

# **INVASIVE BACTERIAL DISEASE SURVEILLANCE REPORT, 2014**

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Emerging Infections Program

Active Bacterial Core Surveillance (ABCs)

Minnesota Department of Health

# Diseases Included

- Group A Streptococcus page 5
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- *Streptococcus pneumoniae* page 34
- Methicillin-resistant *Staphylococcus aureus* (MRSA) page 42
- Legionellosis page 49

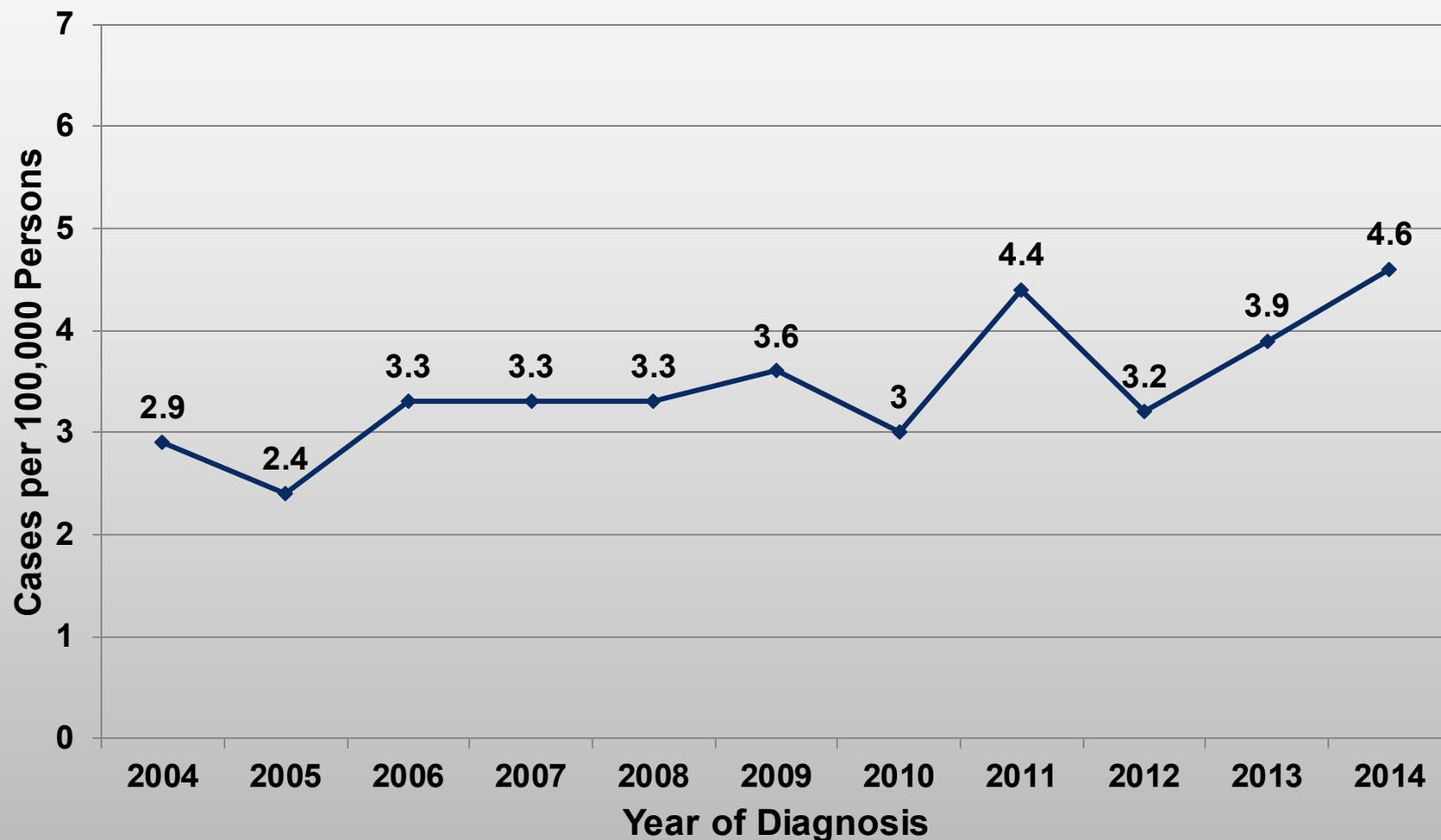
# Surveillance Methods

- Cases include Minnesota residents with invasive infections due to Group A Streptococcus, Group B Streptococcus, *Haemophilus influenzae*, *Neisseria meningitidis*, *Streptococcus pneumoniae*, and methicillin-resistant *Staphylococcus aureus* (MRSA).
- Invasive infections are from normally sterile body sites such as blood, cerebrospinal fluid and others. These usually cause serious illnesses (disease).
- Legionellosis is also included in this report and has separate confirmatory testing criteria including urine antigen, culture, paired serology, and PCR or DFA combined with culture or urine antigen.

# Surveillance Methods (cont.)

- All hospitals and reference laboratories serving Minnesotans are contacted routinely to identify cases.
- Species confirmation, antibiotic resistance and other testing is performed by the MDH Public Health Laboratory.
- Disease rates are based on Census data.
- The Centers for Disease Control and Prevention (CDC) includes these results from Minnesota and other states and regions in a network called Active Bacterial Core Surveillance (ABCs) which covers a population base of 42 million.

# Incidence of Invasive Group A Streptococcal Disease, Minnesota, 2004-2014



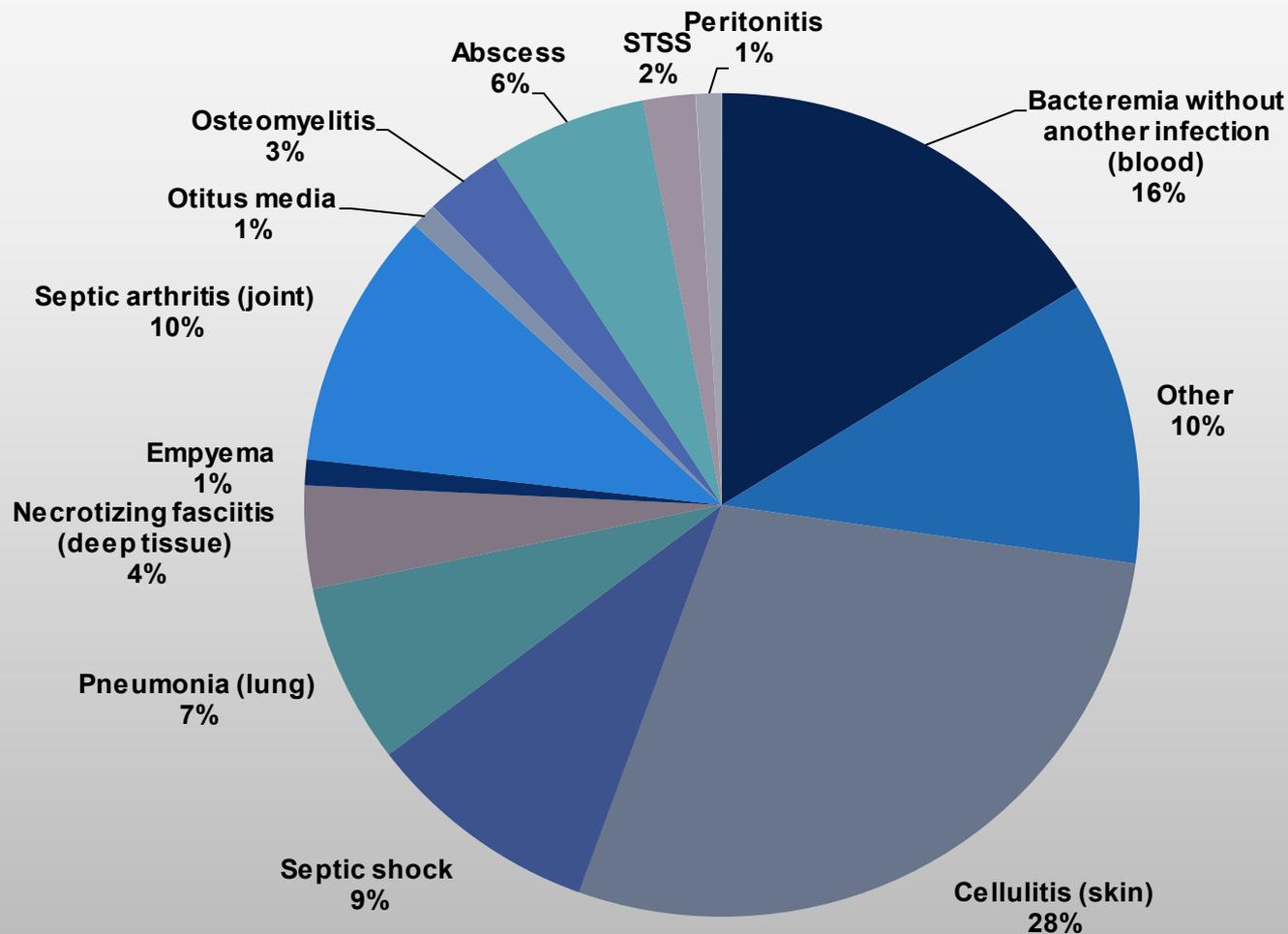
## Incidence of Invasive Group A Streptococcal Disease by Gender and Age Group, Minnesota, 2014

| Characteristic   | Cases<br>(n=259) | Incidence per<br>100,000 persons |
|------------------|------------------|----------------------------------|
| <b>Gender</b>    |                  |                                  |
| Male             | 139              | 5.0                              |
| Female           | 120              | 4.3                              |
| <b>Age Group</b> |                  |                                  |
| Under 1 yr.      | 4                | 5.1                              |
| 1-4 yrs.         | 10               | 3.2                              |
| 5-9 yrs.         | 8                | 2.1                              |
| 10-19 yrs.       | 7                | 1.0                              |
| 20-29 yrs.       | 23               | 2.9                              |
| 30-39 yrs.       | 22               | 2.8                              |
| 40-49 yrs.       | 24               | 3.3                              |
| 50-59 yrs.       | 37               | 4.7                              |
| 60-69 yrs.       | 53               | 9.6                              |
| 70+ yrs.         | 71               | 13.9                             |

## Invasive Group A Streptococcal Disease Cases and Deaths by Age Group, Minnesota, 2014

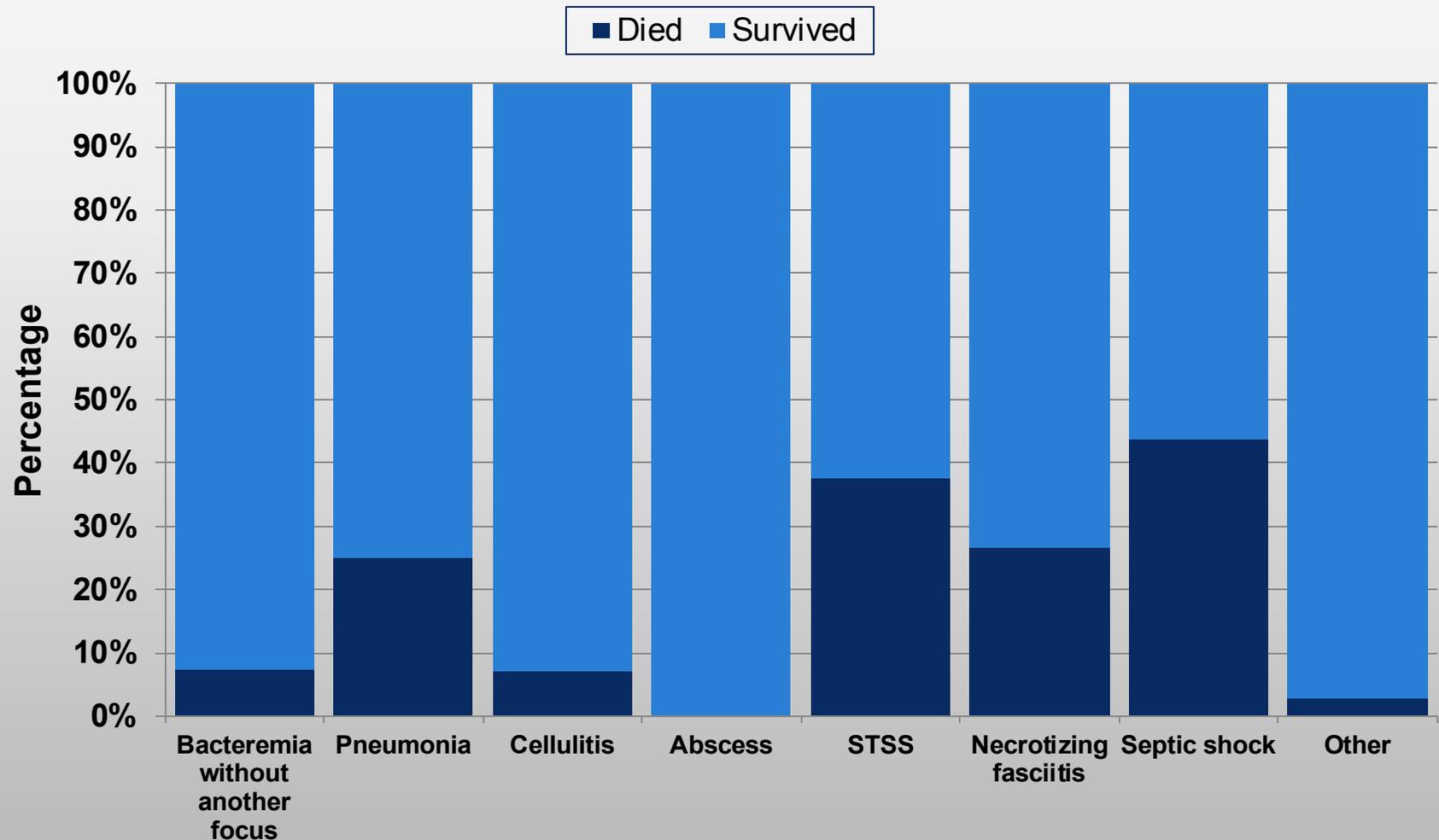
| Age Group    | Cases      | Deaths    | % Died     |
|--------------|------------|-----------|------------|
| Under 1 yr.  | 4          | 0         | 0%         |
| 1-4 yrs.     | 10         | 0         | 0%         |
| 5-9 yrs.     | 8          | 0         | 0%         |
| 10-19 yrs.   | 7          | 0         | 0%         |
| 20-29 yrs.   | 23         | 0         | 0%         |
| 30-39 yrs.   | 22         | 0         | 0%         |
| 40-49 yrs.   | 24         | 2         | 8%         |
| 50-59 yrs.   | 37         | 3         | 8%         |
| 60-69 yrs.   | 53         | 7         | 13%        |
| 70+ yrs.     | 71         | 16        | 23%        |
| <b>Total</b> | <b>259</b> | <b>28</b> | <b>11%</b> |

# Invasive Group A Streptococcal Disease by Type of Infection/Syndrome, Minnesota, 2014

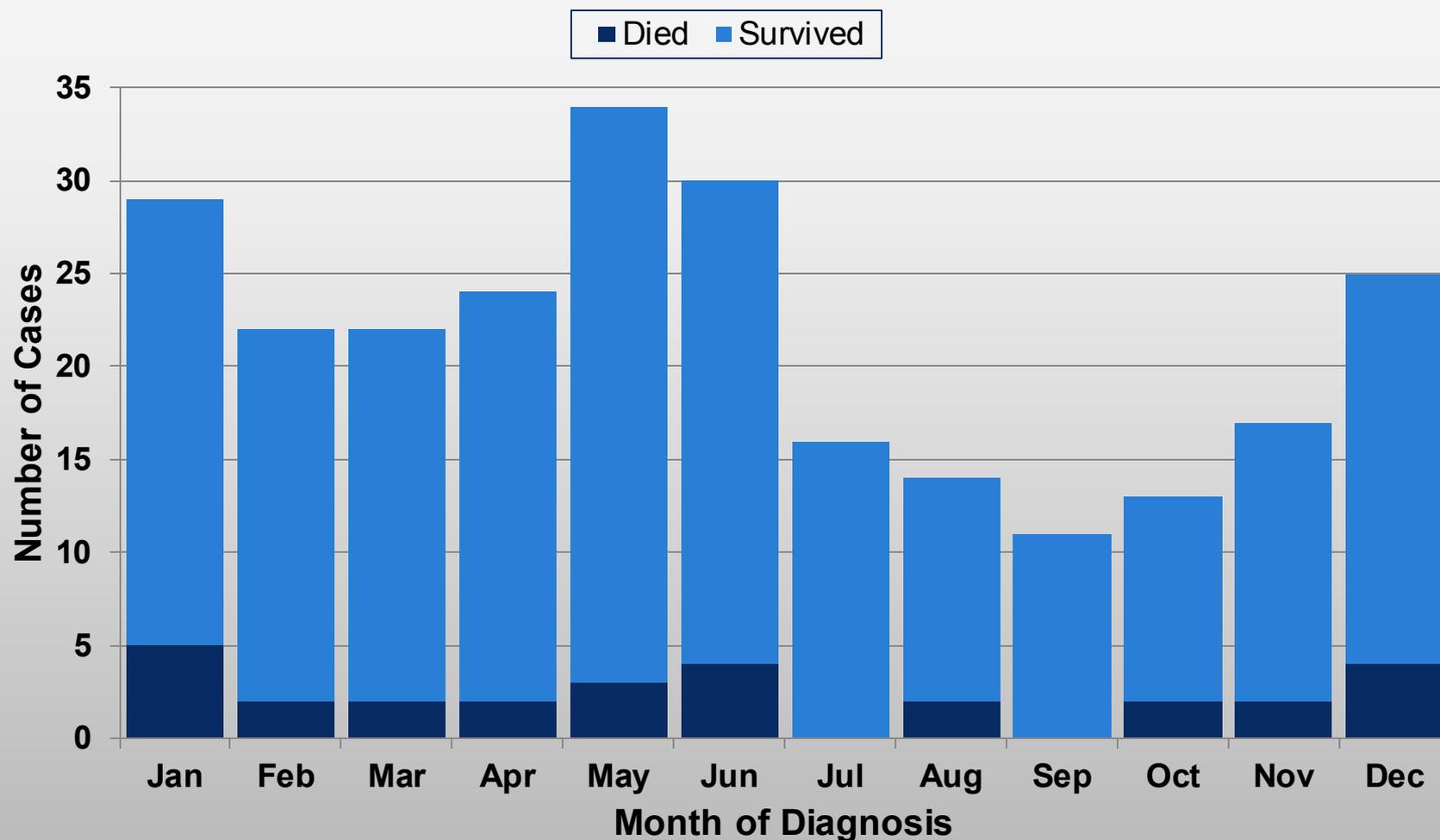


This chart represents 354 infections among 259 cases (some cases had >1 infection).

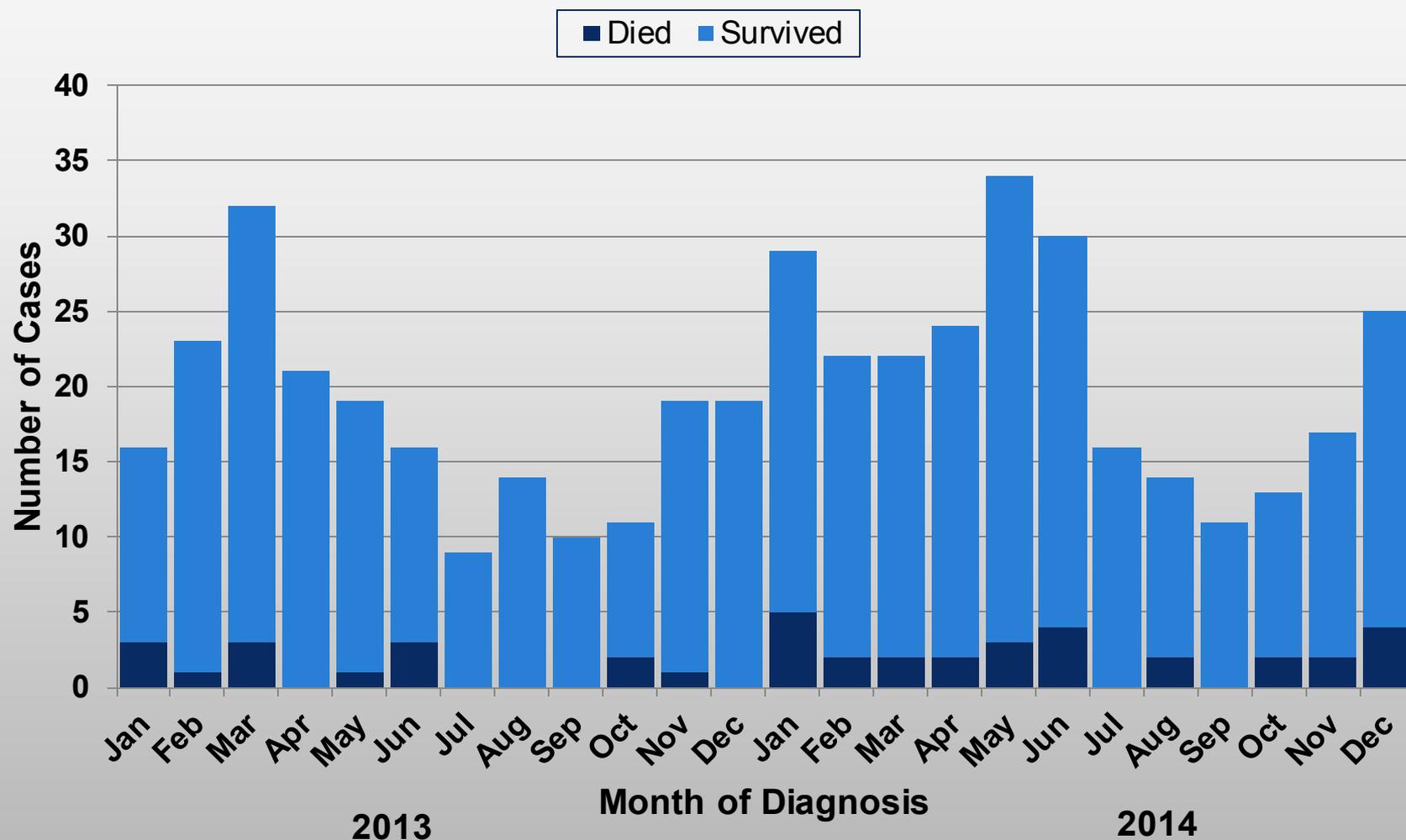
# Outcome of Invasive Group A Streptococcal Disease by Type of Infection/Syndrome, Minnesota, 2014



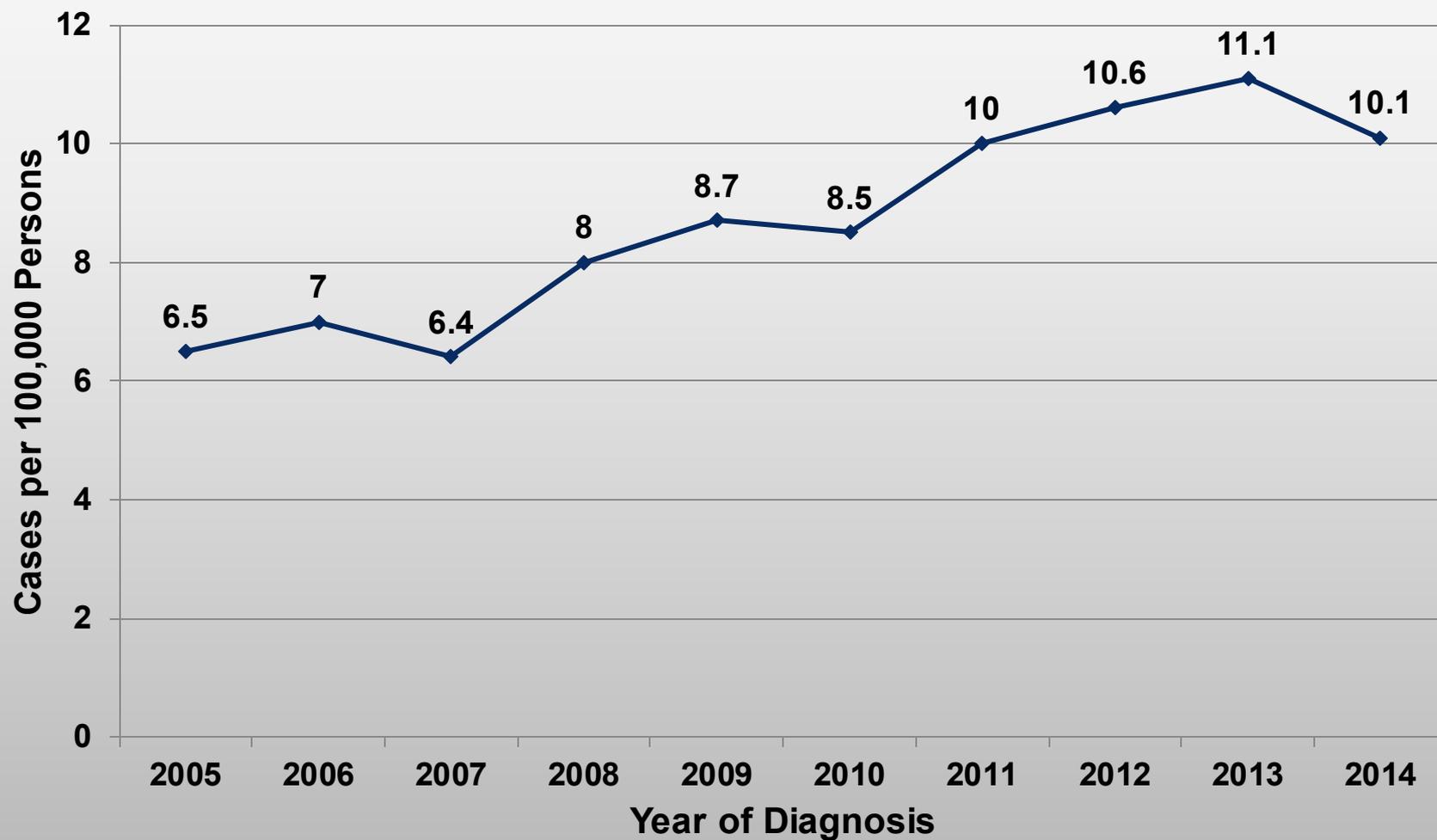
# Cases of Invasive Group A Streptococcal Disease by Month of Diagnosis and Outcome, Minnesota, 2014



# Cases of Invasive Group A Streptococcal Disease by Month of Diagnosis and Outcome, Minnesota, 2013-2014



# Incidence of Invasive Group B Streptococcal Disease, Minnesota, 2005-2014



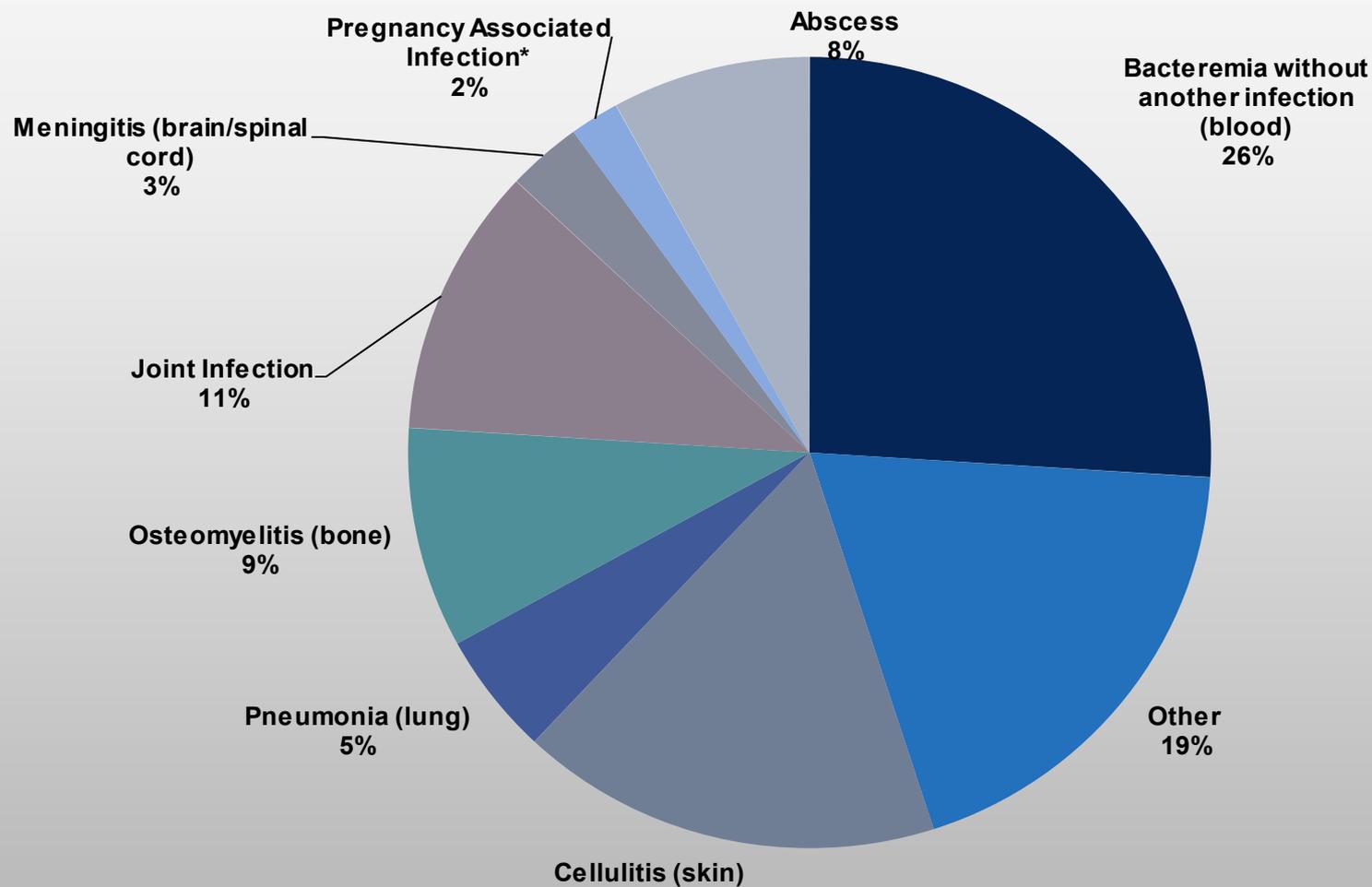
## Incidence of Invasive Group B Streptococcal Disease by Gender and Age Group, Minnesota, 2014

| Characteristic   | Cases<br>(n=548) | Incidence per<br>100,000 persons |
|------------------|------------------|----------------------------------|
| <b>Gender</b>    |                  |                                  |
| Male             | 309              | 11.5                             |
| Female           | 239              | 8.8                              |
| <b>Age Group</b> |                  |                                  |
| Under 1 yr.      | 36               | 52.4                             |
| 1-4 yrs.         | 1                | 0.4                              |
| 5-9 yrs.         | 2                | 0.6                              |
| 10-19 yrs.       | 3                | 0.4                              |
| 20-29 yrs.       | 25               | 3.4                              |
| 30-39 yrs.       | 28               | 4.0                              |
| 40-49 yrs.       | 45               | 6.4                              |
| 50-59 yrs.       | 105              | 13.3                             |
| 60-69 yrs.       | 112              | 20.2                             |
| 70+ yrs.         | 191              | 36.9                             |

## Invasive Group B Streptococcal Disease Cases and Deaths by Age Group, Minnesota, 2014

| Age Group    | Cases      | Deaths    | % Died    |
|--------------|------------|-----------|-----------|
| Under 1 yr.  | 36         | 4         | 11%       |
| 1-4 yrs.     | 1          | 0         | 0%        |
| 5-9 yrs.     | 2          | 0         | 0%        |
| 10-19 yrs.   | 3          | 0         | 0%        |
| 20-29 yrs.   | 25         | 1         | 4%        |
| 30-39 yrs.   | 28         | 0         | 0%        |
| 40-49 yrs.   | 45         | 0         | 0%        |
| 50-59 yrs.   | 105        | 4         | 4%        |
| 60-69 yrs.   | 112        | 0         | 0%        |
| 70+ yrs.     | 191        | 7         | 4%        |
| <b>Total</b> | <b>548</b> | <b>16</b> | <b>3%</b> |

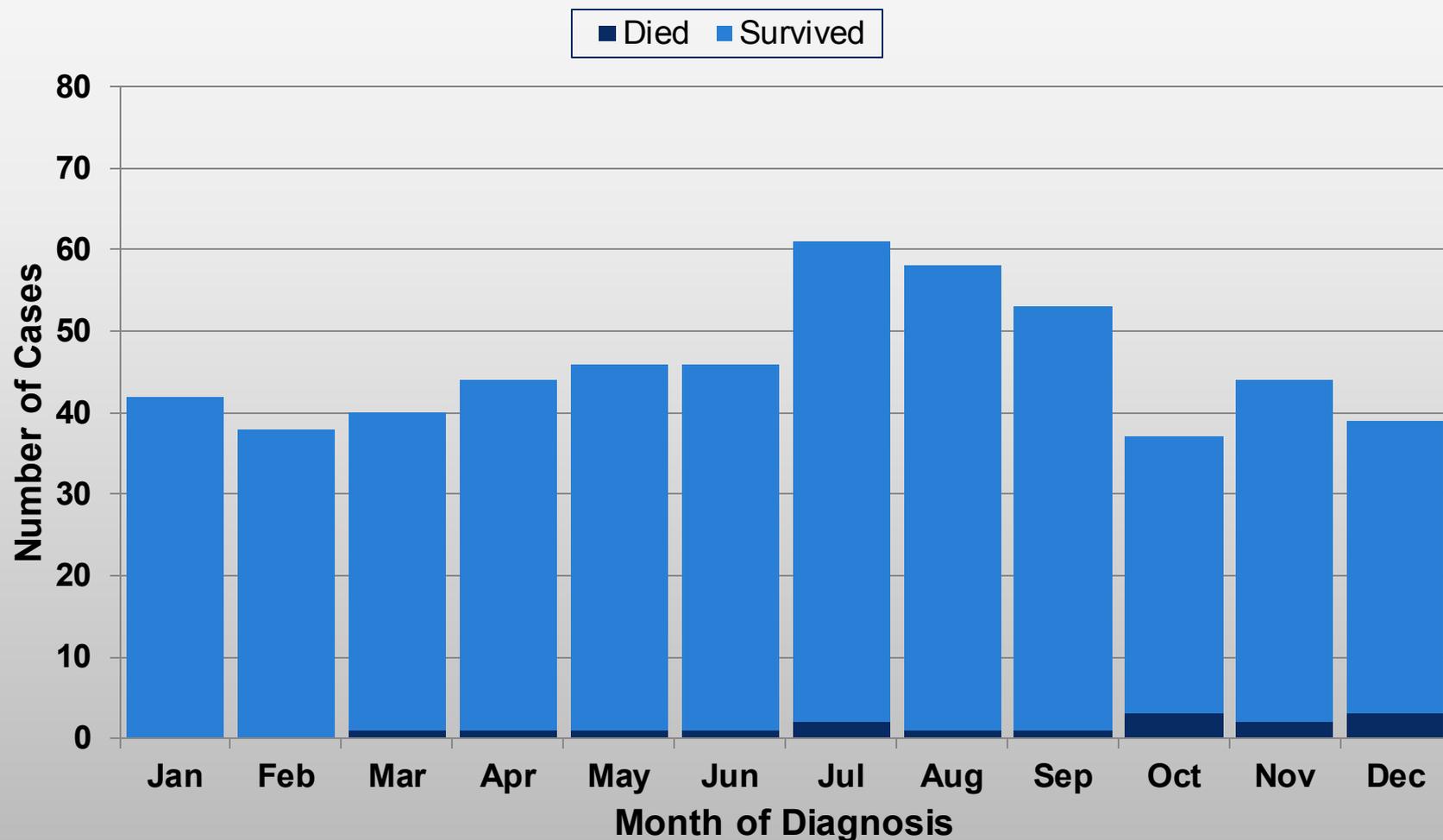
# Invasive Group B Streptococcal Disease by Type of Infection/Syndrome, Minnesota 2014



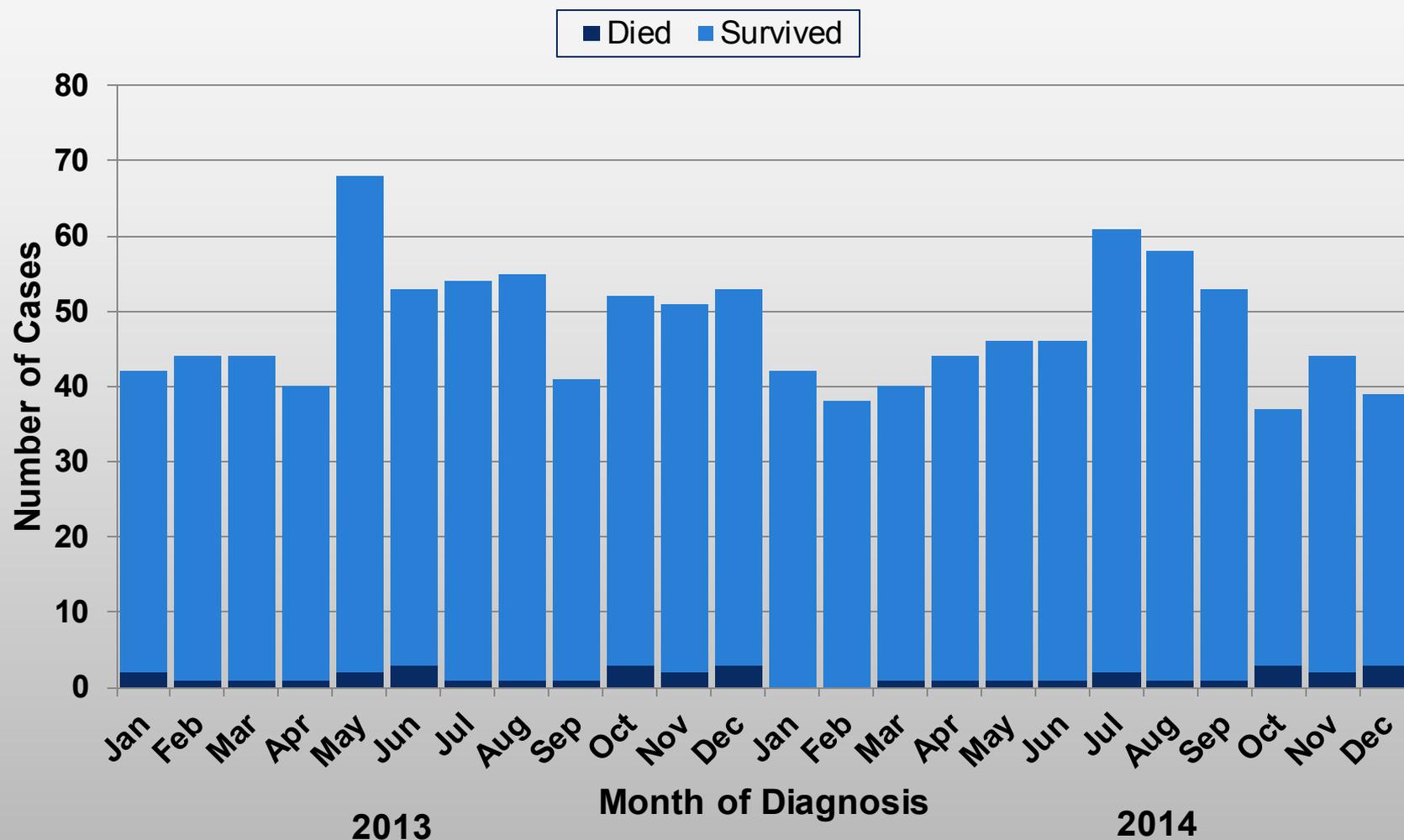
This chart represents 630 infections among 548 cases. (Some cases had >1 infection.)

\* Mother had one of the following infections: Endometriosis, Septic Abortion, Choriamnionitis, or Placental Infection with fetal demise.

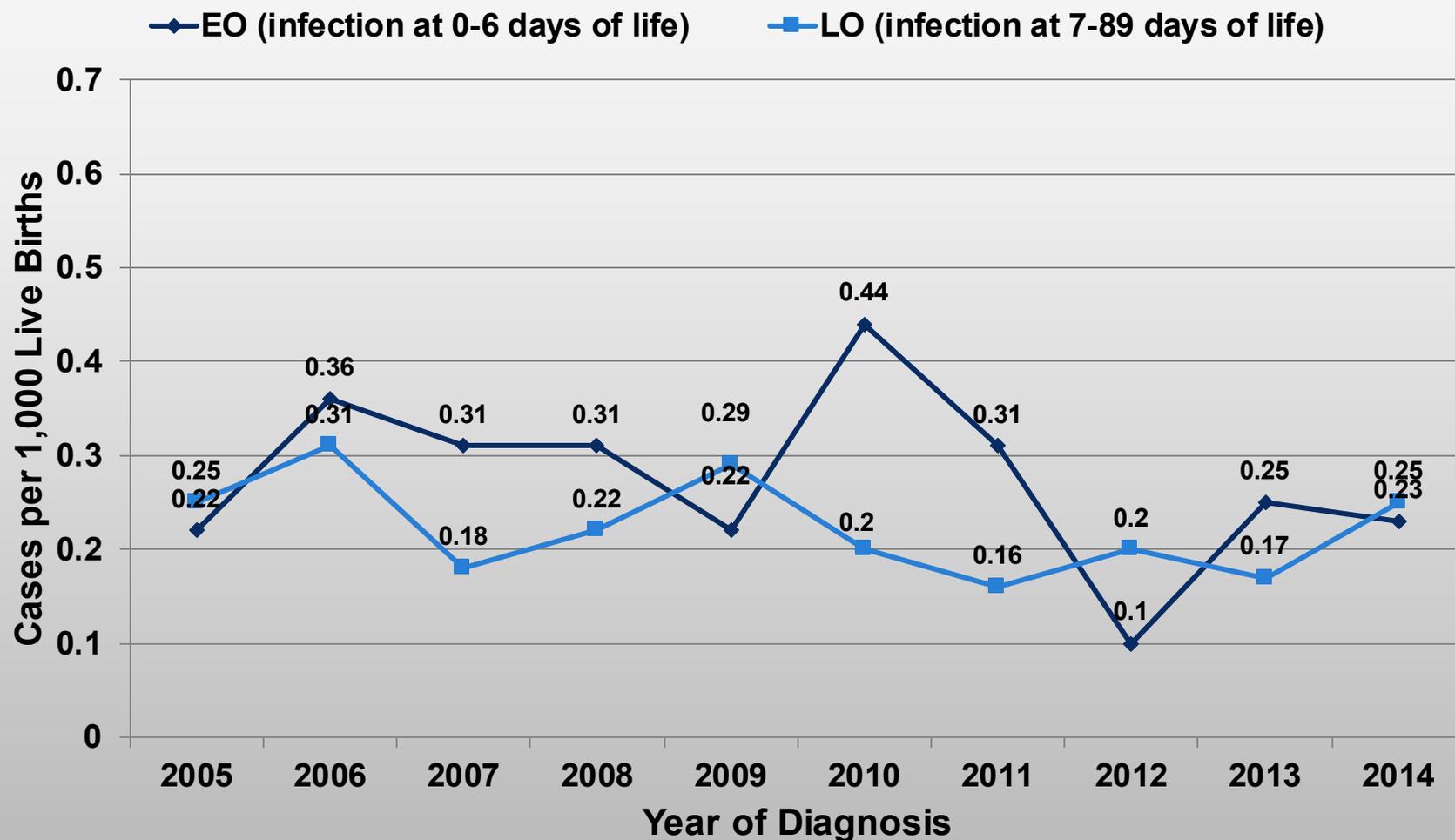
# Cases of Invasive Group B Streptococcal Disease by Month of Diagnosis and Outcome, Minnesota, 2014



## Cases of Invasive Group B Streptococcal Disease by Month of Diagnosis and Outcome, Minnesota, 2013-2014



# Incidence of Invasive Early and Late-Onset Group B Streptococcal Disease, Minnesota, 2005-2014

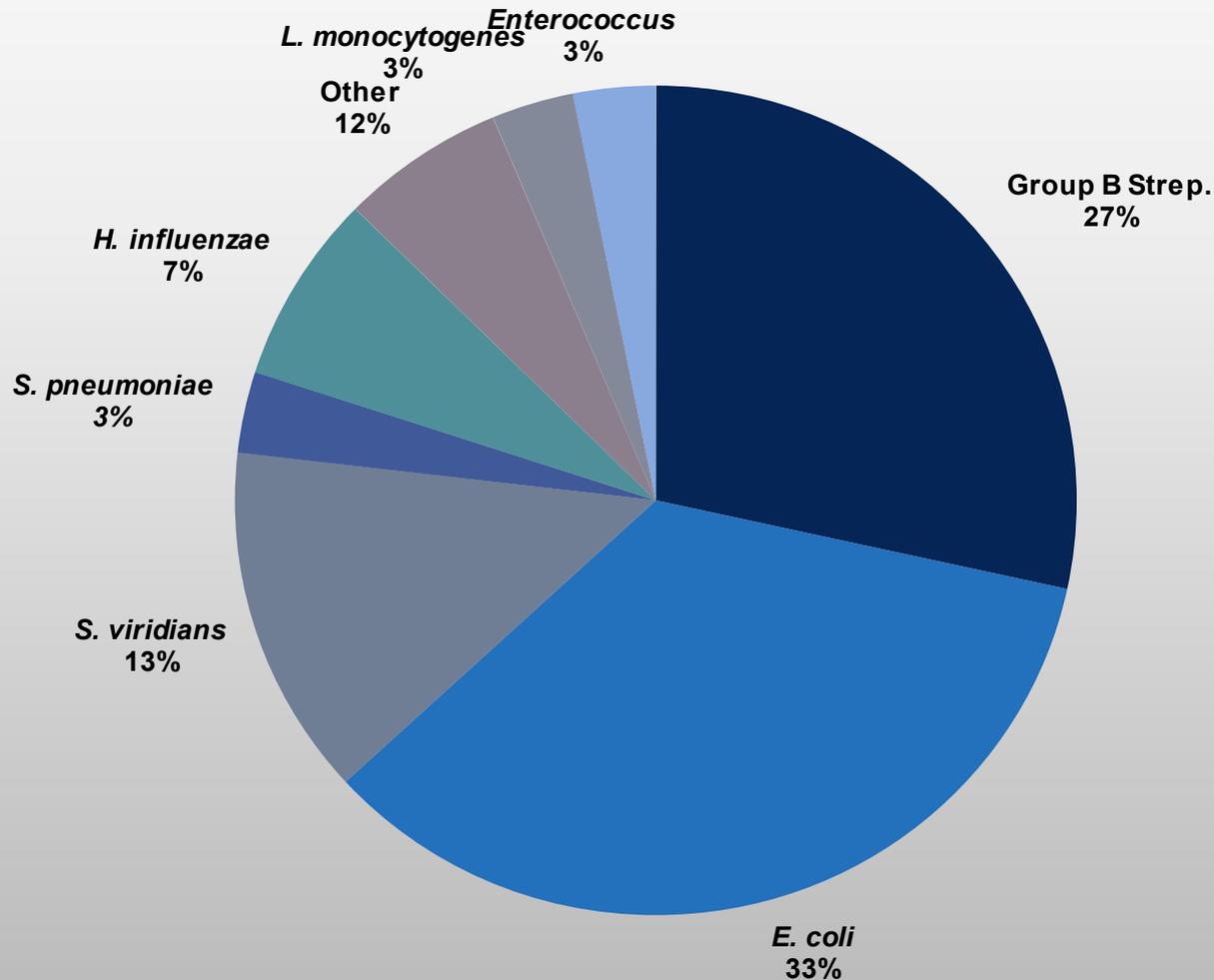


## Early-Onset\* Group B Streptococcal Disease by Race, Gestational Age and Outcome, Minnesota, 2014

| Characteristic         | Cases<br>(n=16) | Percent |
|------------------------|-----------------|---------|
| <b>Race</b>            |                 |         |
| White                  | 11              | 69%     |
| Black                  | 1               | 6%      |
| Asian                  | 1               | 6%      |
| Other                  | 3               | 19%     |
| <b>Gestational Age</b> |                 |         |
| Under 32 weeks         | 3               | 19%     |
| 32-37 weeks            | 2               | 13%     |
| Full-term              | 11              | 69%     |
| <b>Outcome</b>         |                 |         |
| Died                   | 3               | 19%     |
| Survived               | 13              | 81%     |

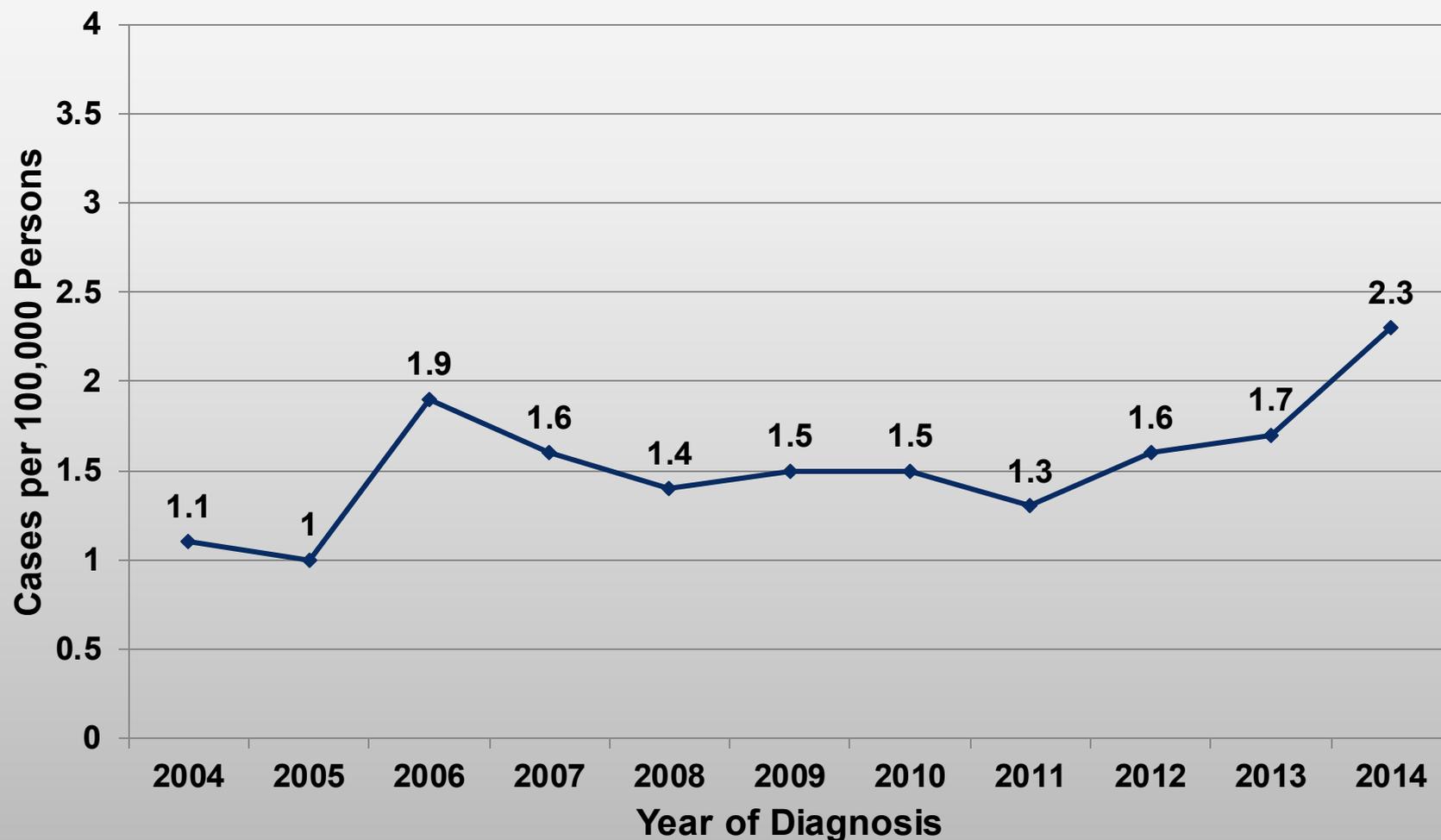
\* onset 0-6 days of life

# Invasive Neonatal Sepsis Disease in First 6 Days of Life by Pathogen, Minnesota, 2014\*



\* This chart represents 60 cases.

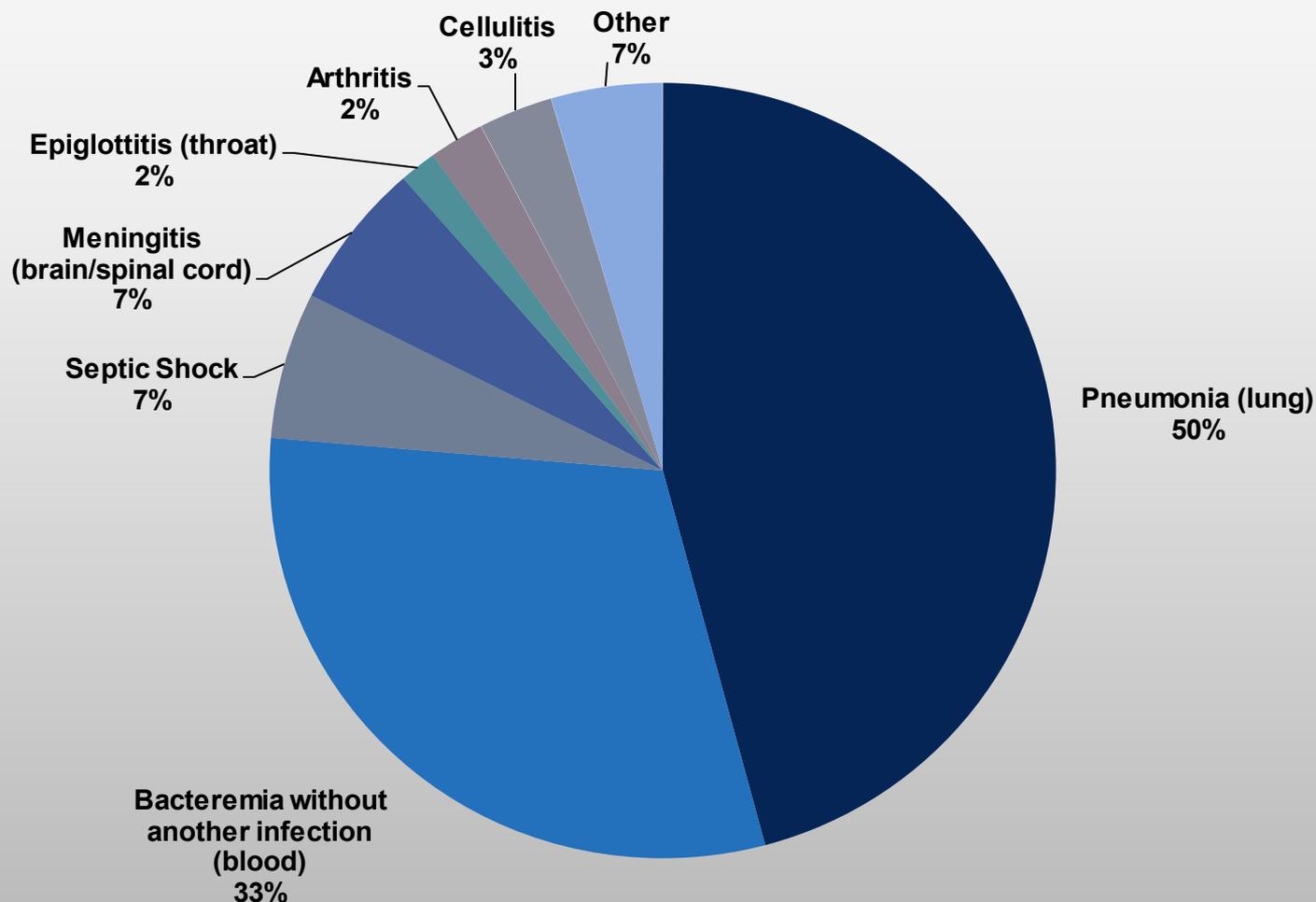
# Incidence of Invasive *Haemophilus influenzae* Disease, Minnesota, 2004-2014



## Incidence of Invasive *Haemophilus influenzae* Disease by Gender and Age Group, Minnesota, 2014

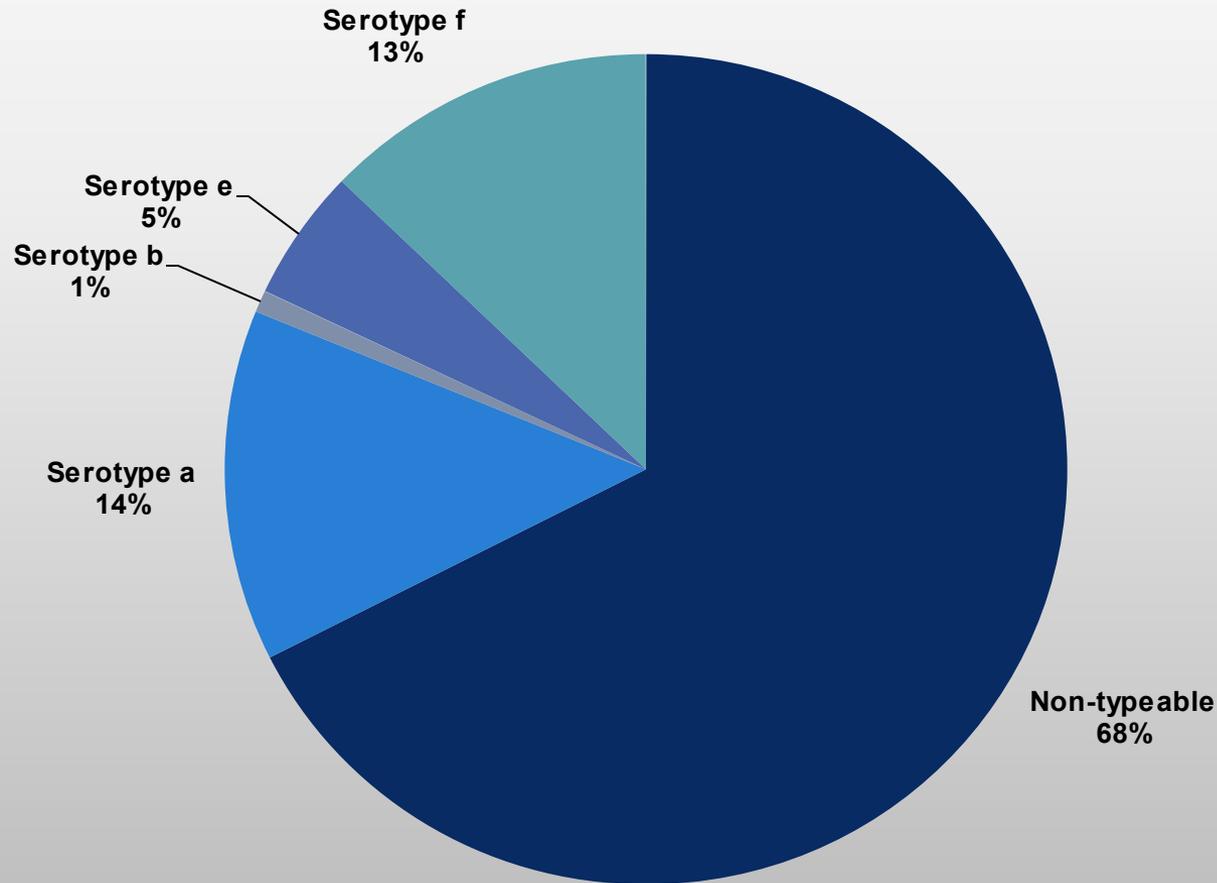
| Characteristic   | Cases<br>(n=123) | Incidence per<br>100,000 persons |
|------------------|------------------|----------------------------------|
| <b>Gender</b>    |                  |                                  |
| Male             | 54               | 2.00                             |
| Female           | 69               | 2.53                             |
| <b>Age Group</b> |                  |                                  |
| Under 1 yr.      | 11               | 16.02                            |
| 1-4 yrs.         | 7                | 2.51                             |
| 5-9 yrs.         | 5                | 1.38                             |
| 10-19 yrs.       | 2                | 0.28                             |
| 20-29 yrs.       | 4                | 0.55                             |
| 30-39 yrs.       | 7                | 0.99                             |
| 40-49 yrs.       | 2                | 0.28                             |
| 50-59 yrs.       | 5                | 0.63                             |
| 60-69 yrs.       | 21               | 3.78                             |
| 70+ yrs.         | 59               | 11.39                            |

# Invasive *Haemophilus influenzae* Disease by Type of Infection/Syndrome, Minnesota 2014



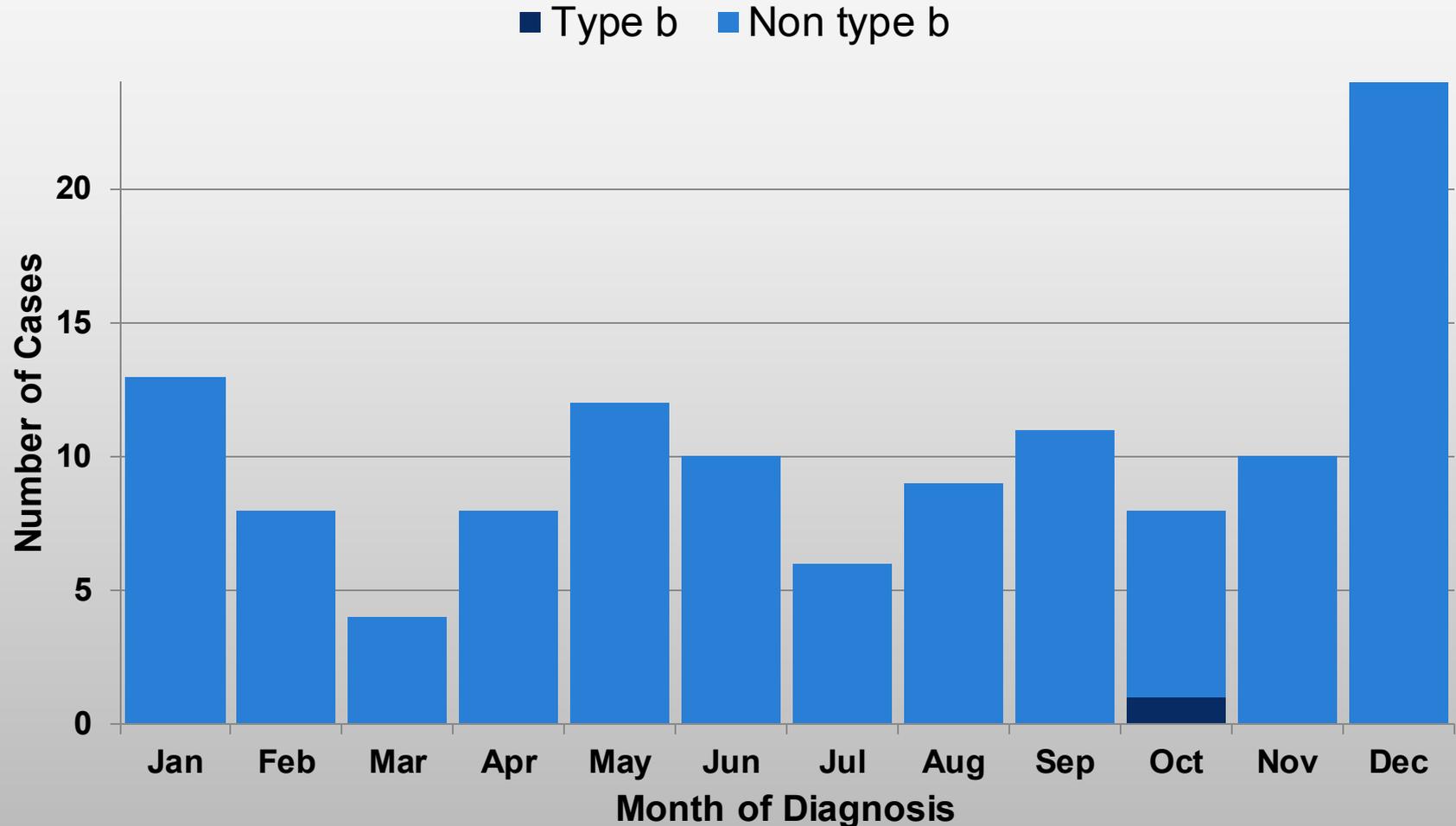
This graph represents 135 infections in 123 cases (some cases had > 1 infection).

# Invasive *Haemophilus influenzae* Disease by Serotype, Minnesota 2014 (n=123\*)

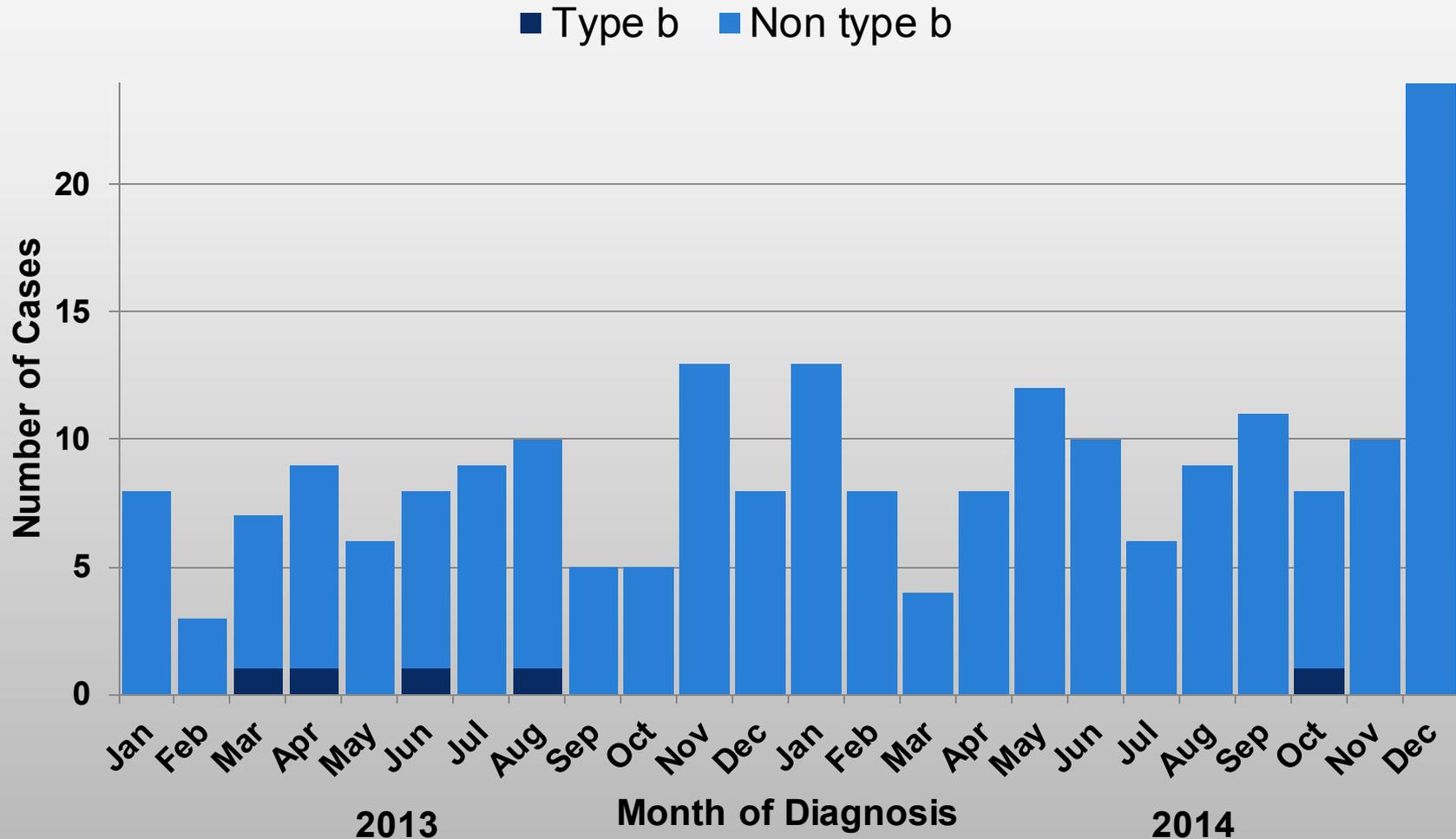


\* 6 case isolates not available for serotyping

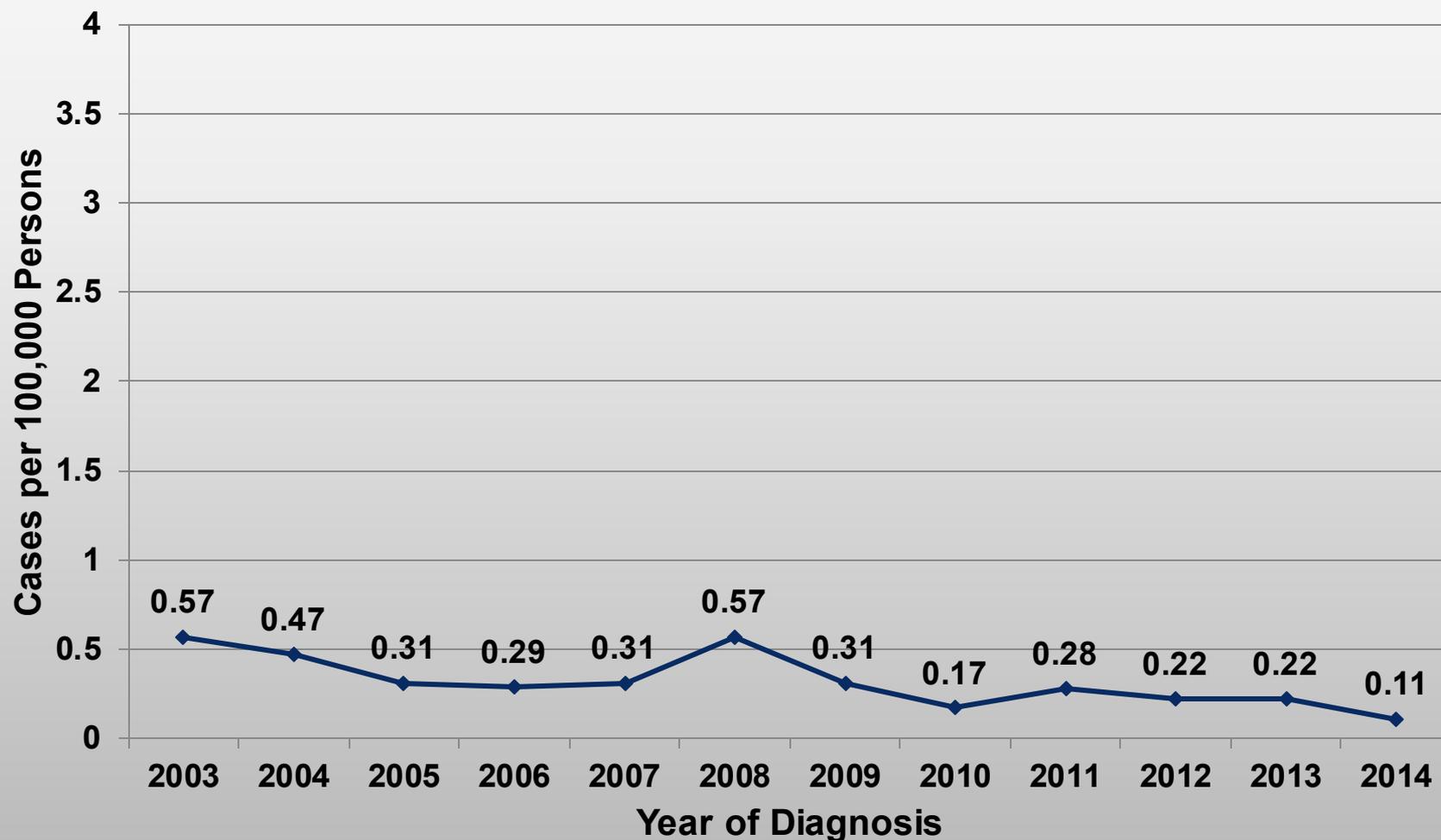
# Cases of Invasive *Haemophilus influenzae* Disease by Month of Diagnosis, Serotype and Outcome, Minnesota, 2014



# Cases of Invasive *Haemophilus influenzae* Disease by Month of Diagnosis and Serotype, Minnesota, 2013-2014



# Incidence of Invasive *Neisseria meningitidis* Disease, Minnesota, 2003-2014



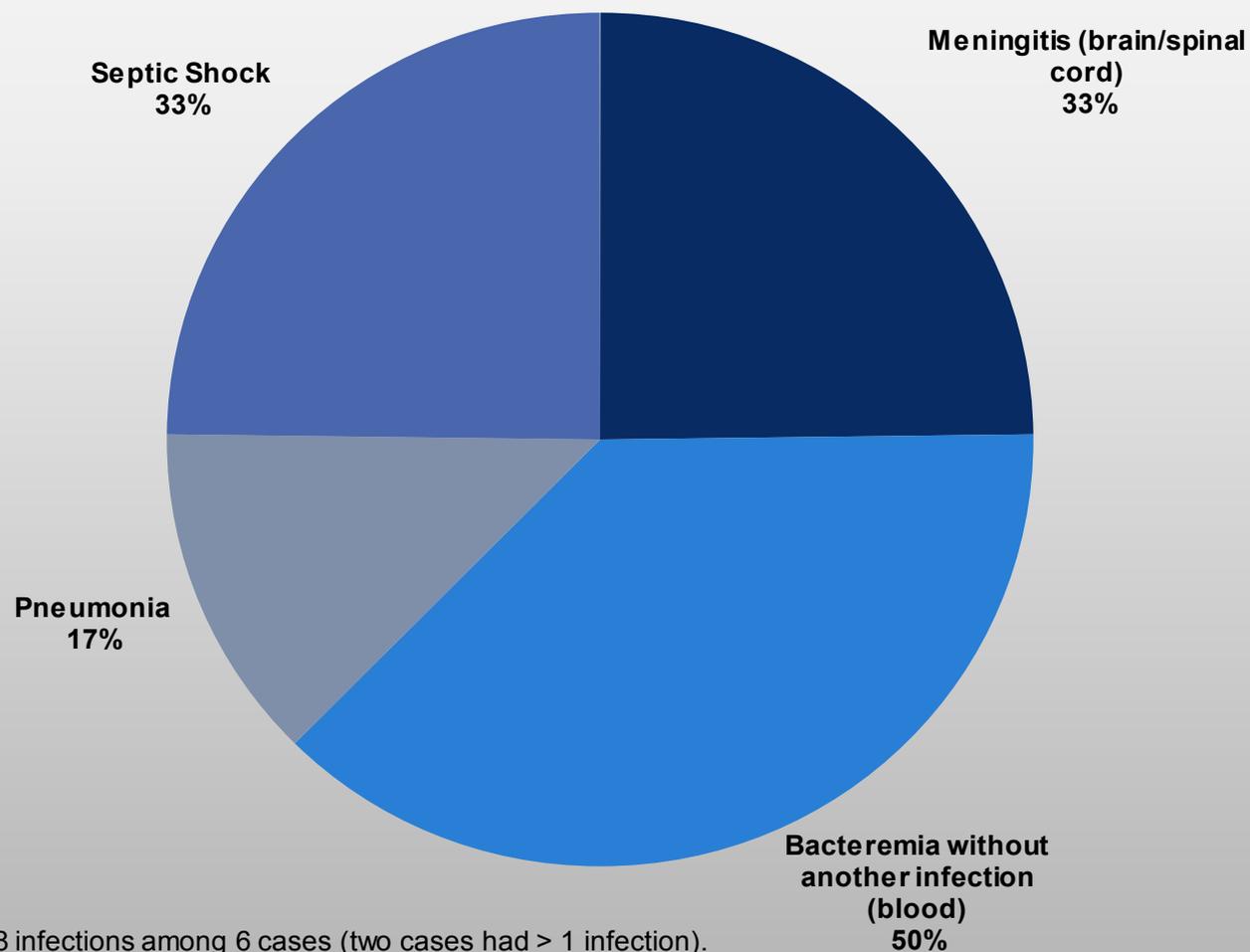
## Incidence of Invasive *Neisseria meningitidis* Disease by Gender and Age Group, Minnesota, 2014

| Characteristic   | Cases<br>(n=6) | Incidence per<br>100,000 persons |
|------------------|----------------|----------------------------------|
| <b>Gender</b>    |                |                                  |
| Male             | 4              | 0.15                             |
| Female           | 2              | 0.07                             |
| <b>Age Group</b> |                |                                  |
| Under 1 yr.      | 1              | 1.46                             |
| 1-4 yrs.         | 0              | 0                                |
| 5-9 yrs.         | 0              | 0                                |
| 10-19 yrs.       | 1              | 0.14                             |
| 20-29 yrs.       | 1              | 0.14                             |
| 30-39 yrs.       | 0              | 0                                |
| 40-49 yrs.       | 3              | 0.43                             |
| 50-59 yrs.       | 0              | 0                                |
| 60-69 yrs.       | 0              | 0                                |
| 70+ yrs.         | 0              | 0                                |

## Invasive *Neisseria meningitidis* Disease Cases and Deaths by Age Group, Minnesota, 2014

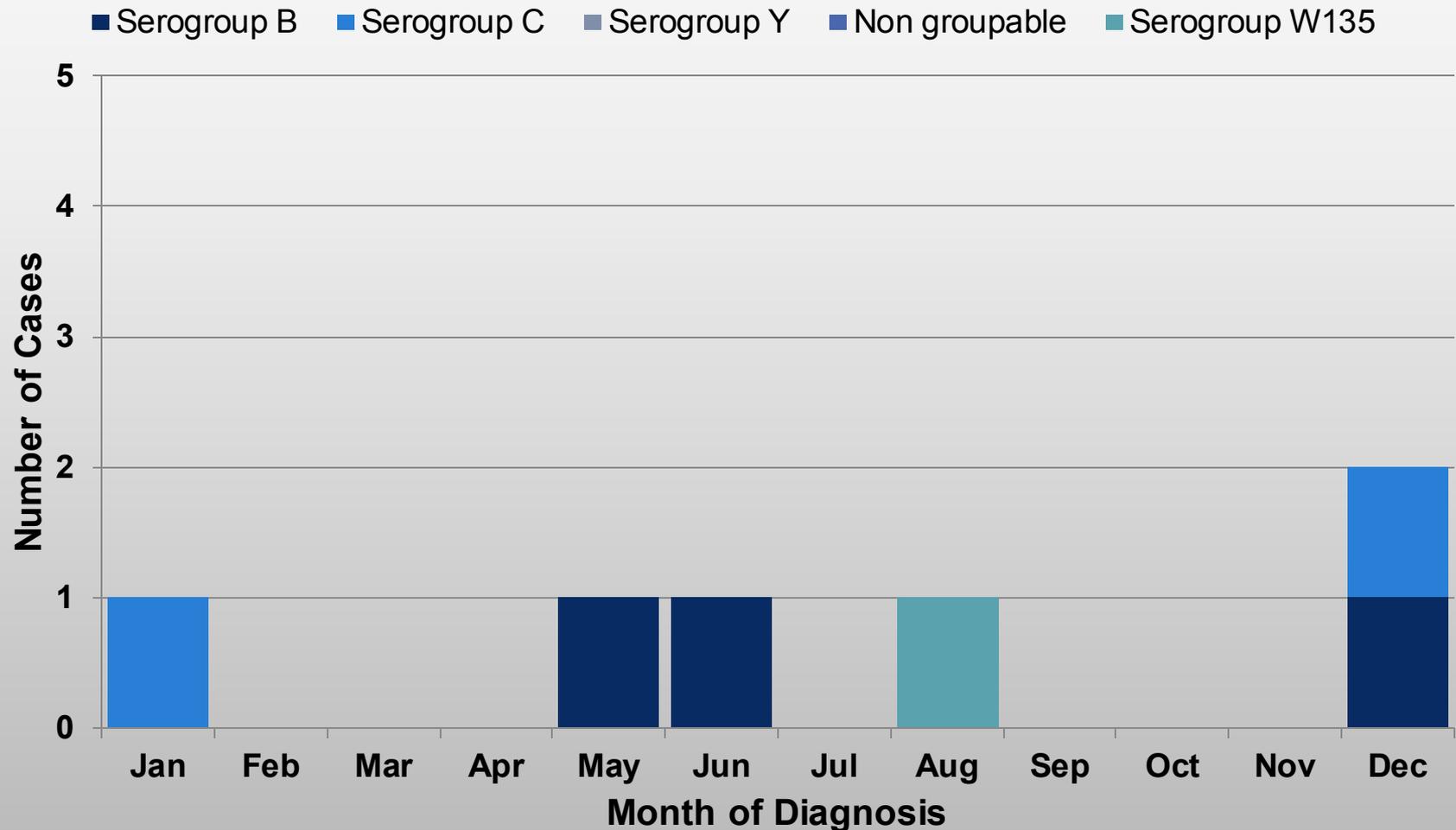
| Age Group    | Cases    | Deaths   | % Died       |
|--------------|----------|----------|--------------|
| Under 1 yr.  | 1        | 0        | --           |
| 1-4 yrs.     | 0        | 0        | --           |
| 5-9 yrs.     | 0        | 0        | --           |
| 10-19 yrs.   | 1        | 0        | --           |
| 20-29 yrs.   | 1        | 0        | --           |
| 30-39 yrs.   | 0        | 0        | --           |
| 40-49 yrs.   | 3        | 1        | 33.3%        |
| 50-59 yrs.   | 0        | 0        | --           |
| 60-69 yrs.   | 0        | 0        | --           |
| 70+ yrs.     | 0        | 0        | --           |
| <b>Total</b> | <b>6</b> | <b>1</b> | <b>16.6%</b> |

# Invasive *Neisseria meningitidis* by Type of Infection/Syndrome, Minnesota 2014\*

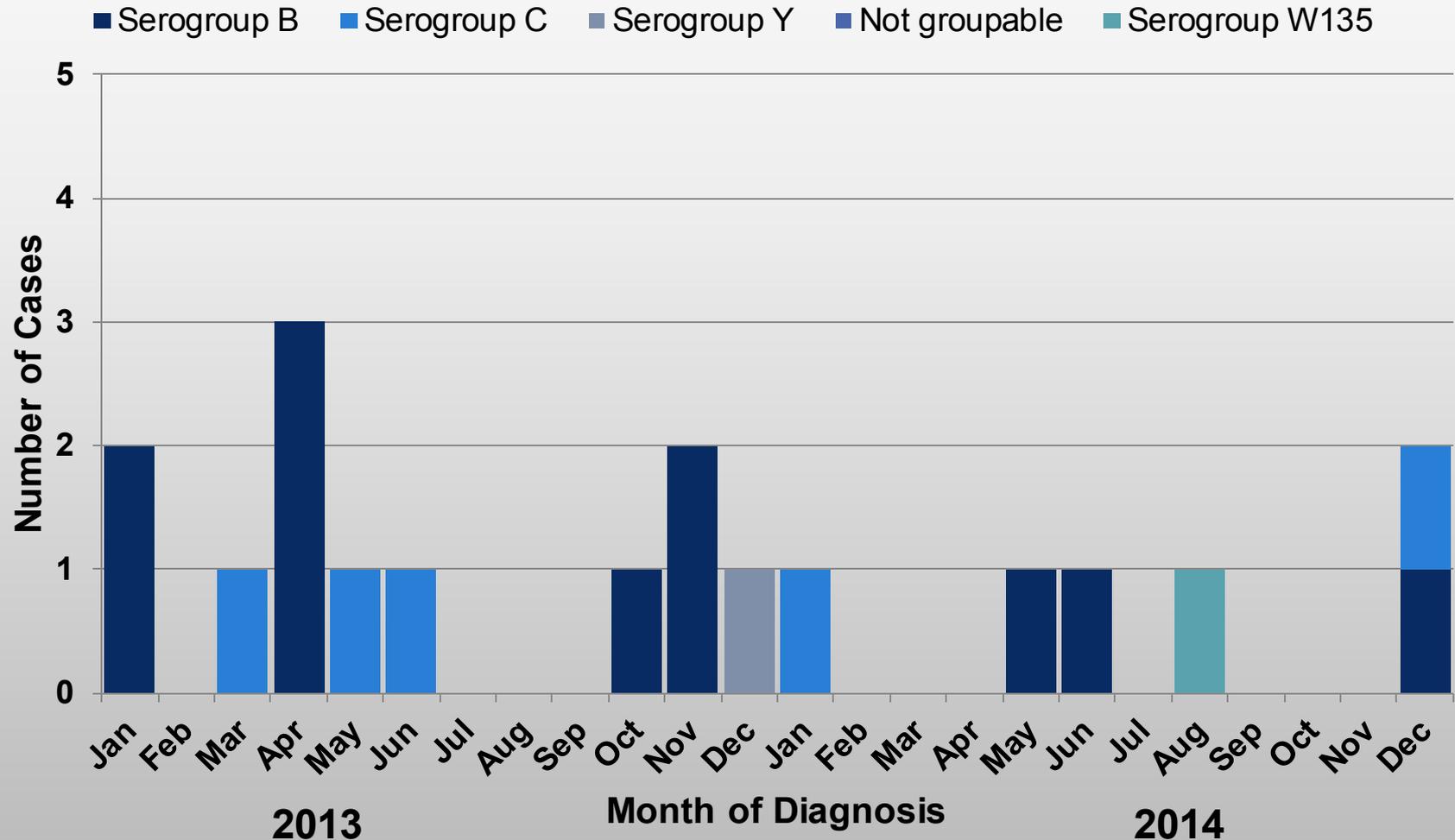


\*This chart represents 8 infections among 6 cases (two cases had > 1 infection).

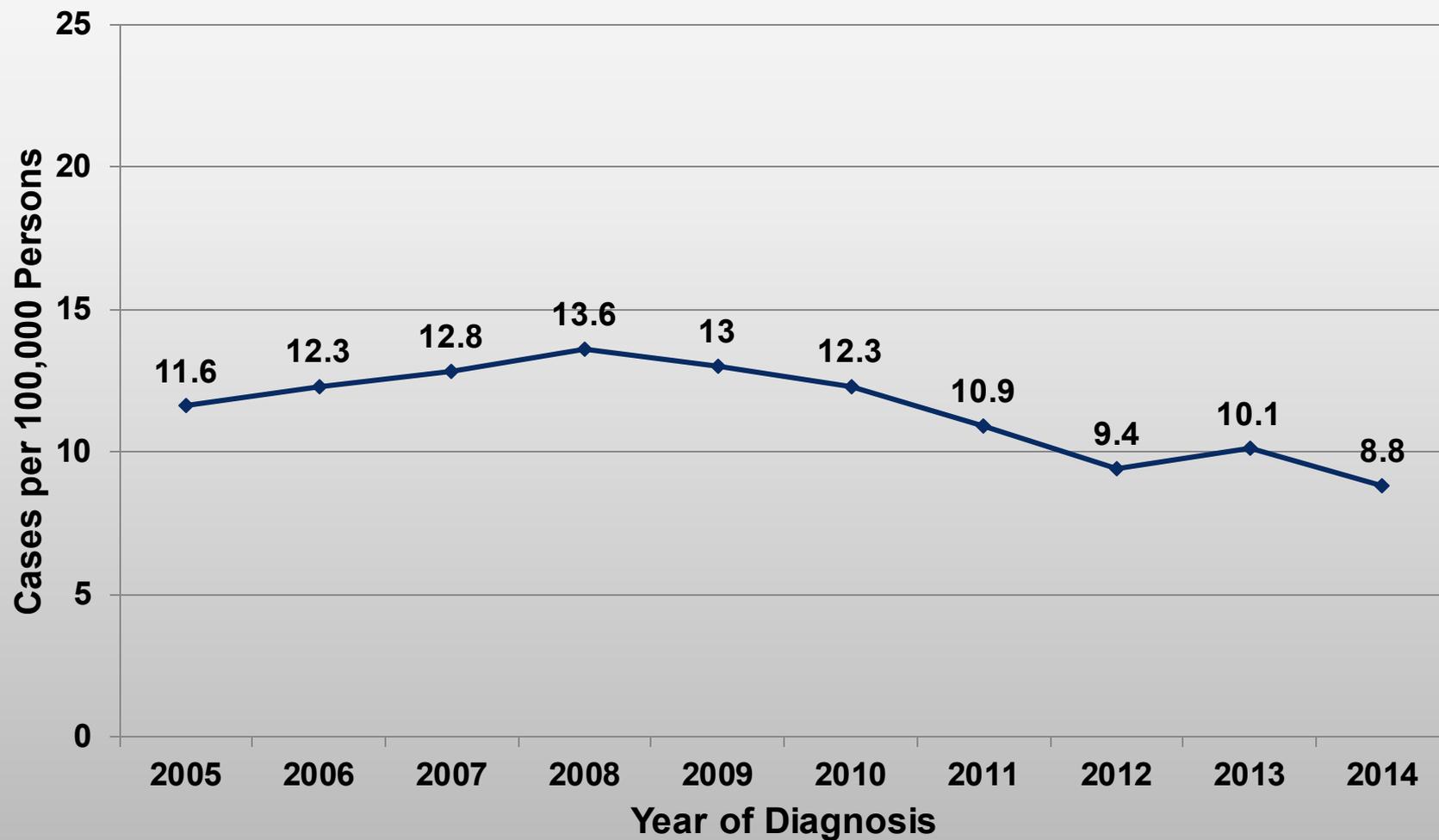
# Cases of Invasive *Neisseria meningitidis* Disease by Month of Diagnosis and Serotype, Minnesota, 2014



## Cases of Invasive *Neisseria meningitidis* Disease by Month of Diagnosis and Serotype, Minnesota, 2013-2014



# Incidence of Invasive Pneumococcal Disease, Minnesota, 2005-2014



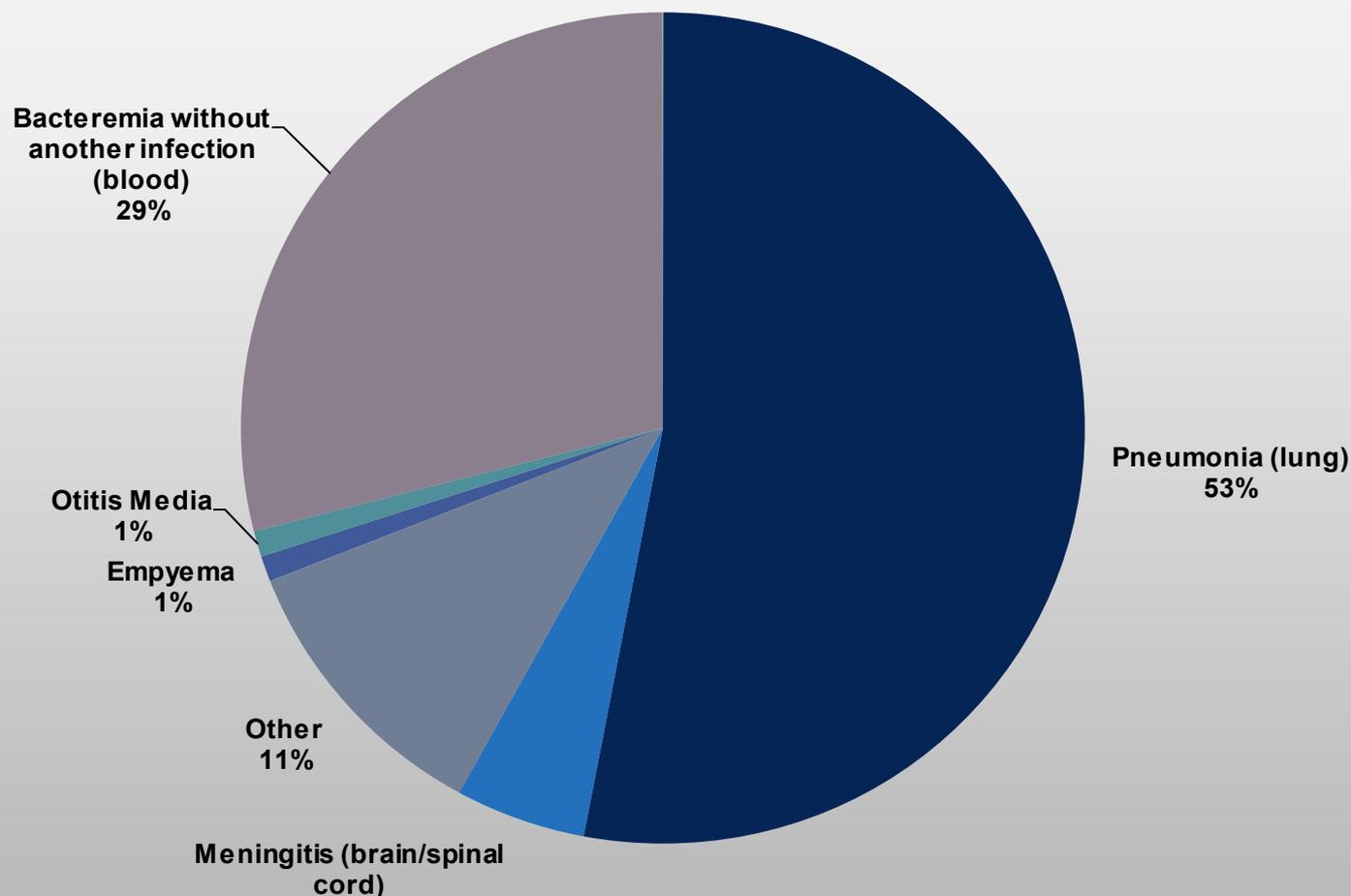
# Incidence of Invasive Pneumococcal Disease by Gender and Age Group, Minnesota, 2014

| Characteristic   | Cases (n=476) | Incidence per 100,000 persons |
|------------------|---------------|-------------------------------|
| <b>Gender</b>    |               |                               |
| Male             | 241           | 8.9                           |
| Female           | 235           | 8.6                           |
| <b>Age Group</b> |               |                               |
| Under 1 yr.      | 19            | 27.7                          |
| 1-4 yrs.         | 22            | 7.9                           |
| 5-19 yrs.        | 19            | 1.8                           |
| 20-29 yrs.       | 25            | 3.4                           |
| 30-39 yrs.       | 26            | 3.7                           |
| 40-49 yrs.       | 30            | 4.3                           |
| 50-64 yrs.       | 124           | 11.2                          |
| 65-79 yrs.       | 122           | 22.6                          |
| 80+ yrs.         | 89            | 41.3                          |

# Invasive Pneumococcal Disease Cases and Deaths by Age Group, Minnesota, 2014

| Age Group    | Cases      | Deaths    | % Died    |
|--------------|------------|-----------|-----------|
| Under 1 yr.  | 19         | 1         | 5%        |
| 1-4 yrs.     | 22         | 0         | 0%        |
| 5-19 yrs.    | 19         | 0         | 0%        |
| 20-29 yrs.   | 25         | 2         | 8%        |
| 30-39 yrs.   | 26         | 1         | 4%        |
| 40-49 yrs.   | 30         | 3         | 10%       |
| 50-64 yrs.   | 124        | 12        | 10%       |
| 65-79 yrs.   | 122        | 8         | 7%        |
| 80+ yrs.     | 89         | 10        | 11%       |
| <b>Total</b> | <b>476</b> | <b>37</b> | <b>8%</b> |

# Invasive Pneumococcal Disease by Type of Infection/Syndrome, Minnesota 2014\*



\*This chart represents 512 infections among 476 cases (some cases had > 1 infection).

## Invasive Pneumococcal Isolates by Serotype Included in 13-Valent Conjugate Vaccine\* by Age Group, Minnesota, 2014

| Age Group    | Isolates   | # included in<br>PCV-13 | % included in<br>PCV-13 |
|--------------|------------|-------------------------|-------------------------|
| Under 1 yr.  | 18         | 4                       | 22%                     |
| 1-4 yrs.     | 21         | 4                       | 19%                     |
| 5-19 yrs.    | 19         | 3                       | 16%                     |
| 20-29 yrs.   | 23         | 3                       | 13%                     |
| 30-39 yrs.   | 25         | 1                       | 4%                      |
| 40-49 yrs.   | 28         | 5                       | 18%                     |
| 50-64 yrs.   | 119        | 32                      | 27%                     |
| 65-79 yrs.   | 115        | 20                      | 17%                     |
| 80+ yrs.     | 85         | 16                      | 19%                     |
| <b>Total</b> | <b>453</b> | <b>88</b>               | <b>19%</b>              |

\*Serotypes 1, 3, 4, 5, 6A, 6B, 7F, 9V, 14, 18C, 19A, 19F, 23F

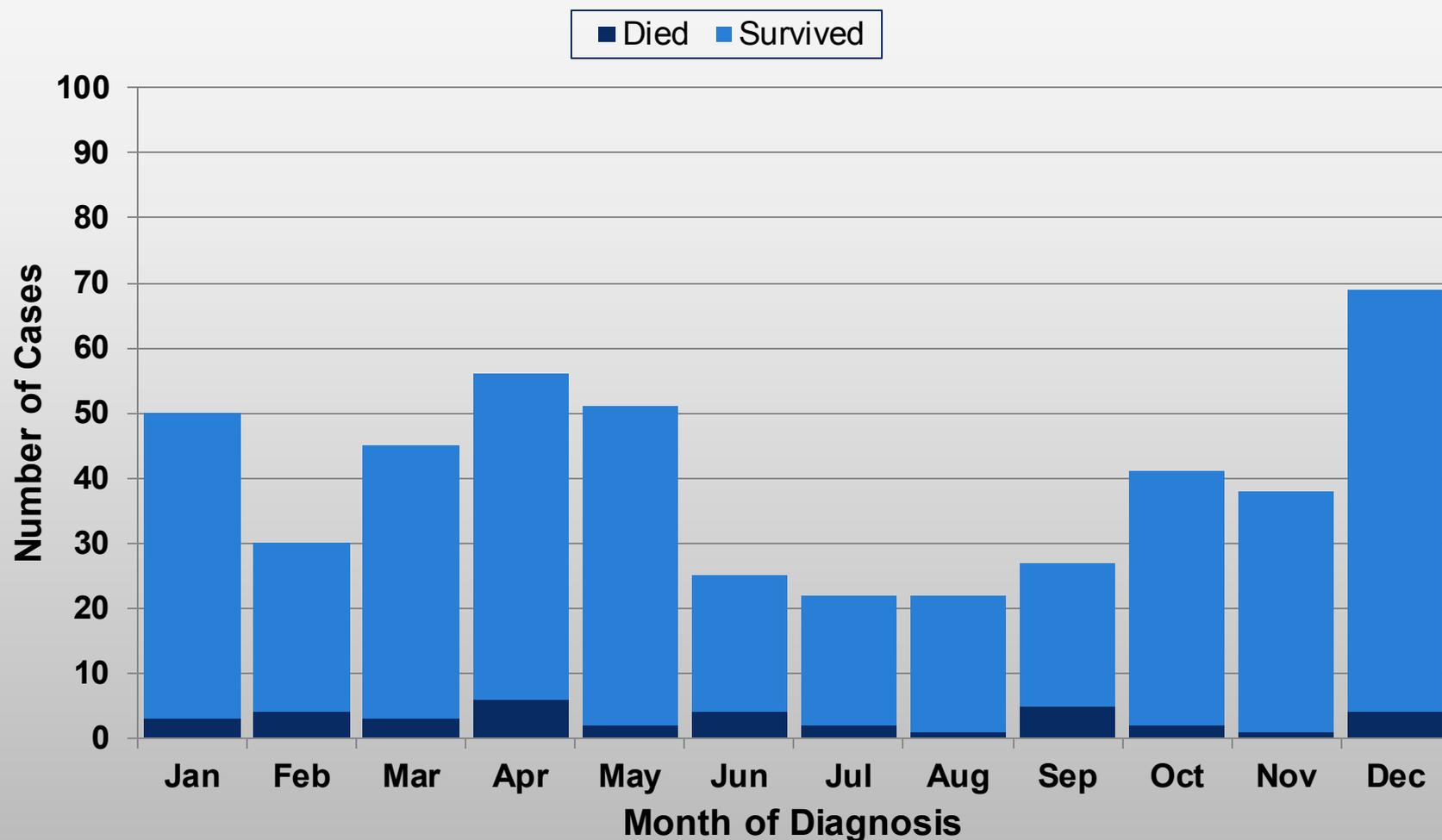
# Invasive Pneumococcal Isolates by Resistance to Antimicrobial Agents, Minnesota, 2014 (n=453 viable isolates)

|                                     | Total Resistant Isolates | % Resistant Isolates |
|-------------------------------------|--------------------------|----------------------|
| <b>Penicillin resistance (R)*</b>   |                          |                      |
| Meningitis breakpoints              | 90                       | 20%                  |
| Non-meningitis breakpoints          | 20                       | 4%                   |
| <b>Resistance to drug classes**</b> |                          |                      |
| No resistance                       | 260                      | 52%                  |
| R to 1 drug class                   | 113                      | 25%                  |
| R to 2-3 drug classes               | 37                       | 8%                   |
| R to 4-5 drug classes               | 43                       | 9%                   |

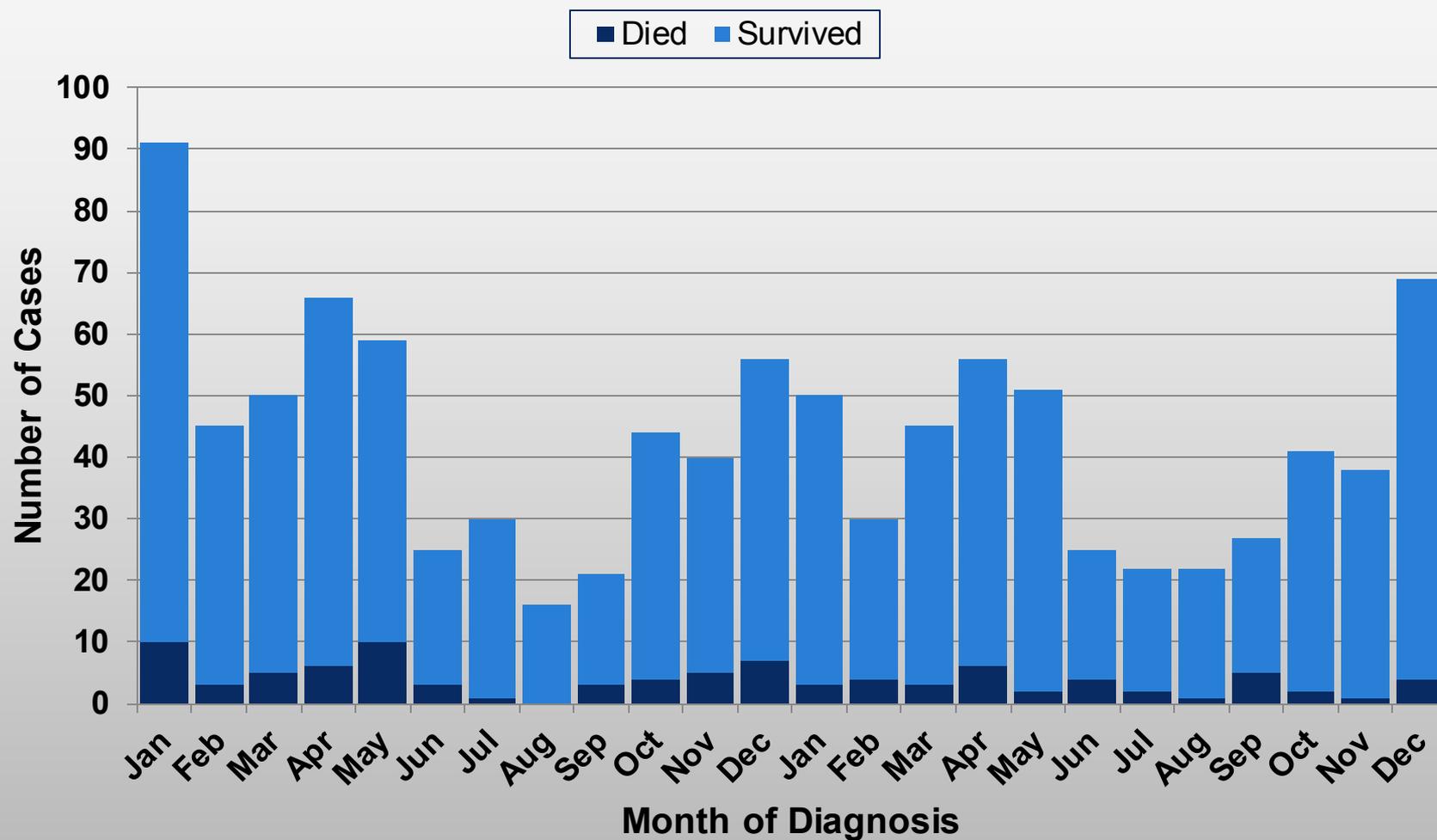
\* Isolates with MIC  $\geq$  0.12  $\mu$ g/ml are Penicillin-R for meningitis,  $\geq$  8  $\mu$ g/ml for non-meningitis.

\*\* Twelve drug classes assessed; R to beta-lactams was assessed by penicillin MIC  $\geq$  0.12  $\mu$ g/ml.

# Cases of Invasive Pneumococcal Disease by Month of Diagnosis and Outcome, Minnesota, 2014



# Cases of Invasive Pneumococcal Disease by Month of Diagnosis and Outcome, Minnesota, 2013-2014



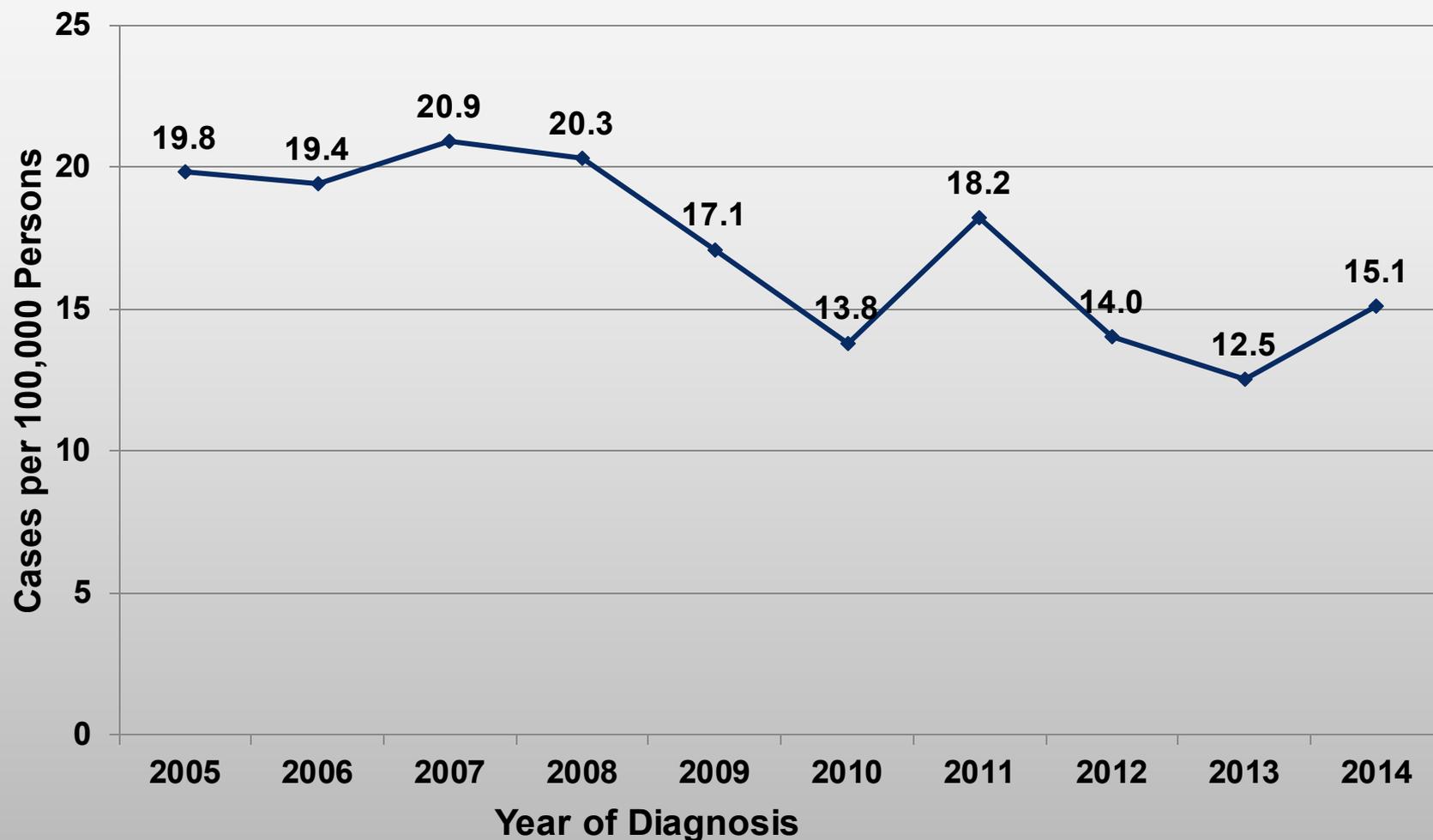
## Invasive MRSA Surveillance Methods

- Cases include Hennepin and Ramsey County, Minnesota residents with invasive infections due to methicillin-resistant *Staphylococcus aureus* (MRSA).
- Invasive infections are from normally sterile body sites such as blood, cerebrospinal fluid and others. These usually cause serious illnesses (disease).
- All metro area hospitals and reference laboratories serving Minnesotans are contacted routinely to identify cases.

## Invasive MRSA Surveillance Methods (cont.)

- Species confirmation, antibiotic resistance and other testing is performed by the MDH Public Health.
- Disease rates are based on census population data.
- The Centers for Disease Control and Prevention (CDC) includes these results from Minnesota and other states and regions in a network called Active Bacterial Core Surveillance (ABCs) which covers a population base of 42 million.

# Incidence of Invasive MRSA Disease, Ramsey and Hennepin Counties, 2004-2014



\* Data from years 2004-2007 includes Ramsey County only.

## Incidence of Invasive MRSA Disease by Gender and Age Group, Ramsey and Hennepin Counties, Minnesota, 2014

| Characteristic   | Cases<br>(n=261) | Incidence per<br>100,000 persons |
|------------------|------------------|----------------------------------|
| <b>Gender</b>    |                  |                                  |
| Male             | 158              | 18.0                             |
| Female           | 103              | 12.2                             |
| <b>Age Group</b> |                  |                                  |
| Under 1 yr.      | 1                | 4.1                              |
| 1-4 yrs.         | 2                | 2.2                              |
| 5-9 yrs.         | 2                | 1.8                              |
| 10-19 yrs.       | 4                | 1.9                              |
| 20-29 yrs.       | 13               | 4.8                              |
| 30-39 yrs.       | 13               | 5.2                              |
| 40-49 yrs.       | 37               | 16.9                             |
| 50-59 yrs.       | 43               | 18.0                             |
| 60-69 yrs.       | 61               | 36.6                             |
| 70+ yrs.         | 85               | 58.9                             |

## Invasive MRSA Disease Cases and Deaths by Age Group, Ramsey and Hennepin Counties, Minnesota, 2014

| Age Group    | Cases      | Deaths    | % Died       |
|--------------|------------|-----------|--------------|
| Under 1 yr.  | 1          | 0         | 0%           |
| 1-4 yrs.     | 2          | 0         | 0%           |
| 5-9 yrs.     | 2          | 0         | 0%           |
| 10-19 yrs.   | 4          | 0         | 0%           |
| 20-29 yrs.   | 13         | 0         | 0%           |
| 30-39 yrs.   | 13         | 1         | 3.8%         |
| 40-49 yrs.   | 37         | 3         | 11.5%        |
| 50-59 yrs.   | 43         | 3         | 11.5%        |
| 60-69 yrs.   | 61         | 3         | 11.5%        |
| 70+ yrs.     | 85         | 16        | 61.5%        |
| <b>Total</b> | <b>261</b> | <b>26</b> | <b>10.0%</b> |

# Incidence of Invasive MRSA Disease by Case Type, Ramsey and Hennepin Counties, Minnesota, 2014

| Case Type             | Cases | Incidence per 100,000 persons |
|-----------------------|-------|-------------------------------|
| Healthcare-associated | 182   | 10.5                          |
| Community-associated  | 76    | 4.4                           |

- Healthcare-associated if case had one or more of the following: MRSA infection was identified more than 3 days after hospital admission; history of hospitalization, surgery, dialysis or residence in a long-term care facility in the previous year; or, presence of an indwelling catheter.
- Community-associated: none of the previously mentioned criteria were met.
- 3 cases could not be classified

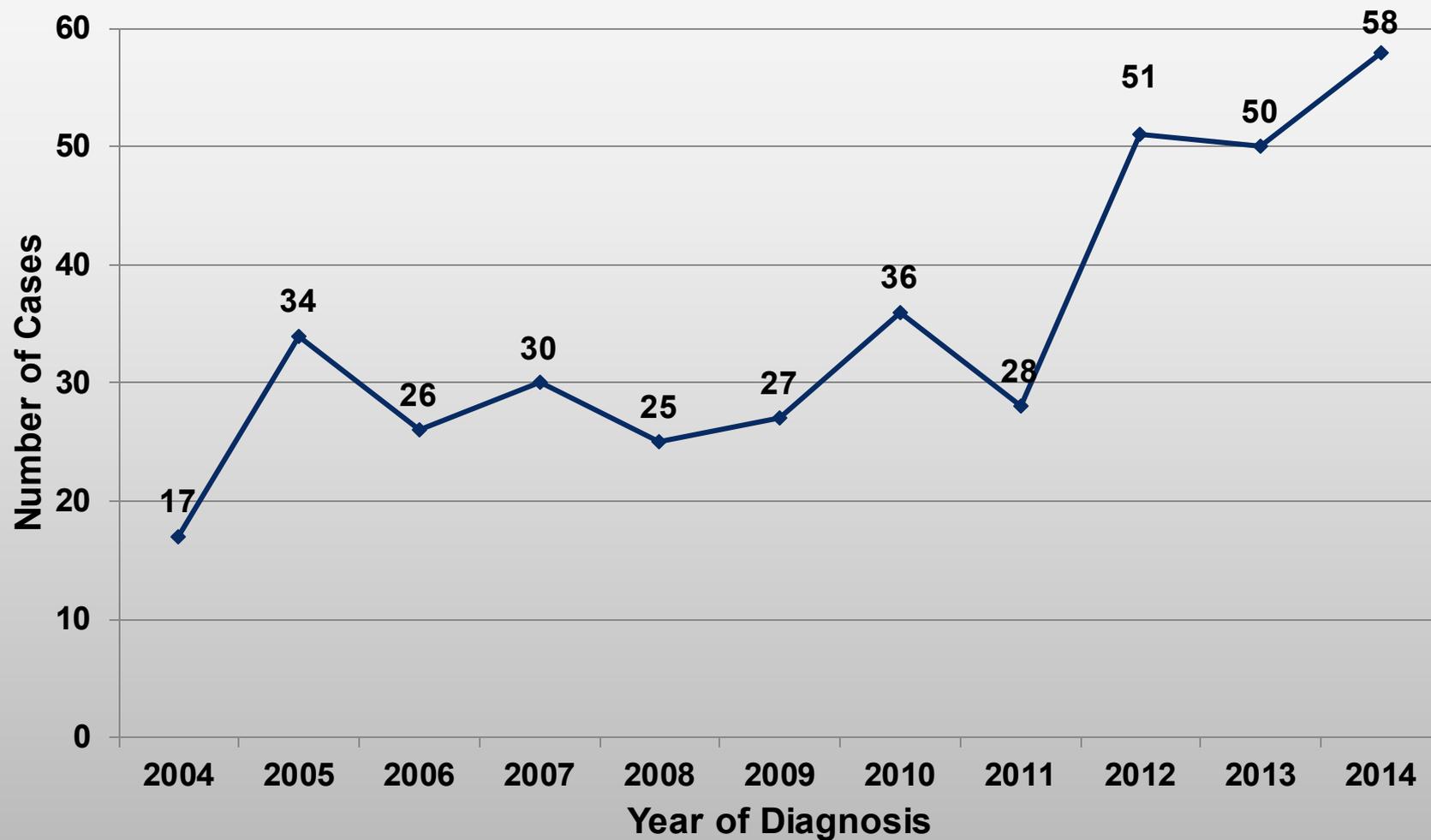
# Invasive MRSA Disease by Type of Infection, Ramsey and Hennepin Counties, Minnesota, 2014

| Type of Infection*                  | Cases |
|-------------------------------------|-------|
| Bacteremia (blood)                  | 190   |
| Without another source of infection | 97    |
| With another source of infection    | 93    |
| Septic arthritis (joint)            | 48    |
| Pneumonia (lung)                    | 31    |
| Osteomyelitis (bone)                | 39    |
| Cellulitis/skin abscess (skin)      | 32    |
| Endocarditis (heart)                | 8     |
| More than one infection type        | 134   |
| Other infection**                   | 78    |

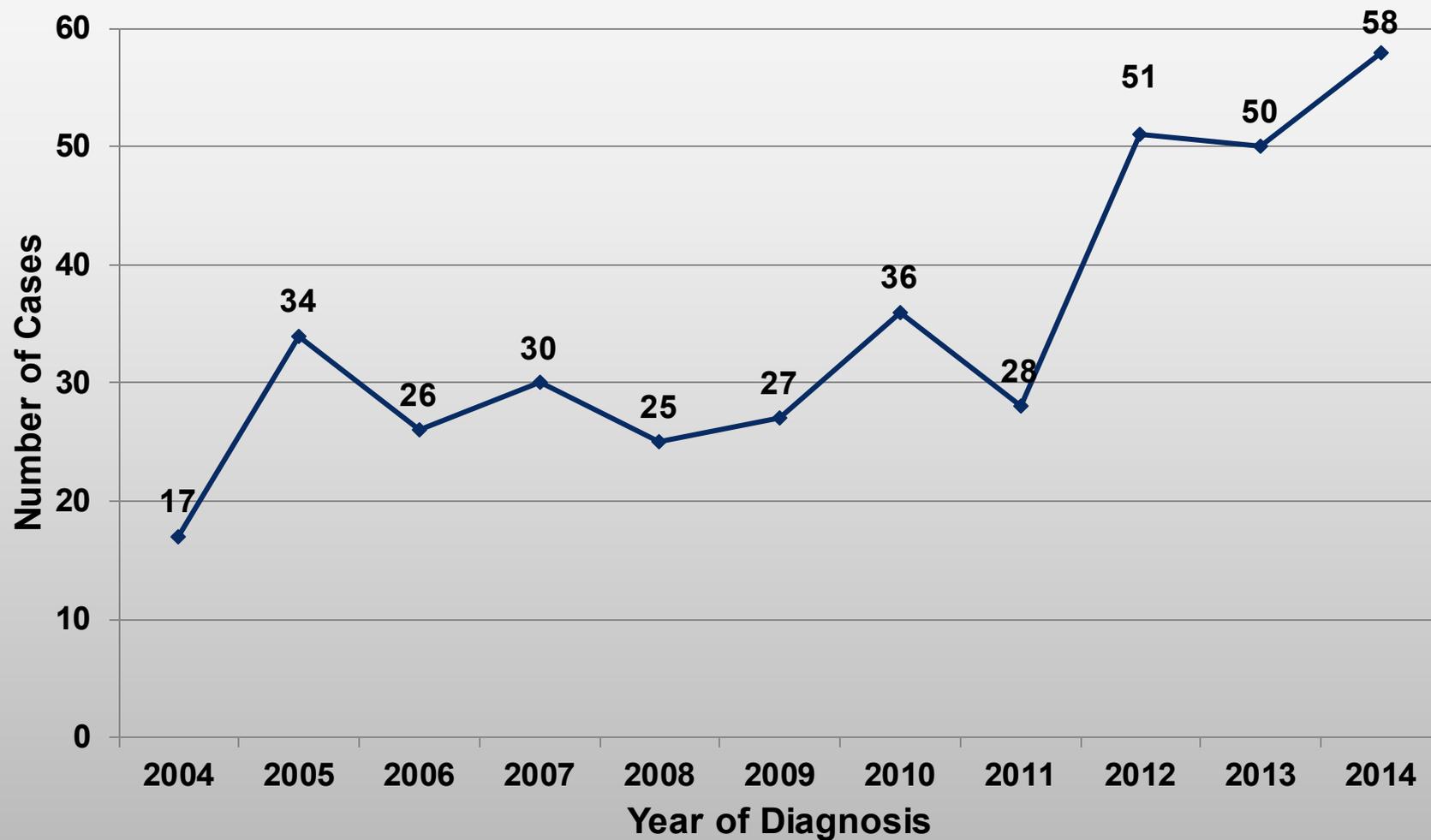
\* Cases may have had more than 1 type of infections

\*\* Other infections included bursitis, catheter site infection, chronic and/or pressure ulcers, empyema (pus), internal organ abscess, meningitis (brain/spinal cord), peritonitis, surgical incision or surgical site infections, septic emboli, septic shock, and urinary tract infections

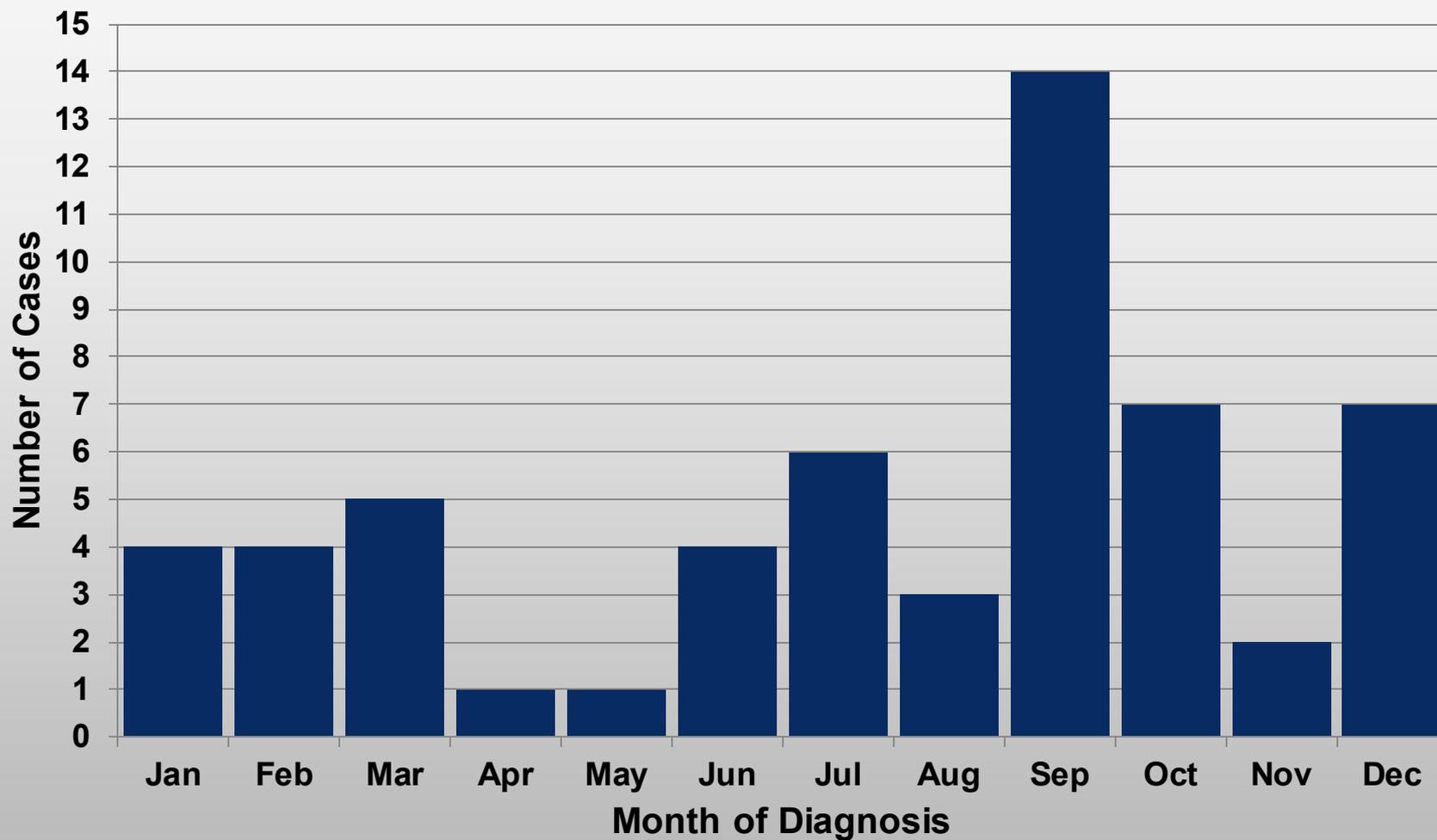
# Confirmed Legionellosis Cases Minnesota, 2004-2014



# Confirmed Legionellosis Cases Minnesota, 2004-2014



# Confirmed Legionellosis Cases by Month of Diagnosis, Minnesota, 2014



## Confirmed Legionellosis Cases by Age Group and Gender, Minnesota, 2014

| Age Group  | Male     | Female   | Total |
|------------|----------|----------|-------|
| 18-29 yrs. | 1        | 1        | 2     |
| 30-39 yrs. | 1        | 1        | 2     |
| 40-49 yrs. | 10       | 5        | 15    |
| 50-59 yrs. | 9        | 4        | 13    |
| 60-69 yrs. | 10       | 4        | 14    |
| 70+ yrs.   | 8        | 4        | 12    |
| Total      | 39 (67%) | 19 (33%) | 58    |

# Possible Exposures Among Confirmed Legionnaires' Disease Cases, Minnesota 2014

