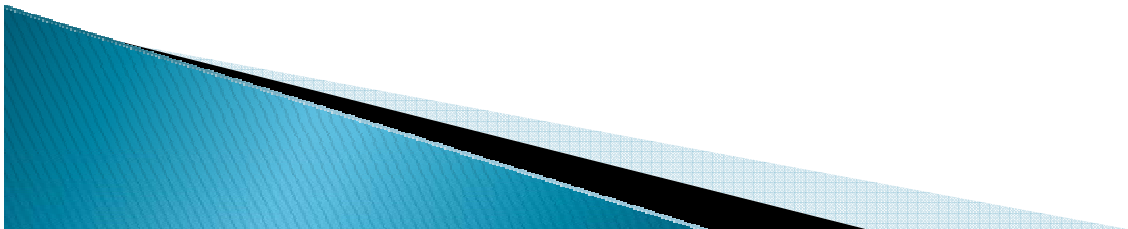
GIS as a tool - Analysis

- EMS time-based service areas – network analysis
- Flow analysis for trauma care
- Access to care
  - Primary care physicians vs. population
  - Prenatal care providers

Enterprise GIS at OSDH

>> Where we are

Enterprise GIS System Progression

2006
- Hired GIS Coordinator
- Offered introductory GIS training

2007
- Centralized GIS software
- Established GIS Advisory Committee

2008
- Published needs assessment
- Designed geodatabase

2009
- Pilot geodatabase
- Implement standards and policies

OSDH GIS Users

- 7 "power" users
- 60 new users
- Licenses:
  - 15 concurrent use licenses
  - A few special extensions and single use licenses

GIS Needs Assessment

▸ Conducted in-house

▸ Duration: October 2006 through July 2008

▸ Goals:

1) Identify current or previous use of maps
2) Identify and document mapping needs
3) Document need for centralized GIS system
4) Educate staff about GIS
5) Inventory software and data

Needs Assessment Stats

- 156 people interviewed
  - 152 OSDH staff
  - 4 outside agencies
- 330+ potential uses of GIS identified
- Extensive review and approval
  - GIS Advisory Committee
  - Health Informatics Council

GIS Advisory Committee

- Guidance and oversight for the GIS system
- Under the umbrella of the Health Informatics Council
- Workgroups include:
  - GIS Strategic Planning
  - GIS Standards and Policies
  - GIS Software Access and Utilization
  - GIS System Hardware Design
  - GIS System Geodatabase Design

OSDH Geodatabase

- Enterprise-level
- Design completed
- Data development in progress
- Next steps:
  - Server setup
  - Data loading and pilot testing

What will be in it?

- Geographic data, not program data
- Base mapping layers (over 100 layers)
  - County boundaries
  - Census tract boundaries
  - Zip code boundaries
  - Road lines
  - Physician office locations
  - Legislative districts
  - Long term care facility locations
  - Schools and school districts
  - Hospitals
  - Libraries
  - …

Purpose of the Geodatabase

▸ Provide central location for geographic data to:

- ◦ Reduce redundant storage of geodata, save disk space
- ◦ Encourage use of consistent, up-to-date geodata; enforce data standards
- ◦ Remove geocoding burden from program staff
- ◦ Control/QA of data access and editing
- ◦ Document metadata

Strategic Planning

》》 Guiding the enterprise GIS

Strategic Planning

▸ Mission and Vision
  ◦ Drafted, in review

▸ SWOT Analysis
  ◦ Drafted and reviewed, due for review again

▸ Goals
  ◦ 1-year goals drafted and in review by workgroups
  ◦ 3-year goals drafted
  ◦ 5-year goals drafted

Vision and Mission

‣ Vision: Geographically enhanced public health data

‣ Mission: To centralize, coordinate and support GIS efforts within OSDH for effective mapping and spatial analysis

SWOT Analysis - Strengths

▸ GIS Coordinator hired
▸ Many GIS Users already
▸ Good GIS software access
▸ GIS Users Group in place, meets monthly
▸ Support/interest for web mapping projects
▸ Legislative interest
▸ Access to training (internal training developed and implemented)
▸ Networking – GIS Day and participation in the larger OK GIS community
▸ Collaboration with other State Agencies
▸ Some financial support in place
▸ Data confidentiality standards in place
▸ Standard map templates developed and implemented
▸ Needs assessment completed
▸ GIS Advisory Committee in place, meets quarterly with motivated workgroups

SWOT Analysis - <u>W</u>eaknesses

▸ Separation from IT, limited server access

▸ Lack of understanding at OSDH of what GIS is and how it can be used

▸ No current GIS standardization

▸ Lack of policies

▸ Budget limitations – no specific GIS budget

▸ Varying levels of buy-in

▸ Lack of QA, future QA will be labor intensive

▸ Current equipment might not support expansion

▸ Not all users are trained

SWOT Analysis - <u>O</u>pportunities

- GIS can help target prevention/program-management efforts, target agency dollars
- Continued collaborations with other agencies
- Interest to support user expansion
- Interest and need for GPS data acquisition
- Benefit outside agencies, reciprocate with data providers/reporters
- Increase staff
- Demonstrate cost-benefits, especially fleet management

SWOT Analysis - Threats

▸ Budget limitations

▸ New commissioner, potential for change

▸ IT infrastructure, potential for reorganization

▸ External job opportunities for GIS professionals could interfere with staff retention

▸ Usage prior to policy/standards implementation, un-checked growth

▸ Lack of confidence in data and GIS products

▸ High demand for GIS products with limited resources

Goals – 1-year

SFY 2009

- Needs Assessment Complete
- Roads Dataset Chosen
- Map Templates Created

SFY 2010

DRAFT

- Geodatabase Implemented
- Geocoding Standards
- More Metadata
- More GIS Training
- Publically Accessible Maps
- GIS Software Use Tracking
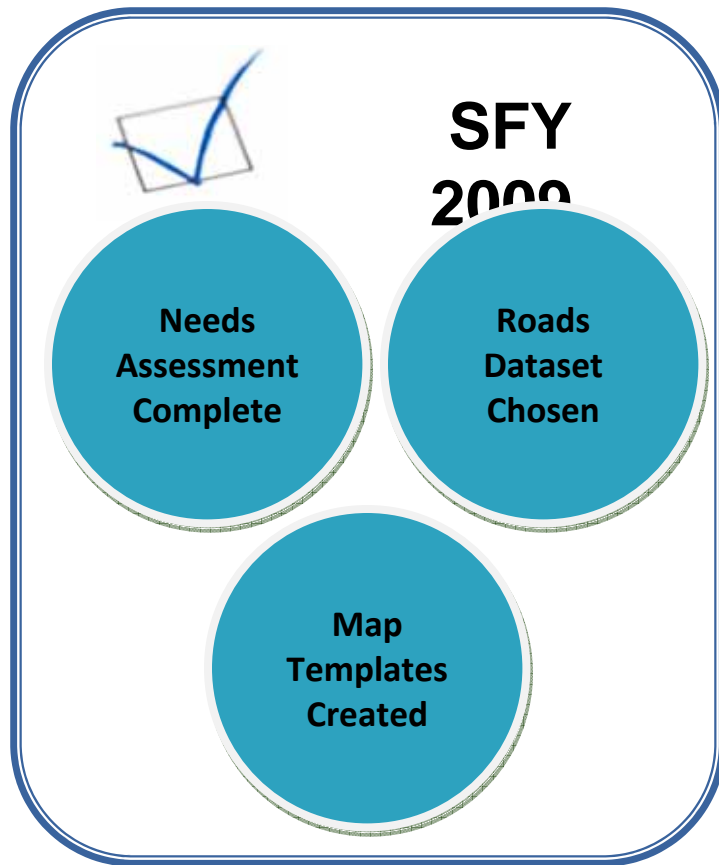
Goals – 3-year

SFY 2010 - 2012

DRAFT

GPS Units Used

GIS Training - Formats

State GI Council

GIS Technician

Multiple GIS Presenters

Map Function in OK2SHARE

Servers Evaluated

Web Map Available to Public

Goals – 5-year

SFY 2010 - 2014

DRAFT

Geodatabase with Data Warehouse

Agency-wide Web Map

GIS Analyst

County Health Departments

More GIS Presenters

Our GIS Work

>> Maps

EMS Services in Oklahoma

Legend

- Ambulance Stations
- Multiple EMS Service Areas Overlap
- Federal Lands
- Counties

Notes: EMS Services are represented to the best of our knowledge as of May 2008. The Service Areas are depicted with a range of colors to distinguish their boundaries. The hatched symbols represent those areas with two or more EMS Services covering the same area.

Data Source: EMS locations and service areas are self-reported to the EMS Division, Protective Health Services, OSDH. They are current as of October 2008.

Created: 03.26.2009

Projection/Coordinate System: USGS Albers Equal Area Conic
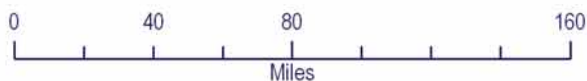
0   40   80   160
Miles

N

Disclaimer: This map is a compilation of records, information and data from various city, county and State offices and other sources, affecting the area shown, and is the best representation of the data available at the time. The map and data are to be used for reference purposes only. The user acknowledges and accepts all inherent limitations of the map, including the fact that the data are dynamic and in a constant state of maintenance.

EMS Division
Medical Facilities Service
Protective Health Services
Oklahoma State Department of Health
Map created by Health Care Information

Oklahoma EMS Coverage Based on Time-to-Service

Legend

- 1 - 5 Minutes from call
- 6 - 10 Minutes from call
- 11 - 20 Minutes from call
- 21+ Minutes from call

Notes: Time to service from initial call is based on driving 65 mph on highways, 45 mph on main roads and 35 mph on rural roads.

A delay of 1 minute is included in this model, which represents the state average time it takes for a responder to enter their vehicle from the time the call comes in.

Data Source: EMS locations and service areas are self-reported to the EMS Division of the Medical Facilities Service at the Oklahoma State Department of Health. Data are current as of October 2008.

Created: 02.03.2009

Projection/Coordinate System: USGS Albers Equal Area Conic

0   40   80   160
Miles

N

EMS Division
Medical Facilities Service
Protective Health Services
Oklahoma State Department of Health
Map created by Health Care Information

SWODA EMS Service Areas

Legend
- EMS Station Location
- County Boundary
- SWODA Boundary
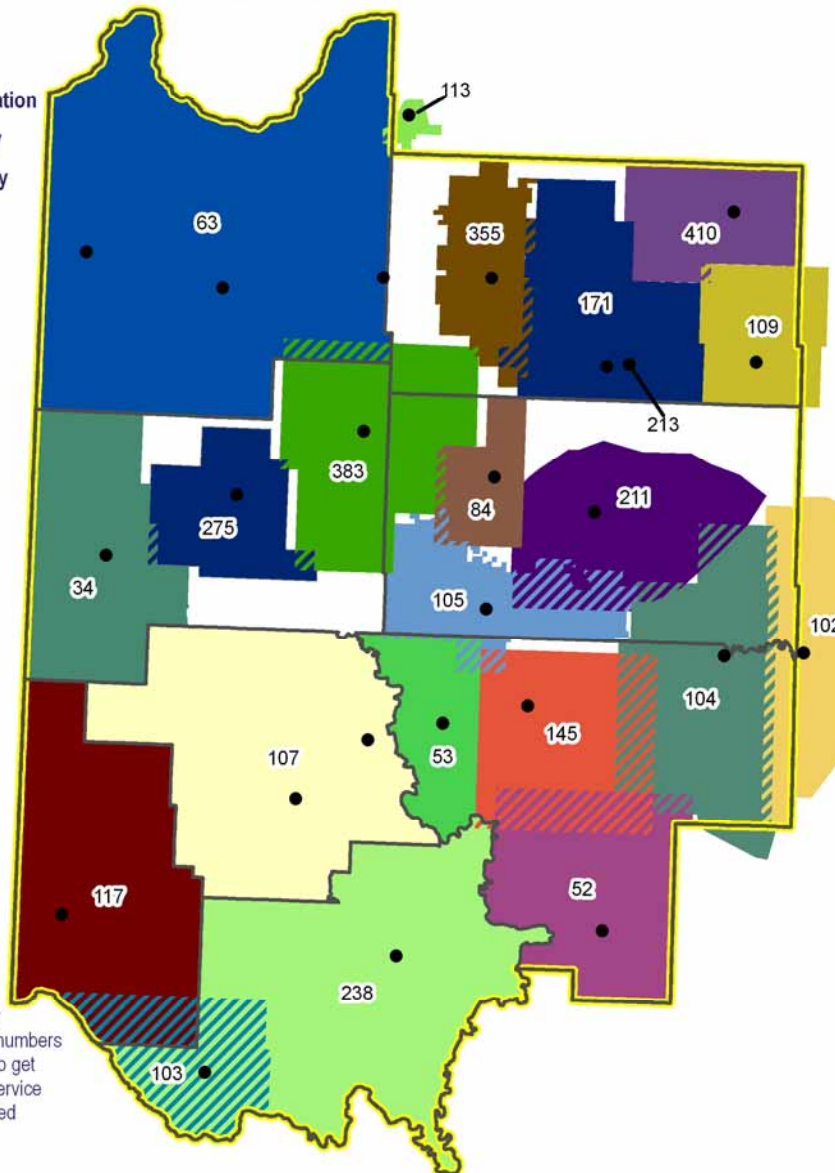
Notes: EMS service areas for SWODA. Reference license numbers from map on attached sheet to get service name. Overlapping service areas are shown with a hatched symbol.

N

Created: 10.13.2008

0 5 10 20 Miles

Projection/Coordinate System: USGS Albers Equal Area Conic

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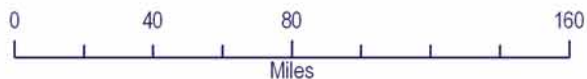
EMS Division
Medical Facilities Service
Protective Health Services
Oklahoma State Department of Health
Map created by Health Care Information

License #	Service Name
34	Erick Ambulance
52	Kiowa County Dist 3 EMS
53	Lone Wolf Community Ambulance
63	Roger Mills Ambulance
84	Burns Flat Ambulance
102	Carnegie Tri-County Municipal Hospital
103	Eldorado EMS - 103
104	Mountain View Gotebo Amb
105	Sentinel City Ambulance Service
107	Greer County Special Ambulance
109	Sinor EMS - Weatherford
113	Leedey Ambulance
117	SW Oklahoma Ambulance Auth
145	Sinor EMS - Hobart
171	Sinor EMS - Clinton
211	Cordell Ambulance
213	Cheyenne & Arapaho EMS
238	Jackson County EMS
275	Sinor EMS- Sayre
355	Butler EMS District
383	Elk City Fire Dept
410	Sinor EMS - Thomas

Senate District 16
EMS Locations and Time to Service

Legend:

- ⊹ EMS Stations
- — Rivers
- Lakes
- Counties
- Senate District 16
- 1 - 5 Minutes from call
- 6 - 10 Minutes from call
- 11+ Minutes from call
- /// No Defined Service

- EMSSTAT- Norman Regional
- Konawa EMS
- Lindsay EMS
- McClain Grady EMS
- Midwest Regional EMS
- Noble Fire Dept
- Pauls Valley Hosp EMS
- REACT EMS
- Stratford Ambulance
- Valley View Hosp EMS
- Wadley's EMS, Inc

Notes: Time to service from initial call is based on driving 65 mph on highways, 45 mph on main roads and 35 mph on rural roads.

A delay of 1 minute is included in this model, which represents the state average time for a responder to enter their vehicle from the time the call comes in.

Data Source: EMS locations and service areas are self reported to the EMS Division, Protective Health Services, OSDH.

Created: 04.23.2009

Projection/Coordinate System: USGS Albers Equal Area Conic
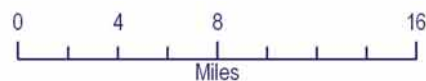
0   4   8   16
Miles

N

Emergency Medical Services Division
Protective Health Services
Oklahoma State Department of Health
Map created by Health Care Information

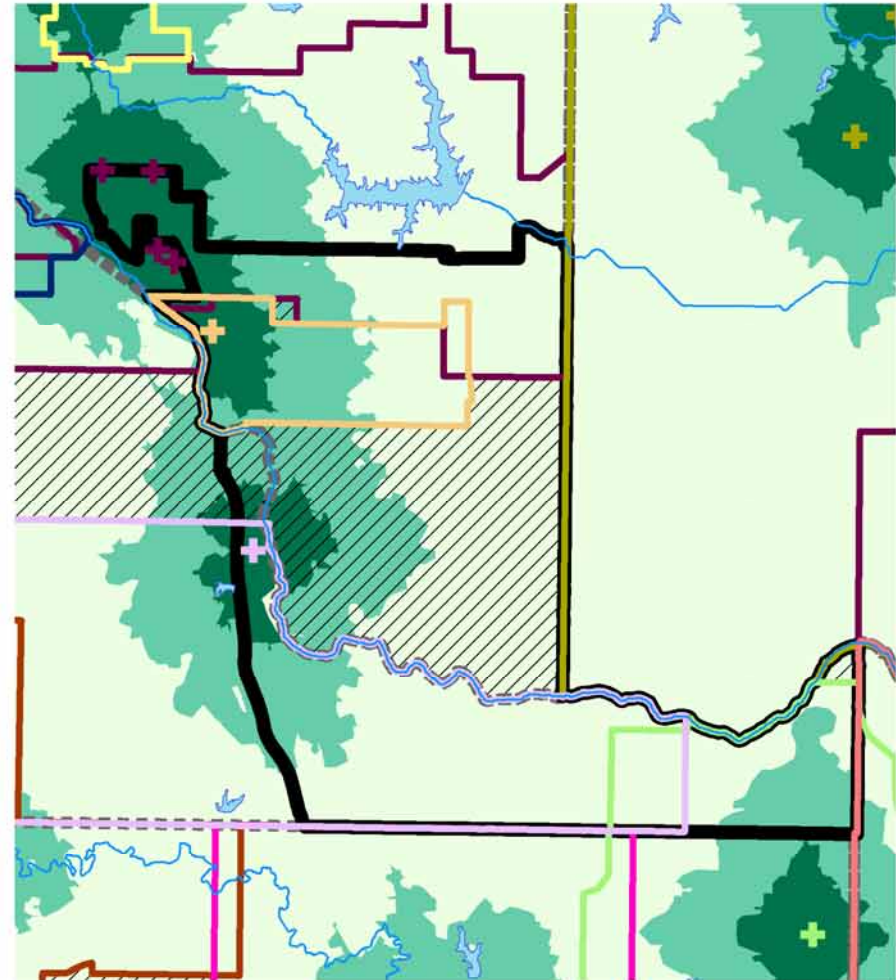# General Flows of Trauma Patient Transports between Oklahoma Hospitals, 2005
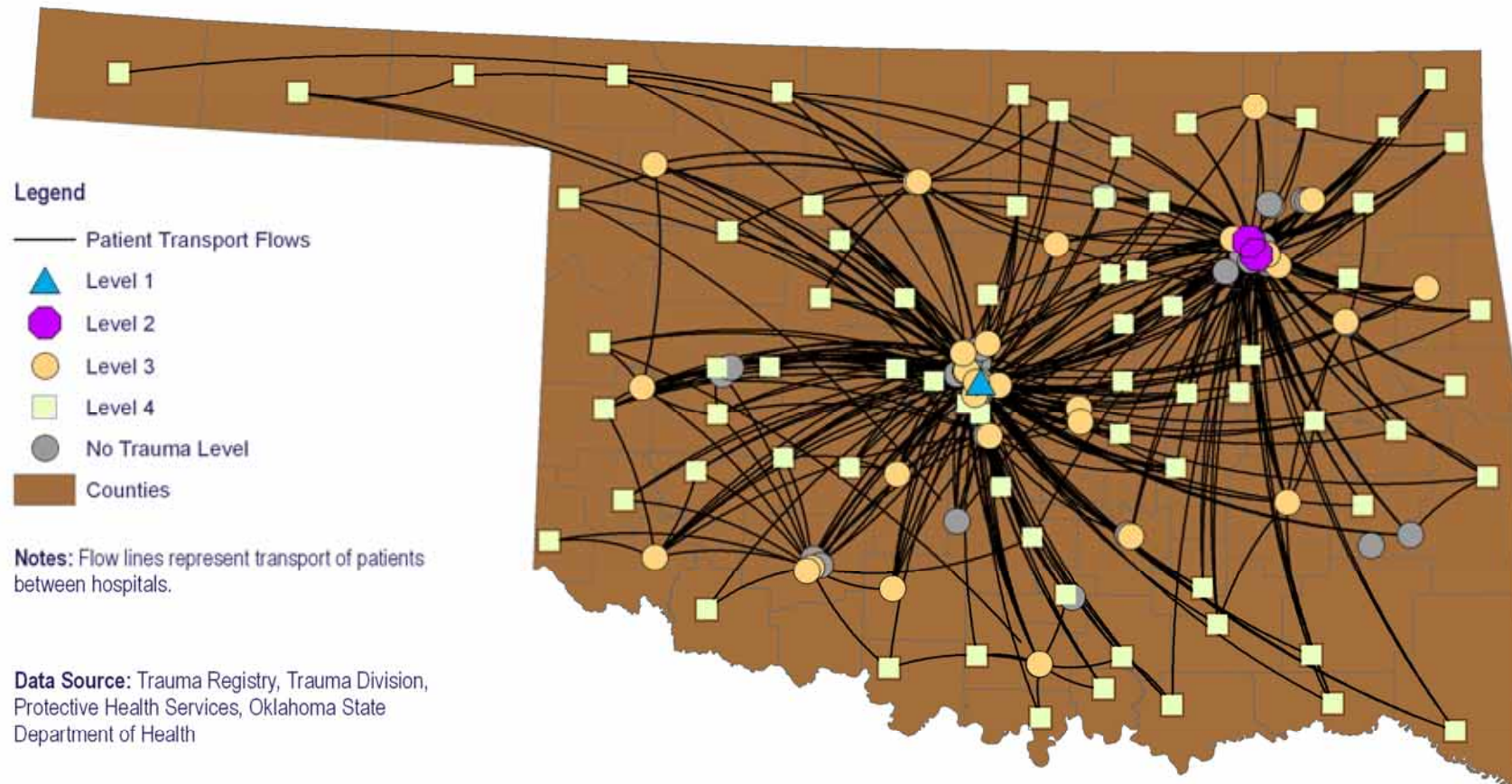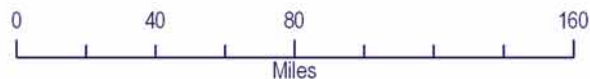
Legend

— Patient Transport Flows

▲ Level 1

⬣ Level 2

○ Level 3

▢ Level 4

● No Trauma Level

▮ Counties

Notes: Flow lines represent transport of patients between hospitals.

Data Source: Trauma Registry, Trauma Division, Protective Health Services, Oklahoma State Department of Health

Created: 05.15.2007

Projection/Coordinate System: USGS Albers Equal Area Conic

0   40   80   160
Miles

N

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Health Care Information Division
Center for Health Statistics
Oklahoma State Department of Health

Primary Stroke Centers and Secondary Stroke Facilities in Oklahoma
April 2009

Legend

- Primary Stroke Center
- Secondary Stroke Facility
- Counties

Data Source:
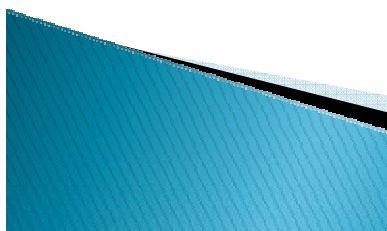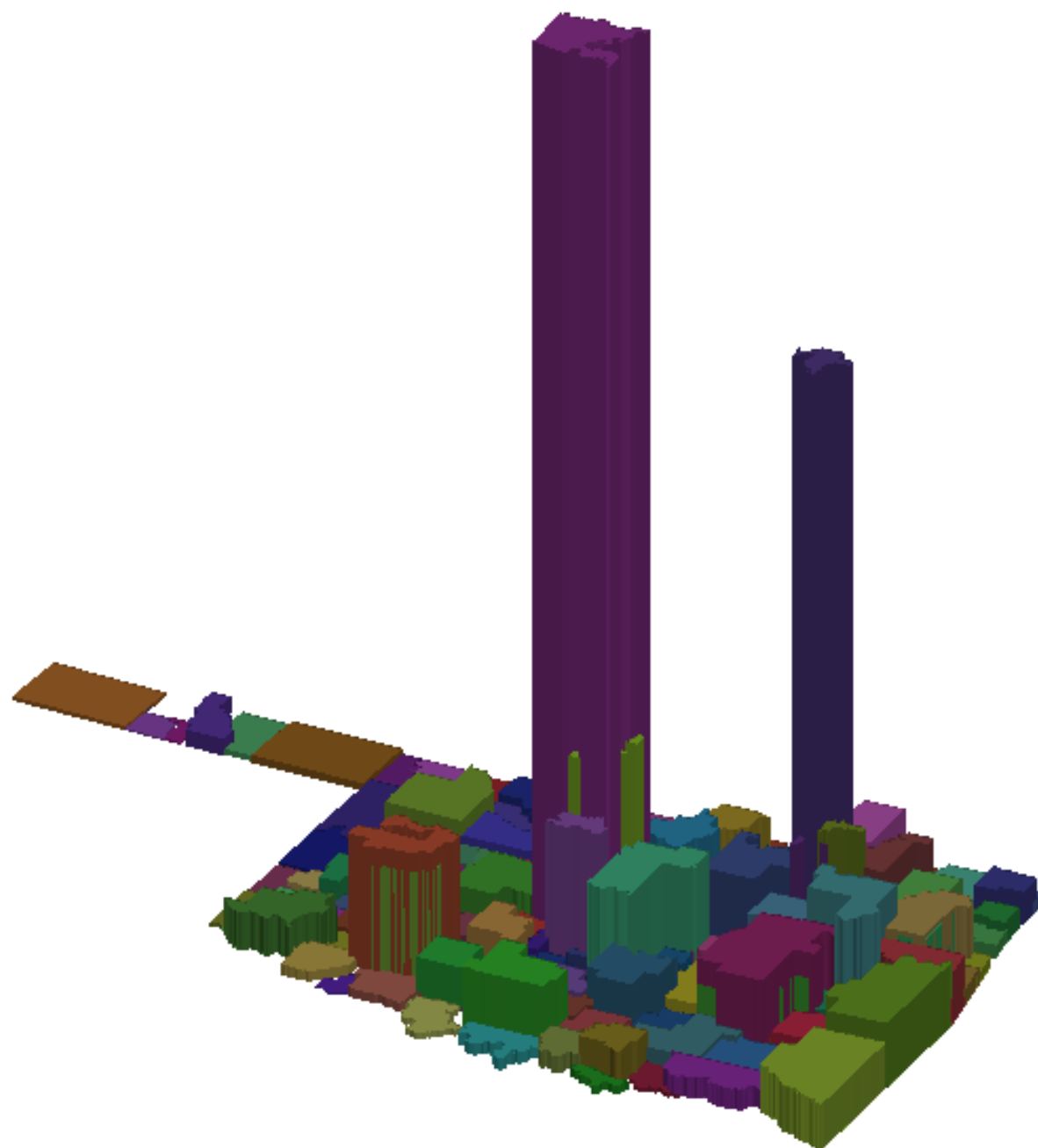Medical Facilities Service, OSDH
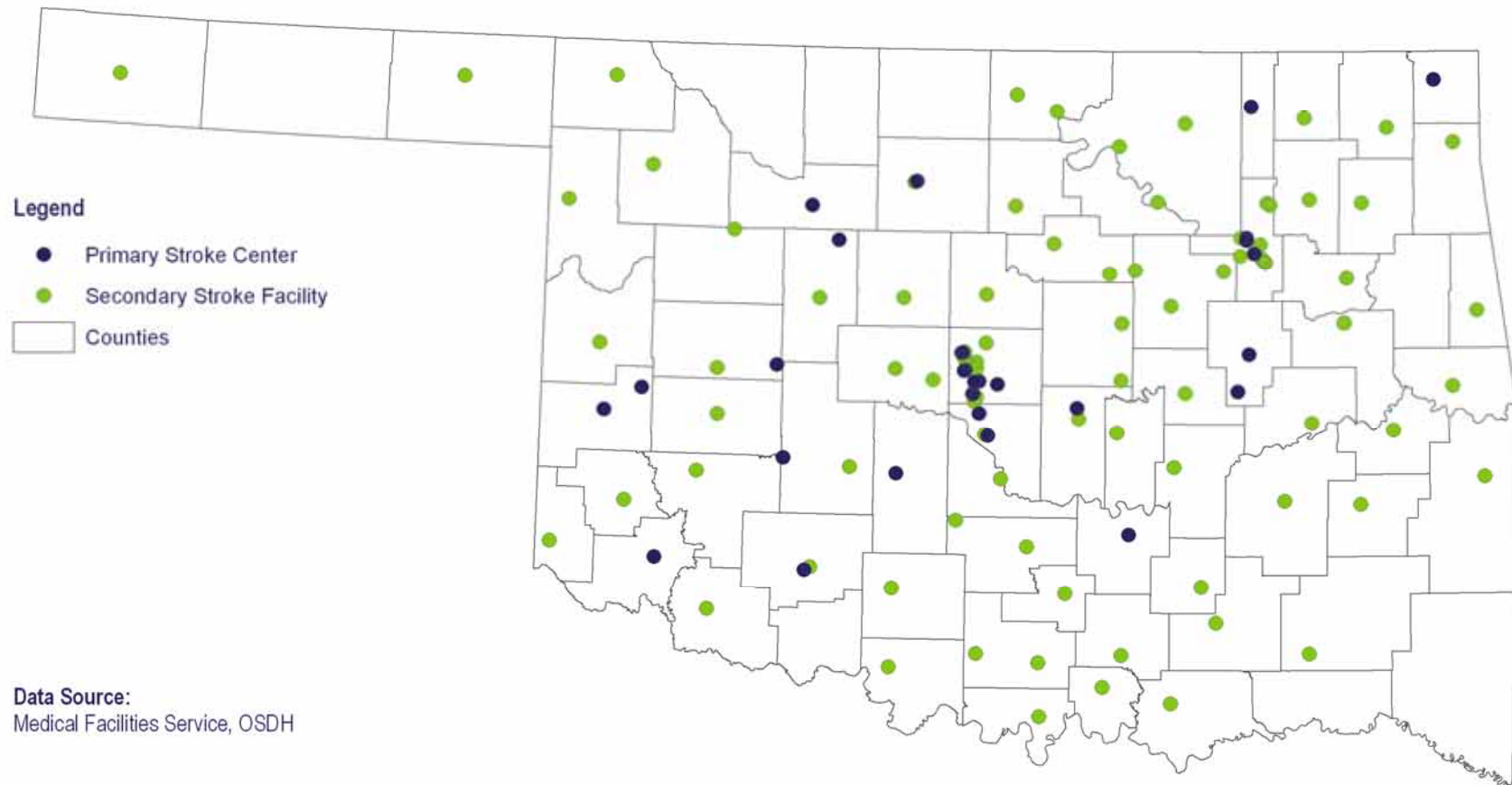
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Projection/Coordinate System: USGS Albers Equal Area Conic
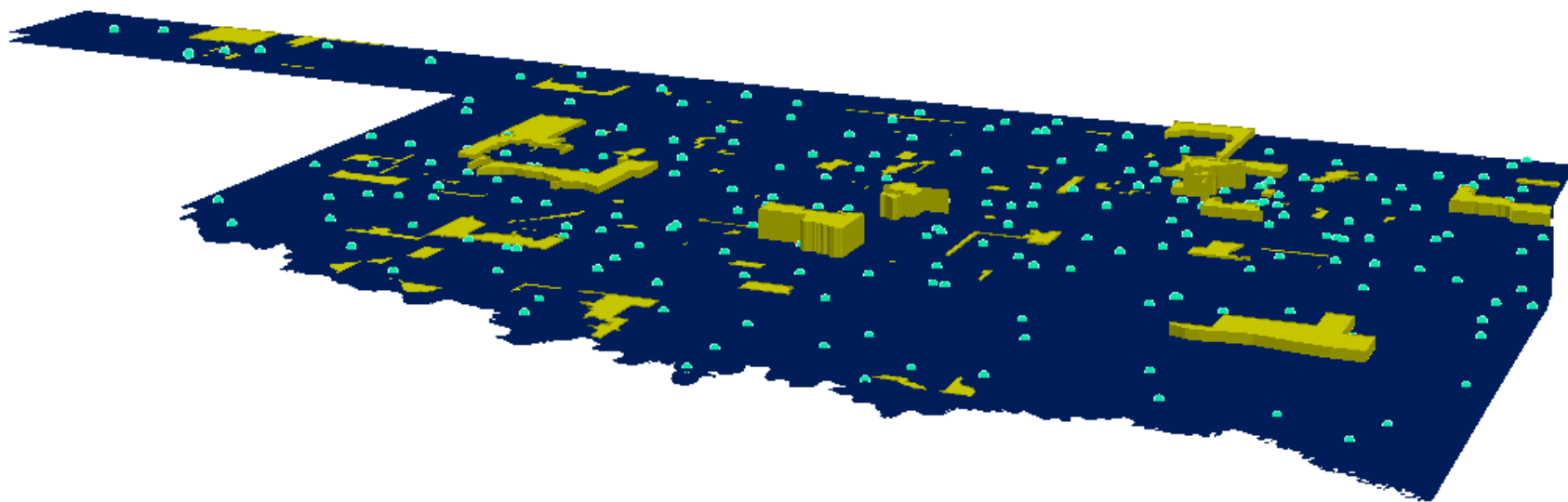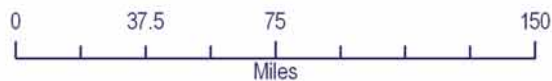
0   37.5   75   150
Miles

N

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Medical Facilities Service
Protective Health Services
Oklahoma State Department of Health
Map created by Health Care Information

Density of Birth Attendants - Physicians and Midwives
Oklahoma, 2006

Density of providers
per square mile

- 0.006 - 0.057
- 0.058 - 0.144
- 0.145 - 0.276
- 0.277 - 0.446
- 0.447 - 0.659
- 0.660 - 0.891
- 0.892 - 1.193
- 1.194 - 1.601
- Counties

Data Source: Oklahoma Birth Records, 2006;
Oklahoma Medical Licensing Board, 2006;
Oklahoma Osteopathic Board

Created: 09.12.2008

Projection/Coordinate System: USGS Albers Equal Area Conic

0   25   50   100
Miles

N

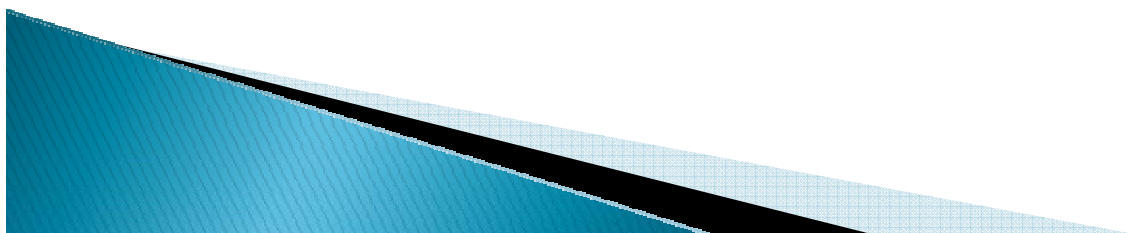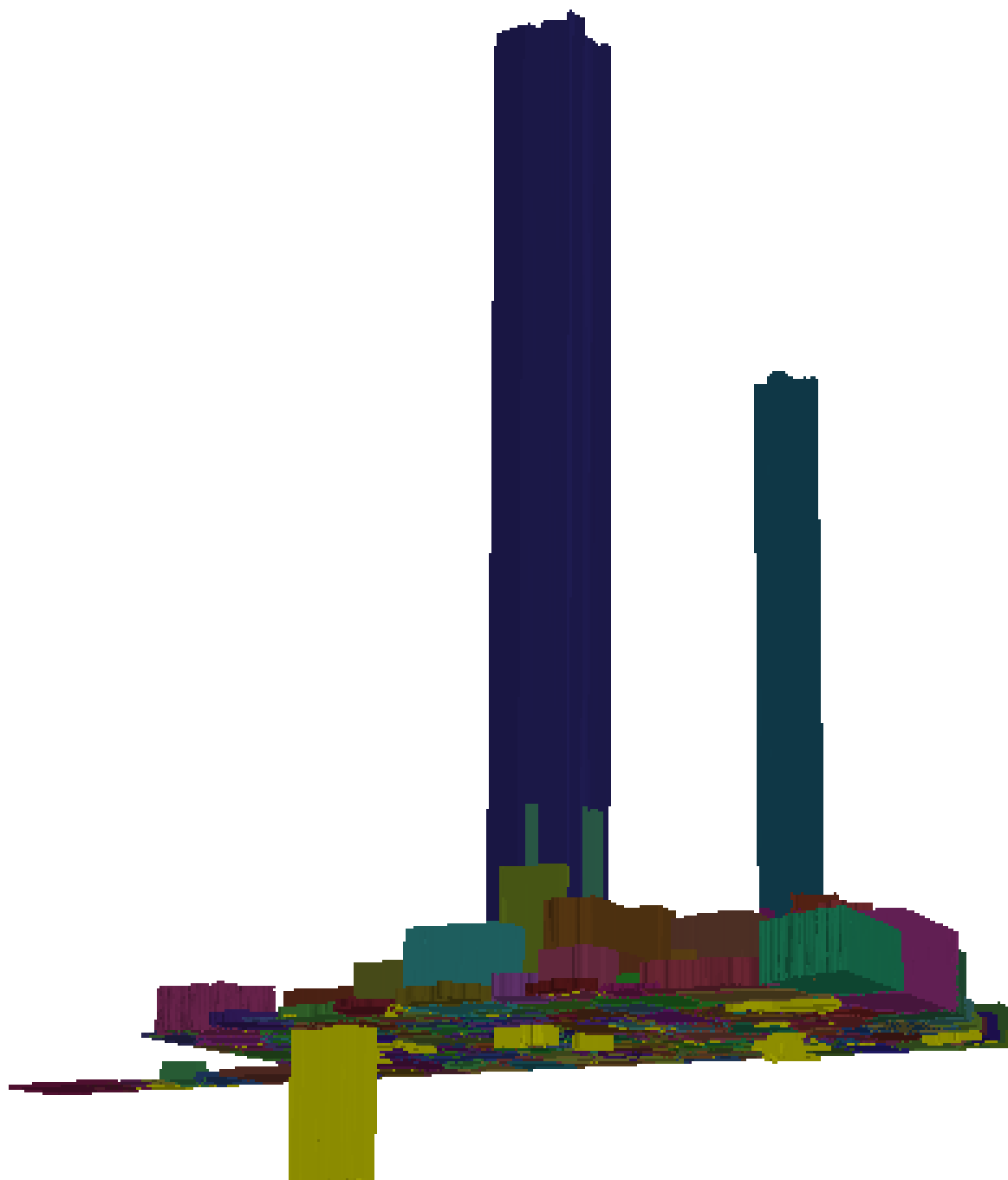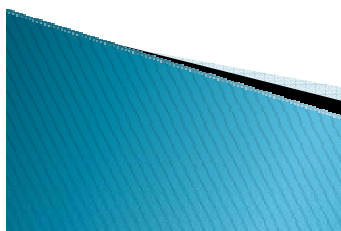Disclaimer: This map is a compilation of records, information and data from various
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Health Care Information Division
Center for Health Statistics
Oklahoma State Department of Health

Oklahoma 4:3:1:3:3 Coverage Rates by Zip Code, 2005 Birth Cohort

**Percent of Children
Up-to-Date by 24
Months of Age**

- **■** < 70%
- **■** 70.1% - 79.9%
- **■** 80% - 89.9%
- **■** 90% - 100%
- **■** No Data

State average rate = 80.3%

Data Source: Oklahoma State Immunization
Information System, Oklahoma State Department of Health

Created: 05.09.2008

Projection/Coordinate System: USGS Albers Equal Area Conic

0   40   80   160
Miles

N

Disclaimer: This map is a compilation of records, information and data from various
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state of maintenance.

Immunization Service
Disease & Prevention Services
Oklahoma State Department of Health
Created by Health Care Information

# Oklahoma 4:3:1:3:3 Zip Code Level Immunization Coverage by Doses, 2005 Birth Cohort

Percent of Children Up-to-Date or Missing Only One Dose by 24 Months of Age

- 🟥 < 70%
- 🟨 70.1% - 79.9%
- 🟦 80% - 89.9%
- 🟦 90% - 100%
- ⬜ No Data

State average rate = 92.0%

Data Source: Oklahoma State Immunization Information System (OSIIS), Oklahoma State Department of Health

Created: 05.09.2008

Projection/Coordinate System: USGS Albers Equal Area Conic

0   40   80   160
Miles

N

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Immunization Service
Disease & Prevention Services
Oklahoma State Department of Health
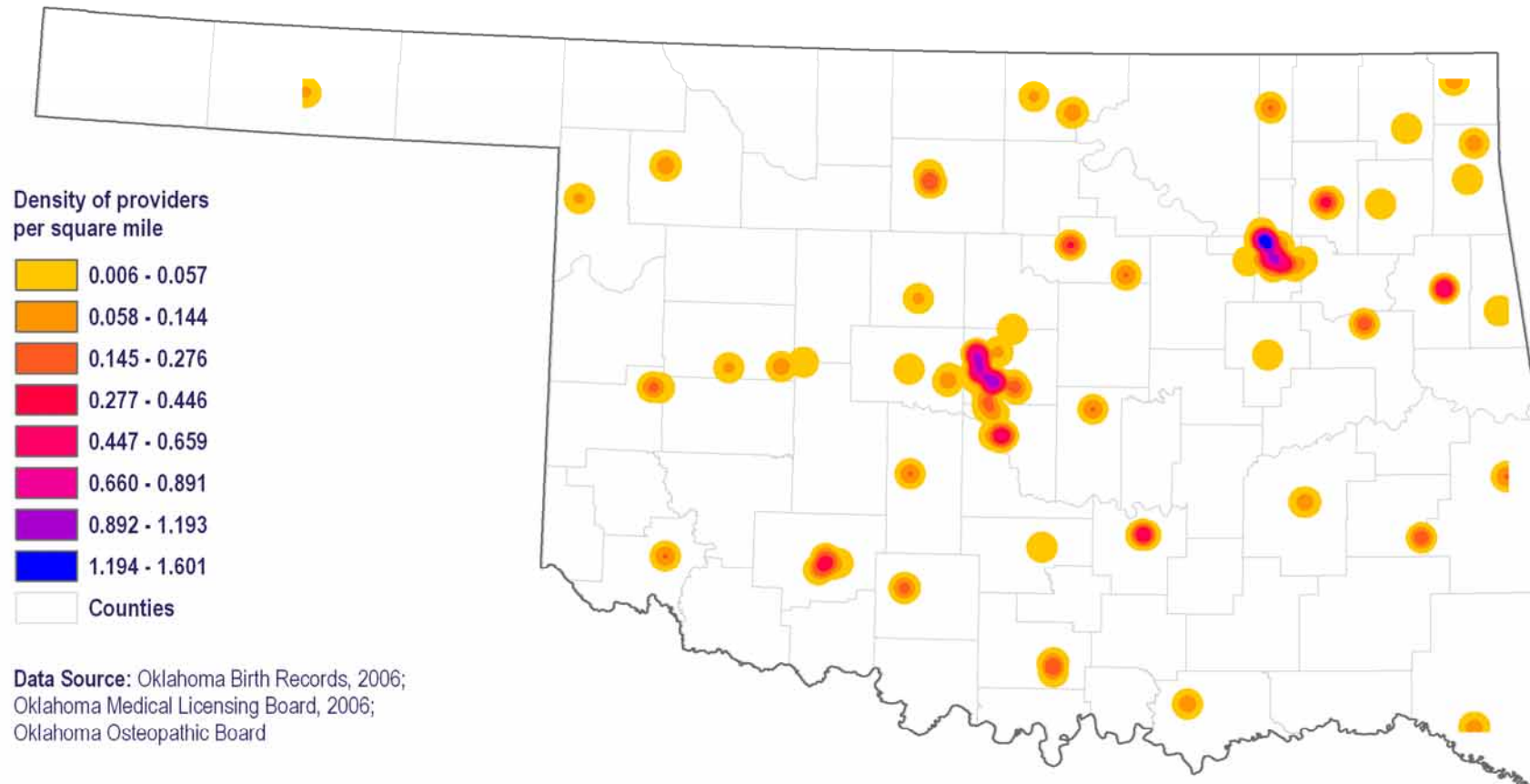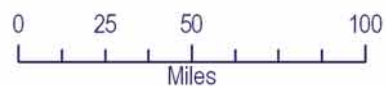Created by Health Care Information

OSDH Information Technology Technical Support and Regional Map

Legend - Technical Support

- ★ **Citrix Sites**
- • **County Health Departments**
- **Central Tech Support**
- **Chris Fleming**
- **Chris Gainey**
- **ChrisAG and ShaneL**
- **Keith Grubb**
- **Pat Langham**
- **Shane Loudon**

LIST OF CITRIX SITES:
1. Boise City - Cimarron County - WIC
2. Shattuck - Newman Memorial Hospital - WIC
3. Cheyenne - Roger Mills Country Memorial Hospital - WIC
4. Norman - Health for Better Babies - FP
5. Seiling - Seiling Municipal Hospital - WIC
6. Tulsa - Neighbors Along The Line - WIC
7. Bartlesville - Tri City Tech - Family Care Services - FP
8. Bartlesville - Family Care Services - FP
9. Jay - Parent Child Connections - OSU Extension Office - FP
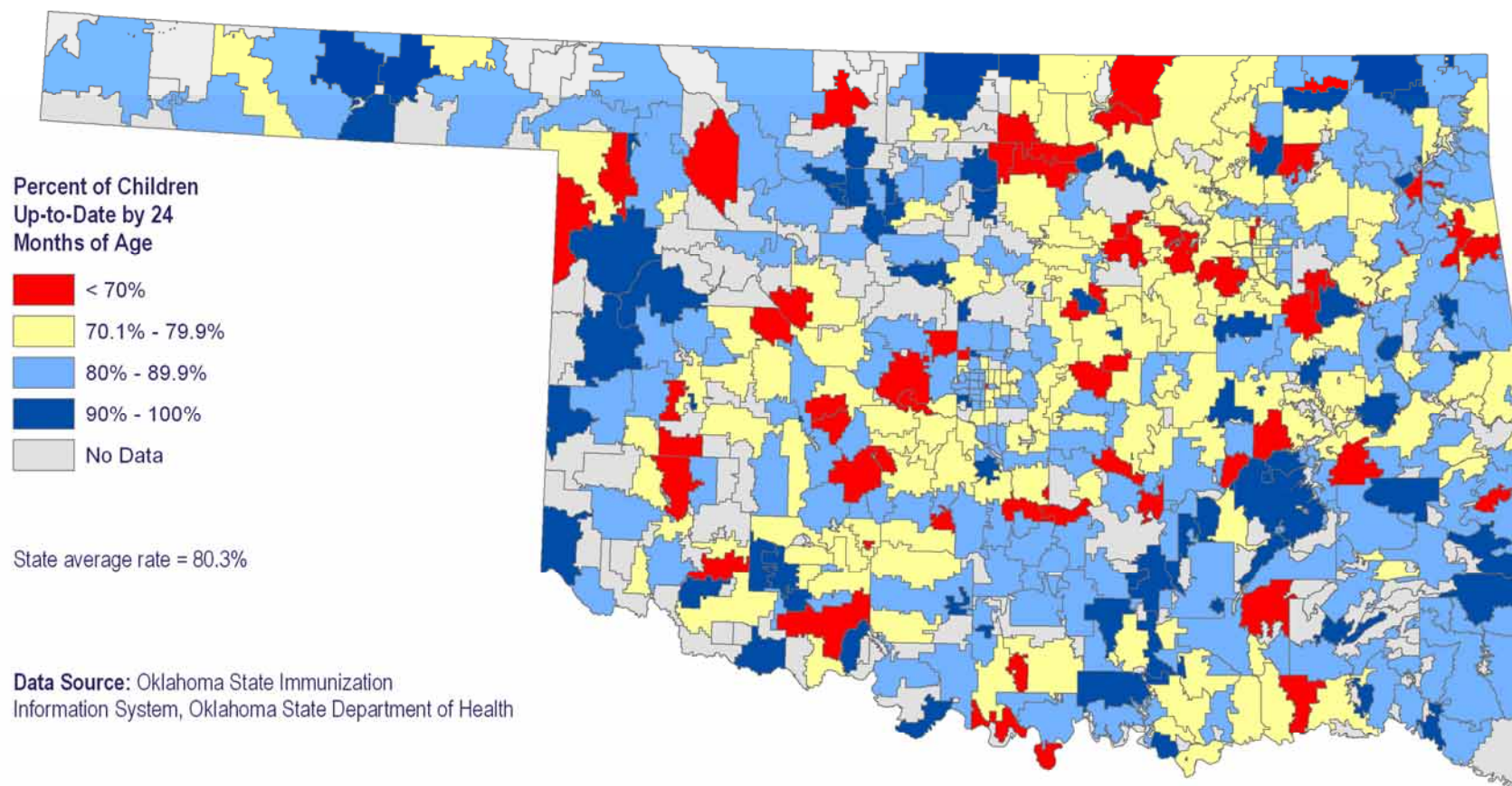
0   50   100   200
Miles

N

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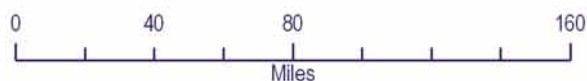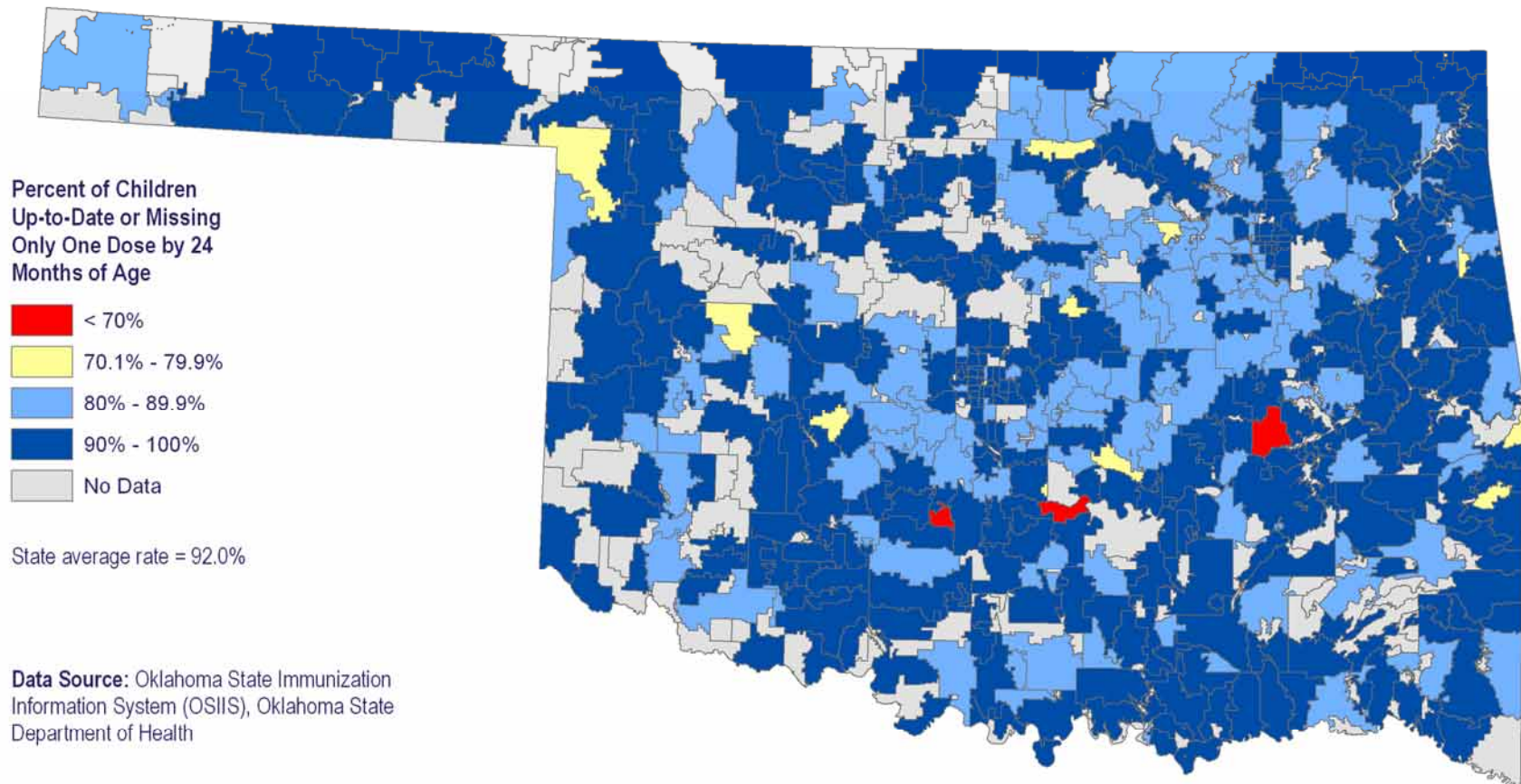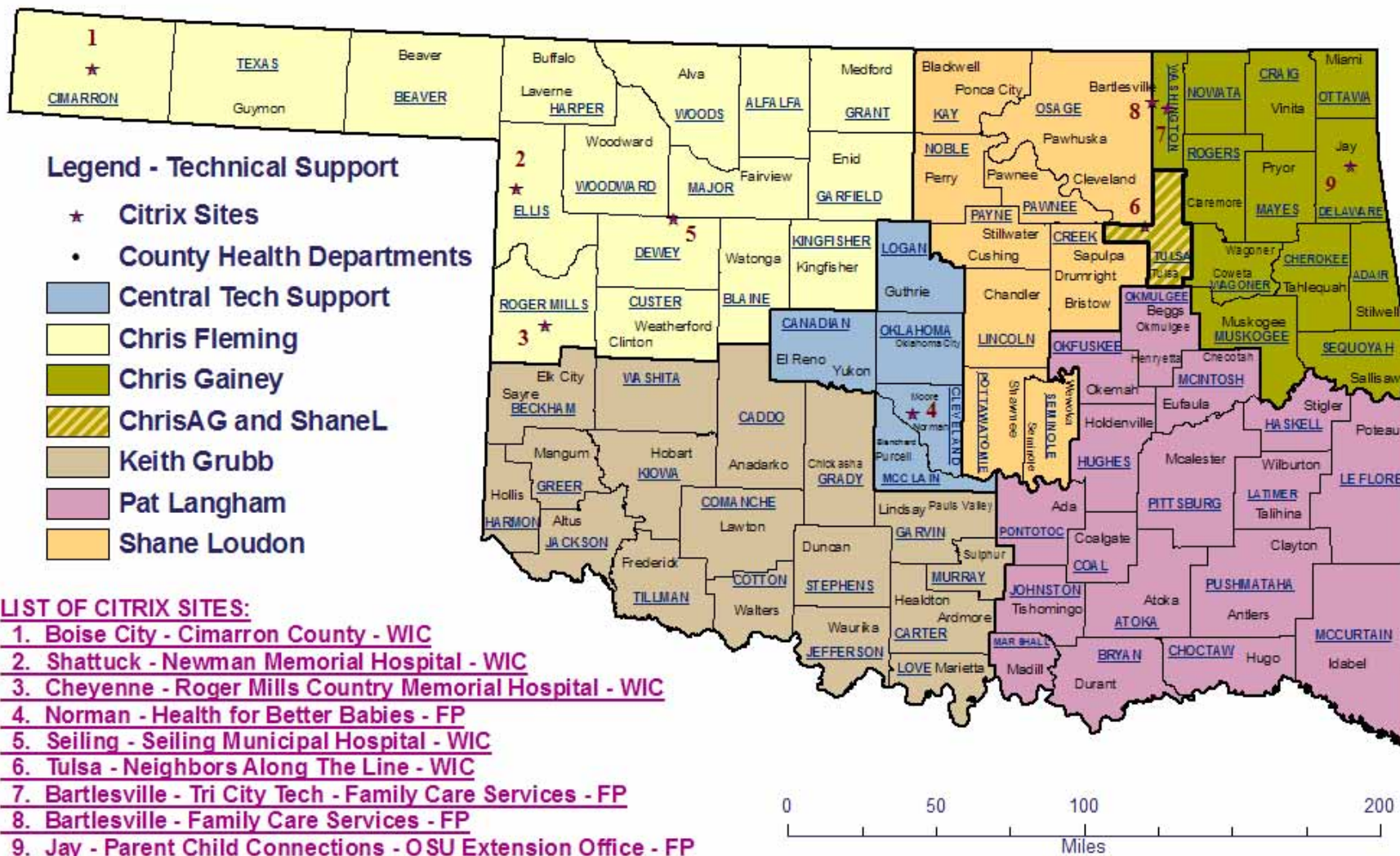
Information Technology Services
Administrative Services
Oklahoma State Department of Health

County labels on map:
CIMARRON, TEXAS, Guymon, Beaver, BEAVER, Buffalo, HARPER, Laverne, Alva, WOODS, ALFALFA, Medford, GRANT, Blackwell, Ponca City, KAY, Bartlesville, OSAGE, Pawhuska, NOWATA, CRAIG, Vinita, OTTAWA, Miami, WASHINGTON, Woodward, WOODWARD, MAJOR, Fairview, Enid, Perry, GARFIELD, NOBLE, Pawnee, Cleveland, PAWNEE, ROGERS, Claremore, Pryor, MAYES, Jay, DELAWARE, ELLIS, DEWEY, Watonga, KINGFISHER, Kingfisher, LOGAN, Stillwater, Cushing, CREEK, Sapulpa, Drumright, TULSA, Tulsa, Wagoner, WAGONER, Coweta, Tahlequah, CHEROKEE, ADAIR, Stilwell, ROGER MILLS, CUSTER, Weatherford, Clinton, BLAINE, CANADIAN, El Reno, Yukon, OKLAHOMA, Oklahoma City, Guthrie, Chandler, Bristow, LINCOLN, OKFUSKEE, Henryetta, OKMULGEE, Beggs, Okmulgee, Muskogee, MUSKOGEE, Checotah, SEQUOYAH, Sallisaw, Elk City, Sayre, BECKHAM, WASHITA, CADDO, POTTAWATOMIE, Shawnee, SEMINOLE, Wewoka, Okemah, HUGHES, MCINTOSH, Eufaula, Stigler, HASKELL, Poteau, LE FLORE, Mangum, Hobart, KIOWA, Anadarko, Chickasha, GRADY, Blanchard, Purcell, MCCLAIN, CLEVELAND, Moore, Norman, Seminole, Holdenville, Mcalester, Wilburton, LATIMER, Talihina, GREER, Hollis, Altus, HARMON, JACKSON, COMANCHE, Lawton, Lindsay, Pauls Valley, GARVIN, Ada, PONTOTOC, PITTSBURG, Atoka, PUSHMATAHA, Antlers, Clayton, Frederick, TILLMAN, Walters, COTTON, STEPHENS, Duncan, Sulphur, MURRAY, Healdton, Ardmore, JOHNSTON, Tishomingo, Coalgate, COAL, ATOKA, CHOCTAW, Hugo, MCCURTAIN, Idabel, Waurika, CARTER, JEFFERSON, LOVE, Marietta, MARSHALL, Madill, Durant, BRYAN

OSDH ARNPs in Oklahoma by County
April 2009

Legend

- NO ARNPs
- Betsy Babler-Schrader
- Cynthia Baker*
- Sheree Caldwell
- Patti Chamberlain
- Katherine Choate*
- Nina Hallum
- Diana Hardwick
- Virginia Lindsey*
- Diane McCright
- Pamela McCray
- Barbara McEndree
- Suzanne Rodgers
- P. Deniece Schwarz
- Kim Short*
- Voye Lynne Stone
- Ellen Trantham
- Teresa Tucker
- Donna White

- Barbara Farley
- Cleo Hightower
- Deborah Farley*
- Deborah Mayo*
- Estelle Ferguson
- Lynda Byrd
- Nancy Dantzler
- Pamela Catalano*
- Pamela Lipscomb
- Sheree Caldwell
- Theresa Cox
- Patrecia Fite*
- Ruth Walker
- Tina Ball

(*) Indicates Pediatric Nurse Practitioners
(1 or 2) Indicates the number of ARNPS whose duty station is at that county

Maternal & Child Health Service
Oklahoma State Department of Health

Percent of Adults with Body Mass Index (BMI) Greater Than or Equal to 30.0 (Obese), 2004 - 2006
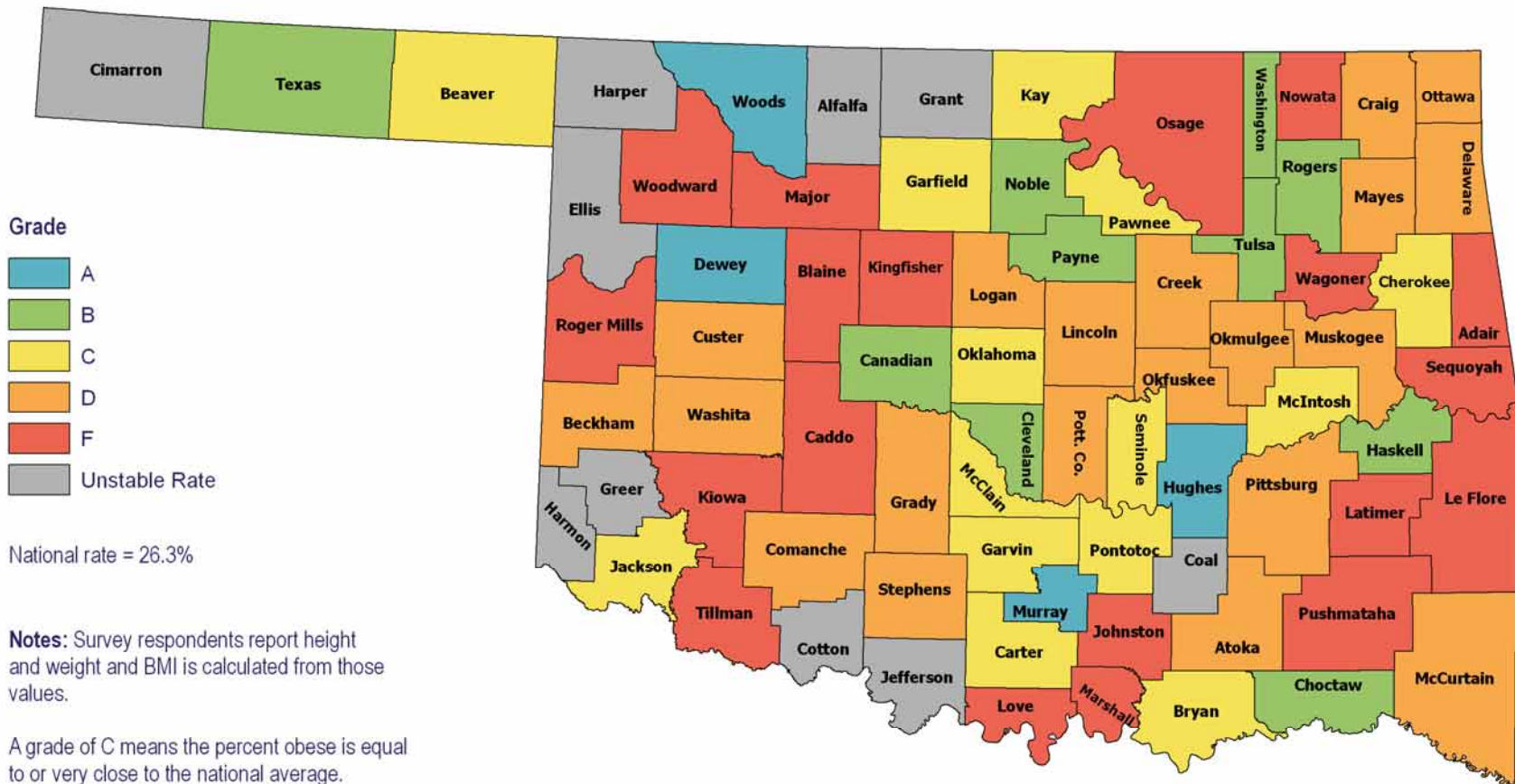
Grade

- A
- B
- C
- D
- F
- Unstable Rate

National rate = 26.3%

Notes: Survey respondents report height and weight and BMI is calculated from those values.
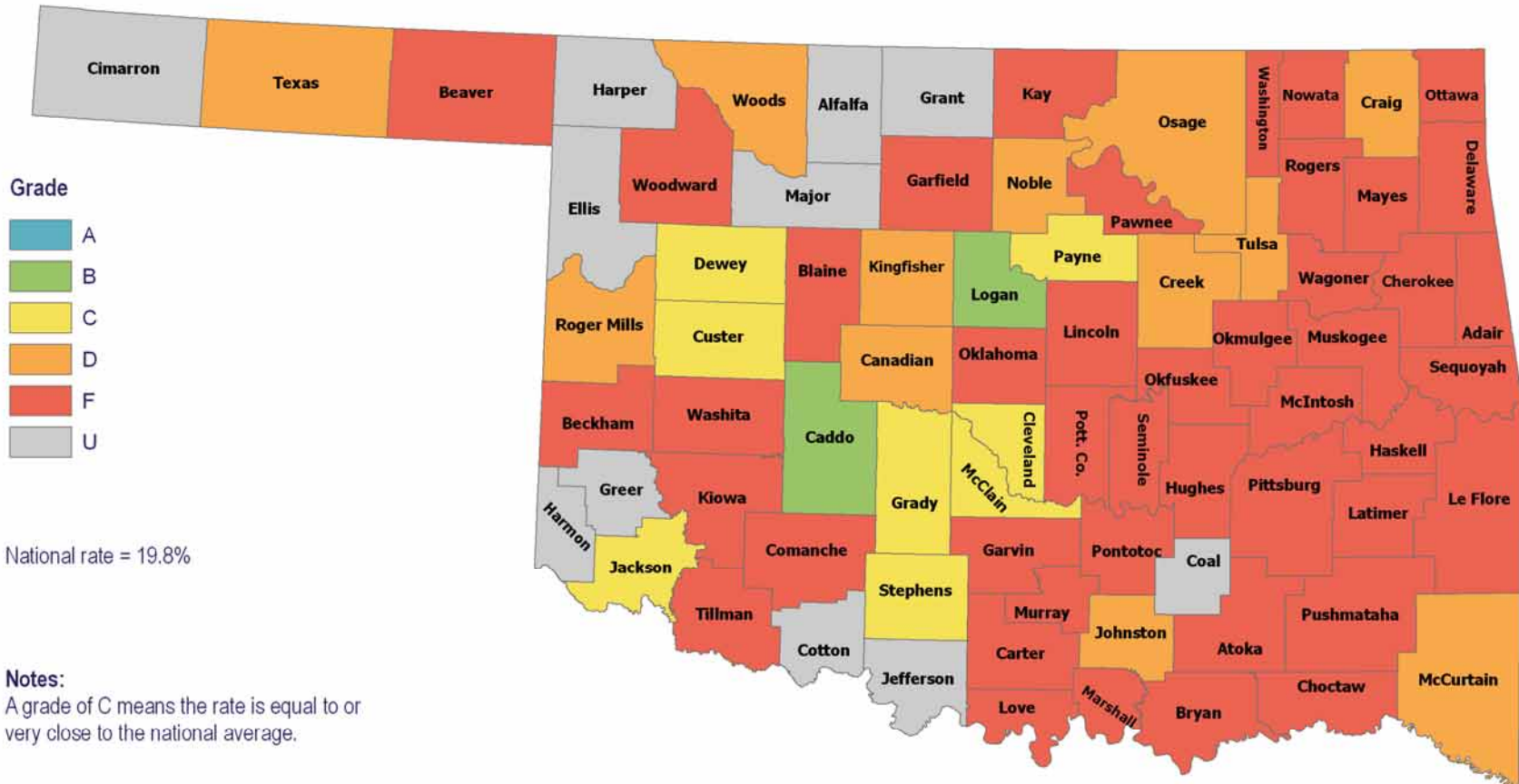
A grade of C means the percent obese is equal to or very close to the national average.

Data Source: Behavioral Risk Factor Surveillance System, OSDH

Created: 12.05.2008

Projection/Coordinate System: USGS Albers Equal Area Conic

N

Health Care Information Division
Center for Health Statistics
Oklahoma State Department of Health

Percent of Adults Who Are Current Smokers, 2004 - 2006

Grade

- A
- B
- C
- D
- F
- U

National rate = 19.8%

Notes:
A grade of C means the rate is equal to or very close to the national average.

Data Source: Behavioral Risk Factor Surveillance System, OSDH

Created: 11.07.2008

Projection/Coordinate System: USGS Albers Equal Area Conic

N

Health Care Information Division
Center for Health Statistics
Oklahoma State Department of Health

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    http://gis.health.ok.gov

    http://www.health.ok.gov/ok2share