

# The Economic Cost of Communicable Disease Surveillance in Colorado

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Colorado Public Health Practice-Based Research Network DACS 71153

Meeting and Conference Presentation

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**The Economic Cost of Communicable Disease Surveillance in Colorado**

ASHEcon

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PBRN

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Disclaimer:

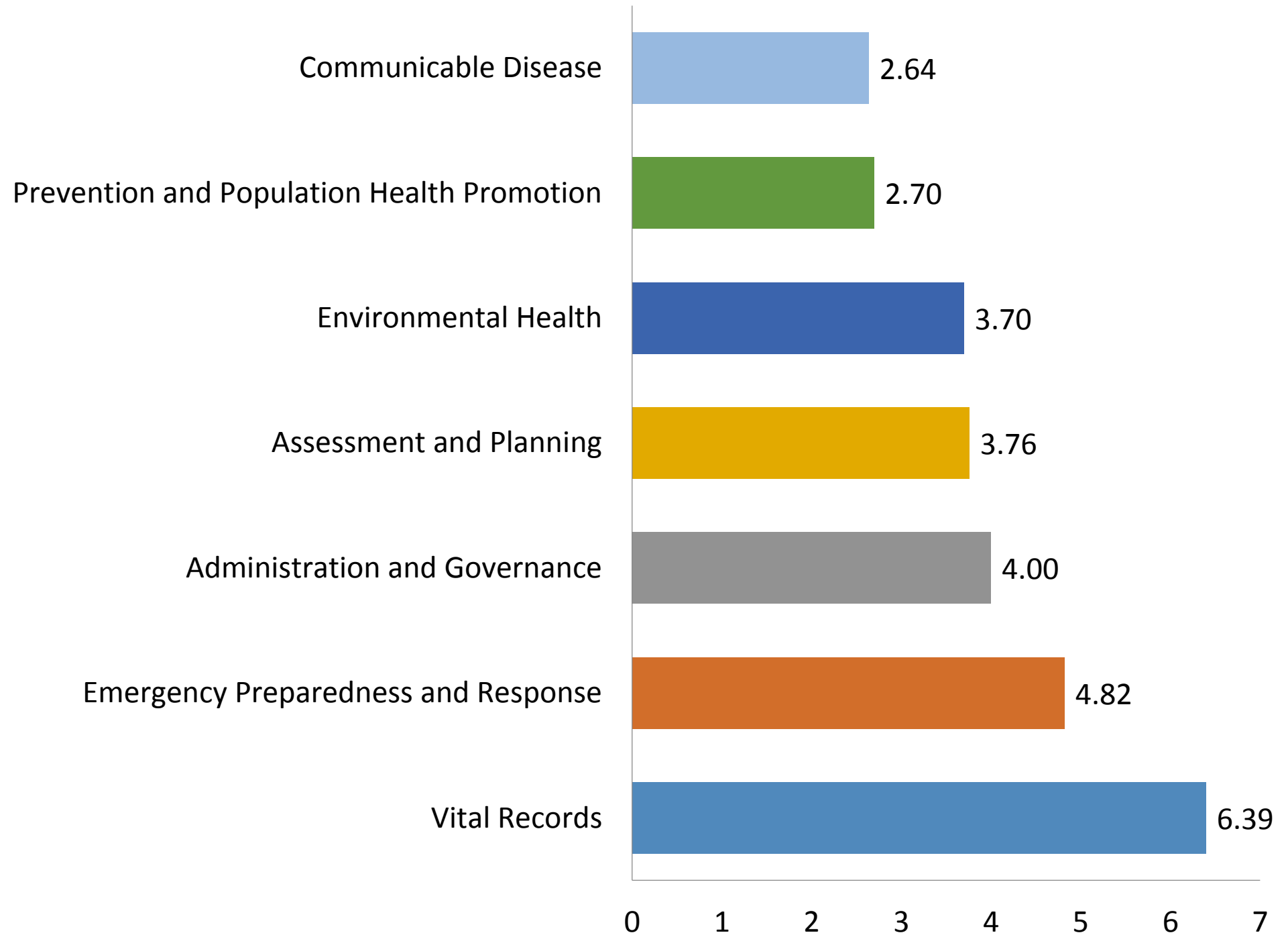
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# Project Introduction

- Little data on the cost of developing and maintaining infrastructure, and providing essential population-based public health services.
- Difficult to make a clear financial case for public health services.
- Limits the amount of informed decision-making that can be done by public health leaders.
- National programs laid the groundwork for our current understanding of the essential components and capabilities of a local public health agency.

# Core Services

- Lists of “Recommended” Core Services
  - IOM / NACCHO / Colorado
- Colorado List:
  1. Communicable Disease Surveillance / Investigation
  2. Disease Prevention / Population Health Promotion
  3. Environmental Health
  4. Assessment and Planning
  5. Emergency Preparedness
  6. Administration and Governance
  7. Vital Records



## Listeria Outbreak Traced to Cantaloupe Packing Shed



Ed Andrieski/Associated Press

The Food and Drug Administration recalled 300,000 cases of melons from Jensen Farms in Colorado following a listeria outbreak.

By WILLIAM NEUMAN

Published: October 19, 2011

A nationwide listeria outbreak that has killed 25 people who ate tainted cantaloupe was probably caused by unsanitary conditions in the packing shed of the Colorado farm where the melons were grown, federal officials said Wednesday.

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## Arrests Made in Colorado Outbreak of Listeria

By THE ASSOCIATED PRESS

Published: September 26, 2013

DENVER — The owners of a Colorado cantaloupe farm were arrested on Thursday on charges stemming from a [2011 listeria epidemic](#) that killed 33 people in one of the nation's deadliest outbreaks of food-borne illness.

Federal prosecutors said the owners, the brothers Eric and Ryan Jensen, were arrested on misdemeanor charges of introducing adulterated

# How Does Communicable Disease Monitoring Work?

Series of tasks by Local Public Health Agency (LPHA)

- Monitoring CEDRS
- Tabulating data
- Assessing community risks and trends
- Receiving reportable disease/condition reports
- Phone or email communication from Regional Epi or Infection Control Practitioner
- Phone or email communication to providers
- Data entry and analysis
- Travel



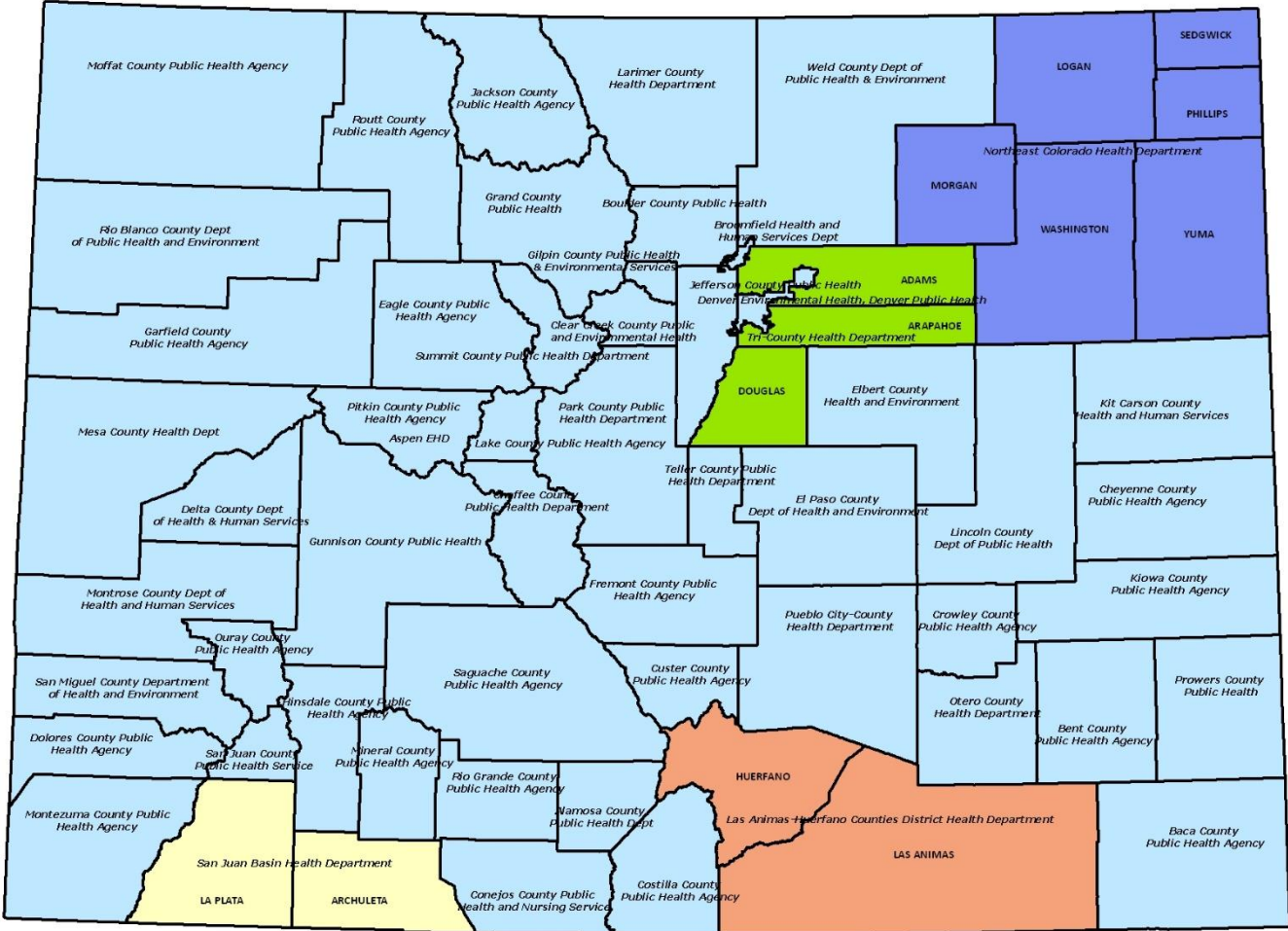
# Research Questions

1. What is the cost of routine communicable disease surveillance by LPHA?
2. Are there economies of scale?

# Colorado Idiosyncrasies

- Some “regional” programs
  - “Outposted EPIs”
- The state role
  - STI’s
  - Maintaining databases

Colorado Local and District Public Health Agencies, July 2009



# Methods

Need measures of both *Inputs* and *Output*

- Inputs
  - Time in minutes
- Output
  - Number of cases investigated
- Unit of analysis is the LPHA
- Current study looks at relationship between the number of cases investigated and time spent on communicable disease surveillance

Other control variables

- Case-Mix – types of conditions
- County Characteristics – poverty rate, population, population density

# Description of Time Log Data Collection

- 54 LPHAs in Colorado
- 46 agencies agreed to participate
  - Response Rate: 85.2%
- 8 agencies were not included in study
  - Time Constraints
  - Not within agency's best interest at the time
  - No time dedicated to CD weekly
- Instrument in field from April 7<sup>th</sup>, 2014 to June 20<sup>th</sup>, 2014



# Output Data

- Based on the Colorado Electronic Disease Reporting System “CEDRS”
- Reported conditions by location
  - Can be entered either by the state or LPHA
- Reportable conditions defined by statute
- Can be reported by:
  - Physicians
  - Other healthcare providers
  - Laboratories

**To Report a case please contact:**

Colorado Department of Public Health & Environment  
4300 Cherry Creek Drive South  
Denver, CO 80246  
Phone: 303-692-2700  
Toll Free Phone: 1-800-866-2759  
Confidential Fax: 303-782-0338  
Toll Free Fax: 1-800-811-7263  
Evening/weekend hours: 303-370-9395



Colorado Department  
of Public Health  
and Environment

Effective: November 30, 2012

**COLORADO BOARD OF HEALTH  
CONDITIONS REPORTABLE BY ALL PHYSICIANS AND HEALTH CARE PROVIDERS  
IN COLORADO**

(Infection in Colorado residents ascertained out-of-state should also be reported.)

The list below applies to physicians and health care providers. Laboratories have separate reporting requirements. A case must be reported to the state or local health department following diagnosis within the timeframe indicated.

*The State Health Department requires reporting all suspected cases, whether or not supporting laboratory data are available.*

**24-Hour Reportables**

Animal Bites by dogs, cats, bats, skunks or other wild carnivores	Haemophilus influenzae (invasive disease)	SARS (Coronavirus)
Anthrax (Bacillus anthracis)	Hepatitis A (Anti-HAV IGM)	Smallpox
Botulism (Clostridium botulinum)	Human Rabies - suspected	Syphilis, early (1 <sup>o</sup> , 2 <sup>o</sup> , early latent) (Treponema pallidum)
Cholera (Vibrio cholerae)	Measles (Rubeola)	Tuberculosis (active disease)
Diphtheria (Corynebacterium diphtheriae)	Neisseria meningitidis (invasive disease)	Typhoid Fever (Salmonella typhi)
Group Outbreaks – known or suspected of all types including foodborne, waterborne or other illness	Pertussis (Bordetella pertussis)	
	Plague (Yersinia pestis)	
	Poliomyelitis	
	Rubella	

**7-Day Reportables**

AIDS and HIV infection	Hepatitis C	Q Fever (Coxiella burnetti)
Aseptic / viral meningitis	Hepatitis other viral	Relapsing Fever (Borrelia sp.)
Brucellosis	Hantavirus	Rocky Mountain Spotted Fever
Campylobacteriosis	Hemolytic uremic syndrome if ≤ 18 yrs	Rubella, congenital
Chancroid (Haemophilus ducreyi)	Influenza – associated hospitalization	Salmonellosis
Chlamydia trachomatis	Influenza – associated death ≤ 18 yrs	Shigellosis
Cryptosporidiosis	Kawasaki Syndrome	+TB skin test in workers exposed to active disease
Cyclospora	Legionellosis	Tetanus
Escherichia coli 0157:H7 & shiga toxin-producing E.coli	Leprosy (Hansen's Disease)	Toxic Shock syndrome
Encephalitis	Listeriosis	Trichinosis
Giardiasis	Lyme Disease (Borelia burgdorferi)	Transmissible spongiform encephalopathy
Gonorrhea, any site	Lymphogranuloma venereum	Tularemia (Francisella tularensis)
Hepatitis B	Malaria (Plasmodium species)	Varicella (Chicken pox)
	Mumps	
	Psittacosis (Chlamydia psittaci)	

**Immediate reporting by phone is required of any illness suspected to be caused by Biological, Chemical, or Radiologic Terrorism**

**All reports should include:**

1. Name of disease or condition
2. Patient's name
3. Patient's date of birth, sex, race and ethnicity
4. Patient's home address and phone
5. Physician's name, address and phone
6. Lab info – test name, collection date and specimen type

**Disease Report Forms can be downloaded from**

[www.co.gov/cdphe](http://www.co.gov/cdphe), search for: Reporting a Disease  
Please fax completed Disease Report Form to 303-782-0338

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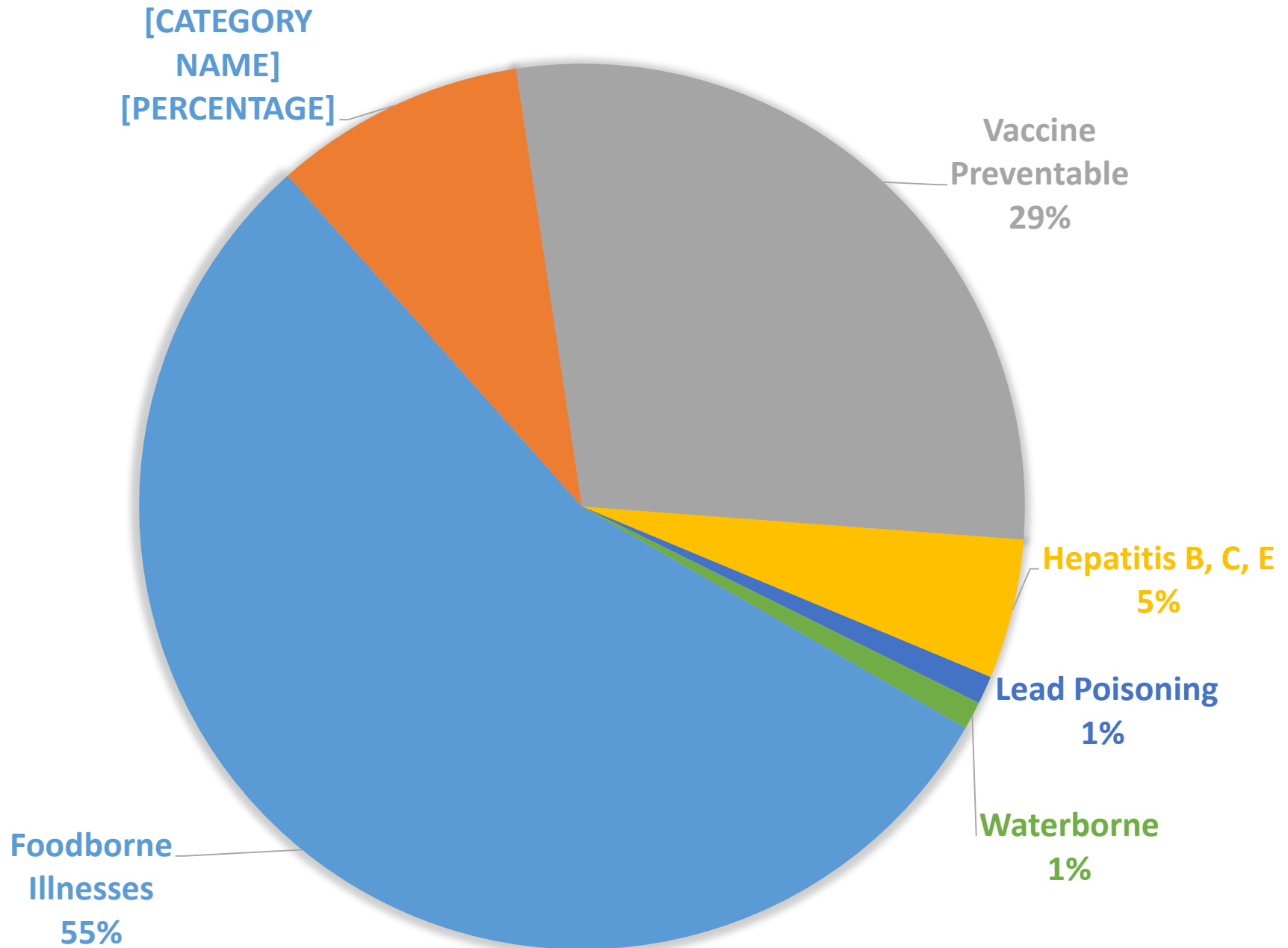
# CEDRS Data

- Provided by State Department of Health
  - Required permission of each individual LPHA
- Received 3 Months of Data
- Matched CEDRS data to time-log data by 2-week time period
- Excluded data on animal bites
  - Recorded inconsistently by LPHA

# Results

# CEDRS Data

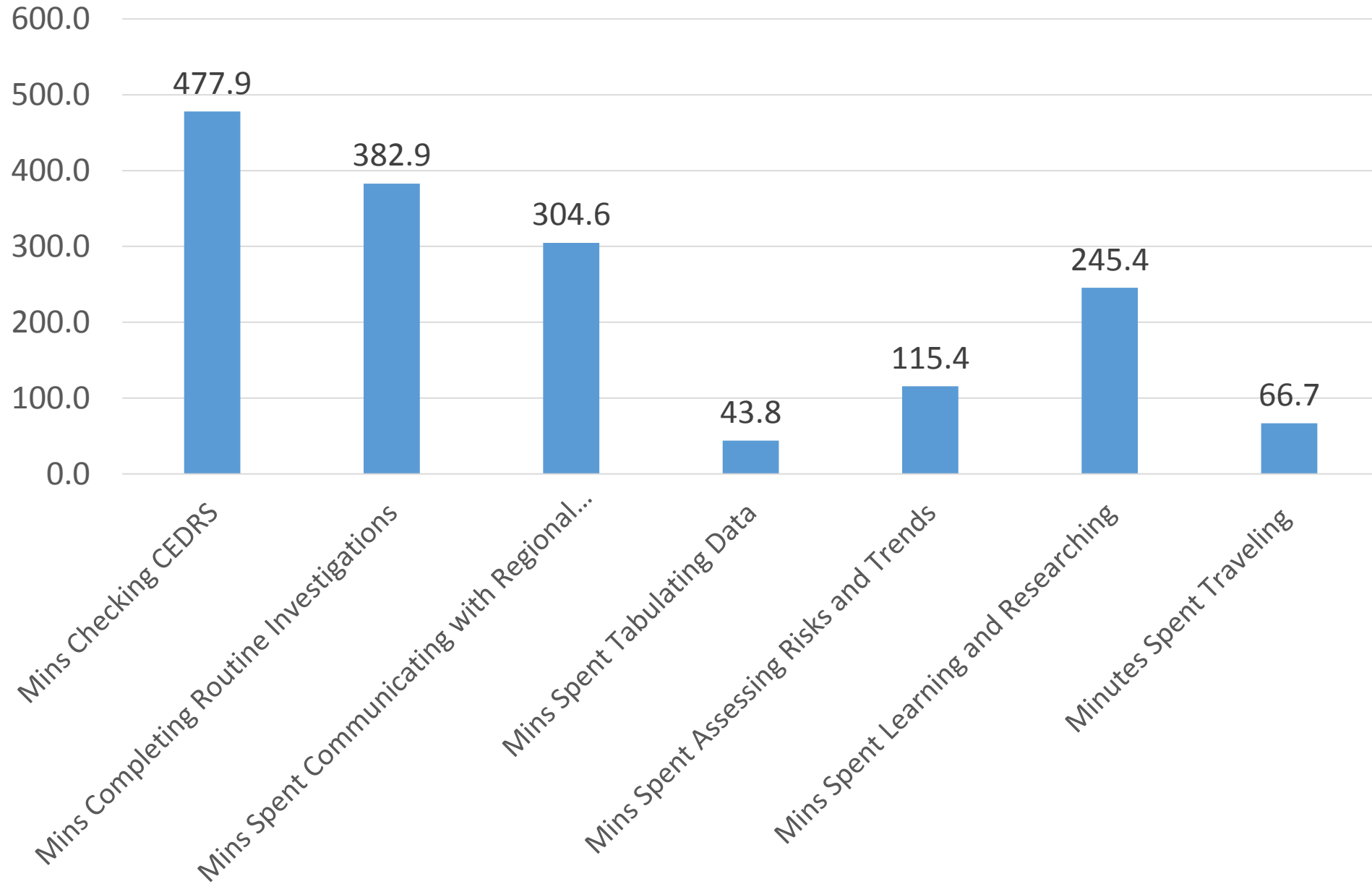
- Significant Range
  - 16 counties had no cases reported during two week timeframe
  - High was 30 cases
  - Mean: 2.6
  - SD: 1.7
  - Skewness: 1.65
  - Kurtosis: 6.45



# Results: Descriptive Statistics on Time-logs

	<b>Minutes</b>
Median	435.0
Mean	802
Minimum	50
Maximum	4,800

Mean Minutes, by Activity



# Zero Counties

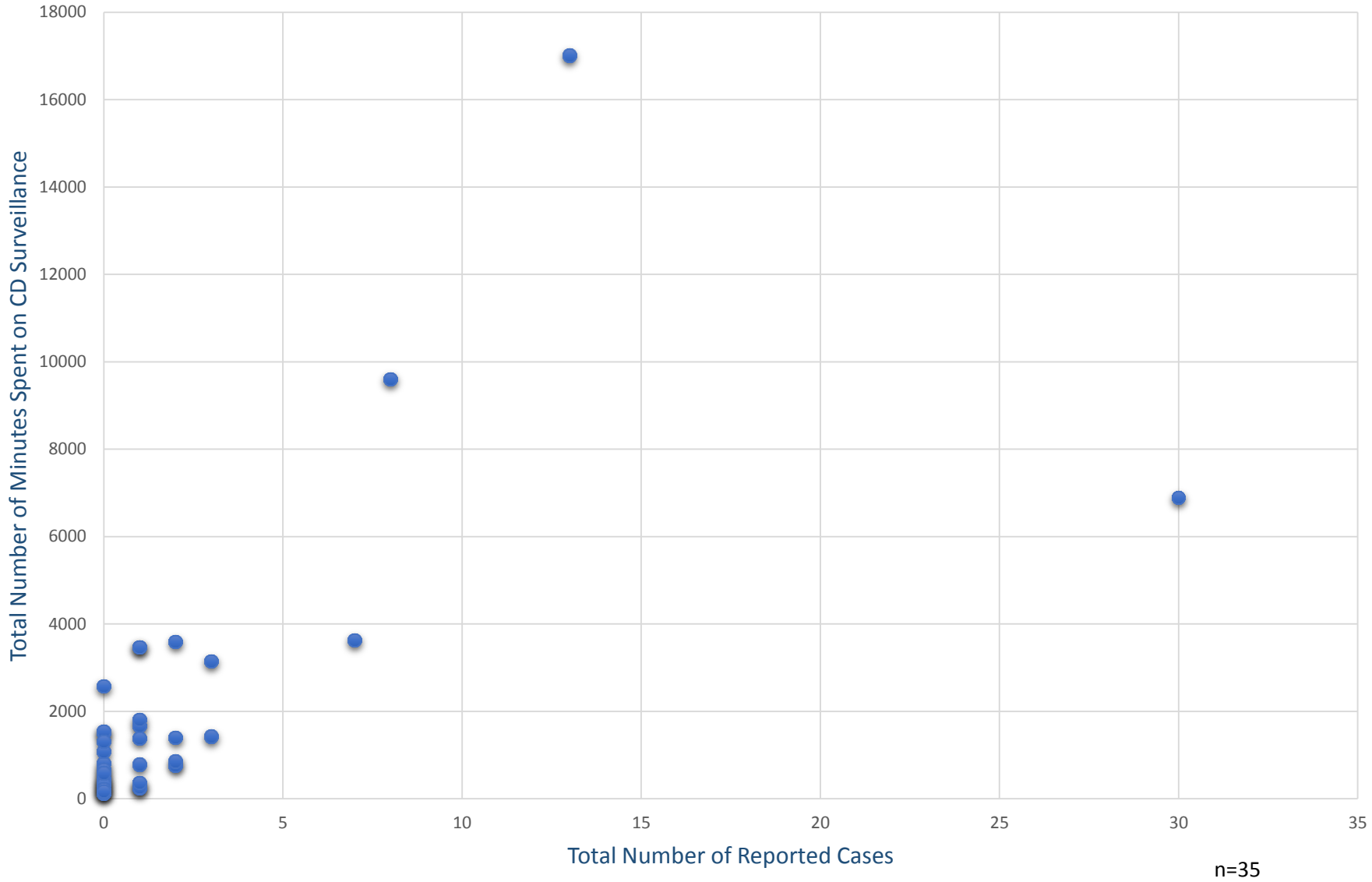
- **16 counties** did not have any cases assigned to them over their 2-week period
  - Mean Population Size of these Counties: 13,339
  - Largest Population of these Counties: 51,944
- Still, these agencies spent an average of **766 minutes** on CD surveillance over two weeks
  - Minimum: 120 minutes over two weeks
  - Maximum: 2,580 minutes over two weeks
  - Range: 2,460 minutes over two weeks
- Time Spent:
  - Checking CEDRS (28%)
  - Communicating with Regional Epis, Infection Control Practitioners, etc. (17%)
  - Learning and Research (13%)

# Understanding the minute averages

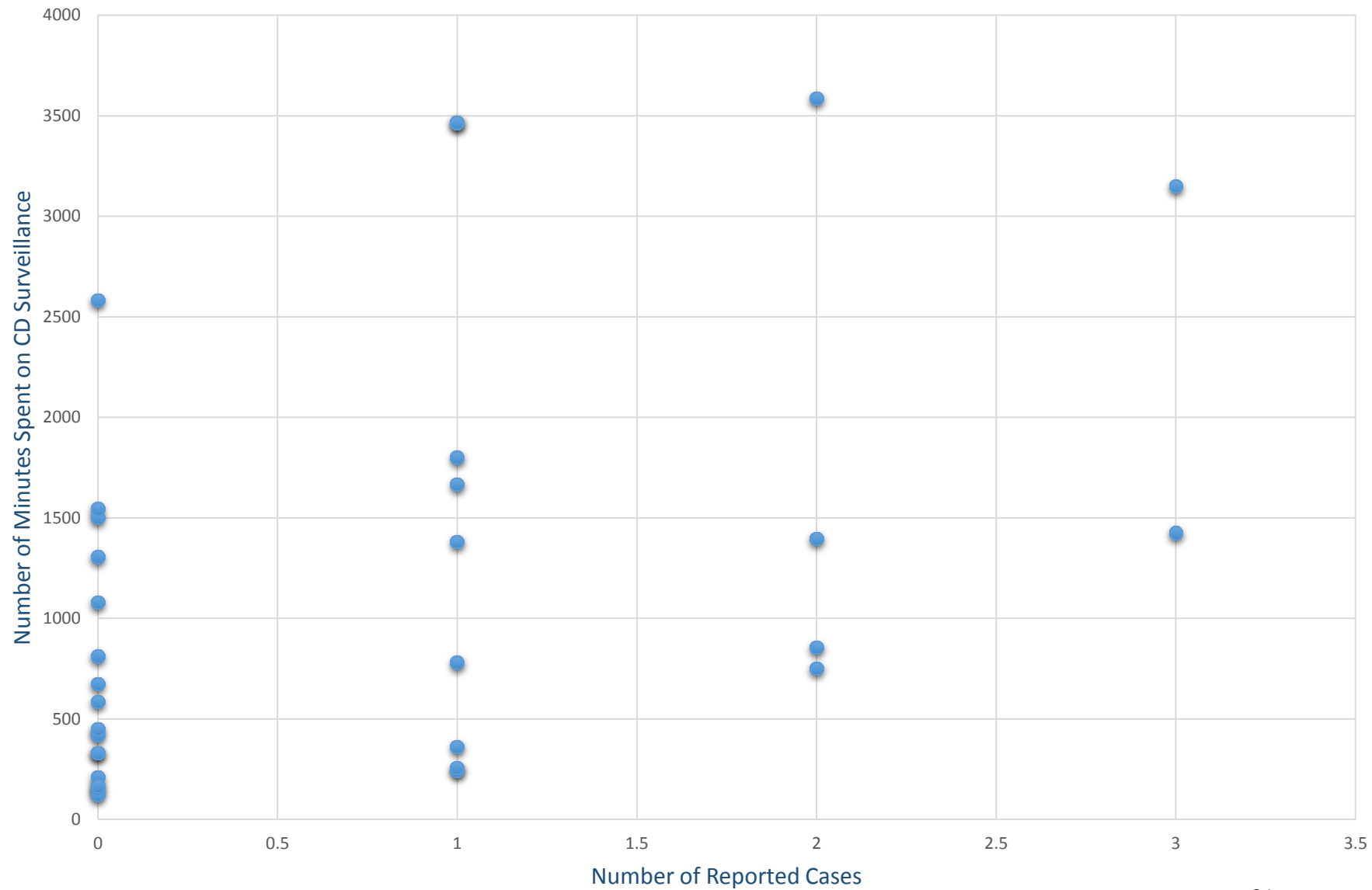
- 16 counties with no cases average:
  - 766 minutes per two weeks
  - 77 minutes per day
- 19 counties with cases spend an average of:
  - 3,247 minutes per two weeks
  - 325 minutes per day → 5 hours 25 minutes per day
  - 1,131 minutes *per case* → 19 hours per case
- Large range of minutes per case
  - High of 1,793 (1 case)
  - Low of 230 (30 cases)
- Subtract off apparent “fixed costs”
  - High of 1,409
  - Low of -526



# Relationship between the Number of Cases Reported and the Minutes Dedicated to CD Surveillance



### Relationship between the Number of Cases Reported and the Time Dedicated to CD Surveillance (for counties with <5 cases)



n=31

# Results: Regression Analysis

Variable	Coefficient	SE	t statistic	P value
Cases	1604.2	202.4	7.93	0.000
Cases Squared	-44.4	6.8	-6.54	0.000
Population Density	-0.4	1.6	-0.28	0.780
County Percent Poverty	6.2	49.4	0.13	0.901
Percent of Case Foodborne	-945.8	890.7	-1.06	0.298
Percent of Cases Zoonotic	-1356.8	1117.7	-1.21	0.235
Percent of Cases Vaccine Preventable	-2653.8	1076.2	-2.47	0.020
_cons	627.2	908.3	0.69	0.496

# Limitations

- Measures of Quality
- Issues of Seasonality
- State Costs
- Indirect Costs
- CEDRS Data
  - Only includes cases where local agency is tasked with the follow-up
  - Some counties do not report animals bites to CEDRS
  - Lead Poisoning cases can also be incomplete
    - There is a different database at CEDRS to track these cases

# Conclusions

- Results suggest some economies of scale
  - Increases at a decreasing rate
- Huge variation in time
  - Appears unrelated to type of case investigated
- Possible cost savings if smaller agencies coordinate