The Importance of Reporting Notifiable Conditions and the Surveillance, Control and Prevention that Follows

Juan Rodriguez, MPH
Chief Epidemiologist
Denton County
Health Department

Objectives

- Define Epidemiology
- Surveillance and Disease Reporting
- Outbreak Investigations
- Interviewing techniques
- Outbreak Exercise

Epidemiology

- Epidemiology is the study of the causes and distribution of disease in a community and the application of this study to the control of health problems.
  - We like to count things
  - Disease occurrence is generally not random, and can be predicted
    - Who?
    - What?
    - Where?
    - When?
    - Why?
    - What next?

What does this actually mean for public health?

- Disease Prevention and Control
- Outbreak Investigations
- Monitor trends and clusters
- Epi data can lead to intervention to minimize or eliminate the affects of a disease or other health condition.

Who is Responsible for Reporting?

- School Nurses
- Physicians, dentists, nurses
- Medical examiners
- Hospital administrators
- Nursing home administrators
- Laboratory directors
- Day care center directors
- Hospital infection control practitioners
- Any person having knowledge that a person is suspected of having a reportable disease or health condition

What are Notifiable Conditions?

- Any disease or condition that is required to be reported under the Texas Administrative Code.
- Any outbreak, exotic disease or unusual group expression of illness which may be a public health concern.

DENTON COUNTY HEALTH DEPARTMENT

Texas Notifiable Conditions

Unless noted by *, report to Denton County Health Department
Juan Rodriguez, MPH, Chief Epidemiologist, (940)349-2916
Jasmine Cluck, MPH, Epidemiology Investigator, (940)349-2919
(940)349-5078 confidential fax

A – I	When to Report	I – Y	When to Report
*Acquired immune deficiency syndrome (AIDS)[1, 2]	Within 1 week	Influenza, Novel[2]	Call Immediately
Amebiasis[2]	Within 1 week	*Lead, child blood, any level & adult blood, any level[4]	Call/Fax Immediately
Amebic meningitis and encephalitis[2]	Within 1 week	Legionellosis[2]	Within 1 week
Anaplasmosis[2]	Within 1 week	Leishmaniasis[2]	Within 1 week
Anthrax[2, 5]	Call Immediately	Listeriosis[2, 5]	Within 1 week
Arbovirus infection[2, 6]	Within 1 week	Lyme disease[2]	Within 1 week
*Asbestosis[7]	Within 1 week	Malaria[2]	Within 1 week
Babesiosis[2]	Within 1 week	Measles (rubeola)[2]	Call Immediately
*Botulism (adult and infant)[2, 5, 8]	Call Immediately	Meningococcal infections, invasive[2, 5]	Call Immediately
Brucellosis[2, 5]	Within 1 work day	Multi-drug-resistant *Acinetobacter* (MDR-A)[2, 10]	Call Immediately
Campylobacteriosis[2]	Within 1 week	Mumps[2]	Within 1 week
*Cancer[11]	See rules[11]	Pertussis[2]	Within 1 work day
Carbapenem resistant *Enterobacteriaceae* (CRE)[2, 12]	Call Immediately	*Pesticide poisoning, acute occupational[13]	Within 1 week
Chagas' disease[2]	Within 1 week	Plague (*Yersinia pestis*)[2, 5]	Call Immediately
*Chancroid[1]	Within 1 week	Poliomyelitis, acute paralytic[2]	Call Immediately
Chickenpox (varicella)[14]	Within 1 week	Poliovirus infection, non-paralytic[2]	Within 1 work day
*Chlamydia trachomatis infection[1]	Within 1 week	Q fever[2]	Within 1 work day
*Contaminated sharps injury[15]	Within 1 week	Rabies, human[2]	Call Immediately
*Controlled substance overdose[16]	Call Immediately	Relapsing fever[2]	Within 1 week
Creutzfeldt-Jakob disease (CJD)[2]	Within 1 week	Rubella (including congenital)[2]	Within 1 work day
Coronavirus, novel causing severe acute respiratory disease[2, 17]	Call Immediately	Salmonellosis, including typhoid fever[2]	Within 1 week
Cryptosporidiosis[2]	Within 1 week	Shigellosis[2]	Within 1 week
Cyclosporiasis[2]	Within 1 week	*Silicosis[18]	Within 1 week
Cysticercosis[2]	Within 1 week	Smallpox[2]	Call Immediately
*Cytogenetic results (fetus and infant only)[19]	See rules[19]	*Spinal cord injury[20]	Within 10 work days
Dengue[2]	Within 1 week	Spotted fever group rickettsioses[2]	Within 1 week
Diphtheria[2]	Call Immediately	*Staph. aureus*, vancomycin-resistant (VSA and VRSA)[2, 5]	Call Immediately
*Drowning/near drowning[20]	Within 10 work days	Streptococcal disease (group A, B, *S. pneumo*), invasive[2]	Within 1 week
Ehrlichiosis[2]	Within 1 week	*Syphilis – primary and secondary stages[1, 21]	Within 1 work day
Escherichia coli infection, Shiga toxin-producing[2, 5]	Within 1 week	*Syphilis – all other stages[1, 21]	Within 1 week
*Gonorrhea[1]	Within 1 week	*Taenia solium* and undifferentiated *Taenia* infection[2]	Within 1 week
Haemophilus influenzae type b infections, invasive[2]	Within 1 week	Tetanus[2]	Within 1 week
Hansen's disease (leprosy)[2]	Within 1 week	*Traumatic brain injury[20]	Within 10 work days
Hantavirus infection[2]	Within 1 week	Trichinosis[2]	Within 1 week
Hemolytic Uremic Syndrome (HUS)[2]	Within 1 week	Tuberculosis (includes all *M. tuberculosis* complex)[5, 22]	Within 1 work day
Hepatitis A (acute)[2]	Within 1 work day	Tularemia[2, 5]	Call Immediately
Hepatitis B, C, and E (acute)[2]	Within 1 week	Typhus[2]	Within 1 week
Hepatitis B identified prenatally or at delivery (acute & chronic)[2]	Within 1 week	*Vibrio* infection, including cholera[2, 5]	Within 1 work day
Hepatitis B, perinatal (HBsAg+ < 24 months old)[2]	Within 1 work day	Viral hemorrhagic fever, including Ebola[2]	Call Immediately
*Human immunodeficiency virus (HIV) infection[1, 2]	Within 1 week	Yellow fever[2]	Call Immediately
Influenza-associated pediatric mortality[2]	Within 1 work day	Yersiniosis[2]	Within 1 week

In addition to specified reportable conditions, any outbreak, exotic disease, or unusual group expression of disease that may be of public health concern should be reported by the most expeditious means available.

*See condition-specific footnote on the reverse for reporting contact information

This form expires on January 31, 2015

What Diseases are Reportable?

- Over 80 diseases
- Reporting Time Frames
  - Immediately
    - Anthrax, Botulism, Meningococcal Infections
  - Within One Working Day
    - Pertussis, Tuberculosis, Hepatitis A, Rubella
  - Within One Week
    - Shigellosis, Salmonellosis, Varicella, Campylobacteriosis

Legal Basis

- Several Texas laws *(Health & Safety Code, Chapters 81, 84, 88, 89, and 92)* require specific information regarding notifiable conditions be provided to the Texas Department of State Health Services (DSHS).
- Health care providers, hospitals, laboratories, schools, and others are required to report patients who are suspected of having a notifiable condition *(Title 25, Texas Administrative Code, Chapters 37, 91, 97, 99, 103).*

And the law also…

- Provides public health agencies and schools with authority to report notifiable conditions
  - Title 25, Chapter 97, Rule 97.2 of the Texas Administrative Code
- Protects our "reporting partners"

HIPAA

- Health Insurance Portability and Accountability Act of 1996 (HIPAA)
- HIPAA implemented standards for how information that identifies a patient can be used and disclosed.

HIPAA

- Not intended to impact public health or interfere with public health activities
- It is not a HIPAA violation for healthcare providers to release case information to health departments.

Confidentiality

- Confidentiality is a legal requirement
- Maintain confidentiality during reporting
  - Only those who "need to know" should have access to health records.
  - Confirm you are faxing to a confidential fax machine
  - Stamp envelopes "Confidential"
  - Do not include identifying information when emailing

Purpose of Disease Reporting

- Surveillance data provides a link to public health practice (planning, implementing, evaluating programs)
- Allows intervention with individual patients
- Allows investigation and control of outbreaks
- Overall Goal: To reduce morbidity and mortality through control and prevention of disease

Public Health Surveillance

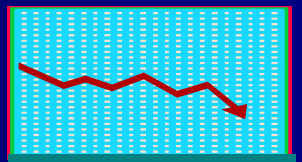
- Ongoing, systematic collection, analysis, and interpretation of health-related data essential to the planning, implementation, and evaluation of public health practice, closely integrated with the timely dissemination of these data to those responsible for prevention and control.

Information Loop of Public Health Surveillance

Public

Health Care Providers

Health Agencies



Analysis

Reports

Summaries, Interpretations, Recommendations

Uses of Public Health Surveillance

- Estimate magnitude of the problem
- Determine geographic distribution of illness
- Portray the natural history of a disease
- Detect epidemics/define a problem
- Generate hypotheses, stimulate research
- Evaluate control measures
- Monitor changes in infectious agents
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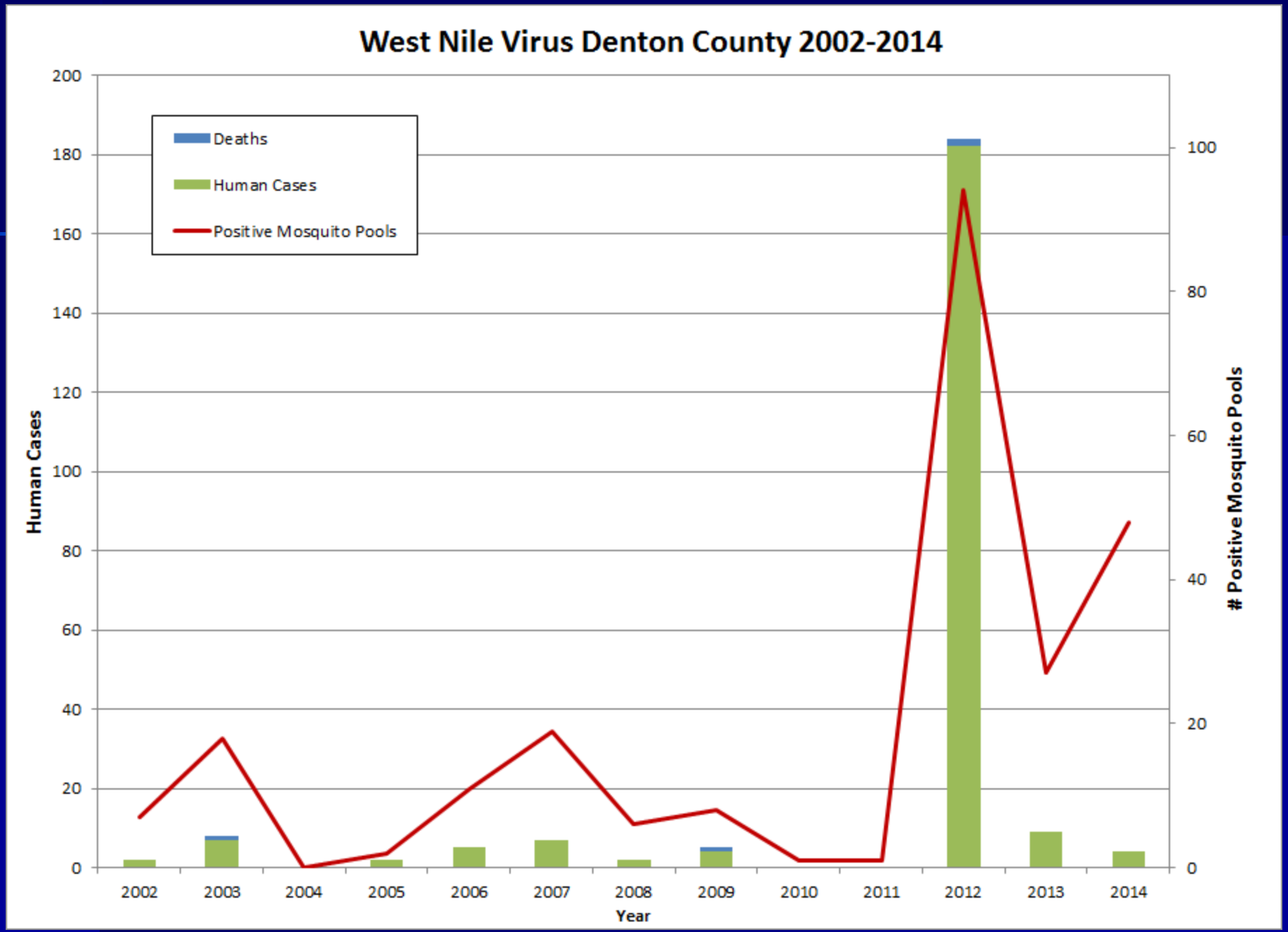
West Nile Virus Denton County 2002-2014
Deaths
Human Cases
Positive Mosquito Pools
Human Cases
Positive Mosquito Pools
Year
0
20
40
60
80
100
120
140
160
180
200
0
20
40
60
80
100
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014

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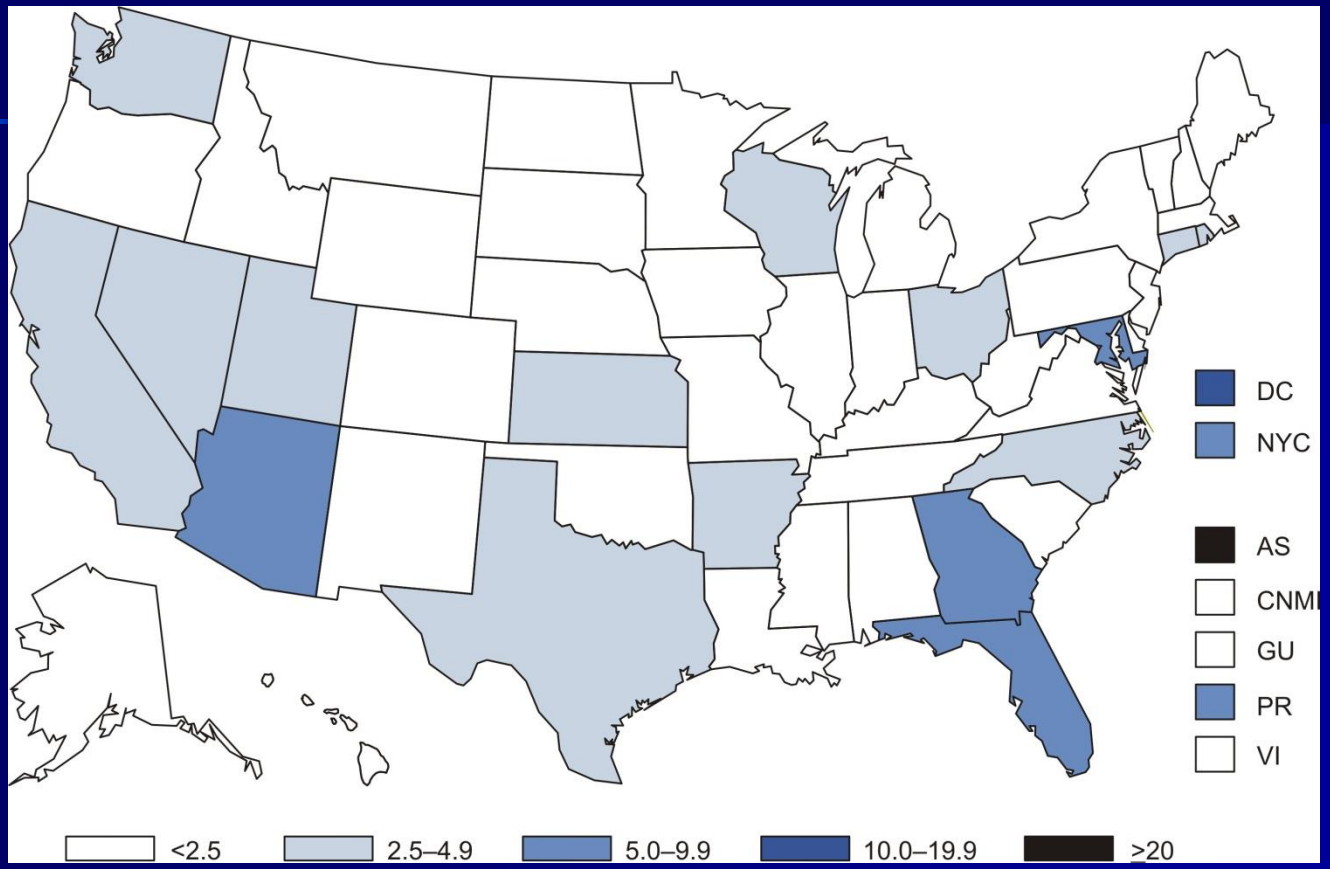
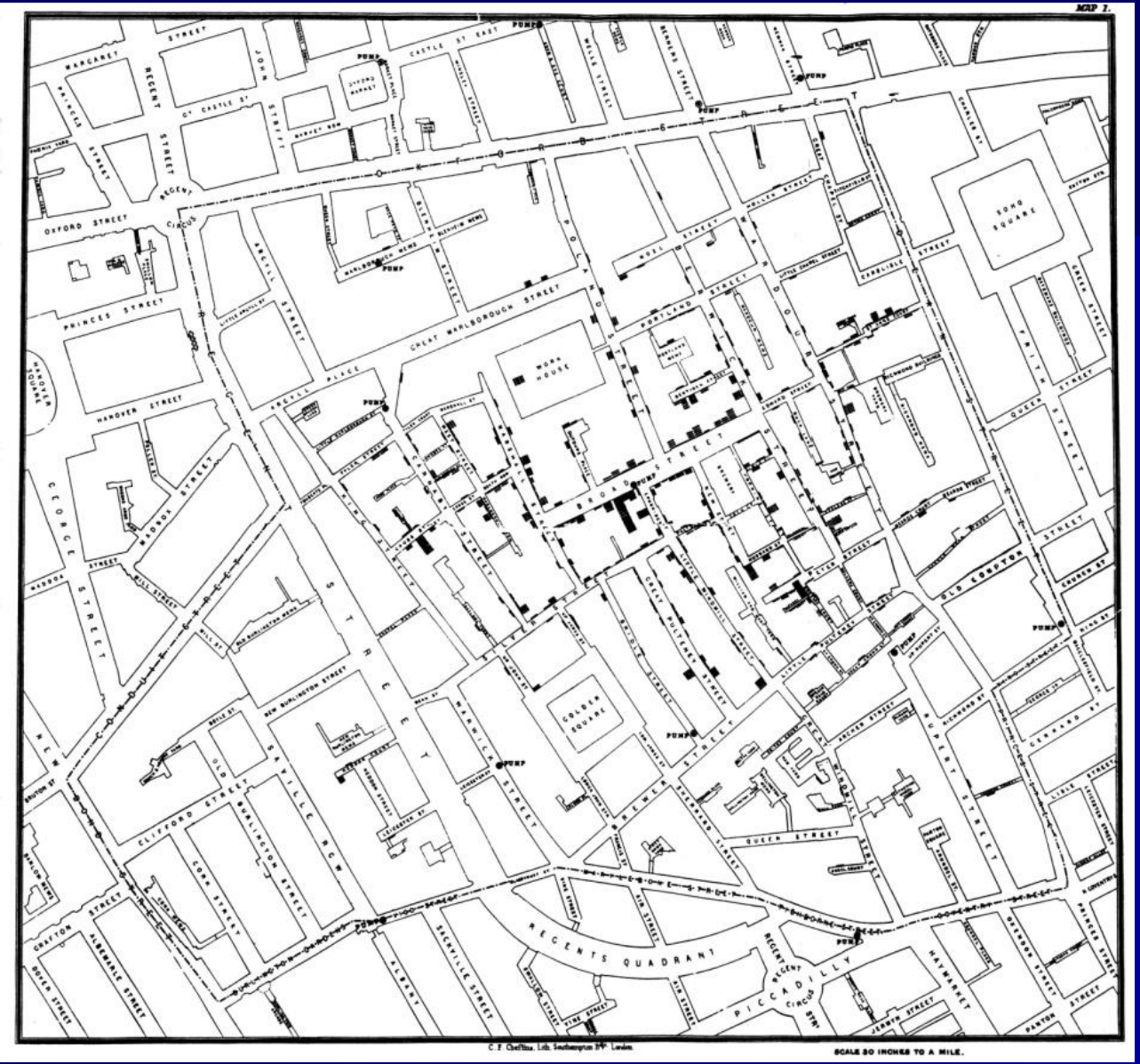
HEPATITIS A
Reported cases per 100,000 population, United States and U.S. territories, 2002



Source: CDC. Summary of notifiable diseases. 2002.


MAP 1.
OXFORD STREET
REGENT STREET
PRINCES STREET
HANOVER STREET
GEORGE STREET
MADDOX STREET
CONDUIT STREET
NEW BOND STREET
CLIFFORD STREET
SAVILLE ROW
OLD BURLINGTON STREET
CORK STREET
GRAFTON STREET
ALBEMARLE STREET
DOVER STREET
ARGYLL STREET
ARGYLL PLACE
GREAT WARLBOROUGH STREET
WORK HOUSE
BROAD STREET
GOLDEN SQUARE
REGENTS QUADRANT
PICCADILLY
HAYMARKET
JERMYN STREET
PANTON STREET
OXENDON STREET
PRINCES STREET
SOHO SQUARE
FRITH STREET
QUEEN STREET
OLD COMPTON STREET
GREAT PULTENEY STREET
NEWER STREET
QUEEN STREET
RUPERT STREET
GERRARD ST
LISLE STREET
PUMP
C. F. Cheffins, Lith. Southampton Bldgs. London.
SCALE 30 INCHES TO A MILE.

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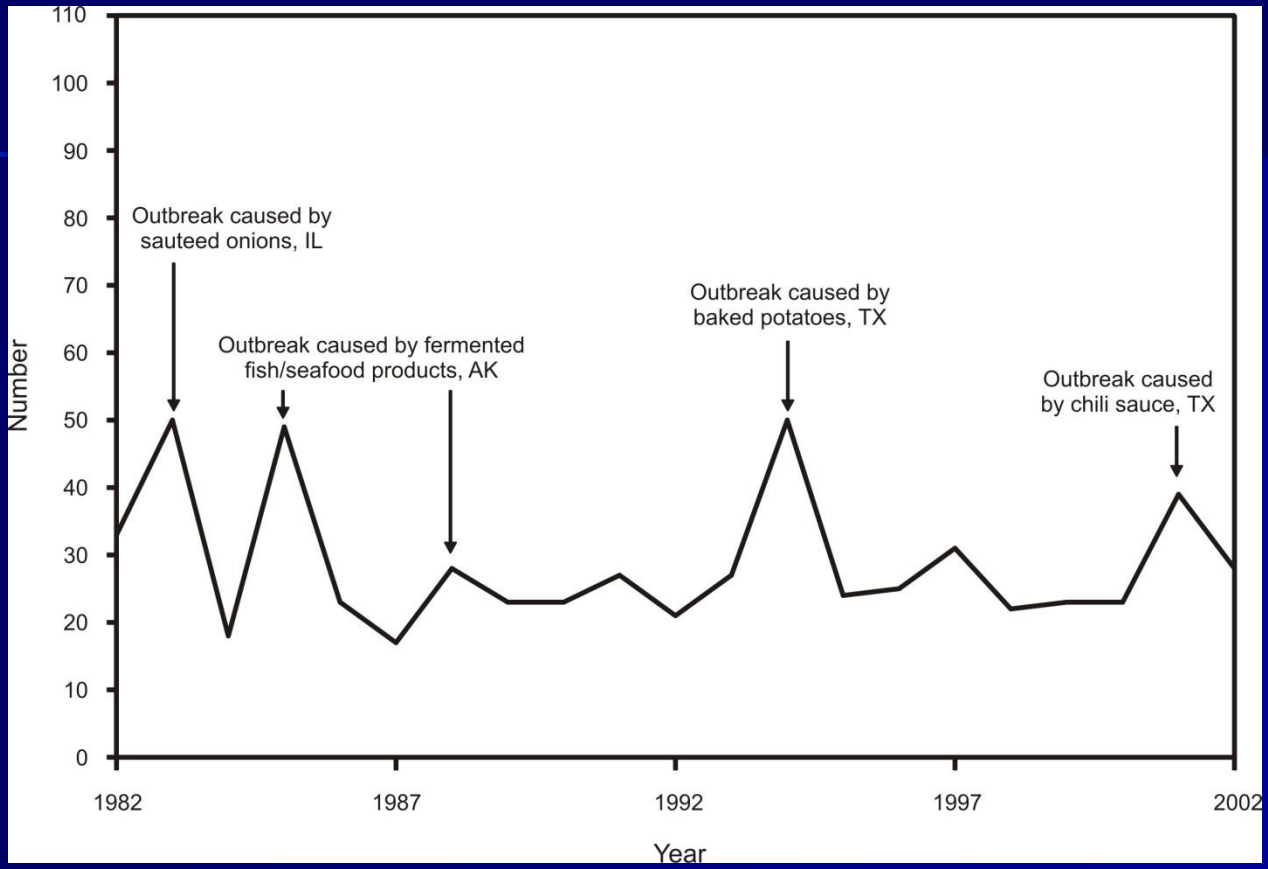
BOTULISM, FOODBORNE
Reported cases, by year, United States, 1982-2002



Data from the annual survey of State Epidemiologist and Directors of State Public Health Laboratories.

Source: CDC. Summary of notifiable diseases. 2002.

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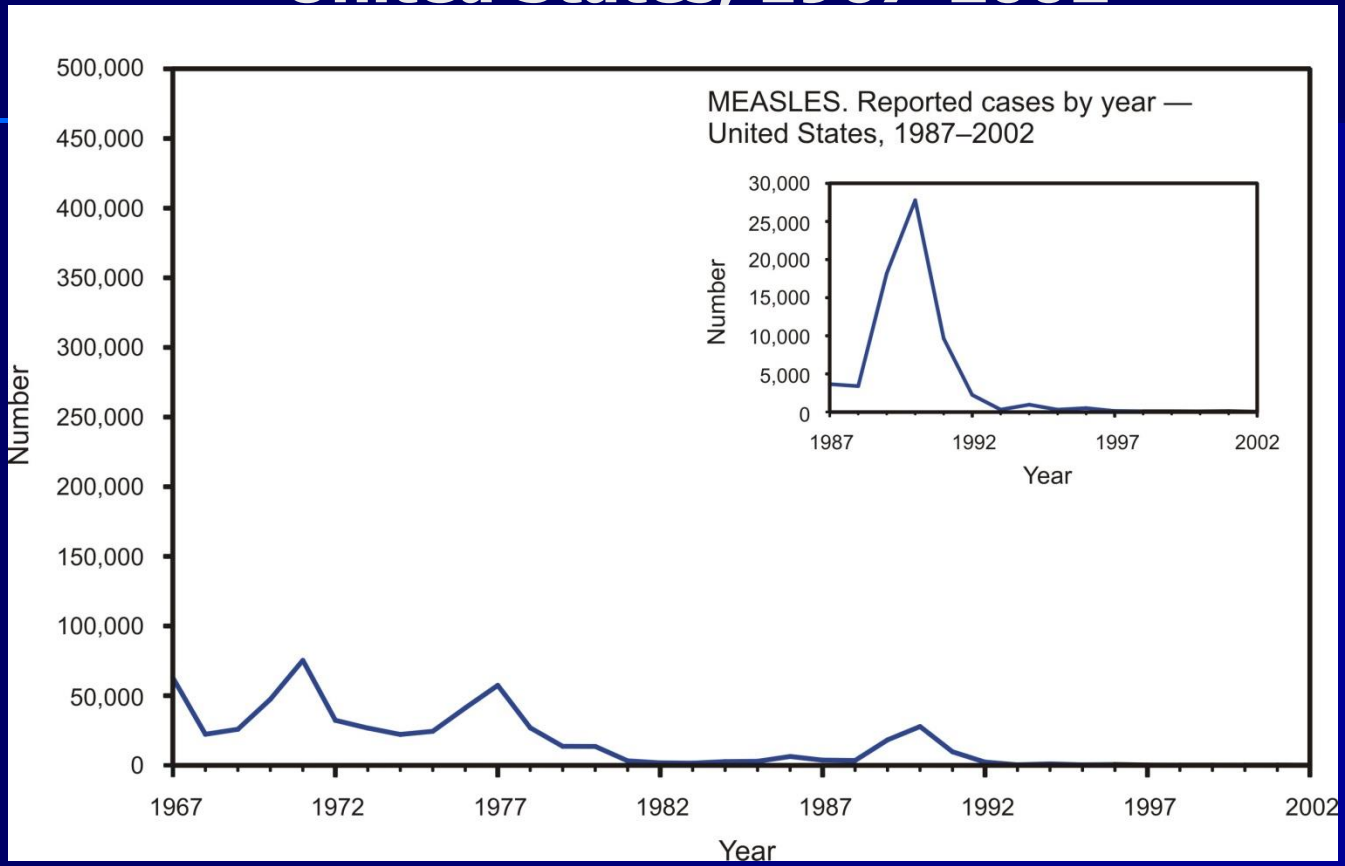
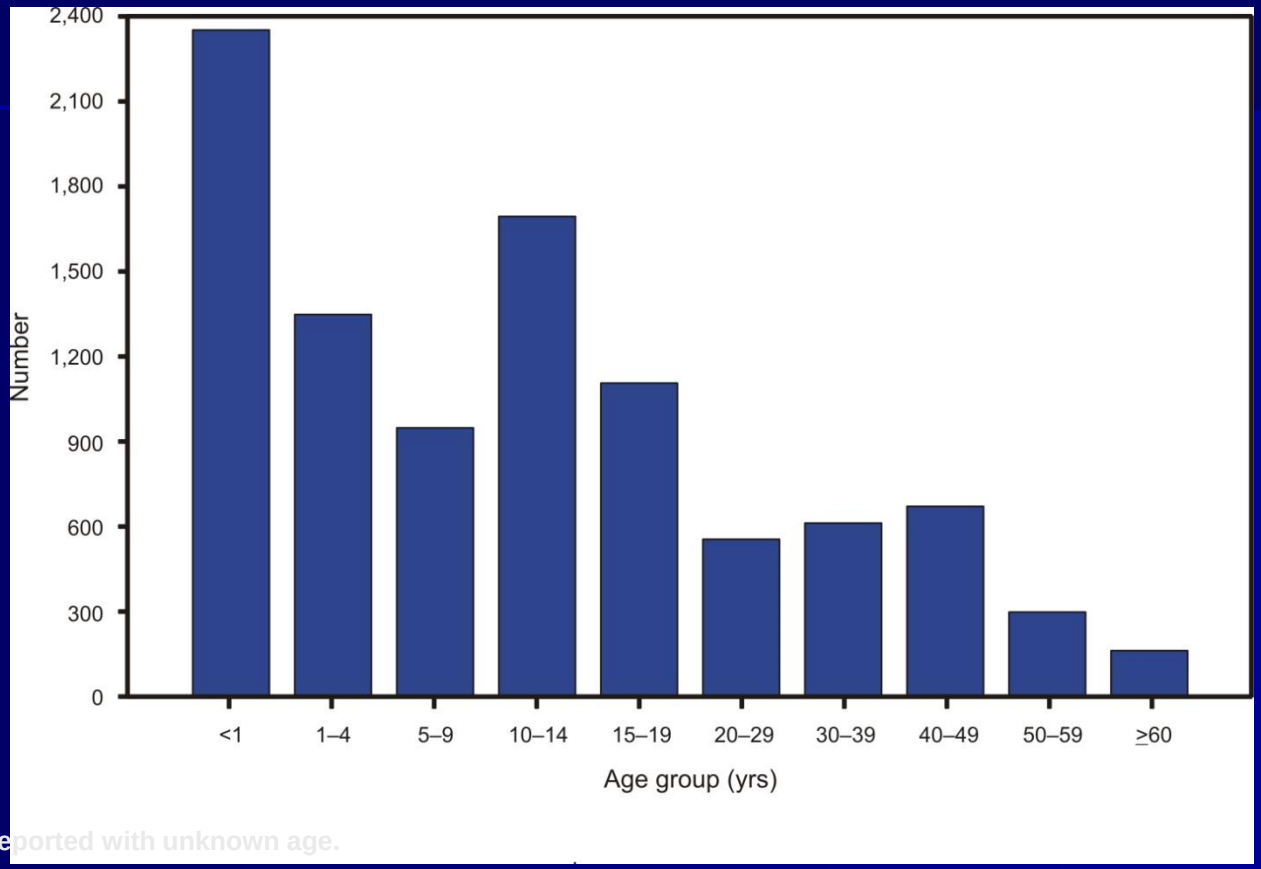
MEASLES
Reported cases, by year, United States, 1967-2002



Source: CDC. Summary of notifiable diseases. 2002.

PERTUSSIS
Reported cases*, by age group, United States, 2002



*Of 9,771 cases, 25 were reported with unknown age.

Source: CDC. Summary of notifiable diseases. 2002.

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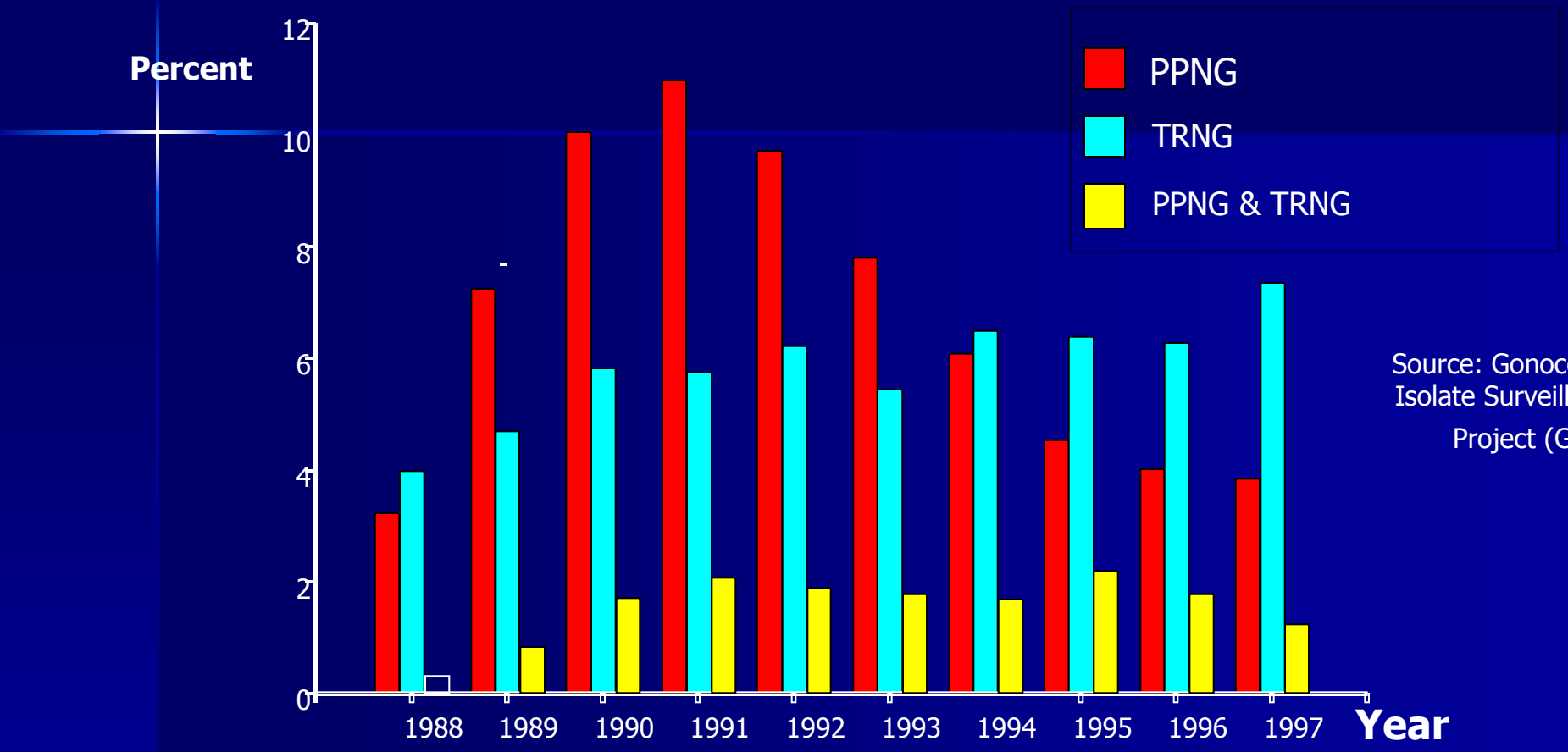
Trends in Plasmid-Mediated Resistance to Penicillin and Tetracycline
United States, 1988-1997



Source: Gonococcal Isolate Surveillance Project (GISP)

Note: "PPNG" (penicillinase-producing) and "TRNG" (tetracycline-resistant) *N. gonorrhoeae* refer to plasmid-mediated resistance to penicillin and tetracycline, respectively.

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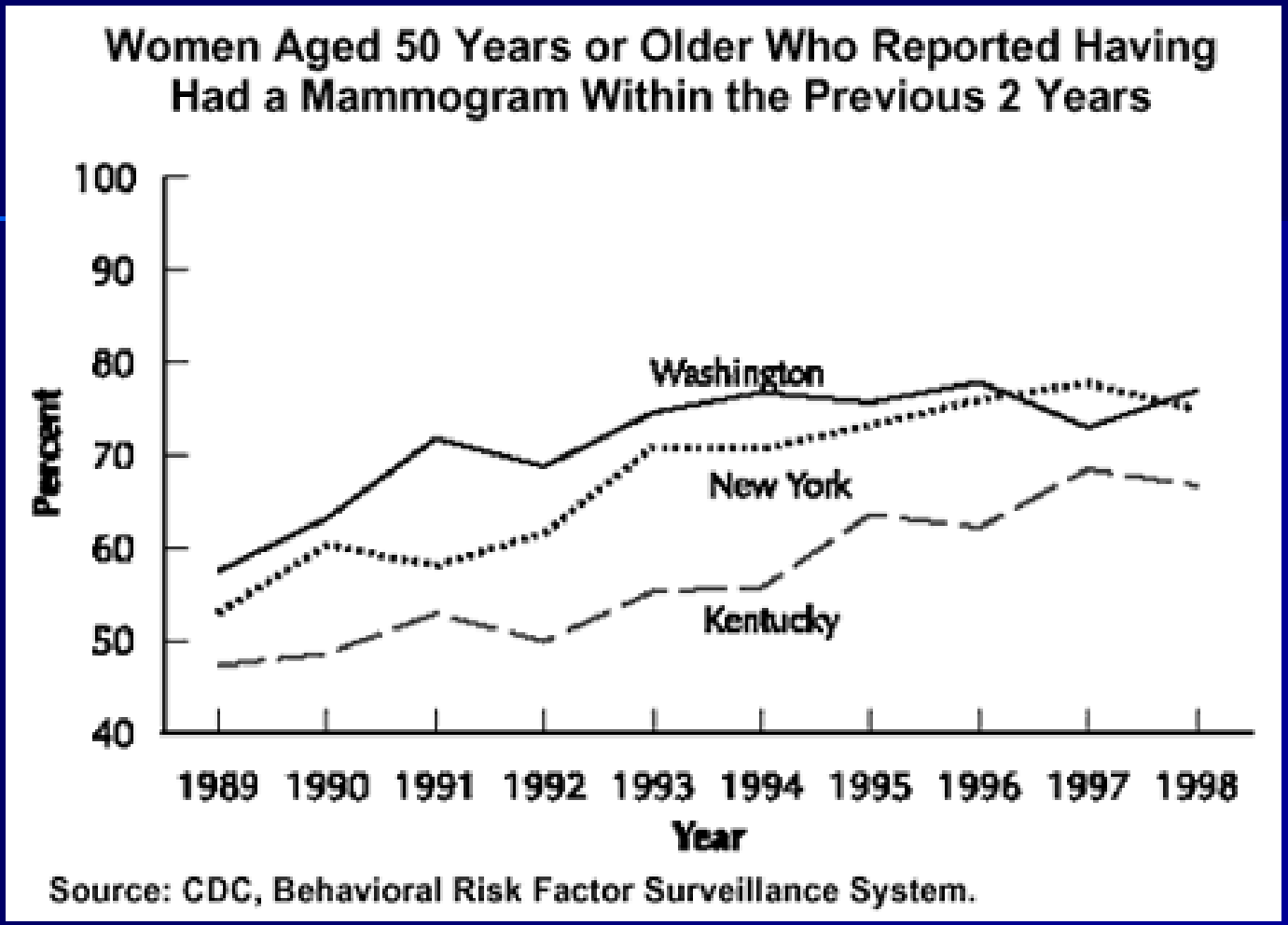
Breast Cancer Screening



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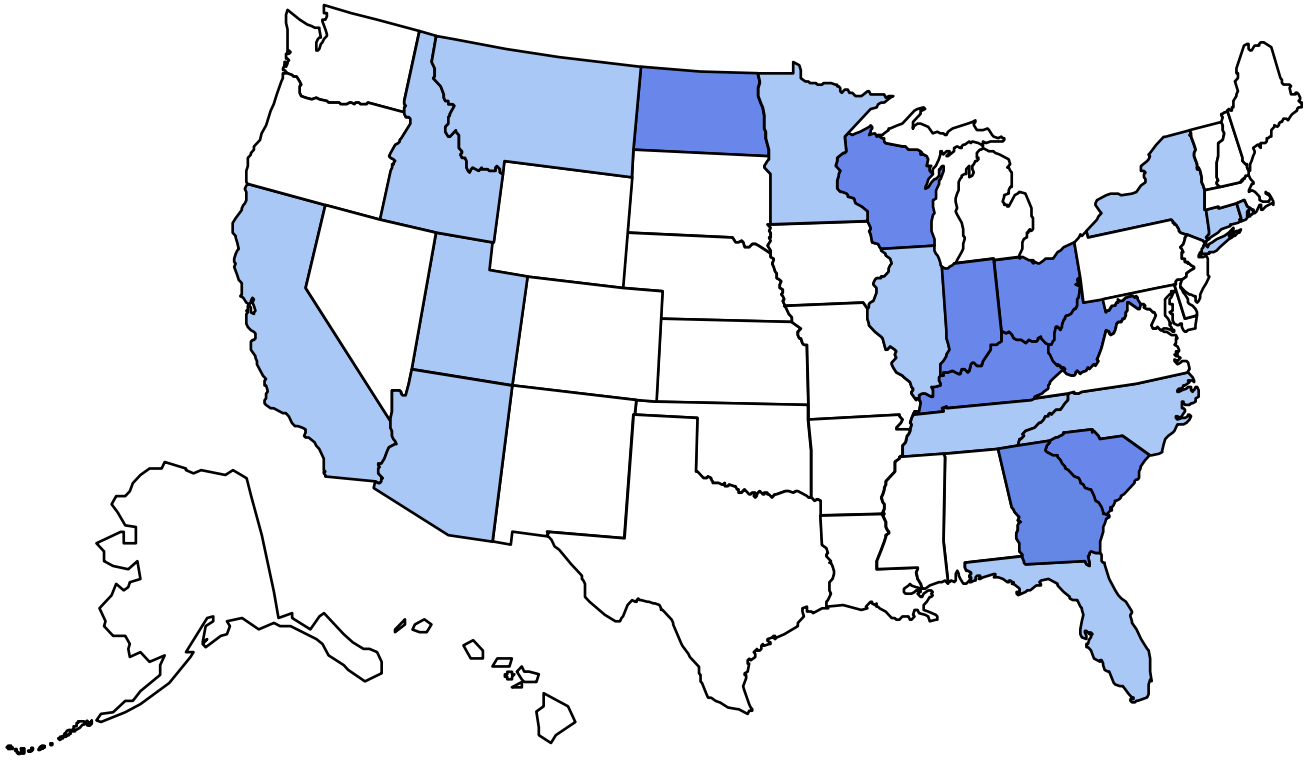
Obesity Trends* Among U.S. Adults

BRFSS, 1985

(*BMI ≥30, or ~ 30 lbs. overweight for 5’ 4” person)

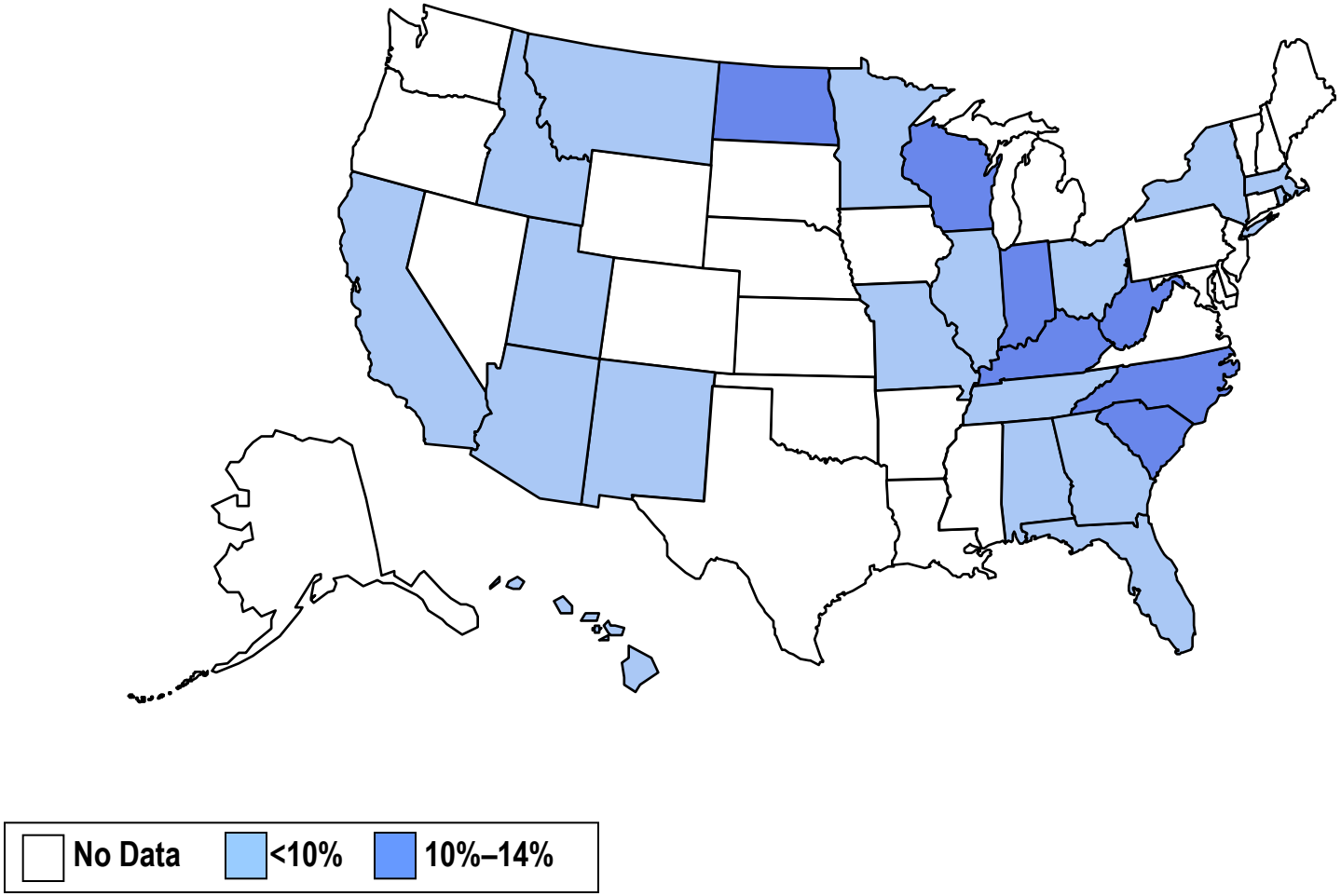


No Data | <10% | 10%–14%

Obesity Trends* Among U.S. Adults

BRFSS, 1986

(*BMI ≥30, or ~ 30 lbs. overweight for 5’ 4” person)



Obesity Trends* Among U.S. Adults

BRFSS, 1987

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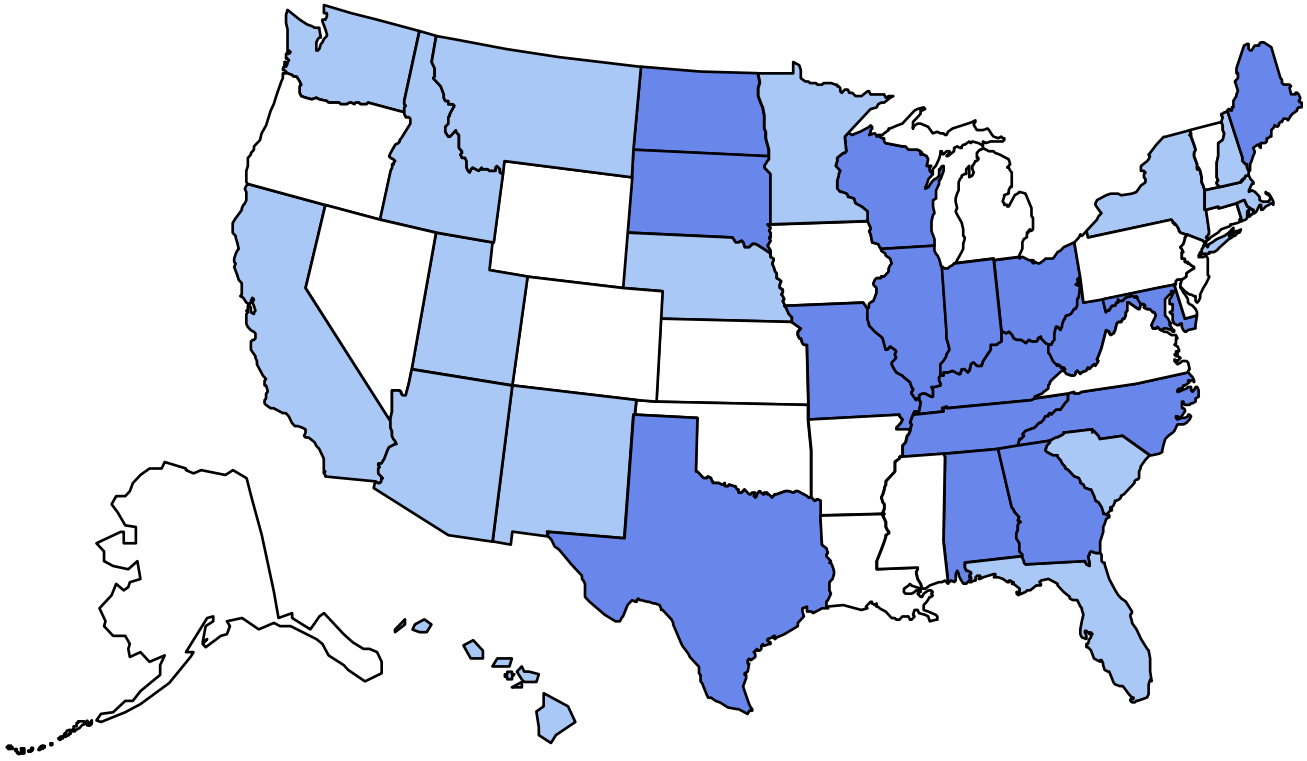

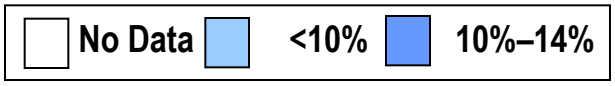

Obesity Trends* Among U.S. Adults

BRFSS, 1988

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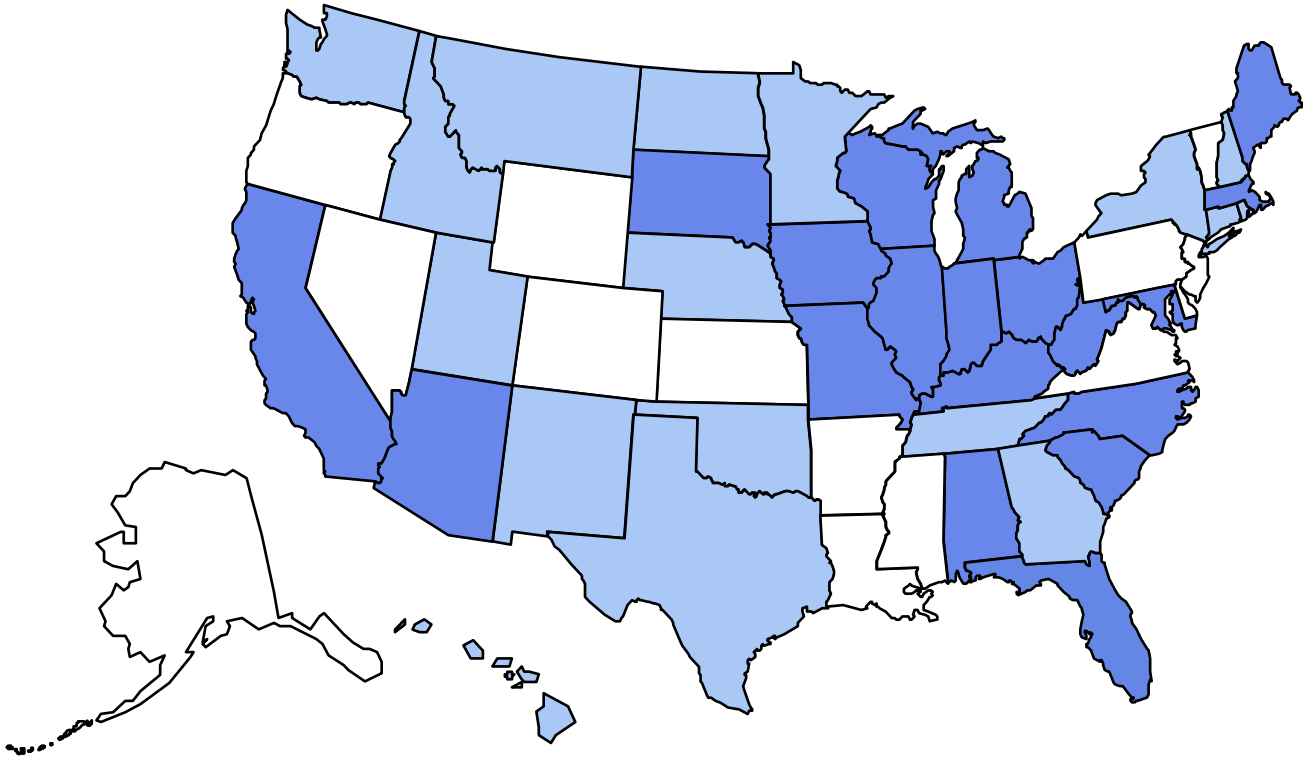

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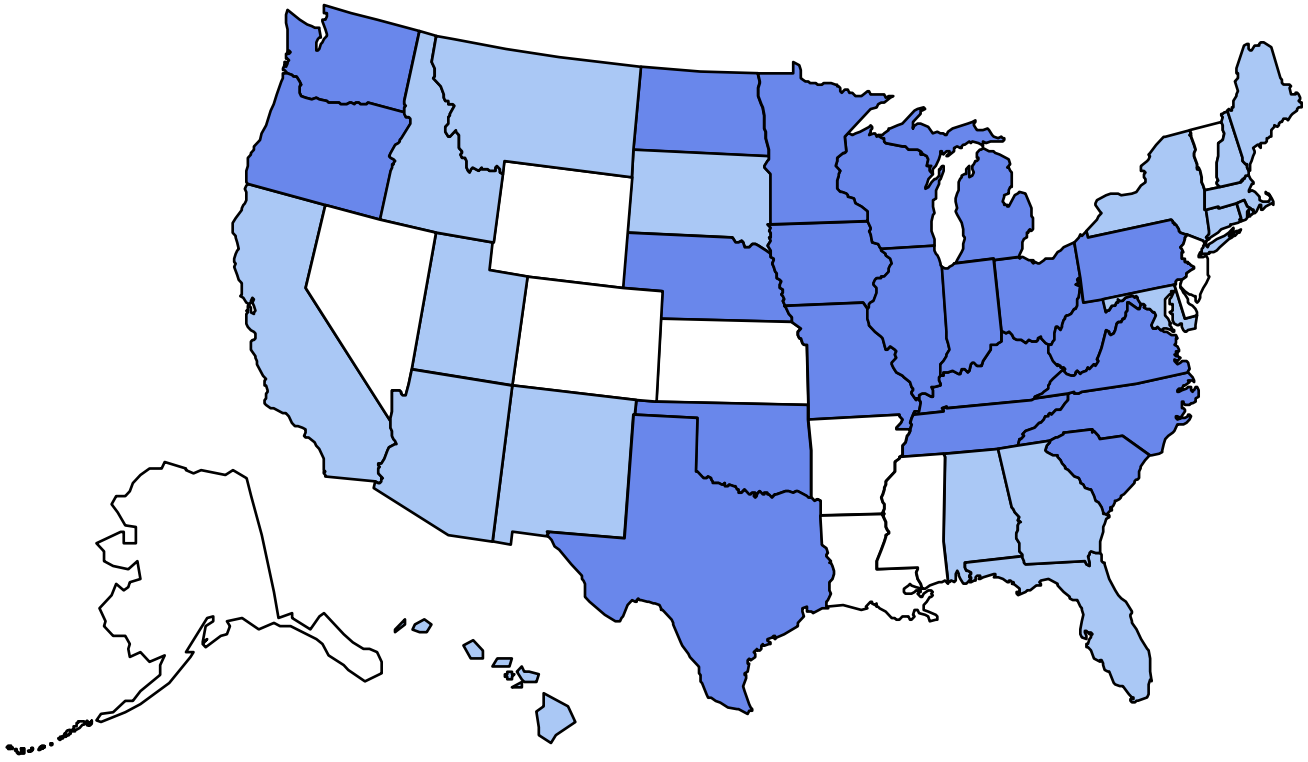
Obesity Trends* Among U.S. Adults

BRFSS, 1989

(*BMI ≥30, or ~ 30 lbs. overweight for 5’ 4” person)



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BRFSS, 1990

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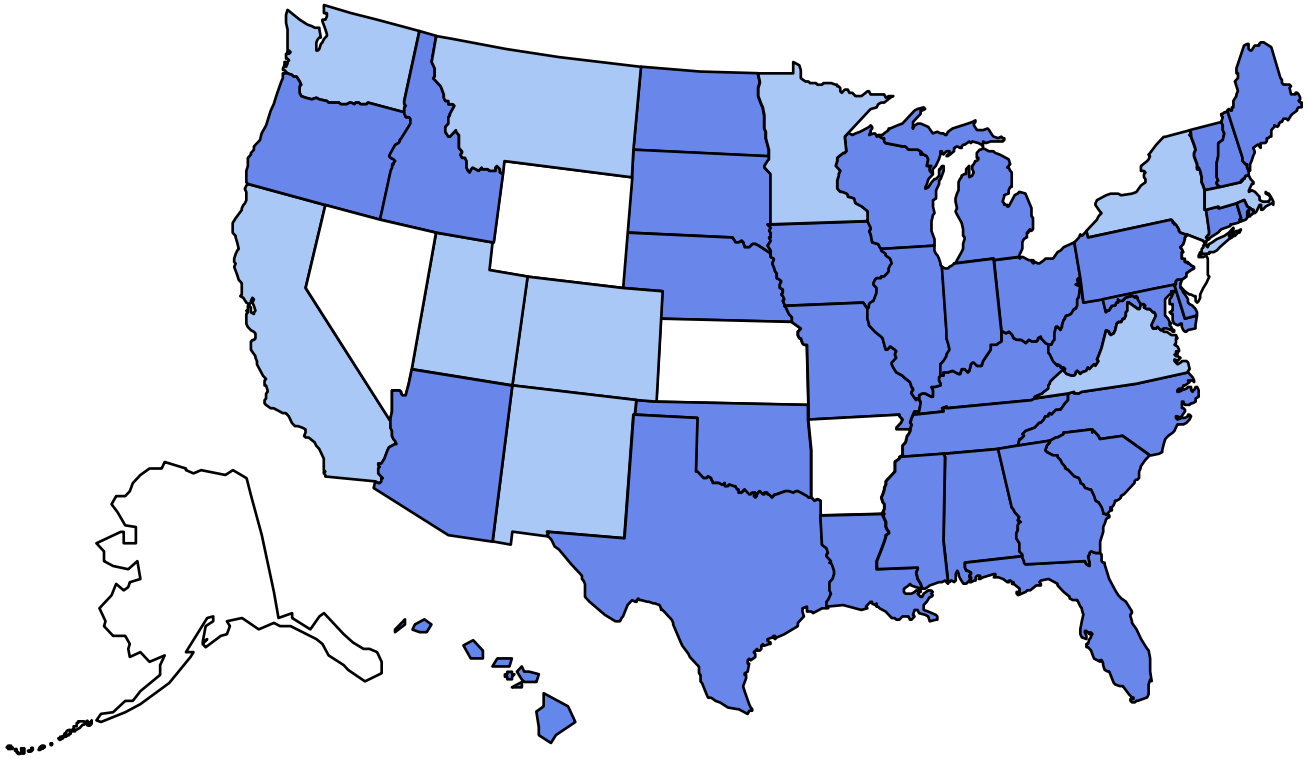
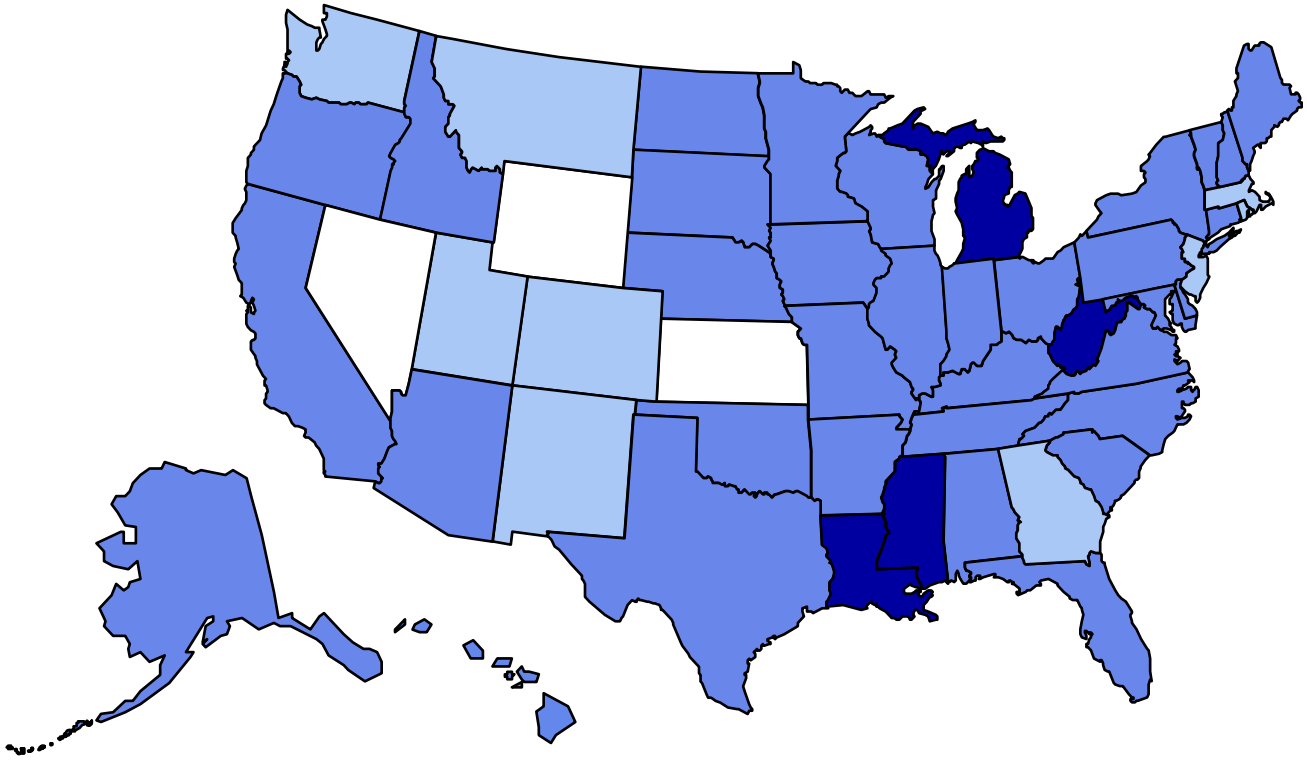


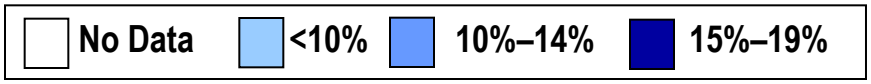
No Data | <10% | 10%–14%

Obesity Trends* Among U.S. Adults

BRFSS, 1991

(*BMI ≥30, or ~ 30 lbs. overweight for 5’ 4” person)





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BRFSS, 1992

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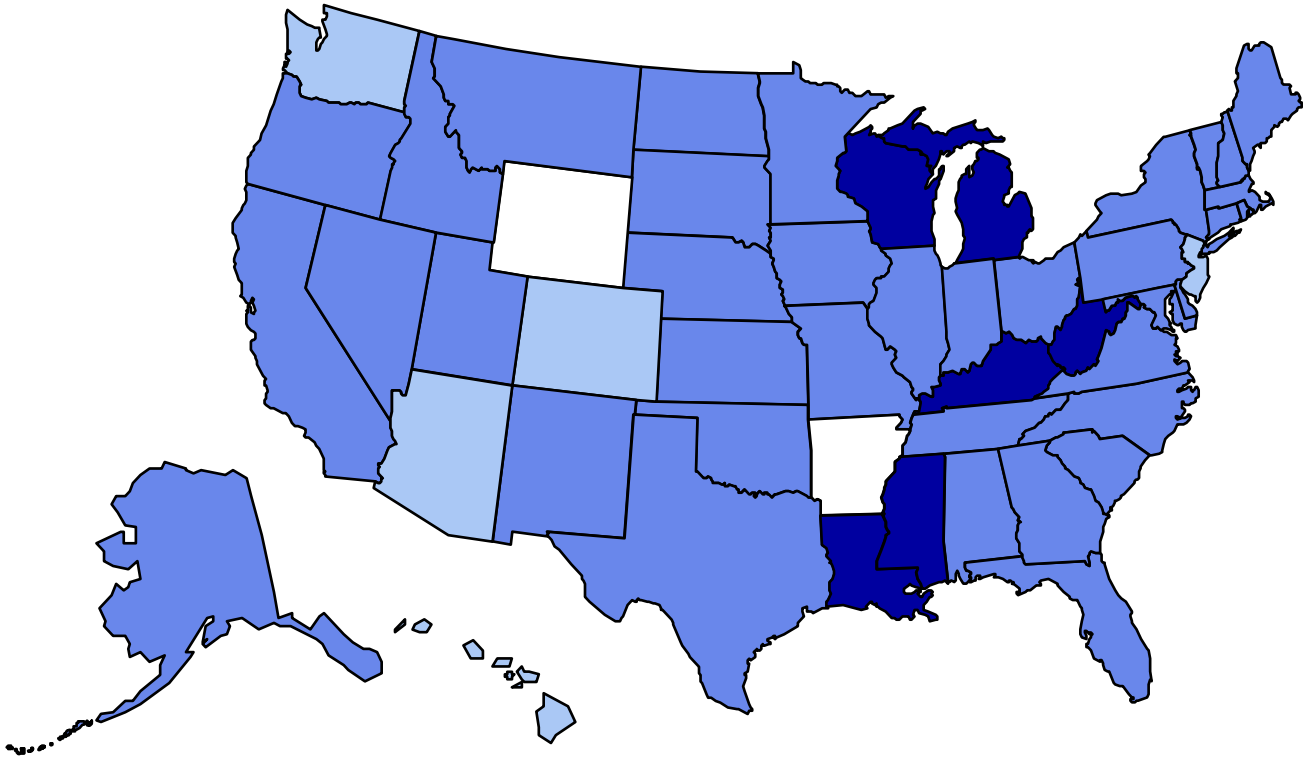

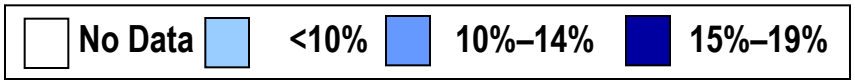

Obesity Trends* Among U.S. Adults

BRFSS, 1993

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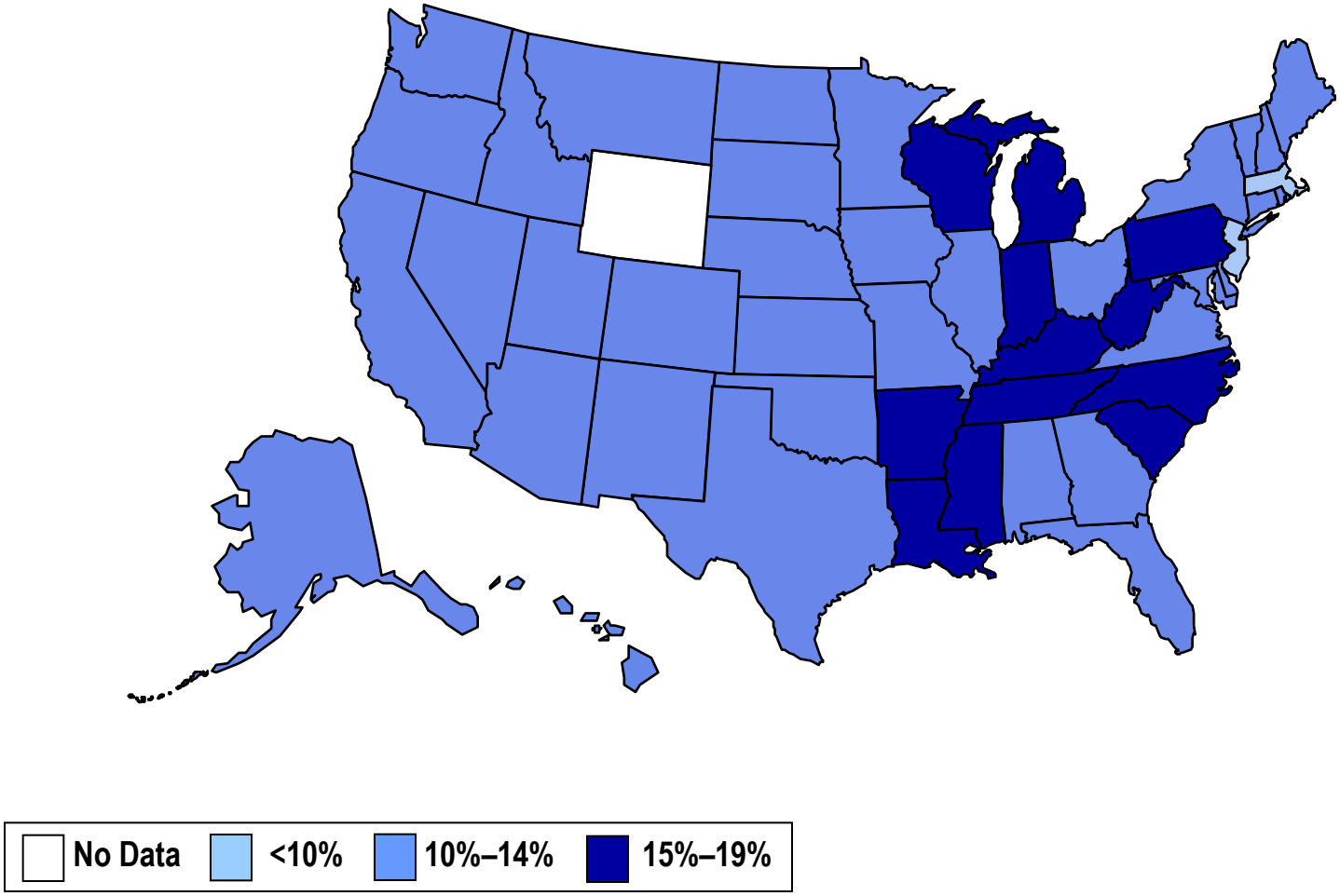

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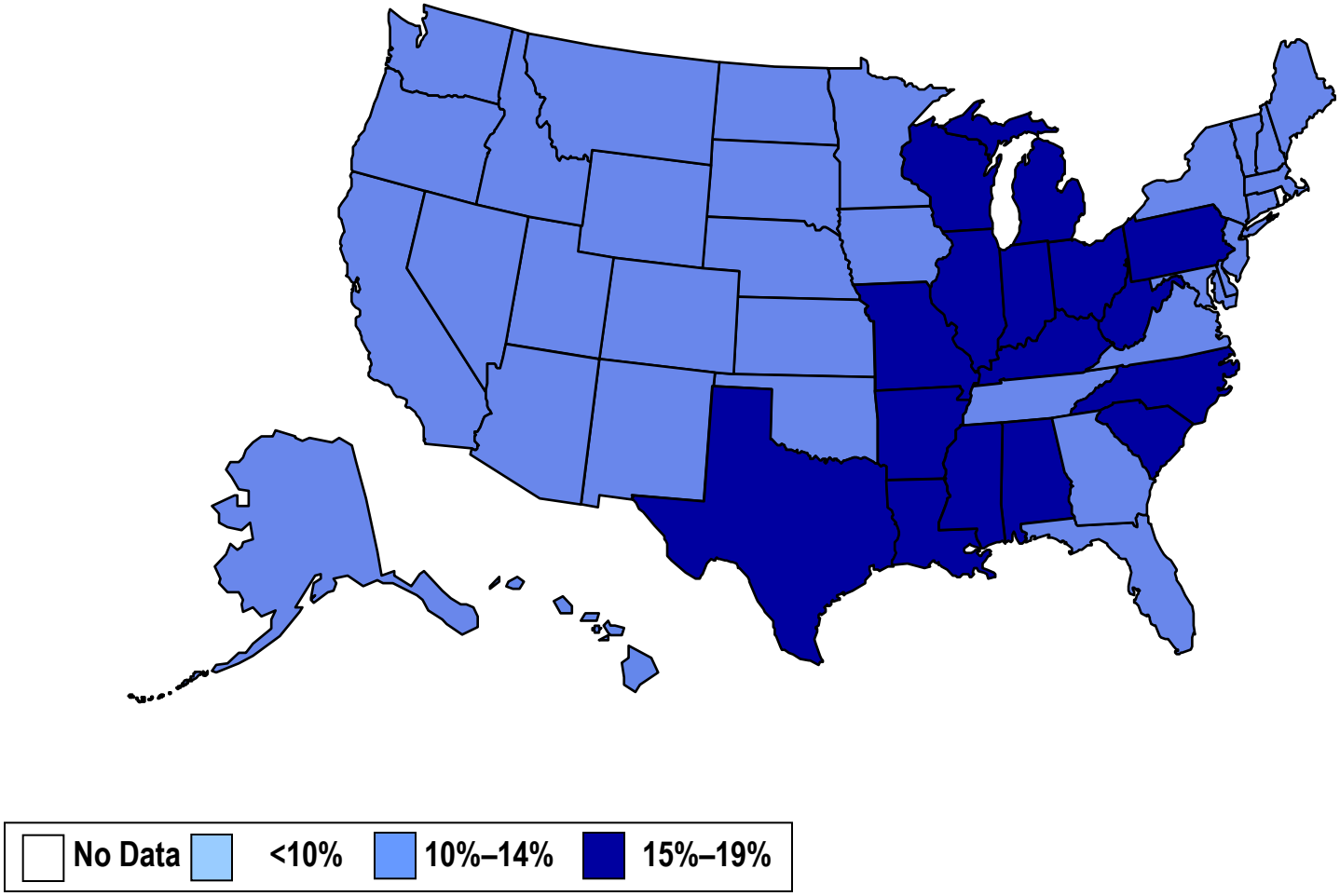

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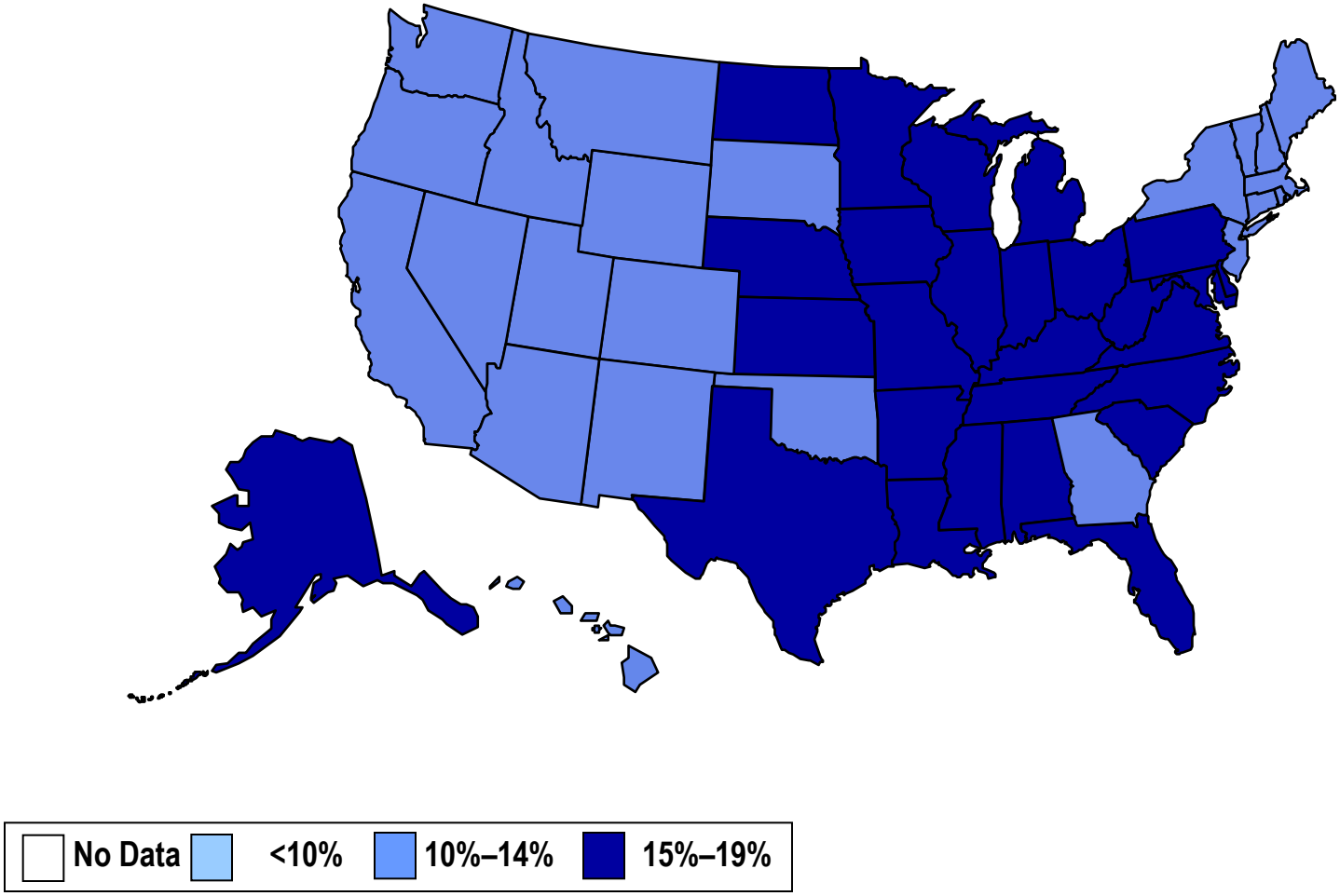

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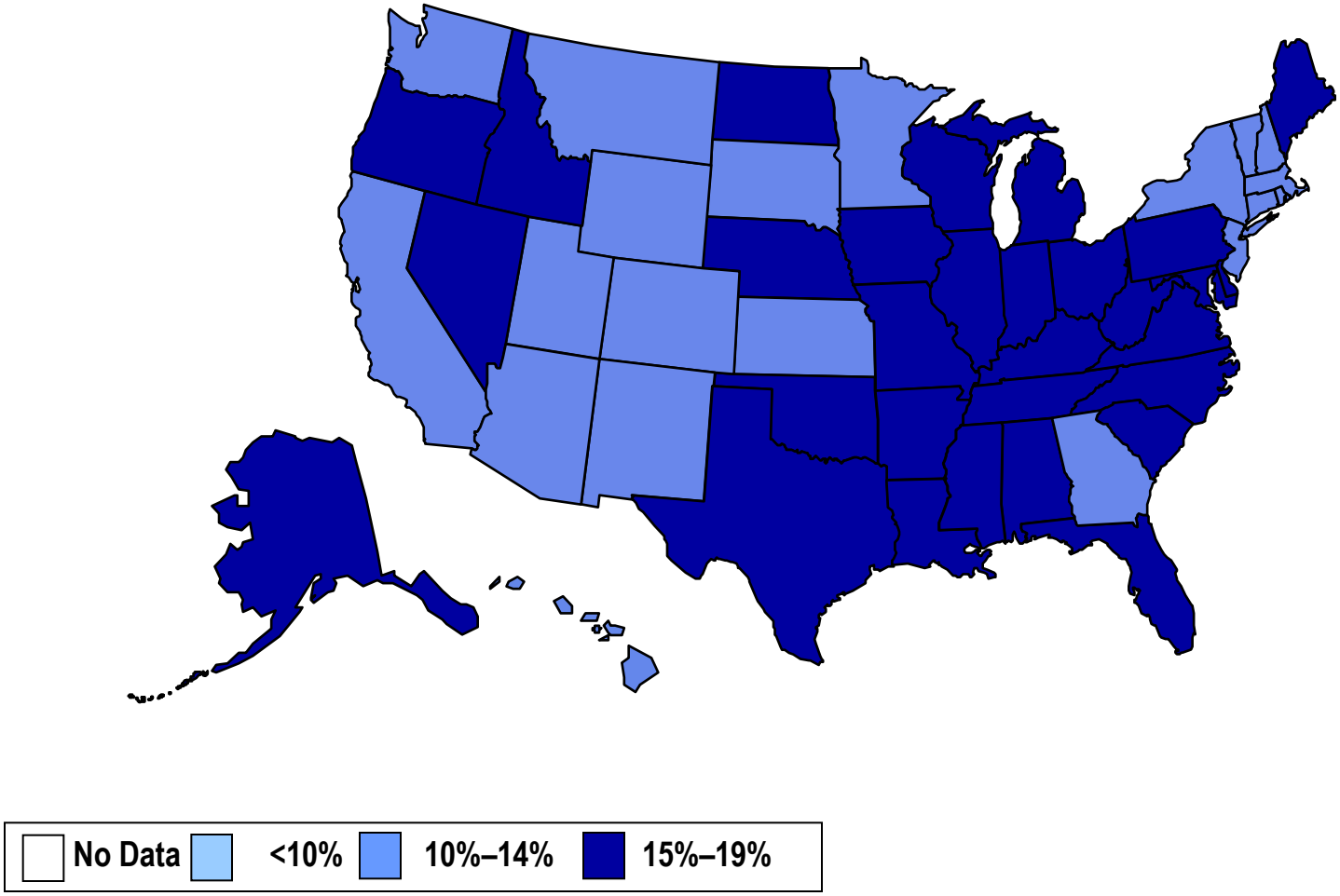

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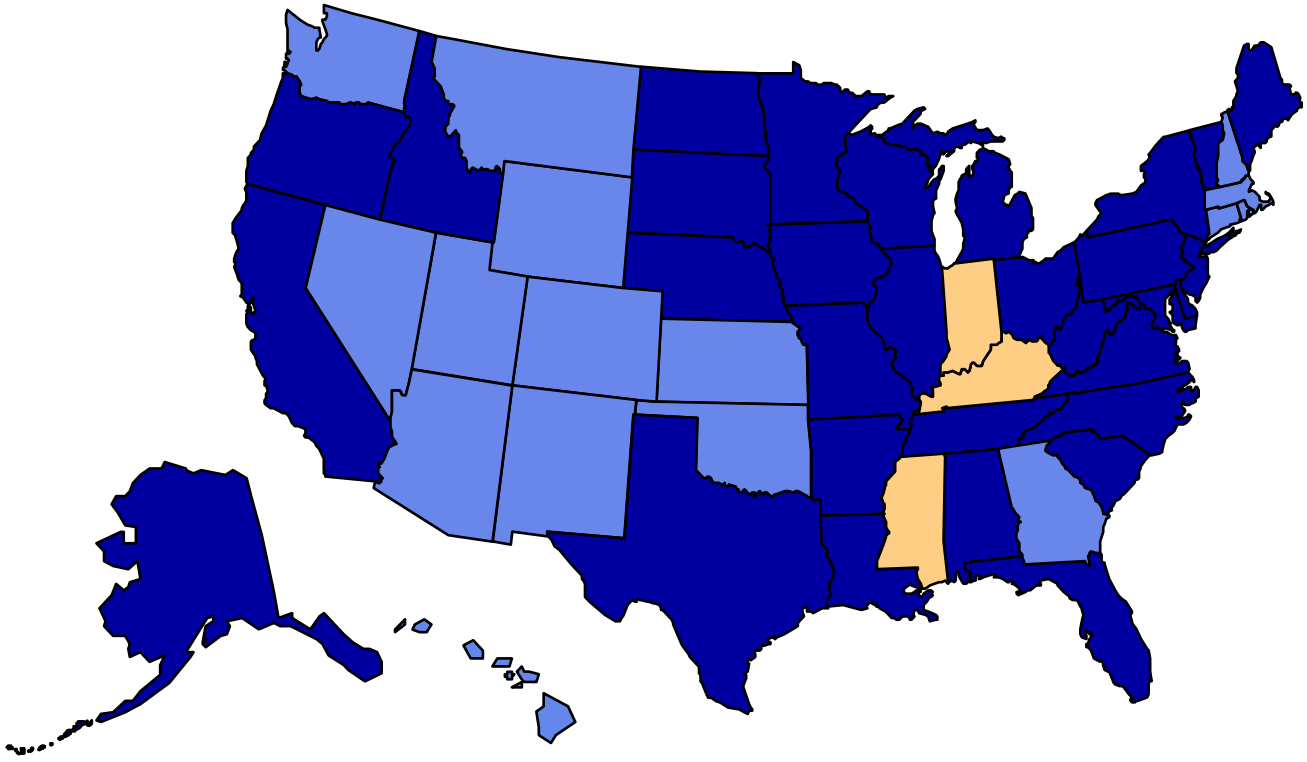
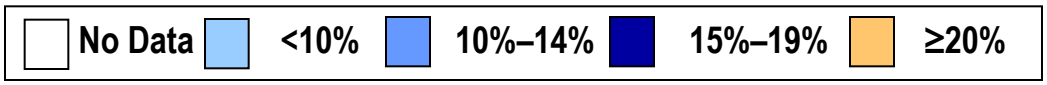
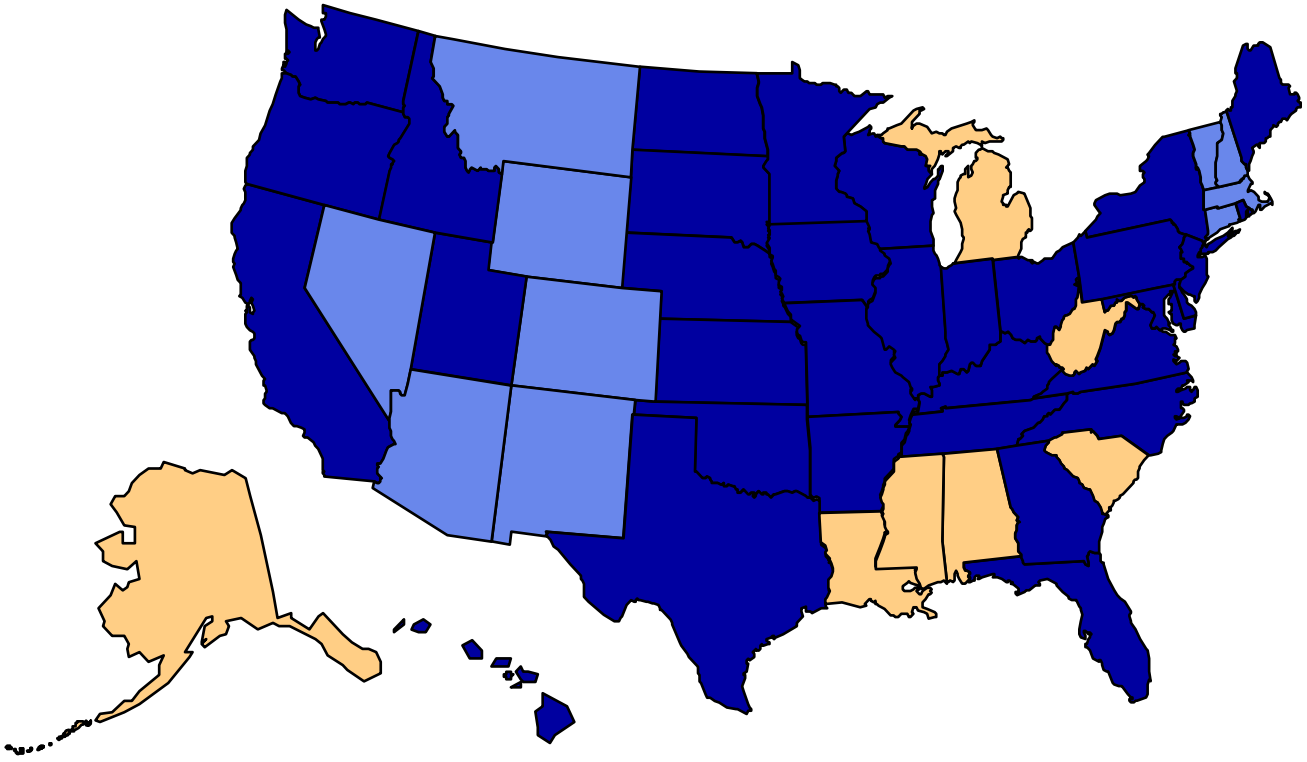


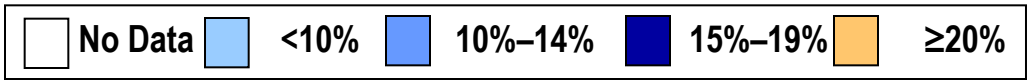


Obesity Trends* Among U.S. Adults

BRFSS, 1998

(*BMI ≥30, or ~ 30 lbs. overweight for 5’ 4” person)





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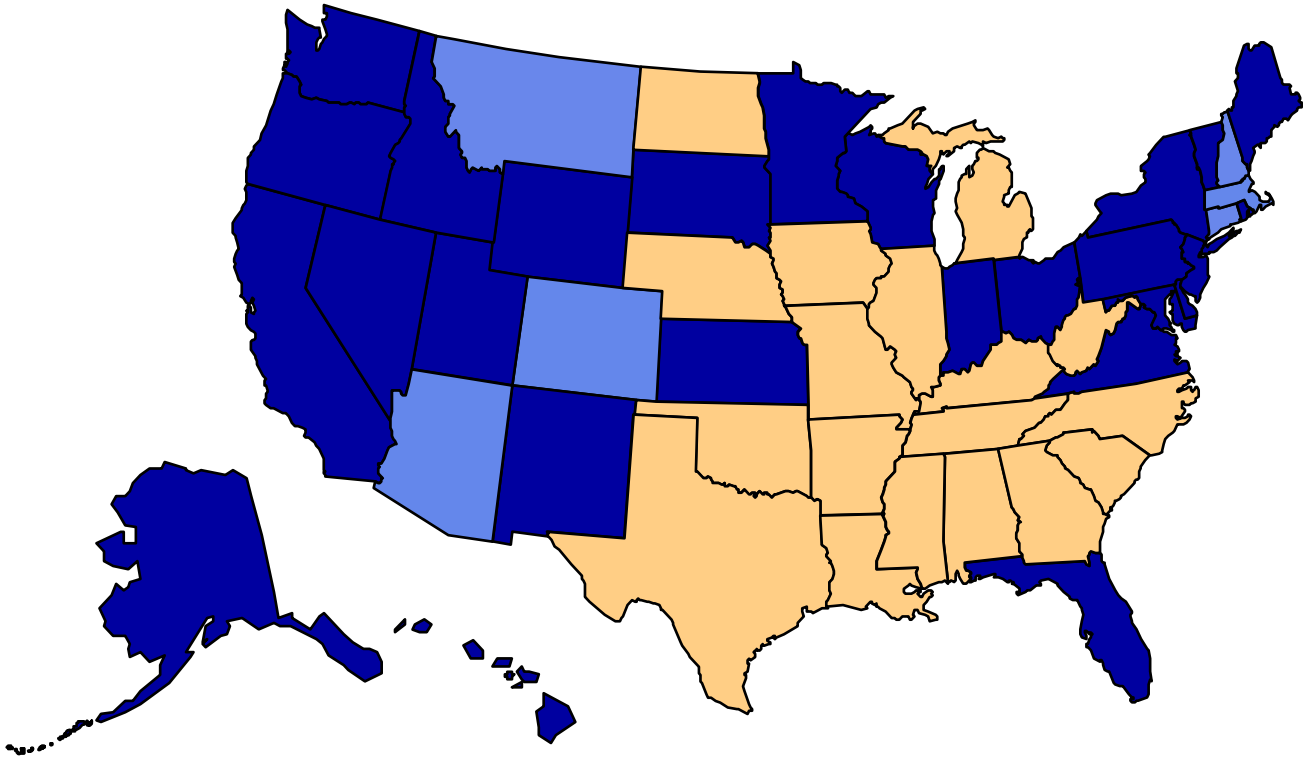

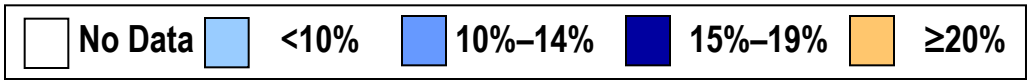

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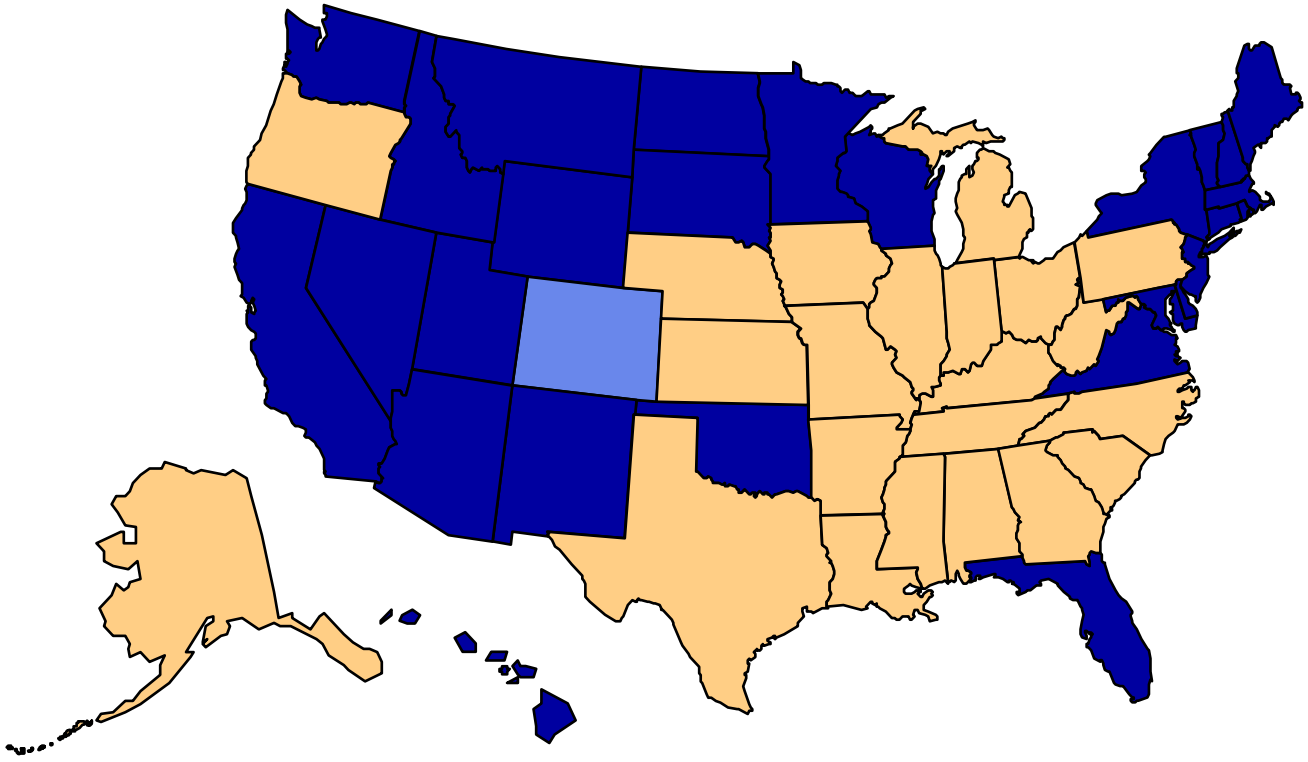

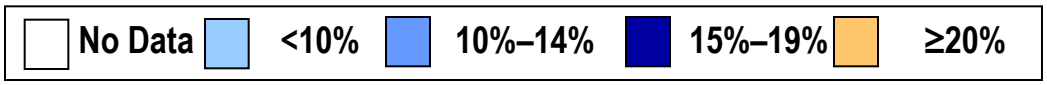

Obesity Trends* Among U.S. Adults

BRFSS, 2001

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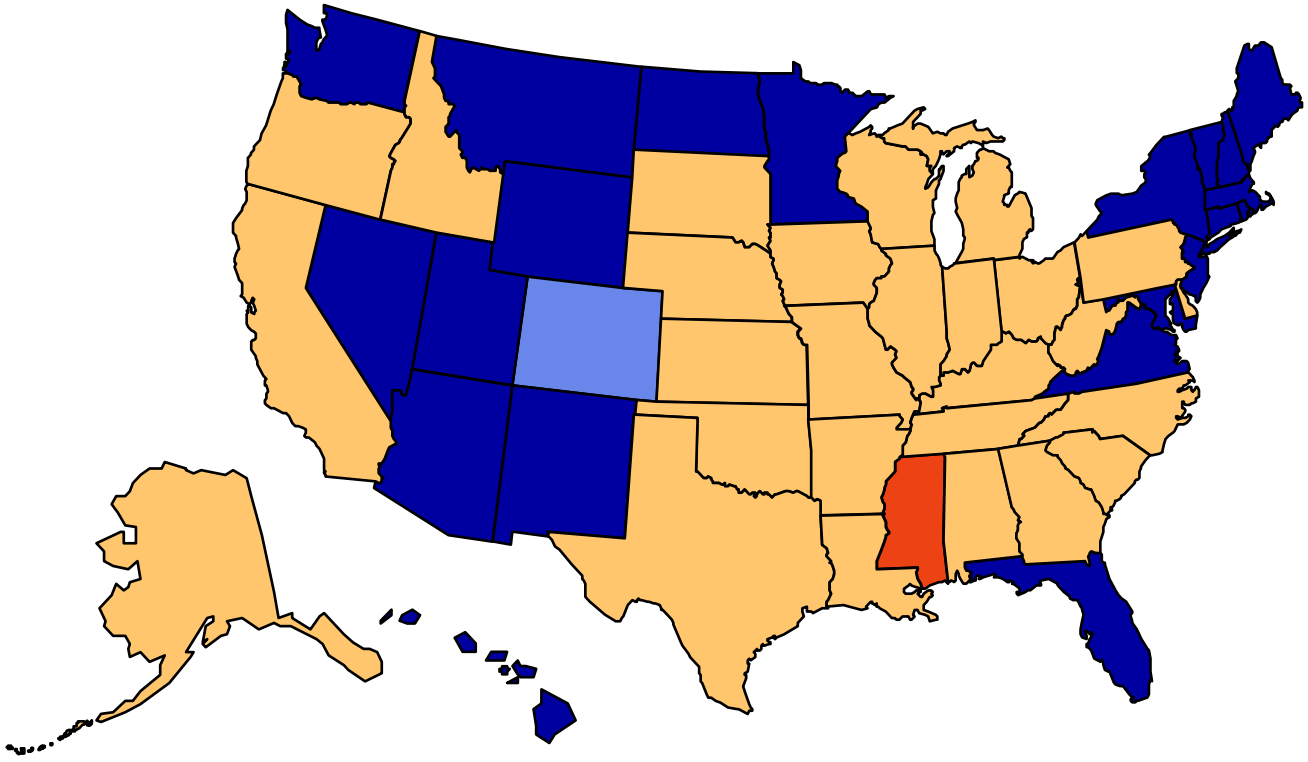
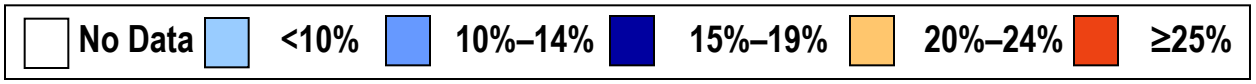
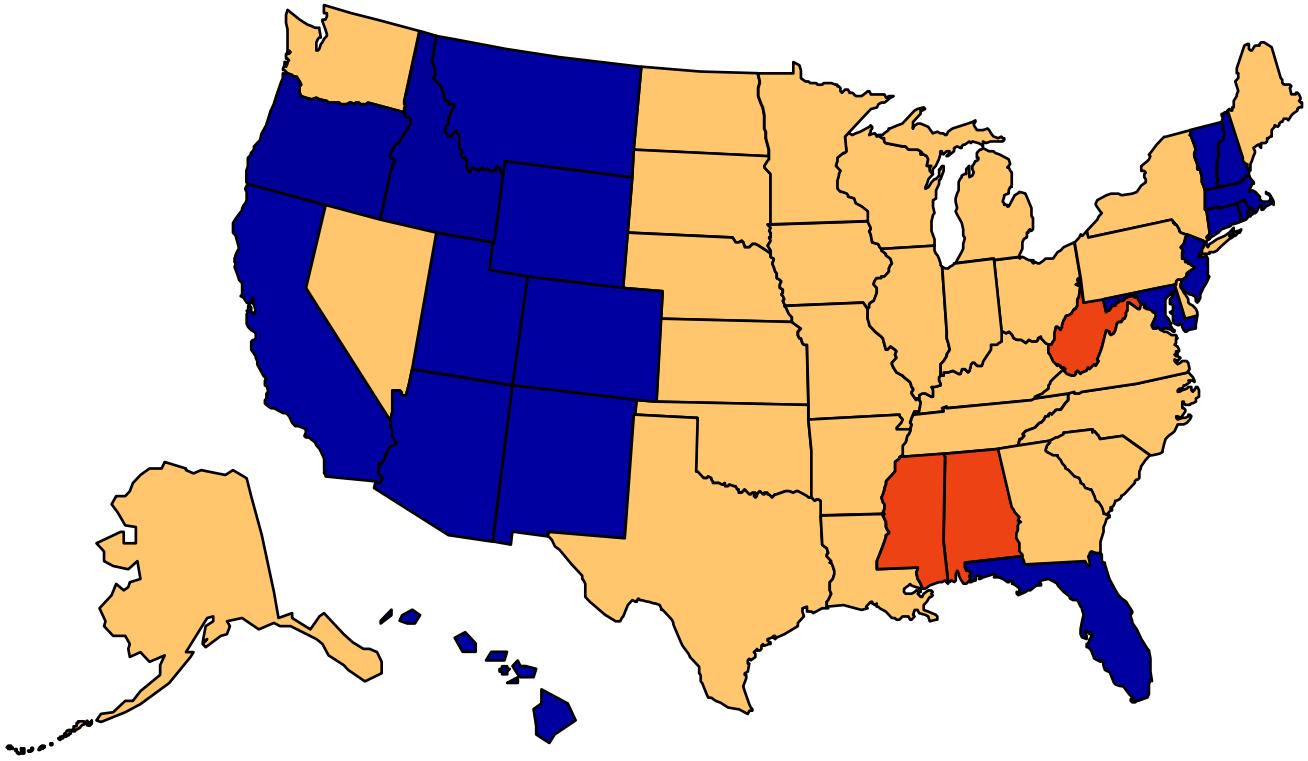
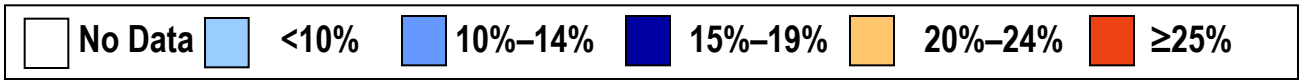




Obesity Trends* Among U.S. Adults
BRFSS, 2002

(*BMI ≥30, or ~ 30 lbs. overweight for 5’ 4” person)





Obesity Trends* Among U.S. Adults

BRFSS, 2003

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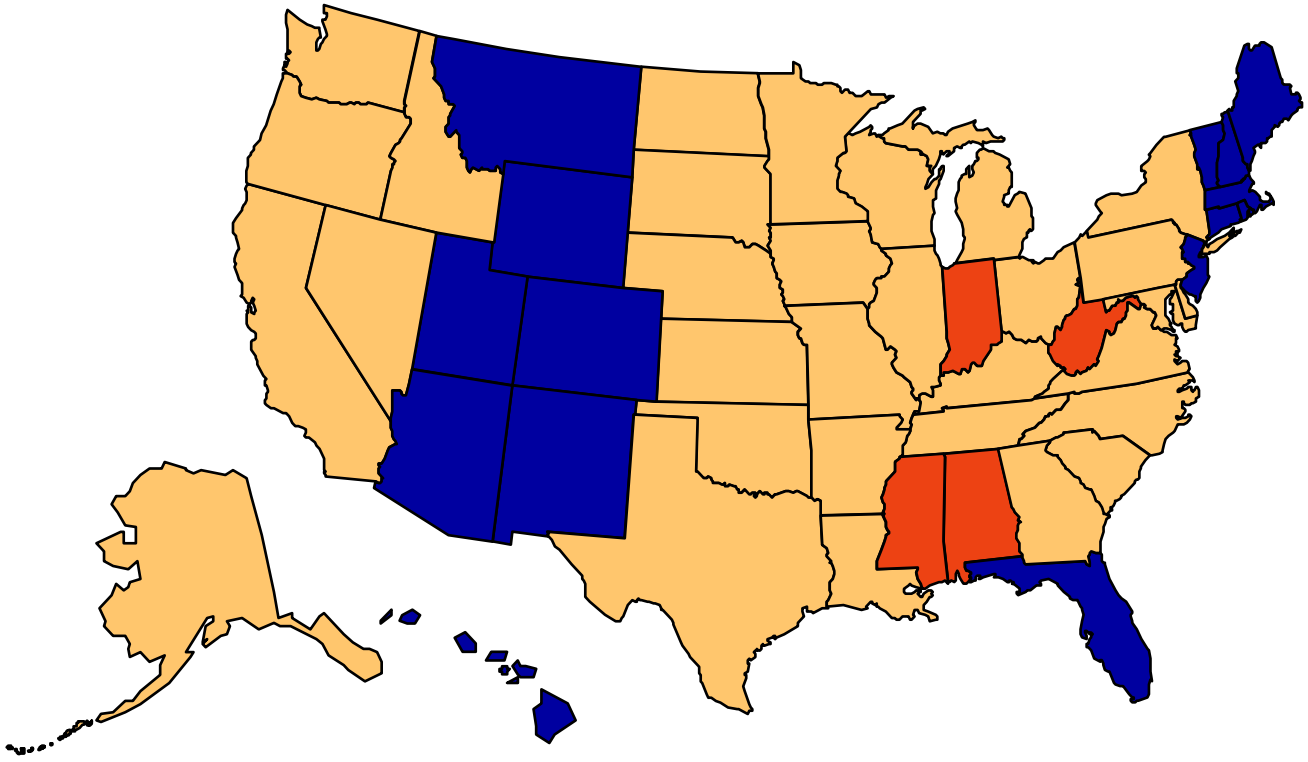

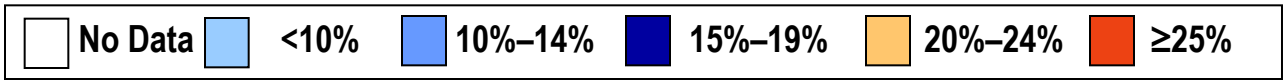

Obesity Trends* Among U.S. Adults

BRFSS, 2004

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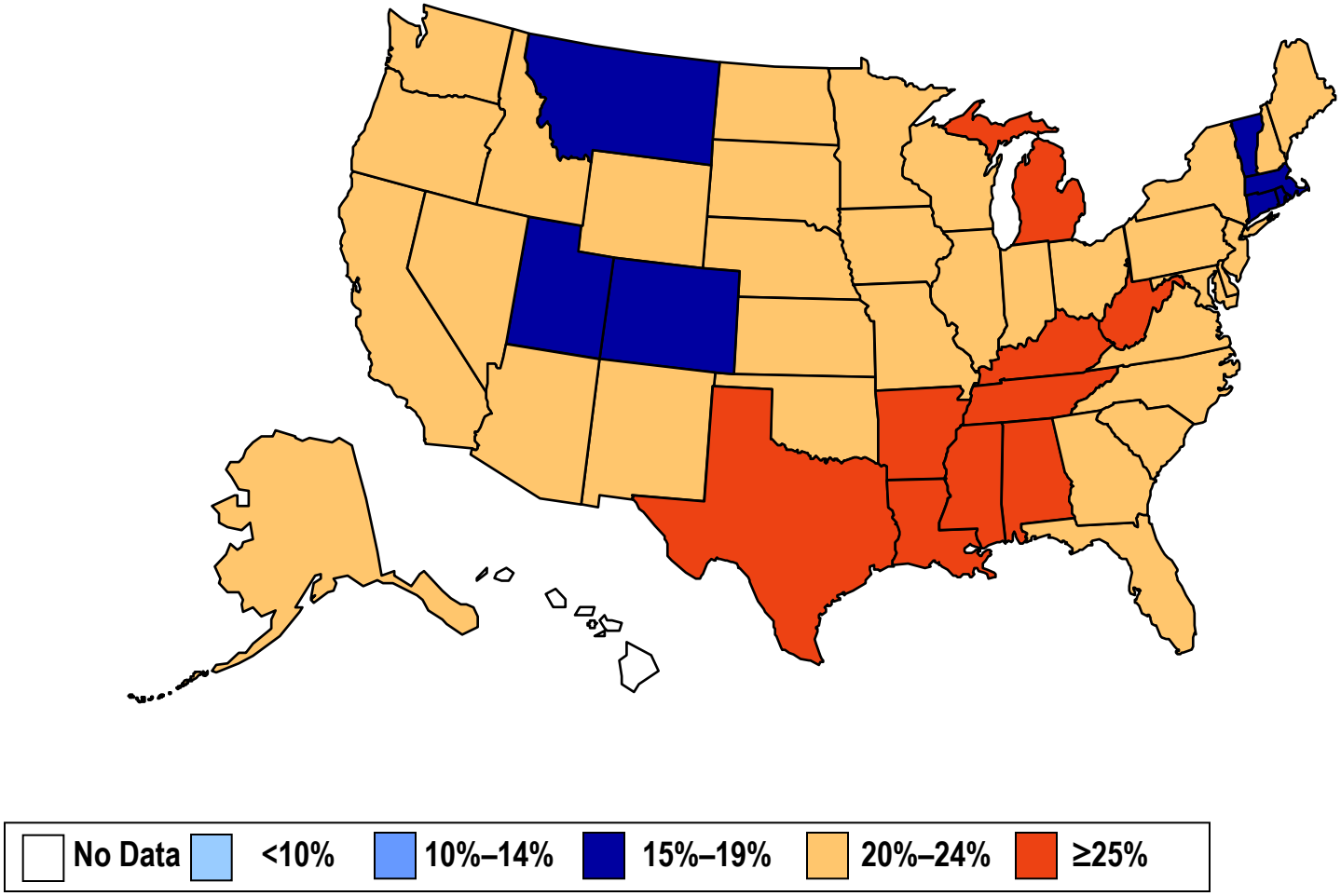
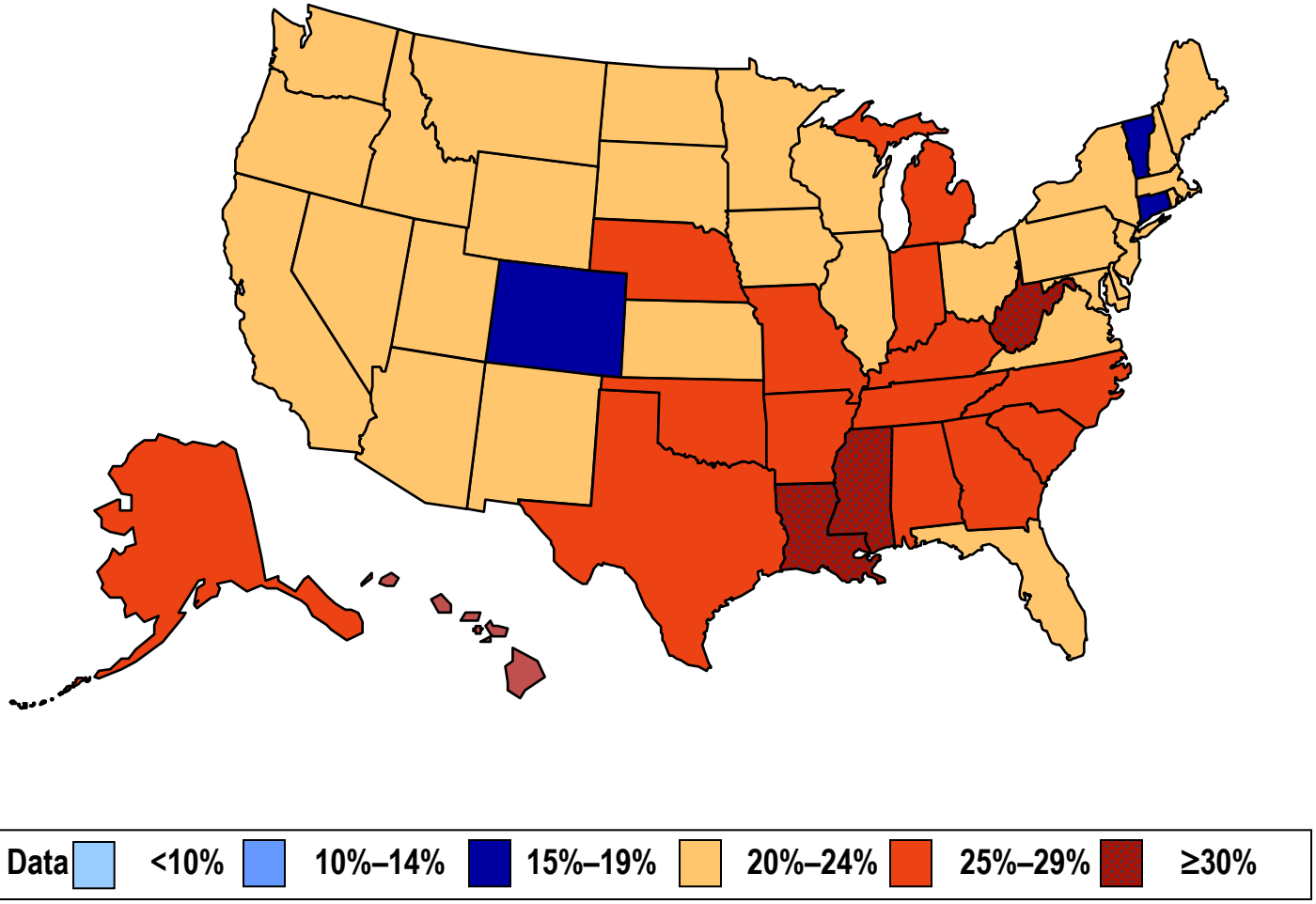


Obesity Trends* Among U.S. Adults

BRFSS, 2005

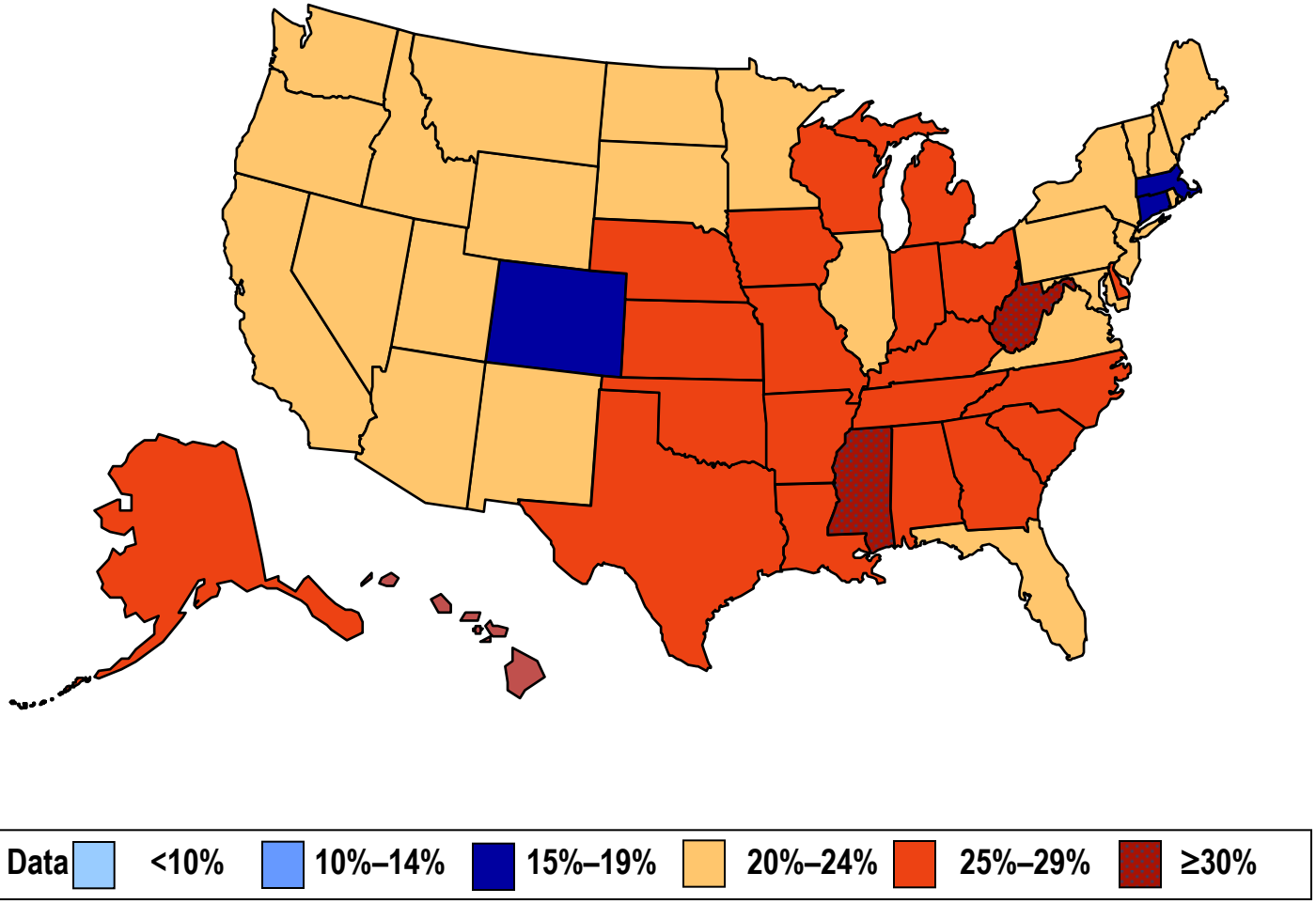
(*BMI ≥30, or ~ 30 lbs. overweight for 5’ 4” person)



Obesity Trends* Among U.S. Adults

BRFSS, 2006

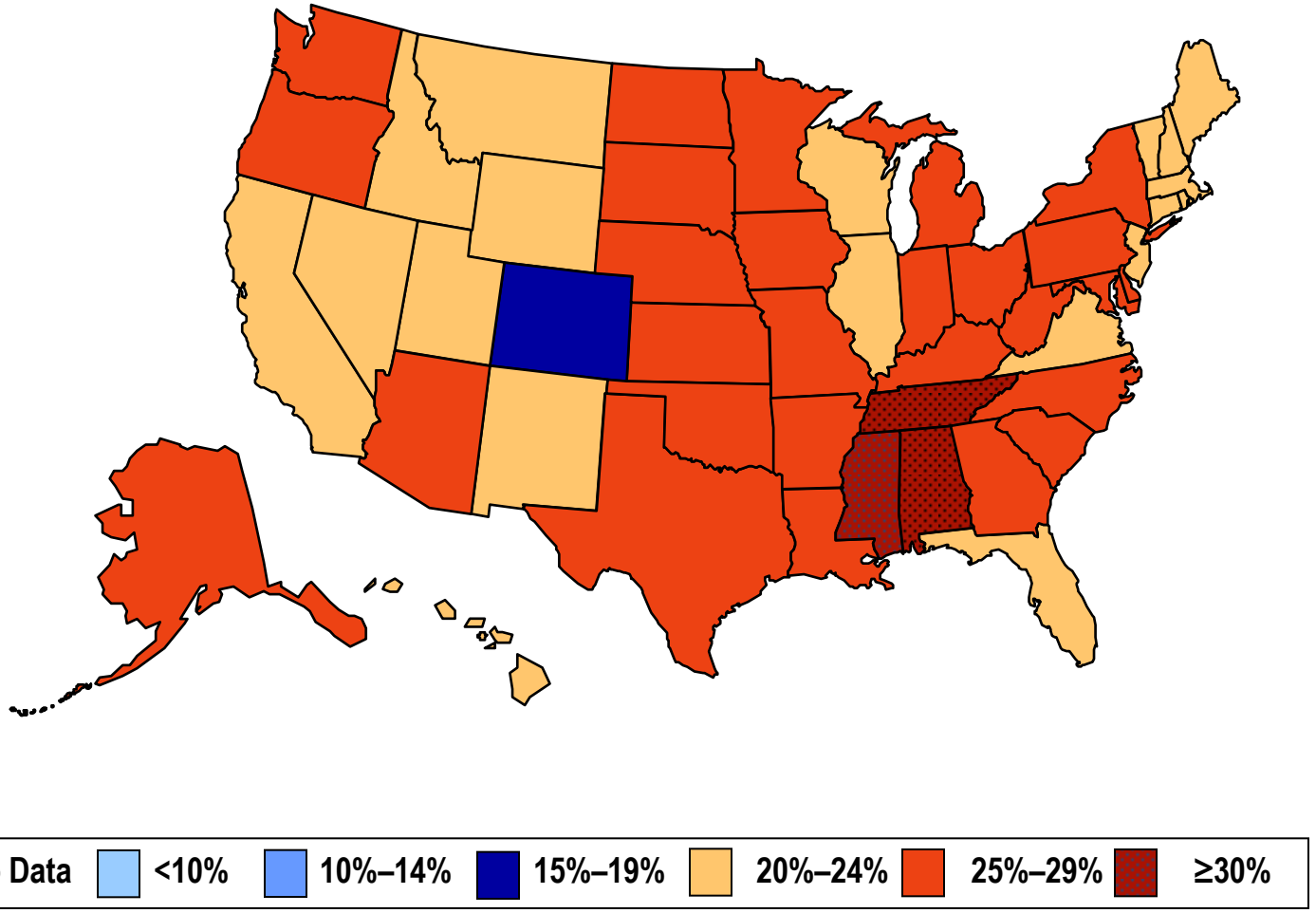
(*BMI ≥30, or ~ 30 lbs. overweight for 5’ 4” person)



Obesity Trends* Among U.S. Adults

BRFSS, 2007

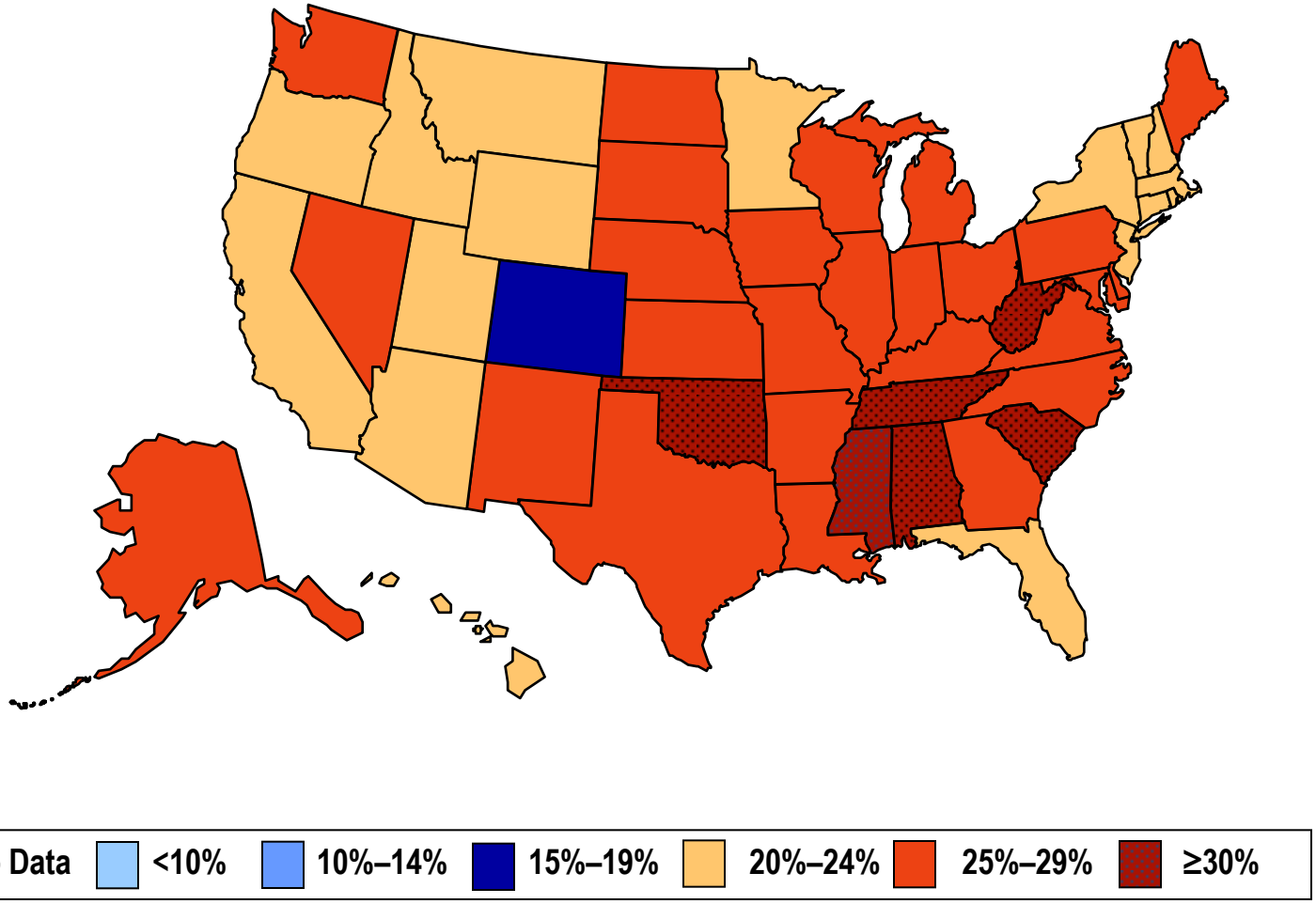
(*BMI ≥30, or ~ 30 lbs. overweight for 5’ 4” person)



Obesity Trends* Among U.S. Adults

BRFSS, 2008

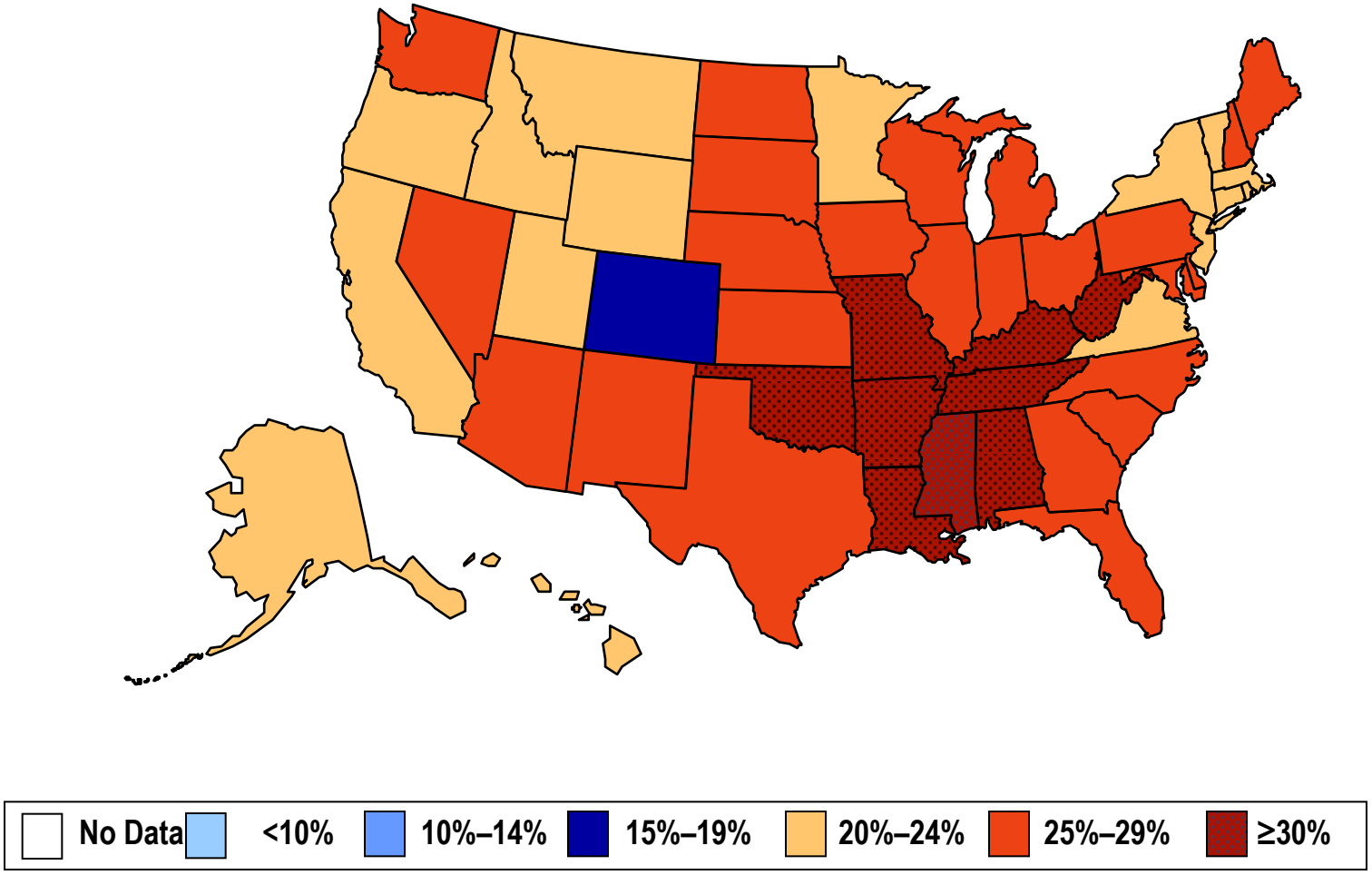
(*BMI ≥30, or ~ 30 lbs. overweight for 5’ 4” person)



Obesity Trends* Among U.S. Adults

BRFSS, 2009

(*BMI ≥30, or ~ 30 lbs. overweight for 5’ 4” person)



Obesity Trends* Among U.S. Adults

BRFSS, 2010

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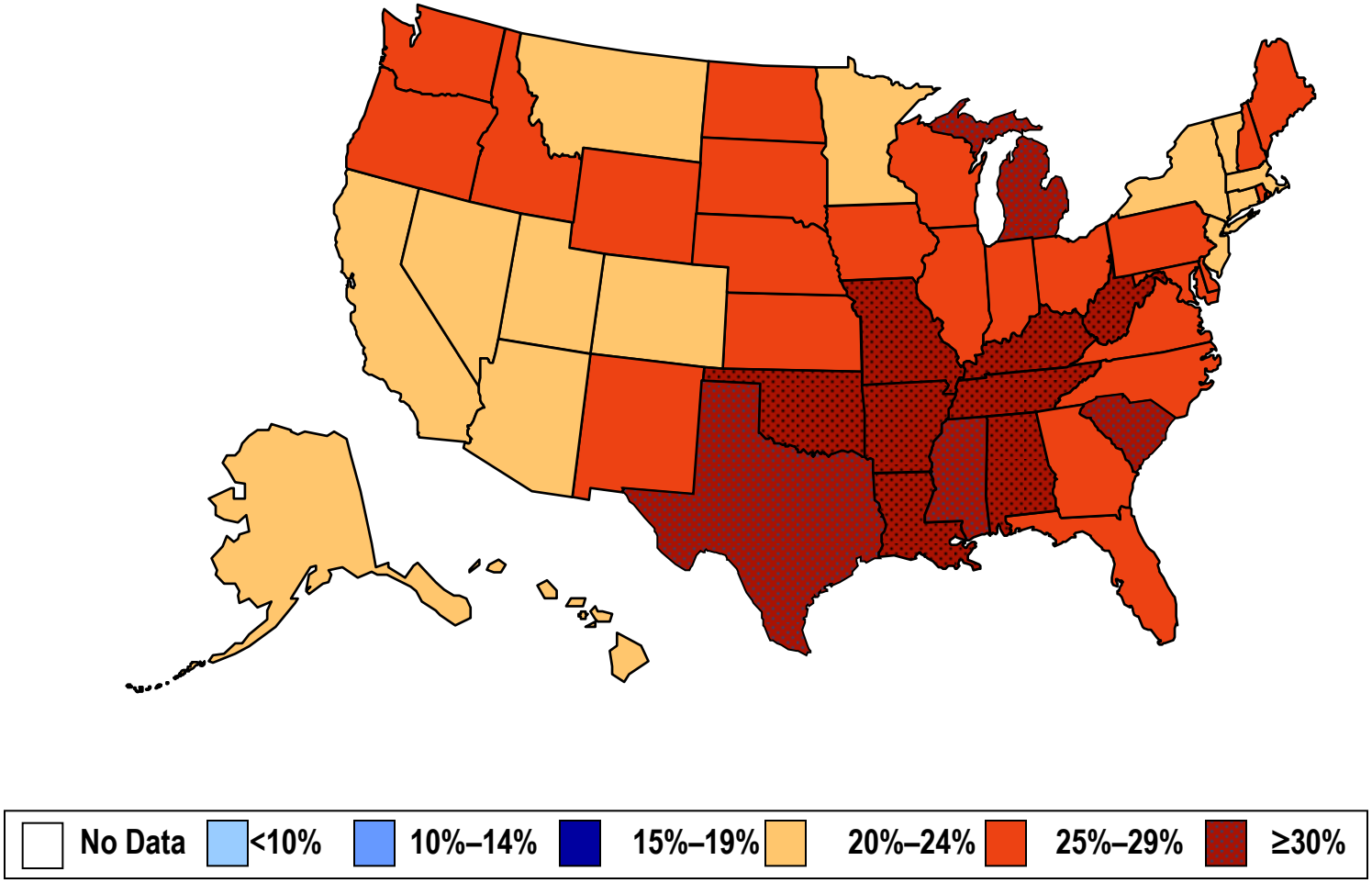
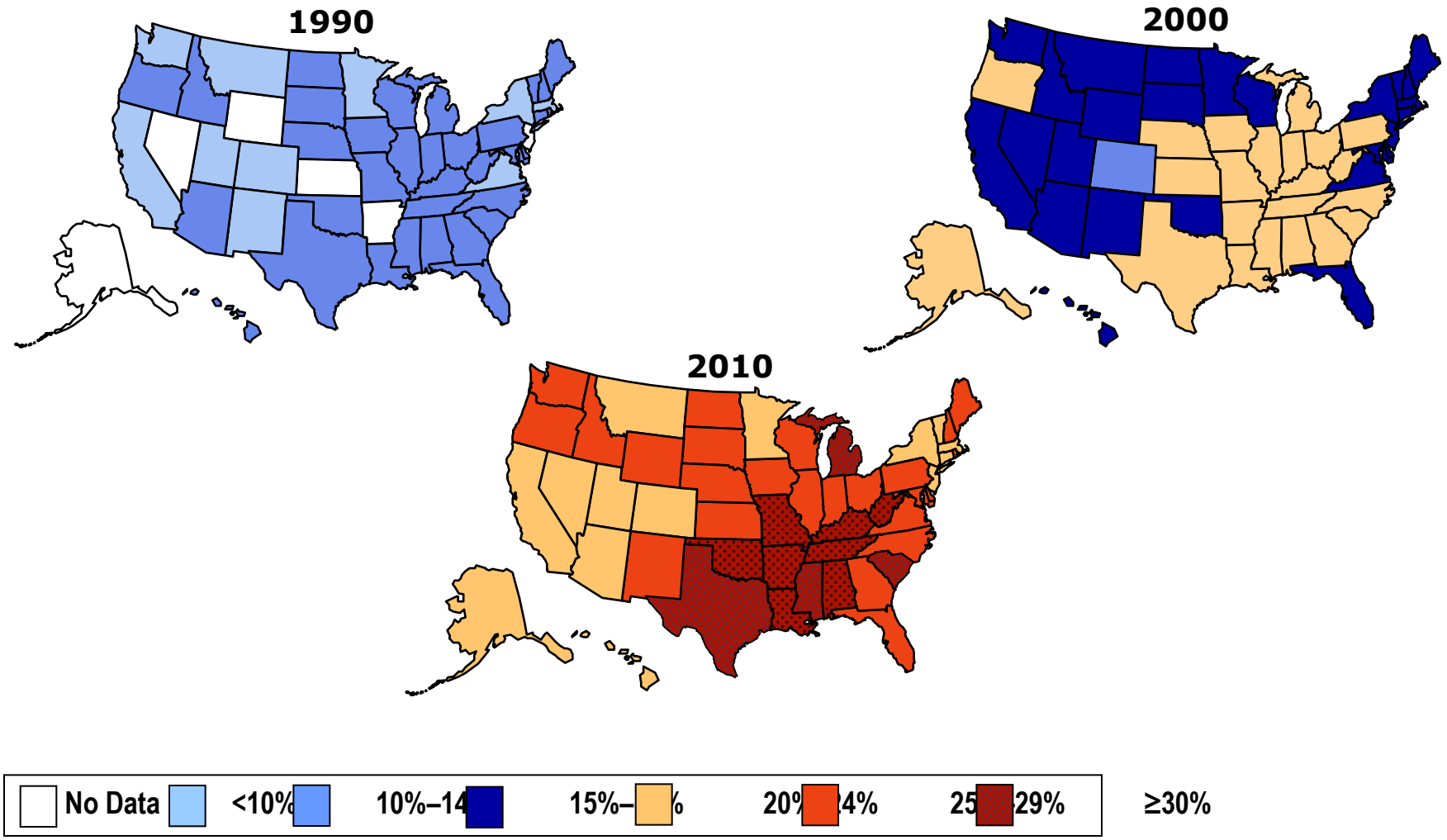


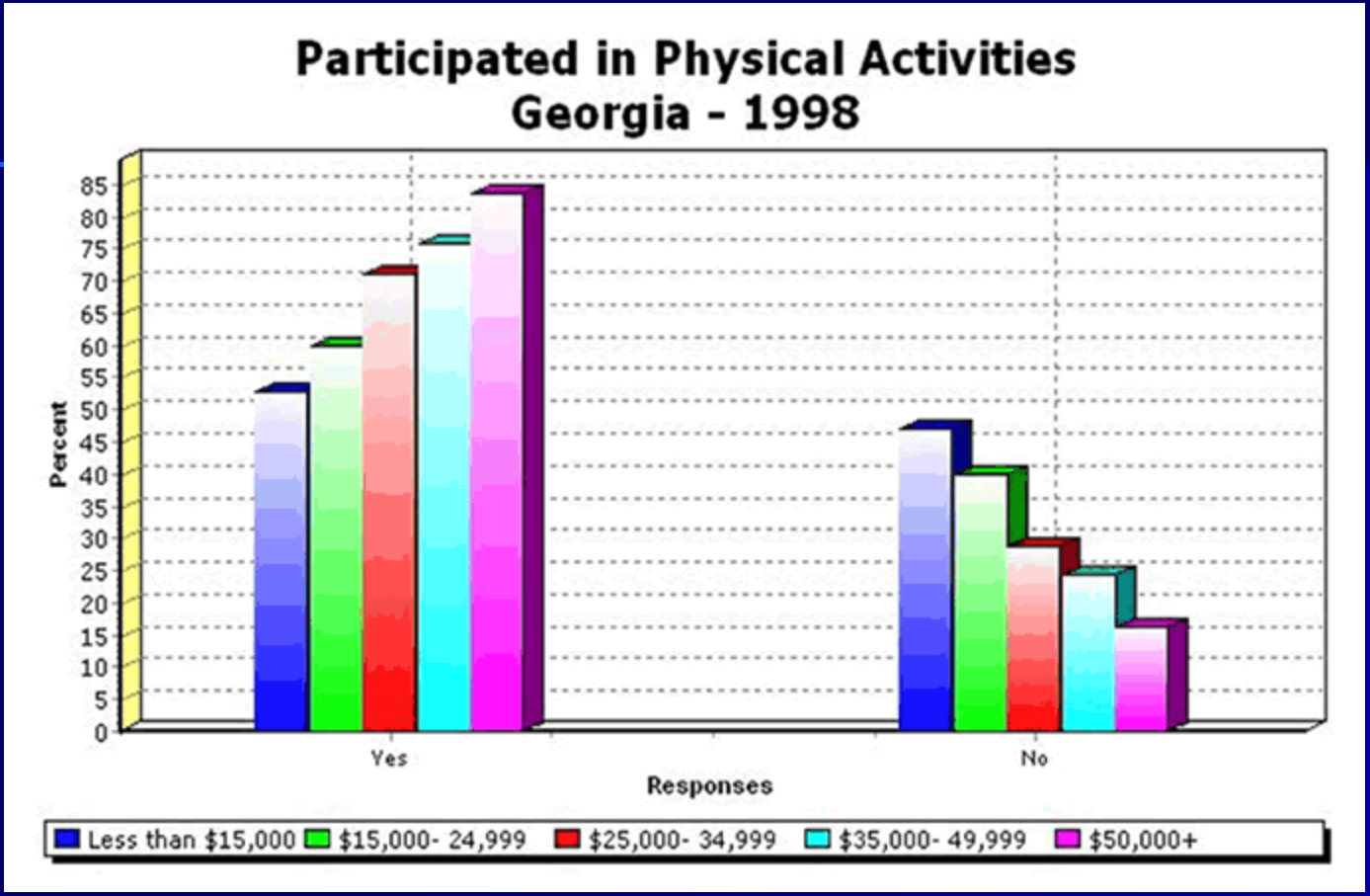
Obesity Trends* Among U.S. Adults

BRFSS, 1990, 2000, 2010

(*BMI ≥30, or about 30 lbs. overweight for 5'4" person)



Physical Activity
Georgia 1998



Source: BRFSS 1998

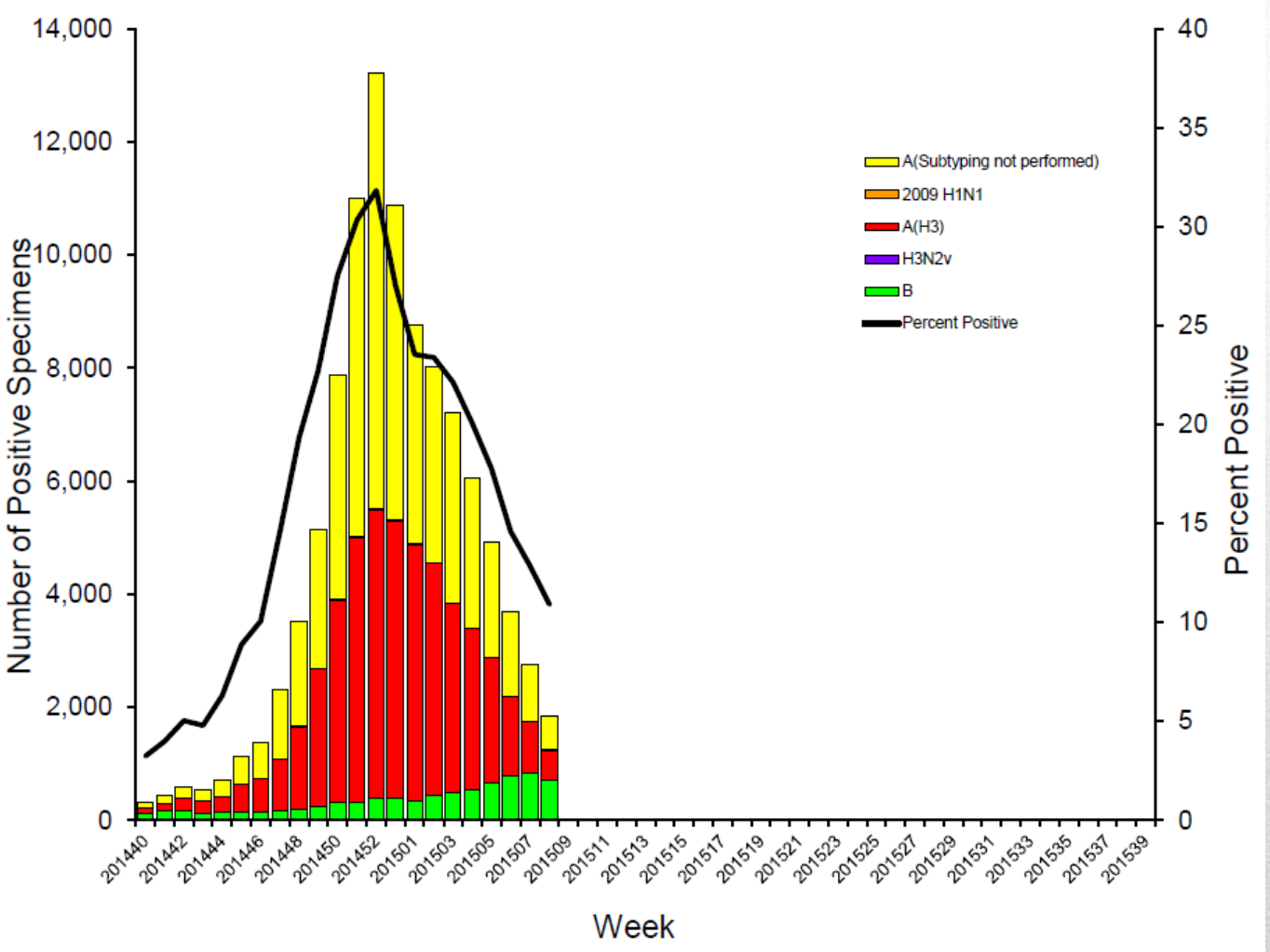
2014-15 Influenza Vaccine Composition, Northern Hemisphere:

- A/California/7/2009 (H1N1)pdm09-like virus
- A A/Texas/50/2012 (H3N2)-like virus
- B/Massachusetts/2/2012-like virus
- B/Brisbane/60/2008-like virus*

* 2014-2015 Northern Hemisphere quadrivalent influenza vaccine influenza B component

2009 Influenza A (H1N1)	27 of 27 (100%) - A/California/7/2009-like
Influenza A (H3N2)	229 of 814 (28.1%) - A/Texas/50/2012 (H3N2)-like
Influenza B (Yamagata Lineage)	138 of 148 (95.2%) - B/Massachusetts/2/2012-like virus
Influenza B (Victoria Lineage)	43 of 47 (91.5%) - B/Brisbane/60/2008-like*

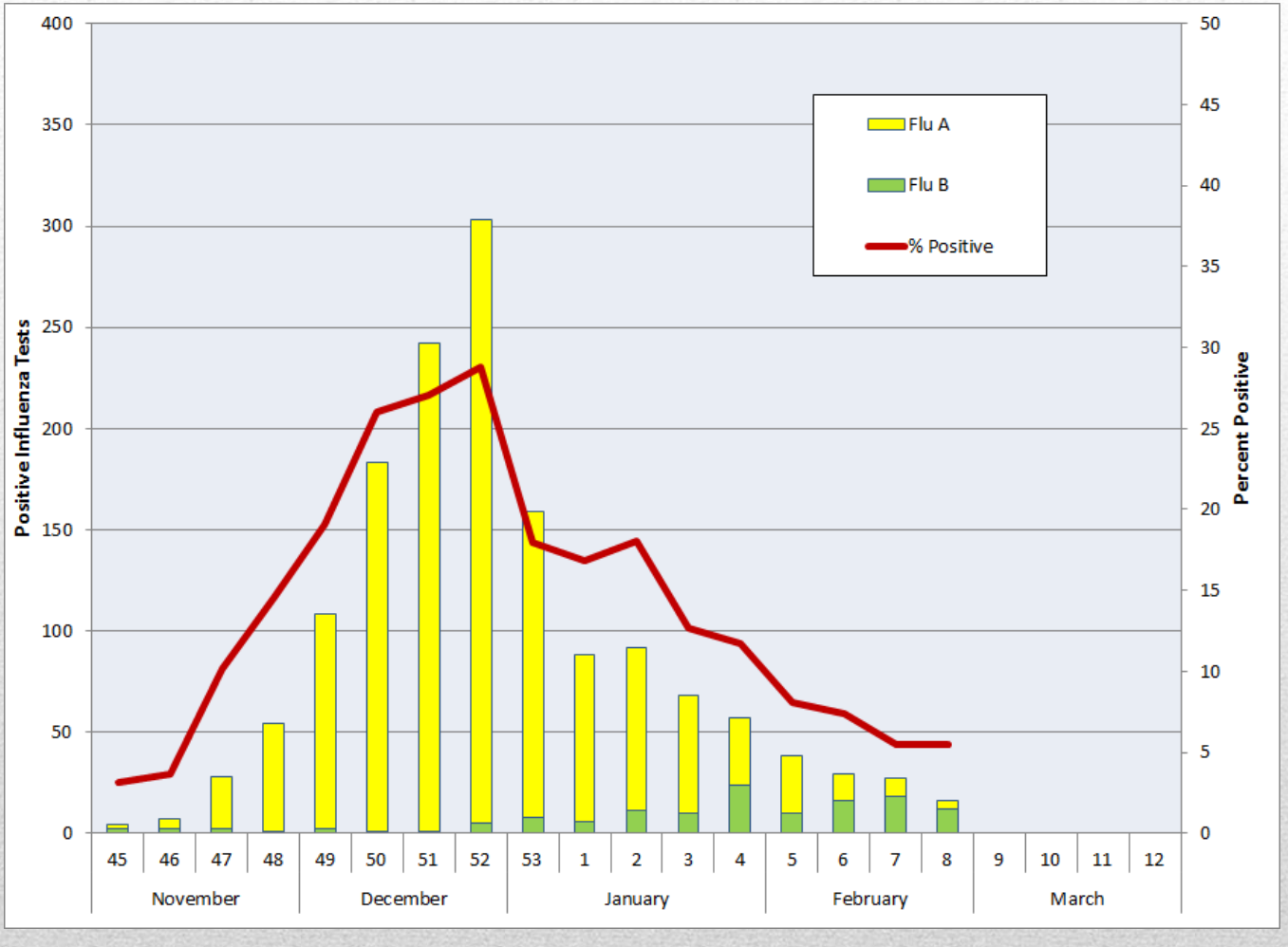
Antigenic Characterization of Influenza Isolates 2014-2015



Influenza Positive Tests Reported to CDC by U.S. WHO/NREVSS Collaborating Laboratories, National Summary, 2014-15

	Week 7	Data Cumulative since September 28, 2014 (Week 40)
No. of specimens tested	16,821	509,958
No. of positive specimens (%)	1,834 (10.9%)	102,274 (20.1%)
Positive specimens by type/subtype		
Influenza A	1,128 (61.5%)	94,477 (92.4%)
A(H1N1)pdm09	11 (1.0%)	179 (0.2%)
H3	524 (46.5%)	44,943 (47.6%)
Subytping not performed	593 (52.6%)	49,354 (52.2%)
Influenza B	706 (38.5%)	7,797 (7.6%)

Influenza Positive Tests Reported to CDC by U.S. WHO/NREVSS Collaborating Laboratories, National Summary, 2014-15



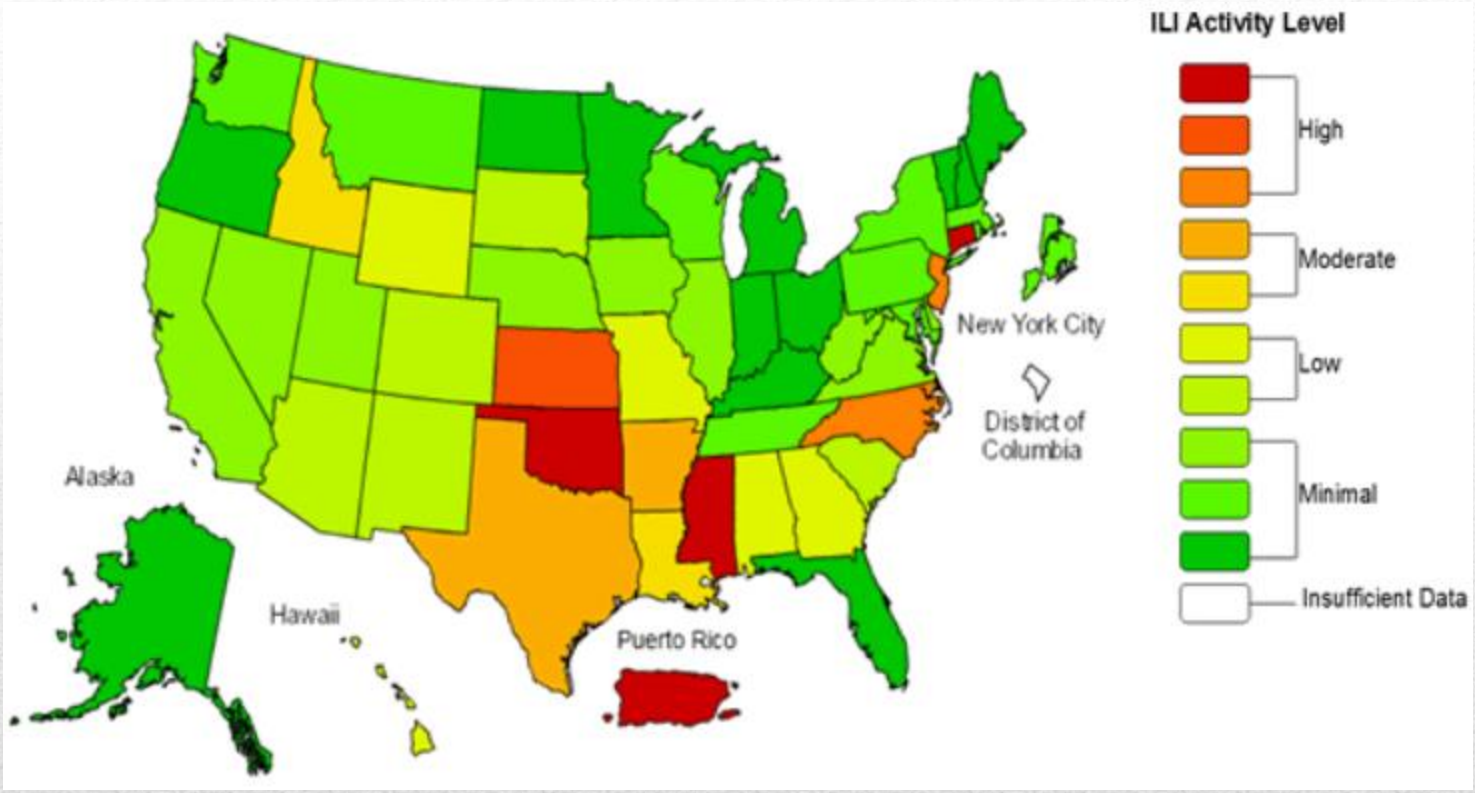
Influenza Positive Tests and Percent Positive, Denton County Hospitals and Providers 2014-2015

Neuraminidase Inhibitor Resistance Testing Results on Samples Collected Since October 1, 2014

	Oseltamivir		Zanamivir		Peramivir	
	Virus Samples tested (n)	Resistant Viruses, Number (%)	Virus Samples tested (n)	Resistant Viruses, Number (%)	Virus Samples tested (n)	Resistant Viruses, Number (%)
Influenza A (H1N1)pdm09	32	1 (3.1)	28	0 (0.0)	32	1 (3.1)
Influenza A (H3N2)	1,944	0 (0.0)	1,944	0 (0.0)	1,222	0 (0.0)
Influenza B	237	0 (0.0)	237	0 (0.0)	237	0 (0.0)

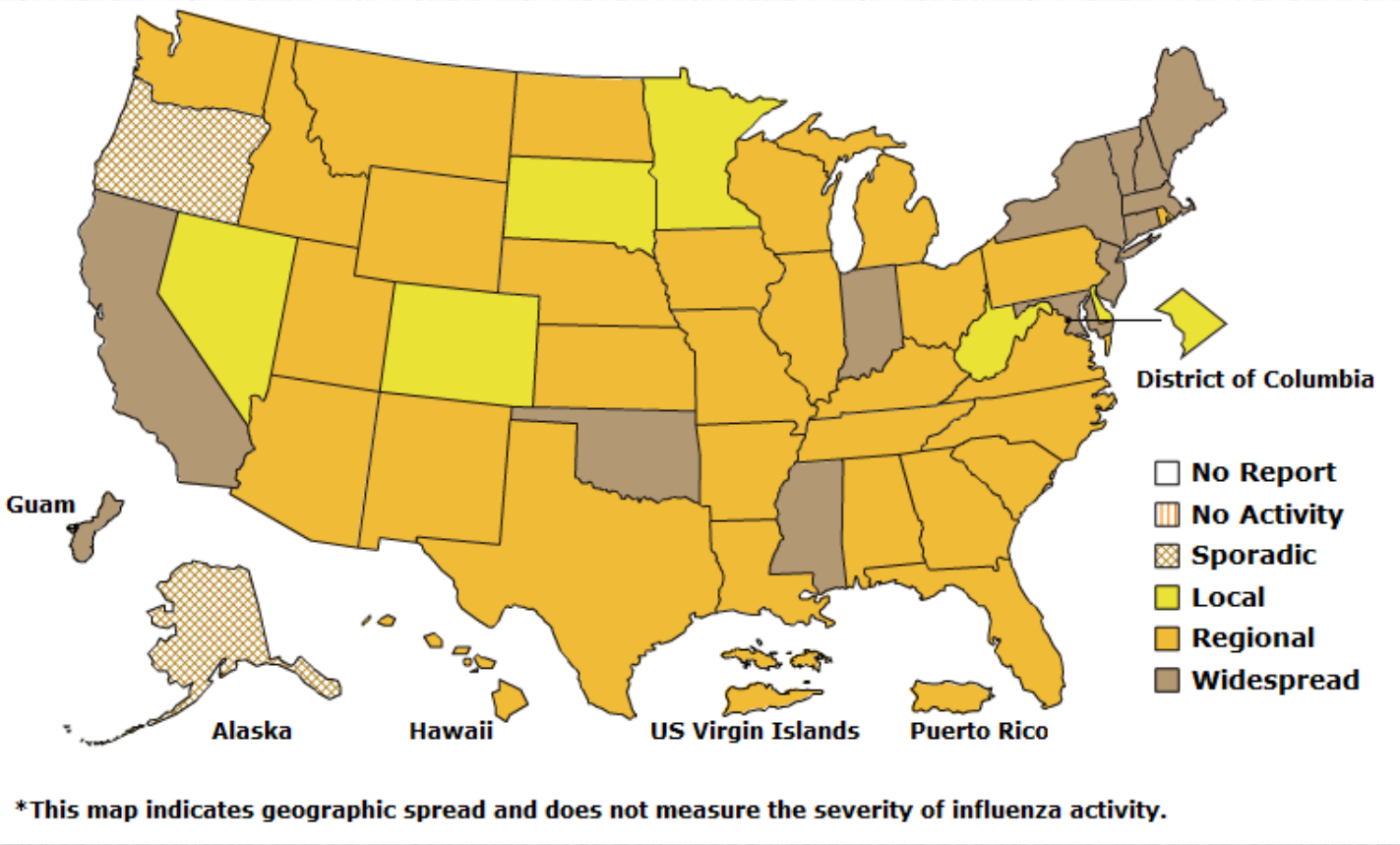
Vaccine Effectiveness(VE)

- VE = 23% (95% confidence interval [CI] = 8%–36%)
  - Represents the reduction in risk provided by the flu vaccine.
  - Relatively low compared with previous seasons (50-60%)
  - More than 2/3 of circulating A (H3N2) viruses are different from the A (H3N2) vaccine component
  - Can still prevent some infections with the currently circulating A (H3N2) viruses as well as other viruses that might circulate later in the season
  - When VE is reduced, vaccination still prevents some illness and serious influenza-related complications



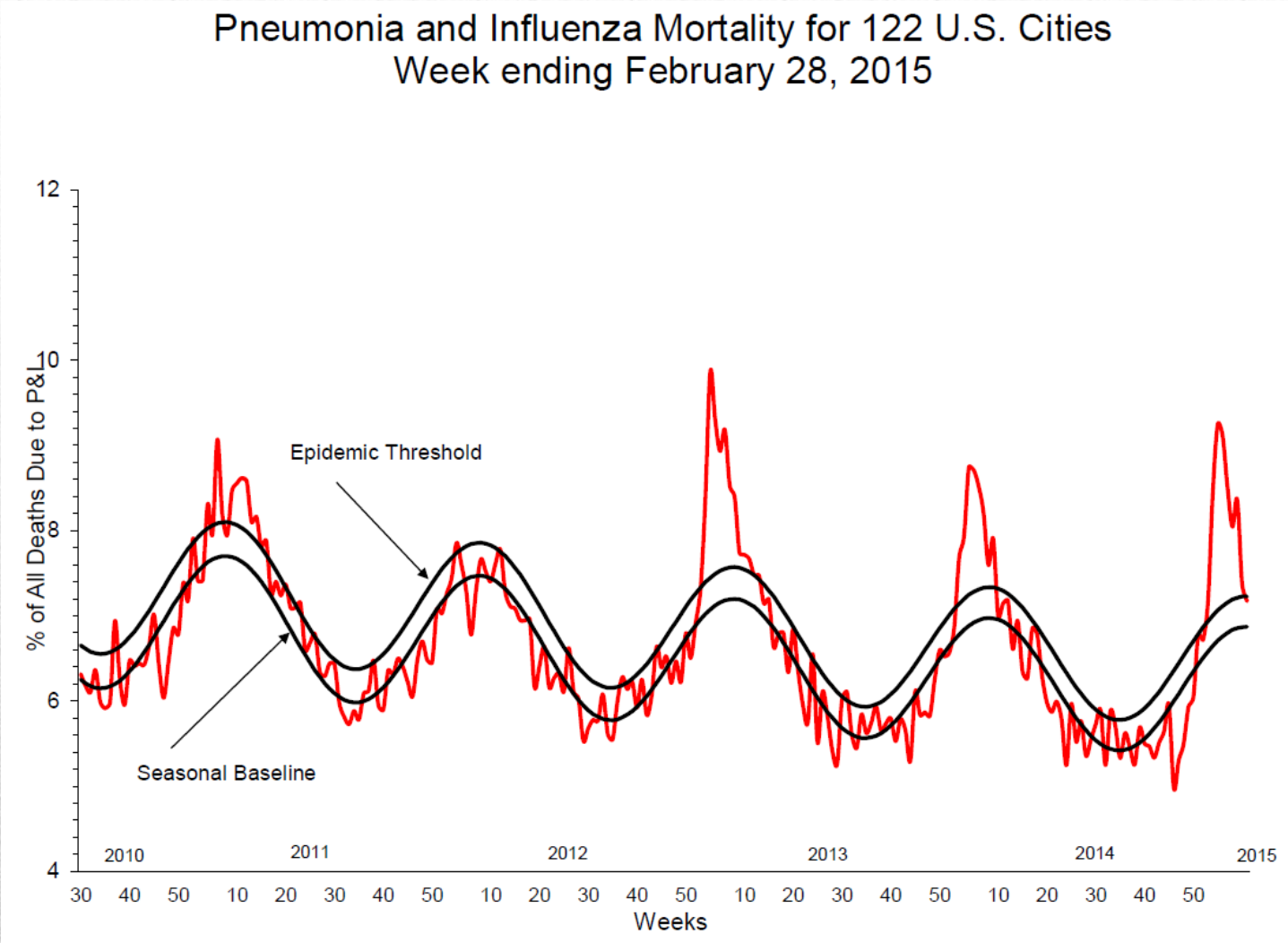
http://gis.cdc.gov/grasp/fluview/main.html

ILI Activity Level Indicator Determined by Data Reported by ILINet, Week Ending February 28, 2015

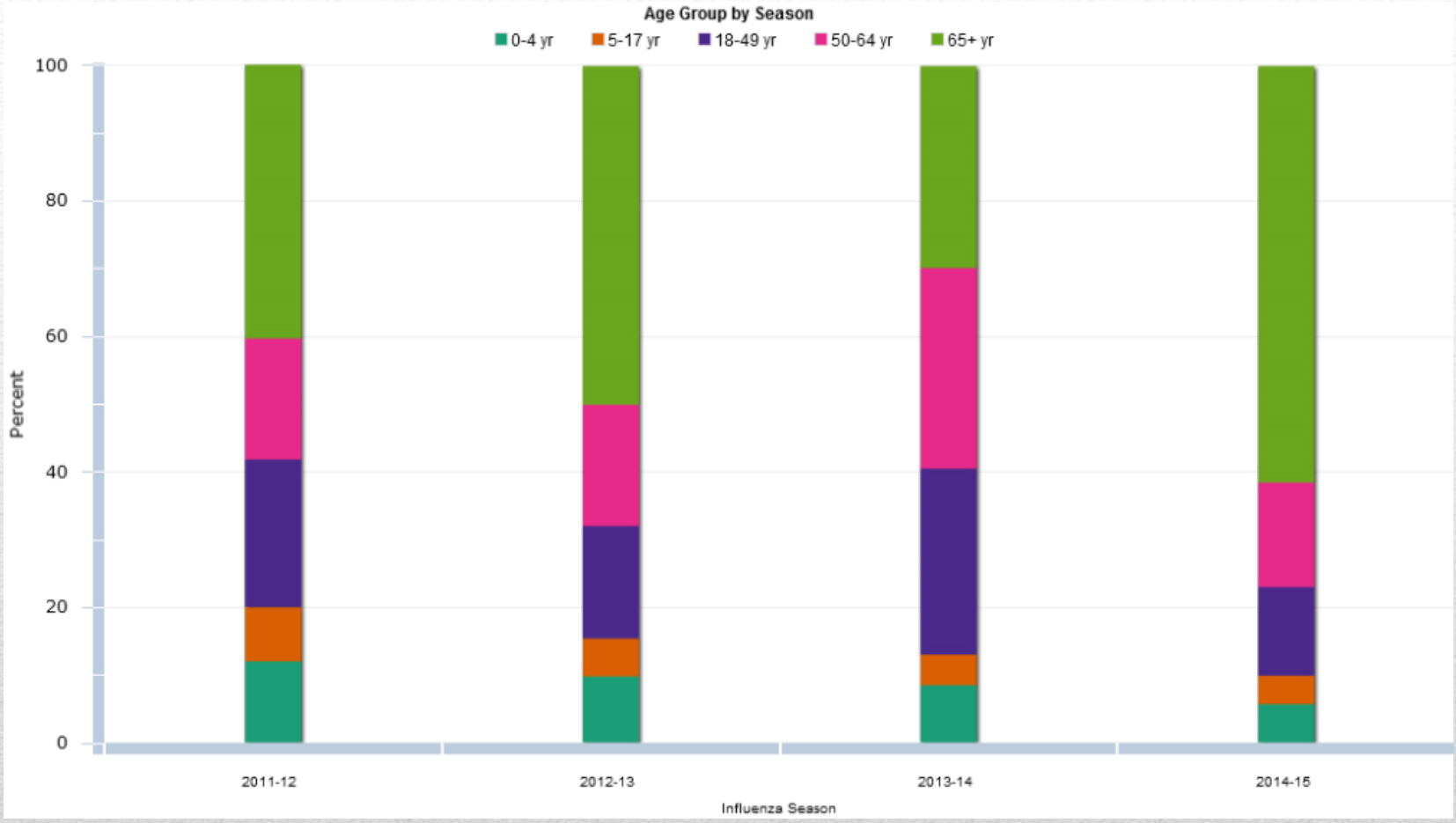


http://www.cdc.gov/flu/weekly/

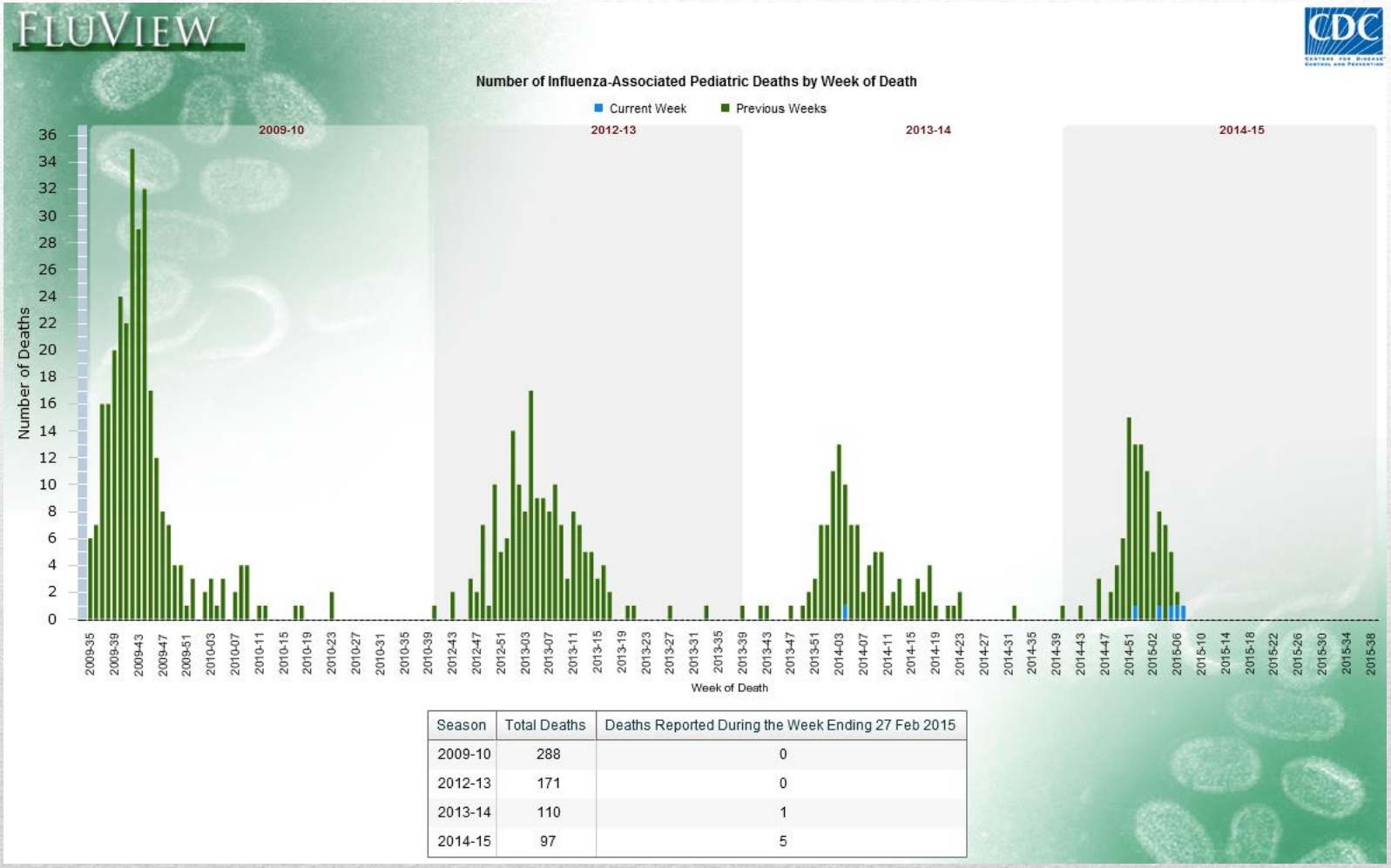
Weekly Influenza Activity Estimates Reported by State and Territorial Epidemiologists* Week Ending February 28, 2015



Pneumonia and Influenza (P&I) Mortality Surveillance:

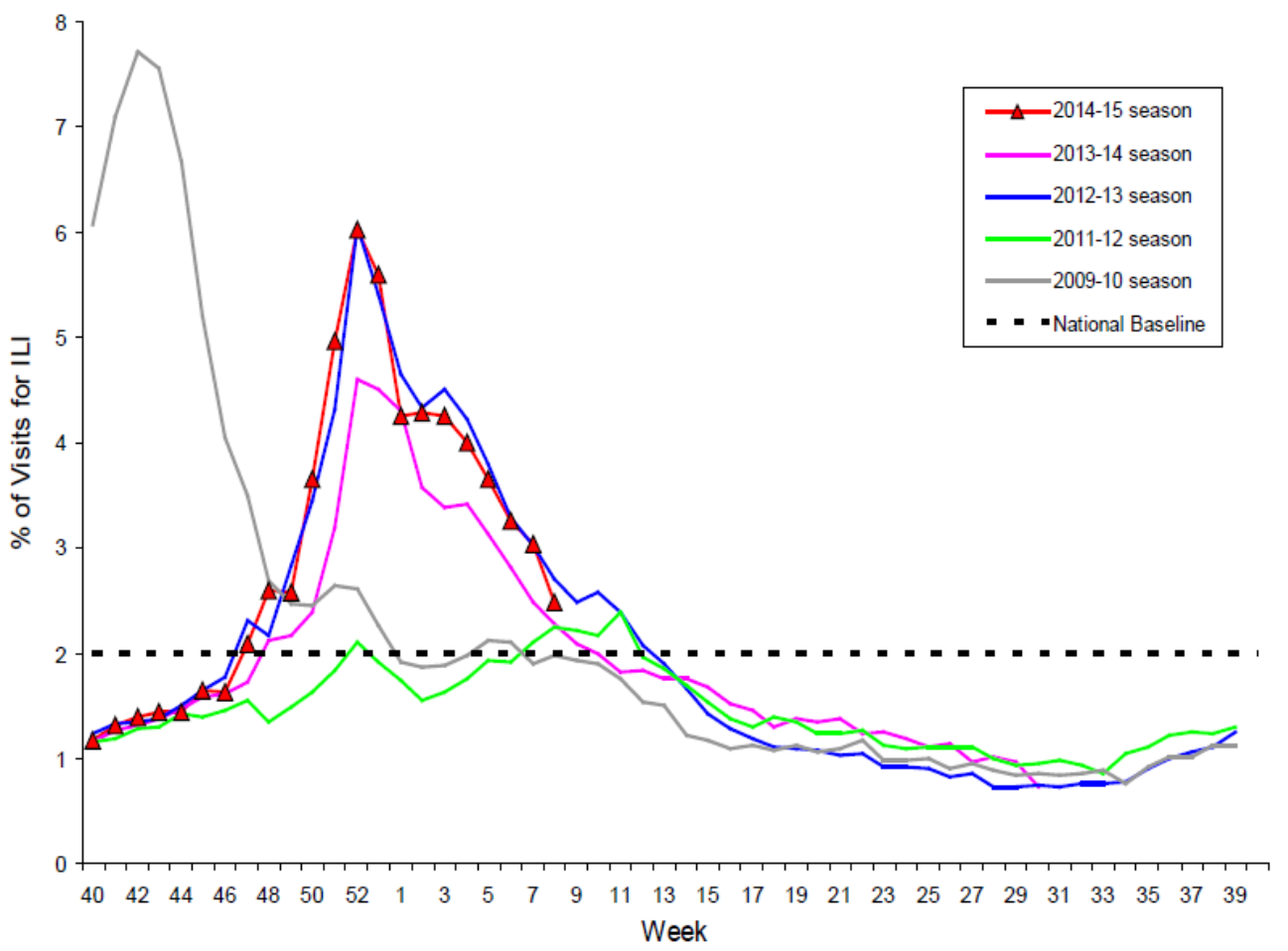


FluSurv-NET Laboratory-Confirmed Influenza Hospitalizations by Age Group, Preliminary data as of Jan 17, 2015

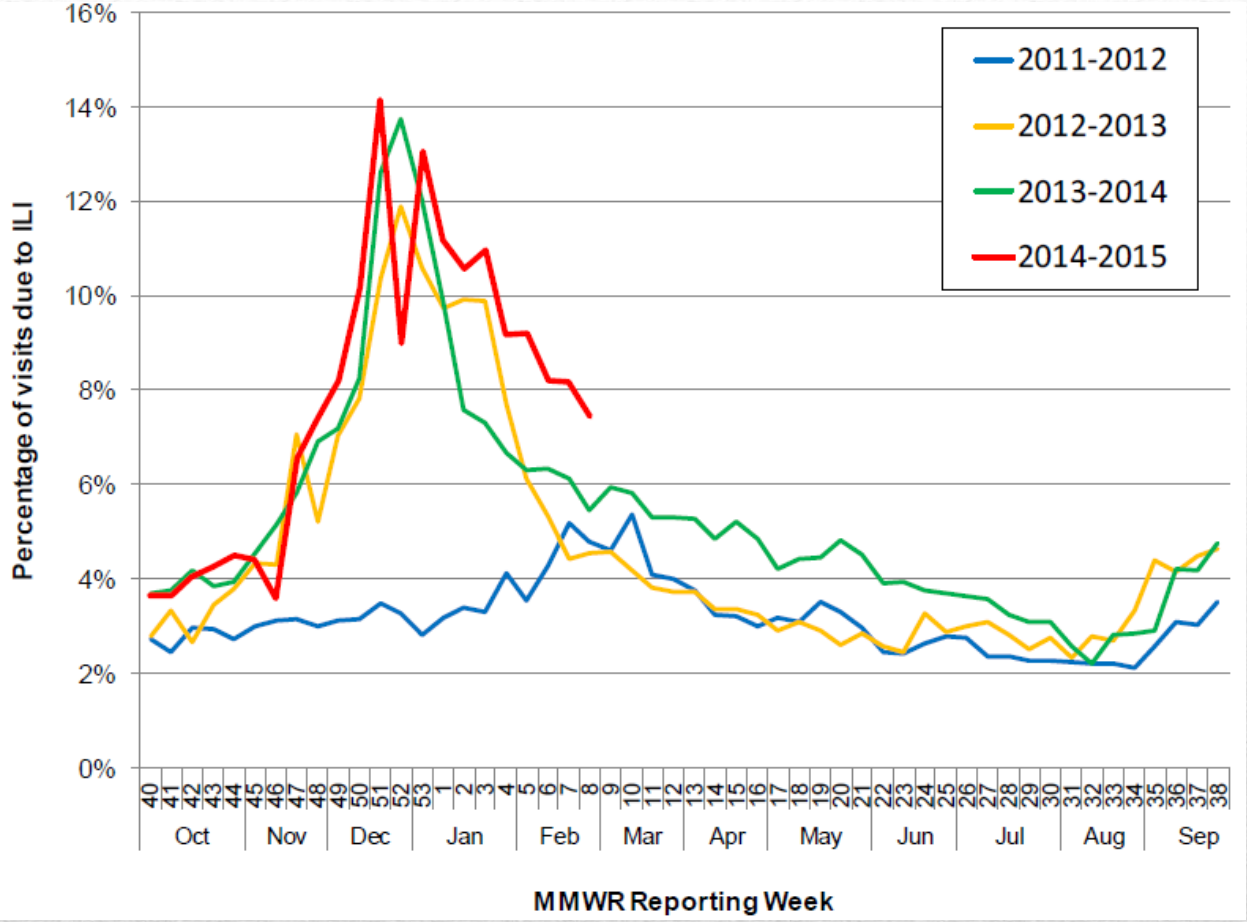


Season	Total Deaths	Deaths Reported During the Week Ending 27 Feb 2015
2009-10	288	0
2012-13	171	0
2013-14	110	1
2014-15	97	5

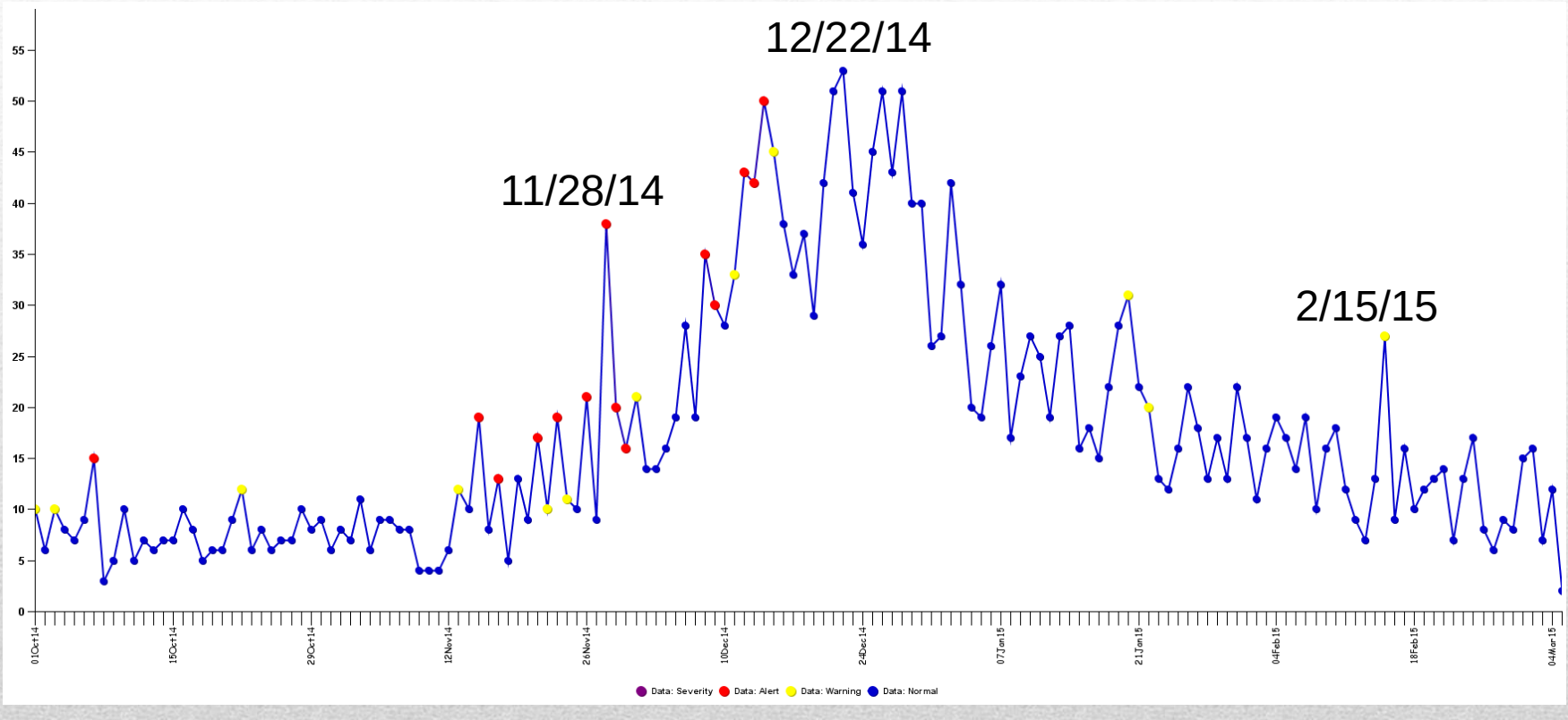
Influenza-Associated Pediatric Mortality:



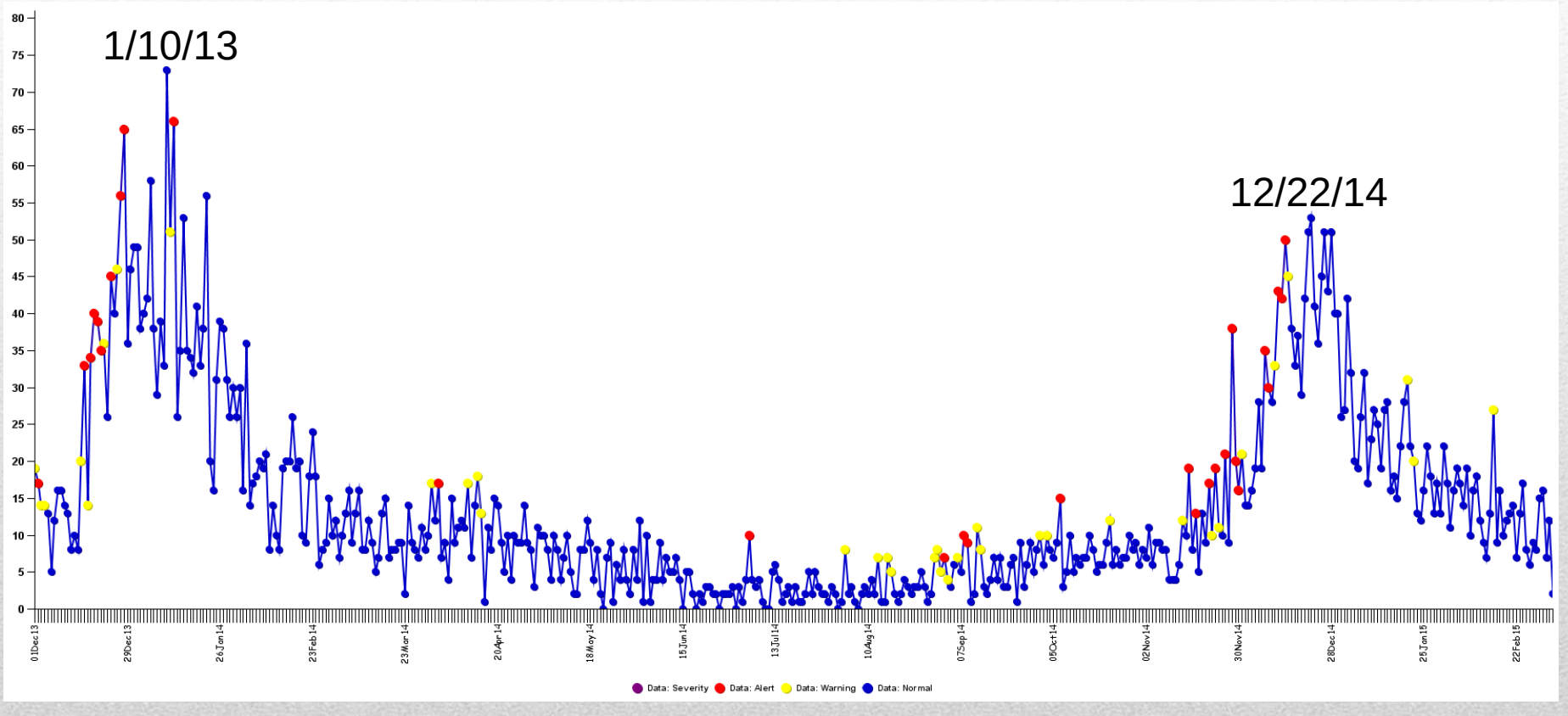
Percentage of Visits Due to ILI Reported by US Outpatient ILI Surveillance Network (ILINet)



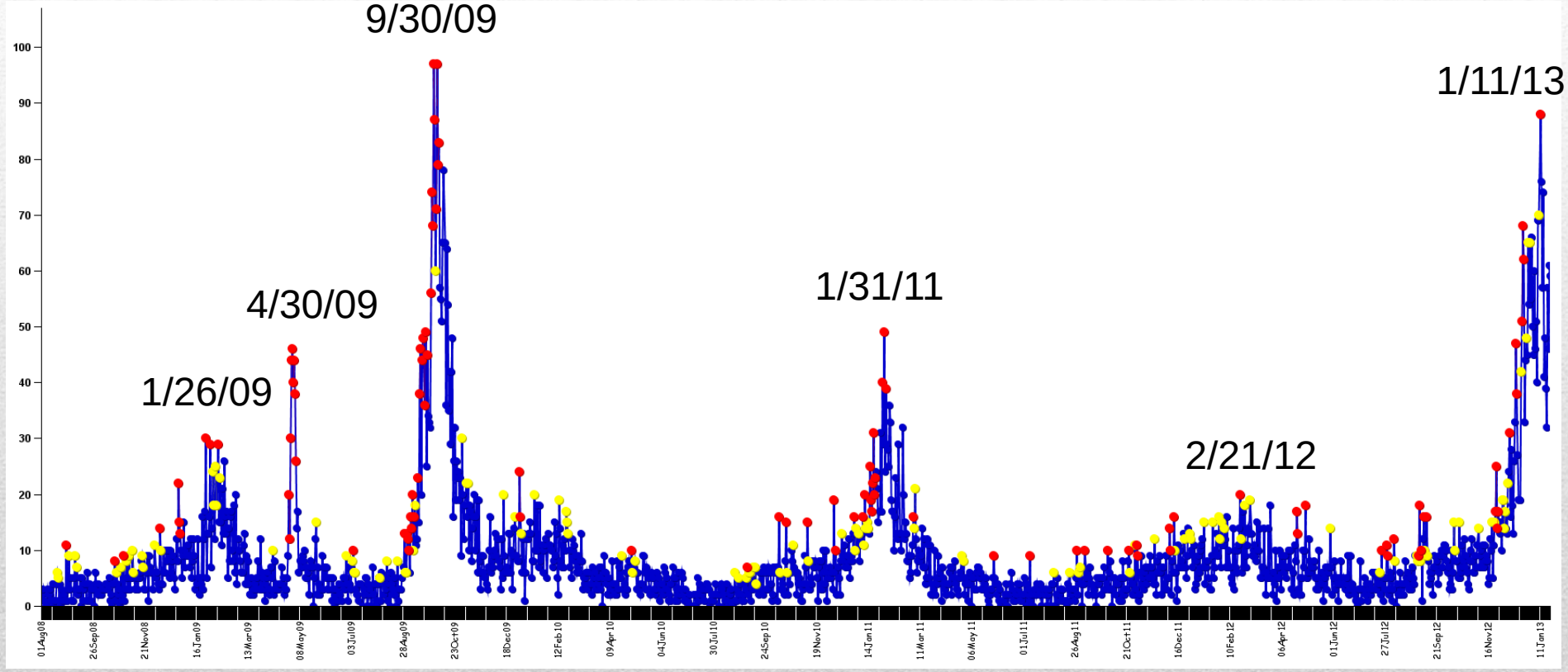
Percentage of Visits Due to ILI Reported by Texas Participants in ILINet



ESSENCE Syndromic Surveillance for ILI, Denton County

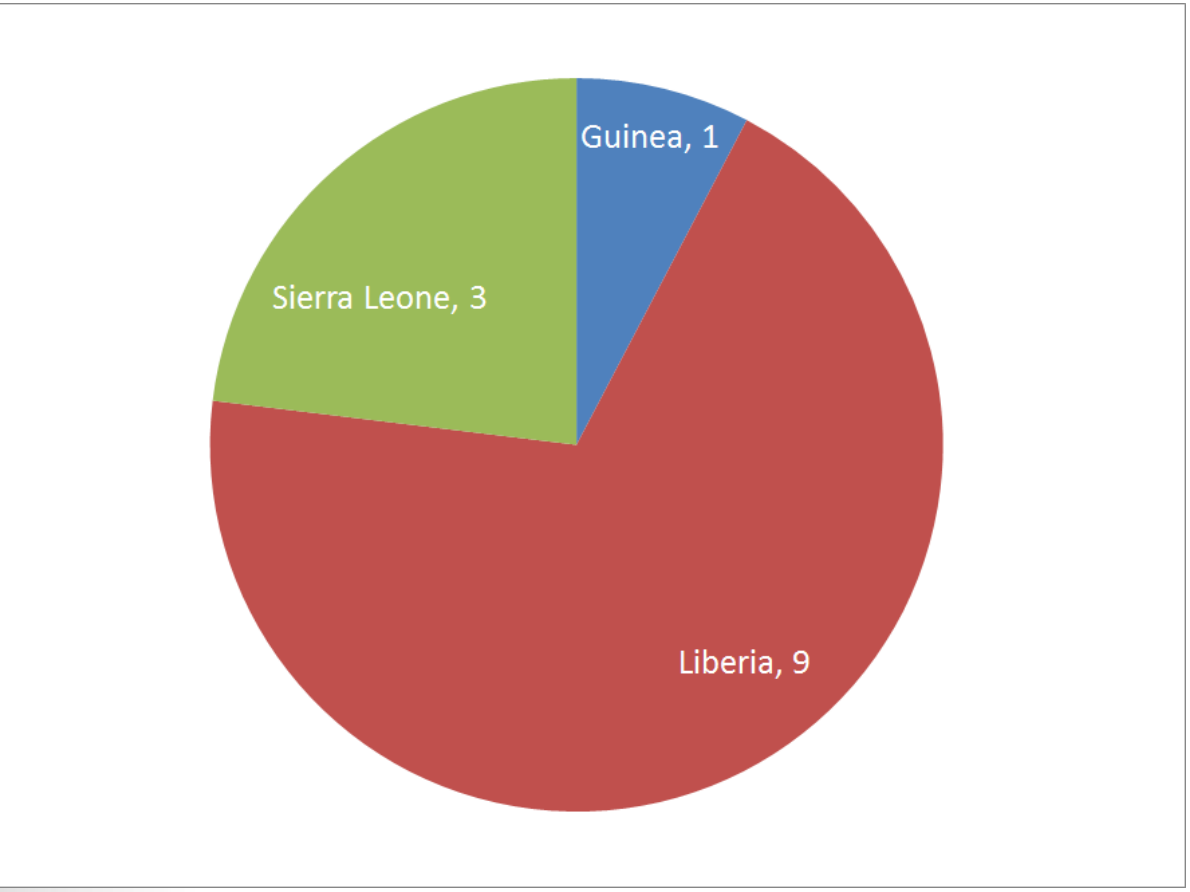


ESSENCE Syndromic Surveillance for ILI, Denton County



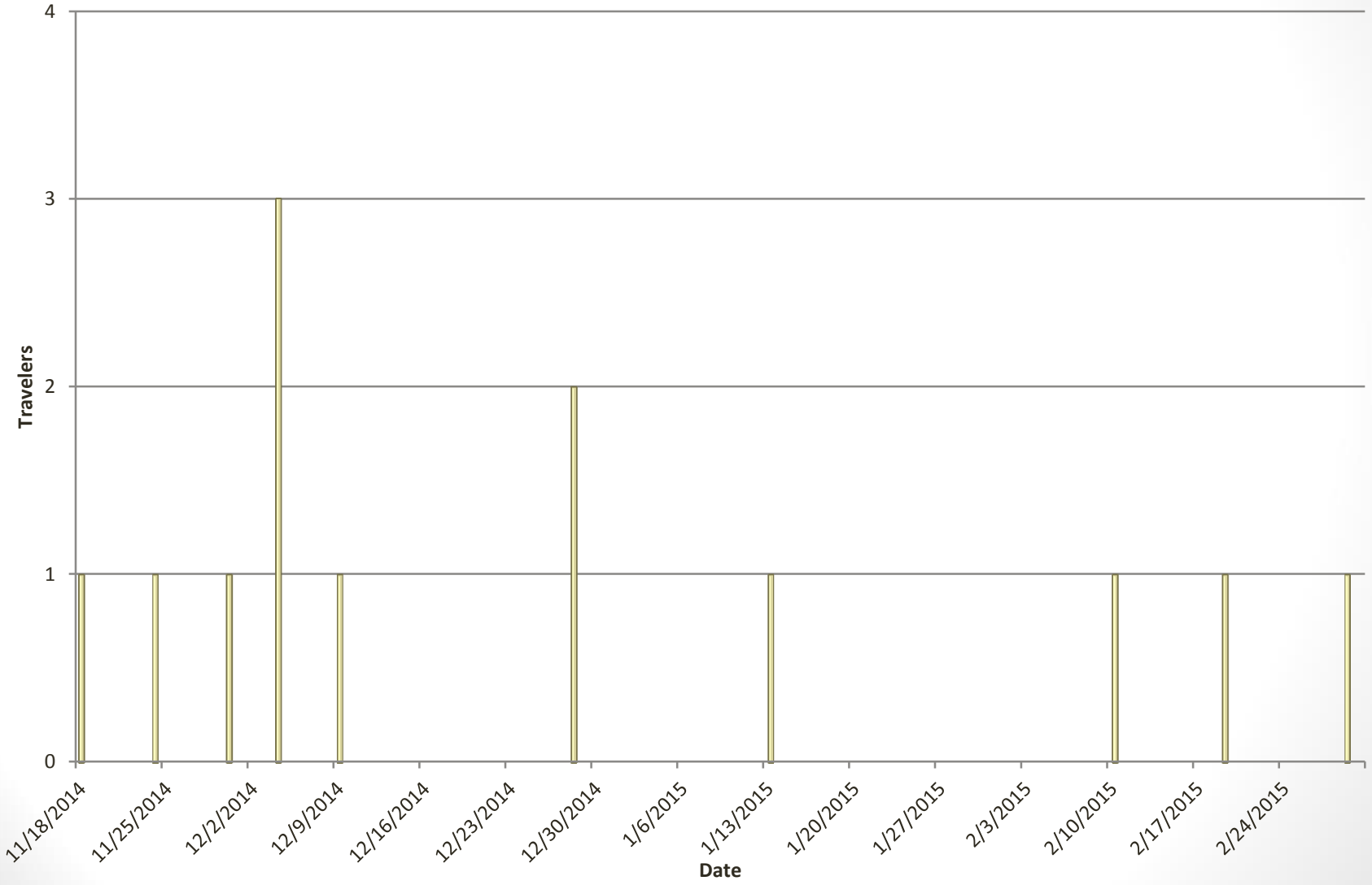
ESSENCE Syndromic Surveillance for ILI, Denton County

West Africa Countries Travelled by Previously Monitored Persons, Denton County



- 11 Total Travelers
  - 12 Low Risk
  - 1 Some Risk

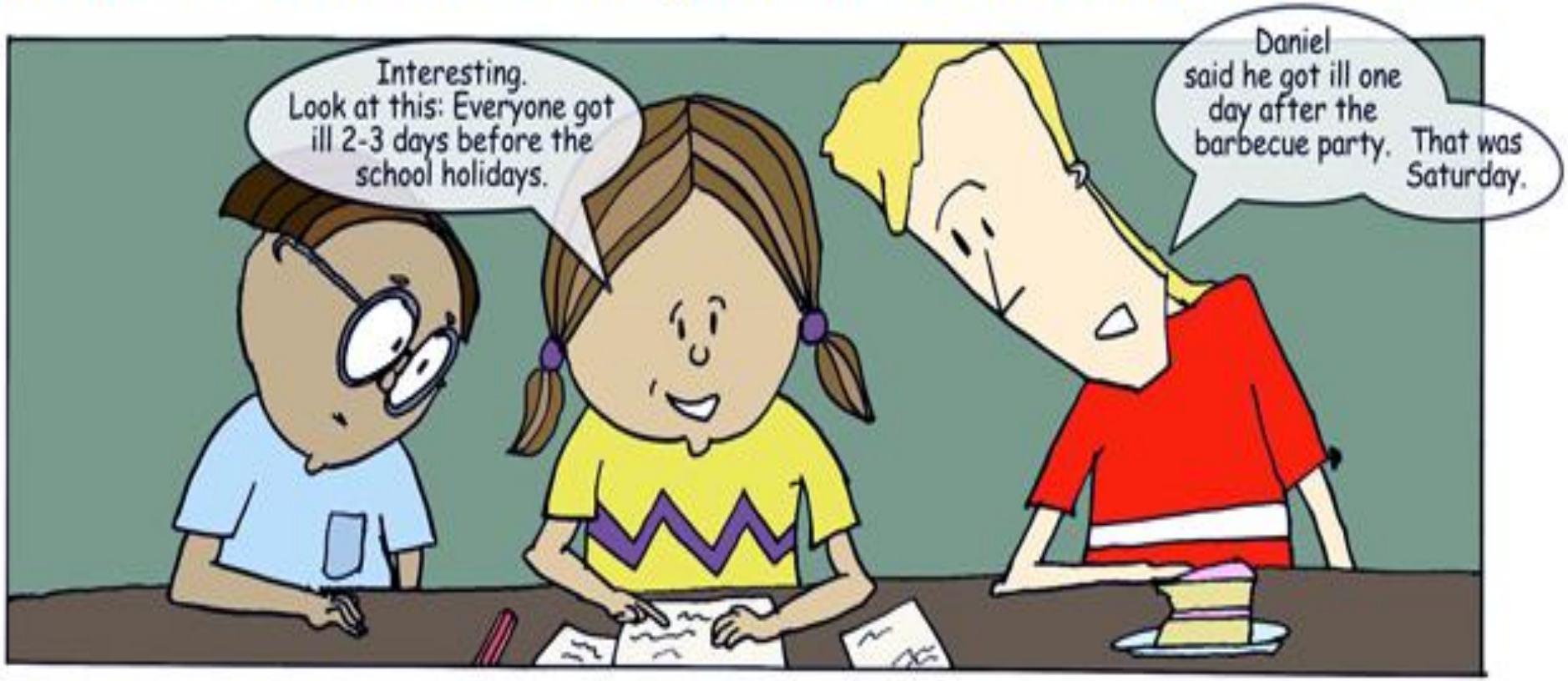
West Africa Travelers Denton County: Last day of Public Health Monitoring



Outbreak Investigations

FIGURE 1

The Disease Detectives detect patterns of disease in their line list



Investigations

- Before you begin an investigation it's important to know what you are dealing with…
  - The agents
  - The reservoir
  - The mode of transmission

The agents

- Bacteria
- Viruses
- Fungi
- Protozoa
- Parasites

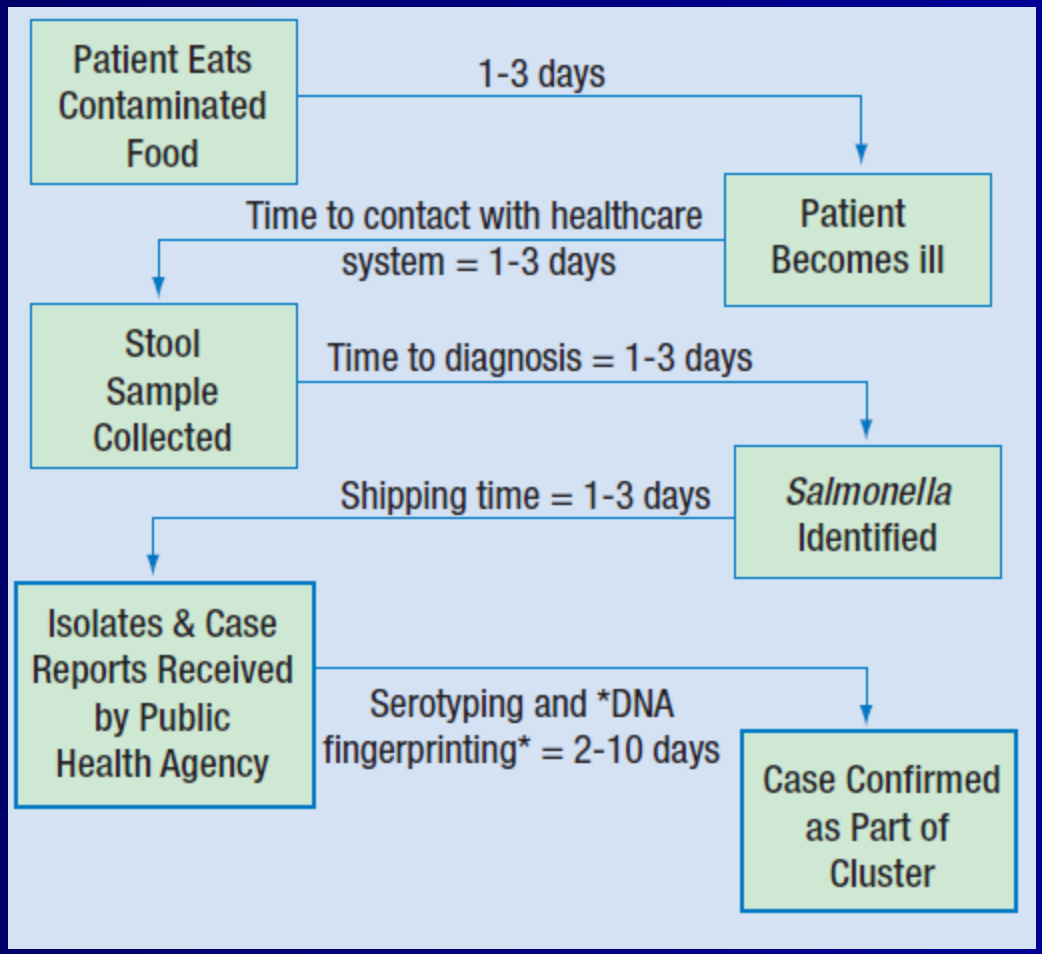
The reservoir

- Where the agent normally lives, grows and multiplies with or without causing harm
  - Humans
  - Carriers
  - Animals-animals to humans
  - Environment- Plant, soil, water

Modes of Transmission

- How does the agent infect the host
- Diseases are spread through
  - Air
  - Food and water
  - Direct contact
  - Vectors-carrier of an infectious agent; capable of transmitting infection from one host to another; especially the animal that transfers an infectious agent from one host to another, usually an arthropod

Sample *Salmonella* case reporting timeline



What is an outbreak?

- Unusual number of cases of a disease
- Depends on the disease
  - 1 case Salmonellosis, not an outbreak
  - 1 case Anthrax, outbreak
  - 4 cases Chlamydia, not an outbreak
  - 1 case Plague, outbreak
- Usually defined as more cases than normally expected
  - 2 or more cases outside the same household, with common exposure to warrant foodborne investigation

Outbreak Investigation: 10 Steps

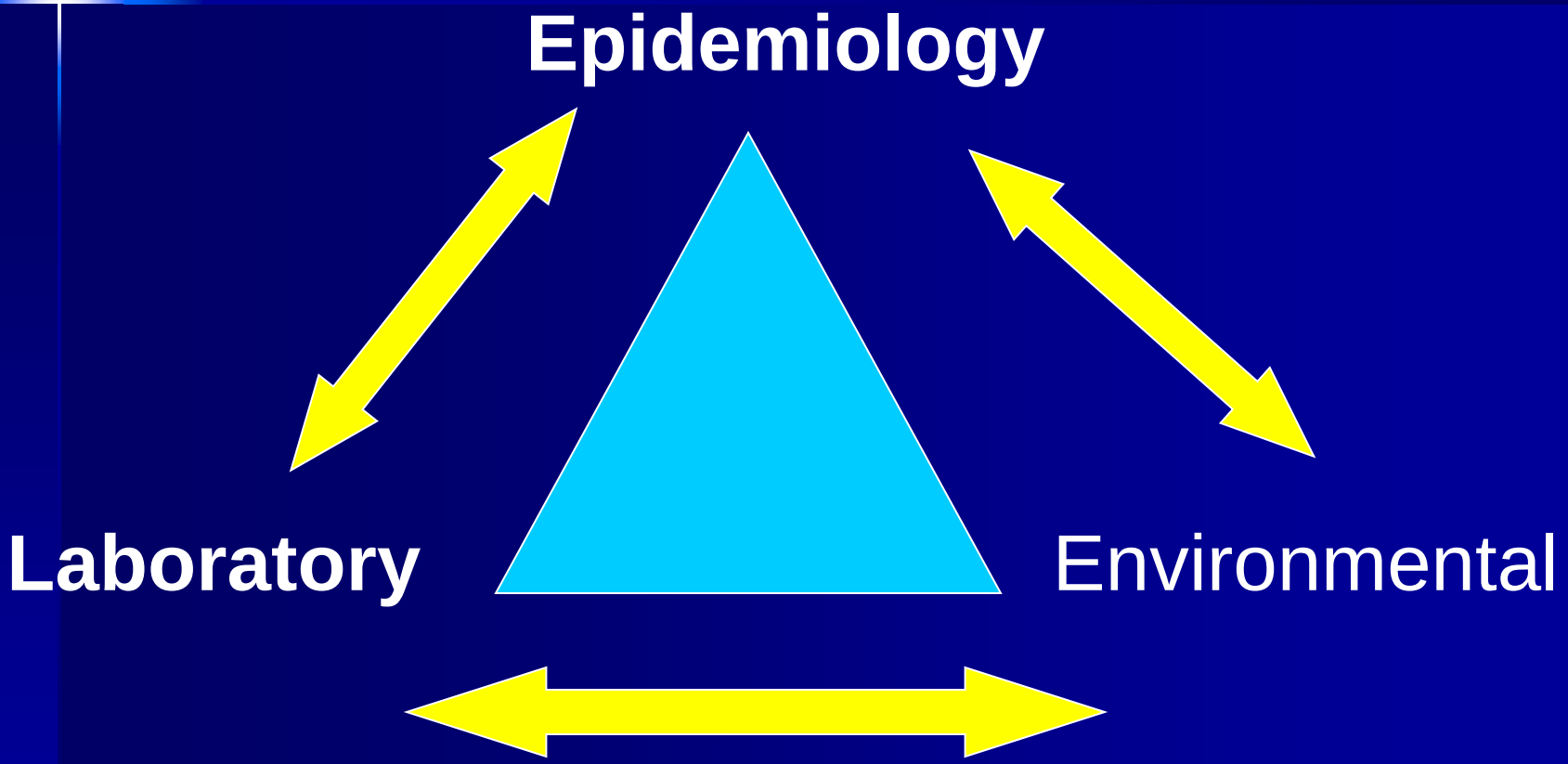
- Confirm Diagnosis
  - laboratory confirmation
  - Or description of common symptoms
- Establish Existence of Outbreak
  - Is the number ill above baseline?
- Relate outbreak to time, place, person/animal

Outbreak Investigation: 10 Steps

- Generate Hypothesis and Case Definition
  - Start broad and narrow as more information is gathered
- Plan Detailed Epi Investigation
  - Incubation Period
  - Symptoms
  - Severity
  - Develop Questionnaire

Outbreak Investigation: 10 Steps

- Conduct Investigation
  - Interview well and ill persons
  - Environmental Inspection
  - Collect specimens for lab
- Analyze & Interpret data
  - Develop epi curve
  - Calculate AR and OR's
  - Age breakdown, symptoms, incubation period, etc.


Epidemiology
Laboratory
Environmental

Outbreak Investigation: 10 Steps

- Test Hypotheses and Draw Conclusions
- Control Measures
  - Exclusion, cohorting, contact precautions
  - Recommendations found in Environmental Inspection
- Draft a Final Report and Communicate Findings

Foodborne Investigation

- Receive report of outbreak
  - Routine surveillance
  - Physician who has seen increased number of cases
  - Ill citizen
  - Well, worried citizen
- Confirm number of cases
  - Line list
- Administer Hypothesis Generating Questionnaire
  - Obtain list of symptoms
    - Create Case Definition
  - Exposure history
    - Travel, events, livestock
  - Obtain extensive food history (7 days)

Foodborne Investigation

- Make field visit
  - Inspect kitchen (with Sanitarian)
  - Take food samples to be tested
- Create menu specific questionnaire
  - Administer questionnaire to cases and controls AND ***food handlers***
- Take stool samples from cases
- Offer Recommendations
  - Follow-up to ensure recommendations are followed.

How does it *really* go?

4:45 Friday afternoon:

- Receive report of disease
  - "I ate at a church picnic yesterday and got sick in the middle of the night. When I went to the doctor, he said he had seen *tons* of other people with similar illness who also attended the picnic."
- Confirm story
  - Call physician
    - Find out if there is more than one case
    - Get any positive lab results
    - Get history of other patients (medical records, phone numbers)

Case Finding

- Talk to a few ill people (3-5) about possible exposures, incubation period, symptoms, etc.
- Compile a list of those possibly exposed
  - Call church to get list of food handlers working and out ill
  - Get list of people who attended picnic
- Contact church for menu
- If problem is widespread or no documentation is available:
  - Contact hospitals and physicians
  - Issue a public announcement

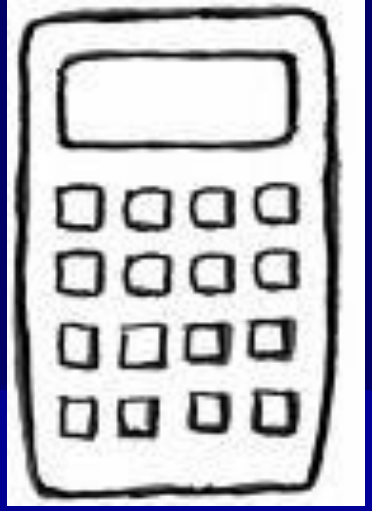
Contact Source

- Ask about complaints
  - Has anyone called the church claiming they are sick?
- Ill food handlers? (restrict from work if ill)
- Leftovers from suspected meal?
- Inform local sanitarian to inspect

Information Collection

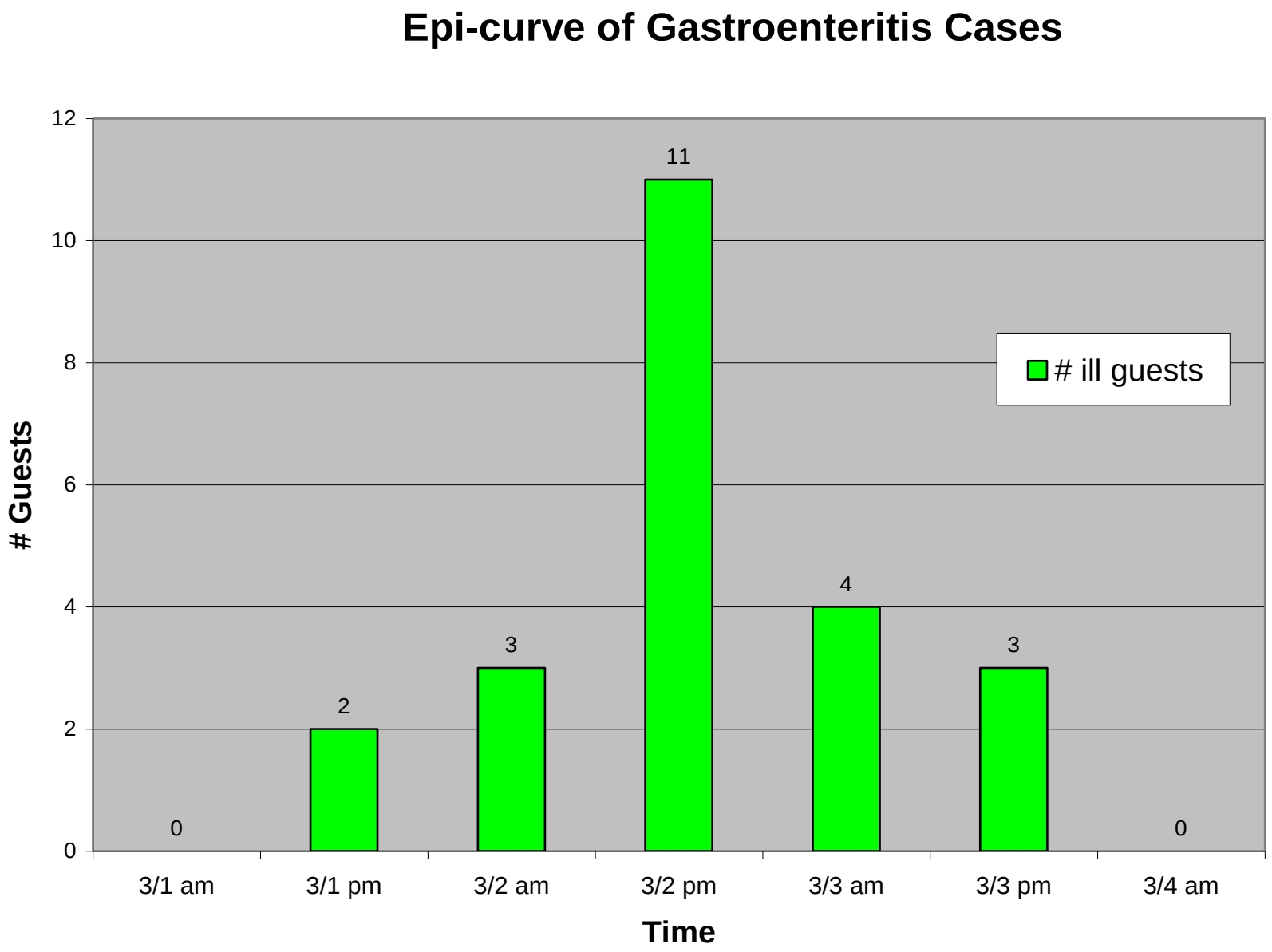
- Site visit/site inspection
- Specimen collection from ill and food handlers
  - Obtain samples while still having symptoms
- Food collection (coordinate with laboratory)
  - Attempt to match PFGE with stool and food specimens
- Questionnaires (to exposed, ill and well)
  - Demographics
  - Symptoms
  - Dates of illness
  - Foods consumed/other exposures (include a menu if available)

Analysis

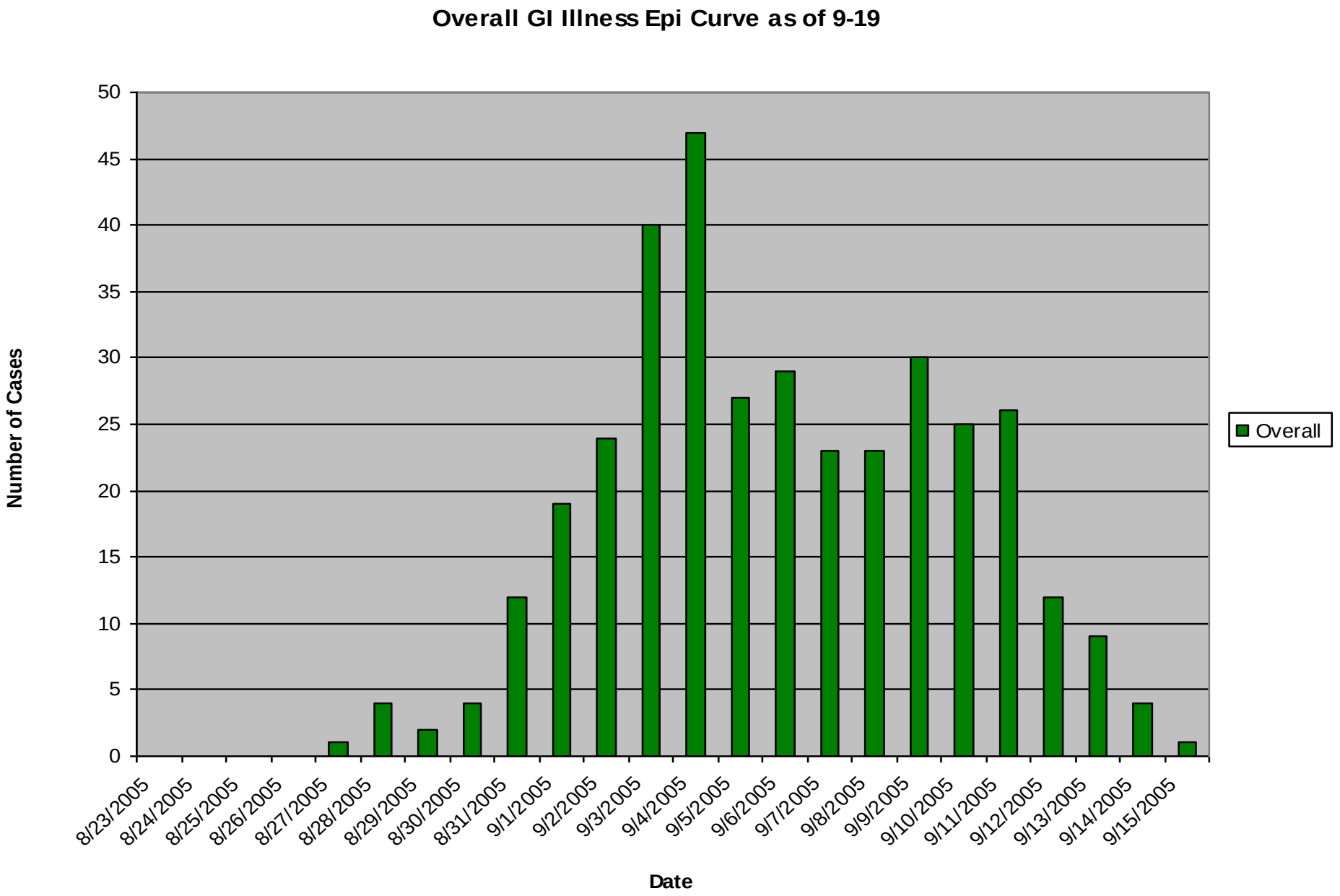


- From questionnaire:
  - Look at distribution of cases over time
    - Epi curve
      - Point source vs ongoing transmission
  - Incubation period
  - Attack rates of different foods
  - Any differences between sick and well

Point Source Outbreak



Transmission Ongoing Outbreak



Analysis

- Case-Control Study (differences between well and ill people)

- Calculate Attack Rate for Outbreak

$$AR = \frac{(\#\text{ of ill persons})}{(\text{total \# of people exposed})} * 100$$

- Calculate an Odds Ratio for foods served

$$OR = \frac{(a*d)}{(b*c)}$$

Analysis

- OR is calculated by using a 2X2 or contingency table:

Exposure:
Did you eat this food?

	Outcome: Were you ill? Yes	**No**
Yes	a	b
No	c	d

Analysis

- OR > 1 indicates the food or exposure is positively associated with the illness (may have causal relationship)
- OR = 1 indicates no relationship
- OR <1 indicates food may have protective effect from becoming ill

Example

- Church Picnic Scenario
- Possible Culprit: Potato Salad
- 65 people consumed and became ill
- 3 people consumed and did not become ill
- 7 did not consume and did not become ill
- 1 did not consume and became ill

Example

Ate Potato Salad?	Became Ill? Yes	Became Ill? No
Yes	65 a	3 b
No	7 c	1 d

OR = (ad)/(bc) = (65*1)/(3*7) = 65/21 = 3.1

Resolution

- Contact others affected by the outbreak
- Implement control measures
  - Make recommendations
- Provide education
- Follow-up to make sure cases are subsiding
- Follow up to make sure recommendations are being followed

Control and Prevention Last but NOT Least

- Control and prevention
  - Specifics depend on the disease
  - Initiate reasonable and generic control measures as soon as possible (eg, time/temperature, handwashing, isolation, exclusion)
  - Do NOT delay control measures in order to investigate the cause of the outbreak
  - Continue control measures while investigating the possible cause

EXERCISE

Exercise Scenario: Wedding Reception

- It's Wednesday afternoon. DCHD receives a phone call from a disgruntled father-of-the-bride, claiming that 120 out of 150 people who attended his daughter's wedding reception the previous Saturday became ill.

WHAT DO YOU DO FIRST?

Wedding Reception

- During your initial questioning, the FOB reveals that the reception was held in the ballroom of a ritzy hotel. He also was able to fax you a list of attendees with contact information as well as a list of the foods served. He also says that his mother was hospitalized due to Gastroenteritis.

WHAT ARE YOUR NEXT STEPS?

Wedding Reception

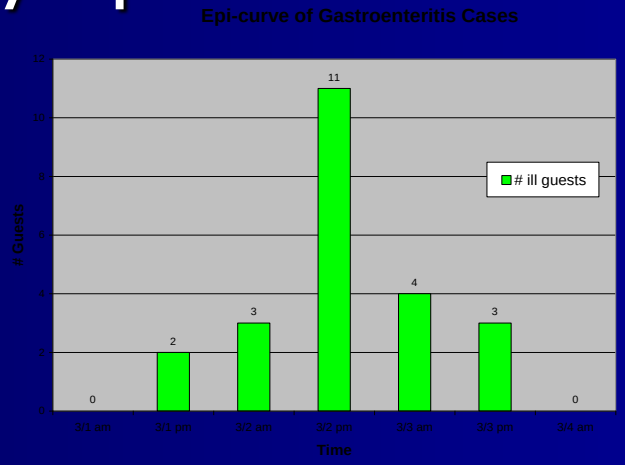
- The hospital confirms that grandma was hospitalized for 2 days with Gastroenteritis. They are currently awaiting the lab results.
- You begin contacting ill persons named by FOB to see if others can submit stool specimens…you actually have 3 people volunteer and arrange for specimen pick-up.

Wedding Reception

- The questionnaire is developed based on the menu served and the symptoms suggested by the FOB.
- Epi staff and MRC volunteers begin interviewing all 150 people, using the questionnaire.

Questionnaire Results:

- Average Incubation period: 11 hours
- Attack Rate= (120 ill/150 total)*100 = 80%
- Symptoms: Cramps (61%); Diarrhea (55%); Nausea (22%); Vomiting (26%); Headache (15%)
- Preliminary epi curve indicates point-source:



Foods Eaten at Wedding Reception

Food Item	Ill persons	Well persons	OR
Shrimp Cocktail	Yes:98 No:22	Yes:26 No:4	
Tossed Salad w/ Vinaigrette	Yes:97 No:23	Yes:24 No:6	
Pasta con Broccoli w/Alfredo Sauce	Yes:110 No:10	Yes:20 No:10	
Chicken Piccata	Yes:106 No:14	Yes:23 No:7	
Wedding Cake w/Buttercream Filling	Yes:89 No:33	Yes:28 No:2	

Foods Eaten at Wedding Reception

Food Item	Ill persons	Well persons	OR
Shrimp Cocktail	Yes:98 No:22	Yes:26 No:4	**0.68**
Tossed Salad w/ Vinaigrette	Yes:97 No:23	Yes:24 No:6	**1.05**
Pasta con Broccoli w/Alfredo Sauce	Yes:110 No:10	Yes:20 No:10	**5.50**
Chicken Piccata	Yes:106 No:14	Yes:23 No:7	**2.30**
Wedding Cake w/Buttercream Filling	Yes:89 No:33	Yes:28 No:2	**0.19**

Wedding Reception

- The Environmental Supervisors reveals the results of the site visit to the hotel. They interviewed one ill food handler who was in charge of plating the dishes. It was also discovered that the warming dish for the pasta was not kept at warm enough temperatures.

DOES THIS CHANGE YOUR HYPOTHESIS?

Wedding Reception

- After 2-3 days, the hospital calls you with the culture results from Grandma.
- Miraculously, the state health department calls you the same day with the culture results from the food samples

- Any guesses???

Wedding Reception

- They both found *Clostridium perfringens*

QUESTIONS?
COMMENTS?