Immunization Registry Data for Community Vaccine Up-To-Date Status and Disease Correlation

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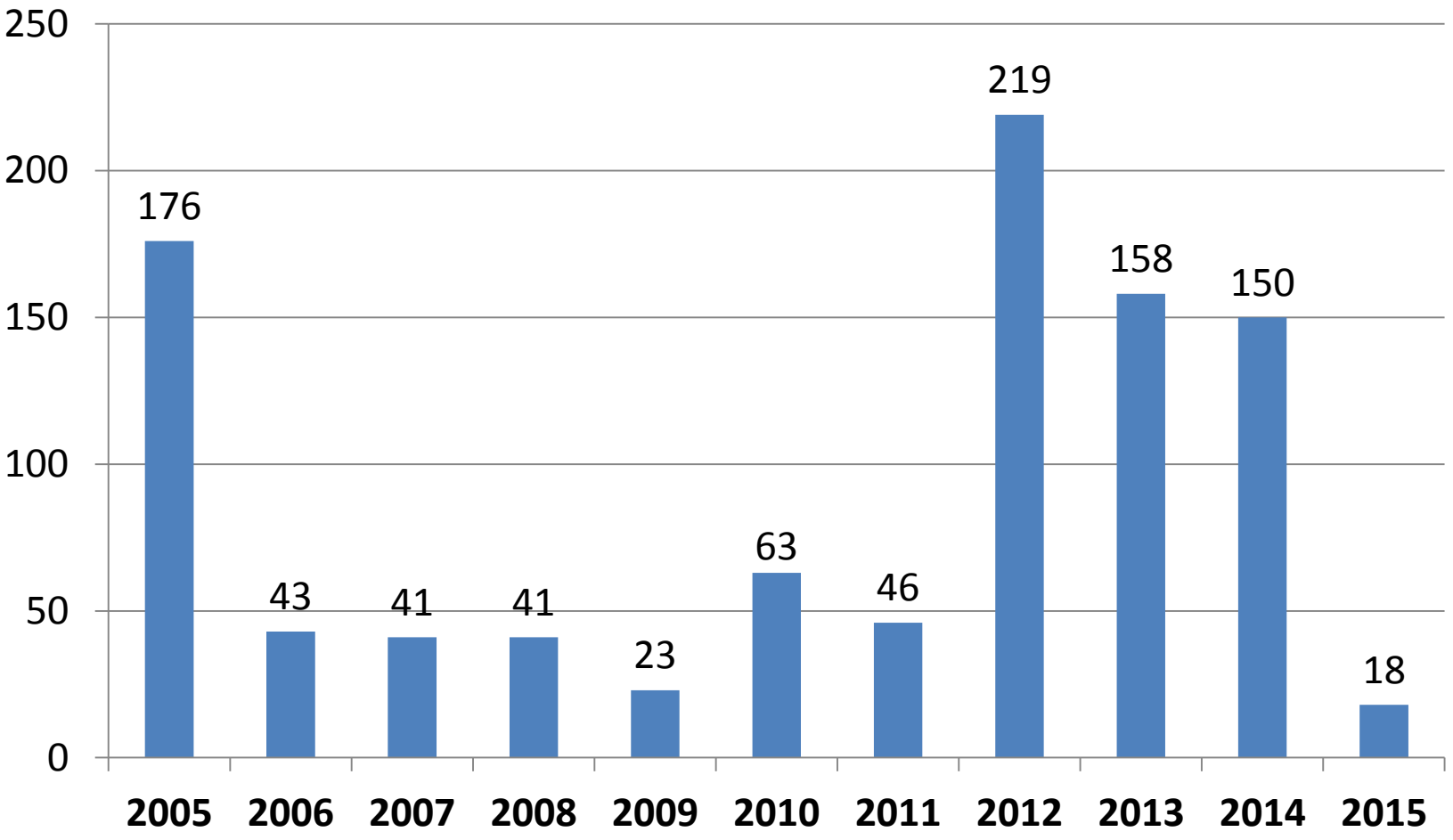
Agenda

- Background
  - Need, opportunity, and importance
- Methodology
  - Framework, data sources, study population
- Results
  - Maps, challenges
- Next steps

Need

Total Pertussis Cases: Denver, CO

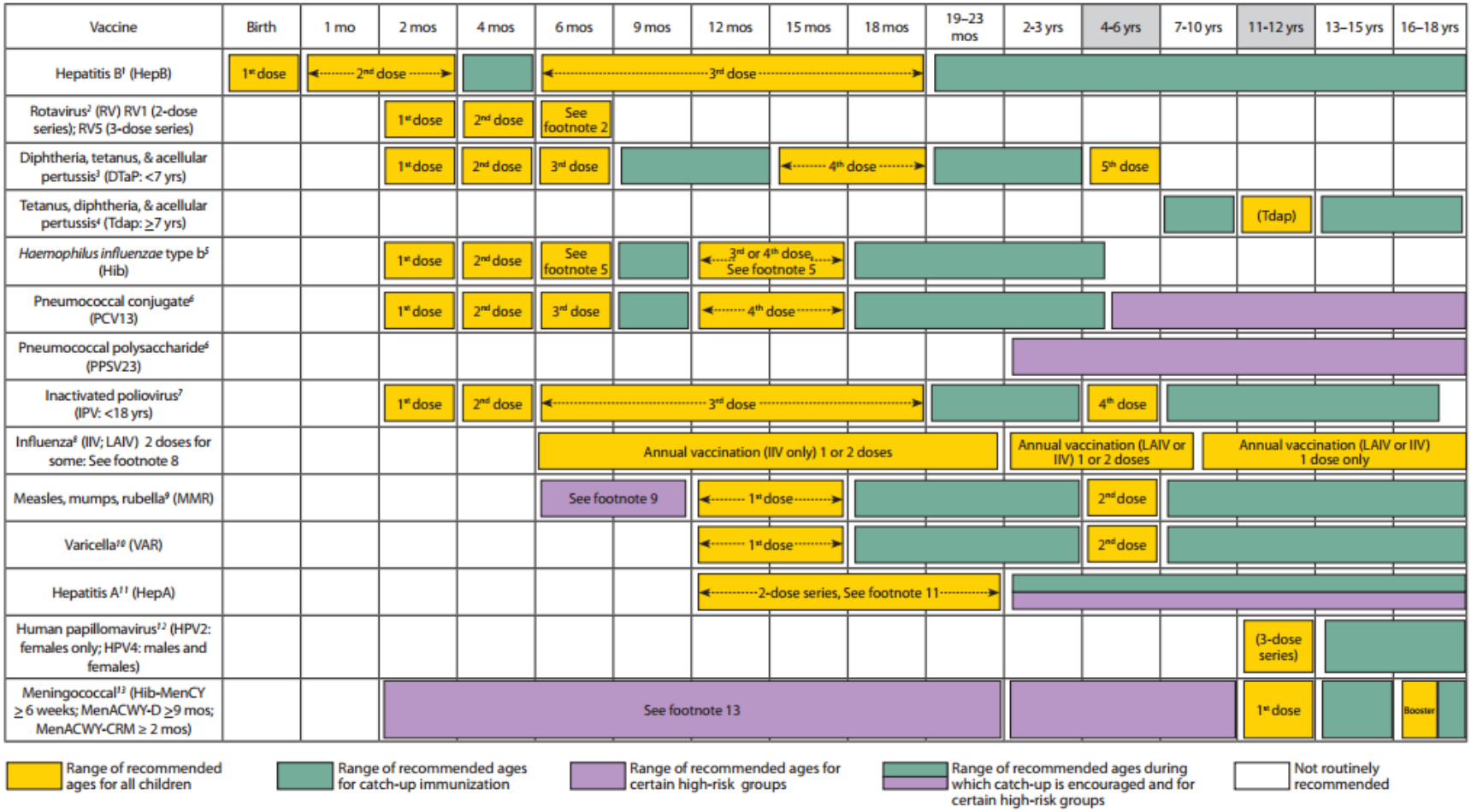


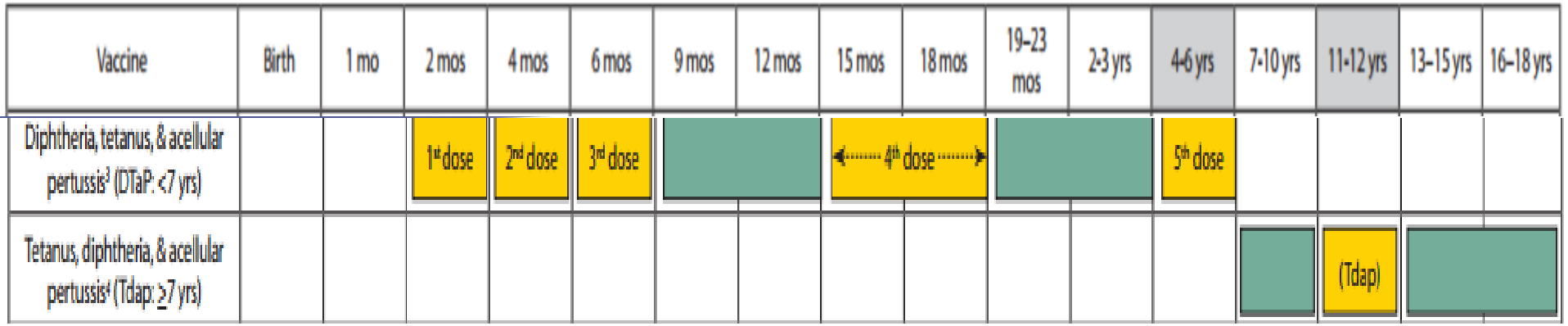
Need

Figure 1. Recommended immunization schedule for persons aged 0 through 18 years – United States, 2015.

(FOR THOSE WHO FALL BEHIND OR START LATE, SEE THE CATCH-UP SCHEDULE [FIGURE 2]).

These recommendations must be read with the footnotes that follow. For those who fall behind or start late, provide catch-up vaccination at the earliest opportunity as indicated by the green bars in Figure 1. To determine minimum intervals between doses, see the catch-up schedule (Figure 2). School entry and adolescent vaccine age groups are shaded.





3. Diphtheria and tetanus toxoids and acellular pertussis (DTaP) vaccine. (Minimum age: 6 weeks. Exception: DTaP-IPV [Kinrix]: 4 years) Routine vaccination:

- Administer a 5-dose series of DTaP vaccine at ages 2, 4, 6, 15 through 18 months, and 4 through 6 years. The fourth dose may be administered as early as age 12 months, provided at least 6 months have elapsed since the third dose. However, the fourth dose of DTaP need not be repeated if it was administered at least 4 months after the third dose of DTaP. 3. Diphtheria and tetanus toxoids and acellular pertussis (DTaP) vaccine (cont'd) Catch-up vaccination: •
  - The fifth dose of DTaP vaccine is not necessary if the fourth dose was administered at age 4 years or older.
- For other catch-up guidance, see Figure 2.

4. Tetanus and diphtheria toxoids and acellular pertussis (Tdap) vaccine. (Minimum age: 10 years for both Boostrix and Adacel) Routine vaccination:

- Administer 1 dose of Tdap vaccine to all adolescents aged 11 through 12 years.
- Tdap may be administered regardless of the interval since the last tetanus and diphtheria toxoidcontaining vaccine.
- Administer 1 dose of Tdap vaccine to pregnant adolescents during each pregnancy (preferred during 27 through 36 weeks' gestation) regardless of time since prior Td or Tdap vaccination. Catch-up vaccination:
- Persons aged 7 years and older who are not fully immunized with DTaP vaccine should receive Tdap vaccine as 1 dose (preferably the first) in the catch-up series; if additional doses are needed, use Td vaccine. For children 7 through 10 years who receive a dose of Tdap as part of the catch-up series, an adolescent Tdap vaccine dose at age 11 through 12 years should NOT be administered. Td should be administered instead 10 years after the Tdap dose.
- Persons aged 11 through 18 years who have not received Tdap vaccine should receive a dose followed by tetanus and diphtheria toxoid (Td) booster doses every 10 years thereafter. Inadvertent doses of DTaP vaccine: - If administered inadvertently to a child aged 7 through 10 years may count as part of the catch-up series. This dose may count as the adolescent Tdap dose, or the child can later receive
- Tdap booster dose at age 11 through 12 years. - If administered inadvertently to an adolescent aged 11 through 18 years, the dose should be counted as the adolescent Tdap booster.
- For other catch-up guidance, see Figure 2.

Opportunity

- The Colorado Immunization Information System (CIIS) contains over 7 million records for about 618,000 patients in Denver County
  - Established approx. 10 years ago; DPH has receiving data for 3 years
  - Receive data on a monthly basis
  - Penetration meets CDC recommendations for data use

What is a community UTD rate? Why is it important?

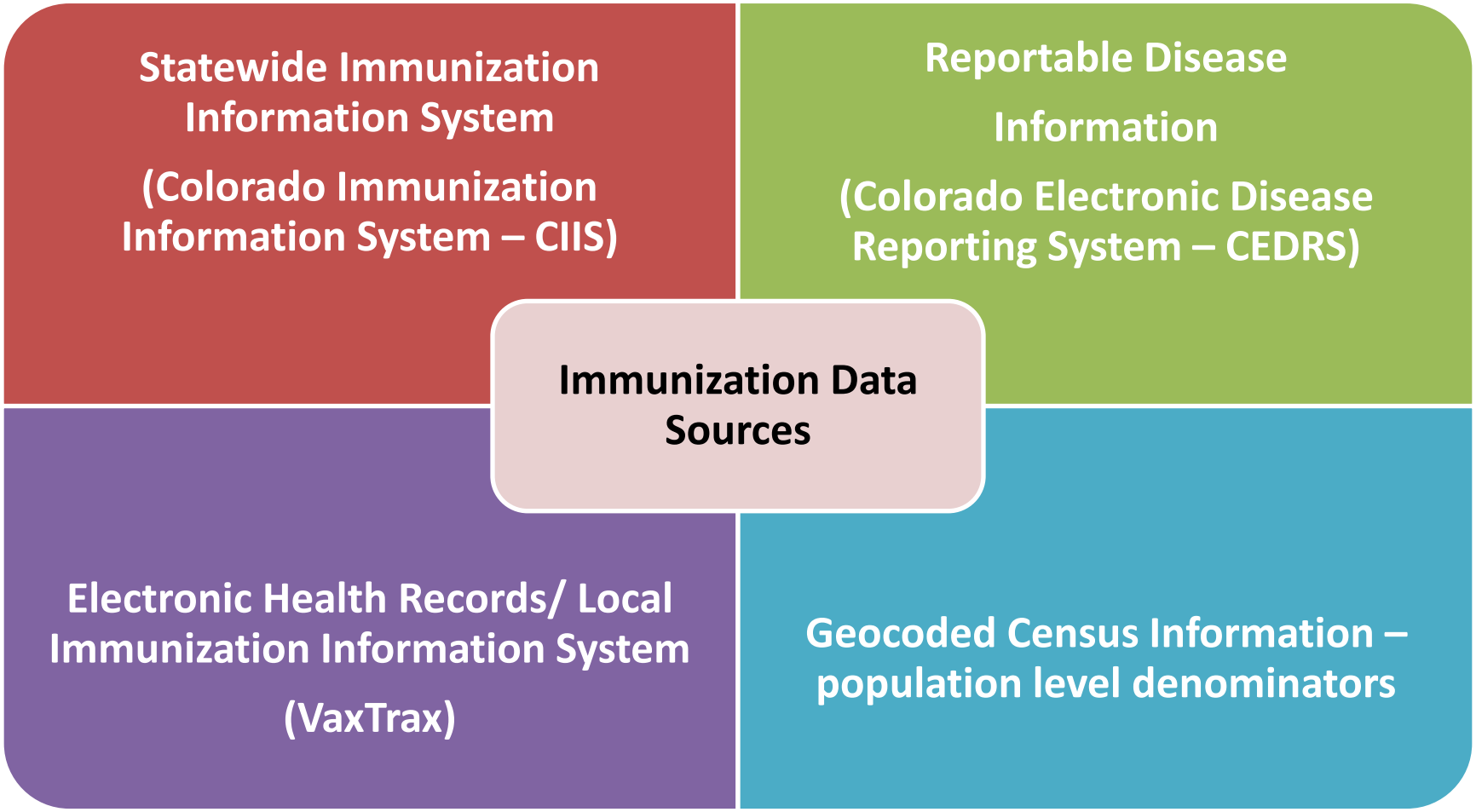
- Population effect on personal health (herd immunity theory)
  - Correlation with disease
  - Population level metric needed
- Small area estimates particularly useful
  - Identification of geographic disparities within population
  - Local data not always available

What is a community UTD rate? Why is it important?

- Better understanding of environmental factors
  - Place-based, spatial analysis
    - Additional techniques and layers available in GIS software
  - Maps are easily understood
    - Can target message to audiences

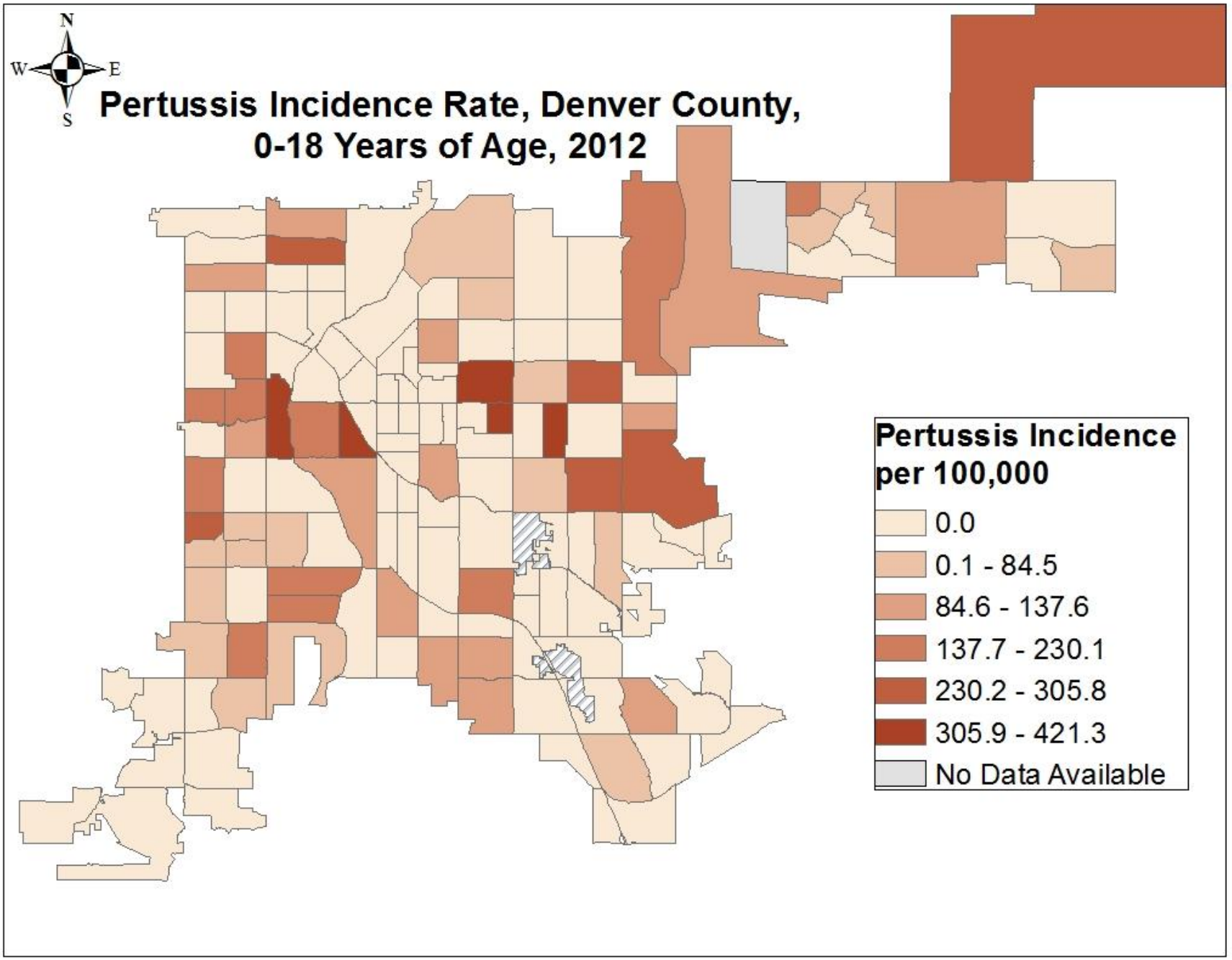
Inputs	Processes	Outputs	Outcomes	Impact
Data Sources Data Infrastructure Software Applications Subject matter expertise	**Statistical & Spatial Analysis** Data management Evaluation of technological solutions Wireframe & requirement development	Integrated data sources Small Area Estimates Accurate patient & population level Up To Date Rates UTD & disease incidence correlation Visualization & self service reporting	Identification of disparities Targeted outreach Informed decision making Knowledge management	Decreased incidence of vaccine preventable disease

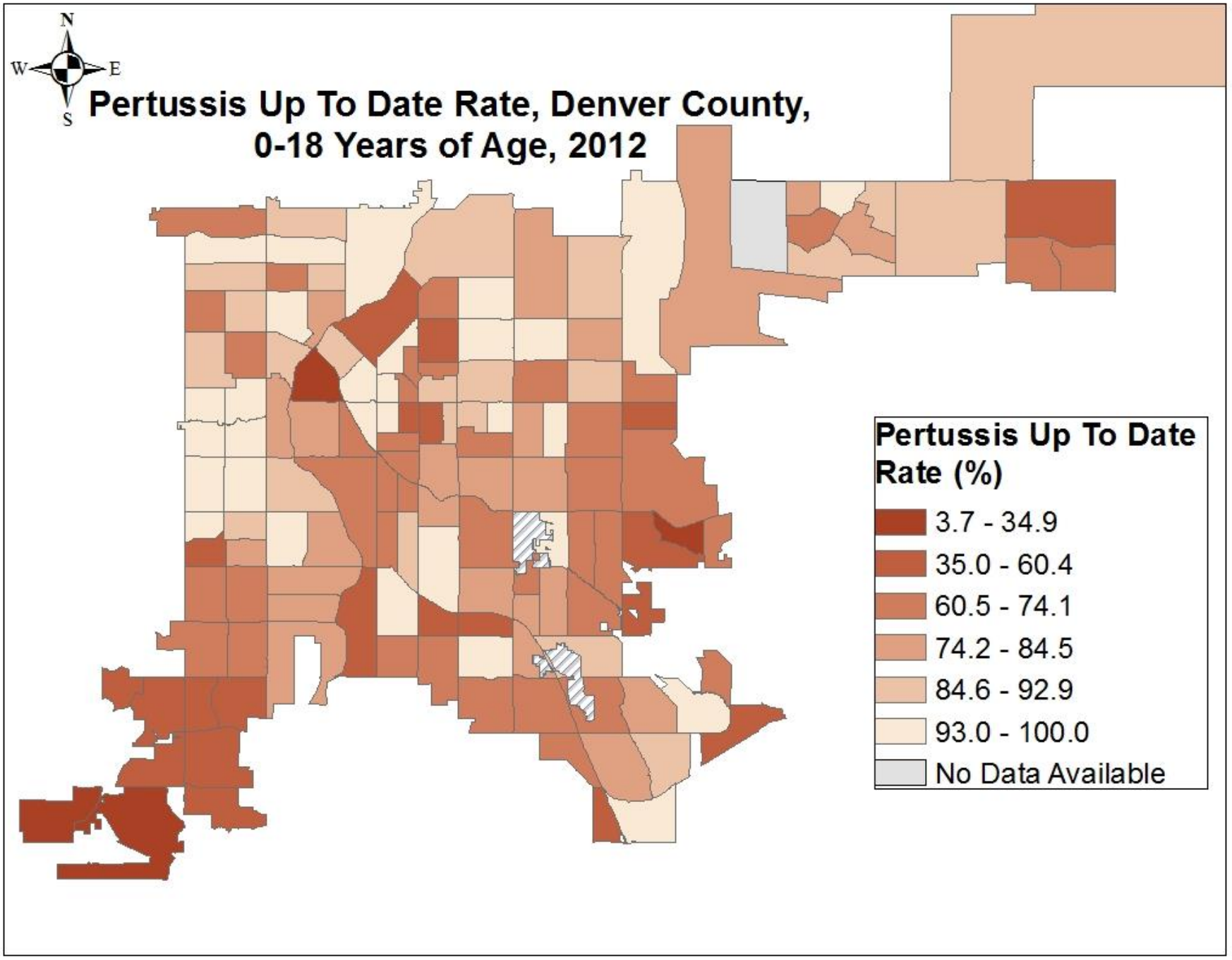
Data Sources



Results

- **Study population:** ages 0-18; 2012; Denver County
  - N = 134,672
- **Geographic level:** census tract
  - N = 144
- **Overall Up To Date Rate:** 69%
  - Range: 4-100%
- **Pertussis Incidence:** 95 cases in 2012
- **p-value for correlation:** <0.06


N
W
E
S
Pertussis Incidence Rate, Denver County,
0-18 Years of Age, 2012
Pertussis Incidence per 100,000
0.0
0.1 - 84.5
84.6 - 137.6
137.7 - 230.1
230.2 - 305.8
305.9 - 421.3
No Data Available


N
W
E
S
Pertussis Up To Date Rate, Denver County,
0-18 Years of Age, 2012
Pertussis Up To Date Rate (%)
3.7 - 34.9
35.0 - 60.4
60.5 - 74.1
74.2 - 84.5
84.6 - 92.9
93.0 - 100.0
No Data Available

Challenges

- **Diverse population across census tracks**
  - Disease incidence rates may vary across tracts that experience the same number of cases
  - Small n's may be especially skewed
  - Spatial smoothing might help account for these difference
    - Apply a EB smoothing technique using GIS software

Challenges & Lessons Learned

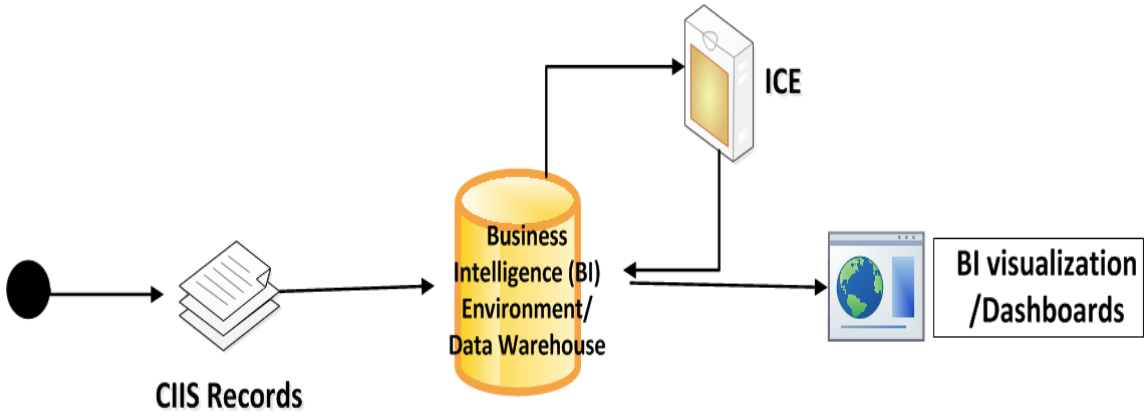
- **Who's included in the denominator and numerator?**
  - Moved Or Gone Elsewhere (MOGE) not always captured
    - Skewed for in migration/out migration
  - Active record definition
    - Any patient?
    - Any patient with a record?
    - Any patient with a history of at least _ vaccines?
    - Any patient with a vaccine in the last _ years?

Next Steps

- Additional spatial analysis
  - Global and local autocorrelation
  - Regression analysis
- Additional antigen analysis
  - Measles
    - Important consideration for Denver Public Schools
  - HPV
    - Disease of interest for new multi-county collaborative

Next Steps

- Process output into a business intelligence environment and dashboard
  - Visualization accomplished through dashboards
  - Multi-county data will be used
  - Automate methodology to look at selected populations, time periods, antigens, etc.



STRENGTHENING HEALTH SYSTEMS THROUGH INTERPROFESSIONAL EDUCATION

A collaboration between the Association of State and Territorial Health Officials, Centers for Disease Control and Prevention, the Council of State and Territorial Epidemiologists, the National Association of County and City Health Officials, and the Public Health Informatics Institute.

Vision Statement: *Illuminate pathways for professionals, organizations, and communities to achieve a collective, transformative, and sustainable impact on population health.*

Thank you!

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To learn more about Project SHINE, check out our website:
http://shinefellows.org

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